Forestry Department
Food and Agriculture Organization of the United Nations

GLOBAL FOREST RESOURCES ASSESSMENT

COUNTRY REPORTS

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The Forest Resources Assessment Programme

Sustainably managed forests have multiple environmental and socio-economic functions important at the global, national and local scales, and play a vital part in sustainable development. Reliable and up-to-date information on the state of forest resources - not only on area and area change, but also on such variables as growing stock, wood and non-wood products, carbon, protected areas, use of forests for recreation and other services, biological diversity and forests' contribution to national economies - is crucial to support decision-making for policies and programmes in forestry and sustainable development at all levels.

FAO, at the request of its member countries, regularly monitors the world's forests and their management and uses through the Forest Resources Assessment Programme. This country report forms part of the Global Forest Resources Assessment 2005 (FRA 2005), which is the most comprehensive assessment to date. More than 800 people have been involved, including 172 national correspondents and their colleagues, an Advisory Group, international experts, FAO staff, consultants and volunteers. Information has been collated from 229 countries and territories for three points in time: 1990, 2000 and 2005.

The reporting framework for FRA 2005 is based on the thematic elements of sustainable forest management acknowledged in intergovernmental forest-related fora and includes more than 40 variables related to the extent, condition, uses and values of forest resources. More information on the FRA 2005 process and the results - including all the country reports - is available on the FRA 2005 Web site (www.fao.org/forestry/fra2005).

The Global Forest Resources Assessment process is coordinated by the Forestry Department at FAO headquarters in Rome. The contact person for matters related to FRA 2005 is:

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Contents

1 Table T1 – Extent of Forest and Other wooded land

1.1 FRA 2005 Categories and definitions

Category	Definition
Forest	Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use. X
Other wooded land	Land not classified as "Forest", spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds *in situ*; OR with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use.
Other land	All land that is not classified as "Forest" or "Other wooded land".
Other land with tree cover (Subordinated to "Other land")	Land classified as "Other land", spanning more than 0.5 hectares with a canopy cover of more than 10 percent of trees able to reach a height of 5 meters at maturity.
Inland water bodies	Inland water bodies generally include major rivers, lakes and water reservoirs.

1.2 National data

1.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest Inventory (2003). Australia's State of the Forests Report 2003. Bureau of Rural Sciences, Canberra.	H	Forest area, forest type	1992-2002	This report is the most comprehensive report and national assessment of Australia's forests. SOFR 2003 was compiled from numerous spatial data sets between 1992 and 2002 and varying from very detailed 1:25,000 scale to broader 1:250,000 scale. www. DAFF Home > Scientific Advice HOME > Forest and Vegetation Sciences > National Forest Inventory Australia > State of the Forests Report
National Forest Inventory (1998). Australia's State of the Forests Report 1998. Bureau of Rural Sciences, Canberra.	H	Forest area, forest type	1992-1998	Compiled from numerous spatial data sets between 1992 and 1998 and varying from very detailed 1:25,000 scale to broader 1:250,000 scale. DAFF Home > Scientific Advice HOME > Forest and Vegetation Sciences > National Forest Inventory Australia > State of the Forests Report > State of the Forests Report 1998
Department of Environment and Heritage (2003) Greenhouse Gas Emissions from Land use change in Australia: An integrated application of the National Carbon Accounting system.	H	Change in area of forest over time from 1990 to 2001	1990 – 2001	The Australian Greenhouse Office National Carbon Accounting System (NCAS) provides a picture of land cover change for the purposes of greenhouse gas accounting using a nationally applied remote sensing approach over Australia based on LANDSAT satellite imagery to maps forest extent at 25m resolution for several time periods since 1972. http://www.greenhouse.gov.au/ncas/ See comments for Table 1 under section 1.6.

Wood, M. S., Stephens, N.C. Allison, B.K. Howell, C.I. (2001). Plantations of Australia 2001. National Plantation Inventory, Bureau of Rural Sciences, Canberra (172pp.).	H	Plantation extent, ownership, species, age class, spatial distribution by States and 15 regions with maps	2000	This report is the definitive national assessment of Australia's plantations up to 2000 based on spatial data and survey of all major plantation growers and as much farm forestry plantation data as could be assembled. www. DAFF Home > Scientific Advice HOME > Forest and Vegetation Sciences > National Forest Inventory Australia > National Plantation Inventory
National Forest Inventory (2005). National Plantation Inventory 2005 Update. M. Parsons and M. Gavran. Bureau of Rural Sciences, Canberra (8pp.).	H	Plantation extent, ownership, species composition, annual planting rate by State	2003	This report is provides and annual update on Australia's plantation estate based on information provided by growers and regional representatives in tabular form (i.e. numbers but no maps or spatial data). www. DAFF Home > Scientific Advice HOME > Forest and Vegetation Sciences > National Forest Inventory Australia > National Plantation Inventory
Hnatiuk, R. P. Tickle, M.S. Wood and C. Howell. 2003. Defining Australian forests. Australian Forestry 66:176-186.	H	Forest area	2003	Paper that provides good discussion of issues rather than a direct data source.

1.2.2 Classification and definitions

National class	**Definitions for National Forest Inventory**
Forest	An area, incorporating all living and nonliving components, that is dominated by trees having usually a single stem and a mature or potentially mature stand height exceeding two metres and with existing or potential crown cover of overstorey strata about equal to or greater than 20 per cent. *[Note that "forest" as defined here includes the sub-categories of woodland, open and closed forest described below].*
Woodland	Sparse forest in which the tree crown cover ranges from greater than 20 to 50 per cent of the land area when viewed from above
Open forest	Forest in which the tree crown cover ranges from greater than 50 to 80 per cent of the land area when viewed from above
Closed forest	Forest in which the tree crown cover ranges from greater than 80 to 100 per cent of the land area when viewed from above.
Other Land	Land not classified as forest or other wooded land. Includes agricultural land, meadows and pastures, built-on areas, barren land, etc.
Inland Water	Area occupied by major rivers, lakes and reservoirs.
Plantation	This report uses the Australian National Forest Policy Statement definition of a timber plantation, as adopted by the National Plantation Inventory, as: *intensively managed stands of trees of either native or exotic species created by the regular placement of seedlings or seeds.*
Forest	An area, with the potential to reach a minimum 20 per cent canopy cover and 2 metres in height and minimum area of 0.2 ha.
Land use change	Land use change is where land that meets the definition of forest is converted to a non-forested condition by direct human action. Commercial forestry activity is excluded, unless post harvest activity involves a change in land use, e.g. To pasture or cropping. Plantations are not included in the Land use change accounting framework unless there is interceding change in land use between the original forest condition and planting of the plantation.

1.2.3 Original data

Previously reported estimates of forest area and change in forest cover (in thousands of hectares)

Forest crown cover class	1990 forest area	Reported 1998 forest area	Most recent forest area 2002 for native forests 2004 for plantations
Woodland	NDA not classified	112,032	102,526
Open	NDA not classified	39,174	45,603
Closed	NDA not classified	4,628	4,626
Unknown crown cover	NDA not classified	-	9,907
Sub-total native forest	NDA not classified	*155,835*[2]	*162,662*
Plantation	NDA not classified	1,484[4]	1,716[5]
Total Forest	**157,359**[1]	**157,319**	**164,378**[3]

Notes: 1. Previous estimate for 1990 forest areas given in FRA 2000 Table 4 p. 393 was 157,359,000 ha and this is now thought to be an underestimate as improved mapping in 2003 has identified additional areas of forest not previously mapped.

2. State of the Forests Report 1998, Table 2, page 32. The total area of native forest (155,834,000 ha) was reported in FRA 2000 as "Closed forest".
3. State of the Forests Report 2003, Table 5, page 37 for native forests (for plantations see note 4). Closed forest was originally 4,644,000 ha but was reduced by 18,000 ha to due to an overestimate of native forest area in Tasmania in the original 2003 SOFR Table 5 to make the totals add up correctly here. Although significant forest clearing occurred between 2000 and 2005, the reported area of forest in Australia increased by 7 million hectares between the 1998 and 2003 State of the Forest Reports. This change is primarily due to improved mapping in many regions within Australia and does not reflect significant increases in the on-ground area of forests. The figures presented in Table 1 for FRA2005 have been adjusted to present a more sensible trend to reflect reality.
4. Plantation area for 2000 of 1,043,000 ha reported in FRA2000 was based on 1997 data. The table above has been updated to include plantation area up to Sept 2000 of 1,484,740 ha from the more authoritative National Plantation Inventory *Plantations of Australia 2001* report.
5. Plantation areas are best available as at end of 2004 from the National Plantation Inventory 2005 Update.

