

Indicator 1.1a: Area of forest by forest type and tenure

This indicator uses the area for each forest type over time as a broad measure of the extent to which forest ecosystems and their diversity are being maintained. Reporting on forest tenure aids our understanding of how different land management regimes may impact on forest biodiversity.



1.1a.i Forest area by forest type (2023)

This part of Indicator 1.1a presents the area of Australia's forests by their category, type and structural classes.

The three other parts of Indicator 1.1a are:

1.1a.ii Forest area by tenure

1.1a.iii Forest area in Regional Forest Agreement regions

1.1a.iv Forest area change over time

Context

The forest area data presented here cover Australia's states and mainland territories and their close offshore islands, but not the external territories of Norfolk Island, Lord Howe Island, Cocos (Keeling) Islands and Christmas Island.

The underlying *Forests of Australia (2023)* dataset is assembled using a [Multiple Lines of Evidence \(MLE\) approach](#).

Definition

Forest: An area, incorporating all living and non-living components, that is dominated by trees having usually a single stem and a mature or potentially mature stand height exceeding 2 metres and with existing or potential crown cover of overstorey strata about equal to or greater than 20 per cent. This includes Australia's diverse native forests and plantations, regardless of age. It is also sufficiently broad to encompass areas of trees that are sometimes described as woodlands.

Forest area, cover and extent are used interchangeably in this work.

Other terms used here can be found in [Australia's forests and forestry glossary](#).

Key points

- Australia has 133.6 million hectares of forest, covering 17% of Australia's land area, of which
 - 131.5 million hectares are Native forests
 - 1.82 million hectares are Commercial plantation¹
 - 0.24 million hectares are Other forest.
- Australia's forests are dominated by Eucalypt forests (101 million hectares, 77% of total native forest)
- Acacia forests (10.9 million hectares, 8% of total native forest) and Rainforest (3.44 million hectares, 3% of total native forest) cover significant areas.
- Structurally, most of Australia's native forest is woodland forest (93 million hectares, 71% of total native forest), with a crown cover of 20–50%.

¹ The area of Commercial plantation reported here differs from the area published by the National Plantation Inventory which are compiled from non-spatial data sources that cannot be integrated with the national spatial (mapped) total forest area dataset required to identify the area of all forests in Australia.

Defining forest, forest categories and forest types

Australia's State of the Forests Report is based on Australia's national definition of forest:

An area, incorporating all living and non-living components, that is dominated by trees having usually a single stem and a mature or potentially mature stand height exceeding 2 metres and with existing or potential crown cover of overstorey strata about equal to or greater than 20 per cent. This includes Australia's diverse native forests and plantations, regardless of age. It is also sufficiently broad to encompass areas of trees that are sometimes described as woodlands.²

Woodland, savanna and eucalypt mallee vegetation are all included where they meet the criteria for height and crown cover.

Australia's national definition of forest is different from the definitions of forest that apply in some other countries, or the definition used by the [Food and Agriculture Organization of the United Nations \(FAO\)](#).

In Australia's National Forest Inventory, forests are assigned to three broad categories: Native forest, Commercial plantation and Other forest. Each of these categories is divided into various forest types.

The **Native forest** category comprises areas dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range. Native forest is classified into eight forest types defined by dominant species or structure, namely Acacia, Callitris, Casuarina, Eucalypt, Mangrove, Melaleuca, Rainforest and Other native forest types. The 'Other native forest' type comprises a range of less common native forest types with relatively small individual areas, as well as native forest where the type is unknown.

Native forest is also divided into three crown cover classes (Closed, Open and Woodland), and three height classes (Tall, Medium and Low). The Eucalypt forest type is also sub-divided into mallee and non-mallee subtypes.

The **Commercial plantation** category comprises hardwood or softwood plantations managed commercially to supply logs for the manufacture of wood products, and reported through the National Plantation Inventory. There are three types:

- Softwood (predominantly radiata pine, *Pinus radiata*, in southern Australia, and southern pine varieties, *Pinus* spp., in Queensland)
- Hardwood (most commonly Tasmanian blue gum, *Eucalyptus globulus*)
- Other (sometimes referred to as Unknown or Mixed species).

The **Other forest** category comprises mostly non-commercial plantations and planted forests of various types, including plantations of sandalwood (*Santalum* spp.), smaller farm forestry and agroforestry plantations, environmental plantings, plantations within the reserve system, and plantations regarded as non-commercial. It also includes non-planted forests dominated by trees of introduced species.

Sparse woody vegetation is not reported in *Australia's State of the Forests Report*. This is a non-forest vegetation type of open woodland, heathland or shrubland, generally with a tree crown cover of 5-20%.

² Definition of forest published 15/12/2023. Corrected 13/02/2024.

Forest area by jurisdiction and category

Australia has 133.6 million hectares of forest, covering 17% of Australia's total land area (Table 1.1a.i-1, showing data as at 2021). Australia has the seventh largest area of forest in the world by country, and approximately 3% of the world's forest area.

The areas of forest in the three broad categories of Australia's forest estate are as follows:

- **Native forest:** 131.5 million hectares (98% of Australia's total forest area). Queensland has the largest area of native forest (39% of Australia's native forest area), with much of the balance in the Northern Territory (18%), Western Australia (16%), and New South Wales (15%).
- **Commercial plantations:** 1.82 million hectares (1.4% of Australia's total forest area)³. Victoria has the largest area of commercial plantations (22% of Australia's commercial plantation area), with New South Wales (20%), Western Australia (17%), Tasmania (16%) and Queensland (12%) making up the balance.
- **Other forest:** 0.24 million hectares (0.18%) of Australia's total forest area. The largest areas of Other forest are in South Australia (0.09 million hectares) and Western Australia (0.04 million hectares). All Other forest in the Northern Territory is sandalwood plantations.

The geographic distribution of Australia's forests is shown in Figure 1.1a.i-1, by forest category. Forests are generally confined to regions where average rainfall exceeds 500 millimetres per year. Most forests are in the northern, eastern, south-eastern and south-western coastal zones of Australia, although woodland forests extend into drier areas in many parts of the country.

Table 1.1a.i-1: Australia's forest area, by jurisdiction

Jurisdiction	Native forest		Commercial plantation		Other forest		Total forest	
	Area ('000 hectares)	Proportion of total Native forest (%)	Area ('000 hectares)	Proportion of total Commercial plantation (%)	Area ('000 hectares)	Proportion of total Other forest (%)	Area ('000 hectares)	Proportion of total forest (%)
ACT	130	0.1	10	0.5	3	1	143	0.1
NSW	19,882	15	368	20	34	14	20,284	15
NT	23,280	18	47	3	6	3	23,333	17
Qld	51,750	39	214	12	12	5	51,977	39
SA	4,866	4	176	10	89	37	5,131	4
Tas.	3,393	3	288	16	26	11	3,707	3
Vic.	7,790	6	403	22	30	13	8,224	6
WA	20,409	16	317	17	41	17	20,766	16
Australia	131,501	100	1,821	100	243	100	133,565	100

The area figure for Commercial plantation used in this update of *Australia's State of the Forest Report* is calculated from a rasterised (gridded) version of the National Plantation Inventory vector-format coverage used to produce the area data reported in [Australian plantation statistics and log availability report 2021](#). Conversion of the vector format to the 1-hectare raster format results in the area figure for Commercial plantations reported here (1.82 million hectares) being slightly higher than the area figure reported in [Australian plantation statistics and log availability report 2021](#) (1.77 million hectares).

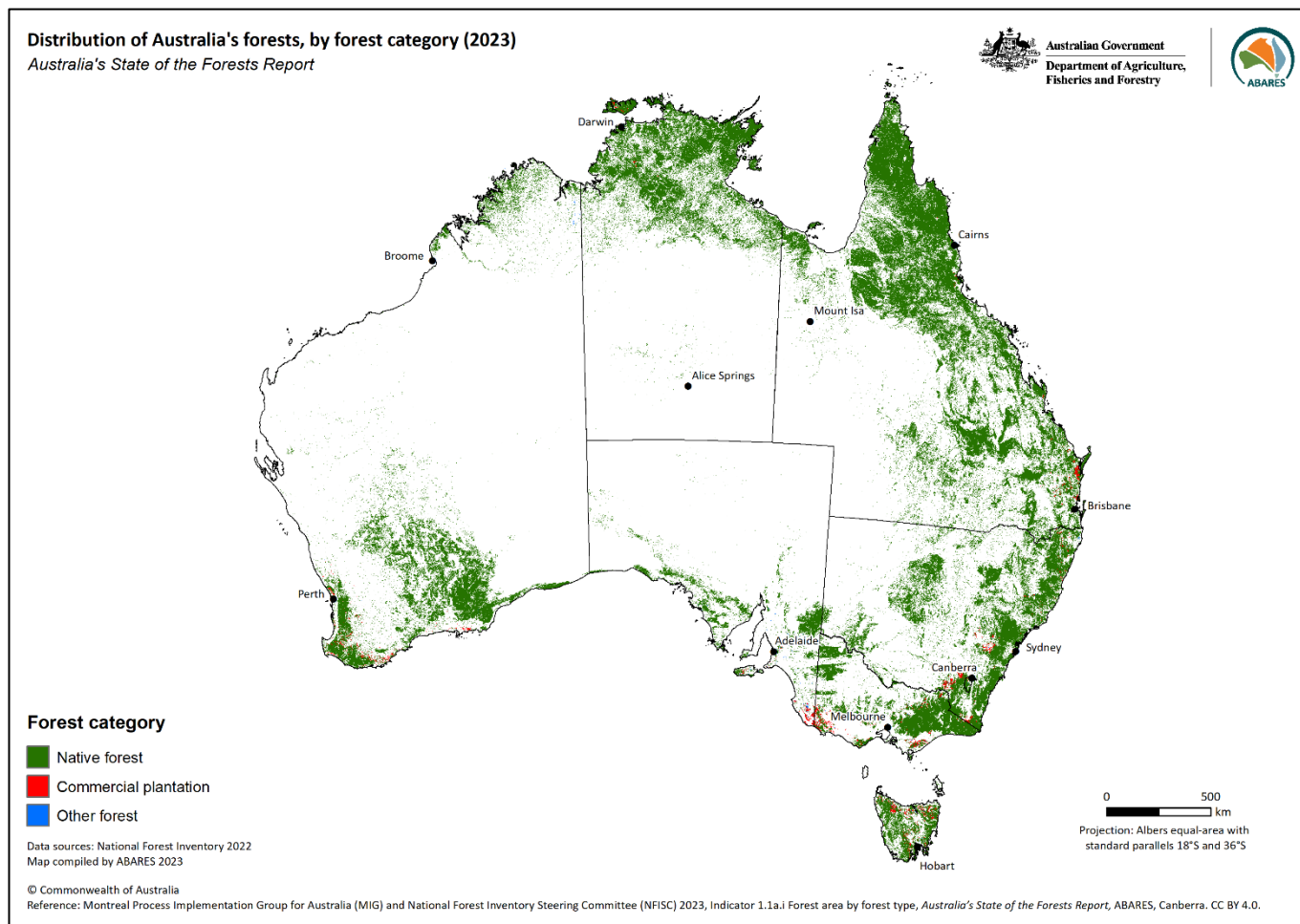
Totals may not tally due to rounding.

Source: ABARES, National Forest Inventory, National Plantation Inventory.

[Click here for a Microsoft Excel workbook of the data for Table 1.1a.i-1.](#)

³ The area figure for Commercial plantations used in *Australia's State of the Forests Report* is calculated from a rasterised (gridded) version of the National Plantation Inventory vector-format coverage used to produce the data reported in [Australian plantation statistics and log availability report 2021](#), and the area figures thus differ.

Figure 1.1a.i-1: Distribution of Australia’s forests, by forest category



Source: ABARES, National Forest Inventory

[Click here for high-definition copy of Figure 1.1a.i-1.](#)

Native forest area by type

The Native forest category is dominated by Eucalypt (77% by area) and Acacia (8%) hardwood forest types (Table 1.1a.i-2). Callitris, the only native forest type dominated by coniferous (softwood) tree species, makes up 2% of native forests. The Rainforest forest type accounts for 3% of native forests, and includes tropical, subtropical, warm-temperate, cool-temperate and dry rainforests.

Table 1.1a.i-2: Australia’s native forest area, by type and by jurisdiction

Forest type	Area ('000 ha)								
	ACT	NSW	NT	Qld	SA	Tas.	Vic.	WA	Australia
Acacia	0	681	1,472	5,188	96	79	37	3,342	10,895
Callitris	0	1,366	0	544	65	1	18	0.1	1,993
Casuarina	1	466	33	175	260	6	54	90	1,086
Eucalypt	129	15,665	19,410	35,382	4,341	2,537	7,240	16,378	101,081
Mangrove	0	8	392	493	19	0	3	196	1,110
Melaleuca	0	67	1,019	5,946	25	24	23	89	7,193
Other native forest	0.2	1,017	704	2,168	58	59	379	315	4,701
Rainforest	0	614	251	1,854	0	686	36	0.2	3,442
Total native forest	130	19,882	23,280	51,750	4,866	3,393	7,790	20,409	131,501

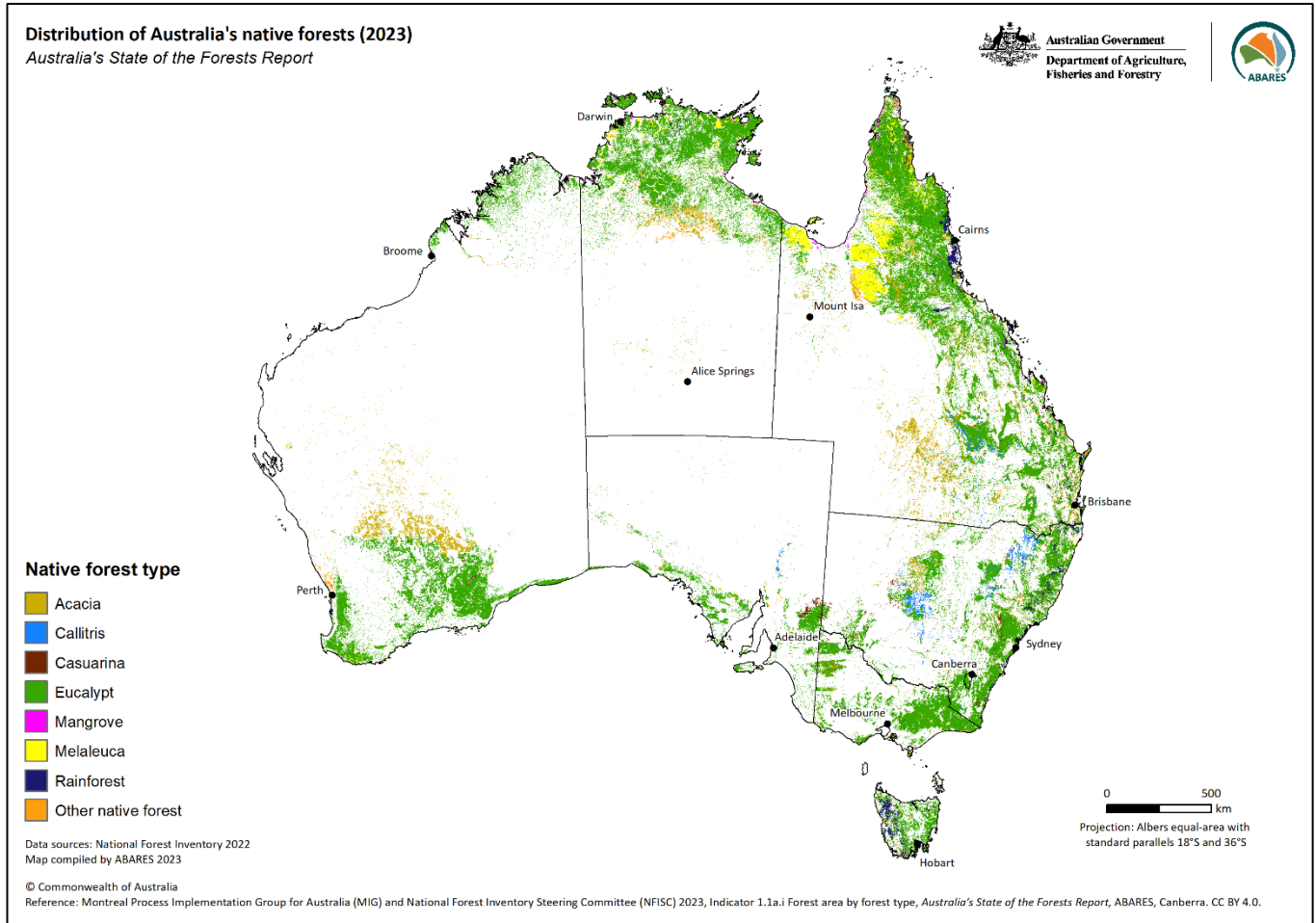
Totals may not tally due to rounding.

Other native forest comprises a range of minor forest types, including Agonis, Atalaya, Banksia, Hakea, Grevillea, Heterodendron, Leptospermum, Lophostemon and Syncarpia (each named after its dominant genus), as well as native forests where the type is unknown. Source: ABARES, National Forest Inventory.

[Click here for a Microsoft Excel workbook of the data for Table 1.1a.i-2.](#)

The geographic distribution of Australia’s forests by forest type is shown in Figure 1.1a.i-2. Eucalypt forests dominate in all jurisdictions, and are most dominant in the Australian Capital Territory (99% of its native forest area) and least dominant in Queensland (68%). The largest areas of Eucalypt, Acacia, Melaleuca, Rainforest and Mangrove forest types occur in Queensland, and the largest areas of Callitris and Casuarina forest are in New South Wales. Rainforest does not occur in South Australia or the Australian Capital Territory at this scale of analysis.

