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Global Forest Resources Assessment 2020

Report

Australia

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FAO has been monitoring the world's forests at 5 to 10 year intervals since 1946. The Global Forest Resources Assessments (FRA) are now produced every five years in an attempt to provide a consistent approach to describing the world's forests and how they are changing. The FRA is a country-driven process and the assessments are based on reports prepared by officially nominated National Correspondents. If a report is not available, the FRA Secretariat prepares a desk study using earlier reports, existing information and/or remote sensing based analysis.

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Introduction

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Introductory text

Introduction

1. This document is Australia's Country Report to the UN FAO Global Forest Resource Assessment 2020 (FRA 2020).
2. Australia's forests are recognised and valued for their diverse ecosystems and unique biodiversity, for their cultural heritage, and for their provision of goods and services such as wood, carbon sequestration, soil and water protection, and aesthetic and recreational values. They are subject to a range of pressures including invasive weeds, pests and diseases, drought, changing fire regimes and climate, urban development and mining, agricultural management practices such as grazing, and the legacy of previous land management practices.
3. Australia has three levels of government: Commonwealth or federal (also referred to as the Australian Government or the national government); state and territory; and local (city-based or regionally based). Australia's state and territory governments have responsibility for land allocation and land management, including forest management. The Commonwealth Government has limited forest management responsibilities, but may influence management through legislative powers associated with foreign affairs (particularly treaties and international agreements), commodity export licensing, taxation, and biodiversity conservation, and through targeted spending programs to meet environmental, social or economic objectives.
4. A well-established policy framework, guided by Australia's National Forest Policy Statement (1992), supports the conservation and sustainable management of Australia's forests, both nationally and at state and territory levels. Through this statement and other legislative and regulatory mechanisms, Australia's national, state and territory governments are committed to the sustainable management of all Australia's forests. Australia's National Forest Policy Statement also mandates national, state and territory governments "to produce and publish a 'state of the forests' review every five years". The most recent such report is *Australia's State of the Forests Report 2018*. Each of *Australia's State of the Forests Reports* from 2003 have served as Australia's country report to the Montreal Process Working Group on criteria and indicators for the conservation and sustainable management of temperate and boreal forests.
5. Data for Australia's forest estate is assembled in the National Forest Inventory (NFI). The NFI is a partnership between Australia's national, state and territory governments and is specified in Australia's National Forest Policy Statement as "the authoritative source of information for national and regional monitoring and reporting to support decision making on all of Australia's forests". The NFI is guided by the NFI Steering Committee (NFISC) which consists of a representative from each state and territory plus a representative from the Australian Government Department of Agriculture (in which the NFI is housed). The NFISC was a co-author of the recently released report *Australia's State of the Forests Report 2018*.
6. Australia's definition of forest is '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.'
7. The definition of Australia's forest used in Australia's Country Report to the FRA 2020 is the same as that used by Australia's NFI and reported in the *Australia's State of the Forests Report* series. Australia's definition **includes** forests in agricultural production systems where grazing occurs, but **excludes** tree crops such as fruit or nut tree plantations, oil palm plantations, olive orchards and Christmas tree plantations. It also **excludes** urban forests. This definition differs from that used by the FAO in the minimum thresholds for height and for canopy cover, and in the treatment of land used for different purposes.
8. Australia does not have, at the national level, a plot-based forest inventory system. Australia's National Forest Inventory is based on information supplied from national, state and territory government agencies, and by private industry. Data from state and territory governments are collected through a range of mechanisms, some of which include sample-based forest inventory plots.
9. As determined at 2016 and published in *Australia's State of the Forests Report 2018*, Australia has 134 million hectares of forest. This is the area figure reported for 2016 in the FRA 2020. This area of forest is equivalent to 17% of Australia's land area. Australia has about 3% of the world's forest area, and globally is the country with the seventh largest forest area.
10. Australia's forest area has increased progressively since 2008, with a net increase over the period 2011 to 2016 of 3.9 million hectares. This increase in forest area is due to the net effect of various forest clearing and establishment processes, including: forest clearing or reclearing for agricultural use; regrowth of forest on areas previously cleared for agricultural use; expansion of forest onto areas not recently containing forest; establishment of environmental plantings; and changes in the commercial plantation estate. The Australian Government Department of the Environment and Energy has interpreted annual Landsat satellite data from 1972 onwards, and has assembled consistent land cover change data for the purpose of reporting greenhouse gas emissions for Australia's National Greenhouse Gas Inventory (NGGI). Published forest cover change figures from this dataset and covering the period 1990-2016 are provided in Australia's National Greenhouse Accounts National Inventory Report 2016 Volume 2, released in 2018 (Australian Government Department of Environment and Energy, 2018). In Australia's Country Report to the FRA 2020, this source is referred to as Australia's National Greenhouse Gas Inventory 2016, or NGGI 2016.
11. Due to continual improvements in methodology at the state and territory level, forest area figures published in each of the various reports in the *Australia's State of the Forests Report* series are inconsistent and can not be compared from report to report. The area of forest reported by Australia in FRA 2015 for the baseline reporting year 2011 was 125 million hectares, as determined at 2011 and published in *Australia's State of the Forests Report 2013*. This area figure is different from the figure reported for 2011 in the FRA 2020. This difference derives from the use of more accurate state, territory and national datasets together with recent high-resolution imagery, to create a more accurate area figure for

- FRA 2020 for 2016, plus the application of updated area change figures from the NGGI (see above). The combined improvement in mapping resolution and more accurate measure of Australia's forest area derives from continual application of the MLE methodology developed and implemented by Australia's National Forest Inventory team (Mutendeuzi M, Read S, Howell C, Davey S & Clancy T, 2013).
12. To determine actual onground changes in forest area that have occurred over time, the total forest area figures reported in the FRA 2020 for the years 2015, 2010, 2005, 2000 and 1990 are derived from the application of data on forest area change over time from Australia's National Greenhouse Gas Inventory 2016, to the total forest area figure of 134 million hectares published in the most recent *Australia's State of the Forests Report 2018* for the year 2016 and reported in the FRA 2020 for the year 2016. These derived forest area figures are referred to as Australia's 'FRA 2020 derived forest areas'.
 13. For each of the FRA 2020 reporting years, the area of commercial plantations is then taken as the absolute area of 'Commercial Plantations' reported in Australia's National Plantation Inventory (NPI) for each year, without adjustment. The area of 'Native forest', or 'Native forest' plus 'Other forest', is then calculated as the difference between the area of 'Commercial plantations' and Australia's total forest area for that year. This approach uses the same principle as implemented for forest area reporting in Australia's Country Report for the FRA 2015.
 14. The area data for tenure, forest type and structure for non-plantation forests for FRA 2020 reporting years 2016, 2015, 2010, 2000 and 1990 are then calculated by applying the area proportions of the various tenure, forest type and structure categories for non-plantation forests published in SOFR 2018, SOFR 2013, SOFR 2003 and SOFR 1998, respectively, to Australia's FRA 2020 derived forest area for each FRA 2020 reporting year. This approach uses the same principle as implemented for forest area reporting in Australia's Country Report for the FRA 2015.
 15. Australia's Country Report to the FRA 2020 therefore presents information for the FRA 2020 reporting years 2016, 2015, 2010, 2005 (Q1a only), 2000 and 1990, using information published in the five-yearly *Australia's State of the Forests Reports* (the SOFR series), in Australia's National Plantation Inventory series of publications, and in Australia's National Greenhouse Accounts National Inventory Report 2016 Volume 2. Additional information is sourced from other published documents, and identified in the relevant section of this response.
 16. For tables where data for years beyond the current reporting year are sought, the most recent figures (2016 for non-plantation forest, and 2018 for plantation forests) are copied into the 'out years'. So, 2016 data for all forests except plantations are reported for the years 2016, 2017, 2018, 2019 and 2020. Similarly, 2018 plantation data are reported for the years 2018, 2019 and 2020, as per the table below.
 17. The SOFR series, together with their citations, used for the FRA reporting years are as follows:

FRA 2020 reporting year	Primary reference
2020	<p>Non-plantation data Copied from FRA 2020 reporting year 2016</p> <p>Commercial plantations Downham, R & Gavran, M 2019, Australian plantation statistics 2019 update, ABARES technical report 19.2, Canberra, May. CC BY 4.0.</p>
2019	<p>Non-plantation data Copied from FRA 2020 reporting year 2016</p> <p>Commercial plantations Downham, R & Gavran, M 2019, Australian plantation statistics 2019 update, ABARES technical report 19.2, Canberra, May. CC BY 4.0.</p>
2018	<p>Non-plantation data Copied from FRA 2020 reporting year 2016</p> <p>Commercial plantations Downham, R & Gavran, M 2019, Australian plantation statistics 2019 update, ABARES technical report 19.2, Canberra, May. CC BY 4.0.</p>
2017	<p>Non-plantation data Copied from FRA 2020 reporting year 2016</p> <p>Commercial plantations Downham, R & Gavran, M 2018, <i>Australian plantation statistics 2018 update</i>, ABARES, Canberra, May. CC BY 4.0.</p>
2016	<p>Non-plantation data SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) <i>Australia's State of the Forests Report 2018</i>, ABARES, Canberra, December. CC BY 4.0.</p> <p>Commercial plantations Downham, R & Gavran, M (2017) <i>Australian plantation statistics 2017 update</i>, ABARES, Canberra, May. CC BY 4.0.</p>
2015	<p>Non-plantation data SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) <i>Australia's State of the Forests Report 2018</i>, ABARES, Canberra, December. CC BY 4.0.</p> <p>Commercial plantations ABARES (2016) <i>Australian plantation statistics 2016</i>, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, August. CC BY 3.0.</p>

FRA 2020 reporting year	Primary reference
2010	<p>Non-plantation data SOFR 2013: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2013) <i>Australia's State of the Forests Report 2013</i>, ABARES, Canberra, December. CC BY 3.0.</p> <p>Commercial plantations Gavran, M & Parsons, M (2011), <i>Australian plantation statistics 2011</i>, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.</p>
2005	<p>Non-plantation data SOFR 2008: Montreal Process Implementation Group for Australia (2008) <i>Australia's State of the Forests Report 2008</i>. Bureau of Rural Sciences, Canberra.</p> <p>Commercial plantations Parsons, M., Gavran, M. and Davidson, J., 2006. Australia's Plantations 2006. Bureau of Rural Sciences, Canberra.</p>
2000	<p>Non-plantation data SOFR 2003: National Forest Inventory (2003) <i>Australia's State of the Forests Report 2003</i>. Bureau of Rural Sciences, Canberra.</p> <p>Commercial plantations Wood, M.S., Stephens, N.C., Allison, B.K., and Howell, C.I. (2001). <i>Plantations of Australia - A report from the National Plantation Inventory and the National Farm Forest Inventory</i>. National Forest Inventory, Bureau of Rural Sciences, Canberra.</p>
1990	<p>Non-plantation data SOFR 1998: National Forest Inventory (1998) <i>Australia's State of the Forests Report 1998</i>. Bureau of Rural Sciences, Canberra. (This report was prepared with data from 1993 to 1996, and is largely representative of the on-ground situation in 1990)</p> <p>Commercial plantations ABARE (1992) <i>Australian Forest Resources 1990 and 1991</i>. ABARE, Canberra.</p>

Additional References:

- Australian Government Department of Environment and Energy (2018) Australian National Greenhouse Accounts - National Inventory Report 2016 Volume 2, DoEE, Canberra. (referred to as National Greenhouse Gas Inventory 2016 or NGGI 2016)
- Mutendeudzi M, Read S, Howell C, Davey S & Clancy T (2013) Improving Australia's forest area estimate using a 'Multiple Lines of Evidence' approach. Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.

1 Forest extent, characteristics and changes

1a Extent of forest and other wooded land

National data

Data sources

1990	References	<ol style="list-style-type: none"> 1. SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0. 2. Australian Forest Resources 1990 and 1991. Commonwealth of Australia 1992, Australian Bureau of Agricultural and Resource Economics, Canberra. 3. Australian Government Department of the Environment and Energy (2018) Australian National Greenhouse Accounts - National Inventory Report 2016 Volume 2, DoEE, Canberra.
	Methods used	Full-cover forest/vegetation maps, Sample-based remote sensing assessment, Registers/questionnaires
	Additional comments	<p>The area of native forest for 1990 was derived by applying the forest cover change figures (described below) to Australia's 2016 total forest area, and deducting the published area of plantations for 1990.</p> <p>The best quantitative measure of the actual change over time in Australia's total forest area is obtained from the annual forest area figures produced for the National Greenhouse Gas Inventory (NGGI) for the purposes of calculating net emissions from forest lands (see SOFR 2018, Indicators 1.1a and 5.1a). These figures are published by the Australian Government Department of the Environment and Energy (DoEE) in annual National Inventory Reports (NIRs). The NGGI area figures are derived from a remotely sensed Landsat satellite dataset that has been collected consistently since 1972, and analysed using a national methodology, thus giving a time-consistent dataset that allows calculation of forest area change over time.</p> <p>NGGI forest area figures from the National Inventory Report 2016, Volume 2 (DoEE 2018a), were used to determine annual forest area change (see SOFR 2018, Figure 1.5a and reference), with those change figures then being applied to Australia's total forest area of 134.0 million hectares as at June 2016 (see SOFR 2018, Figure 1.5b), to show the best estimate of the trend over time in Australia's annual total forest area since 1990.</p> <p>The 1990 figures for the area of plantations are sourced from a compilation of historic plantation area statistics. References for reporting years are identified in the plantation compilation spreadsheet. The 1990 forest industry statistics are drawn from the 'Australian Forest Resources 1990 and 1991', prepared by the Australian Bureau of Agricultural and Resource Economics, Canberra (Commonwealth of Australia 1992). Australia's National Plantation Inventory (NPI) was not established until 1996, with the first report of the NPI published in 1997. The areas of native forest were calculated as the difference between the published plantation areas and the corresponding total derived forest area figure for that year, as per the explanation above. The area of Other planted forest was not available in 1990.</p>
2000	References	<ol style="list-style-type: none"> 1. SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0. 2. Wood, M.S., Stephens, N.C., Allison, B.K., and Howell, C.I. (2001). Plantations of Australia - A report from the National Plantation Inventory and the National Farm Forest Inventory. National Forest Inventory, Bureau of Rural Sciences, Canberra. 3. Australian Government Department of the Environment and Energy (2018) Australian National Greenhouse Accounts - National Inventory Report 2016 Volume 2, DoEE, Canberra.
	Methods used	Full-cover forest/vegetation maps
	Additional comments	

		<p>The area of native forest for 2000 was derived by applying the annual forest cover change figures (described below) to Australia's 2016 total forest area, and deducting the published area of plantations for 2000.</p> <p>The best quantitative measure of the actual change over time in Australia's total forest area is obtained from the annual forest area figures produced for the National Greenhouse Gas Inventory (NGGI) for the purposes of calculating net emissions from forest lands (see SOFR 2018, Indicators 1.1a and 5.1a). These figures are published by the Australian Government Department of the Environment and Energy (DoEE) in annual National Inventory Reports (NIRs). The NGGI area figures are derived from a remotely sensed Landsat satellite dataset that has been collected consistently since 1972, and analysed using a national methodology, thus giving a time-consistent dataset that allows calculation of forest area change over time.</p> <p>NGGI forest area figures from the National Inventory Report 2016, Volume 2 (DoEE 2018a), were used to determine annual forest area change (see SOFR 2018, Figure 1.5a), with those change figures then being applied to Australia's total forest area of 134.0 million hectares as at June 2016 (see SOFR 2018, Figure 1.5b), to show the best estimate of the trend over time in Australia's annual total forest area since 1990.</p> <p>The area of plantations in 2000 is sourced from a compilation of historic plantation area statistics, assembled in Australia's National Plantation Inventory (see References above). The area of native forest was calculated as the difference between the published plantation areas and the corresponding total derived forest area figure for that year, as per the explanation above. The area of Other planted forest was not available in 2000.</p>
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2005	<p>References</p>	<ol style="list-style-type: none"> 1. SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0. 2. Parsons, M., Gavran, M. and Davidson, J., 2006. Australia's Plantations 2006. Bureau of Rural Sciences, Canberra. 3. Australian Government Department of the Environment and Energy (2018) Australian National Greenhouse Accounts - National Inventory Report 2016 Volume 2, DoEE, Canberra.
	<p>Methods used</p>	<p>Full-cover forest/vegetation maps</p>
	<p>Additional comments</p>	<p>The area of native forest for 2005 was derived by applying the annual forest cover change figures (described below) to Australia's 2016 total forest area, and deducting the published area of plantations for 2005.</p> <p>The best quantitative measure of the actual change over time in Australia's total forest area is obtained from the annual forest area figures produced for the National Greenhouse Gas Inventory (NGGI) for the purposes of calculating net emissions from forest lands (see SOFR 2018, Indicators 1.1a and 5.1a). These figures are published by the Australian Government Department of the Environment and Energy (DoEE) in annual National Inventory Reports (NIRs). The NGGI area figures are derived from a remotely sensed Landsat satellite dataset that has been collected consistently since 1972, and analysed using a national methodology, thus giving a time-consistent dataset that allows calculation of forest area change over time.</p> <p>NGGI forest area figures from the National Inventory Report 2016, Volume 2 (DoEE 2018a), were used to determine annual forest area change (see SOFR 2018, Figure 1.5a), with those change figures then being applied to Australia's total forest area of 134.0 million hectares as at June 2016 (see SOFR 2018, Figure 1.5b), to show the best estimate of the trend over time in Australia's annual total forest area since 1990.</p> <p>The area of plantations in 2005 is sourced from a compilation of plantation area statistics assembled in Australia's National Plantation Inventory (see References above). The area of native forest was calculated as the difference between the published plantation areas and the corresponding total derived forest area figure for that year, as per the explanation above. The area of Other planted forest was not available in 2005.</p>

2010	<p>References</p>	<ol style="list-style-type: none"> 1. SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0. 2. Gavran, M & Parsons, M 2011. Australian plantation statistics 2011, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. 3. Australian Government Department of the Environment and Energy (2018) Australian National Greenhouse Accounts - National Inventory Report 2016 Volume 2, DoEE, Canberra.
	<p>Methods used</p>	<p>Full-cover forest/vegetation maps</p>
	<p>Additional comments</p>	