1.3 Analysis and processing of national data

1.3.1 Calibration

Source	Land Area (1,000 Hectares)	Area of Inland water (1,000 Hectares)	Total Area of Australia (1,000 Hectares)
National data – SOFR 1998 and 2003	768,230	5,892	774,122
FAOSTAT	768,230	5,892	774,122

FAOSTAT data agrees with Australian State of the Forests areas so no calibration is necessary.

1.3.2 Estimation and forecasting

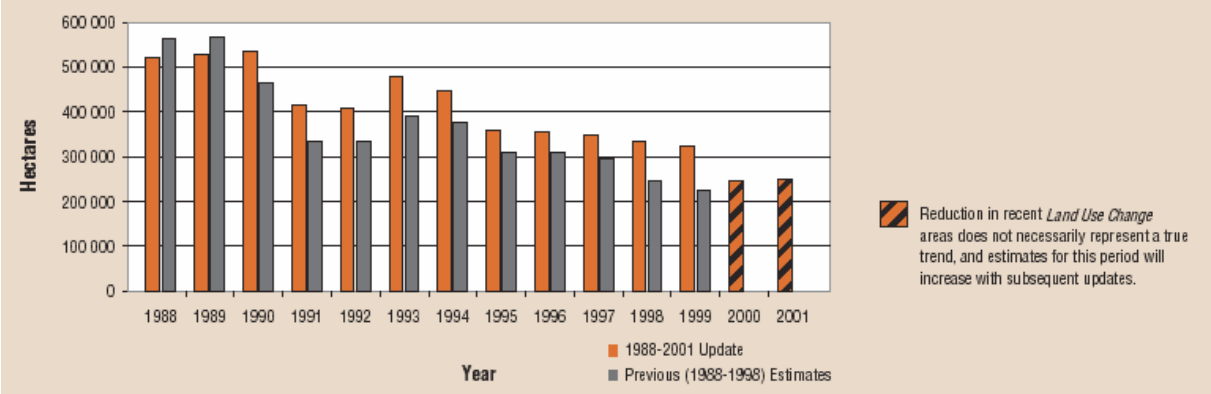
There are difficulties in projecting forest area or other statistics into the future and adjusting for other dates. Australia's domestic forest reporting timetable does not coincide with that for FRA. For most FRA tables (except Tables 1, 2, 3, and 4 involving forest area which are discussed below), Australia's State of the Forests report (SOFR) for 1998 will form the basis for reporting for year 2000 data and the 2003 SOFR is the primary source of information for 2005 data.

Australia's forest extent in 1990 is not known in detail. Despite the difficulties and uncertainties in estimating forest extent over time, the importance of this table was recognised and estimates of Australia's forest area over time for FRA 2005 have been derived using the methods outlined below.

For forest extent, the SOFR 2003 data is used as the baseline for native forest extent in 2002 as it is the most up to date information available nationally. Plantation area estimates are the latest available national figures up to the end of 2004 reported in the National Plantation Inventory Update (NPI, 2005).

The previous estimate for 1990 forest areas given in FRA 2000 Table 4 p. 393 was 157,359,000 ha and this is now thought to be an underestimate as improved mapping in 2003 has identified additional areas of forest not previously mapped. Estimates for native forest loss since 1990 have been published by the AGO (DEH, 2003) and is shown graphically in Figure 1.3.2 below.

Figure 1.3.2 Estimated area of forest loss from 1988 to 2001.



Source: Australian Greenhouse Office National Carbon Accounting System (NCAS) Land use change emission results 1988 – 2001 (DEH, 2003).

Table 1.3.2 below was used to calculate total forest area for 1990, 2000 and 2005. Net forest loss 1990-2001 was estimated from the Australian Greenhouse Office (AGO) estimates of land use change developed for carbon accounting based on LANDSAT satellite image analysis (DEH, 2003). Assumed rate of net forest loss for 2002-2005 was based on 2000 and 2001 results and policies outlined in the 2004 Queensland Government Vegetation Management Framework.

Plantation areas were taken from State of the Forests report 2003, Plantations of Australia 2001 and annual updates published by the National Plantation Inventory. Plantation areas for 2004 and 2005 were estimated based on an assumed rate of new plantation establishment of 50,000 ha/year.

Table 1.3.2 Estimated native, plantation and total forest area from 1990 to 2005.

Year	Estimated plantation area[2] ('000s ha)	Native forest change (loss)[3]	Estimated native forest area at end of year	Estimated total forest area
1990	1,023	534	166,881	167,904
1991	1,028	415	166,466	167,494
1992	1,033	407	166,059	167,092
1993	1,038	478	165,581	166,619
1994	1,043	446	165,134	166,177
1995	1,072	358	164,776	165,848
1996	1,122	366	164,411	165,533
1997	1,176	347	164,064	165,240
1998	1,241	335	163,729	164,970
1999	1,337	323	163,407	164,744
2000	1,485	247	163,160	164,645
2001	1,569	248	162,912	164,481
2002[1]	1,628	250	162,662	164,290
2003	1,666	250	162,412	164,078
2004	1,716	250	162,162	163,878
2005	1,766	250	161,912	163,678

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Notes:

1. Base line year of 2002 used for native forest area from SOFR 2003.
2. Plantation area estimates from ABARE in1990 and National Plantation Inventory after 1994.
3. AGO estimates of forest change (loss) used to estimate earlier native forest areas back to 1990.
   i.e. The native forest area for a given year has been calculated from the previous years figure MINUS the area of forest lost/removed (column 3). The Estimated total forest area is the sum of the plantation (column 2) PLUS native forest (column 4). This is a simplification and ignores the fact that some areas of native forest have been converted to plantations especially in the early 1990's. The slight disadvantages of this are considered to be outweighed by the advantages in getting a better estimate of trend in forest extent over time.

1.4 Reclassification into FRA 2005 classes

The definition of forest used in Australia differs from the FRA 2005 definition in both height and density thresholds. Australian forest has trees with an actual or potential minimum height of 2 metres and minimum crown cover of 20%. Structural classifications above this height threshold are 2-10 m (low), 10-30 m (medium) and >30 m (tall). Thus, it is not possible to discriminate using the 5 metres threshold as requested for FRA2005. The 2 m threshold is used to include all mallee vegetation (12.3 M ha of the total area). This group of *Eucalyptus* species have a tree form and generally range between 2 and 10 m in height, depending on site conditions. They occur in relatively remote areas and are mapped using remote sensing. It is not possible with this methodology to easily detect or report on vegetation above or below a 5 m threshold. Most other tree species form vegetation greater than 5 m tall.

Similarly, much of the Australian forest area is in lower density classes (20-50%) in remote areas and is mapped using remote sensing. It is not generally possible using LANDSAT imagery to distinguish crown cover classes below 20%. See the 2003 State of the Forests

Report and Hnatiuk et al. (2003) for detailed explanation. Thus, only vegetation with a canopy cover greater than 20% is reported.

In the previous FRA2000 Australian report the estimate of area for **Other Wooded Land** was described as below:

> *Data on other wooded land was derived by using a coarse national vegetation dataset at 5 million scale to select tall shrubs and tall, medium and low trees. This dataset does not separately identify forests where Callitris glaucophylla (White Cypress Pine, which is Australia's major native softwood) is the dominant or sub-dominant canopy species. From this vegetation dataset (Commonwealth of Australia 1990, J.A. Carnahan) areas were included in 'other wooded land' where projected foliage cover was less than 10% (this is equivalent to a crown cover of 0.25 to 25%). The following were included:*
> *Tall, Medium and Low Trees (>30, 10-30 and <10m respectively) and Tall Shrubs (>2m). The Tall Shrubs category excludes eucalyptus as there were included under 'forest' as Mallees.*

As the Carnahan dataset dates from 1990 and has not been updated and is at a very coarse scale (1 to 5 million) it would lead to erroneous results if combined with the more recent SOFR results based on areas of forest as at the end of 2002. A similar analysis has therefore not been done for FRA 2005. This means that we are currently not able to report on Other Wooded Land for 2005.

	FRA classes				
Australian National Classes	**FRA Forest**	**FRA Other wooded land**	**FRA Other land**	**Inland water**	**Total**
Plantation	100%	0%	0%	0%	100%
Forest	100%	0%[1]	0%	0%	100%
Other land	0%	0%	100%	0%	100%
Inland Water	**0%**	0%	0%	100%	100%

Note 1: Other Wooded Land is not separately identified in the Australian forest classification and Forest Fallow/Shrubs is not known.

1.5 Data for National reporting table T1

Forest extent for 1990, 2000 and 2005

FRA 2005 Categories	**Area (1,000 hectares)**		
	1990	**2000[2)]**	**2005[3)]**
Forest	167,904	164,645	163,678
Other wooded land	ID	421,590	ID
Other land	ID	181,995	ID
...of which with tree cover [1)]	ID	ID	ID
Inland water bodies	5,892	5,892	5,892
TOTAL	**774,122**	**774,122**	**774,122**

Notes:

1. Figures for 2005 are taken from Australia's 2003 State of the Forest Report of 162,662,000 ha native forest as at the end of 2002 plus the most recent available figure of 1,665,000 ha plantation from the National Plantation Inventory Annual Update for the end of 2003.