Figure 1.1a.i-2: Distribution of Australia's native forests



Source: ABARES, National Forest Inventory.

[Click here for high-definition copy of Figure 1.1a.i-2.](#)

Native forest area by crown cover, height and form

Australia's native forests (98% of Australia's total forest area) are classified into nine structural classes based on three crown cover classes and three stand height classes (Table 1.1a.i-3a and Table 1.1a.i-3b).

The three native forest crown cover classes are:

- Woodland forest (93 million hectares, 71% of Australia's total forest area)
- Open forest (34 million hectares, 26% of Australia's total forest area)
- Closed forest (2.6 million hectares, 2% of Australia's total forest area).

Eucalypt forest types are the largest components of both Woodland and Open forests, while Rainforest is the largest component of Closed forest. Woodland forest is also the largest component of forest in all jurisdictions except Victoria and the Australian Capital Territory where Open forests dominate. Table 1.1a.i-3a and Table 1.1a.i-3b provide more data on the three crown cover classes.

The three stand height classes are Low, Medium and Tall. Separate area figures for height classes are less accurate than for crown cover, but are provided in Figure 1.1a.i-4 in [Supporting information for Indicator 1.1a.i.](#)

Eucalypt mallee forest also is separated as a distinct subtype within the Eucalypt forest type (see Table 1.1a.i-6 in [Supporting information for Indicator 1.1a.i.](#))

The distribution of Australia’s native forest types and structural classes varies across the continent (Figure 1.1a.i-3), depending on climate, soil type and fire history, and is related to soil moisture regimes and water availability, as well as land management practices.

- Woodland forests dominate drier areas, often inland.
- Open forests dominate higher rainfall regions located in the south-eastern, south-western and northern parts of the country.
- Closed forests are found in western Tasmania, north-eastern Queensland, north-eastern New South Wales, and coastal Northern Territory where rainfall is high.

Table 1.1a.i-3a: Australia’s native forest area, by forest type and eucalypt crown cover class

Forest type	Area ('000 hectares)				Total
	Woodland forest	Open forest	Closed forest	Forest of unknown crown cover	
Acacia	9,546	1,274	76	0	10,895
Callitris	1,356	636	1	0	1,993
Casuarina	987	91	8	0	1,086
Eucalypt	74,966	25,993	122	0	101,081
Eucalypt low	17,338	1,420	22	0	18,780
Eucalypt medium	55,208	20,168	27	0	75,403
Eucalypt tall	2,419	4,405	74	0	6,898
Mangrove	280	359	353	118	1,110
Melaleuca	3,463	3,722	8	0	7,193
Rainforest	353	1,298	1,791	0	3,442
Other native forest	2,003	476	192	2,029	4,701
Total native forest	92,955	33,848	2,551	2,147	131,501
Area as proportion of total native forest area (%)	71	26	2	2	100

Totals may not tally due to rounding.

Source: ABARES, National Forest Inventory.

[Click here for a Microsoft Excel workbook of the data for Table 1.1a.i-3a.](#)

Table 1.1a.i-3b: Area of native forest, by crown cover class and jurisdiction

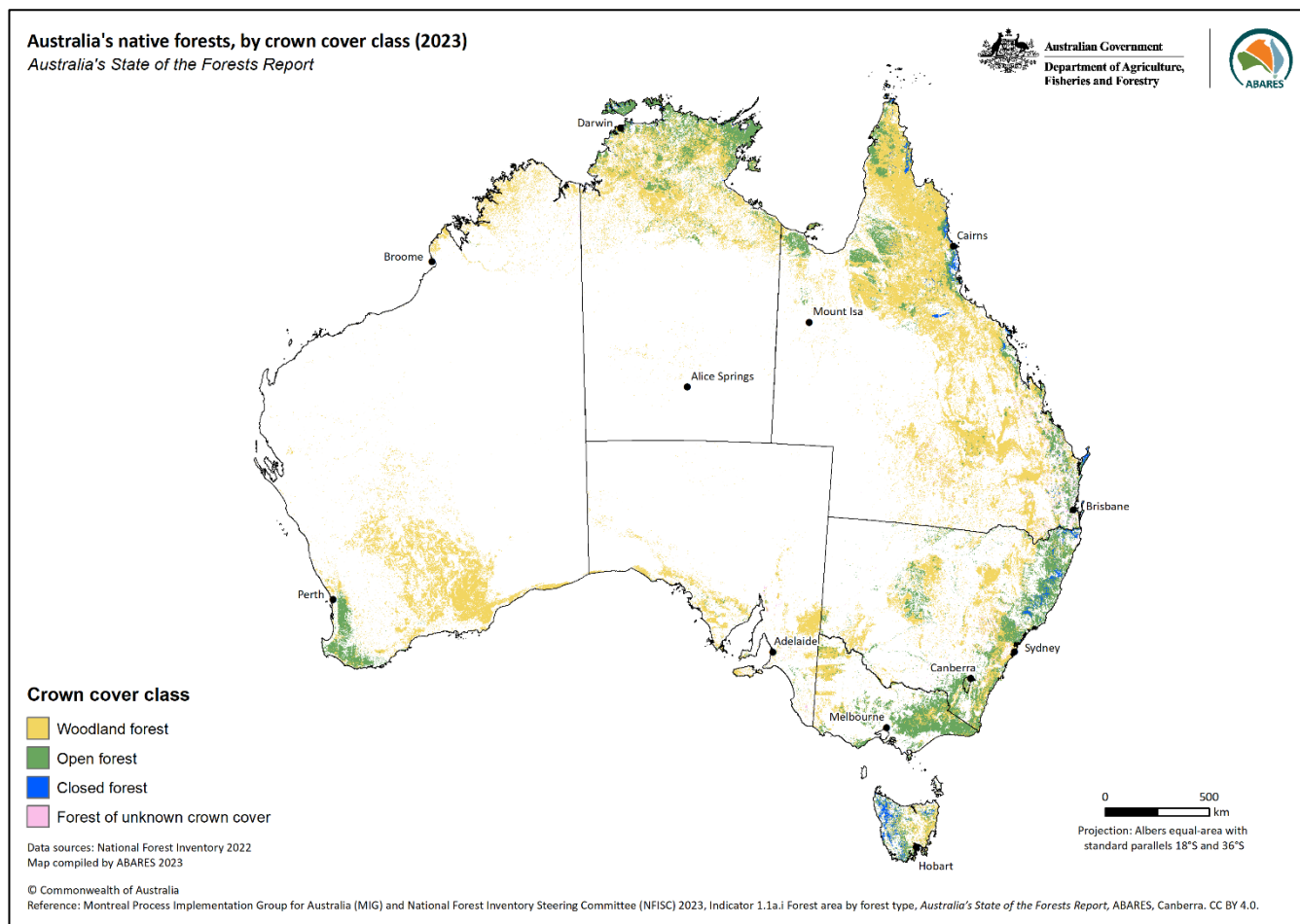
Jurisdiction	Area ('000 hectares) and proportion (%) of cover class									
	Woodland forest		Open forest		Closed forest		Unknown		Total native forest	
	Area	%	Area	%	Area	%	Area	%	Area	%
ACT	38	0.04	92	0.3	0	0	0.1	0.01	130	0.1
NSW	9,813	11	8,982	27	514	20	573	27	19,882	15
NT	15,304	16	7,420	22	399	16	158	7	23,280	18
Qld	40,973	44	8,531	25	1,014	40	1,233	57	51,750	39
SA	4,565	5	257	1	0	0	43	2	4,866	4
Tas.	1,479	2	1,305	4	609	24	0	0	3,393	3
Vic.	2,889	3	4,836	14	2	0	64	3	7,790	6
WA	17,894	19	2,425	7	14	1	76	4	20,409	16
Australia	92,956	100	33,848	100	2,551	100	2,147	100	131,501	100

Totals may not tally due to rounding.

Source: ABARES, National Forest Inventory.

[Click here for a Microsoft Excel workbook of the data for Table 1.1a.i-3b.](#)

Figure 1.1a.i-3: Native forest, by crown cover class



Source: ABARES, National Forest Inventory.

[Click here for high-definition copy of Figure 1.1a.i-3.](#)

Area of Commercial plantations and Other forest

Australia has 1.82 million hectares of Commercial plantations (1.4% of Australia's total forest area). This comprises (Table 1.1a.i-4):

- 1.06 million hectares of softwood plantations (58% of Commercial plantation area)
- 0.74 million hectares of hardwood plantations (41% of Commercial plantation area)
- 0.02 million hectares of unknown or mixed species commercial plantations (1% of Commercial plantation area).

Table 1.1a.i-4: Area of commercial plantation, by type and jurisdiction

Jurisdiction	Commercial plantation area ('000 hectares) and proportion (%) of plantation type							
	Softwood		Hardwood		Unknown or mixed species		Total	
	Area	%	Area	%	Area	%	Area	%
Australian Capital Territory	9	1	0.03	0	0	0	10	1
New South Wales	311	29	57	8	0.3	1	368	20
Northern Territory	2	0	45	6	0	0	47	3
Queensland	193	18	18	2	3	14	214	12
South Australia	130	12	46	6	0.1	0	176	10
Tasmania	81	8	203	27	4	18	288	16
Victoria	235	22	168	23	1	5	403	22
Western Australia	100	9	202	27	14	64	317	17
Australia	1,060	100	739	100	22	100	1,821	100

The area figure for Commercial plantations used in this update of *Australia's State of the Forest Report* is calculated from a rasterised (gridded) version of the National Plantation Inventory vector-format coverage used to produce the area data reported in [Australian plantation statistics and log availability report 2021](#). Conversion of the vector format to the 1-hectare raster format results in the area figure for Commercial plantations reported here (1.82 million hectares) being slightly higher than the area figure reported in [Australian plantation statistics and log availability report 2021](#) (1.77 million hectares).

Totals may not tally due to rounding.

Source: ABARES, National Forest Inventory, National Plantation Inventory.

[Click here for a Microsoft Excel workbook of the data for Table 1.1a.i-4.](#)

Commercial plantations are established in both temperate and tropical regions. Most commercial softwood plantations are in New South Wales (0.31 million hectares, 29% of Australia's total softwood plantation area), Victoria (0.24 million hectares, 22%) and Queensland (0.19 million hectares, 18%). Most commercial hardwood plantations are found in Tasmania and Western Australia (each with 0.20 million hectares and 27% of Australia's total hardwood plantation area) and Victoria (0.17 million hectares, 23%).

The Other forest category comprises 0.24 million hectares (0.2% of total forest area) (Table 1.1a.i-1). This category is dominated by plantations not reported as managed for commercial wood production, and so not listed as Commercial plantations in the National Plantation Inventory. It also contains environmental plantings, sandalwood plantations, and some smaller farm forestry and agroforestry plantations. South Australia has the largest area of Other forest (0.09 million hectares, 38% of the total Other forest area). All Other forest in the Northern Territory is sandalwood plantations.

The Commercial plantation category plus the planted proportion of the Other forest category comprise the 'Planted forests' category used by the Food and Agriculture Organization (FAO) of the United Nations for the five-yearly [Global Forest Resources Assessment](#).

Supporting information for Indicator 1.1a.i Forest area by forest type

Native forest crown cover and stand height classes

Australia's native forests are classified into nine structural classes (Figure 1.1a.i-4). The classification is based on:

- three crown cover classes:
 - Woodland forest, crown cover 20-50%
 - Open forest, crown cover >50-80%
 - Closed forest, crown cover >80-100%
- three stand height classes:
 - Low, height >2-10 metres
 - Medium, height >10-30 metres
 - Tall, height >30 metres.

These structural classes and their area proportions in native forest are shown in Figure 1.1a.i-4 (figures exclude the areas of Mangrove forest and Other native forest for which the height and/or cover class are unknown). Nationally, medium woodland forest is the most common native forest structural class (62 million hectares, 48% of total native forest area), followed by low woodland forest (28 million hectares, 22%). At 0.11 million hectares, tall closed forest has the smallest area proportion (0.1%).

Figure 1.1a.i-4: Native forest structural classes and area proportions, 2021



Percentages are area proportions of each height class/crown cover class combination in Australia's total native forest area, excluding areas of Mangrove forest and Other native forest for which height and cover class are unknown. In accordance with the definition of forest used for the National Forest Inventory, the crown cover values relate to existing or potential crown cover, and the height values relate to mature or potentially mature stand height.

Source: Adapted from a diagram in Australian Land Information Group and Carnahan JA (1990). *Atlas of Australian Resources, Vegetation*. Australian Government Publishing Service, Canberra.

The area of the Eucalypt forest type by height and cover classes is shown in Table 1.1a.i-5. Native forest type and crown cover are reasonably well measured across Australia, but only limited forest height information is collected outside forests in which wood is harvested.

Table 1.1a.i-5: Area of Eucalypt forest, by structural class and jurisdiction

Forest structural class	Area ('000 hectares)								
	ACT	NSW	NT	Qld	SA	Tas.	Vic.	WA	Australia
Eucalypt low woodland	0	2,519	3,867	1,406	3,906	59	1,103	4,479	17,338
Eucalypt low open	0	148	657	36	218	61	199	102	1,420
Eucalypt low closed	0	0.01	1	10	0	6	0	5	22
Eucalypt medium woodland	8	5,670	9,134	28,045	200	1,070	1,427	9,655	55,208
Eucalypt medium open	1	5,138	5,747	3,549	17	209	3,597	1,912	20,169
Eucalypt medium closed	0	1	4	22	0	0	0	0.2	27
Eucalypt tall woodland	30	29	0	2,099	0	259	0	2	2,419
Eucalypt tall open	91	2,086	0	216	0	874	916	222	4,405
Eucalypt tall closed	0	74	0	0	0	0	0	0.02	74
Total Eucalypt forest	129	15,665	19,410	35,382	4,341	2,537	7,240	16,378	101,081

Totals may not tally due to rounding.

Source: ABARES, National Forest Inventory, National Plantation Inventory.

[Click here for a Microsoft Excel workbook of the data for Table 1.1a.i-5.](#)

Eucalypt mallee forest also is separated as a distinct subtype within the Eucalypt forest type. The majority of Eucalypt mallee forest (9.1 million hectares, 87%) is low woodland, and is found predominantly in South Australia and Western Australia (see Table 1.1a.i-6).

Table 1.1a.i-6: Area of Eucalypt mallee forest, by structural class and jurisdiction

Forest structural class	Area ('000 hectares)								
	ACT	NSW	NT	Qld	SA	Tas.	Vic.	WA	Australia
Eucalypt mallee low woodland	0	855	0.4	0	3,749	0	1,091	3,372	9,067
Eucalypt mallee low open	0	2	0	0	211	0	199	1	412
Eucalypt mallee low closed	0	0	0	0	0	0	0	0	0
Eucalypt mallee medium woodland	0	778	0	0.3	0	0	49	3	830
Eucalypt mallee medium open	0	81	0	0	0	0	0	0	81
Eucalypt mallee medium closed	0	0	0	0	0	0	0	0	0
Eucalypt mallee tall woodland	0	27	0	0	0	0	0	0	27
Eucalypt mallee tall open	0	0	0	0	0	0	0	0	0
Eucalypt mallee tall closed	0	0	0	0	0	0	0	0	0
Eucalypt mallee total	0	1,742	0	0	3,960	0	1,339	3,376	10,418
Eucalypt non-mallee total	129	13,922	19,410	35,381	381	2,537	5,901	13,001	90,663
Eucalypt total	129	15,665	19,410	35,382	4,341	2,537	7,240	16,378	101,081

Totals may not tally due to rounding.

Source: ABARES, National Forest Inventory.

[Click here for a Microsoft Excel workbook of the data for Table 1.1a.i-6.](#)

Mapping forest for the 2023 update of forest area for Australia's State of the Forests Report

A Multiple Lines of Evidence (MLE) process was used by ABARES to examine and combine forest cover data from multiple sources to produce the [Forests of Australia \(2023\)](#) spatial dataset. Appropriate independent datasets were intersected using analytical spatial (GIS) software, to identify areas where datasets agree on the allocation of land as forest or on the allocation of land as non-forest. For areas for which the datasets disagree, allocation as forest or non-forest is made through an assessment of the accuracy and/or currency of individual datasets, through using ancillary data from the National Vegetation Information System (NVIS), and through validation with recent high-resolution aerial and satellite imagery. Validation also involves input from and checking by the relevant state and territory agencies. The product is a forest/non-forest binary raster (grid) at 100 metre resolution (each cell or pixel thus being 1 hectare in area).

Input datasets for the MLE process included forest cover data sourced from relevant state or territory agencies, forest cover data from other national programs and datasets such as the *National Greenhouse Accounts* (NGA), which produces the *National Greenhouse Gas Inventory* (NGGI), and the forest cover dataset [Forests of Australia \(2018\)](#) developed for reporting in [Australia's State of the Forests Report 2018](#) (Table 1.1a.i-7). The datasets all have different data dates, and the data date of the combined *Forests of Australia (2023)* dataset is taken as 2021. The publication date for this update is 2023.