		<p>The area of native forest for 2010 was derived by applying the annual forest cover change figures (described below) to Australia's 2016 total forest area, and deducting the published area of plantations for 2010.</p> <p>The best quantitative measure of the actual change over time in Australia's total forest area is obtained from the annual forest area figures produced for the National Greenhouse Gas Inventory (NGGI) for the purposes of calculating net emissions from forest lands (see SOFR 2018, Indicators 1.1a and 5.1a). These figures are published by the Australian Government Department of the Environment and Energy (DoEE) in annual National Inventory Reports (NIRs). The NGGI area figures are derived from a remotely sensed Landsat satellite dataset that has been collected consistently since 1972, and analysed using a national methodology, thus giving a time-consistent dataset that allows calculation of forest area change over time.</p> <p>NGGI forest area figures from the National Inventory Report 2016, Volume 2 (DoEE 2018a), were used to determine annual forest area change (see SOFR 2018, Figure 1.5a), with those change figures then being applied to Australia's total forest area of 134.0 million hectares as at June 2016 (see SOFR 2018, Figure 1.5b), to show the best estimate of the trend over time in Australia's annual total forest area since 1990.</p> <p>The area of plantations in 2010 is sourced from a compilation of historic plantation area statistics, assembled in Australia's National Plantation Inventory (see References above). The area of 'Native forest plus Other planted forest' was calculated as the difference between the published plantation areas and the corresponding total derived forest area figure for that year, as per the explanation above. The areas of Native forest and Other planted forest were then calculated by applying the ratio of the area of Native Forest to the area of Other Forest in SOFR 2013, to the derived area of 'Native forest plus Other planted forest' for the year 2010.</p>
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2015	References	<ol style="list-style-type: none"> SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0. ABARES (2016) Australian plantation statistics 2016, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, August. CC BY 3.0. Australian Government Department of the Environment and Energy (2018) Australian National Greenhouse Accounts - National Inventory Report 2016 Volume 2, DoEE, Canberra.
	Methods used	Sample-based remote sensing assessment, Full-cover forest/vegetation maps, Registers/questionnaires
	Additional comments	<p>The area of native forest for 2015 was derived by applying the annual forest cover change figures (described below) to Australia's 2016 total forest area, and deducting the published area of plantations for 2015.</p> <p>The best quantitative measure of the actual change over time in Australia's total forest area is obtained from the annual forest area figures produced for the National Greenhouse Gas Inventory (NGGI) for the purposes of calculating net emissions from forest lands (see SOFR 2018, Indicators 1.1a and 5.1a). These figures are published by the Australian Government Department of the Environment and Energy (DoEE) in annual National Inventory Reports (NIRs). The NGGI area figures are derived from a remotely sensed Landsat satellite dataset that has been collected consistently since 1972, and analysed using a national methodology, thus giving a time-consistent dataset that allows calculation of forest area change over time.</p> <p>NGGI forest area figures from the National Inventory Report 2016, Volume 2 (DoEE 2018a), were used to determine annual forest area change (see SOFR 2018, Figure 1.5a), with those change figures then being applied to Australia's total forest area of 134.0 million hectares as at June 2016 (see SOFR 2018, Figure 1.5b), to show the best estimate of the trend over time in Australia's annual total forest area since 1990.</p> <p>The area of plantations in 2015 is sourced from area statistics assembled in Australia's National Plantation Inventory (see References above). The area of 'Native forest plus Other planted forest' was calculated as the difference between the published plantation areas and the corresponding total derived forest area figure for that year, as per the explanation above. The areas of Native forest and Other planted forest were then calculated by applying the ratio of the area of Native Forest to the area of Other Forest in SOFR 2018, to the derived area of 'Native forest plus Other planted forest' for the year 2015.</p>

2016	References	<ol style="list-style-type: none"> SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0. Downham, R & Gavran, M (2017) Australian plantation statistics 2017 update, ABARES, Canberra, May. CC BY 4.0.
	Methods used	Full-cover forest/vegetation maps, Sample-based remote sensing assessment
	Additional comments	

		<p>The area of Native forest for 2016 is the area of 'Native forest' published in SOFR 2018.</p> <p>The area of Total forest for 2016 is the total area of forest published in SOFR 2018.</p> <p>The area of Other planted forest is the difference between the total area of forest published in SOFR 2018, and the sum of the areas of Native forest and Plantation area of 'Other forest' published in SOFR 2018.</p> <p>The area of plantations for 2016 is the area published by the National Plantation Inventory, ABARES (see References above).</p>
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2017	References	<p>1. Native and Other forest: SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0.</p> <p>2. Plantation forest: Downham, R & Gavran, M 2018, Australian plantation statistics 2018 update, ABARES, Canberra, May. CC BY 4.0.</p>
	Methods used	Registers/questionnaires, Full-cover forest/vegetation maps, Sample-based remote sensing assessment
	Additional comments	<p>The area of Native forest for 2017 is the area of 'Native forest' published in SOFR 2018.</p> <p>The area of Total forest for 2017 is the total area of forest published in SOFR 2018.</p> <p>The area of Other planted forest is the total area of forest reported in 2016 (published in SOFR 2018), less the area of Native forest less the area of Plantations.</p> <p>The area of plantations for 2017 is the area published by the National Plantation Inventory, ABARES (see References above).</p> <p>Commercial plantation data are collected through registers and questionnaires. Data for the other two forest categories are assembled using a combination of remote sensing assessments and full cover forest and vegetation maps.</p>

2018	References	<p>1. Native and Other forest: SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0.</p> <p>2. Plantation forest: Downham, R & Gavran, M 2019, Australian plantation statistics 2019 update, ABARES technical report 19.2, Canberra, May. CC BY 4.0</p>
	Methods used	Registers/questionnaires, Sample-based remote sensing assessment, Full-cover forest/vegetation maps
	Additional comments	<p>The area of Native forest and Other forest is a direct copy of the areas reported in 2016.</p> <p>The Plantation forest area is the actual area published for this reporting year.</p> <p>Commercial plantation data are collected through registers and questionnaires. Data for the other two forest categories are assembled using a combination of remote sensing assessments and full cover forest and vegetation maps.</p>

Classifications and definitions

1990	National class	Definition
	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	

		<p>1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation.</p> <p>2. A plantation reported through Australia's National Plantation Inventory.</p>
	Other forest	This national class had not been developed at this time. It was first introduced and reported in SOFR 2013.

	National class	Definition
2000	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	<p>1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation.</p> <p>2. A plantation reported through Australia's National Plantation Inventory.</p>
	Other forest	This national class had not been developed at this time. It was first introduced and reported in SOFR 2013.

	National class	Definition
2005	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	<p>1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation. 2. A plantation reported through Australia's National Plantation Inventory.</p>
	Other forest	This national class had not been developed at this time. It was first introduced and reported in SOFR 2013.

	National class	Definition
2010	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	<p>1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation. 2. A plantation reported through Australia's National Plantation Inventory.</p>
	Other forest	

		A National Forest Inventory forest category that includes non-commercial plantations and planted forests that are not reported through the National Plantation Inventory but that satisfy the definition of forest. It includes farm forestry and agroforestry plantations, sandalwood plantations, environmental plantings, plantations within the reserve system, and plantations regarded as not commercially viable. Non-planted forests dominated by introduced species are also included in this category.
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	National class	Definition
2015	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation. 2. A plantation reported through Australia's National Plantation Inventory.
	Other forest	A National Forest Inventory forest category that includes non-commercial plantations and planted forests that are not reported through the National Plantation Inventory but that satisfy the definition of forest. It includes farm forestry and agroforestry plantations, sandalwood plantations, environmental plantings, plantations within the reserve system, and plantations regarded as not commercially viable. Non-planted forests dominated by introduced species are also included in this category.

	National class	Definition
2016	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation. 2. A plantation reported through Australia's National Plantation Inventory.
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	Other forest	

	A National Forest Inventory forest category that includes non-commercial plantations and planted forests that are not reported through the National Plantation Inventory but that satisfy the definition of forest. It includes farm forestry and agroforestry plantations, sandalwood plantations, environmental plantings, plantations within the reserve system, and plantations regarded as not commercially viable. Non-planted forests dominated by introduced species are also included in this category.
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	National class	Definition
2018	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation. 2. A plantation reported through Australia's National Plantation Inventory.
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Original data and reclassification

	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Forest	Other wooded land	Other land
1990	Native forest	132 859.30	100.00 %	%	%
	Commercial plantation	1 022.90	100.00 %	%	%
	Other forest	0.00	100.00 %	%	%
	Total	133 882.20	133 882.20	–	–

	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Forest	Other wooded land	Other land
2000	Native forest	130 329.40	100.00 %	%	%
	Commercial plantation	1 484.70	100.00 %	%	%
	Other forest	0.00	0.00 %	%	%
	Total	131 814.10	131 814.10	–	–

2005	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Forest	Other wooded land	Other land
	Native forest	128 010.67	100.00 %	%	%
	Commercial plantation	1 739.40	100.00 %	%	%
	Other forest	0.00	0.00 %	%	%
	Total	129 750.07	129 750.07	–	–

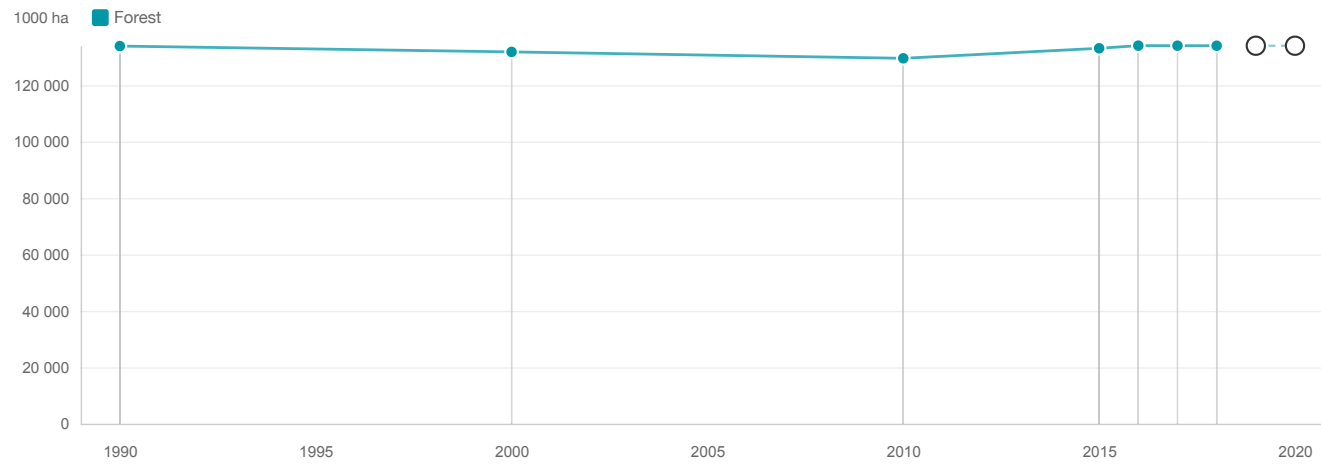
2010	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Forest	Other wooded land	Other land
	Native forest	127 378.20	100.00 %	%	%
	Commercial plantation	2 008.90	100.00 %	%	%
	Other forest	159.00	100.00 %	%	%
	Total	129 546.10	129 546.10	–	–

2015	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Forest	Other wooded land	Other land
	Native forest	130 676.70	100.00 %	%	%
	Commercial plantation	1 973.40	100.00 %	%	%
	Other forest	444.40	100.00 %	%	%
	Total	133 094.50	133 094.50	–	–

2016	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Forest	Other wooded land	Other land
	Native forest	131 614.80	100.00 %	%	%
	Commercial plantation	1 974.80	100.00 %	%	%
	Other forest	447.60	100.00 %	%	%
	Total	134 037.20	134 037.20	–	–

	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Forest	Other wooded land	Other land
2017	Native forest	131 614.80	100.00 %	%	%
	Commercial plantation	1 955.00	100.00 %	%	%
	Other forest	447.60	100.00 %	%	%
	Total	134 017.40	134 017.40	–	–

	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Forest	Other wooded land	Other land
2018	Native forest	131 614.80	100.00 %	%	%
	Commercial plantation	1 942.70	100.00 %	%	%
	Other forest	447.60	100.00 %	%	%
	Total	134 005.10	134 005.10	–	–



FRA categories	Area (1000 ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Forest (a)	133 882.20	131 814.10	129 546.10	133 094.50	134 037.20	134 017.40	134 005.10	134 005.10	134 005.10
Other wooded land (a)									
Other land (c-a-b)	634 347.80	636 415.90	638 683.90	635 135.50	634 192.80	634 212.60	634 224.90	634 224.90	634 224.90
Total land area (c)	768 230.00	768 230.00	768 230.00	768 230.00	768 230.00	768 230.00	768 230.00	768 230.00	768 230.00

The FAOSTAT land area figure for the year 2015 is used for all reference years

Climatic domain	% of forest area 2015	Override value
Boreal		0.00
Temperate		35.00
Sub-tropical		50.00
Tropical		15.00

Comments

1. Forecasts have not been provided for the years 2017, 2018, 2019 and 2020.
2. For the years 2017 and 2018, the area of *Naturally regenerating forest* and the area of *Other planted forest* are simply a copy of the areas reported in 2016 for these categories (see SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0.). The areas of *Plantation forest* are from more recently published data (see Downham, R & Gavran, M 2019, Australian plantation statistics 2019 update, ABARES technical report 19.2, Canberra, May. CC BY 4.0.)
3. For the years 2019 and 2020, the areas of all FRA categories are simply a copy of the areas reported for the year 2018.
4. **Native forest:** A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
5. **Plantation forest:** A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation. A plantation reported through Australia's National Plantation Inventory.
6. **Other forest:** A National Forest Inventory forest category that includes non-commercial plantations and planted forests that are not reported through the National Plantation Inventory but that satisfy the definition of forest. It includes farm forestry and agroforestry plantations, sandalwood plantations, environmental plantings, plantations within the reserve system, and plantations regarded as not commercially viable. Non-planted forests dominated by introduced species are also included in this category. This category, which equates to the FRA 2020 category 'Other planted forest', was only introduced into Australia's national forest reporting for SOFR 2013 (and reported in the FRA reporting year 2010). As such, data are not available for this category for the FRA reporting years 1990, 2000 and 2005. While this implies that the total planted forest area may be an underestimate for these years, it should be noted that areas of 'Other planted forest' was likely to be less during these early years as the plantings from programs implemented by national, state and territory governments to establish planted areas of sandalwood (*Santalum* species), farm forestry and agroforestry plantations, and environmental plantings are less likely to have met the definition of forest at this time.
7. The definition of Australia's forest used in this report is the same as that used by Australia's National Forest Inventory and reported in Australia's SOFR series. Australia's definition of forest is '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.'
8. Australia's definition **includes** forests in agricultural production systems where grazing occurs, but **excludes** tree crops such as fruit or nut tree plantations, oil palm plantations, olive orchards, Christmas tree plantations, and urban forests. This definition differs from that used by the FAO in the minimum thresholds for both height and canopy cover, and in the treatment of land use.
9. Australia does not have, at the national level, a plot-based forest inventory system. Australia's NFI is based on information supplied from national, state and territory government agencies, and by private industry. Data from state and territory governments are collected through a range of mechanisms, some of which are from sample based forest inventory plots.

10. To address the mapping inconsistencies between forest area figures published in SOFR 2018, SOFR 2013, SOFR 2003 and SOFR 1998, a set of derived forest extent figures have been calculated and reported for the purposes of the FRA 2020 for 2015, 2010, 2000 and 1990
11. The SOFR 2018 total forest area of 134,037,000 hectares provides the baseline (or reference value) for the year 2016, from which the area figures for earlier FRA 2020 reporting years (2015, 2010, 2000 and 1990) are derived, by application of the NGGI 2016 forest cover change figures. The derived forest area figures provided here for 1990, 2000, 2010 and 2015 are referred to as Australia's FRA 2020 derived forest areas. For each of the reporting years, the component of the total forest area that is the commercial plantation extent is the area (referred to by FRA as 'hard data') of commercial plantations taken from Australia's National Plantation Inventory for the respective years. The area of native forest for 1990 and 2000, or the combined area of native forest and other forest for the years 2010, 2015 and 2016, is the difference between the total derived area and the area of commercial plantations for that year.
12. Data entered for the years 1990-2018 are therefore considered to be hard data based on published figures.
13. To meet the requirements of the FRA 2020 for data to be reported for the years 2019 and 2020, Australia has copied the 2018 figures into the 'out years' 2019 and 2020. These figures are neither forecasts nor estimates.
14. Australia, through the Australian Government Department of the Environment and Energy, has assembled consistent land cover change data from 1972-2016 for the purpose of reporting greenhouse gas emissions. Published forest cover change figures from this dataset and covering the period 1990-2016 are provided in Australia's National Greenhouse Accounts National Inventory Report 2016 Volume 2, released in 2018 (Australian Government Department of the Environment and Energy, 2018). This report is referred to as Australia's National Greenhouse Gas Inventory 2016, or NGGI 2016, in Australia's Country Report to the FRA 2020. The time-series of forest area shown in the data presented in Australia's Country Report to the FRA 2020 shows a decrease in 1990 to 2008, followed by a progressive increase until 2016. The net increase in forest area over the period 2011 to 2016 was 3.9 million hectares. This reflects real on-ground changes in forest area, being derived from a consistent time-series of Landsat satellite data and uniform application through that time-series of the current area algorithm, as interpreted for Australia's National Greenhouse Gas Inventory (NGGI). This increase in forest area is due to the net effect of forest clearing or reclearing for agricultural use; regrowth of forest on areas previously cleared for agricultural use; expansion of forest onto areas not recently containing forest; establishment of environmental plantings; and changes in the commercial plantation estate.
15. The area of forest reported by Australia for the year 2015 in FRA 2015 was 125 million hectares. The difference in the reported forest area for Australia for the year 2015 in FRA 2020 derives from the use of more accurate state, territory and national datasets and recent high resolution imagery, plus actual on-ground changes in forest area. .
16. The improved mapping resolution and more accurate measure of Australia's forest area has derived from the new MLE methodology developed and implemented by Australia's National Forest Inventory team. The MLE approach integrates forest cover data provided by state and territory land management agencies, with data sourced from a variety of remote-sensing methods. This approach gives a higher level of certainty for areas of forest and non-forest. The resultant National Forest Inventory forest cover dataset derives from an updated and more rigorous and robust understanding of Australia's total forest area, and of the geographic distribution of national forest types and land tenure. Further information is available from SOFR 2018, and from Mutendeuzi M, Read S, Howell C, Davey S & Clancy T (2013).
17. Australia is unable to provide figures to report the category 'Other Wooded Land'. As such, this area is included in the 'Other Land' category.

See Introduction for reference list.