1.6 Comments to National reporting table T1

- Australia's definition for forest includes land with trees >2m and >20% crown cover (actual or potential).

- The Australian Greenhouse Office (DEH, 2003) has reported on change in "woody" forest area for the purposes of greenhouse gas accounting using a nationally applied remote sensing approach derived from analysis of LANDSAT imagery. The methodologies used for deriving these estimates are significantly different from those used for the National Forest Inventory which have been derived from a wide range of different sources including aerial photography. However, the AGO figures are considered the best available estimates of forest loss and have been combined with the NFI estimate of native and plantation forest extent in 2002 to present the best estimate of the change in forest extent between 1990 and 2000.

- National Plantation Inventory estimates have been used to report on plantation forest extent. In part of the country, plantations have replaced native forest during the reporting periods. Thus, summing native forest and plantation area may result in a small overestimate of the total forest area. On the other hand, some clearing of native forest for plantation may be assessed as deforestation by the AGO. This may compensate for potential errors from combining the two data sources. Overall, the slight disadvantages of this approach are considered to be outweighed by the advantages in getting a better estimate of trend in forest extent over time.

2 Table T2 – Ownership of Forest and Other wooded land

2.1 FRA 2005 Categories and definitions

Category	Definition
Private ownership	Land owned by individuals, families, private co-operatives, corporations, industries, religious and educational institutions, pension or investment funds, and other private institutions.
Public ownership	Land owned by the State (national, state and regional governments) or government-owned institutions or corporations or other public bodies including cities, municipalities, villages and communes.
Other ownership	Land that is not classified either as "Public ownership" or as "Private ownership".

2.2 National data

2.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest Inventory (1998). Australia's State of the Forests Report 1998. Bureau of Rural Sciences, Canberra.	H	Forest area, forest type	1992-1998	This report is the most comprehensive report and national assessment of Australia's forests compiled from numerous spatial data sets between 1992 and 1998 and varying from very detailed 1:25,000 scale to broader 1:250,000 scale. DAFF Home > Scientific Advice HOME > Forest and Vegetation Sciences > National Forest Inventory Australia > State of the Forests Report > State of the Forests Report 1998
Wood, M. S., Stephens, N.C. Allison, B.K. Howell, C.I. (2001). Plantations of Australia - A report from the National Plantation Inventory and the National Forest Inventory. Canberra, Bureau of Rural Sciences: 172pp.	H	Plantation extent, ownership, species, age class, spatial distribution by States and 15 regions with maps	2000	This report is the definitive national assessment of Australia's plantations up to 2000 based on spatial data and survey of all major plantation growers and as much farm forestry plantation data as could be assembled. www. DAFF Home > Scientific Advice HOME > Forest and Vegetation Sciences > National Forest Inventory Australia > National Plantation Inventory
National Forest Inventory (2004). National Plantation Inventory 2004 Update. M. Parsons, M. Gavran and A. Gerrand. Canberra, Bureau of Rural Sciences**:** 8pp.	H	Plantation extent, ownership, species composition, annual planting rate by State	2003	This report is provides and annual update on Australia's plantation estate based on information provided by growers and regional representatives in tabular form (i.e. numbers but no maps or spatial data). www. DAFF Home > Scientific Advice HOME > Forest and Vegetation Sciences > National Forest Inventory Australia > National Plantation Inventory

2.2.2 Classification and definitions

National class	Definition
MULTIPLE-USE FOREST	State forest, timber reserves and other forest areas on which a range of forest values are managed including timber harvesting, water supply, conservation of biodiversity, recreation and environmental protection. They are managed by State and Territory agencies in accordance with State/Territory Acts and regulations.
Nature conservation reserves	Crown lands that are formally reserved for environmental, conservation and recreational purposes. They include national parks, nature reserves, State and Territory recreation and conservation areas, formal reserves on State forest and Crown lands reserved to protect water supply catchments. This does not include informal reserves and those pending gazettal.
Private Land	Land held under freehold title and under private ownership. It includes land held under freehold title with special conditions attached for designated Indigenous communities.
Leasehold Land	Crown land held under leasehold title and generally regarded as 'privately managed'. It includes land held under leasehold title with special conditions attached for designated Indigenous communities
OTHER CROWN LAND	Crown land reserved for a variety of purposes including utilities, scientific research, education, stock routes, mining, use by the defence forces, and use by Indigenous communities.
Unresolved tenure	Areas identified where tenure is unknown or for which there are no data. Most of these are methodological rather than tenure issues.

2.2.3 Original data

Forest (land) ownership in 2000 using Australia's 1998 SOFR

Forest ownership	Native forest [1] area ('000 ha)	Plantation [2, 3] ('000 ha)	Total forest area ('000 ha)
Leasehold	66,102	-	66,102
Private	42,018	595	42,613
Conservation reserve	17,580	-	17,580
Other Crown Land	15,597	0	15,597
Multiple-use	13,351	686 [4]	14,037
Unresolved tenure	1,186	204 [5]	1,390
Total	**155,834**	**1,485**	**157,319**

Notes:

1. Native forest areas as at end 2000 from Table 5 SOFR 1998.
2. Plantation area reported in SOFR 1998 was 1,043,000 ha. This was based on a 1994 estimate. The above estimate of 1,484,743 ha for 2000 was reported in the 2001 Plantations of Australia Summary report and is a more accurate estimate being based on spatial and tabular data collected as at the end of 2000. http://www.affa.gov.au/content/publications.cfm?ObjectID=1571D698-0B85-4D2D-BD41514BE432B98C
3. The NPI collects and presents data on both land and tree ownership classes. Only figures for ownership of the land are shown here.
4. Public plantations are entered under 'multiple use for the purpose of this table.
5. 204,000 ha of plantations were reported as "Unknown" tenure in 2001 even though this land is likely to be private land.

2.3 Analysis and processing of national data

2.3.1 Calibration

FAOSTAT data agrees with Australian State of the Forests areas so no calibration is necessary.

2.3.2 Estimation and forecasting

1990 forest area by tenure is not known. For year 2000 native forests we have used the 1998 State of the Forests Report areas. For plantations the National Plantation Inventory data from the Plantations of Australia 2001 report (Wood et al, 2001) is used as is a far more accurate estimate being based on spatial and tabular data collected as at the end of 2000.

The tables below show adjustments made to forest ownership for 2000 using forest tenure data from the State of the Forests Reports 1998. New forest area for 2000 was derived from the 2002 estimate published in the 2003 State of the Forests report and published estimates of forest cover change from DEH 2003 (see notes under section 1.3.2 for FRA Table 1). Tenure for this revised 2000 forest area was determined by applying the estimates from the 1998 State of the Forests Report proportionally to the revised area figure from FRA Table 1.

	Native forest ownership in 2000 (000s ha)	
	From SOFR 1998	**Adjusted**
Leasehold	66,102	69,209
Private	42,018	43,993
Conservation reserve	17,580	18,406
Other Crown Land	15,597	16,330
Multiple-use	13,351	13,979
Unresolved tenure	1,186	1,242
Total	**155,834**	**163,160**

	Plantation ownership (2000)
Private	595
Public	686
Other	205
Total	**1,485**

2.4 Reclassification into FRA 2005 classes

	FRA Classes			
Australian National Classes	**Private Ownership**	**Public Ownership**	**Other ownership**	**Total**
Leasehold		100%		100%
Private	100%			100%
Multiple Use Forest		100%		100%
Nature Conservation Reserve		100%		100%
Other Crown Land		100%		100%
Unresolved Tenure			100%	100%

2.5 Data for National reporting table T2

FRA 2005 Categories	**Area (1000 hectares)**			
	Forest		**Other wooded land**	
	1990	**2000**	**1990**	**2000**
Private ownership	NDA	44,588	ID	ID
Public ownership	NDA	118,611	ID	ID
Other ownership	NDA	1,446	ID	ID
TOTAL	**167,904**	**164,645**	**ID**	**421,590**

2.6 Comments to National reporting table T2

- Public ownership includes land leased to private parties on short and long term leases. These are mainly for grazing and management of forest resources is generally undertaken by public agencies.
- The National Plantation Inventory collects and presents data on both land and tree ownership classes. Only figures for ownership of the land are shown here.

3 Table T3 – Designated function of Forest and Other wooded land

3.1 FRA 2005 Categories and definitions

Types of designation

Category	Definition
Primary function	A designated function is considered to be primary when it is significantly more important than other functions. This includes areas that are legally or voluntarily set aside for specific purposes.
Total area with function	Total area where a specific function has been designated, regardless whether it is primary or not.