Table 1.1a.i-7: Key MLE input datasets

Dataset	Description
Forests of Australia (2018)	<i>Forests of Australia (2018)</i> is the forest extent dataset that was used in <i>Australia's State of the Forests Report 2018</i> . It is a continental dataset of forest extent by national forest categories and types, and was developed by a Multiple Lines of Evidence process from multiple forest, vegetation and land cover spatial data inputs, including contributions from relevant Australian, state and territory government agencies and external sources.
State-wide Land and Tree Study (SLATS) Woody Extent (2018) - Queensland. Also known as Queensland Foliage Projective Cover (FPC) (2018).	The Queensland government SLATS method calculates Foliage Projective Cover (FPC) values from Sentinel-2 satellite images (and before 2018 used Landsat satellite Thematic Mapper™ and Enhanced Thematic Mapper Plus (ETM+) images). ABARES used an empirically derived relationship between FPC and crown-cover values (Scarath et al. 2008) to delineate the landscape into forest and non-forest areas (an FPC of 11% is approximately equivalent to a crown cover of 20%). The Sentinel-2 dataset is produced at 10 m × 10 m resolution, and is supported by on-ground validation. The dataset covers the whole of Queensland, and was developed to support land-clearance legislation and monitoring of change.
National Greenhouse Gas Inventory (2016 – 2020)	The National Greenhouse Gas Inventory (NGGI) dataset is produced from Landsat satellite Thematic Mapper™, Enhanced Thematic Mapper Plus (ETM+) and Operational Land Image images for the Australian Government Department of the Climate Change, Energy, the Environment and Water (DCCEEW), and identifies woody vegetation of height or potential height greater than 2 metres, crown cover greater than 20%, and with a minimum patch size of 0.2 hectares. The dataset is compiled using time-series data since 1972, and is produced at a 25 m × 25 m resolution. The NGGI dataset used was developed by combining five annual layers (2016-2020, inclusive) from the <i>National forest and sparse woody vegetation data (Version 5.0)</i> (DISER 2021) spatial dataset produced using the algorithms for land-use change allocation developed for the <i>National Inventory Reports</i> (DISER 2020). The original 25 m resolution, three-class (forest, sparse woody and non-forest) dataset was resampled to a binary (forest and non-forest) 100 m raster by classifying as forest the 100 m pixels that had more than half their area as forest; the sparse woody and non-forest classes were combined into a non-forest class.
NSW H_Woody_Fuzzy_2_Class	This dataset was developed to support New South Wales Natural Resources Commission's (NRC) Monitoring, Evaluation and Reporting Program and is based on the NGGI dataset produced by DCCEEW from Landsat data.

	NRC applied Fuzzy Logic and Probability modelling to the NGGI dataset to derive annual layers distinguishing between forest and non-forest at 25 m raster resolution. Each of five annual layers, 2015-2019, was resampled to a 100 m raster by classifying as forest the 100 m pixels that had more than half their area as forest as determined from 25 m pixels. The five annual layers were combined and every pixel in the combination that had been classified as forest in any year during 2015-2019 period was allocated as forest (and the balance non-forest). This approach was taken to prevent areas where the crown cover had reduced below 20%, through events such as fire, harvesting, drought or disease, from being incorrectly classified as non-forest.
National Plantation Inventory 2020 spatial dataset	National Plantation Inventory (NPI) data as at 2020 were used to identify the area of Commercial plantations (Legg et al. 2021). The associated spatial vector dataset was converted to a raster format before being integrated with the Multiple Lines of Evidence forest cover raster dataset.
Qld 2016–17, 2017-18, and 2019 Land Clearing datasets	These annual datasets are produced by the Queensland government for the purposes of tracking vegetation clearing in the state, and were used by ABARES to identify and classify as non-forest cleared areas that would otherwise have been incorrectly mapped as forest in <i>Forests of Australia (2023)</i> .
NSW 2017-18, 2018-19 and 2019-20 Woody vegetation clearing datasets	These annual datasets are produced by the New South Wales government for the purposes of tracking vegetation clearing in the state, and were used by ABARES to identify and classify as non-forest cleared areas that would otherwise have been incorrectly mapped as forest in <i>Forests of Australia (2023)</i> .
Tasmania Forest Communities with NVIS Groups 2020 dataset	This statewide forest cover dataset was provided by the Tasmanian government for use in SOFR 2023. The vector (shapefile) dataset distinguishes between forest and non-forest polygons, with the forest polygons further attributed with relevant forest communities, including the dominant tree species. The dataset also includes attributes of vegetation community codes, source data and a National Vegetation Information System attribute that describes high-level forest structure.
Victorian Land Cover (2015-19)	The Victorian Department of Environment, Land, Water and Planning recommended allocating as forest the following cover types from the Victorian Land Cover (2015-19) dataset: <ul style="list-style-type: none"> - Treed native vegetation - Conifer plantation - Hardwood plantation - Mangrove vegetation - Perennial wetland
Global Mangrove Watch (2018)	The Global Mangrove Watch dataset is based on ALOS PALSAR and Landsat imagery, and provides geospatial information about mangrove extent and changes. Geoscience Australia is a collaborator of the GMW project through the Digital Earth Australia project (Bunting et al. 2018; Thomas et al. 2017).
Land Use Mapping Project (LUMP) of the Northern Territory (2016 – 2022)	The LUMP dataset (DEPWS 2020) maps land use in the Northern Territory using the national classification scheme developed by the Australian Collaborative Land Use and Management Program (ACLUMP). The dataset was used to identify and map sandalwood plantations in <i>Forests of Australia (2023)</i> .
National Vegetation Information System (NVIS) 6.0 (2020)	The NVIS dataset contains detailed vegetation descriptions in 6 hierarchal classes, Level 1-6, based on structural and floristic information including dominant genus, growth form, height and cover. Level 6 (VI) Sub-Association (sub-stratum) growth form, height and cover information was used to identify mapped areas that fulfilled the definition of forest (growth form = tree, potential height ≥ 2 m and potential crown cover = 20%).
Catchment Scale Land Use Mapping (CLUM) 2020 land-use mask	The CLUM dataset (ABARES 2020) was used as land-use mask to exclude from the Multiple Lines of Evidence forest cover dataset land uses deemed to be not suitable to carry forests, for example urban residential, industrial, mining, horticulture and intensive agriculture.
Google Earth Pro, Bing Maps and World Imagery by ESRI	The most recent high-resolution imagery from Google Earth Pro, Bing Maps and World Imagery by ESRI were used for validation of forest and non-forest allocation in areas where confidence in other datasets was low.

Attribution of the Forests of Australia (2023) dataset

Each forest pixel (cell) in the [Forests of Australia \(2023\)](#) dataset was given a number of attributes, including for forest type, tenure, height and canopy cover (Table 1.1a.i-8).

Table 1.1a.i-8: Data sources for attribution of forest areas

Parameter	Data sources (ordered by priority)	Notes
Forest type	<ul style="list-style-type: none"> • NPI 2020, then • Land Use Mapping Project of the Northern Territory (LUMP), 2016-2022 • Tasmania Forest Communities with NVIS Groups 2020, then • NVIS 6.0, then • <i>Forests of Australia (2018)</i> 	<p>A hierarchical approach was used to derive and allocate National Forest Inventory (NFI) forest types to the NFI 2021 forest cover dataset in the following order:</p> <ol style="list-style-type: none"> 1. the NPI 2021 spatial dataset was used to allocate types to Commercial plantations 2. the NT LUMP 2016-2022 dataset was used to allocate sandalwood plantations in the Northern Territory to 'Other forest' 3. native forest types were then allocated: <ul style="list-style-type: none"> – Tasmania, from <i>Tasmania Forest Communities with NVIS Groups 2020</i> – ACT, from <i>Forests of Australia (2018)</i> – for all other states and territories, from Major Vegetation Subgroup (MVS), Major Vegetation Group (MVG), Level V and Level VI categories of the NVIS 6.0 dataset. 4. where forest types could not be allocated from the above sources, forest types used in <i>Forests of Australia (2018)</i> were allocated 5. any remaining native forest areas not allocated a forest type were allocated as "Other native forest". Planted forest areas not allocated a type were allocated as "Other forest".
Forest tenure	<ul style="list-style-type: none"> • Jurisdictional land tenure datasets from relevant land titles registries and spatial data agencies, then • National land tenure data from PSMA Australia Limited (2019), then • <i>Tenure of Australia's Forests (2018)</i>, as used for SOFR 2018. 	<p>The process to allocate tenure categories to the NFI 2021 dataset used a combination of national tenure information from PSMA, and data from all jurisdictions. Data sources used for each jurisdiction were prioritised based on the assessed accuracy of each dataset.</p>
Forest height and cover	<ul style="list-style-type: none"> • NVIS 6.0, then • Tasmania Forest Communities with NVIS Groups 2020, then • <i>Forests of Australia (2018)</i>. 	

NFI, National Forest Inventory; NPI, National Plantation Inventory; NVIS, National Vegetation Information System; PSMA, PSMA Australia Ltd (now trading as Geoscape Australia).

Differences between the forest area reported in SOFR 2018 and the 2023 forest area update

This section outlines methodological reasons why the forest areas reported in this 2023 update of the forest area for *Australia's State of the Forests Report* (SOFR) differ from the forest areas reported in [Australia's State of the Forests Report 2018](#). The areas reported in this 2023 update of forest area are drawn from the [Forests of Australia \(2023\)](#) dataset, whereas the areas reported in *Australia's State of the Forests Report 2018* were drawn from the *Forests of Australia (2018)* dataset. Regular methodological updates mean that differences in reported

areas between successive SOFRs do not necessarily reflect actual, on-ground change in forest area. Measurement of the actual, on-ground change in forest area over time uses a different approach (see [Indicator 1.1a.iv – Forest area change over time](#)).

Continual improvement in measuring the extent of Australia's forests, and in the reporting of forest area, has occurred since national figures were first reported in 1974 (Forwood 1975). Australia's reported forest area has fluctuated between 105 million hectares and 164 million hectares since that date, but these historic fluctuations in reported areas did not represent actual changes in on-ground forest cover. Instead, they were generally due to a combination of:

- changes in the area basis reported (from only commercial forests to all forests)
- changes prior to 1998 in the definition of forest
- variability in state and territory data
- correction of mapping errors
- the progressive incorporation of a variety of remotely sensed datasets, and
- recent validation with high-resolution aerial and satellite imagery.

Australia's total forest area of 133.6 million hectares calculated as at 2021 from the *Forests of Australia (2023)* dataset, and reported in this 2023 update of forest area, differs by only 0.4% from the total forest area as at 2016 calculated from the [Forests of Australia \(2018\)](#) dataset and reported in SOFR 2018. The small difference, and the larger differences in the detailed mapping that underpins it, mostly reflect the incorporation of new and updated data provided by states and territories, delivered as a result of technological advances. A greater coverage of recent, high-resolution imagery for validation also facilitated the reclassification of some areas from forest to non-forest, and other areas from non-forest to forest.

Differences in forest area

Australia's total forest area calculated from the *Forests of Australia (2023)* dataset and reported in this 2023 update of forest area is 133.6 million hectares. This is 476 thousand hectares (0.4%) less than the forest area calculated from the *Forests of Australia (2018)* dataset and reported in SOFR 2018 (Table 1.1a.i-9). This net decrease is the sum of

- 3.58 million hectares now identified as forest that was identified as non-forest in the *Forests of Australia (2018)* dataset, and
- 4.06 million hectares that was identified as forest in the *Forests of Australia (2018)* dataset but that is now identified as non-forest in the *Forests of Australia (2023)* dataset.

Most of these differences do not reflect actual, on-ground changes of forest area, but instead reflect improved data accuracy and improved coverage of the high-resolution aerial and satellite imagery used for validation.

The area identified as forest in the *Forests of Australia (2023)* dataset is smaller than the area identified as forest in the *Forests of Australia (2018)* dataset in the Northern Territory (402 thousand hectares, 1.7% of the jurisdiction's forest area) and Western Australia (215 thousand hectares, 1.0%), and is larger than the area identified as forest in the *Forests of Australia (2018)* dataset in Queensland (146 thousand hectares, 0.3%) and South Australia (71 thousand hectares, 1.4%).

Table 1.1a.i-9: Forest area differences between the *Forests of Australia (2018)* dataset reported in SOFR 2018 and the *Forests of Australia (2023)* dataset reported in this 2023 update of forest area

Jurisdiction	Area ('000 hectares) and proportion (%) of <i>Forests of Australia (2023)</i> area						
	Forests of Australia (2018) ¹	Forests of Australia (2023) ²	Difference		Non-forest in <i>Forests of Australia (2018)</i> but forest in <i>Forests of Australia (2023)</i>	Forest in <i>Forests of Australia (2018)</i> but non-forest in <i>Forests of Australia (2023)</i>	Forest in both <i>Forests of Australia (2018)</i> and <i>Forests of Australia (2023)</i>
	Area	Area	Area	(%)	Area	Area	Area
Australian Capital Territory	142	143	1	0.4	1	0	142
New South Wales	20,368	20,284	-83	-0.4	324	407	19,960
Northern Territory	23,735	23,333	-402	-1.7	396	798	22,937
Queensland	51,830	51,977	146	0.3	1,903	1,757	50,074
South Australia	5,060	5,131	71	1.4	119	47	5,012
Tasmania	3,699	3,707	9	0.2	150	142	3,557
Victoria	8,222	8,224	2	0.0	148	147	8,075
Western Australia	20,981	20,766	-215	-1.0	544	759	20,222
Australia	134,037	133,565	-476	-0.4	3,585	4,057	129,980

Totals may not tally due to rounding.

¹Data from the *Forests of Australia (2018)* dataset were reported in *Australia's State of the Forests Report 2018*.

²Data from the *Forests of Australia (2023)* dataset are reported in this 2023 update of forest cover for *Australia's State of the Forests Report*.

Source: ABARES, National Forest Inventory, National Plantation Inventory.

[Click here for a Microsoft Excel workbook of the data for Table 1.1a-9.](#)

Nationally, the area identified consistently as forest, that is, in both the *Forests of Australia (2018)* dataset and the *Forests of Australia (2023)* dataset, was 130 million hectares (97% of the total forest area in either dataset). Furthermore, in all jurisdictions, at least 96% of the area identified as forest in the *Forests of Australia (2023)* dataset has also been identified as forest in the *Forests of Australia (2018)* dataset. These results give a high level of confidence in the areas classified as forest by the Multiple Lines of Evidence (MLE) process, and demonstrate the improved consistency that the MLE methodology has brought to the mapping of Australia's forest extent.

Datasets driving increased accuracy of forest area determination

The largest area identified as forest in the [Forests of Australia \(2023\)](#) dataset that was identified as non-forest in the [Forests of Australia \(2018\)](#) dataset is in Queensland (1.9 million hectares). The largest area identified as non-forest in the *Forests of Australia (2023)* dataset that was identified as forest in the *Forests of Australia (2018)* dataset is also in Queensland (1.8 million hectares). These changes result from the Queensland Statewide Landcover and Trees Study (SLATS) process using Sentinel 2 satellite data at 10 m resolution instead of Landsat satellite data at 30 m resolution to derive Queensland's Foliage Projective Cover (FPC) dataset, a key input into the Multiple Lines of Evidence (MLE) process; and from the use of 1 m resolution imagery from Earth-1 to restrict the SLATS coverage to areas with tree cover. Improved coverage of high-resolution imagery for validation (Google EarthPro, Bing Maps and ESRI World Imagery) and the new NVIS 6.0 dataset also enabled better classification in Queensland.

Classification changes, also driven by new data, exist in other jurisdictions, notably Western Australia and the Northern Territory. In both these jurisdictions, the new Global Mangrove Watch (2018) dataset identified mangrove forest not previously identified. Other validation by these jurisdictions enabled identification of non-

forest areas incorrectly identified as forest in the *Forests of Australia (2018)* dataset. The Northern Territory Department of Environment, Parks and Water Security provided an unpublished dataset with boundaries of treeless plains, which were used to reclassify as non-forest areas of shrublands and low open woodlands that were previously classified as forest (Figure 1.1a.i-5) (Emberg et al. 2023).

Figure 1.1a.i-5: Stunted *Eucalyptus tetradonta* vegetation on Groote Island (Northern Territory) reclassified from forest to non-forest based on new information.

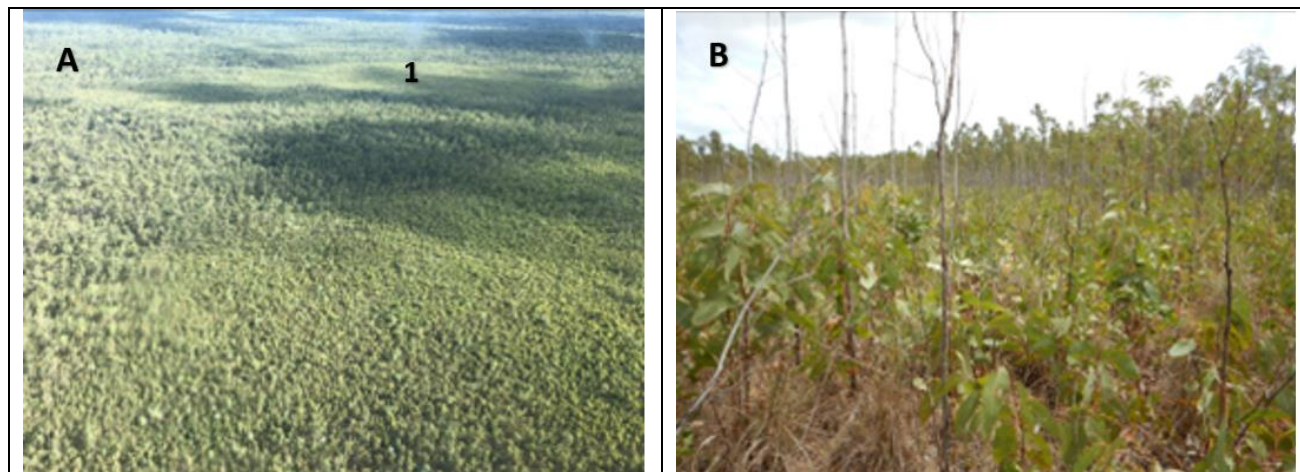


Image B shows the stunted *Eucalyptus tetradonta* in area 1 of image A. Images provided by Northern Territory Department of Environment, Parks and Water Security

Significant revisions of the NVIS 5.1 dataset occurred between 2016 and 2019, with production of NVIS 6.0. This included reattribution of Major and Sub-Major Vegetation Groups in many areas across multiple states, and updates to the spatial boundaries of some NVIS polygons, which with improved coverage of high-resolution imagery for validation supported reclassification of many areas.