1b Forest characteristics

National data

Data sources

1990	References	<ol style="list-style-type: none"> 1. SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0. 2. Australian Forest Resources 1990 and 1991. Commonwealth of Australia 1992, Australian Bureau of Agricultural and Resource Economics, Canberra. 3. Australian Government Department of the Environment and Energy (2018) Australian National Greenhouse Accounts - National Inventory Report 2016 Volume 2, DoEE, Canberra.
	Methods used	Full-cover forest/vegetation maps, Sample-based remote sensing assessment, Registers/questionnaires
	Additional comments	<p>The area of native forest for 1990 was derived by applying the forest cover change figures (described below) to Australia's 2016 total forest area, and deducting the published area of plantations for 1990.</p> <p>The best quantitative measure of the actual change over time in Australia's total forest area is obtained from the annual forest area figures produced for the National Greenhouse Gas Inventory (NGGI) for the purposes of calculating net emissions from forest lands (see SOFR 2018, Indicators 1.1a and 5.1a). These figures are published by the Australian Government Department of the Environment and Energy (DoEE) in annual National Inventory Reports (NIRs). The NGGI area figures are derived from a remotely sensed Landsat satellite dataset that has been collected consistently since 1972, and analysed using a national methodology, thus giving a time-consistent dataset that allows calculation of forest area change over time.</p> <p>NGGI forest area figures from the National Inventory Report 2016, Volume 2 (DoEE 2018a), were used to determine annual forest area change (see SOFR 2018, Figure 1.5a and reference), with those change figures then being applied to Australia's total forest area of 134.0 million hectares as at June 2016 (see SOFR 2018, Figure 1.5b), to show the best estimate of the trend over time in Australia's annual total forest area since 1990.</p> <p>The 1990 figures for the area of plantations are sourced from a compilation of historic plantation area statistics. References for reporting years are identified in the plantation compilation spreadsheet. The 1990 forest industry statistics are drawn from the 'Australian Forest Resources 1990 and 1991', prepared by the Australian Bureau of Agricultural and Resource Economics, Canberra (Commonwealth of Australia 1992). Australia's National Plantation Inventory (NPI) was not established until 1996, with the first report of the NPI published in 1997. The areas of native forest were calculated as the difference between the published plantation areas and the corresponding total derived forest area figure for that year, as per the explanation above. The area of Other planted forest was not available in 1990.</p>
2000	References	<ol style="list-style-type: none"> 1. SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0. 2. Wood, M.S., Stephens, N.C., Allison, B.K., and Howell, C.I. (2001). Plantations of Australia - A report from the National Plantation Inventory and the National Farm Forest Inventory. National Forest Inventory, Bureau of Rural Sciences, Canberra. 3. Australian Government Department of the Environment and Energy (2018) Australian National Greenhouse Accounts - National Inventory Report 2016 Volume 2, DoEE, Canberra.
	Methods used	Full-cover forest/vegetation maps
	Additional comments	

		<p>The area of native forest for 2000 was derived by applying the annual forest cover change figures (described below) to Australia's 2016 total forest area, and deducting the published area of plantations for 2000.</p> <p>The best quantitative measure of the actual change over time in Australia's total forest area is obtained from the annual forest area figures produced for the National Greenhouse Gas Inventory (NGGI) for the purposes of calculating net emissions from forest lands (see SOFR 2018, Indicators 1.1a and 5.1a). These figures are published by the Australian Government Department of the Environment and Energy (DoEE) in annual National Inventory Reports (NIRs). The NGGI area figures are derived from a remotely sensed Landsat satellite dataset that has been collected consistently since 1972, and analysed using a national methodology, thus giving a time-consistent dataset that allows calculation of forest area change over time.</p> <p>NGGI forest area figures from the National Inventory Report 2016, Volume 2 (DoEE 2018a), were used to determine annual forest area change (see SOFR 2018, Figure 1.5a), with those change figures then being applied to Australia's total forest area of 134.0 million hectares as at June 2016 (see SOFR 2018, Figure 1.5b), to show the best estimate of the trend over time in Australia's annual total forest area since 1990.</p> <p>The area of plantations in 2000 is sourced from a compilation of historic plantation area statistics, assembled in Australia's National Plantation Inventory (see References above). The area of native forest was calculated as the difference between the published plantation areas and the corresponding total derived forest area figure for that year, as per the explanation above. The area of Other planted forest was not available in 2000.</p>
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2005	References	<ol style="list-style-type: none"> 1. SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0. 2. Parsons, M., Gavran, M. and Davidson, J., 2006. Australia's Plantations 2006. Bureau of Rural Sciences, Canberra. 3. Australian Government Department of the Environment and Energy (2018) Australian National Greenhouse Accounts - National Inventory Report 2016 Volume 2, DoEE, Canberra.
	Methods used	Full-cover forest/vegetation maps
	Additional comments	<p>The area of native forest for 2005 was derived by applying the annual forest cover change figures (described below) to Australia's 2016 total forest area, and deducting the published area of plantations for 2005.</p> <p>The best quantitative measure of the actual change over time in Australia's total forest area is obtained from the annual forest area figures produced for the National Greenhouse Gas Inventory (NGGI) for the purposes of calculating net emissions from forest lands (see SOFR 2018, Indicators 1.1a and 5.1a). These figures are published by the Australian Government Department of the Environment and Energy (DoEE) in annual National Inventory Reports (NIRs). The NGGI area figures are derived from a remotely sensed Landsat satellite dataset that has been collected consistently since 1972, and analysed using a national methodology, thus giving a time-consistent dataset that allows calculation of forest area change over time.</p> <p>NGGI forest area figures from the National Inventory Report 2016, Volume 2 (DoEE 2018a), were used to determine annual forest area change (see SOFR 2018, Figure 1.5a), with those change figures then being applied to Australia's total forest area of 134.0 million hectares as at June 2016 (see SOFR 2018, Figure 1.5b), to show the best estimate of the trend over time in Australia's annual total forest area since 1990.</p> <p>The area of plantations in 2005 is sourced from a compilation of plantation area statistics assembled in Australia's National Plantation Inventory (see References above). The area of native forest was calculated as the difference between the published plantation areas and the corresponding total derived forest area figure for that year, as per the explanation above. The area of Other planted forest was not available in 2005.</p>

2010	References	<ol style="list-style-type: none"> 1. SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0. 2. Gavran, M & Parsons, M 2011. Australian plantation statistics 2011, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra. 3. Australian Government Department of the Environment and Energy (2018) Australian National Greenhouse Accounts - National Inventory Report 2016 Volume 2, DoEE, Canberra.
	Methods used	Full-cover forest/vegetation maps
	Additional comments	

		<p>The area of native forest for 2010 was derived by applying the annual forest cover change figures (described below) to Australia's 2016 total forest area, and deducting the published area of plantations for 2010.</p> <p>The best quantitative measure of the actual change over time in Australia's total forest area is obtained from the annual forest area figures produced for the National Greenhouse Gas Inventory (NGGI) for the purposes of calculating net emissions from forest lands (see SOFR 2018, Indicators 1.1a and 5.1a). These figures are published by the Australian Government Department of the Environment and Energy (DoEE) in annual National Inventory Reports (NIRs). The NGGI area figures are derived from a remotely sensed Landsat satellite dataset that has been collected consistently since 1972, and analysed using a national methodology, thus giving a time-consistent dataset that allows calculation of forest area change over time.</p> <p>NGGI forest area figures from the National Inventory Report 2016, Volume 2 (DoEE 2018a), were used to determine annual forest area change (see SOFR 2018, Figure 1.5a), with those change figures then being applied to Australia's total forest area of 134.0 million hectares as at June 2016 (see SOFR 2018, Figure 1.5b), to show the best estimate of the trend over time in Australia's annual total forest area since 1990.</p> <p>The area of plantations in 2010 is sourced from a compilation of historic plantation area statistics, assembled in Australia's National Plantation Inventory (see References above). The area of 'Native forest plus Other planted forest' was calculated as the difference between the published plantation areas and the corresponding total derived forest area figure for that year, as per the explanation above. The areas of Native forest and Other planted forest were then calculated by applying the ratio of the area of Native Forest to the area of Other Forest in SOFR 2013, to the derived area of 'Native forest plus Other planted forest' for the year 2010.</p>
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<p>2015</p>	<p>References</p>	<ol style="list-style-type: none"> 1. SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0. 2. ABARES (2016) Australian plantation statistics 2016, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, August. CC BY 3.0. 3. Australian Government Department of the Environment and Energy (2018) Australian National Greenhouse Accounts - National Inventory Report 2016 Volume 2, DoEE, Canberra.
	<p>Methods used</p>	<p>Sample-based remote sensing assessment, Full-cover forest/vegetation maps, Registers/questionnaires</p>
	<p>Additional comments</p>	<p>The area of native forest for 2015 was derived by applying the annual forest cover change figures (described below) to Australia's 2016 total forest area, and deducting the published area of plantations for 2015.</p> <p>The best quantitative measure of the actual change over time in Australia's total forest area is obtained from the annual forest area figures produced for the National Greenhouse Gas Inventory (NGGI) for the purposes of calculating net emissions from forest lands (see SOFR 2018, Indicators 1.1a and 5.1a). These figures are published by the Australian Government Department of the Environment and Energy (DoEE) in annual National Inventory Reports (NIRs). The NGGI area figures are derived from a remotely sensed Landsat satellite dataset that has been collected consistently since 1972, and analysed using a national methodology, thus giving a time-consistent dataset that allows calculation of forest area change over time.</p> <p>NGGI forest area figures from the National Inventory Report 2016, Volume 2 (DoEE 2018a), were used to determine annual forest area change (see SOFR 2018, Figure 1.5a), with those change figures then being applied to Australia's total forest area of 134.0 million hectares as at June 2016 (see SOFR 2018, Figure 1.5b), to show the best estimate of the trend over time in Australia's annual total forest area since 1990.</p> <p>The area of plantations in 2015 is sourced from area statistics assembled in Australia's National Plantation Inventory (see References above). The area of 'Native forest plus Other planted forest' was calculated as the difference between the published plantation areas and the corresponding total derived forest area figure for that year, as per the explanation above. The areas of Native forest and Other planted forest were then calculated by applying the ratio of the area of Native Forest to the area of Other Forest in SOFR 2018, to the derived area of 'Native forest plus Other planted forest' for the year 2015.</p>

<p>2016</p>	<p>References</p>	<ol style="list-style-type: none"> 1. SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0. 2. Downham, R & Gavran, M (2017) Australian plantation statistics 2017 update, ABARES, Canberra, May. CC BY 4.0.
	<p>Methods used</p>	<p>Full-cover forest/vegetation maps, Sample-based remote sensing assessment</p>
	<p>Additional comments</p>	

		<p>The area of Native forest for 2016 is the area of 'Native forest' published in SOFR 2018.</p> <p>The area of Total forest for 2016 is the total area of forest published in SOFR 2018.</p> <p>The area of Other planted forest is the difference between the total area of forest published in SOFR 2018, and the sum of the areas of Native forest and Plantation area of 'Other forest' published in SOFR 2018.</p> <p>The area of plantations for 2016 is the area published by the National Plantation Inventory, ABARES (see References above).</p>
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2017	References	<p>1. Native and Other forest: SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0.</p> <p>2. Plantation forest: Downham, R & Gavran, M 2018, Australian plantation statistics 2018 update, ABARES, Canberra, May. CC BY 4.0.</p>
	Methods used	Registers/questionnaires, Full-cover forest/vegetation maps, Sample-based remote sensing assessment
	Additional comments	<p>The area of Native forest for 2017 is the area of 'Native forest' published in SOFR 2018.</p> <p>The area of Total forest for 2017 is the total area of forest published in SOFR 2018.</p> <p>The area of Other planted forest is the total area of forest reported in 2016 (published in SOFR 2018), less the area of Native forest less the area of Plantations.</p> <p>The area of plantations for 2017 is the area published by the National Plantation Inventory, ABARES (see References above).</p> <p>Commercial plantation data are collected through registers and questionnaires. Data for the other two forest categories are assembled using a combination of remote sensing assessments and full cover forest and vegetation maps.</p>

2018	References	<p>1. Native and Other forest: SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0.</p> <p>2. Plantation forest: Downham, R & Gavran, M 2019, Australian plantation statistics 2019 update, ABARES technical report 19.2, Canberra, May. CC BY 4.0</p>
	Methods used	Registers/questionnaires, Sample-based remote sensing assessment, Full-cover forest/vegetation maps
	Additional comments	<p>The area of Native forest and Other forest is a direct copy of the areas reported in 2016.</p> <p>The Plantation forest area is the actual area published for this reporting year.</p> <p>Commercial plantation data are collected through registers and questionnaires. Data for the other two forest categories are assembled using a combination of remote sensing assessments and full cover forest and vegetation maps.</p>

Classifications and definitions

1990	National class	Definition
	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	

		<p>1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation.</p> <p>2. A plantation reported through Australia's National Plantation Inventory.</p>
	Other forest	This national class had not been developed at this time. It was first introduced and reported in SOFR 2013.

	National class	Definition
2000	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	<p>1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation.</p> <p>2. A plantation reported through Australia's National Plantation Inventory.</p>
	Other forest	This national class had not been developed at this time. It was first introduced and reported in SOFR 2013.

	National class	Definition
2005	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	<p>1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation. 2. A plantation reported through Australia's National Plantation Inventory.</p>
	Other forest	This national class had not been developed at this time. It was first introduced and reported in SOFR 2013.

	National class	Definition
2010	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	<p>1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation. 2. A plantation reported through Australia's National Plantation Inventory.</p>
	Other forest	

		A National Forest Inventory forest category that includes non-commercial plantations and planted forests that are not reported through the National Plantation Inventory but that satisfy the definition of forest. It includes farm forestry and agroforestry plantations, sandalwood plantations, environmental plantings, plantations within the reserve system, and plantations regarded as not commercially viable. Non-planted forests dominated by introduced species are also included in this category.
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	National class	Definition
2015	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation. 2. A plantation reported through Australia's National Plantation Inventory.
	Other forest	A National Forest Inventory forest category that includes non-commercial plantations and planted forests that are not reported through the National Plantation Inventory but that satisfy the definition of forest. It includes farm forestry and agroforestry plantations, sandalwood plantations, environmental plantings, plantations within the reserve system, and plantations regarded as not commercially viable. Non-planted forests dominated by introduced species are also included in this category.

	National class	Definition
2016	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation. 2. A plantation reported through Australia's National Plantation Inventory.
	Other forest	A National Forest Inventory forest category that includes non-commercial plantations and planted forests that are not reported through the National Plantation Inventory but that satisfy the definition of forest. It includes farm forestry and agroforestry plantations, sandalwood plantations, environmental plantings, plantations within the reserve system, and plantations regarded as not commercially viable. Non-planted forests dominated by introduced species are also included in this category.

	National class	Definition
2017	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation. 2. A plantation reported through Australia's National Plantation Inventory.
	Other forest	

	A National Forest Inventory forest category that includes non-commercial plantations and planted forests that are not reported through the National Plantation Inventory but that satisfy the definition of forest. It includes farm forestry and agroforestry plantations, sandalwood plantations, environmental plantings, plantations within the reserve system, and plantations regarded as not commercially viable. Non-planted forests dominated by introduced species are also included in this category.
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	National class	Definition
2018	Native forest	A category in Australia's National Forest Inventory that comprises national forest types dominated by the suite of native tree species naturally associated with forest in that location and located within their natural range, and that is not a plantation and not in the national category 'Other forest'.
	Commercial plantation	1. A National Forest Inventory forest category that comprises hardwood or softwood plantations managed commercially to supply logs to wood-processing industries for the manufacture of wood products. Previously reported in FRA 2015 as Industrial Plantation. 2. A plantation reported through Australia's National Plantation Inventory.
	Other forest	A National Forest Inventory forest category that includes non-commercial plantations and planted forests that are not reported through the National Plantation Inventory but that satisfy the definition of forest. It includes farm forestry and agroforestry plantations, sandalwood plantations, environmental plantings, plantations within the reserve system, and plantations regarded as not commercially viable. Non-planted forests dominated by introduced species are also included in this category.