Designation categories

Category / Designated function	Definition
Production	Forest / Other wooded land designated for production and extraction of forest goods, including both wood and non-wood forest products.
Protection of soil and water	Forest / Other wooded land designated for protection of soil and water.
Conservation of biodiversity	Forest / Other wooded land designated for conservation of biological diversity.
Social services	Forest / Other wooded land designated for the provision of social services.
Multiple purpose	Forest / Other wooded land designated to any combination of: production of goods, protection of soil and water, conservation of biodiversity and provision of social services and where none of these alone can be considered as being significantly more important than the others.
No or unknown function	Forest / Other wooded land for which a specific function has not been designated or where designated function is unknown.

3.2 National data

3.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest Inventory (2003). Australia's State of the Forests Report 2003. Bureau of Rural Sciences, Canberra	H			

3.2.2 Classification and definitions

National class	Definition
Leasehold	Crown land held under leasehold title and generally regarded as 'privately managed'. It includes land held under leasehold title with special conditions attached for designated Indigenous communities.
Multiple Use Forest	State forest, timber reserves and other forest areas on which a range of forest values are managed including timber harvesting, water supply, conservation of biodiversity, recreation and environmental protection. They are managed by State and Territory agencies in accordance with State/Territory Acts and regulations.

Nature Conservation Reserve	Crown lands that are formally reserved for environmental, conservation and recreational purposes. They include national parks, nature reserves, State and Territory recreation and conservation areas, and Crown lands reserved to protect water supply catchments.
Private	Land held under freehold title and under private ownership. It includes land held under freehold title with special conditions attached for designated Indigenous communities.
Other Crown Land	Crown land reserved for a variety of purposes including utilities, scientific research, education, stock routes, mining, use by the armed forces, and use by Indigenous communities.
Unresolved Tenure	Areas identified where tenure is unknown or for which there are no data. Most of these are methodological rather than tenure issues.

3.2.3 Original data

Australian National Classes[1]	**1998 forest area**	**Most recent forest area 2002 for native forests 2004 for plantations**
Multiple Use Forest	14,037	
Nature Conservation Reserve	17,580	21,491
Other Crown Land	15,597	
Private	42,613	
Leasehold	66,102	
Unresolved Tenure	1,390	
Sub-total native forest	***155,834***	***162,662***
Plantation	1,484[4]	1,716[5]
Total	**157,319**[2]	**164,378**[3]

Notes: 1. See Comments to National reporting table T3 for more detailed explanation.
2. See table 1 for more detailed explanation.
3. See table 1 for more detailed explanation.
4. Plantation area for 2000 of 1,484,740 ha up to Sept 2000 from the 2001 Plantations of Australia report.
5. Plantation areas are best available as at end of 2004 from the NPI 2005 Update.

3.3 Analysis and processing of national data

3.3.1 Calibration

FAOSTAT data agrees with Australian State of the Forests areas so no calibration is necessary.

3.3.2 Estimation and forecasting

Designated function was determined using the tenure data from Table 2 (forest ownership). The table below shows the distribution of designated function to tenure classes. Adjustments were made to forest ownership for 2000 using forest tenure data from the State of the Forests Reports 1998. New forest area for 2000 was derived from the 2002 estimate published in the 2003 State of the Forests report and published estimates of forest cover change from DEH 2003 (see notes for Table 1). Tenure for this revised 2000 forest area was determined by applying the estimates from the 1998 State of the Forests Report proportionally to the revised area figure from Table 1.

3.4 Reclassification into FRA 2005 classes

	FRA 2005 classes						
Australian National Classes	Production	Protection of soil & water	Conservation of biodiversity	Social services	Multiple purpose	No or unknown function	**Total**
Multiple Use Forest	100%						100%
Plantation	100%						100%
Nature Conservation Reserve			100%				100%
Other Crown Land					100%		100%
Private					100%		100%
Leasehold					100%		100%
Unresolved Tenure						100%	

3.5 Data for National reporting table T3

FRA 2005 Categories / Designated function	Area (1000 hectares)					
	Primary function			Total area with function		
	1990	2000	2005	1990	2000	2005
Forest						
Production		15,463	13,107			
Protection of soil and water						
Conservation of biodiversity		18,406	21,390			
Social services						
Multiple purpose		129,534	127,064			
No or unknown function		1,242	2,117			
Total - Forest	**167,904**	**164,645**	**163,678**			
Other wooded land						
Production	ID	ID	ID	ID	ID	ID
Protection of soil and water	ID	ID	ID	ID	ID	ID
Conservation of biodiversity	ID	ID	ID	ID	ID	ID
Social services	ID	ID	ID	ID	ID	ID
Multiple purpose	ID	ID	ID	not appl.	not appl.	not appl.
No or unknown function	ID	ID	ID	not appl.	not appl.	not appl.
Total – Other wooded land	ID	**421,590**	ID	**not appl.**	**not appl.**	**not appl.**

3.6 Comments to National reporting table T3

- Australia does not have a classification system that can directly report on the Designated Function classes used by FRA. The reclassification shows the fairly arbitrary reclassification done to convert land tenure data into function classes. Several of the tenures actually fulfil more than one function – notably the Multiple – use forest but have been included under the Production function as this is the primary function in many areas.
- Plantations have been included in Production primary function class.

- For private forest areas designation is not generally reported. In Tasmania, private forest owners who managed, or intend to manage, their land for wood production can list their properties as Private Timber Reserves. For leasehold forests it will depend on the utilisation of the land.
- In most forests that are ‘ designated’ for wood production harvesting is restricted from stream reserves, steep slopes, sensitive soils, in the habitats of rare plants or animals etc. However, these are not generally mapped or geographically designated in tenure databases or in strategic management plans. They are often mapped in larger-scale operational plans once detailed assessments are undertaken.
- It could be argued that the primary functions for many public native forests in Australia are to protect soil, water and biodiversity. Wood production can only occur if these values (and others such as visual amenity, recreation) are provided for. Codes of practice and other state regulations provide similar limitations to the use of plantations and private forests.

4 Table T4 – Characteristics of Forest and Other wooded land

4.1 FRA 2005 Categories and definitions

Category	Definition
Primary	Forest / Other wooded land of native species, where there are no clearly visible indications of human activities and the ecological processes are not significantly disturbed.
Modified natural	Forest / Other wooded land of naturally regenerated native species where there are clearly visible indications of human activities.
Semi-natural	Forest / Other wooded land of native species, established through planting, seeding or assisted natural regeneration.
Productive plantation	Forest / Other wooded land of introduced species, and in some cases native species, established through planting or seeding mainly for production of wood or non wood goods.
Protective plantation	Forest / Other wooded land of native or introduced species, established through planting or seeding mainly for provision of services.

4.2 National data

4.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest Inventory (2003). Australia's State of the Forests Report 2003. Bureau of Rural Sciences, Canberra	H		2003	
Keenan, R.J. and Ryan, M. (2004) Old growth forests. Science for Decision makers, Bureau of Rural Sciences, Canberra 8pp.	H	Old growth forest area	Up to 2002	Used data from the Comprehensive Regional Assessment (CRA) process under the Regional Forest Agreements which formed part of the 1992 National Forest Policy.

4.2.2 Classification and definitions

National class	Definition
Old growth forest	Ecologically mature forest where the effects of disturbances are now negligible.

4.2.3 Original data

The main sources of data for this table are assessments of old growth forests undertaken during Comprehensive Regional Assessments for Regional Forest Agreements (Keenan and Ryan 2004) the Plantations of Australia 2001 report (Wood et al. 2001). Old growth forests in Australia are defined as '*Ecologically mature forest where the effects of disturbances are now negligible.* This broadly corresponds to the definition of Primary Forest used in the FRA2005.

Table 39: Old-growth forest in RFA/CRA regions ('000 ha)

State	Total forest	Total old-growth forest	Old-growth in formal and informal reserves[1]	Distribution of old-growth by tenure		
				Private	Public	Unreserved
New South Wales	8 992	2 536	1 742	644	1 892	0
Queensland	3 230	270	166	71	196	3
Tasmania	3 169	1 239	851	115	1 124	0
Victoria	5 744	841	455	–	838	2
Western Australia[2]	2 121	347	233	0	346	1
Native forest total	23 256	5 233	3 447	830	4 396	6

Source: National Forest Inventory (2003)

[1] Includes nature conservation reserves and informal reserves on other tenures.

[2] Based on mapping for the Western Australia RFA. Mapping has subsequently been refined. All old-growth forest in Western Australia is protected by government policy.