For the *Forests of Australia (2018)* dataset, the 2015 annual spatial layer of the National Greenhouse Gas Inventory (NGGI) dataset was used as an input into the MLE process. For the *Forests of Australia (2023)* dataset, five annual NGGI layers (2016 to 2020 inclusive) were combined to form a single input. This allowed retention of disturbed forest areas where canopy cover had temporarily reduced below 20%, and enabled identification of forest areas previously incorrectly identified as non-forest.

Woody vegetation clearing data for 2017-20 from the Statewide Landcover and Trees Study (SLATS) programs in Queensland and New South Wales was separated into areas of forest cleared by activities associated with a land-use change (e.g. urban development, pasture or mining), which were re-reclassified as non-forest, and areas where canopy cover loss was temporary (e.g. forest harvesting or thinning), which were retained as forest.

It was more difficult to identify areas classified as non-forest in the *Forests of Australia (2018)* dataset but that are now classified in the *Forests of Australia (2023)* dataset as forest due to regrowth or forest expansion. This is because transitions from non-forest to forest are generally gradual, whereas transitions from forest to non-forest are generally abrupt.

Reallocation of forest to non-forest due to new data and improved imagery

The examples provided in Figures 1.1a.i-6 and 1.1a.i-7 show areas classified as forest in the *Forests of Australia (2018)* dataset but reallocated as non-forest in the *Forests of Australia (2023)* dataset due to new data and improved coverage of high-resolution imagery for validation. They do not relate to actual on-ground change in forest cover.

Reallocation as non-forest of areas incorrectly classified as forest in the [Forests of Australia \(2018\)](#) dataset occurred for naturally treeless landscapes (heathlands, shrublands and grasslands) including: Grevillea heathlands on Cape York (Figure 1.1a.i-6); Acacia shrublands in central Queensland (Figure 1.1a.i-7); treeless plains of the Northern Territory (Figure 1.1a.i-5 above); and hummock grasslands on sandstone peninsulas in the King Leopold Ranges in Western Australia.

Figure 1.1a.i-6: Example of an area classified as forest in the *Forests of Australia (2018)* dataset but as non-forest in the *Forests of Australia (2023)* dataset due to better floristics information and high-resolution imagery. Cape York, northern Queensland. Individual green and pink squares on images B and C have an area of 1 hectare (100 m x 100 m).

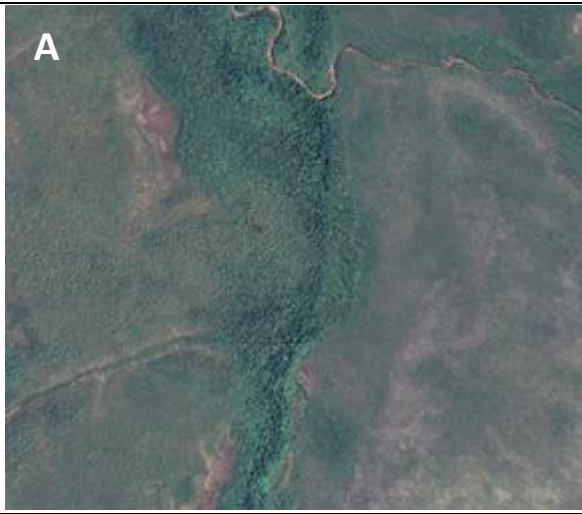

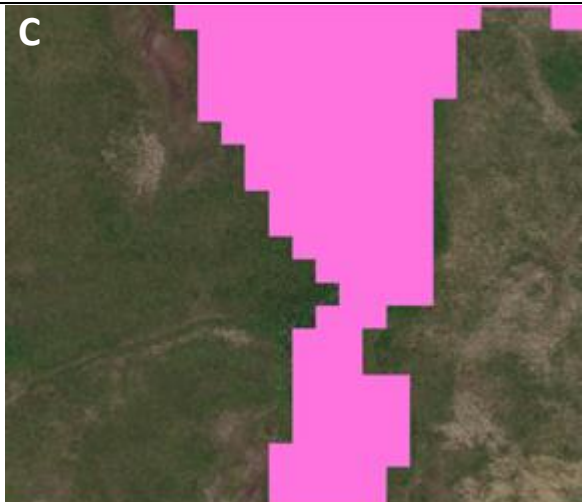


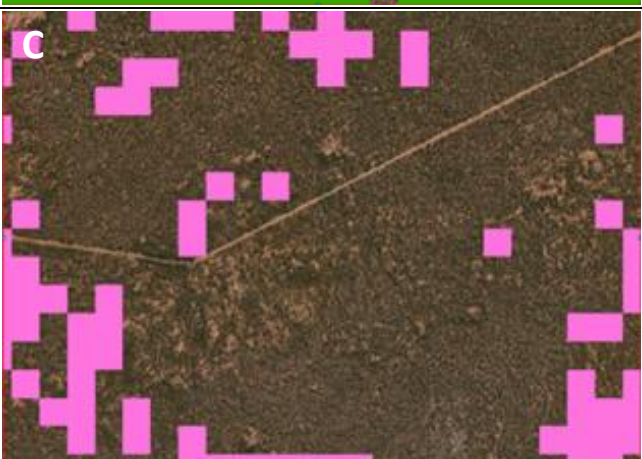
 <p>A</p>	<p>A High-resolution Google EarthPro imagery (2017).</p> <p>The updated NVIS 6.0 Major Vegetation Subgroups (MVS) for this area are ‘Heathlands’ on the left and right areas of the image and ‘Other forests and woodlands’ along the centre of the image and along the river.</p>
 <p>B</p>	<p>B Green area was classified as forest in the <i>Forests of Australia (2018)</i> dataset.</p> <p>Large areas of heathland (dominated by <i>Grevillea glauca</i>, <i>Melaleuca viridiflora</i> and <i>G. pteridifolia</i>) were incorrectly classified as forest in the <i>Forests of Australia (2018)</i> dataset.</p>
 <p>C</p>	<p>C Pink area now classified as forest in the <i>Forests of Australia (2023)</i> dataset. Background is 2021 imagery from ESRI World Imagery.</p> <p>The updated NVIS MVS for the non-coloured areas is ‘Heathlands’ and upper stratum tree height code is ‘6’ indicating a height range of 2-10 m, and cover code is ‘bi’ indicating tree crown cover range of 0–0.25%. The tree crown cover is consistent with allocation of the area as non-forest, validated by imagery.</p> <p>The updated NVIS 6.0 MVS for the pink areas is ‘Other forests and woodland’.</p>

Figure 1.1a.i-7: Example of an area classified as forest in the *Forests of Australia (2018)* dataset but as non-forest in the *Forests of Australia (2023)* dataset due to better floristics information. Jundah, central Queensland. Individual mid-green and pale-green squares on images B and C have an area of 1 hectare (100 m x 100 m).

	<p>A High-resolution Google EarthPro imagery (2020).</p> <p>The updated NVIS Major Vegetation Subgroups (MVS) for this area are ‘Acacia shrublands’, a non-forest vegetation type. Upper stratum has <i>Eucalyptus populnea</i> and <i>Grevillea striata</i> as emergents.</p>
	<p>B Green area classified as forest in the <i>Forests of Australia (2018)</i> dataset.</p> <p>Most of the area is described in the updated NVIS 6.0 MVS as ‘Acacia shrublands’.</p>
	<p>C Only pink squares are now classified as forest in <i>Forests of Australia (2023)</i> dataset. Background is 2021 imagery from ESRI World Imagery.</p> <p>The upper stratum tree height code for the non-coloured areas is ‘6’ indicating a height range of 2–10 m. However, the cover code is ‘bi’ indicating a crown cover range of 0–0.25% or non-forest.</p>

Reallocation of non-forest to forest due to new data and improved imagery

The examples provided in Figures 1.1a.i-8, 1.1a.i-9 and 1.1a.i-10 show areas classified as non-forest in the [Forests of Australia \(2018\)](#) dataset but reallocated as forest in the [Forests of Australia \(2023\)](#) dataset due to new data and improved coverage of high-resolution imagery for validation. They do not relate to actual on-ground change in forest cover.

The examples are from different ecosystems including woodland, rainforest and mangrove forests.

Figure 1.1a.i-8: Example of an area classified as non-forest in the *Forests of Australia (2018)* dataset but as forest in the *Forests of Australia (2023)* dataset due to new datasets and high-resolution imagery. South of Croydon, northern Queensland. Individual green and pink squares on images B and C have an area of 1 hectare (100 m x 100 m).



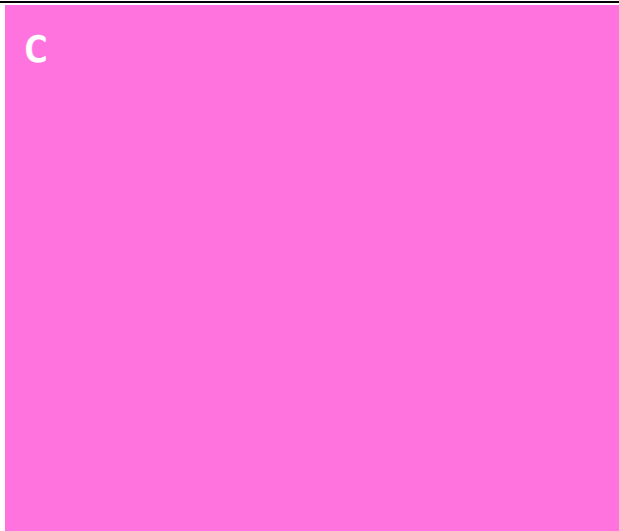
<p>A</p> 	<p>A High-resolution Google EarthPro imagery (2020).</p> <p>The updated NVIS Major Vegetation Subgroup (MVS) for this area is ‘Melaleuca open forests and woodlands’. The upper stratum tree height code is ‘7’ indicating a height range of 10–30 m, and cover code is ‘i’ indicating a tree crown cover range of 20–50%. The crown cover is consistent with allocation of the area as forest, validated by imagery.</p>
<p>B</p> 	<p>B Green area classified as forest in the <i>Forests of Australia (2018)</i> dataset. Background is 2021 imagery from ESRI World Imagery.</p> <p>Areas of ‘Melaleuca open forests and woodlands’ are incorrectly classified as non-forest in the <i>Forests of Australia (2018)</i> dataset.</p>
<p>C</p> 	<p>C All the area, pink, classified as forest in the <i>Forests of Australia (2023)</i> dataset.</p> <p>The updated NVIS Major Vegetation Subgroup (MVS) for the pink areas is Melaleuca open forests and woodlands’ and the upper stratum tree height code is ‘7’ indicating a height range of 10–30 m, and cover code is ‘i’ indicating a tree crown cover range of 20–50%. The crown cover is consistent with allocation of the area as forest.</p>

Figure 1.1a.i-9: Example of an area classified as non-forest in the *Forests of Australia (2018)* dataset but as forest in the *Forests of Australia (2023)* dataset due to new datasets and high-resolution imagery. North of Corinna, western Tasmania. Individual green and pink squares on images B and C have an area of 1 hectare (100 m x 100 m).


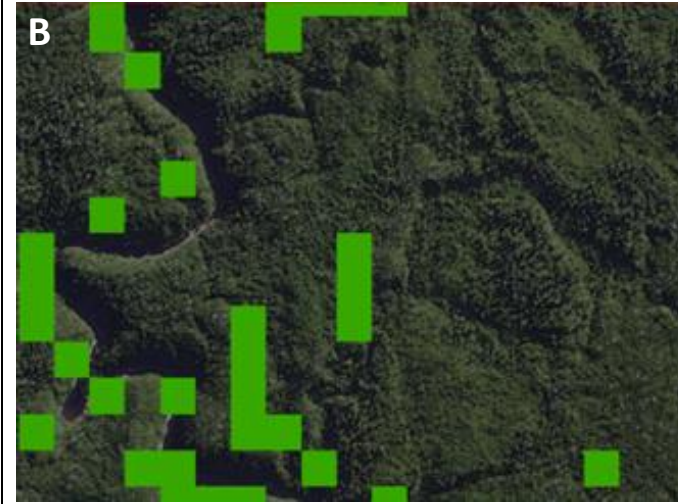
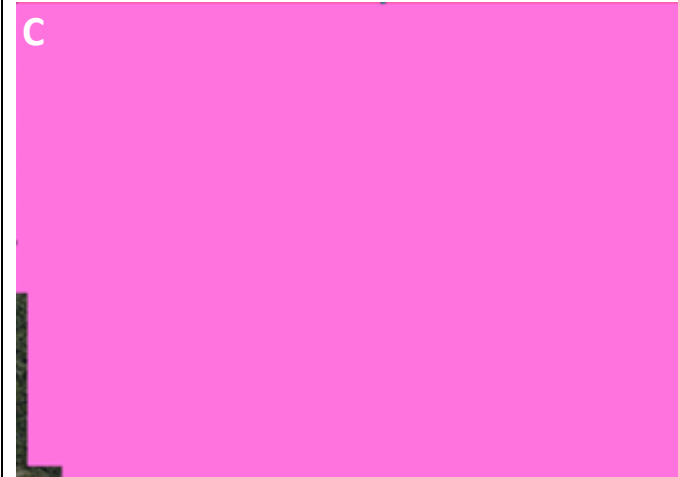



 <p>A</p>	<p>A) High-resolution Google EarthPro imagery (2022).</p> <p>The updated NVIS Major Vegetation Subgroups (MVSs) for this area include ‘Cool temperate rainforest’ and ‘Eucalypt tall open forests’. The upper strata tree height codes are ‘7’ and ‘8’ indicating a height range of 10–30 m and greater than 30 m, and cover codes are ‘d’ and ‘c’ indicating a crown cover ranges of 50–70% and greater than 70%.</p>
 <p>B</p>	<p>B) Green squares classified as forest in the <i>Forests of Australia (2018)</i> dataset. Background is 2021 imagery from ESRI World Imagery.</p> <p>Areas of ‘Cool rainforest’ and ‘Eucalypt tall open forests’ incorrectly classified as non-forest in the <i>Forests of Australia (2018)</i> dataset.</p>
 <p>C</p>	<p>C) All the area, pink, classified as forest in the <i>Forests of Australia (2023)</i> dataset.</p> <p>Areas of ‘Cool rainforest’ and ‘Eucalypt tall open forests’ correctly classified as forest in the <i>Forests of Australia (2023)</i> dataset.</p>

Figure 1.1a.i-10: Example of an area classified as non-forest in the *Forests of Australia (2018)* dataset but as forest in the *Forests of Australia (2023)* dataset due to better new datasets and high-resolution imagery. Derby, Western Australia. Individual green and pink squares on images B and C have an area of 1 hectare (100 m x 100 m).

 <p>A) High-resolution Google EarthPro imagery (2018). NVIS Major Vegetation Subgroup (MVS) attributes areas labelled 1 as 'Unknown'. However, these areas are mapped as mangrove forest by the Global Mangrove Watch (2018) dataset and this allocation is supported by the high-resolution imagery.</p>	<p>A) High-resolution Google EarthPro imagery (2018). NVIS Major Vegetation Subgroup (MVS) attributes areas labelled 1 as 'Unknown'. However, these areas are mapped as mangrove forest by the Global Mangrove Watch (2018) dataset and this allocation is supported by the high-resolution imagery.</p>
 <p>B) Green squares, areas classified as forest in the <i>Forests of Australia (2018)</i> dataset. Background is 2021 imagery from ESRI World Imagery. Area 1 in image A) is mangrove forest incorrectly classified as non-forest in the <i>Forests of Australia (2018)</i> dataset.</p>	<p>B) Green squares, areas classified as forest in the <i>Forests of Australia (2018)</i> dataset. Background is 2021 imagery from ESRI World Imagery. Area 1 in image A) is mangrove forest incorrectly classified as non-forest in the <i>Forests of Australia (2018)</i> dataset.</p>
 <p>C) Pink squares, areas classified as forest in the <i>Forests of Australia (2023)</i> dataset. Background is 2021 imagery from ESRI World Imagery. Mangrove forest previously classified as non-forest in the <i>Forests of Australia (2018)</i> dataset is correctly classified as forest in the <i>Forests of Australia (2023)</i> dataset.</p>	<p>C) Pink squares, areas classified as forest in the <i>Forests of Australia (2023)</i> dataset. Background is 2021 imagery from ESRI World Imagery. Mangrove forest previously classified as non-forest in the <i>Forests of Australia (2018)</i> dataset is correctly classified as forest in the <i>Forests of Australia (2023)</i> dataset.</p>

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More information

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Acknowledgement of Country

We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.

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Indicator 1.1a: Area of forest by forest type and tenure

This indicator uses the area for each forest type over time as a broad measure of the extent to which forest ecosystems and their diversity are being maintained. Reporting on forest tenure aids our understanding of how different land management regimes may impact on forest biodiversity.



1.1a.ii Forest area by tenure (2023)

This part of Indicator 1.1a presents the area of Australia's forests by tenure.

The three other parts of Indicator 1.1a are:

1.1a.i Forest area by forest type

1.1a.iii Forest area in Regional Forest Agreement regions

1.1a.iv Forest area change over time

Context

Land tenure is the mechanism that declares the legal relationship between people and land. Tenure is a key forest attribute and has a major bearing on the management intent for forests.

Definition

The National Forest Inventory classifies land into six tenure classes: Leasehold forest, Multiple-use public forest, Nature conservation reserve, Other Crown land, Private forest, and Unresolved tenure.

Other terms used here can be found in [Australia's forests and forestry glossary](#).