Original data and reclassification

	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Naturally regenerating forest	Plantation forest	Other planted forest
1990	Native forest	132 859.30	100.00 %	%	%
	Commercial plantation	1 022.90	0.00 %	100.00 %	%
	Other forest	0.00	0.00 %	%	%
	Total	133 882.20	132 859.30	1 022.90	–

Plantation forest	Area (1000 ha)	...of which introduced
Commercial plantation	1 022.90	90.57 %
Total	1 022.90	926.44

	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Naturally regenerating forest	Plantation forest	Other planted forest
2000	Native forest	130 329.40	100.00 %	%	%
	Commercial plantation	1 484.70	%	100.00 %	%

	Total	131 814.10	130 329.40	1 484.70	-
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Plantation forest	Area (1000 ha)	...of which introduced
Commercial plantation	1 484.70	65.48 %
Total	1 484.70	972.18

	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Naturally regenerating forest	Plantation forest	Other planted forest
2005	Native forest	128 010.67	100.00 %	%	%
	Commercial plantation	1 739.40	%	100.00 %	%
	Total	129 750.07	128 010.67	1 739.40	-

Plantation forest	Area (1000 ha)	...of which introduced
Commercial plantation	1 739.40	56.92 %
Total	1 739.40	990.07

	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Naturally regenerating forest	Plantation forest	Other planted forest
2010	Native forest	127 378.20	100.00 %	%	%
	Commercial plantation	2 008.90	%	100.00 %	%
	Other forest	159.00	%	%	100.00 %
	Total	129 546.10	127 378.20	2 008.90	159.00

Plantation forest	Area (1000 ha)	...of which introduced
Commercial plantation	2 008.90	50.95 %
Total	2 008.90	1 023.53

2015	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Naturally regenerating forest	Plantation forest	Other planted forest

	Native forest	130 676.70	100.00 %	%	%
	Commercial plantation	1 973.40	%	100.00 %	%
	Other forest	444.40	%	%	100.00 %
	Total	133 094.50	130 676.70	1 973.40	444.40

Plantation forest	Area (1000 ha)	...of which introduced
Commercial plantation	1 973.40	52.47 %
Total	1 973.40	1 035.44

2016	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Naturally regenerating forest	Plantation forest	Other planted forest
	Native forest	131 614.80	100.00 %	%	%
	Commercial plantation	1 974.80	%	100.00 %	%
	Other forest	447.60	%	%	100.00 %
	Total	134 037.20	131 614.80	1 974.80	447.60

Plantation forest	Area (1000 ha)	...of which introduced
Commercial plantation	1 974.80	52.50 %
Total	1 974.80	1 036.77

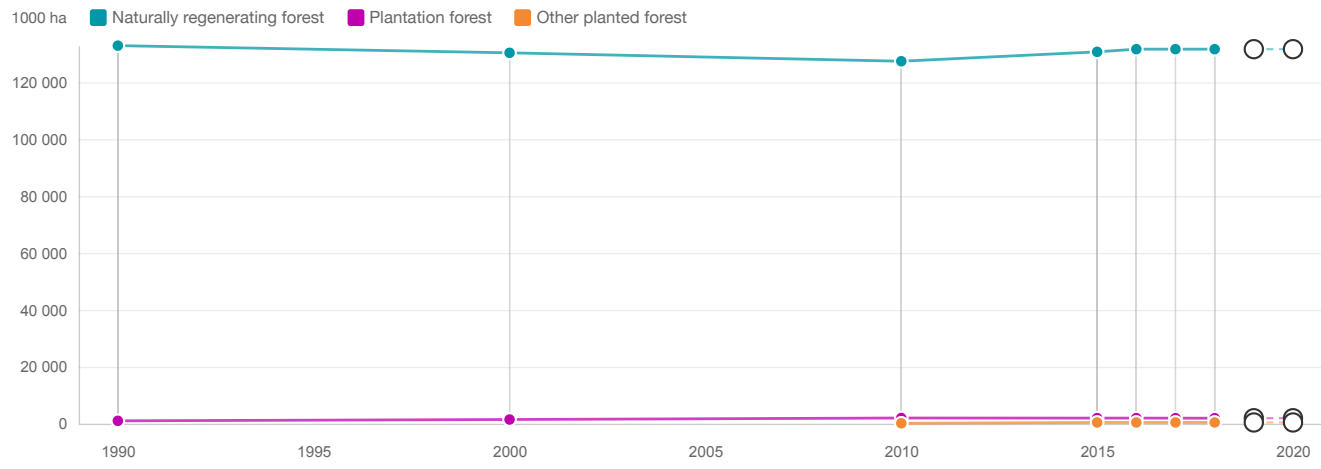
2017	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Naturally regenerating forest	Plantation forest	Other planted forest
	Native forest	131 614.80	100.00 %	%	%
	Commercial plantation	1 955.00	%	100.00 %	%
	Other forest	447.60	%	%	100.00 %
	Total	134 017.40	131 614.80	1 955.00	447.60

Plantation forest	Area (1000 ha)	...of which introduced
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Plantation forest	Area (1000 ha)	...of which introduced
Commercial plantation	1 955.00	53.04 %
Total	1 955.00	1 036.93

2018	Classifications and definitions		FRA classes		
	Class	Area (1000 ha)	Naturally regenerating forest	Plantation forest	Other planted forest
	Native forest	131 614.80	100.00 %	%	%
	Commercial plantation	1 942.70	%	100.00 %	%
	Other forest	447.60	%	%	100.00 %
	Total	134 005.10	131 614.80	1 942.70	447.60

Plantation forest	Area (1000 ha)	...of which introduced
Commercial plantation	1 942.70	53.38 %
Total	1 942.70	1 037.01



FRA categories	Forest area (1000 ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Naturally regenerating forest (a)	132 859.30	130 329.40	127 378.20	130 676.70	131 614.80	131 614.80	131 614.80	131 614.80	131 614.80
Planted forest (b)	1 022.90	1 484.70	2 167.90	2 417.80	2 422.40	2 402.60	2 390.30	2 390.30	2 390.30
Plantation forest	1 022.90	1 484.70	2 008.90	1 973.40	1 974.80	1 955.00	1 942.70	1 942.70	1 942.70
...of which introduced species	926.44	972.18	1 023.53	1 035.44	1 036.77	1 036.93	1 037.01	1 037.01	1 037.01
Other planted forest			159.00	444.40	447.60	447.60	447.60	447.60	447.60
Total (a+b)	133 882.20	131 814.10	129 546.10	133 094.50	134 037.20	134 017.40	134 005.10	134 005.10	134 005.10
Total forest area	133 882.20	131 814.10	129 546.10	133 094.50	134 037.20	134 017.40	134 005.10	134 005.10	134 005.10

Comments

Classifications and Definitions

For the purpose of FRA 2020, the reported SOFR 2018 categories are equivalent to FRA 2020 categories:

SOFR 2018 categories	FRA 2020 classes
Native Forest	Naturally regenerating forest
Commercial plantation	Plantation forest
Other forest	Other planted forest

See comments section in FRA 2020 question 1a: 'Extent of forest and other wooded land' for SOFR 2018 definitions of Native forest and commercial plantation.

The national forest category 'Other forest', which equates to the FRA 2020 category 'Other planted forest', was only introduced into Australia's national forest reporting for SOFR 2013 (and reported in the FRA reporting year 2010). As such, data are not available for this category for the FRA reporting years 1990, 2000 and 2005. While this implies that the total planted forest area may be an underestimate for these years, it should be noted that areas of 'Other planted forest' was likely to be less during these early years as the plantings from programs implemented by national, state and territory governments to establish planted areas of sandalwood (*Santalum* species), farm forestry and agroforestry plantations, and environmental plantings are less likely to have met the definition of forest at this time.

Forecasts have not been provided for the years 2017, 2018, 2019 and 2020.

- For the years 2017 and 2018, the area of *Naturally regenerating forest* and the area of *Other planted forest* are simply a copy of the areas reported in 2016 for these categories. The areas of *Plantation forest* are from more recently published data (see references).
- For the years 2019 and 2020, the areas of all FRA categories are simply a copy of the areas reported in 2018.

1c Primary forest and special forest categories

National Data

Data sources + type of data source eg NFI, etc

The area of mangroves for Australia for 1990, 2000, 2010 and 2015 is published in each of SOFR 1998, 2003, 2013 and 2018 because these are the most accurate areas for each these years.

The area of primary forest in Australia for 2000 and is published as 'old-growth forest' in SOFR 2018.

National classification and definitions

Source: SOFR 2018, 'Glossary', pages 517 – 531

Mangroves	1. A tree or shrub that normally grows above mean sea level in the intertidal zone of coastal environments and estuarine margins. 2. The tidal habitat comprising mangrove trees and shrubs. 3. A national forest type dominated by mangrove trees.
Old-growth	Ecologically mature forest where the effects of disturbances are now negligible.

Original data

Mangrove area for 1990:

Source: SOFR 1998, Chapter 3: 'The Size, Distribution and Tenure of the Forest Estate', Table 1, page 31.

Forest type	Australian Capital Territory	New South Wales	Northern Territory	Queensland	South Australia	Tasmania	Victoria	Western Australia	Australia
Mangrove	0	7	442	398	20	0	5	173	1,045
Total native forest	120	20 787	35 385	49 056	5 499	2 904	7 285	34 800	155,835

Source: National Forest Inventory (1997).

Mangrove area for 2000:

Source: SOFR 2003, Chapter 1: 'Conservation of biological diversity', 1.1a 'Ecosystem diversity', page 68.

	Woodland	Open	Closed	Unknown crown cover	Total native forest
Mangrove	25	266	325	132	749
Total native forest	102 526	45 603	4 644	9 907	162 680

Source: National Forest Inventory (2003).

Mangrove area for 2010:

Source: SOFR 2013, Indicator 1.1a: 'Area of forest by forest type and tenure', page 37.

Forest type	Area ('000 hectares)
Mangrove	913

Native forest total	122,581
Australian forest total	124,751

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

Mangrove area for 2015:

Source: SOFR 2018, Indicator 1.1c ; Area of forest in protected area categories', page 99.

Native forest type	Area ('000 hectares)
Mangrove	854
Total native forest	131,615

Source: ABARES, National Forest Inventory (NFI)

Primary forest for 2000 and 2015:

Source: SOFR 2018, Indicator 1.1b: 'Old-growth forest areas in RFA regions ('000 hectares)', Table 1.15, page 77.

RFA region	Areas from CRAs (1995–2000)			Areas in most recent data ^a	
	Forest	Old-growth forest	Old-growth forest as proportion of total forest (%)	Old-growth forest	Old-growth as proportion of total forest at CRA (%)
Eden	533	98	18	98	18
Upper North East	2,167	655	30	655	30
Lower North East	3,175	1,030	32	1,030	32
Southern NSW	2,446	753	31	753	31
Total RFA regions in NSW	8,320	2,536	30	2,536	30
Tasmanian	3,205	1,239	39	1,206	38
Total RFA region in Tasmania	3,205	1,239	39	1,206	38
Central Highlands	692	26	4	9	1
East Gippsland	1,078	225	21	109	10
Gippsland	1,426	209	15	78	5
North East	1,252	259	21	141	11
West Victoria	968	122	13	91	9
Total RFA regions in Victoria	5,415	841	16	428	8
South-West Forest Region of WA	2,235	347	8	334	15
Total RFA regions in WA	2,235	347	8	334	15

Total RFA regions in Australia	19,175	4,963	26	4,504	23
CRA, Comprehensive Regional Assessment.					
^a Dates of most recent data: Victoria, 2009; New South Wales, 2001; Tasmania 2017; Western Australia, 2017. Data include public and private land (including private land protected by conservation covenant).					
Sources: National Forest Inventory, data provided by states for <i>Australia's State of the Forests Report 2018</i> , and state forest management planning documentation interpreted by ABARES.					

Analysis and processing of national data

Estimation and forecasting

Mangrove and primary forest area data from SOFR 2018 was used to populate the table.

Reclassification into FRA 2020 categories

For the purpose of FRA 2020, 'old-growth forest' category reported in SOFR 2018 broadly corresponds to the FAO FRA 2020 definition of Primary Forest.

FRA categories	Area (1000 ha)				
	1990	2000	2010	2015	2020
Primary forest		4 963.00		4 504.00	
Temporarily unstocked and/or recently regenerated					
Bamboos					
Mangroves	1 045.00	749.00	913.00	854.00	
Rubber wood					

Comments

Australia does not have national data for bamboos, temporarily unstocked and/or recently regenerated, and rubber wood.

Mangrove area figures are taken directly from SOFRs 1998, 2003, 2013 and 2018, and reported in the FRA 2020 reporting years 1990, 2000, 2010 and 2015 respectively. The 2020 mangrove area was not reported.

Reported changes in mangrove area from 2000 - 2015 are primarily due to improvements in availability in high-resolution remotely sensed data and forest mapping techniques.

For the purpose of FRA 2020, 'old-growth forest' category reported in SOFR 2018 broadly corresponds to the FAO FRA 2020 definition of Primary forest. As defined in SOFR 2018, old growth forest are ecologically mature forest where the effects of disturbances are now negligible.

The majority of the decrease in primary forest occurred in 2000 and 2015 in Victoria, and was almost entirely due to bushfires in the decade to 2009. Information on primary forest is limited to the area identified during the original comprehensive regional assessment surveys in the 1990s for the Regional Forest Agreement (and Comprehensive Regional Assessment) regions, discussed in SOFR 2008.

For more information please refer to SOFR 2018, Indicator 1.1b: 'Area of forest, by growth stage', pages 75-80.

1d Annual forest expansion, deforestation and net change

National Data

Data sources + type of data source eg NFI, etc

Australian Government Department of the Environment and Energy, National Inventory Report 2016 Volume 2 and Australia's Plantations Statistics Update 2018.

National classification and definitions

Source: SOFR 2018, Glossary, pages 517-531.

Forest Expansion	Forest expansion comprises 'natural expansion' plus 'afforestation' on land not carrying forest in 1990. 'Afforestation' includes only areas of new Commercial plantations on previously cleared land only. Some commercial timber plantation species are Australian native species, of which some are endemic (but not necessarily) to the planting site.
Afforestation	Establishment of forest on land not forested in 1990. The Kyoto Protocol and initiatives such as the Carbon Farming Initiative use specific definitions of afforestation.
Deforestation	A type of land clearing involving the permanent removal of tree cover. The Kyoto Protocol and initiatives such as the Carbon Farming Initiative use specific definitions of deforestation.

Original data

Source: SOFR 2018, Indicator 5.1a: 'Contribution of forest ecosystems and forest industries to the global greenhouse gas balance', underlying data for Figure 5.3, page 320.

Annual area of forest cleared, recleared, and regrown ('000 hectares)			
Year	Clearing	Reclearing	Regrowth
1990	-588	-320	234
1991	-474	-342	244
1992	-372	-375	261
1993	-263	-315	233
1994	-268	-343	254
1995	-214	-274	197
1996	-219	-275	178
1997	-218	-281	184
1998	-222	-297	191
1999	-259	-344	218
2000	-265	-337	188
2001	-306	-375	197
2002	-276	-354	206
2003	-221	-350	228
2004	-230	-393	252
2005	-283	-530	308
2006	-238	-517	308
2007	-201	-482	336

2008	-139	-381	442
2009	-104	-341	509
2010	-82	-329	451
2011	-66	-313	435
2012	-57	-325	514
2013	-60	-418	506
2014	-60	-375	569
2015	-58	-350	533
2016	-60	-395	564

Source: Australian Government Department of the Environment and Energy. Clearing and reclearing data are annual area data from Figure 6.5a of *National Inventory Report 2016 Volume 2* (DoEE 2018a). Regrowth data are gross annual area of regrowth on land cleared since 1990 (Figure 6.5b of *National Inventory Report 2016 Volume 2* shows the cumulative regrowth area after accounting for reclearing, and those area data are therefore different to the gross regrowth areas presented here). The year '2016' refers to the financial year.

Source: Australia's Plantation Statistics Update 2018, Figure 2, page 5.

Commercial plantation establishment, Australia, 1990–91 to 2015–16																												
Plantation type	Unit	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Total (Hardwood and Softwood)	'000 ha	38.6	35.6	31.4	33.6	23.6	27.0	48.9	54.4	65.6	94.8	137.5	84.4	54.4	42.3	53.6	72.0	78.4	86.6	72.3	49.7	23.5	9.6	4.2	2.2	1.8	0.6	1.4

Analysis and processing of national data

Estimation and forecasting

Compilation table of Clearing, Reclearing, Regrowth, Deforestation, Afforestation, Total change in forest area, Natural Expansion and Forest Expansion ('000 hectares).

Year	Clearing	Reclearing	Deforestation (clearing + reclearing)	Deforestation (averages)	Afforestation (new plantations)	Afforestation (averages)	Total change in forest area	Natural Expansion (Total change less Deforestation less Afforestation)	Natural Expansion (averages)	Forest Expansion (afforestation + natural expansion)	Forest Expansion (averages)
1990	-588	-320	-908		38.6		-201.18	668		706.62	
1991	-474	-342	-816		31.4		-233.48	551		582.82	
1992	-372	-375	-747		33.6		-202.57	511		544.63	
1993	-263	-315	-578		23.6		-262.06	292		315.79	
1994	-268	-343	-611		27		-105.89	478		504.92	
1995	-214	-274	-488		48.9		-140.70	298		347.26	
1996	-219	-275	-494		54.4		-168.84	271		325.30	
1997	-218	-281	-499		65.6		-194.41	239		304.72	

1998	-222	-297	-518		94.8		-251.39	172		266.93	
1999	-259	-344	-602	(1990-1999)	137.5	(1990-1999)	-307.52	157	(1990-1999)	294.93	(1990-1999)
2000	-265	-337	-602	-626.20	84.4	45.34	-456.23	61	374.05	145.55	419.39
2001	-306	-375	-681		54.4		-405.13	222		276.28	
2002	-276	-354	-629		42.3		-348.41	239		280.93	
2003	-221	-350	-572		53.6		-341.52	177		230.32	
2004	-230	-393	-622		72.0		-512.75	38		109.65	
2005	-283	-530	-813		78.4		-450.87	284		362.07	
2006	-238	-517	-755		86.6		-325.13	343		430.05	
2007	-201	-482	-683		72.3		-33.47	577		649.35	
2008	-139	-381	-520		49.7		206.91	677		726.89	
2009	-104	-341	-445	(2000-2009)	23.5	(2000-2009)	398.60	820	(2000-2009)	843.95	(2000-2009)
2010	-82	-329	-411	-632.30	9.6	73.12	578.38	980	332.39	989.14	405.50
2011	-66	-313	-379		4.2		636.23	1,011		1015.16	
2012	-57	-325	-382		2.2		652.70	1,032		1034.65	
2013	-60	-418	-478		1.8		801.08	1,277		1279.24	
2014	-60	-375	-434	(2010-2014)	0.6	(2010-2014)	879.98	1,314	(2010-2014)	1314.38	(2010-2014)
2015	-58	-350	-408	-416.84	1.4	8.25	942.51	1,349	1118.26	1350.54	1126.51

Reclassification into FRA 2020 categories

For the purpose of FRA 2020, calculations using SOFR 2018 total forest area for the 2016 reporting year, National Inventory Report (NIR) annual forest cover change figures, and Australian plantation statistics were required to fit FRA categories.

1. Forest expansion (a) = Afforestation + Natural Expansion

-of which afforestation = plantations newly established on cleared agricultural land (Australia's Plantation Statistics time series data)
-of which natural expansion = Annual total forest change (NIR annual forest area change) LESS Deforestation (NIR clearing PLUS reclearing) LESS Afforestation

2. Deforestation (b) = NIR Clearing + NIR Reclearing figures

- Clearing and reclearing data are annual area data from Figure 6.5a of National Inventory Report (NIR) 2016 Volume 2 (DoEE 2018a).

Due to the overlapping nature of the FRA reporting periods (1990-2000 and 2000-2010), to ensure data reported in each of the 10 year reporting periods are mutually exclusive, the ten-year window begins with the start year of the reporting period and ends one year before the end of the reporting period. For example, 1990-2000 is the average of the data reported in the 10 years from 1990 to 1999, and so on.

FRA categories	Area (1000 ha/year)			
	1990-2000	2000-2010	2010-2015	2015-2020
Forest expansion (a)	419.39	405.50	1 126.52	
...of which afforestation	45.34	73.12	8.25	
...of which natural expansion	374.05	332.39	1 118.26	
Deforestation (b)	626.20	632.30	416.84	
Forest area net change (a-b)	-206.81	-226.80	709.68	182.12

Comments

Forest Expansion	Forest expansion comprises 'natural expansion' plus 'afforestation' on land not carrying forest in 1990. 'Afforestation' includes only areas of new Commercial plantations on previously cleared land only. Some commercial timber plantation species are Australian native species, of which some are endemic (but not necessarily) to the planting site.
Afforestation	Establishment of forest on land not forested in 1990. The Kyoto Protocol and initiatives such as the Carbon Farming Initiative use specific definitions of afforestation.
Deforestation	A type of land clearing involving the permanent removal of tree cover. The Kyoto Protocol and initiatives such as the Carbon Farming Initiative use specific definitions of deforestation.