4.3 Analysis and processing of national data

4.3.1 Calibration

4.3.2 Estimation and forecasting

Data for forest characteristics have been derived from studies of old growth forests (considered equivalent to primary forest) and plantation area estimates (all considered productive plantations). Those forests not classed as old growth are considered modified natural forests. The term 'semi-natural forest' is not applied in Australia.

Both native forest and plantation areas were derived using the methods outlined in section 1.3.2. Adjustments to determine a revised 2000 forest area for each forest type for T4 was determined by applying the estimates from the 2003 State of the Forests Report proportionally to the revised area figure from FRA Table T1.

4.4 Reclassification into FRA 2005 classes

FRA Class	**National Reporting Class**
Primary	Old Growth 100%
Modified natural	Other native forest 100%
Semi-natural	
Productive plantation	Plantation 100%
Protective plantation	

4.5 Data for National reporting table T4

FRA 2005 Categories	Area (1000 hectares)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Primary	NDA	5,233	5,233	ID	ID	ID
Modified natural	NDA	157,927	156,679	ID	ID	ID
Semi-natural	NDA	NDA		ID	ID	ID
Productive plantation	1,023	1,485	1,766	ID	ID	ID
Protective plantation	NDA	NDA		ID	ID	ID
TOTAL	**167,904**	**164,645**	**163,678**	**ID**	**ID**	**ID**

4.6 Comments to National reporting table T4

- Primary category comprises that classified as 'old growth forest' and assessed in areas where Comprehensive Regional Assessments were undertaken for Regional Forest Agreements.
- The area of primary forest for 1990 is not known. This would have been higher than in the 2000 figure due to disturbances such as harvesting, fire and conversion to agriculture occurring between 1990 and 2000.
- The area of old growth forests in remaining regions is likely to be small because most are open and woodland forests that have been subject to past human-induced fires and other disturbances such as grazing or harvesting or are regrowth following conversion to agriculture. Remaining rainforest areas in Australia have been subject to some harvesting or other human disturbance. Many could be validly described as primary forest. Thus, the area of primary forest reported is an underestimate.
- The term 'semi-natural' forest is not used in Australia.
- Some plantations established for wood production also perform protective functions.
- There has been a considerable area of forest planted in the last 20 years under a range of government programs for aesthetic, nature conservation, soil erosion protection or to maintain water quality. In addition, many private farmers have been undertaking some tree planting primarily for protective purposes but these areas are not known. There are no comprehensive statistics for these types of forest.

5 Table T5 – Growing stock

Growing stock has been assessed on some parts of the forest estate that are used or planned for wood production in Australia. Assessment methods and merchantability standards vary between state and region.

There has been no national compilation of these statistics and it is not considered appropriate to derive estimates from insufficient data.

6 Table T6 – Biomass stock

6.1 FRA 2005 Categories and definitions

Category	Definition
Above-ground biomass	All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage.
Below-ground biomass	All living biomass of live roots. Fine roots of less than 2mm diameter are excluded because these often cannot be distinguished empirically from soil organic matter or litter.
Dead wood biomass	All non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.

6.2 National data

6.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
Australian Greenhouse Office (2002). National Greenhouse Gas Inventory 2000. Australian Greenhouse Office, Canberra.	H		2003	

6.2.2 Original data

Note: Source of 2005 data - SOFR2003 pp201 Table 69. National forest type by area and carbon biomass

Major Vegetation Group	Above Ground Biomass (MtDM)	Root Biomass (MtDM)	Forest Floor Biomass) (MtDM)	Total Biomass (MtDM)	Total Carbon (MtC)
Rainforest and Vine Thickets	844	84	403	1 331	599
Eucalyptus Tall Open Forest	670	94	429	1 193	537
Eucalyptus Open Forest	4 091	1 841	1 853	7 785	3 503
Eucalyptus Low Open Forest	35	16	14	64	29
Eucalyptus Woodland	3 206	1 315	851	5 372	2 417
Tropical Eucalyptus Woodland/Grassland	1 242	509	378	2 130	958
Acacia Forest and Woodland	445	200	300	945	425
Callitris Forest and Woodland	66	30	24	119	54
Casuarina Forest and Woodland	33	15	24	72	32
Melaleuca Forest and Woodland	311	140	76	526	237
Mallee Woodland and Shrubland	311	298	73	682	307
Low Closed Forest and Closed Shrubland	60	57	4	121	54
Other forest and woodlands	1 512	916	477	2 905	1 307
Total Native Forest	12 824	5 515	4 905	23 244	10 460
Softwood Plantation	82	57	3	142	71
Hardwood Plantation	23	9	1	33	17
Total Plantation	105	66	4	176	88
Total Forest	12 929	5 581	4 909	23 420	10 548

Original data source: Australian Greenhouse Office (2003)

Australian Greenhouse Office (2002). Greenhouse Gas Emissions from Land Use Change in Australia: An Integrated Application of the National Carbon Accounting System. Australian Greenhouse Office, Canberra.

Australian Greenhouse Office (2002). National Greenhouse Gas Inventory 2000. Australian Greenhouse Office, Canberra.

Note that these biomass estimates were derived from the National Vegetation Information System which covers a broader range of vegetation types that the National Forest Inventory "forests" layer. Some of these may not be forests but they are the ones that have been used by the Australian Greenhouse Office in the National Carbon Accounting System (NCAS) so we have been consistent with that.

6.3 Analysis and processing of national data

6.3.1 Estimation and forecasting

Figures reported for 2005 are based on calculations undertaken in 2003 for the State of the Forests Report. They have not been adjusted for changes in biomass stocks as a result of land clearing or afforestation after 2003.

6.4 Reclassification into FRA 2005 classes

FRA Class	National Reporting Class
Above-ground biomass	Above-ground biomass 100%
Below-ground biomass	Root biomass 100%
Dead wood biomass	Forest floor biomass 100%

6.5 Data for National reporting table T6

FRA 2005 Categories	Biomass (million metric tonnes oven-dry weight)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Above-ground biomass			12,929			
Below-ground biomass			5,581			
Dead wood biomass			4,909			
TOTAL			**23,420**			

Note: Source of 2005 data - SOFR2003 pp201 Table 69.

6.6 Comments to National reporting table T6

- Biomass estimates presented in the original data are for vegetation classes used in the National Vegetation Information System. These differ to some extent from those used by the National Forest Inventory. The forest area base for these estimates differs from other parts of the report because of different technical approaches to assessing forest extent such as differences in the scale of mapping used by the Australian Greenhouse Office. They include small areas of some vegetation classes that do not meet the definition of forest but they are the ones that have been used by the Australian Greenhouse Office in the National Carbon Accounting System (NCAS) so we have been consistent with that.
- The Australian NCAS system presents information on carbon flux (change) and does not routinely report on carbon stocks.
- Includes estimates of biomass for plantations.
- Figures reported for 2005 are based on calculations undertaken in 2003 for the State of the Forests Report. They have not been adjusted for changes in biomass stocks as a result of land clearing or afforestation after 2003.
- The AGO is due to report on the National Carbon Accounts in mid 2005 which will contain updated estimates of biomass and carbon contained in forests. These figures were not available at the time of compilation of this report and have not been able to be included.

7 Table T7 – Carbon stock

7.1 FRA 2005 Categories and definitions

Category	Definition
Carbon in above-ground biomass	Carbon in all living biomass above the soil, including stem, stump, branches, bark, seeds, and foliage.
Carbon in below-ground biomass	Carbon in all living biomass of live roots. Fine roots of less than 2 mm diameter are excluded, because these often cannot be distinguished empirically from soil organic matter or litter.
Carbon in dead wood biomass	Carbon in all non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.
Carbon in litter	Carbon in all non-living biomass with a diameter less than a minimum diameter chose by the country for lying dead (for example 10 cm), in various states of decomposition above the mineral or organic soil. This includes the litter, fumic, and humic layers.
Soil carbon	Organic carbon in mineral and organic soils (including peat) to a specified depth chosen by the country and applied consistently through the time series.

7.2 National data

7.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
AUSTRALIAN GREENHOUSE OFFICE (2002). NATIONAL GREENHOUSE GAS INVENTORY 2000. AUSTRALIAN GREENHOUSE OFFICE, CANBERRA.	H		2003	

7.2.2 Original data

See 6.2.2 above.

7.3 Analysis and processing of national data

7.3.1 Estimation and forecasting

See comments under sections 6.3.1 and 6.6 above.