Key points

- The majority of Australia's 133.6 million hectares of forest is privately managed under private and leasehold land (90.8 million hectares, 68% of total native forest).
- 22.1 million hectares (17%) of Australia's forest is on formal nature conservation reserves.
- 10.7 million hectares (8.0%) of Australia's forest is on multiple-use public native forest tenure.
- 10.0 million hectares (7.6%) of Australia's forest is on other Crown land or where tenure is unresolved.

What is tenure?

Land tenure is the formal land title system that declares the legal relationship between people and land. Tenure describes who owns which land, and determines who has the right to use and occupy land and the activities that are permitted on that land. For forests, land tenure is a key attribute that has a major bearing on how forests can be managed, and underpins the identification of who has access to, and rights of use over, forests and forest resources. Tenure of forest land cannot always be used to determine ownership of trees.

In the National Forest Inventory, forest tenure is reported in six national tenure classes that bring together the range of tenures used by each state and territory across Australia:

- **Leasehold forest** – Crown land held under leasehold title, and generally privately managed although state and territory governments may retain various rights over the land, including over forests or timber on the land. This class includes land held under leasehold title with special conditions attached for designated Indigenous communities.

- **Multiple-use public forest** – Publicly owned state forest, timber reserves and other land on which a range of forest values are managed by state and territory government agencies in accordance with relevant Acts and regulations. The forest values can include provision of wood for harvest, supply of water, conservation of biodiversity, recreation, and environmental protection.
- **Nature conservation reserve** – Crown land that is formally reserved for environmental, conservation and recreational purposes, including national parks, nature reserves, state and territory recreation and conservation areas, and some formal reserves in state forests as defined by jurisdictions. It does not include informal reserves and those pending gazettal. The commercial harvesting of wood and non-wood forest products is generally not permitted in nature conservation reserves.
- **Other Crown land** – Crown land reserved for a variety of purposes, including utilities, scientific research, education, stock routes, mining, water-supply catchments, and use by Indigenous communities. Includes Crown land that is unreserved or unallocated. Excludes leasehold forest, nature conservation reserve, and multiple-use public forest.
- **Private forest** – Land held under freehold title and typically under private ownership. It excludes leased Crown land, but includes land held under freehold title with special conditions attached for designated Indigenous communities.
- **Unresolved tenure** – Land where data are insufficient to determine land ownership status.

The process for determining the tenure of Australia’s forest is summarised in the [Supporting information for Indicator 1.1a.ii – Forest area by tenure](#) and in Jacobsen et al. (2019). The process accepts state and territory datasets as the authoritative source of tenure data, where they are available. The most recent spatial compilation for this indicator, [Tenure of Australia’s forests \(2023\)](#), supplements these state and territory datasets with national land tenure information from PSMA Australia Limited and previous NFI national tenure compilations.

Changes over time in the area of forest in different tenure classes reflect both changes in the total area of forest and changes in tenure classification of some areas of forest (see [Supporting information for Indicator 1.1a.ii – Forest area by tenure](#)).

Australia’s forest area by tenure class

Private and Leasehold forests account for 90.8 million hectares of Australia forests (68% of Australia’s total forest area) (Table 1.1a.ii-1a). Queensland contains the largest area of Leasehold forest, with 27.4 million hectares, and Private forest with 16.1 million hectares (Figure 1.1a.ii-1).

Forest on Nature conservation reserve tenure accounts for 22 million hectares of forest (17%), most of which is native forest (Table 1.1a.ii-1b). Large areas of these are found in New South Wales, Western Australia and Queensland (Figure 1.1a.ii-1).

Table 1.1a.ii-1a: Area of forest by jurisdiction and tenure

Tenure class	Area ('000 hectares)									Proportion of total forest (%)
	ACT	NSW	NT	Qld	SA	Tas.	Vic.	WA	Total forest	
Leasehold forest	8	3,913	9,749	27,428	1,427	9	0.2	5,422	47,956	36
Multiple-use public forest	16	2,122	0	3,140	29	762	3,292	1,352	10,715	8.0
Nature conservation reserve	117	5,638	11	4,236	1,758	1,533	3,458	5,301	22,052	17
Other Crown land	1	837	487	932	74	379	131	6,971	9,812	7.3
Private forest	0	7,708	13,064	16,114	1,839	1,024	1,342	1,720	42,811	32
Unresolved tenure	0	66	23	126	3	0	0	0	218	0.2
Total forest	143	20,284	23,333	51,977	5,131	3,707	8,224	20,766	133,565	100

Totals may not tally due to rounding.

Source: ABARES, National Forest Inventory.

[Click here for a Microsoft Excel workbook of the data for Table 1.1a.ii-1a.](#)

Table 1.1a.ii-1b: Area of native forest, by tenure class and jurisdiction

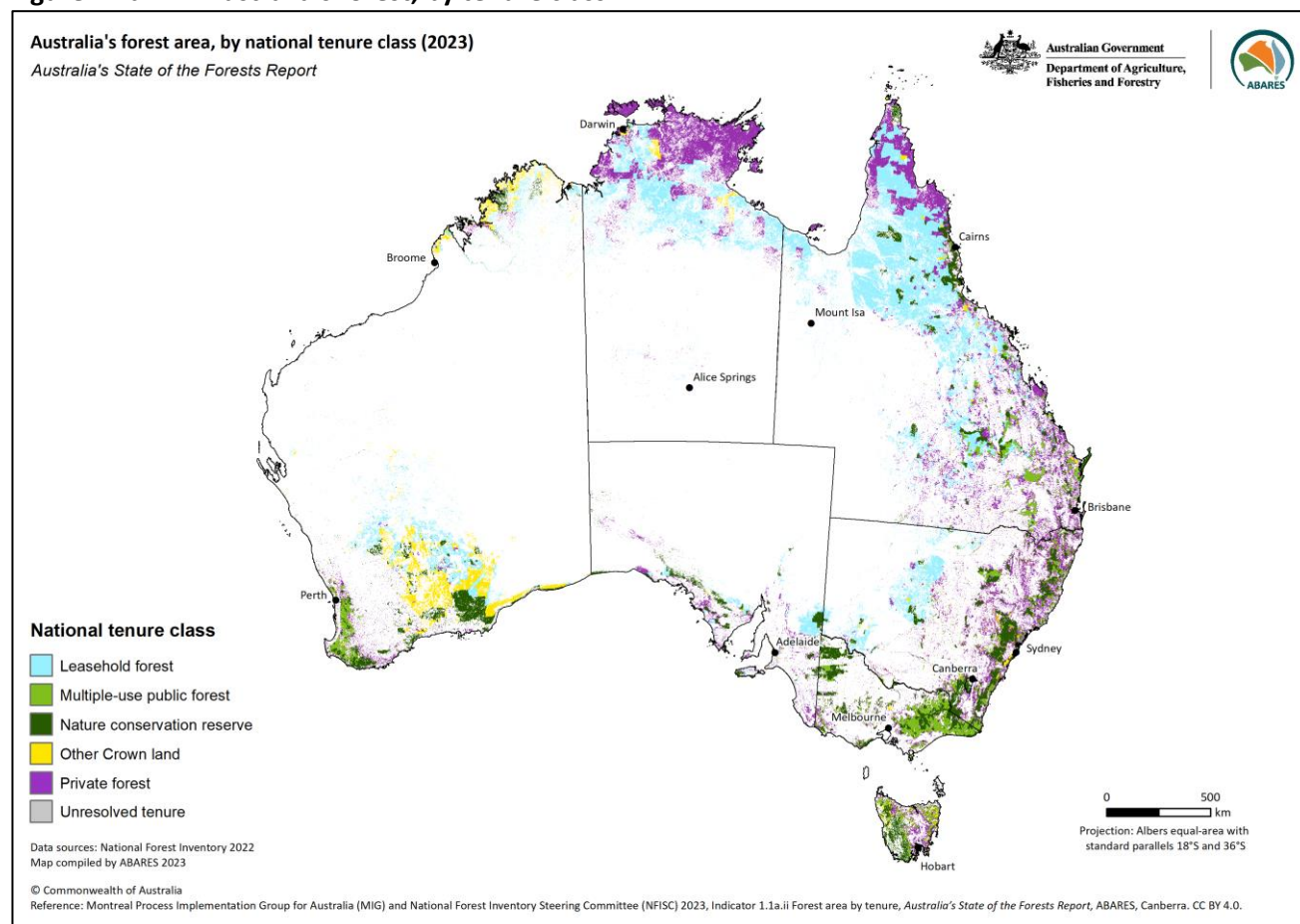
Tenure class	Area ('000 hectares)									Total native forest	Proportion of total native forest (%)
	ACT	NSW	NT	Qld	SA	Tas.	Vic.	WA			
Leasehold forest	8	3,913	9,749	27,428	1,406	8	0.2	5,414	47,926	36	
Multiple-use public forest	5	1,857	0	2,948	16	645	3,162	1,294	9,927	7.5	
Nature conservation reserve	117	5,637	11	4,236	1,756	1,532	3,456	5,292	22,037	17	
Other Crown land	0.5	829	486	932	72	377	127	6,938	9,763	7.4	
Private forest	0	7,580	13,011	16,081	1,613	831	1,044	1,471	41,631	32	
Unresolved tenure	0	66	23	126	3	0	0	0	218	0.2	
Total native forest	130	19,882	23,280	51,750	4,866	3,393	7,790	20,409	131,501	100	

Totals may not tally due to rounding.

Source: ABARES, National Forest Inventory.

[Click here for a Microsoft Excel workbook of the data for Table 1.1a.ii-1b.](#)

Figure 1.1a.ii-1: Australia's forest, by tenure class



[Click here to download a high-resolution version of Figure 1.1a.ii-1.](#)

Forest on Private and Leasehold tenure

Private and Leasehold forest contain the largest area of Australia's forests, totaling 90.8 million hectares (Table 1.1a.ii-1a). The largest areas of these are in the Northern Territory and Queensland (Figure 1.1a.ii-1).

Of Australia's total forest area of 134 million hectares:

- 48.0 million hectares (36%) is on Leasehold tenure and
- 42.8 million hectares (32%) is on Private tenure.

This combined 90.8 million hectares is privately managed forest¹ and covers 68% of the total area of Australia's forest. Freehold land held by Indigenous communities is included in the national land tenure class of Private forest.

Of the total area of 132 million hectares of native forest (Table 1.1a.ii-1b):

- 47.9 million hectares (36% of the total area of Australia's native forest) is on Leasehold tenure
- 41.6 million (32%) hectares is on Private tenure.

Together, a total of 89.6 million hectares (68%) of native forest are privately managed. Some of these forests are privately managed for wood production.

The jurisdictions with the highest proportion of their native forest that is privately managed are:

- the Northern Territory (96% of native forest area)
- Queensland (84% of native forest area).

In Queensland, under the *Forestry Act 1959* the state retains rights of ownership and access to timber and associated forest products of commercial value on all Crown land, including land leased to a private lessee under the *Land Act 1994*.

The jurisdictions with the lowest proportions of their native forest that is privately managed are:

- Victoria (13% of native forest area)
- the Australian Capital Territory (6% of native forest area).

Forest on Nature conservation reserve tenure

Forest on Nature conservation reserve tenure total 22.1 million hectares of Australia's total forest area of 134 million hectares (17% of total forest area) (Table 1.1a.ii-1a). Effectively all of this is native forest (Table 1.1a.ii-1b).

By jurisdiction, the largest area of native forest on Nature conservation reserve tenure is in:

- New South Wales with 5.6 million hectares (26% of the total native forest on Nature conservation reserve tenure)
- Western Australia with 5.3 million hectares (24%).

The Australian Capital Territory has the highest proportion of its total native forest area on Nature conservation reserve tenure (90%), followed by Tasmania (45%), Victoria (44%) and South Australia (36%) (Table 1.1a.ii-1a).

Nature conservation reserves have a range of legislated management intents including the protection of biodiversity. Some forest areas in other land tenure classes also have their legislated management intent as protection of biodiversity, including Indigenous-owned or Indigenous-managed land on private, leasehold or other Crown land. Further information and data can be found in:

- forest in protected area categories (Indicator 1.1c)
- Indigenous forest estate (Indicators 6.4a and 6.4c in Criterion 6).

¹ Excluding the small areas of Leasehold tenure where the Commonwealth is the lessee

Multiple-use public forest tenure

Forest on Multiple-use public forest tenure totals 10.7 million hectares (8.0% of Australia's total 134 million hectares of forest) (Table 1.1a.ii-1a). These forests are predominately in the south-east and south-west of Australia (Figure 1.1a.ii-1).

- 9.9 million hectares of Multiple-use public forest is native forest (7.5% of Australia's total native forest area) (Table 1.1a.ii-1b).

Multiple-use public native forests have multiple management objectives. In some jurisdictions, wood harvesting is permitted in multiple-use forests, but not where restricted by jurisdictional forest management codes of practice (see Indicator 2.1a).

By jurisdiction, the largest areas of multiple-use public native forests (Table 1.1a.ii-1b) occur in:

- Victoria, with 3.1 million hectares (32% of the total area of multiple-use public native forests)
- Queensland, with 2.9 million hectares (30%)
- New South Wales, with 1.9 million hectares (19%).

By proportion of total native forest, Victoria (41%) and Tasmania (19%) have the highest proportions of their native forest area in Multiple-use public forests. For all other jurisdictions the proportion of their native forest area in Multiple-use public forests is less than 10%.

Forests on Other Crown land tenure and Unresolved tenure

Forest on Other Crown land tenure and Unresolved tenure total 10.0 million hectares (7.8% of Australia's total forest area) (Table 1.1a.ii-1a). The largest areas of Other Crown land are found in Western Australia (Figure 1.1a.ii-1).

Of Australia's total forest area of 134 million hectares:

- 9.8 million hectares of forest is on Other Crown land (7.3% of Australia's total forest area).

Western Australia has 6.9 million hectares of native forest on Other Crown land (71% of the total native forest on Other Crown land).

Other Crown land includes land owned by Commonwealth or state and territory governments that is used for a variety of purposes such as utilities, research, education, mining and water supply catchments, and is not covered by other national tenure classes. This tenure class also includes unreserved Crown land and unallocated Crown land.

An additional 0.2 million hectares of forest is on land with Unresolved tenure (0.2% of Australia's total forest area).

Supporting information for Indicator 1.1a.ii Forest area by tenure

Methodology for determining the tenure of Australia's forests

The method used to determine tenure recognises state and territory land title registers as the formal legal sources of tenure information, specifies the sourcing of data from the most accurate spatial representations of these land registers, and provides transparent translation of the range of jurisdictional tenure classes into the six national tenure classes (see Jacobsen et al. 2019). This method was applied to assemble both the [Tenure of Australia's forests \(2018\)](#) spatial dataset and the current update to the [Tenure of Australia's forests \(2023\)](#) dataset.

State and territory tenure datasets used for the 2018 spatial compilation were updated for the 2023 spatial compilation. In addition, newly available tenure information was sourced for the entire state of South Australia, and large parts of Western Australia, providing coverage of known gaps in the national tenure dataset.

National land tenure information from PSMA Australia Limited (operating as Geoscape Australia) and previous NFI national tenure compilations were used to fill remaining gaps in coverage. Land managed by the Department of Defence occurs across multiple tenures, and information from the Department of Defence was not used in this most recent spatial compilation.

Differences in native forest areas by tenure class since SOFR 2018

The tenure area data reported in this 2023 update of tenure for *Australia's State of the Forests Report* (SOFR) differ from the tenure area data reported in [Australia's State of the Forests Report 2018](#). The areas reported in this 2023 update are drawn from the [Tenure of Australia's forests \(2023\)](#) dataset, whereas the areas reported in *Australia's State of the Forests Report 2018* were drawn from the [Tenure of Australia's forests \(2018\)](#) dataset. These differences have a variety of causes, of which only some are actual change in tenure over time. The main driver of differences is the increased accuracy of the datasets now used.

Forest on Private and Leasehold tenure

The total area of native forest on Private tenure reported here is 600 thousand hectares more than reported in SOFR 2018. This is primarily due to the transfer of forest on Leasehold tenure to Private tenure; and the transfer of national parks to Indigenous freehold (Private) tenure (noting that these areas continue to be managed as conservation reserves).

The total area of native forest on Leasehold tenure reported here is 680 thousand hectares more than reported in SOFR 2018. This is largely due to more accurate input data for Western Australia.

Forest on Nature conservation reserve tenure

The area of native forest on Nature conservation reserve tenure reported here is 318 thousand hectares more than reported in SOFR 2018. This is due to a combination of more accurate tenure data for Western Australia, and transfer of land on other tenures to conservation reserves in New South Wales and Victoria.

Forest on Multiple-use public forest tenure

The area of native forest on Multiple-use public forest tenure reported here is 155 thousand hectares more than reported in SOFR 2018. In Victoria, an additional 110 thousand hectares of Multiple-use public forest results from using more accurate Victorian tenure information (land previously classed as Other Crown land is now classified as Multiple-use public forest). Increases of 67 thousand and 33 thousand hectares of Multiple-use public forest in Queensland and Tasmania, respectively, were driven by an increase in forest area reported on this tenure class. There was a decrease of 50 thousand hectares in Western Australia resulting from the use of more accurate tenure information.

Forests on Other Crown land tenure and Unresolved tenure

The area of native forest on Other Crown land tenure reported here is 1.3 million hectares less than reported in SOFR 2018. This is due to more accurate tenure data for Western Australia, and the transfer of unallocated Crown land to freehold tenure across multiple states.

The area of forest on Unresolved tenure reported here is 587 thousand hectares less than reported in SOFR 2018. This is due to improved attribution and spatial completeness of input tenure datasets.

References

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Indicator 1.1a: Area of forest by forest type and tenure

This indicator uses the area for each forest type over time as a broad measure of the extent to which forest ecosystems and their diversity are being maintained. Reporting on forest tenure aids our understanding of how different land management regimes may impact on forest biodiversity.