The definitions used for Australia are those used in SOFR 2018 (as per the glossary, pages 517-531). For the purpose of FRA 2020, area figures are derived from SOFR 2018 total forest area for the 2016 reporting year, National Inventory Report (NIR) annual forest cover change figures, and Australian plantation statistics to fit FRA categories.

1. Forest expansion (a) = Afforestation + Natural Expansion

....of which afforestation = plantations newly established on cleared agricultural land (Australia's Plantation Statistics time series data)

....of which natural expansion = Annual total forest change (NIR annual forest area change) LESS Deforestation (NIR clearing PLUS reclearing) LESS Afforestation

2. Deforestation (b) = NIR Clearing + NIR Reclearing figures

Clearing and reclearing data are annual area data from Figure 6.5a of National Inventory Report (NIR) 2016 Volume 2 (DoEE 2018a).

1e Annual reforestation

National Data

Data sources + type of data source eg NFI, etc

Plantation re-establishment: ABARES Australia's Plantation Statistics 2016, Australian Plantation Statistics 2017 Update and National Plantation Inventory figures collected through surveys of plantation owners

Regeneration of native forest post harvest: SOFR 2018: Montreal Process Implementation Group for Australia & National Forest Inventory Steering Committee (2018) Australia's State of the Forests Report 2018, ABARES, Canberra, December. CC BY 4.0., Tables 2.17, 2.18, 2.19 and 2.20 (pages 226-229).

National classification and definitions

Reforestation	For the purposes of FRA 2020, Australia's reforestation figures includes areas of native forest regenerated following harvest activities, and of areas of plantations re-planted after harvest.
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Original data

See 'Analysis and processing of national data' below

Analysis and processing of national data

Estimation and forecasting

Table compiled from a range of area proportion of harvested multiple-use public native forest effectively regenerated and plantation establishment extracted from SOFR 2018.

Area proportion of harvested multiple-use public native forest effectively regenerated, Australia (NSW, Vic, WA and Tas.)									
	Net area effectively regenerated where regeneration is a targeted outcome (hectares) ^d								
Year	NSW	Vic.	WA	Tas.	Total	Converted to '000 hectares	Plantation establishment ('000 hectares)	Reforestation ('000 ha)	Reforestation averages
2000-01	3,300	6,988	10,000	4,011	24,299.00	24.30	85.78	108.70	
2001-02	3,300	6,129	16,630	4,568	30,627.00	30.63	54.38	85.01	
2002-03	3,300	4,984	13,950	3,837	26,071.00	26.07	42.32	68.39	
2003-04	3,300	4,968	9,725	5,141	23,134.00	23.13	53.59	76.72	
2004-05	3,312	2,655	9,610	6,526	22,103.00	22.10	72.03	94.13	
2005-06	3,733	2,112	7,440	6,942	20,227.00	20.23	78.39	98.62	
2006-07	2,337	4,062	9,670	9,244	25,313.00	25.31	86.57	111.88	
2007-08	5,093	3,367	8,820	10,010	27,290.00	27.29	72.32	99.61	
2008-09	2,929	3,050	7,640	7,002	20,621.00	20.62	49.66	70.28	Mean (2000-01 to 2009-10)
2009-10	3,653	5,311	10,660	6,220	25,844.00	25.84	23.51	49.35	86.41
2010-11	4,951	4,137	6,140	6,888	22,116.00	22.12	9.58	31.70	
2011-12	6,034	4,055	7,490	9,002	26,581.00	26.58	4.19	30.77	
2012-13	4,010	3,397	7,780	8,639	23,826.00	23.83	2.22	26.04	
2013-14	4,965	2,242	6,730	7,192	21,129.00	21.13	1.75	22.88	
2014-15	5,650	3,459	5,480	3,985	18,574.00	18.57	0.63	19.21	Mean (2010-11 to 2014-15)

2015-16	3,736	5,194	6,360	2,994	18,284.00	18.28	1.41	19.70	26.12
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An estimate of 3,300 hectares is included for NSW (the state of New South Wales) for the years 2000-01, 2001-02, 2002-03 and 2003-04 for net area effectively regenerated.

An estimate of 10,000 hectares was used for WA (the state of Western Australia) for the year 2000-01 for net area effectively regenerated.

Reclassification into FRA 2020 categories

For the purpose of FRA 2020, the area of reforestation is the summation of the area of Australia's commercial plantations re-established after harvest, and of the area of Native forest effectively regenerated following harvest activities.

FRA categories	Area (1000 ha/year)			
	1990-2000	2000-2010	2010-2015	2015-2020
Reforestation		86.41	26.12	

Comments

For the purpose of FRA 2020, the area of reforestation is the summation of Australia's commercial plantations re-established after harvest, and the area of Native forest effectively regenerated following harvesting activities.

Due to the overlapping nature of the FRA reporting periods (1990-2000 and 2000-2010), to ensure data reported in each of the 10 year reporting periods are mutually exclusive, the ten-year window begins with the start year of the reporting period and ends one year before the end of the reporting period. For example, 1990-2000 is the average of the data reported in the 10 years from 1990 to 1999, and so on.

1f Other land with tree cover

National Data

Data sources + type of data source eg NFI, etc

Australia does not have national data nor does it report on area of other land with tree cover for the FRA categories palms, tree orchards, agroforestry and trees in urban settings.

National classification and definitions

Farm Forestry/Agroforestry	Establishment and/or management of trees or forests on agricultural landscapes for commercial, aesthetic and/or environmental reasons. Also known as agroforestry.
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Original data

Not applicable - data are unavailable.

Analysis and processing of national data

Estimation and forecasting

Not applicable - data are unavailable.

Reclassification into FRA 2020 categories

Not applicable - data are unavailable.

FRA categories	Area (1000 ha)				
	1990	2000	2010	2015	2020
Palms (a)					
Tree orchards (b)					
Agroforestry (c)					
Trees in urban settings (d)					
Other (specify in comments) (e)					
Total (a+b+c+d+e)	–	–	–	–	–
Other land area	634 347.80	636 415.90	638 683.90	635 135.50	634 224.90

Comments

Information for this land cover is not available at the national level.

2 Forest growing stock, biomass and carbon

2a Growing stock

National Data

Data sources + type of data source eg NFI, etc

While growing stock have been assessed on some areas of the forest estate that are used or planned for wood production in Australia, there are no national data for growing stock in Australia. Assessment methods and merchantability standards vary between state and region and there are therefore insufficient data to compile a meaningful estimate at the national level. This is consistent with Australia's country reports for previous FRAs.

National classification and definitions

Not applicable - data are unavailable.

Original data

Not applicable - data are unavailable.

Analysis and processing of national data

Estimation and forecasting

Not applicable - data are unavailable.

Reclassification into FRA 2020 categories

Not applicable - data are unavailable.

FRA categories	Growing stock m ³ /ha (over bark)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Naturally regenerating forest									
Planted forest									
...of which plantation forest									
...of which other planted forest									
Forest									
Other wooded land									

FRA categories	Total growing stock (million m ³ over bark)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Naturally regenerating forest									
Planted forest									
...of which plantation forest									
...of which other planted forest									
Forest									
Other wooded land									

Comments

While growing stock have been assessed on some areas of the forest estate that are used or planned for wood production in Australia, there are no national data for growing stock in Australia. Assessment methods and merchantability standards vary between state and region and there are therefore insufficient data to compile a meaningful estimate at the national level. This is consistent with Australia's country reports for previous FRAs.

2b Growing stock composition

National Data

Data sources + type of data source eg NFI, etc

Australia does not have national data on growing stock composition.

National classification and definitions

Not applicable - data are unavailable.

Original data

Not applicable - data are unavailable.

Analysis and processing of national data

Estimation and forecasting

Not applicable - data are unavailable.

Reclassification into FRA 2020 categories

Not applicable - data are unavailable.

FRA categories	Scientific name	Common name	Growing stock in forest (million m ³ over bark)				
			1990	2000	2010	2015	2020
Native tree species							
#1 Ranked in terms of volume							
#2 Ranked in terms of volume							
#3 Ranked in terms of volume							
#4 Ranked in terms of volume							
#5 Ranked in terms of volume							
#6 Ranked in terms of volume							
#7 Ranked in terms of volume							
#8 Ranked in terms of volume							
#9 Ranked in terms of volume							
#10 Ranked in terms of volume							
Remaining native tree species							
Total volume of native tree species			-	-	-	-	
Introduced tree species							
#1 Ranked in terms of volume							
#2 Ranked in terms of volume							
#3 Ranked in terms of volume							
#4 Ranked in terms of volume							
#5 Ranked in terms of volume							
Remaining introduced tree species							
Total volume of introduced tree species			-	-	-	-	
Total growing stock			-	-	-	-	

Comments

While growing stock has been assessed on some parts of the forest estate that are used or planned for wood production in Australia, this assessment has not been carried out across all Australia's forest extent and moreover assessment methods and merchantability standards vary between state and region. There are therefore insufficient data to compile a meaningful estimate at the national level.

2c Biomass stock

National Data

Data sources + type of data source eg NFI, etc

Australia's national dataset for biomass and carbon stocks were supplied by Australian Government Department of the Environment and Energy, and published in Australia's State of the Forests Report 2018 with detailed explanation provided in Criterion 5, see page 322.

National classification and definitions

Source: SOFR 2018, Glossary, pages 517-531.

Above-ground living biomass	All living biomass above the soil, including stump, stem, bark, branches and foliage, and attached material such as dead branches.
Below-ground living biomass	All biomass of live roots in the soil. (Fine roots are often excluded from measurement because it is difficult to separate these from soil organic matter.)

Original data

Above and below ground biomass is reported by the Australian Government Full Carbon Accounting Model (FullCAM) which is an ecosystem model that uses a mass-balance approach to carbon cycling for each of the following 3 carbon pools: biomass (above and below ground); dead organic matter (dead wood and litter); and soil organic matter.

Source: SOFR 2018, Indicator 5.1a: 'Contribution of forest ecosystems and forest industries to the global greenhouse gas balance', Table 5.4, page 322.

Carbon pools in forests (from SOFR 2018, Table 5.4, page 322)				
	2001	2006	2011	2016
Pool	Mt C	Mt C	Mt C	Mt C
Living biomass (1)	5,639	5,596	5,594	5,627
Deadwood (2)	1,629	1,620	1,618	1,618
Litter (3)	596	590	590	593
Above-ground total	7,864	7,806	7,802	7,838
Living biomass (4)	2,682	2,658	2,654	2,665
Soil ^a (5)	11,416	11,349	11,363	11,445
Below-ground total	14,097	14,007	14,018	14,110
Total forest	21,961	21,813	21,820	21,949
Mt C, million tonnes of carbon.				
^a Soil carbon is reported to a depth of 1 m for mangrove forests, but to 30 cm for all other forests.				

Area of forest (from Tables 1a and 1b) and year for which carbon pool is reported (from table above)

Reporting Year	2000	2010	2015	2016	2017	2018	2019	2020
FRA 2020 area of forest (hectares)	131,814,100	129,546,100	133,094,000	134,037,200	134,017,500	134,005,100	134,005,100	134,005,100
Reporting year for carbon pool	2001	2011	2016	2016	2016	2016	2016	2016

Analysis and processing of national data

Estimation and forecasting

Calculating biomass data from carbon mass data depends on a number of factors including sub-pools of carbon and the species of tree. It is a reasonable assumption to use a default multiplier of 1 tonne carbon to 2 tonnes biomass when converting carbon mass data to biomass data. With this assumption, derived forest biomass was calculated by doubling SOFR 2018 carbon mass per hectare for 2001, 2011 and 2016, and applying the figures to Australia's FRA 2020 derived total forest area (see FRA 2020 Question 1) for the years 2000, 2010, and 2015 respectively. The biomass per hectare for 2016 was also applied to the derived area of forest for 2016 and 2017. The figures for the reporting years 2019 and 2020 are not forecast figures - they are copies of the biomass figure for 2018.

Biomass pools in forests						
	2001		2011		2016	
Pool	(tonnes)	(tonnes/ha)	(tonnes)	(tonnes/ha)	(tonnes)	(tonnes/ha)
Above-ground biomass (Living biomass only, Litter is excluded.)	11,278,000,000	85.56	11,188,000,000	86.36	11,254,000,000	86.36
Below-ground biomass (Living biomass only, Soil is excluded.)	5,364,000,000	40.69	5,308,000,000	40.97	5,330,000,000	39.77
Deadwood	3,258,000,000	24.72	3,236,000,000	24.98	3,236,000,000	24.14

As requested by FAO, total area of forest are provided by Australia for the reporting years 2017, 2018, 2019 and 2020 in Question 1a and 1b. These areas are not estimates but are based on the following data:

- for the category Plantation forest, more recently published figures are available for 2017 and 2018, with data from 2018 simply copied for the reporting years 2019 and 2020; and
- for the categories Naturally regenerating forest and Other planted forest, area data are simply copied from the year 2016 for the reporting years 2017, 2018, 2019 and 2020.

Year	1990	2000	2010	2015	2016	2017	2018	2019	2020
FRA 2020 Derived Area of forest (hectares)	133,822,000.00	131,814,100.00	129,546,100.00	133,094,000.00	134,037,200.00	134,017,500.00	134,005,100.00	134,005,100.00	134,005,100.00
Reporting year for carbon pool	No data	2001	2011	2016	2016	2016	2016	2016	2016

Reclassification into FRA 2020 categories

For the purpose of FRA 2020, the reported SOFR 2018 categories are equivalent to FRA 2020 categories:

FRA 2020	SOFR 2018 (see Original Data above)
Above-ground biomass	(1) Living biomass
Below-ground biomass	(4) Living biomass
Dead wood	(2) Dead wood

FRA categories	Forest biomass (tonnes/ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Above-ground biomass		85.56	86.36	84.56	83.96	83.97	83.98	83.98	83.98
Below-ground biomass		40.69	40.97	40.05	39.77	39.77	39.77	39.77	39.77
Dead wood		24.72	24.98	24.31	24.14	24.15	24.15	24.15	24.15

Comments

Soil Carbon is reported at a depth of 1 m for mangrove forests, but 30 cm for all other forests.

No biomass data are available for the reporting year 1990.

Above and below ground biomass is reported by the Australian Government Full Carbon Accounting Model (FullCAM) which is an ecosystem model that uses a mass-balance approach to carbon cycling for each of the following 3 carbon pools: biomass (above and below ground); dead organic matter (dead wood and litter); and soil organic matter. Australia's national dataset for biomass and carbon stocks were supplied by Australian Government Department of the Environment and Energy, and published in Australia's State of the Forests Report 2018 with detailed explanation provided in Criterion 5, see page 322.

Calculating biomass data from carbon mass data depends on a number of factors including sub-pools of carbon and the species of tree. It is a reasonable assumption to use a default multiplier of 1 tonne carbon to 2 tonnes biomass when converting carbon mass data to biomass data. With this assumption, derived forest biomass was calculated by doubling SOFR 2018 carbon mass per hectare for 2001, 2011 and 2016, and applying the figures to Australia's FRA 2020 derived total forest area (see FRA 2020 Question 1) for the years 2000, 2010, and 2015 respectively. The biomass per hectare for 2016 was also applied to the derived area of forest for 2016 and 2017. The figures for the reporting years 2019 and 2020 are not forecast figures - they are copies of the biomass figure for 2018

For the purpose of FRA 2020, the reported SOFR 2018 categories are equivalent to FRA 2020 categories:

FRA 2020	SOFR 2018
Above-ground biomass	Living biomass; All living biomass above the soil, including stump, stem, bark, branches and foliage, and attached material such as dead branches.
Below-ground biomass	Living biomass; All biomass of live roots in the soil. (Fine roots are often excluded from measurement because it is difficult to separate these from soil organic matter.)
Dead wood	Dead wood

For additional information please refer to SOFR 2018, Indicator 5.1a: 'Contribution of forest ecosystems and forest industries to the global greenhouse gas balance', page 322.

2d Carbon stock

National Data

Data sources + type of data source eg NFI, etc

Australia's national dataset for biomass and carbon stocks were supplied by Australian Government Department of the Environment and Energy, and published in Australia's State of the Forests Report 2018.

National classification and definitions

Source: SOFR 2018, Glossary, pages 517-531.

Above-ground biomass	All living biomass above the soil, including stump, stem, bark, branches and foliage, and attached material such as dead branches. Reported by the Australian Government Full Carbon Accounting Model (FullCAM) which is an ecosystem model that uses a mass-balance approach to carbon cycling for each of the following 3 carbon pools: biomass (above and below ground); dead organic matter (dead wood and litter); and soil organic matter.
Below-ground biomass	All biomass of live roots in the soil. (Fine roots are often excluded from measurement because it is difficult to separate these from soil organic matter.)

Original data

The forest carbon mass (tonnes/ha) were calculated by applying the SOFR 2018 carbon mass per hectare for 2001, 2011 and 2016 to Australia's FRA 2020 derived total forest area (see FRA 2020 Question 1) for the years 2000, 2010, and 2015 respectively. The carbon mass per hectare for 2016 was also applied to the derived area of forest for 2016 and 2017. The figures for the reporting years 2019 and 2020 are not forecast figures - they are copies of the carbon mass figure for 2018.

Data source: SOFR 2018, Indicator 5.1a: 'Contribution of forest ecosystems and forest industries to the global greenhouse gas balance', Table 5.4, page 322.

From SOFR 2018: Table 5.4 Carbon pools in forests				
	2001	2006	2011	2016
Pool	Mt C	Mt C	Mt C	Mt C
Living biomass	5,639	5,596	5,594	5,627
Deadwood	1,629	1,620	1,618	1,618
Litter	596	590	590	593
Above-ground total	7,864	7,806	7,802	7,838
Living biomass	2,682	2,658	2,654	2,665
Soil ^a	11,416	11,349	11,363	11,445
Below-ground total	14,097	14,007	14,018	14,110
Total forest	21,961	21,813	21,820	21,949
Mt C, million tonnes of carbon.				
^a Soil carbon is reported to a depth of 1 m for mangrove forests, but to 30 cm for all other forests.				

As requested by FAO, total area of forest are provided by Australia for the reporting years 2017, 2018, 2019 and 2020 in Question 1a and 1b. These areas are not estimates but are based on the following:

1. for the category Plantation forest, more recently published figures are available for 2017 and 2018, with data from 2018 simply copied for the reporting years 2019 and 2020; and
2. for the categories Naturally regenerating forest and Other planted forest, area data are simply copied from the year 2016 for the reporting years 2017, 2018, 2019 and 2020.