7.4 Reclassification into FRA 2005 classes

FRA Class	National Reporting Class
Carbon in above-ground biomass	Above-ground biomass 100%
Carbon in below-ground biomass	Root biomass 100%
Carbon in dead wood	Not reported
Carbon in litter	Forest floor biomass 100%
Soil carbon to a depth of _____ cm	Not reported

7.5 Data for National reporting table T7

FRA 2005 Categories	Carbon (Million metric tonnes)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Carbon in above-ground biomass			5,824			
Carbon in below-ground biomass			2,515			
Sub-total: Carbon in living biomass			**8,339**			
Carbon in dead wood			*			
Carbon in litter			*			
Sub-total: Carbon in dead wood and litter			2,209			
Soil carbon to a depth of _____ cm						
TOTAL CARBON			**10,548**			

* Included in total below

7.6 Comments to National reporting table T7

- Total includes estimates for plantations and native forest carbon stock.
- Figures derived using data supplied by the Australian Greenhouse Office and presented in the 2003 State of the Forests Report.
- Also see comments under sections 6.2.2, 6.3.1 and 6.6 above.

8 Table T8 – Disturbances affecting health and vitality

The degree of fire impacts varies significantly with location in Australia. The effects of fire are determined by the interaction of vegetation type, fire intensity, seasonality and fire history.

Fire is an inevitable, periodic event in most Australian forests that can have both positive and negative impacts on forest health and vitality. The impact of fire on the biota varies according to ecosystem sensitivity to fire, intensity and frequency, which in turn depends upon many factors including fuel availability, prevailing weather and the season. Whether started by humans or lightning, forest fires occur somewhere in Australia every year. However, although fire is an ecological disturbance, most forests are able to naturally regenerate, given appropriate climatic conditions, proximity to seed and sufficient recovery time between disturbances.

Although individual agencies within the States and Territories keep a range of statistics, there is no comprehensive national database on fire occurrence, cost and impact, and no standard protocol or custodian. For these reasons it is considered that there is insufficient data to be able to report in the FRA Table T8 on fire.

In the 2003 State of the Forests Report, it was estimated that between April 1998 and March 1999, 14.3 million hectares (9 per cent) of Australia's forests were identified through remote sensing as having been burnt by fires. The following year 27.2 million hectares (17 per cent) were burnt by fire. These figures include both wild fires and fuel reduction burns. Furthermore, the definition of wildfire varies: in southern regions, concerted efforts are made to control wildfires; in remote locations in the north of Australia there is little or no control or management of fires.

Most state forest management agencies reported impacts on forests of animal pests, insect pests, pathogens, weeds and other introduced biota. Other processes or agents impacting on forest health include stream and salinity, soil acidity, drought and the impacts of river regulation. However, the amount of data on areas affected is very limited and insufficient to report for FRA Table T8.

9 Table T9 – Diversity of tree species

9.1 FRA 2005 Categories and definitions

Category	Definition
Number of native tree species	The total number of native tree species that have been identified within the country.
Number of critically endangered tree species	The number of native tree species that are classified as "Critically endangered" in the IUCN red list.
Number of endangered tree species	The number of native tree species that are classified as "Endangered" in the IUCN red list.
Number of vulnerable tree species	The number of native tree species that are classified as "Vulnerable" in the IUCN red list.

9.2 National data

9.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
IUCN (2003). 2003 IUCN Red List of Threatened Species. <www.redlist.org>. Downloaded on 22 September 2004	H		2004	

9.2.2 Original data

Australian species listed on the 2003 IUCN Red List of Threatened Species.

Scientific Name	Common Name(s)	Red List
Eucalyptus recurva	**MONGARLOWE MALLEE (E)**	CR D ver 2.3 (1994)
Wollemia noblis	Wollemi pine	CR D ver 2.3 (1994)
Alectryon ramiflorus		EN B1+2c ver 2.3 (1994)
Cycas megacarpa		EN A2c ver 3.1 (2001)
Cycas platyphylla		EN A2c ver 3.1 (2001)
Eucalyptus morrisbyi	Morrisby's Gum (E)	EN B1+2ce ver 2.3 (1994)
Flindersia ifflaina		EN A2cd, B1+2c ver 2.3 (1994)
Flindersia pimenteliana		EN C2a ver 2.3 (1994)
Livistona drudei		EN A1c ver 2.3 (1994)
Xanthostemon oppositifolius		EN B1+2c, C2a ver 2.3 (1994)
Acacia crassicarpa		VU A1cd+2cd, B1+2abcd ver 2.3 (1994)
Aglaia australiensis		VU D2 ver 2.3 (1994)
Aglaia brassii		VU A1c ver 2.3 (1994)
Aglaia brownie		VU A1c ver 2.3 (1994)
Alectryon repandodentatus		VU B1+2c ver 2.3 (1994)
Archontophoenix myolensis		VU C2a ver 2.3 (1994)
Athrotaxis cupressoides	Pencil Pine	VU A1ac ver 2.3 (1994)
Athrotaxis laxifolia		VU D1 ver 2.3 (1994)
Athrotaxis selaginoides	King BillyPine (E)	VU A1c ver 2.3 (1994)
Brachychiton velutinosus		VU B1+2c, C2a ver 2.3 (1994)
Callitris baileyi		VU A1c ver 2.3 (1994)
Callitris drummondii	Drummond'sCypress (E)	VU A1c ver 2.3 (1994)
Callitris monticola		VU A1c ver 2.3 (1994)
Callitris oblonga		VU A1c ver 2.3 (1994)
Callitris roei		VU A1c ver 2.3 (1994)
Ceratopetalum succirubrum		VU A2cd ver 2.3 (1994)
Cycas conferta		VU C1 ver 3.1 (2001)
Cycas desolata		VU D2 ver 3.1 (2001)
Cycas silvestris		VU D2 ver 3.1 (2001)
Flindersia laevicarpa		VU C1+2a ver 2.3 (1994)
Hedyscepe canterburyana	Big Mountain Palm (E)	VU D2 ver 2.3 (1994)
Helicia australasica	Umbrella Palm (E)	VU C2b ver 2.3 (1994)
Howea belmoreana	Curly Palm (E) Kentia Palm (E) Sentry Palm (E)	VU D2 ver 2.3 (1994)
Howea forsteriana	Kentia Palm (E) Thatch Palm (E)	VU D2 ver 2.3 (1994)
Intsia bijuga		VU A1cd ver 2.3 (1994)

Myristica ampliata		VU D2 ver 2.3 (1994)
Normanbya normanbyi	Black Palm (E)	VU A1c ver 2.3 (1994)

Critically endangered = CRD
Endangered = EN
Vulnerable = VU

Source: 2003 IUCN Red List of Threatened Species. <www.redlist.org>.

9.3 Data for National reporting table T9

FRA 2005 Categories	**Number of species (year 2000)**
Native tree species	2,100
Critically endangered tree species	2
Endangered tree species	8
Vulnerable tree species	27

9.4 Comments to National reporting table T9

- Number of native tree species is estimated to be in the order of 2,100. Number of tree species is an estimate based on consultation with government botanists.
- Number of species can vary with taxonomic reclassification and occasional discovery of new species.

10 Table T10 – Growing stock composition

There are a large number of tree species in Australia and there has been no national compilation of timber volume or tree assessment by species or genus. The three most common genera, in order of area covered by the forest type with the genus being dominant are *Eucalyptus*, *Acacia* and *Callitris*. The two most common genera, *Eucalyptus* and *Acacia* both have more than 500 species in them. In most areas the forest types are mixtures of several species so it is not possible to list the species separately.

11 Table T11 – Wood removal

11.1 FRA 2005 Categories and definitions

Category	Definition
Industrial wood removal	The wood removed (volume of roundwood over bark) for production of goods and services other than energy production (woodfuel).
Woodfuel removal	The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

11.2 National data

11.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
ABARE (2002b). Wood and Wood Product Statistics: Production and Consumption Time Series. Australian Bureau of Agricultural and Resource Economics, Canberra.	H		2002	
Driscoll, D.A., Milkovits, G. and Freudenberger, D. (2000). Impact and Use of Firewood in Australia. CSIRO Sustainable Ecosystems, Canberra.	M		2000	

11.2.2 Original data

Timber removals in cubic metres

Year	Industrial Roundwood	Wood Fuel	Total
1988	16,902,000	3,051,433	19,953,433
1989	16,584,000	3,298,064	19,882,064
1990	17,213,000	3,545,312	20,758,312
1991	16,604,000	3,786,530	20,390,530
1992	16,654,000	4,020,352	20,674,352
1993	17,659,000	4,251,357	21,910,357
1994	18,762,000	4,490,496	23,252,496
1995	19,560,000	4,742,499	24,302,499
1996	19,340,000	5,017,892	24,357,892
1997	19,908,000	5,297,933	25,205,933
1998	21,184,000	5,636,923	26,820,923
1999	20,587,000	5,974,408	26,561,408
2000	24,042,000	6,332,782	30,374,782
2001	24,353,000	6,707,306	31,060,306
2002	23,102,000	3,082,000	26,184,000
2003	26,734,000	3,092,000	29,826,000

All figures from FAOSTAT 2005, submitted by the Australian Bureau of Agricultural and Resource Economics and derived from the Quarterly Forest Product Statistics (www.abare.gov.au). All figures are under bark volume.