1.1a.iii Forest area in Regional Forest Agreement regions (2023)

This part of Indicator 1.1a presents the area of Australia's forests in Regional Forest Agreement regions by forest category, type and tenure.

The three other parts of Indicator 1.1a are:

1.1a.i Forest area by forest type

1.1a.ii Forest area by tenure

1.1a.iv Forest area change over time

Context

Regional Forest Agreements (RFA) were established to provide a framework for sustainable forest management and conservation in regions containing substantial forestry activities. There are 10 RFAs across New South Wales, Victoria, Tasmania and Western Australia.

Definition

A Regional Forest Agreement is an agreement between the Australian Government and a state government about the long-term management and use of forests in a region, and that meets the requirements listed in the Commonwealth *Regional Forest Agreements Act 2002*.

Other terms used here can be found in [Australia's forests and forestry glossary](#).

Key points

- Regional Forest Agreements (RFAs) are long-term Commonwealth–state agreements for the conservation and sustainable management of specific regions of Australia's native and plantation forests.
- Ten RFAs across eleven regions cover 21.7 million hectares of forest in south-eastern and south-western Australia.
- RFAs cover 5% of Australia's land area, contain 16% of Australia's total forest area and account for 61% of the total area of multiple-use public native forest.

What are Regional Forest Agreements?

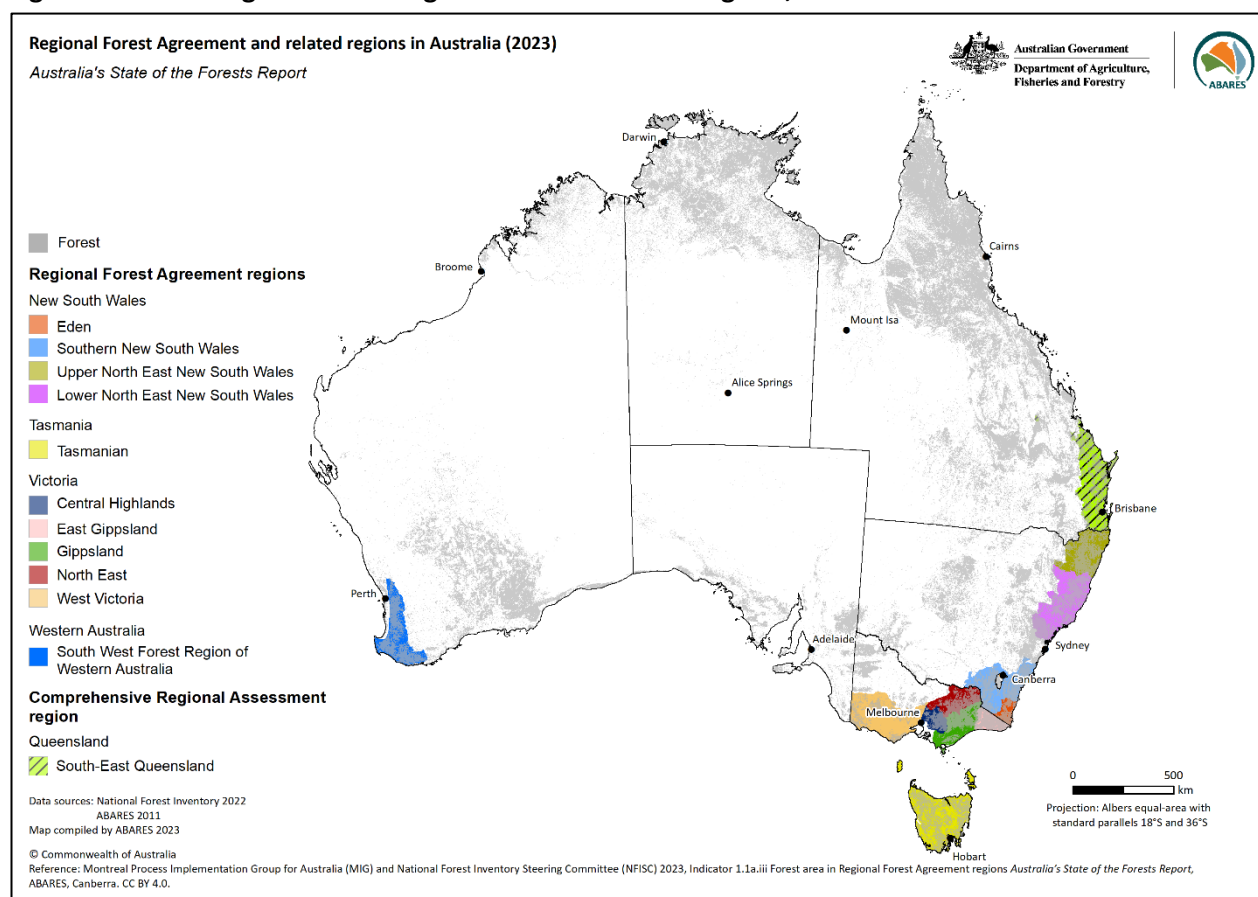
Regional Forest Agreements (RFAs) are long-term Commonwealth–state agreements for the conservation and sustainable management of specific regions of Australia's native and plantation forests.

A key outcome of the [National Forest Policy Statement](#) was the negotiation of RFAs between the Australian Government and four state governments. The origins and development of Australia's RFAs are described in Davey (2018). The RFAs were designed to balance the competing values placed on forests and provide certainty for forest-based industries, and were informed by science-based methodologies and Comprehensive Regional Assessments (CRAs) that determined forest allocation for different uses and underpinned forest management strategies.

Between 1997 and 2001 ten RFAs covering 11 regions were signed between the Australian Government and the New South Wales, Tasmania, Victoria and Western Australia state governments (Figure 1.1a.iii-1). The Upper North East and Lower North East RFA regions of New South Wales are covered by a single RFA. The Australian and Queensland governments completed a CRA for south-east Queensland, however an RFA was not signed and is not reported herein. Between 2017 and 2020 all ten RFAs were varied and extended. RFAs in New South Wales, Tasmania and Western Australia were extended on a 20-year rolling agreement, and RFAs in Victoria were extended to 2030.

Core objectives of RFAs were the promotion of ecologically sustainable forest management and sustainable yield of wood products, and the development of a comprehensive, adequate and representative (CAR) reserve system on public and private land. The [scientific framework](#) behind the CAR reserve system underpins the [National Reserve System](#), Australia’s network of protected areas. Information on forests in protected area categories is reported in Indicator 1.1c. A compilation of data on reservation and resource availability outcomes for all RFA regions is reported in Jacobsen et al. (2020) using the forest ecosystems mapped at the time the RFAs were signed.

Figure 1.1a.iii-1: Regional Forest Agreement and related regions, and current forest cover



[Click here to download a high-resolution version of Figure 1.1a.iii-1.](#)

Forest area in RFA regions

The ten RFAs across eleven RFA regions cover 39.2 million hectares of south-eastern and south-western Australia (Figure 1.1a.iii-1, Table 1.1a.iii-1), and include 21.7 million hectares of Australia’s forests (55% of the total area of RFA regions, and 16% of Australia’s total forest area).

The total forest area in RFA regions of 21.7 million hectares comprises:

- 20.5 million hectares of native forests (94% of all forest in RFA regions)
- 1.1 million hectares of commercial plantations (5.2%)
- 0.1 million hectares of other forests (0.4%).

The 1.1 million hectares of commercial plantations in RFA regions is 62% of the total area of Australia’s commercial plantations.

The largest areas of forest in RFA regions are found in:

- New South Wales (42% of total forest in RFA regions)
- Victoria (28%)
- Tasmania (17%)
- Western Australia (13%).

The largest areas of forest by individual RFA regions (Table 1.1a.iii-1) are in the:

- Tasmanian RFA region (3.7 million hectares of forest)
- Lower North East New South Wales region (3.4 million hectares)
- South West Forest Region of Western Australia (2.8 million hectares).

Table 1.1a.iii-1: Area of forest in Regional Forest Agreement Regions, by state

RFA region	Area ('000 hectares)				
	Land area	Native forest	Commercial plantation	Other forest	Total forest
Eden	813	556	42	0	599
Upper North East (New South Wales)	3,909	2,326	49	16	2,391
Lower North East (New South Wales)	5,784	3,411	34	4	3,450
Southern New South Wales	4,510	2,521	150	5	2,677
Total RFA regions in New South Wales	15,016	8,815	276	26	9,116
Tasmanian	6,810	3,393	288	26	3,707
Total RFA regions in Tasmania	6,810	3,393	288	26	3,707
Central Highlands	1,130	708	12	2	722
East Gippsland	1,214	1,101	6	1	1,108
Gippsland	2,662	1,491	88	6	1,586
North East Victoria	2,320	1,293	55	5	1,353
West Victoria	5,778	1,087	243	14	1,344
Total RFA regions in Victoria	13,105	5,681	404	28	6,112
South West Forest Region of Western Australia	4,258	2,617	155	0	2,772
Total RFA regions in Western Australia	4,258	2,617	155	0	2,772
Total RFA regions in Australia	39,189	20,506	1,122	80	21,707

Forest data on this table and throughout this indicator are from the *Forests of Australia (2023)* spatial dataset, and do not relate to the forest ecosystems mapped at the time the RFAs were signed.

Areas for Tasmania are derived from the spatial boundary of the Tasmanian RFA region held by ABARES, and differ slightly from the areas derived from the spatial boundary of the state of Tasmania used in tables elsewhere.

The Upper North East and Lower North East regions are covered by a single RFA, North East New South Wales.

Totals may not tally due to rounding.

Source: ABARES, National Forest Inventory, National Plantation Inventory.

[Click here for a Microsoft Excel workbook of the data for Table 1.1a.iii-1.](#)

Tenure of forest in RFA regions

Forest in RFA regions occurs mostly across the three tenure classes of Nature conservation reserve, Multiple-use public forest and Private forest (Table 1.1a.iii-2):

- 7.9 million hectares of forest in RFA regions is on Nature conservation reserve (37% of all forest in RFA regions)
- 6.5 million hectares are on Multiple-use public forest tenure (30%)
- 6.5 million hectares are on Private tenure (30%).

RFA regions contain a significant portion of Australia's total native forest area on Multiple-use public forest tenure. RFA regions cover 5.1% of Australia's land area, but contain 16% of Australia's total forest area, and account for 61% of the total area of Multiple-use public native forest.

RFA regions also contain 36% of Australia's total native forest area on Nature conservation reserve tenure.

The tenure of forest land in RFAs varies across regions. Three RFA regions in New South Wales (Southern, Upper North East and Lower North East) contain smaller proportions of their forest area as Multiple-use public forest (15%, 18% and 14%, respectively), and larger proportions of their forest areas as either on Nature conservation reserve tenure (Southern, 48%) and Private forest tenure (Upper North East and Lower North East, 52% and 44% respectively). This contrasts with four RFA regions in Victoria (Central Highlands, East Gippsland, Gippsland and North East), which contain larger proportions of their forest area on Multiple-use public forest tenure (55%, 52%, 55% and 57%, respectively) and smaller proportions of their forest area on Private forest tenure (17%, 6%, 13% and 13% respectively).

Table 1.1a.iii-2: Area of forest by tenure in Regional Forest Agreement Regions, by state

RFA region	Area ('000 hectares)						Total forest
	Leasehold forest	Multiple-use public forest	Nature conservation reserve	Other Crown land	Private forest	Unresolved tenure	
Eden	0	205	236	6	152	0	599
Upper North East (New South Wales)	9	429	642	56	1,252	3	2,391
Lower North East (New South Wales)	4	484	1,342	93	1,524	2	3,450
Southern New South Wales	4	403	1,274	89	904	3	2,677
Total RFA regions in New South Wales	17	1,520	3,494	245	3,831	9	9,116
Tasmanian	9	762	1,533	379	1,024	0	3,707
Total RFA regions in Tasmania	9	762	1,533	379	1,024	0	3,707
Central Highlands	0	400	185	16	121	0	722
East Gippsland	0	579	455	5	70	0	1,108
Gippsland	0	866	492	13	214	0	1,586
North East Victoria	0	776	388	19	170	0	1,353
West Victoria	0	342	477	29	496	0	1,344
Total RFA regions in Victoria	0	2,963	1,996	82	1,071	0	6,112
South West Forest Region of Western Australia	12	1,241	908	66	545	0	2,772
Total RFA regions in Western Australia	12	1,241	908	66	545	0	2,772
Total RFA regions in Australia	38	6,487	7,931	772	6,471	9	21,707

Forest data on this table and throughout this indicator are from the *Forests of Australia (2023)* spatial dataset, and do not relate to the forest ecosystems mapped at the time the RFAs were signed.

Areas for Tasmania are derived from the spatial boundary of the Tasmanian RFA region held by ABARES, and differ slightly from the areas derived from the spatial boundary of the state of Tasmania used tables elsewhere.

The Upper North East and Lower North East regions are covered by a single RFA, North East New South Wales.

Totals may not tally due to rounding.

Source: ABARES, National Forest Inventory, National Plantation Inventory.

[Click here for a Microsoft Excel workbook of the data for Table 1.1a.iii-2.](#)

Supporting information for Indicator 1.1a.iii Forest area in Regional Forest Agreement regions

Forest types in RFA regions

The national forest types are not evenly distributed across areas in and outside RFA regions. RFA regions include 16% of Australia's total native forest area and 18% of all Eucalypt forest, but they contain all 100% of Eucalypt tall closed forests, 93% of Eucalypt tall open forests, and 46% of the Eucalypt medium open forests, which are the three major forest types used for wood production. RFA regions also contain 37% of the total area of Rainforest (Table 1.1a.iii-3).

In contrast, RFA regions contain comparatively small proportions of other forest types, namely Casuarina (6% of total extent of this forest type), Callitris (5%), Melaleuca (3%), Acacia (1%) and Mangrove (0.7%) (Table 1.1a.iii-3). Only 0.6% by area of the Eucalypt mallee subtype is in RFA regions.

A total of 62% of the area of Australia's commercial plantations is in RFA regions, including 71% of hardwood plantations and 56% of softwood plantations (Table 1.1a.iii-3).

Table 1.1a.iii-3: Area of forest in Regional Forest Agreement regions, by forest type

Forest type	Area in RFA regions ('000 hectares)	Area in Australia ('000 hectares)	Proportion in RFA regions (%)
Acacia	128	10,895	1
Callitris	93	1,993	5
Casuarina	70	1,086	6
Eucalypt	18,013	101,081	18
Eucalypt Low Woodland	212	17,339	1
Eucalypt Low Open	263	1,419	19
Eucalypt Low Closed	6	22	28
Eucalypt Medium Woodland	3,903	55,208	7
Eucalypt Medium Open	9,213	20,169	46
Eucalypt Medium Closed	1	26	4
Eucalypt Tall Woodland	261	2,418	11
Eucalypt Tall Open	4,081	4,405	93
Eucalypt Tall Closed	74	74	100
Mangrove	7	1,110	0.7
Melaleuca	181	7,193	3
Rainforest	1,278	3,442	37
Other native forest	735	4,701	16
Total native forest	20,506	131,501	16
Softwood plantation	588	1,060	56
Hardwood plantation	523	739	71
Mixed species plantation	10	22	45
Total Commercial plantation	1,122	1,821	62
Other forest	80	243	33
Total forest	21,707	133,565	16

Forest data on this table and throughout this Indicator are from the *Forests of Australia (2023)* spatial dataset, and do not relate to the forest ecosystems mapped at the time the RFAs were signed.

Totals may not tally due to rounding.

Source: ABARES, National Forest Inventory, National Plantation Inventory.

Differences in forest areas in RFA regions in 2018 and 2023

The forest area in RFA regions (21.7 million hectares) is 177 thousand hectares less than reported in SOFR 2018.

- The forest area in RFA regions in New South Wales, the Tasmanian RFA region and all RFA regions in Victoria except for the West Victoria RFA region was largely unchanged.
- The forest area in the West Victoria RFA region is 60 thousand hectares less than reported in SOFR 2018, due mostly to a decrease in the area of Other forest due to clearing of non-commercial plantations for agricultural purposes.
- The forest area in the South West Forest Region of Western Australia is 147 thousand hectares less than reported in SOFR 2018, due to a combination of corrections from improved mapping, and clearing of commercial plantations to non-forest for other land uses.

In the Upper and Lower regions of the North East New South Wales RFA region, the area of commercial plantations decreased by 25 thousand hectares (23% of the total commercial plantations in these regions), resulting from the clearing of plantations for agricultural purposes or from reclassification as non-commercial plantations and therefore Other forest.

The difference in forest area in RFA regions since 2018 by tenure class varies from region to region.

- In RFA regions in Victoria, updated tenure information drives the decrease in the extent of forest on Other Crown land (109 thousand hectares less than 2018) and on Private forest tenure (63 thousand hectares less), and an increase of forest reported on Multiple-use public forest tenure (104 thousand hectares more).
- In the South West Forest Region of Western Australia, most of the reported difference in forest area is on Private forest tenure (109 thousand hectares less than reported in SOFR 2018).
- In the Upper and Lower North East regions of the North East New South Wales RFA, an increase in 33 thousand hectares of forest on Nature conservation reserve tenure results from an increase in the area of national parks and other conservation reserves.

Difference in forest areas in RFA regions in other reporting

Information on forest areas in RFA regions in this Indicator is derived from the [Forests of Australia \(2023\)](#) dataset held in Australia's National Forest Inventory. This dataset is assembled using a Multiple Lines of Evidence (MLE) (Mutendeuzi et al. 2013) approach that incorporates the most up-to-date versions of suitable regional and national spatial forest cover datasets.