Year	1990	2000	2010	2015	2016	2017	2018	2019	2020

FRA 2020	133,822,000.00	131,814,100.00	129,546,100.00	133,094,000.00	134,037,200.00	134,017,500.00	134,005,100.00	134,005,100.00	134,005,100.00
Derived Area of forest (hectares)									

Analysis and processing of national data

Estimation and forecasting

Derived forest carbon mass figures using SOFR 2018 absolute figures from 2001, 2011 and 2016 against FRA 2020 derived total forest area from 2000, 2010 and 2016 (see questions 1a and 1b).

- FRA 2020 total forest area for 2000 = 131,814.10 ('000 hectares)
- FRA 2020 total forest area for 2010 = 129,546.11 ('000 hectares)
- FRA 2020 total forest area for 2016 = 134,037.20 ('000 hectares)

Forest Carbon						
Pool	2001		2011		2016	
	(tonnes C)	(tonnes/ha)	(tonnes C)	(tonnes/ha)	(tonnes C)	(tonnes/ha)
Living biomass (above-ground)	5,639,000,000.00	42.78	5,594,000,000.00	43.18	5,627,000,000.00	41.98
Deadwood	1,629,000,000.00	12.36	1,618,000,000.00	12.49	1,618,000,000.00	12.07
Litter	596,000,000.00	4.52	590,000,000.00	4.55	593,000,000.00	4.42
Living biomass (below-ground)	2,682,000,000.00	20.35	2,654,000,000.00	20.49	2,665,000,000.00	19.88
Soil	11,416,000,000.00	86.61	11,363,000,000.00	87.71	11,445,000,000.00	85.39

As requested by FAO, total area of forest are provided by Australia for the reporting years 2017, 2018, 2019 and 2020 in Question 1a and 1b. These areas are not estimates but are based on the following:

1. for the category Plantation forest, more recently published figures are available for 2017 and 2018, with data from 2018 simply copied for the reporting years 2019 and 2020; and
2. for the categories Naturally regenerating forest and Other planted forest, area data are simply copied from the year 2016 for the reporting years 2017, 2018, 2019 and 2020.

Year	1990	2000	2010	2015	2016	2017	2018	2019	2020
FRA 2020									
Derived Area of forest (hectares)	133,822,000.00	131,814,100.00	129,546,100.00	133,094,000.00	134,037,200.00	134,017,500.00	134,005,100.00	134,005,100.00	134,005,100.00
Reporting year for carbon pool	No data	2001	2011	2016	2016	2016	2016	2016	2016

Reclassification into FRA 2020 categories

For the purpose of FRA 2020, the reported SOFR 2018 categories are equivalent to FRA 2020 categories:

FRA 2020	SOFR 2018
Carbon in above-ground biomass	Carbon in living biomass (above-ground)
Carbon in below-ground biomass	Carbon in living biomass (below-ground)
Carbon in dead wood	Carbon in deadwood
Carbon in litter	Carbon in litter
Soil carbon	Carbon in soil

FRA categories	Forest carbon (tonnes/ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Carbon in above-ground biomass		42.78	43.18	42.28	41.98	41.99	41.99	41.99	41.99
Carbon in below-ground biomass		20.35	20.49	20.02	19.88	19.89	19.89	19.89	19.89
Carbon in dead wood		12.36	12.49	12.16	12.07	12.07	12.07	12.07	12.07
Carbon in litter		4.52	4.55	4.46	4.42	4.42	4.43	4.43	4.43
Soil carbon		86.61	87.71	85.99	85.39	85.40	85.41	85.41	85.41

Soil depth (cm) used for soil carbon estimates	30.00
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Comments

Soil Carbon is reported at a depth of 1 m for mangrove forests, but 30 cm for all other forests.

No carbon data are available for the reporting year 1990.

Derived forest carbon mass figures using SOFR 2018 absolute figures from 2001, 2011 and 2016 against FRA 2020 derived total forest area from 2000, 2010 and 2016 (see questions 1a and 1b).

- FRA 2020 total forest area for 2000 = 131,814.10 ('000 hectares)
- FRA 2020 total forest area for 2010 = 129,546.11 ('000 hectares)
- FRA 2020 total forest area for 2016 = 134,037.20 ('000 hectares)

As requested by FAO, total area of forest are provided by Australia for the reporting years 2017, 2018, 2019 and 2020 in Question 1a and 1b. These figures are NOT forward estimates but are instead as follows:

1. for the category Plantation forest, more recently published figures in the years 2017 and 2018, and data copied from 2018 for the reporting years 2019 and 2020; and
2. for the categories Naturally regenerating forest and Other planted forest, data copied from the year 2016 for the reporting years 2017, 2018, 2019 and 2020.

- FRA 2020 total forest area of Australia for reporting year 2017 = 134,017.50 ('000 hectares)
- FRA 2020 total forest area of Australia for reporting year 2018 = 134,005.10 ('000 hectares)
- FRA 2020 total forest area of Australia for reporting year 2019 = 134,005.10 ('000 hectares)
- FRA 2020 total forest area of Australia for reporting year 2020 = 134,005.10 ('000 hectares)

For the purpose of FRA 2020, the reported SOFR 2018 categories are equivalent to FRA 2020 categories:

FRA 2020	SOFR 2018
Carbon in above-ground biomass	Carbon in living biomass (above-ground)
Carbon in below-ground biomass	Carbon in living biomass (below-ground)
Carbon in deadwood	Carbon in deadwood
Carbon in litter	Carbon in litter
Soil carbon	Carbon in soil

Above and below ground biomass is reported by the Australian Government Full Carbon Accounting Model (FullCAM) which is an ecosystem model that uses a mass-balance approach to carbon cycling for each of the following 3 carbon pools: biomass (above and below ground); dead organic matter (dead wood and litter); and soil organic matter.

Carbon data from previous FRA 2015 report (based on SOFR 2013) are substantially lower than the forest carbon stock reported for the same time-periods (2000, 2010 and 2016) in SOFR 2018. This increase for FRA 2020 has been linked to reassessment of the forest area used for Australia's National Greenhouse Accounts, an increase in the model parameter for maximum biomass per hectare, and an increase in modelled carbon stocks in non-production forests. While advances have been made in the understanding of agricultural soils (and by extension the soils of lands newly converted to forest), overall understanding of the dynamics of soil carbon in Australian forests remains low, especially in native forests.

SOFR 2018 reports that, at the end of 2016, Australia's forests stored a total of 21,949 Mt C. Soil carbon is the largest pool of carbon in forests, and accounts for 52% of carbon stored on forest lands. Living biomass is the other significant pool, comprising tree stems, branches, bark and foliage as above-ground components, and roots as below ground components. The value of soil carbon reported in SOFR 2018 is likely to be an underestimate because soil carbon data are currently unavailable for large areas of forest land, and because measurements and calculations are only made to 30 cm in depth.

For additional information please refer to SOFR 2018, Indicator 5.1a: 'Contribution of forest ecosystems and forest industries to the global greenhouse gas balance', page 322.

3 Forest designation and management

3a Designated management objective

National Data

Data sources + type of data source eg NFI, etc

1. Australia does not have, at the national level, a plot-based forest inventory system. Australia's National Forest Inventory is based on information supplied from national, state and territory government agencies, and by private industry. Data from state and territory governments are collected through a range of mechanisms, some of which include sample-based forest inventory plots.
2. National statistics describing Australia's forest estate are compiled every five years and presented in *Australia's State of the Forests Report* (SOFR). Economic, trade and employment statistics are updated more frequently. The process to assemble Australia's national forest cover dataset for each five-yearly report draws on the information assembled for the preceding reports and integrates any newly acquired national and jurisdictional forest cover datasets that are available. With improvements in mapping, data availability and data collection technologies, direct comparisons can not be made between the forest areas reported in each of the five-yearly SOFRs.
3. For example, the area of forest reported by Australia in FRA 2015 for the baseline reporting year 2011 was 125 million hectares, as determined at 2011 and published in *Australia's State of the Forests Report 2013*. This is different from the figure reported for 2011 in the FRA 2020. Some of this difference derives from the use of more accurate state, territory and national datasets together with recent high-resolution imagery, and some from actual on-ground changes in forest area. This improved mapping resolution and more accurate measure of Australia's forest area derives from continual application of the MLE methodology developed and implemented by Australia's National Forest Inventory team (Mutendeudzi M, Read S, Howell C, Davey S & Clancy T, 2013).
4. To address the differences in forest area figures published in various reports in the *Australia's State of the Forests Report* series that derive from continual improvements in methodology, the forest area figures reported in the FRA 2020 for the years 2015, 2010, 2005, 2000 and 1990 are derived from the application of data on forest area change over time from Australia's National Greenhouse Gas Inventory 2016, to the forest area figure of 134 million hectares reported in the FRA 2020 for the year 2016. These derived forest area figures are referred to as Australia's 'FRA 2020 derived forest areas'. Data for the years out from 2016 to 2020 are taken from Australia's response to FRA 2020 Questions 1a and 1b.
5. For each of the FRA 2020 reporting years, the area of commercial plantations is taken as the absolute area of 'Commercial Plantations' reported in Australia's National Plantation Inventory (NPI) for each year, without adjustment, including for the years 2017 and 2018 (see references listed in FRA 2020 Question 1b). The area of 'Native forest', or 'Native forest' plus 'Other forest', is then calculated as the difference between the area of 'Commercial plantations' and Australia's total forest area for that year. This approach uses the same principle as implemented for forest area reporting in Australia's Country Report for the FRA 2015.
6. The tenure, forest type and structure area data for FRA 2020 reporting years 2016, 2015, 2010, 2000 and 1990 are then calculated by applying the area proportions of the various tenure, forest type and structure categories published in SOFR 2018, SOFR 2013, SOFR 2003 and SOFR 1998 respectively, to Australia's FRA 2020 derived forest area for each FRA 2020 reporting year. This approach uses the same principle as implemented for forest area reporting in Australia's Country Report for the FRA 2015.
7. Australia's Country Report to the FRA 2020 therefore presents information for the FRA 2020 reporting years 2016, 2015, 2010, 2005 (Q1a only), 2000 and 1990, using information published in the five-yearly *Australia's State of the Forests Reports* (the SOFR series), in the Australia's National Plantation Inventory series of publications, and in the Australia's National Greenhouse Accounts National Inventory Report 2016 Volume 2. Additional information is sourced from other published documents, and identified in the relevant section of this response. The references for the publications are presented in the Introduction to Australia's Country Report 2020.

National classification and definitions

The ownership or tenure of forest land, especially native forest, has a major bearing on its management. Australia has six national land tenure classes used to classify land in the National Forest Inventory and are as follows:

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 Aboriginal and Torres Strait Islander communities.
Multiple-use public forest	publicly owned state forest, timber reserves and other land, managed by state and territory government agencies for a range of forest values, including wood harvesting, water supply, biodiversity conservation, recreation and environmental protection.
Nature conservation reserve	publicly owned lands managed by state and territory government agencies that are formally reserved for environmental, conservation and recreational purposes, including national parks, nature reserves, state and territory recreation and conservation areas, and some categories of formal reserves within state forests. This class does not include informal reserves (areas protected by administrative instruments), areas protected by management prescription, or forest areas pending gazettal to this tenure. The harvesting of wood and non-wood forest products generally is 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, use by the defence forces, and to protect water-supply catchments, with some areas used by Indigenous communities.
Private forest	land held under freehold title and private ownership, and usually privately managed. This class includes land with special conditions attached for designated Indigenous communities.
Unresolved tenure	land where data are insufficient to determine land ownership status.

Publicly owned tenures include 'multiple-use public forest', 'nature conservation reserve' and 'other Crown land'. 'Leasehold forest' is Crown land (land that belongs to a national, state or territory government) that is privately managed, although state and territory governments may retain various rights over the land, including over forests or timber on the land.

Original data

WORKINGS

Proportions calculated using derived total forest areas for FRA 2020

Tenure for: 1990 Native forest only 2000 Native forest only 2010 Native forest + other forest 2015 Native forest + other forest	FRA 2020 Reporting Year 1990 SOFR 1998 proportions (Native forest only)	Derived Area 1990 ('000 ha)	FRA 2020 Reporting Year 2000 SOFR 2003 (Native forest only)	Derived Area 2000 ('000 ha)	FRA 2020 Reporting Year 2010 SOFR 2013 (Native and Other forest)	Derived Area 2010 ('000 ha)	FRA 2020 Reporting Year 2015 SOFR 2018 (Native and Other forest)	Derived Area 2015 ('000 ha)
Leasehold forest	42.4%	56,357.0	46.5%	60,563.0	39.5%	50,432.3	35.3%	46,239.7
Multiple-use public forest	8.6%	11,382.6	7.0%	9,129.0	8.3%	10,556.6	8.0%	10,440.8
Nature conservation reserve	11.3%	14,988.1	13.2%	17,217.3	17.5%	22,318.5	16.2%	21,278.8
Other Crown land	10.0%	13,297.4	8.1%	10,529.4	6.6%	8,464.8	8.3%	10,860.5
Private land (including Indigenous)	27.0%	35,823.0	23.9%	31,186.8	27.2%	34,700.9	31.7%	41,512.8
Unresolved tenure	0.8%	1,011.1	1.3%	1,704.0	0.8%	1,064.1	0.6%	788.5
Derived Total (Native forest + Other)	100%	132,859.1	100%	130,329.4	100%	127,537.2	100%	131,121.1
Plantations		1,022.9		1,484.7		2,008.9		1,973.4
...of which public plantations		...721.3		...619.6		...455.5		...397.2

Soil and water protection

From SOFR 2018 Table 4.1: Area of forest managed primarily for protection functions of soil and water values				
Area ('000 hectares)	Area ('000 hectares)	Proportion of total forest	Total forest area 2015 and 2010	FRA 2020 area protected
2016 (FRA reporting year 2015)	36,573	27.3%	133,094.5	36,334.8
2011 (FRA reporting year 2010)	29,808	23.9%	129,546.1	30,961.5

Area of native forest managed for protection of conservation of biodiversity

For FRA reporting year 2015: from SOFR 2018, Table 1.31: Area of native forest on land managed for protection of biodiversity, by jurisdiction, p100											
Jurisdiction	Area ('000 hectares)								Total native forest managed for protection of biodiversity	Total native forest	Proportion of native forest managed for protection of biodiversity (%)
	Native forest in the National Reserve System	Native forest not in the National Reserve System but managed for protection of biodiversity ^a					Protected areas not otherwise reported ^f				
		NCR tenure ^b	Private covenant ^c	MUF ^d	Defence estate ^e						
ACT	114	0	0	5	1	2	122	130	93%		
NSW	5,776	17	86	1,816	34	33	7,762	19,925	39%		
NT	5,847	1.1	0	0	526	0	6,374	23,686	27%		
Qld	8,889	16	3	2,826	448	189	12,371	51,580	24%		

SA	2,613	17	0.1	8	35	4	2,678	4,856	55%
Tas.	1,622	4	17	612	24	324	2,603	3,342	78%
Vic.	3,322	86	35	3,036	22	26	6,527	7,645	85%
WA	5,426	569	8	1,342	181	3	7,528	20,450	37%
Australia	33,609	710	148	9,645	1,272	581	45,965	131,615	35%

^a Native forest areas in the CAR reserve system are either in the National Reserve System or in one of the other categories listed in this table.

^b Comprises native forest on nature conservation reserve tenure not included in the National Reserve System.

^c Comprises areas of native forest under private conservation covenant not in the National Reserve System. These areas are on predominantly leasehold and private land tenures.

^d Multiple-use public native forests are included where biodiversity conservation is a specified management intent, either through jurisdictional legislation designating protection of the forest area and conservation of biodiversity being specified in legislation, or conservation of biodiversity being regulated or managed through a management planning instrument.

^e Comprises forest on the Defence estate (on other Crown land tenure) not included in other categories.

^f Comprises forest in the CAR reserve system, World Heritage Areas and Ramsar wetland sites not included in other categories; includes CAR reserves on Future Potential Production Forest land in Tasmania.

Note: Totals may not tally due to rounding.

Source: ABARES, National Forest Inventory (NFI) for forest area; Australian Government Department of the Environment and Energy (CAPAD); Australian Government Department of Defence.

For FRA reporting year 2010: from SOFR 2013, Table 1.26: Area of native forest on land protected for conservation of biodiversity, by jurisdiction ('000 hectares)									
Jurisdiction	Forest in CAPAD	Forest not in CAPAD		Protected areas in MUF ^a	Other protected areas on Crown managed land ^b	Total forest protected for biodiversity conservation			
		Nature reserve	Legally covenanted land						
ACT	114	4	0	0	2	120			
NSW	5,667	153	293	1,829	39	7,981			
NT	3,781	1	0	0	299	4,081			
Qld	6,510	177	1	2,774	467	9,929			
SA	2,112	27	7	4	33	2,183			
Tas.	1,556	23	0	789	12	2,380			
Vic.	3,231	247	34	2,926	20	6,458			
WA	3,456	1,169	59	1,290	93	6,067			
Total	26,427	1,801	394	9,612	965	39,199			
Total forest area SOFR 2013						122,581.00			

Note: Totals may not tally due to rounding.

^a Multiple-use native forests are included where jurisdictional legislation designates protection of the forest area and conservation of biodiversity is specified in legislation and/or regulated or managed through a management planning instrument.			
^b Includes defence estates on various land tenures that have not been counted under other columns.			
Source: Australian Bureau of Agricultural and Resource Economics and Sciences, National Forest Inventory for forest area; Australian Government Department of Sustainability, Environment, Water, Population and Communities (Collaborative Australian Protected Area Database and National Conservation Lands Database); Australian Government Department of Defence.			

Primary designated management (mutually exclusive categories)

- Production: plantations only for PRIMARY designated management

- Protection of soil and water: these areas are within the forest areas identified in Australia's forest tenure category 'Multiple Use' and can not be spatially differentiated.

- Conservation of biodiversity: Nature conservation reserves only for PRIMARY designated management

Example: the 2015 area is calculated based on the area of 'native and other' in NCR as a proportion of the total area of 'native and other' reported in SOFR 2018, multiplied by the 2015 'derived total area less plantations'

- Social Services: these areas are within the areas identified as Multiple Use and can not be spatially differentiated

- Multiple use: equivalent to Australia's national forest tenure categories 'Multiple use public native forests'

- Other: for objectives other than those listed above (production, protection, conservation, social services or multiple use). Almost all of Australia's national tenure category 'leasehold forest' is managed for the agricultural purpose of grazing, however, it is understood to be more appropriate to report this are under the FRA category 'None/unknown'

- None/Unknown: Australia is reporting areas for the four categories 'Leasehold forest', 'Private forest', 'Other Crown land' and 'Unresolved tenure' in this FRA 2020 category.