11.3 Analysis and processing of national data

11.3.1 Estimation and forecasting

1990 figures are the mean of 1988-1992
2000 figures are the mean of 1998-2002
2005 figures are the annual estimates for 2003

11.4 Data for National reporting table T11

FRA 2005 Categories	Volume in 1000 cubic meters of roundwood over bark					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Industrial roundwood	16,791	22,653	26,734			
Woodfuel	3,540	5,547	3,092			
TOTAL for Country	**20,331**	**28,200**	**29,826**			

11.5 Comments to National reporting table T11

- All figures from FAOSTAT 2005, submitted by the Australian Bureau of Agricultural and Resource Economics and derived from their Quarterly Forest Product Statistics
- 1990 figures are the mean of 1988-1992
- 2000 figures are the mean of 1998-2002
- 2005 figures are the annual estimates for 2003
- Production comes from both native forest and plantations. The proportion of wood produced from plantations has increased from 45% in 1990 to about 60% in 2003.

12 Table T12 – Value of wood removal

12.1 FRA 2005 Categories and definitions

Category	Definition
Value of industrial wood removal	Value of the wood removed for production of goods and services other than energy production (woodfuel).
Value of woodfuel removal	Value of the wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use.

12.2 National data

12.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest Inventory (2003). Australia's State of the Forests Report 2003. Bureau of Rural Sciences, Canberra	H		2003	
ABARE (2002a). Wood and Wood Product Statistics: Trade Time Series. Australian Bureau of Agricultural and Resource Economics, Canberra.	H		2002	
ABARE (2003). Australian Forest and Wood Product Statistics: September –December Quarters 2002. Australian Bureau of Agricultural and Resource Economics, Canberra.	H		2003	
ABARE (2005) Australian forest and wood product statistics. September and December quarters 2004.	H		1997 2004	

12.2.2 Classification and definitions

National class	Definition
	See comments under Original data section and Table T12

12.2.3 Original data

Value of forestry production is the estimated gross value of logs at mill door or wharf. Total values for 2004 and 2005 are simple linear extrapolations based on the previous 5 years. Australian financial years July-June. Figures indicated are those to the year ending in June (i.e. 1998 is for the 1997-98 financial year).

Value of Forestry Production (Nominal, AUDmillion$).

	1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Broadleaved								
Native forest*	515.7	479.2	563.0	556.9	515.5	541.5		
Plantation	0.0	27.2	40.8	47.0	68.2	82.4		
Sub-total	515.7	506.4	603.8	603.9	583.7	623.9		
Coniferous								
Native forests (cypress)	16.5	17.8	18.7	22.2	22.5	22.9		
Plantations	569.4	569.4	608.0	641.0	713.6	743.5		
Sub-total	585.9	587.2	626.7	663.2	736.1	766.4		
Total	**1101.6**	**1093.6**	**1230.5**	**1267.1**	**1319.8**	**1390.3**	**1465.1**	**1533.4**
USD/AUD	*1.629*	*1.530*	*1.805*	*1.958*	*1.766*	*1.333*		*1.301*
Value in USD	**676.2**	**714.7**	**681.7**	**647.1**	**747.3**	**1043.0**		**1178.6**

Source: Australian Bureau of Agricultural and Resource Economics Quarterly Forest Product Statistics.

12.3 Analysis and processing of national data

12.3.1 Estimation and forecasting

Australian financial year is July to June. Figures for 2000 are means for 1997-8 to 2001-2. Figure for 2005 estimate only based on linear extrapolation of the values from the previous 5 years.

12.4 Reclassification into FRA 2005 classes

FRA Class	**National Reporting Class**
Industrial Roundwood	Hardwood Plantation 100%, Softwood Plantation 100%, Native Forest 100%
Woodfuel	NDA (no reliable data available)

12.5 Data for National reporting table T12

FRA 2005 Categories	Value of roundwood removal (1000 USD)					
	Forest			Other wooded land		
	1990	2000	2005	1990	2000	2005
Industrial roundwood	NDA	693,400	1,178,600	NDA	NDA	NDA
Woodfuel	NDA	NDA	NDA	NDA	NDA	NDA
TOTAL for Country	**NDA**	**693,400**	**1,178,600**	NDA	NDA	NDA

12.6 Comments to National reporting table T12

- Value of forest production has only been collected nationally since 1992-3 financial year.
- Values are at mill door or wharf. Forest figures will include wood harvested from OWL.
- Adjusted to USD using historical exchange rates in Appendix 4 of Guidelines for Reporting.
- Australian financial year is July to June. Figures for 2000 are means for 1997-8 to 2001-2.
- Figure for 2005 estimate only based on linear extrapolation of the values from the previous 5 years.

13 Table T13 – Non-wood forest product removal

13.1 FRA 2005 Categories and definitions

The following categories of non-wood forest products have been defined:

Category
Plant products / raw material
1. Food
2. Fodder
3. Raw material for medicine and aromatic products
4. Raw material for colorants and dyes
5. Raw material for utensils, handicrafts & construction
6. Ornamental plants
7. Exudates
8. Other plant products
Animal products / raw material
9. Living animals
10. Hides, skins and trophies
11. Wild honey and bee-wax
12. Bush meat
13. Raw material for medicine
14. Raw material for colorants
15. Other edible animal products
16. Other non-edible animal products

13.2 National data

13.2.1 Data sources

References to sources of information	**Quality (H/M/L)**	**Variable(s)**	**Year(s)**	**Additional comments**
National Forest Inventory (2003). Australia's State of the Forests Report 2003. Bureau of Rural Sciences, Canberra	H		2003	

13.3 Data for National reporting table T13

FRA 2005 Categories	Scale factor	Unit	NWFP removal		
			1990	2000	2005
Plant products / raw material					
1. Food					
2. Fodder					
3. Raw material for medicine and aromatic products					
4. Raw material for colorants and dyes					
5. Raw material for utensils, handicrafts & construction					
6. Ornamental plants					
7. Exudates					
8. Other plant products					
Animal products / raw material					
9. Living animals					
10. Hides, skins and trophies					
11. Wild honey and bee-wax	1	tonne		23,163	
12. Bush meat					
13. Raw material for medicine					
14. Raw material for colorants					
15. Other edible animal products					
16. Other non-edible animal products					

13.4 Comments to National reporting table T13

- Data source: Pp 239 Indicator 6.1f SOFR2003
- National & jurisdictional data on the supply and demand of non-wood products are sparse;
- Use of non-wood forest products by indigenous communities is also significant in some areas. Products include: foods, medicinal products, materials for artworks, handicrafts, implements, dyes, ochres, pigments and fibres.
- The estimates for honey and apiary products are for commercial hives using exotic bees and do not necessarily all arise from forests
- Other known important commercial, non-wood forest products include game meat and animal skins from native species (kangaroos, wallabies and possum) and exotic species (deer, pigs, goats), bush foods (seeds, flowers and fruit used for food products or flavouring) tree seeds (for propagation of commercial and ornamental trees, shrubs and flowers.

14 Table T14 – Value of non-wood forest product removal

14.1 FRA 2005 Categories and definitions

The following categories of non-wood forest products have been defined:

Category
Plant products / raw material
1. Food
2. Fodder
3. Raw material for medicine and aromatic products
4. Raw material for colorants and dyes
5. Raw material for utensils, handicrafts & construction
6. Ornamental plants
7. Exudates
8. Other plant products
Animal products / raw material
9. Living animals
10. Hides, skins and trophies
11. Wild honey and bee-wax
12. Bush meat
13. Raw material for medicine
14. Raw material for colorants
15. Other edible animal products
16. Other non-edible animal products

14.2 National data

14.2.1 Data sources

References to sources of information	**Quality (H/M/L)**	**Variable(s)**	**Year(s)**	**Additional comments**
National Forest Inventory (2003). Australia's State of the Forests Report 2003. Bureau of Rural Sciences, Canberra	M		2003	
ABS (2002). Agricultural Commodities, 2000–2001. Australian Bureau of Statistics, Canberra.	H		2002	

14.3 Data for National reporting table T14

FRA 2005 Categories	Value of the of NWFP removed (1000 USD)		
	1990	**2000**	**2005**
Plant products / raw material 1. Food			
2. Fodder			
3. Raw material for medicine and aromatic products			
4. Raw material for colorants and dyes			
5. Raw material for utensils, handicrafts & construction			
6. Ornamental plants			
7. Exudates			
8. Other plant products			
Animal products / raw material 9. Living animals			
10. Hides, skins and trophies			
11. Wild honey and bee-wax		26,532	
12. Bush meat			
13. Raw material for medicine			
14. Raw material for colorants			
15. Other edible animal products			
16. Other non-edible animal products			
TOTAL		**26,532**	

14.4 Comments to National reporting table T14

- National & jurisdictional data on the supply and demand of non-wood products are sparse.
- The only national figures are for honey and apiary products, which may also include products from environments outside forests.
- Data source: Pp 239 Indicator 6.1f SOFR2003 (Value = AUD$36m)
- Currency exchange rate: AUD$1 = USD$0.737 (11 October 2004)

15 Table T15 – Employment in forestry

15.1 FRA 2005 Categories and definitions

Category	Definition
Primary production of goods	Employment in activities related to primary production of goods, like industrial roundwood, woodfuel and non-wood forest products.
Provision of services	Employment in activities directly related to services from forests and woodlands.
Unspecified forestry activities	Employment in unspecified forestry activities.