Other reporting on forest areas in RFA regions may use different approaches to identify forest coverage, and thus may show different forest area figures for RFA regions. At signing, the RFAs used forest ecosystem mapping units that were derived from state-based forest mapping programs. Continued use of these forest ecosystems is an approach that provides a consistent baseline figure for reporting against RFA values over time, but does not take account of forest losses (such as through clearing or bushfires) or gains (such as through regrowth or re-establishment) that have occurred since signing the RFAs, and thus gives areas that differ from the current forest areas identified through the MLE approach and reported here.

A compilation of data on forests in RFA regions according to the original forest ecosystem mapping units is provided in Jacobsen et al. (2020).

References

Davey SM (2018). [Regional forest agreements: origins, development and contributions](#), *Australian Forestry* **81**: 64–88.

Jacobsen R, Davey SM, Read SM (2020). [Regional forest agreements: compilation of reservation and resource availability outcomes](#), ABARES Technical report 20.11, Canberra, December.

Mutendeudzi M, Read S, Howell C, Davey S, Clancy T (2013). [Improving Australia's forest area estimate using a Multiple Lines of Evidence approach](#), ABARES Technical report 13.07, Canberra, November 2013.

More information

Learn more about the [Criterion 1 of Australia's State of the Forest Report](#).

Web agriculture.gov.au/abares/forestsaustralia/sofr/

Download a [Microsoft Excel workbook of the data for Indicator 1.1a.iii](#).

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Acknowledgement of Country

We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.

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Indicator 1.1a: Area of forest by forest type and tenure



This indicator uses the area for each forest type over time as a broad measure of the extent to which forest ecosystems and their diversity are being maintained. Reporting on forest tenure aids our understanding of how different land management regimes may impact on forest biodiversity.

1.1a.iv Forest area change over time (2023)

This part of Indicator 1.1a presents the change in forest area over time.

The three other parts of Indicator 1.1a are:

1.1a.i Forest area by forest type

1.1a.ii Forest area by tenure

1.1a.iii Forest area in Regional Forest Agreement regions

Context

The net change in Australia's forest area over time presented here, and the losses and gains that comprise that net change, are derived from area change figures published in Australia's *National Inventory Report* series.

Key points

- Australia's total forest area increased by 0.75 million hectares over the five-year period from 2016 to 2021.
- Australia's total forest area has continued to increase since 2008.
- Forest area change is calculated by applying forest area change data from Australia's greenhouse gas inventory reporting to Australia's total forest area of 133.6 million hectares.
- The total area of both primary (first-time) clearing and secondary clearing (re-clearing) of forest has been progressively reducing over time.

Change in total forest area over time

Australia's forest area increased by 0.75 million hectares over the 5-year period from 2016 to 2021. This maintained the rise in total forest area that has been observed since 2008 (Figure 1.1a.iv-1A,B).

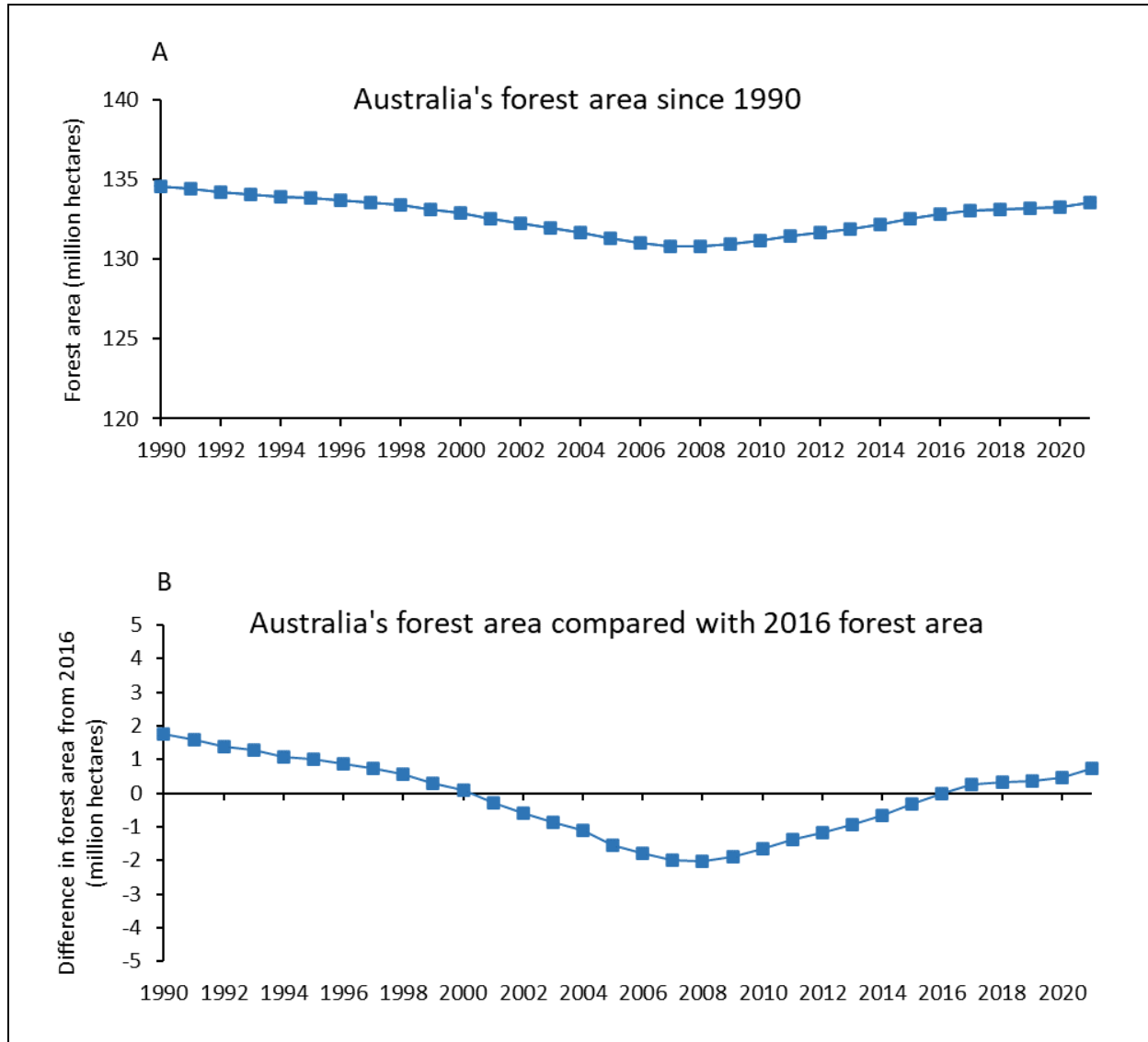
The annual change in Australia's forest area is calculated by application of forest area change data from Australia's *National Inventory Report 2021* (DCCEEW 2023a,b) to the total forest area figure of 133.6 million hectares determined by ABARES using the Multiple Lines of Evidence process (see [Indicator 1.1a.i Forest area by forest type](#)).

Trends in forest area over the period from 1989 to 2021 differ between states and territories:

- in New South Wales and Queensland, forest area decreased from 1989 to 2008, by a combined total of 6.6 million hectares, but there was no substantial change after 2008
- in South Australia and Western Australia, forest area increased progressively over the whole period from 1989 to 2021, by a combined total of 4.9 million hectares

- in the Australian Capital Territory, Victoria, Tasmania and the Northern Territory, there was minimal change in forest area over the whole period from 1989 to 2021.

Figure 1.1a.iv-1: Australia's forest area change over time



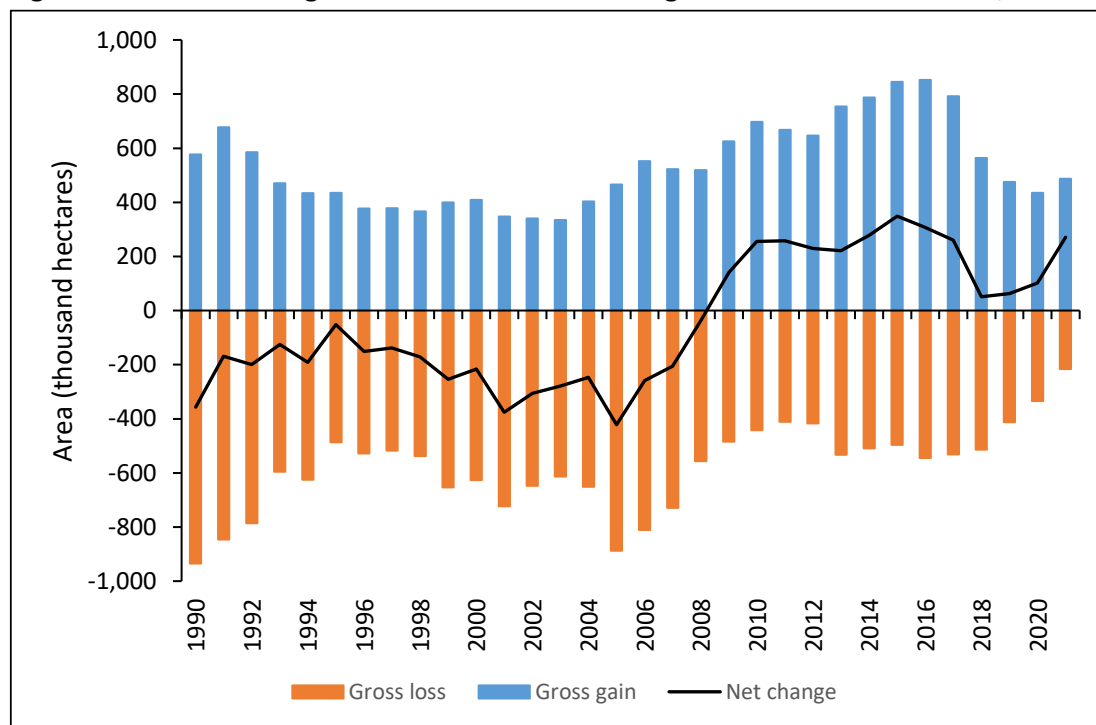
Source: ABARES *Forests of Australia (2023)* dataset as published in [Indicator 1.1a.i \(2023\)](#); *National Inventory Report 2021* (DCCEEW 2023a), Table 6.2.2. Figures as at June each year.

[Click here for a Microsoft Excel workbook of the data for Figure 1.1a.iv-1.](#)

The gains and losses in forest area each year, and the resultant net annual change in forest area, are shown in Figure 1.1a.iv-2. The net annual area changes are the net result of a number of processes:

- natural expansion of forest onto areas of grassland that have not held forest for many years
- clearing of forest for agriculture, regrowth of forest onto recently cleared land, and re-clearing of regrowth forest
- clearing of forest for urban expansion, mining or other infrastructure
- changes in the area of commercial plantations
- new environmental plantings
- changes in the area of mangroves.

Figure 1.1a.iv-2: Annual gains and losses and net change in Australia’s forest area, 1990 to 2021



Gross loss is sum of Forest land converted to Cropland, Forest land converted to Grassland, Forest land converted to Wetlands, and Forest land converted to Settlements. Gross gain is sum of Cropland converted to Forest land, Grassland converted to Forest land, Wetlands converted to Forest land and Settlements converted to Forest land. The majority of area transitions are from and to Grassland.

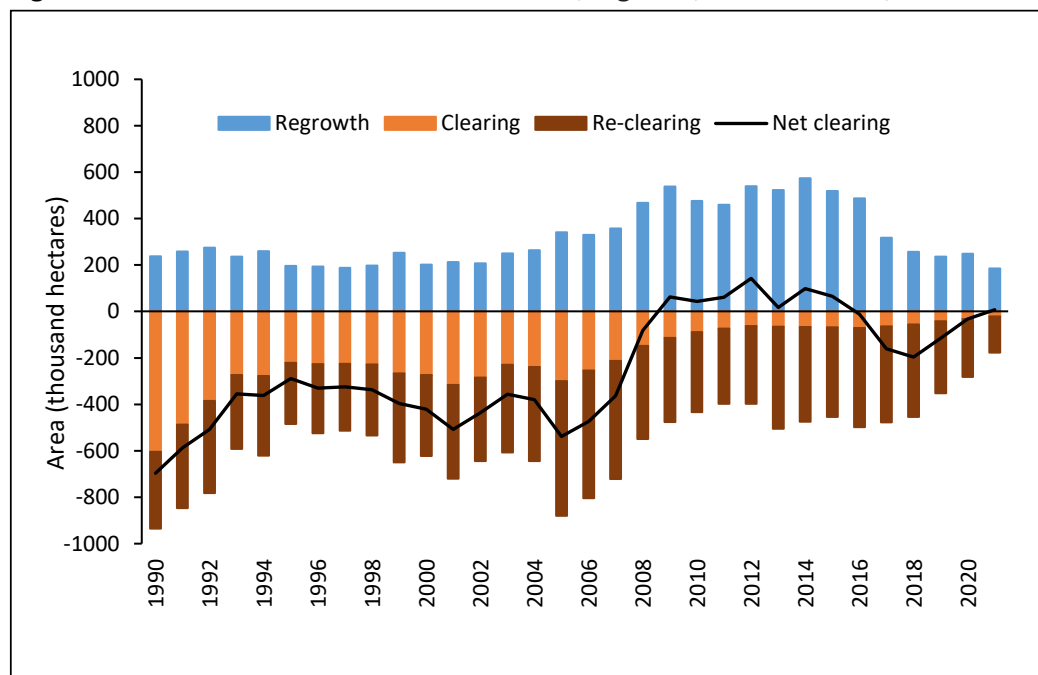
Source: Land Transition Matrix for *National Inventory Report 2021* (DCCEEW 2023b).

[Click here for a Microsoft Excel workbook of the data for Figure 1.1a.iv-2.](#)

Clearing, regrowth and re-clearing

One component of change in Australia’s forest area is clearing of forest, followed over time by regrowth of forest onto recently cleared land, then by re-clearing of that regrowth forest. This pattern of land management can be found in some of Australia’s grazing lands, mostly in Queensland and New South Wales. The national area of forest cleared, regrown and re-cleared is shown in Figure 1.1a.iv-3. Harvesting and replanting of native forest or plantations, as temporary changes in canopy cover in forest remaining forest, are not considered clearing or regrowth.

Figure 1.1a.iv-3: Annual areas of forest cleared, regrown, and re-cleared, 1990 to 2021



These data use annual 'Identified regrowth' figures from *National Inventory Report 2021*, Table A5.6.12.1a-b, to allow comparison to the annual clearing and re-clearing figures. The 'Sustained regrowth' figures from *National Inventory Report 2021*, Table A5.6.12.6, use an algorithm to combine data from multiple years to determine the area of long-term sustained regrowth.

Source: *National Inventory Report 2021* (DCCEEW 2023b).

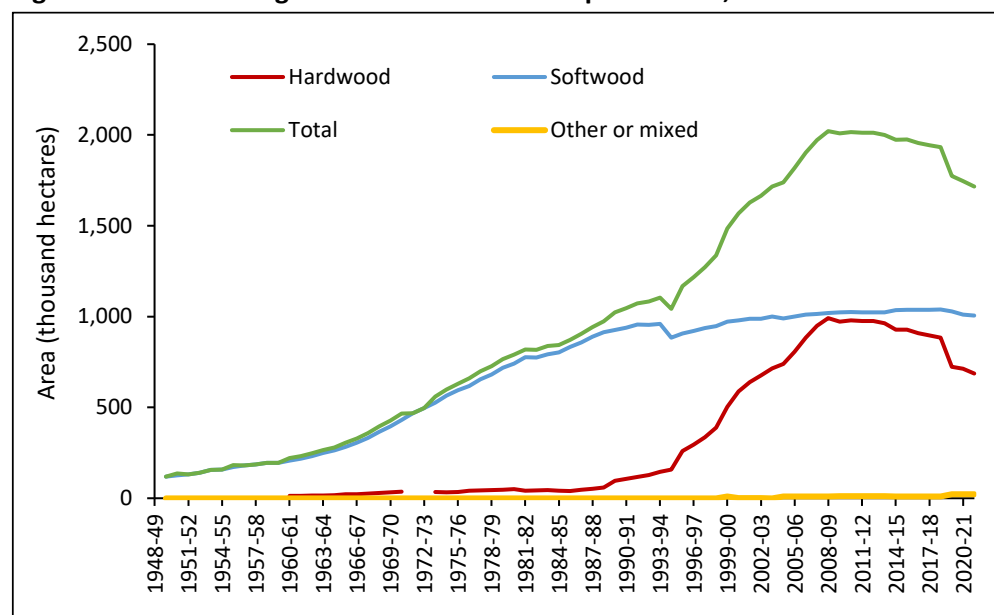
[Click here for a Microsoft Excel workbook of the data for Figure 1.1a.iv-3.](#)

The total area of both primary (first-time) clearing and secondary clearing (re-clearing) of forest has been progressively reducing over time. The areas of forest cleared and re-cleared in 2020–21 were the lowest in this data series, at 22 thousand (cleared) and 155 thousand (re-cleared) hectares; and in that year the area of forest cleared or re-cleared was exceeded by the area of forest regrowing from previous clearing (185 thousand hectares). The average annual area of first-time forest clearing in the 5-year period 2016–21 was 43 thousand hectares.

Change in Commercial plantation area over time

The area of Commercial plantations decreased by 239 thousand hectares (12%) over the period 2016–17 to 2021–22 (Figure 1.1a.iv-4), mostly due to a decrease of 221 thousand hectares (24%) in the area of hardwood plantations. Some of this area was returned to agriculture or other uses upon the expiration of hardwood plantation lease arrangements, while some still carries plantation trees now judged not to be commercial (so classified as 'Other forest', not 'Commercial plantation') and likely to be converted to agriculture in the future. Only a small area of new plantations was established (see Indicator 2.1b).