Analysis and processing of national data

Estimation and forecasting

As discussed in Question 1a and 1b of this response, Australia is not providing forward estimates nor forecasts. The data reported in the years out from 2016 are from published data for plantations where available (2017 and 2018), and otherwise areas copied from the most recent year reported in FRA 2020.

Reclassification into FRA 2020 categories

Primary designated management objective

FAO Category	Australian classification
Production	Commercial plantations
Protection of soil and water	Not separately identified
Conservation of biodiversity	IUCN categories I-IV
Social Services	Not separately identified
Multiple use	Multiple-use public native forest
Other	none
None/unknown	Leasehold forest, Private forest, Other Crown land, and Unresolved tenure

Designated management objective

FAO Category	Australian classification

Production	Plantation forest plus Multiple-use public native forest
Protection of soil and water	From figures published in SOFR 2013 (for 2010) and SOFR 2018 (for 2015 and 2020)
Conservation of biodiversity	1990 - from areas identified in SOFR 1998 as Multiple-use public forest and IUCN categories I-IV 2000 - from areas identified in SOFR 2003 as Multiple-use public forest and IUCN categories I-IV 2010 - from areas identified in SOFR 2013 managed for conservation of biodiversity 2015 - from areas identified in SOFR 2018 managed for conservation of biodiversity 2020 - from areas identified in SOFR 2018 managed for conservation of biodiversity
Social Services	Multiple-use public native forest and Nature Conservation Reserves and public component of Plantation Forests
Other	All forest (except plantations) on leasehold, private, Other Crown land and Unresolved tenure

Areas for each of the FRA categories are calculated by applying the proportions of native forest in each of the Australian tenure categories (from each SOFR report) to the total forest area over time (the derived native forest extent) (see FRA 2020 Question 1a), as follows:

FRA Reporting Year	Areas calculated by applying proportions published in the following, to the derived total forest areas:
1990	SOFR 1998
2000	SOFR 2003
2010	SOFR 2013
2015	SOFR 2018
2020	SOFR 2018

Primary designated management objective

FRA 2020 categories	Forest area (1000 ha)				
	1990	2000	2010	2015	2020
Production (a)	1 022.90	1 484.70	2 008.90	1 973.40	1 942.70
Protection of soil and water (b)					
Conservation of biodiversity (c)	14 481.66	17 594.47	22 260.35	23 899.97	24 071.55
Social Services (d)					
Multiple use (e)	11 382.60	9 129.00	10 556.60	10 440.80	10 515.77
Other (specify in comments) (f)	0.00	0.00	0.00	0.00	0.00
None/unknown (g)	106 995.04	103 605.93	94 720.25	96 780.33	97 475.08
Total forest area	133 882.20	131 814.10	129 546.10	133 094.50	134 005.10

Total area with designated management objective

FRA 2020 categories	Forest area (1000 ha)				
	1990	2000	2010	2015	2020
Production	12 405.50	10 613.70	12 565.50	12 414.20	12 383.50
Protection of soil and water			30 961.50	36 334.80	36 053.00
Conservation of biodiversity	25 864.20	26 723.50	40 733.10	45 736.90	46 065.19
Social Services	27 091.90	26 965.90	33 330.60	32 116.80	32 347.37
Other (specify in comments)	106 488.60	103 983.10	94 662.10	99 401.50	100 115.10

Comments

The figures provided for 2020 are not forecasts but simply the sum of:

1. the 2016 areas of the categories as a proportion of the total area for 2016 (all published in SOFR 2018) applied to the area of non-plantation forest reported for 2016, and
2. the area of plantation published in 2018 (the latest year for which data are available).

Primary designated management (mutually exclusive categories)

FRA 2020 Category	Australian classification - SOFR 2018
Production	Commercial plantations

Protection of soil and water	Not separately identified
Conservation of biodiversity	IUCN categories I-IV
Social Services	Not separately identified
Multiple use	Multiple-use public native forest
Other	none
None/unknown	Leasehold forest, Private forest, Other Crown land, and Unresolved tenure

Designated management objective

FRA 2020 Category	Australian classification - SOFR 2018
Production	Plantation forest plus Multiple-use public native forest
Protection of soil and water	From figures published in SOFR 2013 (for 2010) and SOFR 2018 (for 2015 and 2020)
Conservation of biodiversity	1990 - from areas identified in SOFR 1998 as Multiple-use public forest and IUCN categories I-IV 2000 - from areas identified in SOFR 2003 as Multiple-use public forest and IUCN categories I-IV 2010 - from areas identified in SOFR 2013 managed for conservation of biodiversity 2015 - from areas identified in SOFR 2018 managed for conservation of biodiversity 2020 - from areas identified in SOFR 2018 managed for conservation of biodiversity
Social Services	Multiple-use public native forest and Nature Conservation Reserves and public component of Plantation Forests
Other	All forest (except plantations) on leasehold, private, Other Crown Land and Unresolved tenures

3b Forest area within protected areas and forest area with long-term management plans

National Data

Data sources + type of data source eg NFI, etc

FRA reporting year	Source	Data source
1990	SOFR 1998	IUCN categories I-IV
2000	SOFR 2003	IUCN categories I-IV
2010	SOFR 2013	IUCN categories I-IV
2015	SOFR 2018	IUCN categories I-IV
2016	SOFR 2018	IUCN categories I-IV

National classification and definitions

Forest area within legally established protected areas: Includes IUCN protected area Categories I-IV and Excludes V and VI.

Forest area with long-term forest management plan: "Long-term" constitutes forest area that has ten years or more of documented management plans

Original data

For reporting year

FRA categories	1990	2000 (from SOFR 2003)	2010 (from SOFR 2013)	2015 (from SOFR 2018)	2016 (from SOFR 2018)	2017 (from SOFR 2018)	2018 (from SOFR 2018)	2019 (from SOFR 2018)	2020 (from SOFR 2018)
	Forest area within protected areas (I-IV)	10.90%	13.5% of native forest	17.45% of native and other forest	18.23% of native and other forest	18.23% of native and other forest	18.23% of native and other forest	18.23% of native and other forest	18.23% of native and other forest
Forest area with long-term forest management plan			22% of total forest	32% of total forest	32% of total forest	32% of total forest	32% of total forest	32% of total forest	32% of total forest
...of which in protected areas (note same percentage for SOFR 2013 and SOFR 2018)			14% of total forest	14% of total forest	14% of total forest	14% of total forest	14% of total forest	14% of total forest	14% of total forest
Source	1990 published plantation plus derived non-plantation area	2000 published plantation plus derived non-plantation area	2010 published plantation plus derived non-plantation area	2015 published plantation plus derived non-plantation area	SOFR 2018 total area with 2016 published plantation, SOFR 2018 native forest area, and balance allocated to 'Other'	2017 published plantation and 2016 published non-plantation	2018 published plantation and 2016 published non-plantation	copy of 2018	copy of 2018

Total Forest Area(1000 ha)	133,882.20	131,814.10	129,546.10	133,094.50	134,037.20	134,017.50	134,005.10	134,005.10	134,005.10
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Analysis and processing of national data

Estimation and forecasting

Using proportions from published reports applied to derived forest areas for non-plantation forests as reported in question 1a and 1b, as follows:

FRA Reporting Year	Areas calculated by applying proportions published in the following, to the derived total forest areas excluding plantations:
1990	SOFR 1998
2000	SOFR 2003
2010	SOFR 2013
2015	SOFR 2018
2016	SOFR 2018
2017	SOFR 2018
2018	SOFR 2018
2019	SOFR 2018
2020	SOFR 2018

Reclassification into FRA 2020 categories

Forest area within legally established protected areas: Includes IUCN protected area Categories I-IV and Excludes V and VI.

Forest area with long-term forest management plan: "Long-term" constitutes forest area that has ten years or more of documented management plans.

FRA categories	Area (1000 ha)								
	1990	2000	2010	2015	2016	2017	2018	2019	2020
Forest area within protected areas	14 481.66	17 594.47	22 260.35	23 899.97	24 071.55	24 071.55	24 071.55	24 071.55	24 071.55
Forest area with long-term forest management plan			28 824.69	42 965.58	43 270.00	43 263.64	43 259.64	43 259.64	43 259.64
...of which in protected areas			17 911.85	19 048.04	19 183.00	19 180.21	19 178.43	19 178.43	19 178.43

Comments

Data

Forest areas within protected areas are IUCN categories I-IV proportions from each of SOFR 1998, 2003, 2013 and 2016 applied to the FRA 1990, 2000, 2010 and 2015 areas respectively, and areas from SOFR 2018 (for non-plantation forest) and published plantation statistics (for plantation forests) for FRA 2016 reporting year. Forest area with long-term management plan: "Long-term" constitutes forest area that has ten years or more of documented management plans.

The figures for 2017, 2018, 2019 and 2020 are not forward estimates or forecasts. They are based on the most recent published areas for plantation forests (up to and including 2018) and non-plantation forests (2016), calculated from the proportion of the area protected in 2016 (all forest less plantation forests, in SOFR 2018), and applied to the total non-plantation forest area identified in questions 1a and 1b of Australia's Country Report to FRA 2020 for the reporting years 2017, 2018, 2019 and 2020.

4 Forest ownership and management rights

4a Forest ownership

National Data

Data sources + type of data source eg NFI, etc

WORKINGS

Adjusted proportions using derived total forest areas for FRA 2020

Tenure for: 1990 Native forest only 2000 Native forest only 2010 Native forest + other forest 2015 Native forest + other forest	FRA 2020 Reporting Year 1990 SOFR 1998 proportions (Native forest only)	Derived Area 1990 ('000 ha)	FRA 2020 Reporting Year 2000 SOFR 2003 (Native forest only)	Derived Area 2000 ('000 ha)	FRA 2020 Reporting Year 2010 SOFR 2013 (Native and Other forest)	Derived Area 2010 ('000 ha)	FRA 2020 Reporting Year 2015 SOFR 2018 (Native and Other forest)	Derived Area 2015 ('000 ha)
Leasehold forest	42.4%	56,357.0	46.5%	60,563.0	39.5%	50,432.3	35.3%	46,239.7
Multiple-use public forest	8.6%	11,382.6	7.0%	9,129.0	8.3%	10,556.6	8.0%	10,440.8
Nature conservation reserve	11.3%	14,988.1	13.2%	17,217.3	17.5%	22,318.5	16.2%	21,278.8
Other Crown land	10.0%	13,297.4	8.1%	10,529.4	6.6%	8,464.8	8.3%	10,860.5
Private land	27.0%	35,823.0	23.9%	31,186.8	27.2%	34,700.9	31.7%	41,512.8
Unresolved tenure	0.8%	1,011.1	1.3%	1,704.0	0.8%	1,064.1	0.6%	788.5
Derived Total (Native forest + Other)	100%	132,859.1	100%	130,329.4	100%	127,537.2	100%	131,121.1
Plantations		1,022.9		1,484.7		2,008.9		1,973.4
...of which public plantations		721.3		619.6		455.5		397.2
...of which private plantations		301.6		586.6		1440		1505.2
...of which unknown ownership		0		278.5		113.4		71

National classification and definitions

The ownership or tenure of forest land, especially native forest, has a major bearing on its management. Australia has six national land tenure classes used to classify land in the National Forest Inventory and are as follows:

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 Aboriginal and Torres Strait Islander communities.
Multiple-use public forest	publicly owned state forest, timber reserves and other land, managed by state and territory government agencies for a range of forest values, including wood harvesting, water supply, biodiversity conservation, recreation and environmental protection.
Nature conservation reserve	publicly owned lands managed by state and territory government agencies that are formally reserved for environmental, conservation and recreational purposes, including national parks, nature reserves, state and territory recreation and conservation areas, and some categories of formal reserves within state forests. This class does not include informal reserves (areas protected by administrative instruments), areas protected by management prescription, or forest areas pending gazettal to this tenure. The harvesting of wood and non-wood forest products generally is 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, use by the defence forces, and to protect water-supply catchments, with some areas used by Indigenous communities.

Private forest	land held under freehold title and private ownership, and usually privately managed. This class includes land with special conditions attached for designated Indigenous communities.
Unresolved tenure	land where data are insufficient to determine land ownership status.

Publicly owned tenures include 'multiple-use public forest', 'nature conservation reserve' and 'other Crown land'. 'Leasehold forest' is Crown land (land that belongs to a national, state or territory government) that is privately managed, although state and territory governments may retain various rights over the land, including over forests or timber on the land.

Indigenous land access, management or ownership - see SOFR 2018, page 398

Indigenous owned and managed	Freehold lands that are both owned and managed by Indigenous communities
Indigenous managed	Lands that are managed but not owned by Indigenous communities (e.g. Crown reserves and leases); and lands that are owned by Indigenous people, but have formal shared management agreements with Australian and state and territory government agencies (e.g. leased-back nature conservation reserves)
Indigenous co-managed	Lands that are owned and managed by other parties, but have formal, legally binding agreements in place to include input from Indigenous people in the process of developing and implementing a management plan (e.g. nature conservation reserve memoranda of understanding)
Other special rights	Lands subject to native title determinations, registered Indigenous Land Use Agreements and legislated special cultural use provisions. These are independent of tenure and, in most cases, do not grant ownership or management rights of land to Indigenous communities. They can provide for the right to access areas of cultural significance or the use of areas for cultural purposes (e.g. within protected water supply catchment areas), or can provide a legal requirement for consultation with the local Indigenous community before any major development activities take place.

Original data

WORKINGS

Adjusted proportions using derived total forest areas for FRA 2020				
Tenure - Native forest + other forest	SOFR 1998 (Native only) FRA 2020 Period 1990	SOFR 2003 (Native only) FRA 2020 Period 2000	SOFR 2013 (Native and Other) FRA 2020 Period 2010	SOFR 2018 (Native and Other) FRA 2020 Period 2015
Leasehold forest	42.4%	44.2%	39.5%	35.3%
Multiple-use public forest	8.6%	6.4%	8.3%	8.0%
Nature conservation reserve	11.3%	15.2%	17.5%	16.2%
Other Crown land	10.0%	7.4%	6.6%	8.3%
Private land	27.0%	25.8%	27.2%	31.7%
Unresolved tenure	0.8%	1.0%	0.8%	0.6%
Derived Total (Native forest + Other)	100%	100%	100%	100%
Plantations (1000 hectares)	1022.9	1484.7	2008.9	1973.4
....of which public plantations	721.3	619.6	455.5	397.2

Analysis and processing of national data

Estimation and forecasting

WORKINGS

Adjusted proportions using derived total forest areas for FRA 2020

Tenure for: 1990 Native forest only 2000 Native forest only 2010 Native forest + other forest 2015 Native forest + other forest	FRA 2020 Reporting Year 1990 SOFR 1998 proportions (Native forest only)	Derived Area 1990 ('000 ha)	FRA 2020 Reporting Year 2000 SOFR 2003 (Native forest only)	Derived Area 2000 ('000 ha)	FRA 2020 Reporting Year 2010 SOFR 2013 (Native and Other forest)	Derived Area 2010 ('000 ha)	FRA 2020 Reporting Year 2015 SOFR 2018 (Native and Other forest)	Derived Area 2015 ('000 ha)
Leasehold forest	42.4%	56,357.0	46.5%	60,563.0	39.5%	50,432.3	35.3%	46,239.7
Multiple-use public forest	8.6%	11,382.6	7.0%	9,129.0	8.3%	10,556.6	8.0%	10,440.8
Nature conservation reserve	11.3%	14,988.1	13.2%	17,217.3	17.5%	22,318.5	16.2%	21,278.8
Other Crown land	10.0%	13,297.4	8.1%	10,529.4	6.6%	8,464.8	8.3%	10,860.5
Private land	27.0%	35,823.0	23.9%	31,186.8	27.2%	34,700.9	31.7%	41,512.8
Unresolved tenure	0.8%	1,011.1	1.3%	1,704.0	0.8%	1,064.1	0.6%	788.5
Derived Total (Native forest + Other)	100%	132,859.1	100%	130,329.4	100%	127,537.2	100%	131,121.1
Plantations		1,022.9		1,484.7		2,008.9		1,973.4
...of which public plantations		...721.3		...619.6		...455.5		...397.2

Reclassification into FRA 2020 categories

Australian National Tenure Classes	FRA Classes			
	Private Ownership	Public Ownership	Other ownership	Total
Leasehold forest		100%		100%
Private forest	100%			100%
Multiple Use Public Forest		100%		100%
Nature Conservation Reserve		100%		100%
Other Crown Land		100%		100%
Unresolved Tenure			100%	100%
Plantation forest				
Plantations - public land		100%		100%
Plantations - private land	100%			100%
Indigenous land				
Indigenous owned and managed	100%			

FRA categories	Forest area (1000 ha)			
	1990	2000	2010	2015
Private ownership (a)	36 124.62	31 773.37	36 184.19	43 018.03
...of which owned by individuals				
...of which owned by private business entities and institutions				
...of which owned by local, tribal and indigenous communities			16 847.83	17 862.51
Public ownership (b)	96 746.39	98 058.21	92 342.30	89 217.00
Unknown/other (specify in comments) (c)	1 011.19	1 982.52	1 019.61	859.47
Total forest area	133 882.20	131 814.10	129 546.10	133 094.50

Comments

Land tenure is an important attribute of forests, and one determinant of forest management. Different types of ownership are linked to who has the right to use and occupy land, the right to use forest resources, and the conditions that may be attached to these rights. Tenure of forest land cannot always be used to determine ownership of trees. In the National Forest Inventory, forest ownership is reported in six national tenure classes that bring together the wide range of land tenures used by each jurisdiction across Australia. The classes can be grouped on the basis of land ownership as public or private, with a small area of unresolved tenure.

Publicly owned tenures include 'leasehold', 'multiple-use public forest', 'nature conservation reserve' and 'other Crown land'.

'Leasehold forest' is Crown land (land that belongs to a national, state or territory government) that is privately managed, although state and territory governments may retain various rights over the land, including over forests or timber on the land.

Some forests on private land are publicly managed as conservation reserves, for example Kakadu National Park in the Northern Territory.

For commercial plantations, the ownership of the land can be different from ownership of the trees, and management arrangements can be complex.

4b Holder of management rights of public forests

National Data

Data sources + type of data source eg NFI, etc

See Original Data for sources of data.