15.2 National data

15.2.1 Data sources

References to sources of information	Quality (H/M/L)	Variable(s)	Year(s)	Additional comments
National Forest Inventory (2003). Australia's State of the Forests Report 2003. Bureau of Rural Sciences, Canberra.	H	Employment in the forest sector	1993-2001	Relevant employment Table 102 attached below.
ABS (2002a). Labour Force. Catalogue No. 6203.0. Australian Bureau of Statistics: Canberra.	H	Employment in the forest sector	2002	
ABARE (2002a). Australian Forest and Wood Product Statistics March/June 2002 Quarters. Australian Bureau of Agricultural and Resource Economics, Canberra.	H	Employment in the forest sector	2002	
ABARE (2003). Australian Commodity Statistics 2002. Australian Bureau of Agricultural and Resource Economics, Canberra.	H		2002	
ABARE (2005) Australian forest and wood product statistics. September and December quarters 2004.	H	Employment in the forest sector	1997 2004	Table 49 included below.

15.2.2 Classification and definitions

National class	Definition
Forestry and harvesting	Includes employees directly related to forestry and harvesting. Does not include truck drivers, managers or conservation staff.
Park ranger and forester employment	The terms forester and park ranger were defined by the individuals completing the census.

15.2.3 Original data

Source: 2003 State of the Forests Report:

Table 102: Direct employment in the forest sector ('000 employees)

Year	1993–1994	1994–1995	1995–1996	1996–1997	1997–1998	1998–1999	1999–2000	2000–2001
Forestry and harvesting[1]	11.3	12.4	11.4	10.9	14.0	14.1	8.8	13.4
Wood and wood products								
Log sawmilling	8.3	9.0	8.1	7.1	7.0	5.6	6.5	5.3
Resawn and dressed timber	6.7	7.1	6.4	6.9	7.4	6.2	6.2	7.9
Veneers, plywood and fabricated wood manufacturing	5.6	6.2	5.9	5.6	4.9	5.0	4.9	5.5
Wooden structural fittings and other joinery	18.0	17.2	17.1	16.4	18.7	20.1	22.2	20.2
Hardwood woodchips	0.7	0.8	0.9	0.9	0.9	0.7	0.8	0.6
Other wood products	7.6	7.8	7.4	6.7	6.5	5.7	6.2	5.7
Total	46.9	48.1	45.8	43.8	45.4	43.4	46.8	45.3
Paper and paper products								
Pulp, paper and paperboard	5.8	5.6	5.8	5.2	4.8	4.4	4.3	5.1
Paper bags (including sack)	1.0	0.9	1.0	1.2	1.2	1.3	1.4	1.2
Solid fibreboard containers	2.4	2.3	4.1	2.4	2.4	2.5	2.6	2.9
Corrugated fibreboard containers	4.8	5.3	5.7	5.6	5.4	5.5	4.9	5.9
Other paper products	3.8	3.6	3.5	3.4	3.5	3.7	3.6	4.6
Total	17.9	17.8	20.0	17.9	17.2	17.3	16.9	19.7
Total forestry and wood products sectors	76.1	78.3	77.2	72.6	76.6	74.8	72.4	78.4
Total manufacturing industries	1 092.3	1 115.3	1 111.5	1 129.3	1 121.2	1 083.5	1 114.9	1 131.0
Total employees	7 755.2	8 056.6	8 289.2	8 354.8	8 461.3	8 647.4	8 906.6	9 090.0
Forest and wood products as a proportion of total employees (per cent)	*0.98*	*0.97*	*0.93*	*0.87*	*0.91*	*0.86*	*0.81*	*0.86*

Source: ABS (2002); ABARE (2002a,b, 2003)

[1] Does not include truck drivers, managers or conservation staff.

Table 103: Park ranger and forester employment (total numbers)

1996	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Other	Total
Forester	62	483	9	309	74	227	386	217	0	1 767
Park ranger	38	333	168	435	106	84	351	169	6	1 690
2001										
Forester	59	427	10	309	98	342	418	272	0	1 935
Park ranger	21	382	145	399	92	53	421	78	8	1 599

Source: Space Time Research (1996, 2000)

Note: The terms forester and park ranger were defined by the individuals completing the census.

49 Employment in forest product industries

	1997-98 '000	1998-99 '000	1999-00 '000	2000-01 '000	2001-02 b '000	2002-03 b '000	2003-04 b '000
Forestry and logging	14.0	14.0	8.7	13.5	13.2	9.7	12.1
Manufacturing industry a							
Log sawmilling and timber dressing							
Log sawmilling	7.0	5.6	6.5	5.3	na	na	na
Wood chipping	0.9	0.7	0.8	0.6	na	na	na
Timber resawing or dressing	7.4	6.2	6.2	7.9	na	na	na
Total	15.3	12.5	13.5	13.9	17.2	18.8	20.3
Other wood product manufacturing							
Plywood and veneer	1.5	1.5	1.5	1.0	na	na	na
Fabricated wood	3.4	3.5	3.4	4.5	na	na	na
Wooden structural component	18.7	20.1	22.2	20.2	na	na	na
Wood products nec	6.5	5.7	6.2	5.7	na	na	na
Total	30.2	30.9	33.3	31.4	30.8	36.0	41.0
Paper and paper products							
Pulp, paper and paperboard	4.8	4.4	4.3	5.1	na	na	na
Solid paperboard containers	2.4	2.5	2.6	2.9	na	na	na
Corrugated paperboard containers	5.4	5.5	4.9	5.9	na	na	na
Paper bag and sack	1.2	1.3	1.4	1.3	na	na	na
Paper products nec	3.5	3.7	3.6	4.6	na	na	na
Total	17.2	17.3	16.9	19.7	21.7	18.9	18.0
Total wood manufacturing industry	62.6	60.7	63.6	65.0	69.7	73.7	79.3
Total forestry	76.6	74.7	72.4	78.5	82.9	83.4	91.4
Total manufacturing industries	1 123.0	1 079.6	1 099.5	1 094.0	1 060.4	1 090.6	1 032.7
Total employment	8 477.3	8 641.4	8 835.2	8 972.3	9 095.7	9 322.8	9 431.1

a ANZSIC group and class. Based on PAYE employment statistics excluding volunteers. b Industry group totals are sourced from *The Labour Force* survey and are not directly comparable with data sourced from *Manufacturing Industry* survey data prior to 2001-02 due to differences in collection methodology.
Sources: ABS, *The Labour Force,* cat. no. 6203.0, Canberra, ABS, *Manufacturing Industry, Australia, Preliminary,* cat. no. 8201.0, Canberra; ABS, *Manufacturing Industry, Australia,* cat. no. 8221.0, Canberra.

Source: ABARE (2005) Australian forest and wood product statistics. September and December quarters 2004.

15.3 Analysis and processing of national data

15.3.1 Estimation and forecasting

See comments in section 15.6 under Table T15.

15.4 Reclassification into FRA 2005 classes

FRA Class	National Reporting Class
Primary production of goods	• Forestry and harvesting 100%
Provision of services	• Forester 100% • Park Ranger 100%
Unspecified forestry activities	NDA

15.5 Data for National reporting table T15

FRA 2005 Categories	Employment (1000 person-years)	
	1990	2000
Primary production of goods	11.3	13.4
Provision of services	3.5	3.5
Unspecified forestry activities	NDA	NDA
TOTAL	**14.8**	**16.9**

15.6 Comments to National reporting table T15

- 1990 estimate for primary production of goods and services' is actually 1993 figure from p282 SOFR2003 Table 102 shown above.
- Primary production of goods and services excludes those involved in transporting of harvested material and indirect employment to support harvesting and transport contractors.
- Estimate for 'provision of services' is based on those people reporting that they work as foresters or park rangers in the national census in 1996 and 2001.
- Total estimate excludes those involved in conversion and manufacturing of forest products. This was estimated to be 65,000 people in 2000. See SOFR and ABARE tables presented above.

16 Thematic reporting tables

Australia plans to submit a separate thematic report on Planted forests.