Figure 1.1a.iv-4: Change in area of Commercial plantations, 1948-2021



Source: ABARES (2023)

[Click here for a Microsoft Excel workbook of the data for Figure 1.1a.iv-4.](#)

References

ABARES (Australian Bureau of Agricultural and Resource Economics and Sciences) (2023). *Australian plantation statistics 2023 update*, ABARES, Canberra, August. CC BY 4.0. doi.org/10.25814/hhk8-4x26

DCCEEW (Department of Climate Change, Energy, the Environment and Water) (2023a). *National Inventory Report 2021. Volume 1*. Commonwealth of Australia, Canberra. dcceew.gov.au/climate-change/publications/national-inventory-report-2021

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Supporting information for Indicator 1.1a.iv Forest area change over time

This section presents some examples of on-ground change in forest area that were identified during creation of the 2023 update to Australia's forest coverage.

Transitions from forest to non-forest (typically due to land clearing) generally happen at a single point in time and are therefore easy to identify in datasets and imagery time-series. The examples of detected loss in forest cover shown here are associated with mining development (Figure 1.1a.iv-5), urban development (Figure 1.1a.iv-6) and plantation clearing or agriculture (Figure 1.1a.iv-7).

Transitions from non-forest to forest (due for example to forest establishment or regrowth) can be gradual and are less easy to identify or associate with a particular time-point. The examples of detected gain in forest cover shown here are associated with plantation establishment (Figure 1.1a.iv-8), other forest planting (Figure 1.1a.iv-9) and native forest expansion or thickening (Figure 1.1a.iv-10).

Native forest clearance for mine development

Figure 1.1a.iv-5: Forest clearance due to mine infrastructure development. Gunnedah, New South Wales: example area reported as forest in SOFR 2018 but as non-forest in the 2023 forest coverage. Individual green and pink squares on images **B** and **D** have an area of 1 hectare (100 m x 100 m).

A ESRI World Imagery 2015, showing mine areas in forest setting.

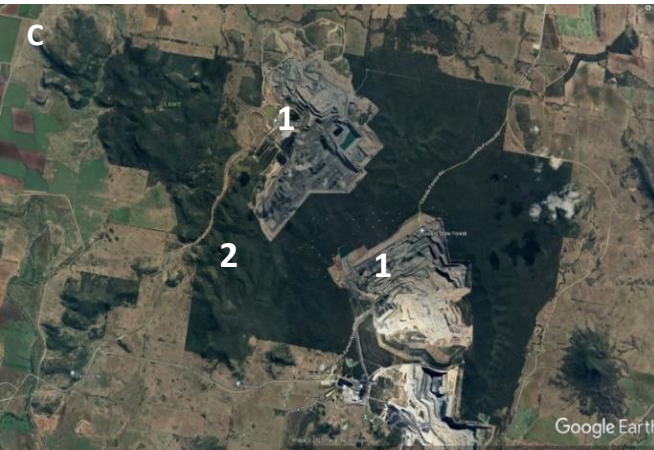


Area 1, mine. Area 2, forest (Callitris forest type).

B ESRI World imagery 2021. Green squares, areas reported as forest in SOFR 2018.

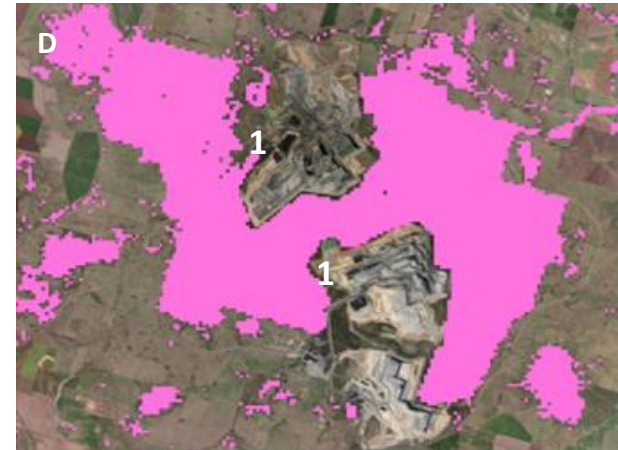


C Google EarthPro imagery 2022, showing areas of mine expansion and remaining forest.



Area 1, mine expansion. Area 2, remaining forest (Callitris forest type).

D ESRI World imagery 2021. Pink squares, areas reported as forest in 2023 forest coverage update.



Area 1 reclassified as non-forest, reflecting forest removal and land-use change from mining expansion.

Native forest clearance for urban expansion

Figure 1.1a.iv-6: Forest clearance due to urban residential expansion. Coomera, south-east Queensland: example area reported as forest in SOFR 2018 but as non-forest in the 2023 forest coverage. Individual green and pink squares on images **B** and **D** have an area of 1 hectare (100 m x 100 m).

A Google EarthPro imagery 2016, showing areas of initial urban development in forest setting.



B Green squares, areas reported as forest in SOFR 2018. Backdrop is ESRI World imagery 2022.



C ESRI World Imagery 2022, showing urban expansion and forest clearance.



D Pink squares, areas reported as forest in 2023 forest coverage update. Backdrop is ESRI World imagery 2022.



Expansion of urban development has resulted in further clearing of forest. Following incorporation of the SLATS 2018 and NGGI 2016-20 datasets, the 2023 forest coverage reports these recently cleared areas as non-forest.

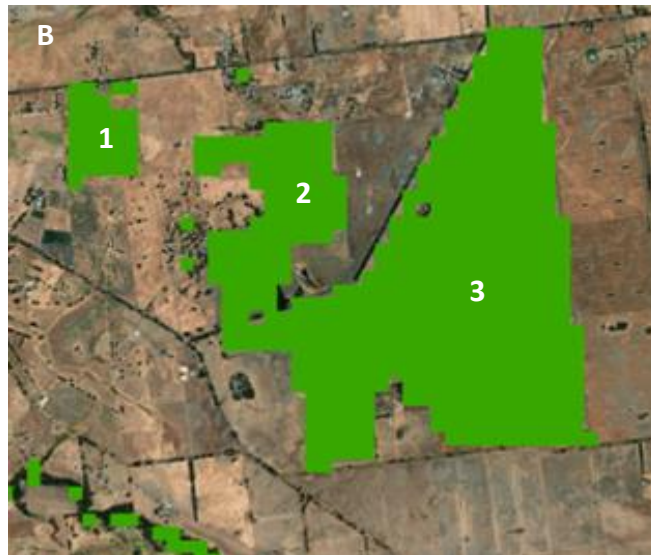
Plantation clearance and conversion to agriculture

Figure 1.1a.iv-7: Plantation clearance and conversion to agriculture. Capel, south-west Western Australia: example area reported as forest in SOFR 2018 but as non-forest in the 2023 forest coverage. Individual green and pink squares on images **B** and **C** have an area of 1 hectare (100 m x 100 m).

A Google EarthPro imagery circa 2014, showing landscape before plantation clearing and land-use change.



B Green squares, areas reported as forest (mostly commercial plantation) in SOFR 2018. Backdrop is ESRI World imagery 2022.



Areas **1**, **2** and **3** are reported as commercial plantation (Hardwood) in SOFR 2018.

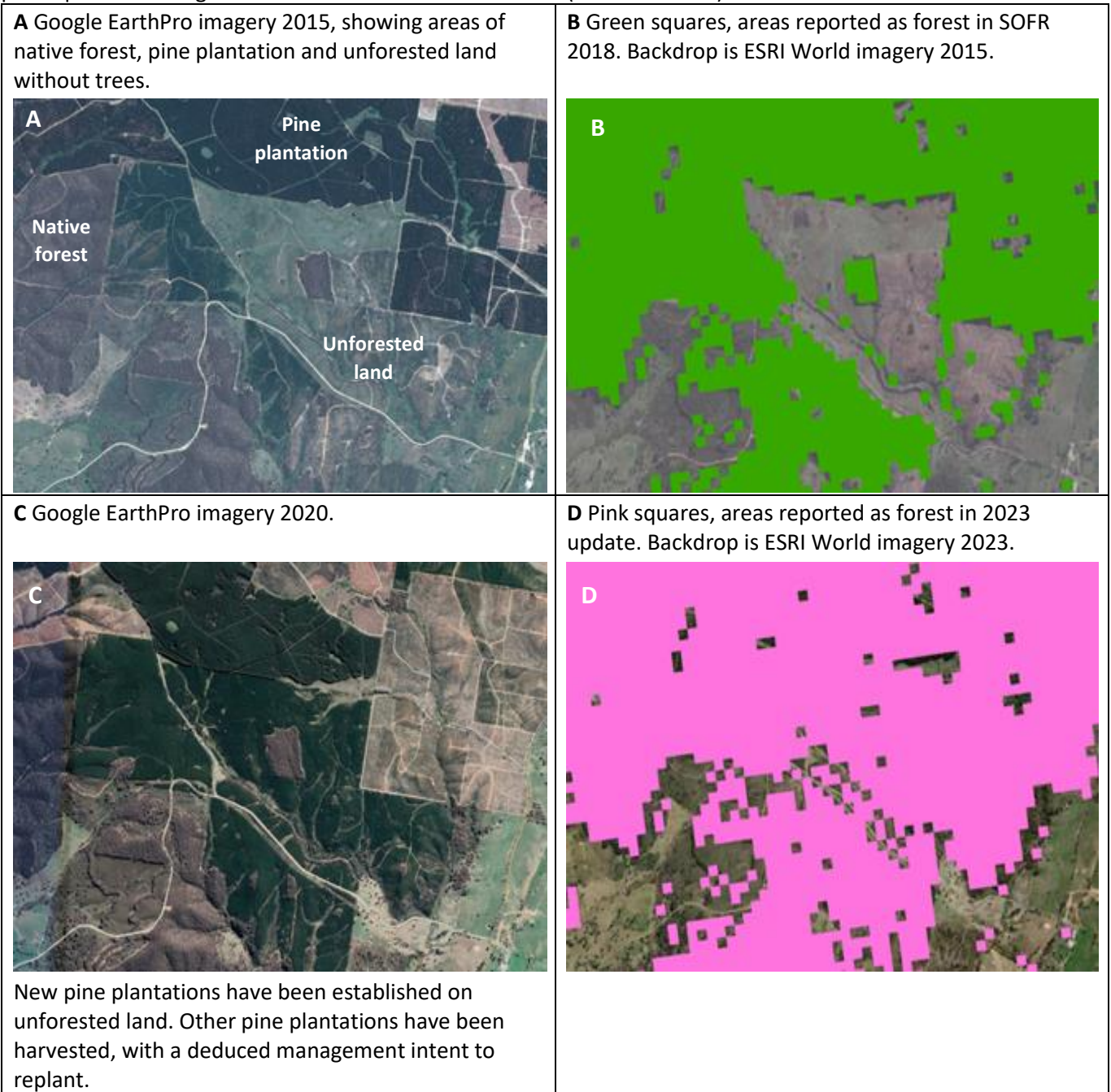
C Pink squares, areas reported as forest in 2023. Backdrop is ESRI World imagery 2022



No commercial plantation was reported within the area in the 2023 forest coverage.

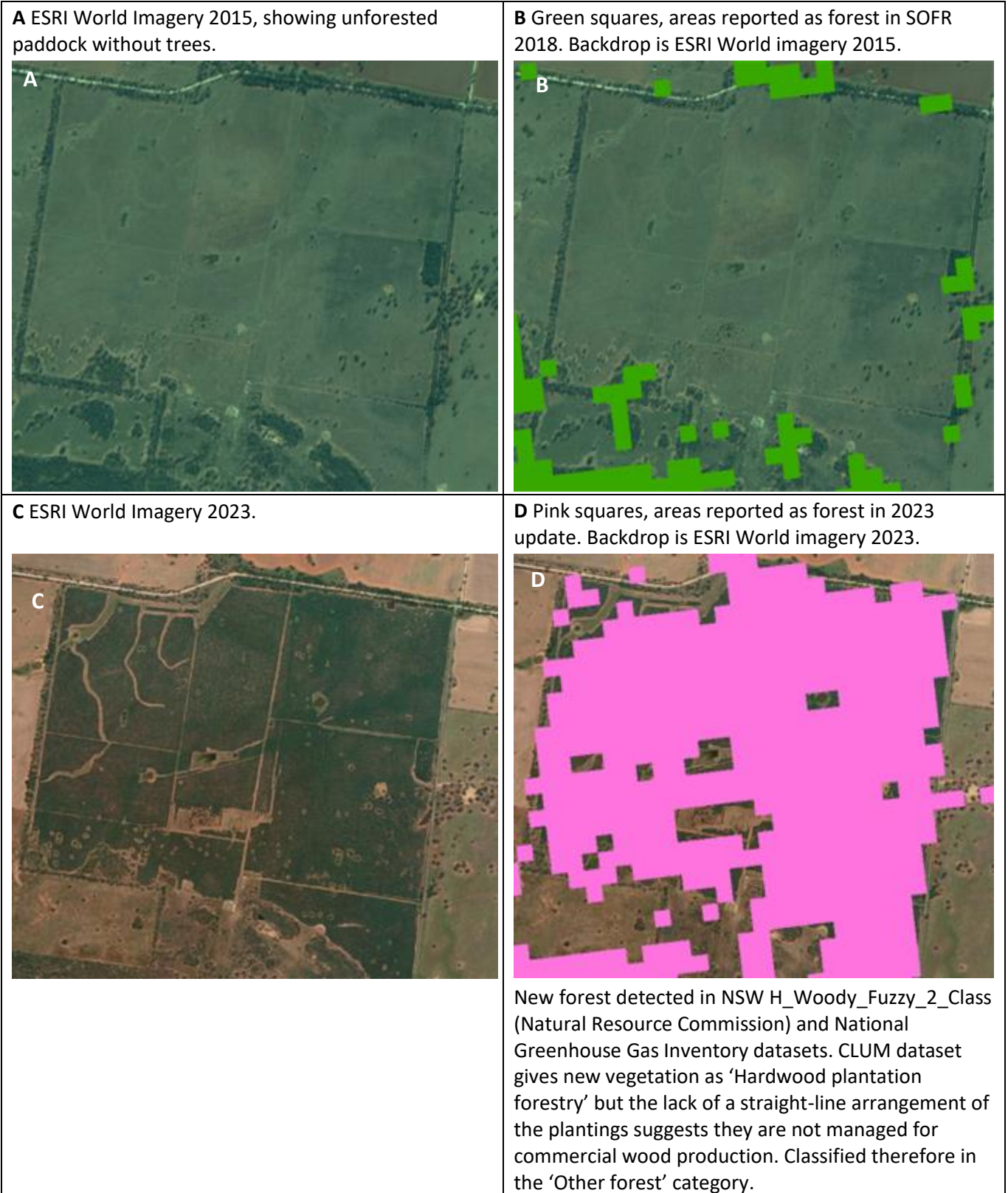
Plantation establishment

Figure 1.1a.iv-8: Plantation establishment on unforested land. Burruga, central tablelands, New South Wales: example area reported as non-forest in SOFR 2018 but as forest in the 2023 forest coverage. Individual green and pink squares on images **B** and **D** have an area of 1 hectare (100 m x 100 m).



Establishment of environmental plantings

Figure 1.1a.iv-9: Environmental planting on unforested land. Bogan Gate, north-west of Parkes, New South Wales: example area reported as non-forest in SOFR 2018 but as forest in the 2023 forest coverage. Individual green and pink squares on images **B** and **D** have an area of 1 hectare (100 m x 100 m).



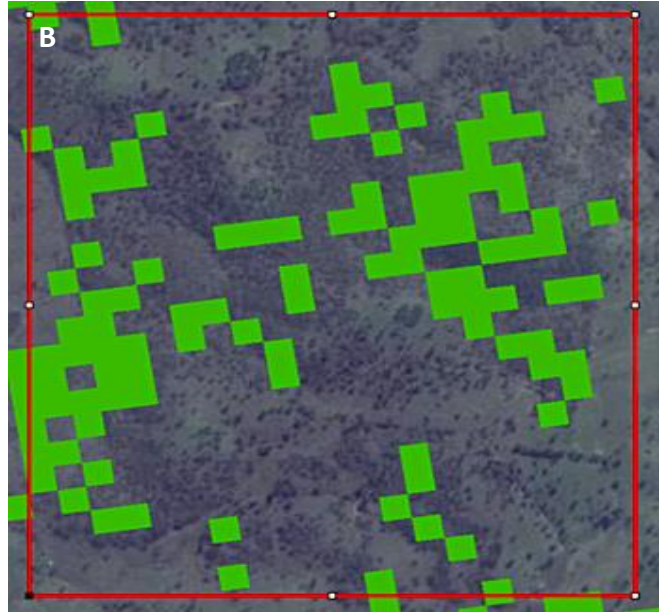
Native forest expansion

Figure 1.1a.iv-10: Expansion of native forest onto unforested land. Emmavale, northern New South Wales: example area reported as non-forest in SOFR 2018 but as forest in the 2023 forest coverage. Individual green and pink squares on images **B** and **C** have an area of 1 hectare (100 m x 100 m).

A Google EarthPro imagery 2010. Red polygon shows area in panels **B** and **D**.



B Green squares, areas reported as forest in SOFR 2018. Backdrop is ESRI World imagery 2014.



C Google EarthPro 2023. Red polygon shows area in panels **B** and **D**.



Imagery shows progressive thickening of native forest regrowth over time.

D Pink squares, areas reported as forest in 2023 update. Backdrop is ESRI World imagery 2023.



The new forest was detected in the NSW H_Woody_Fuzzy_2_Class (Natural Resource Commission) and National Greenhouse Gas Inventory datasets. The allocated forest type is Eucalypt Medium Open forest, from NVIS information which gave dominant eucalypt species as by *Eucalyptus blakelyi*, *E. melliodora*, *E. moluccana* and *Angophora floribunda*.

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