INDIGENOUS MANAGED PUBLIC LAND

For reporting year 2015

SOFR 2018, 6.4a: Area of forest to which Indigenous people have use and rights that protect their special values and are recognised through formal and informal management regimes, Table 6.44, p 401

For reporting year 2010

SOFR 2013, 6.4a: Area of forest to which Indigenous people have use and rights that protect their special values and are recognised through formal and informal management regimes, Table 6.40, p 304

National classification and definitions

Management category - from SOFR 2018
Indigenous owned and managed - private ownership
Indigenous managed - public ownership - the area of public land with Indigenous management is within the total area of public ownership of forests.
Indigenous co-managed - combination of public and private
Other special rights - combination

Original data

	1990	2000	2010	2015
Area proportions for Total forest and Plantations				
Tenure - Native forest + other forest	<i>Source: SOFR 1998</i> (Native only) Period 1990	<i>Source: SOFR 2003</i> (Native only) Period 2000	<i>Source: SOFR 2013</i> (Native & other) Period 2010	<i>Source: SOFR 2018</i> (Native & other) Period 2015
Leasehold forest	42.4%	46.5%	39.6%	35.3%
Multiple-use public forest	8.6%	7.0%	8.3%	8.0%
Nature conservation reserve	11.3%	13.2%	17.5%	16.2%
Other Crown land	10.0%	8.1%	6.6%	8.3%
Private land (including Indigenous)	27.0%	23.9%	27.2%	31.7%
Unresolved tenure	0.8%	1.3%	0.7%	0.6%
Derived Total (Native forest + Other)	100.0%	100.0%	100.0%	100.0%
NPI Plantation areas ('000 ha)	1022.9	1484.7	2008.9	1973.4
...of which public plantation ('000 ha)	721.3	619.6	455.5	397.2
	NPI 1989-90	NPI 1999-00	NPI 2009-10	NPI 2014-15

	1990	2000	2010	2015

Plantations ('000 hectares)	1022.9	1484.7	2008.9	1973.4
Public	721.3	619.6	455.5	397.2
Private	301.6	586.6	1440	1505.2
Joint	0	278.5	113.4	71

Indigenous managed forest categories	Year	Proportion of total forest in the respective SOFR
Indigenous managed	SOFR 2013	2%
Indigenous managed	SOFR 2018	4%

Analysis and processing of national data

Estimation and forecasting

Proportions of forest tenure categories from each of the Australia's State of the Forests Reports (SOFR) 1998, 2003, 2013, and 2018 were applied to the derived total forest extent calculated for 1990, 2000, 2010, and 2015 respectively. This is consistent with responses to other questions in Australia's country report to the FRA 2020.

Reclassification into FRA 2020 categories

Australian National Tenure Classes	FRA Classes		
	Public Ownership	Local, Tribal and Indigenous communities	Total
Multiple Use Public Forest	100%		100%
Nature Conservation Reserve	100%		100%
Other Crown Land	100%		100%
Indigenous managed land		(100% - subset of Public owned forest)	(100%)

FRA categories	Forest area (1000 ha)			
	1990	2000	2010	2015
Public Administration (a)	40 389.38	37 495.26	39 354.76	38 104.80
Individuals (b)	56 357.01	60 562.95	50 495.29	46 239.71
Private business entities and institutions (c)				
Local, tribal and indigenous communities (d)			2 492.25	4 872.49
Unknown/other (specify in comments) (e)	0.00	0.00	0.00	0.00
Total public ownership	96 746.39	98 058.21	92 342.30	89 217.00

Comments

The national forest management category 'Indigenous forests', which equates to the FRA 2020 category 'Local, tribal and Indigenous communities', was only introduced into Australia's national forest reporting for SOFR 2013 (and reported in the FRA 2015 reporting year 2010). As such, data are not available for this category for the FRA 2020 reporting years 1990, and 2000.

Leasehold land is Crown land (public land) held under lease and managed (administered) by private entities. While many of the leases are held primarily by landholders for grazing purposes, it is also known that corporate enterprises and other private business entities also hold management rights of public forests through leasehold arrangements, however, data on these areas managed under such corporate arrangements is not known. As such, notwithstanding the columns tally, it would be misleading and incorrect to add zeros into the blank spaces.

5 Forest disturbances

5a Disturbances

National Data

Data sources + type of data source eg NFI, etc

Australia does not have national data for areas affected by disturbances other than fire. In addition to fire, SOFR 2018, addresses the factors affecting the health and vitality of Australia's native forests and plantations. It focuses on the impacts of vertebrates, invertebrates, pathogens and weeds on forest health, but also covers other potentially damaging processes, such as drought, extreme climatic events and climate change.

National classification and definitions

Source: SOFR 2018, Indicator 3.1a: 'Scale and impact of agents and processes affecting forest health and vitality', pages 239 to 256.

Insects	A great diversity of native invertebrates (mostly insects), and a smaller number of introduced species, inhabit forests and can periodically increase in population and cause extensive damage. For the most damaging pest species, active management plans are implemented to prevent adverse effect when needed.
Disease	Australia has a raft of introduced and non-introduced pathogens and diseases. Introduced pathogens are the most damaging diseases in native forests because of the broad suit of highly susceptible species that they affect. Native pathogens, by comparison, damage a narrow range of susceptible species, and their host plants have higher levels of resistance (presumably as a result of co-evolution).
Severe weather events	Australia is predicted to experience warmer temperatures, altered rainfall patterns, more severe droughts, more intense rainfall events and more heatwaves over the course of the 21 st Century. Severe weather events that directly and indirectly affect native forests in Australia include droughts, storms and flooding.

Original data

Not applicable - data are unavailable.

Analysis and processing of national data

Estimation and forecasting

Not applicable - data are unavailable.

Reclassification into FRA 2020 categories

Not applicable - data are unavailable.

FRA categories	Area (1000 ha)																	
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Insects (a)																		
Diseases (b)																		
Severe weather events (c)																		
Other (specify in comments) (d)																		
Total (a+b+c+d)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total forest area	131 814.10	–	–	–	–	129 750.07	–	–	–	–	129 546.10	–	–	–	–	133 094.50	134 037.20	134 017.40

Comments

Australia does not have national data for areas affected by disturbances other than fire.

Source: SOFR 2018, Indicator 3.1a: 'Scale and impact of agents and processes affecting forest health and vitality', pages 239 to 256.

Insects	Australia does not have national data for area damaged by insects. Damage to forest ecosystems from most native insect pests has usually been of low severity but sometimes widespread in extent. Occasional outbreaks and epidemics have occurred, with the resultant damage adversely affecting commercial values, particularly in plantations. The scale and impact of insect pests in native forest was much lower in 2011-16 compared to 2006-11. (Source: pages 243 and 244).
Disease	Australia does not have national data for area damaged by disease. Species of <i>Teratosphaeria</i> (formerly <i>Mycosphaella</i>) causing leaf disease commonly reported in species of <i>Eucalyptus</i> plantations have caused extensive severe defoliation in Tasmania and Victoria. Spring needle cast caused by the fungus <i>Cyclaneusma minus</i> continues to be the most damaging pathogen impacting <i>Pinus radiata</i> plantations in Tasmania. Diplodia canker (<i>Sphaeropsis sapinea</i>) was found widespread in <i>P. radiata</i> plantations in all eastern states, and north-east Victoria reported treatment of Dothistroma needle blight (caused by <i>Dothistroma septosporum</i>). Myrtle rust (<i>Austropuccinia psidii</i>) remains the most significant pathogen threat to native forests, occupying much of its predicted climatically optimal range in New South Wales and Queensland. Root-rots and butt-rots caused by <i>Armillaria</i> species, notably <i>A. leuotobalina</i> , are widespread in tall, closed forests in south-western Western Australia. Myrtle wilt (<i>Chalara australis</i>) is the only significant pathogen impacting temperate rainforests of Tasmania and Victoria. The extent of a canker disease of marri (<i>Corymbia calophylla</i>) caused by the native fungus <i>Quambalaria coyrecup</i> has increased in south-western Western Australia. (Source: pages 245-247).
Severe weather events	Australia does not have national data for area damaged by severe weather events. There were no damaging drought events reported for the period 2011-16. Areas of the northern jarrah forests that were affected by the severe drought in 2009-10 showed good recovery four years later. In February 2015, tropical cyclone Marcia caused extensive damage to commercial pine plantations in central Queensland. Native forest within the surrounding regions of Byfield National Park and the Shoalwater Bay Training Area also suffered severe wind damage and defoliation. (Source: pages 249-252).
Other (specify in comments)	Apart from fire, no other natural disturbances were identified to have adversely affected the vigour and productivity of forests within Australia.

5b Area affected by fire

National Data

Data sources + type of data source eg NFI, etc

Australia has no nationally coordinated approach to the systematic mapping and reporting of fire areas. For reporting in SOFR 2018, annual spatial coverages of fires for the period 2011–12 to 2015–16 were therefore sourced from each state and territory separately, either by direct provision by the state or territory or from the North Australia and Rangelands Fire Information (NAFI) www.firenorth.org.au/nafi3/. Most jurisdictions create their fire area dataset from multiple sources, including satellite imagery, aerial photography, aerial reconnaissance, and operational and on-ground knowledge and measurement.

Meaningful datasets of fires or burnt areas in woodland forests, such as the savannas of northern Australia, can be derived from satellite-based platforms carrying Advanced Very High Resolution Radiometer (AVHRR165), Moderate-resolution Imaging Spectroradiometer (MODIS166) and Landsat ETM167 sensors. The different satellites detect areas affected by fire in different ways (for example, through hot-spots, smoke plumes or vegetation changes), and combining the fire area data from different sensors gives a fire area statement that is larger than that from each satellite individually. The extent and distribution of burnt area in open or closed forests was determined by combining satellite data with ground-based measurements and high-resolution aerial photography. States and territories used a number of methods to determine the area of forest burnt in their jurisdiction.

National classification and definitions

Source: SOFR 2018, Glossary, pages 517-531.

The figures reported by Australia for areas burnt are a combination of data describing planned fires and unplanned fires, as defined below.

Planned fires	Fires lit in accordance with fire management plan or planned burning program for fuel reduction, ecological or silvicultural purposes, or as part of bushfire control efforts; they are also called 'prescribed burns' or sometimes 'fuel reduction burns'. They are periodically scheduled for times of the year when temperature, humidity and fuel loads enable fire control, yet still allow achievement of burning targets. Planned fires can become unplanned fires if they escape the containment lines and become uncontrolled.
Unplanned fires	Fires that have started naturally (predominately by lightning), accidentally or deliberately (such as by arson) but not as part of a program of prescribed burning; they are also called bushfires or wildfires.

Original data

Source: SOFR 2013, Indicator 3.1b: 'Area of forest burnt by planned and unplanned fire', Table 3.5, page 195.

Jurisdiction	Area burnt ('000 hectares)				
	2006-07	2007-08	2008-09	2009-10	2010-11
ACT	0.7	0.5	0.5	3.2	0.8
NSW	413	132	107	288	95
NT	4,365	3,480	3,022	3,006	1,575
Qld	3,952	2,281	2,426	5,449	577
SA	510	507	35	18	141
Tas	74	38	24	27	16
Vic.	1,344	189	592	183	203
WA	585	1,375	865	953	494
Total	10,833	8,002	7,072	9,926	3,102
Notes:					
Totals may not tally due to rounding.					
Data are combination of MODIS data (Table 3.3) and state and territory data (Table 3.4).					

As in other tables, includes areas burnt more than once.

Source: SOFR 2018, Indicator 3.1b: 'Area of forest burnt by planned and unplanned fire', Table 3.6, page 263.

Jurisdiction	Forest fire area				
	2011–12	2012–13	2013–14	2014–15	2015–16
All fire					
ACT	0	9	0	3	5
NSW	85	540	610	241	289
NT	10,109	10,076	6,784	10,591	8,004
Qld	14,640	14,731	6,190	9,138	5,203
SA	13	39	222	10	19
Tas.	13	65	18	29	84
Vic.	100	255	363	174	132
WA	1,899	1,637	1,294	1,049	1,142
southern WA ^b	199	104	106	294	469
northern WA ^c	1,700	1,533	1,189	755	674
Australia	26,860	27,351	15,483	21,235	14,879

^a Cumulative area of fire in forest is the sum of the five annual area totals, and therefore counts multiple times any forest areas that were burnt in two or more years of the five-year period. This metric can therefore exceed the total forest area.

^b Data for forest south of the Tropic of Capricorn.

^c Data for forest north of the Tropic of Capricorn.

Totals may not tally due to rounding.

Note: Table 3.6: Area of forest fire, 2011–12 to 2015–16, by year and jurisdiction ('000 hectares), (the areas reported separately for planned and unplanned fire are not included here for FRA 2020).

Analysis and processing of national data

Estimation and forecasting

For years 2006 to 2011, the proportion of total forest area burnt in each year as reported in SOFR 2013 was calculated. For the years 2012 to 2015, the proportion of total forest area burnt in each year as reported in SOFR 2018 was also calculated. These calculated proportions were then applied to the 'FRA 2020 derived forest area' for the respective FRA 2020 reporting year (see below for calculations).

Jurisdiction	2006–07	2007–08	2008–09	2009–10	2010–11
	Area burnt	Area burnt	Area burnt	Area burnt	Area burnt
	('000 hectares)	('000 hectares)	('000 hectares)	('000 hectares)	('000 hectares)

Australia	10,883	8,002	7,072	9,926	3,102
Total forest area (as reported in SOFR 2013)	124,751	124,751	124,751	124,751	124,751
.....Proportions of fire against total forest area	9%	6%	6%	8%	2%
Derived total forest area (FRA 2020)	129,299.19	128,974.07	128,940.60	129,147.51	129,546.11
.....forest area affected by fire	11,279.77	8,272.88	7,309.50	10,275.82	3,221.23
Derived forest area affected by fire using proportions calculated from SOFR 2018 areas and FRA 2020 derived total forest area for 2011-2016					
	2011–12	2012–13	2013–14	2014–15	2015–16
Jurisdiction	Area burnt	Area burnt	Area burnt	Area burnt	Area burnt
	('000 hectares)	('000 hectares)	('000 hectares)	('000 hectares)	('000 hectares)
Australia	26,860	27,351	15,483	21,235	14,879
Total forest area (as reported in SOFR 2018)	134,037	134,037	134,037	134,037	134,037
.....Proportions of fire against total forest area	20%	20%	12%	16%	11%
Derived total forest area (FRA 2020)	130,124.49	130,760.73	131,413.43	132,214.51	133,094.49
.....forest area affected by fire	26,075.96	26,682.46	15,179.94	20,946.27	14,774.38

Reclassification into FRA 2020 categories

The area of forest burnt reported for FRA 2020 includes the total area of forest burnt in a given year as calculated from data reported in SOFR 2013 and in SOFR 2018.

FRA categories	Area (1000 ha)																	
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total land area affected by fire																		
...of which on forest							11 279.77	8 272.88	7 309.50	10 275.82	3 221.23	26 075.96	26 682.46	15 179.94	20 946.27	14 774.38		

Comments

Australia does not have national data on total land area affected by fire and only reports on forest which has been affected by fire.

The figures reported by Australia for areas burnt are a combination of data describing planned and unplanned fires, as defined below:

Planned fires	Fires lit in accordance with fire management plan or planned burning program for fuel reduction, ecological or silvicultural purposes, or as part of bushfire control efforts; they are also called 'prescribed burns' or sometimes 'fuel reduction burns'. They are periodically scheduled for times of the year when temperature, humidity and fuel loads enable fire control, yet still allow achievement of burning targets. Planned fires can become unplanned fires if they escape the containment lines and become uncontrolled.
Unplanned fires	Fires that have started naturally (predominately by lightning), accidentally or deliberately (such as by arson) but not as part of a program of prescribed burning; they are also called bushfires or wildfires.

Note the change in methodology between the years 2006-10 (see SOFR 2013, page 195) and 2011-2015 (see SOFR 2018, Indicator 3.1b, pages 257-272.), described below.

The data sources and the methods used to derive areas of forest fire for SOFR 2018 are both different to those used for SOFR 2013, and therefore the results cannot be directly compared between these reports. Furthermore, different algorithms and data resolutions were used in analysis of the fire datasets reported in SOFR 2018.

The large area burnt in 2011 and 2012 was due to a series of preceding wet years in central Australia that led to high fuel loads in 2011.

Spatial data for areas of forest affected by area is restricted to periods from 2006 to 2015 where adequate data was sourced from SOFR 2013 and 2018. There is insufficient data to report on remaining time periods.

Fire is an intrinsic part of Australia's landscape, and bushfires have been an important factor in Australian ecosystems for millions of years. Much of Australia's native vegetation has evolved to be tolerant of fire, and many plant species require fire to regenerate, with adaptations that promote the spread of fire. The fire regime (the frequency, seasonality and intensity of burning of an area over a period of time) is a major determinant of many aspects of Australia's forest ecosystems. Indigenous Australians have long used fire as a land-management tool. Planned fire is currently used by land managers to manage vegetation, and to protect properties from uncontrolled bushfire by reducing fuel loads. The main factors required for propagation of fire are the presence of fuel, oxygen and an ignition source. Fires can originate from human activity and from natural causes, with lightning nearly always the natural source of fire. Fire intensity and the speed at which a fire spreads depend on fuel load and arrangement, fuel moisture, prevailing temperature, wind speed and slope angle. The most intense fires occur when temperatures are high, humidity is low, winds are strong, and the arrangement of fuel allows rapid propagation. Further information is available in SOFR 2018.

In the period of January 2006 to December 2010, the cumulative total area of forest burnt in Australia estimated from a combination of Moderate-resolution Imaging Spectroradiometer (MODIS) data and state and territory data was 39.0 million hectares. SOFR 2013 (pages 188-199 and Table 3.5) provides further detail on the methodology of data collection. In the period of January 2011 to December 2015, the cumulative total area of forest burnt estimated from a combination of MODIS, Advanced Very High Resolution Radiometer (AVHRR) and Landsat ETM data and state and territory data was 105.8 million hectares. SOFR 2018 (pages 257-272, Table 3.6) provides further detail on the methodology of data collection.

5c Degraded forest

Does your country monitor area of degraded forest		No
If "yes"	What is the national definition of "Degraded forest"?	
	Describe the monitoring process and results	

Comments

Australia does not have a national definition of "Degraded forest" and does not have any national programs in place to monitor degraded forests.

6 Forest policy and legislation

6a Policies, Legislation and national platform for stakeholder participation in forest policy

National Data

Data sources + type of data source eg NFI, etc

Data were sourced from state, territory and Australian Government agencies. Additional information can be found in SOFR 2018. This publication, together with underpinning data, are available at www.agriculture.gov.au/abares/forestaustralia/sofr/sofr-2018 and www.agriculture.gov.au/abares/publications.

National classification and definitions

Source: SOFR 2018, Glossary, page 529.

Sustainable Forest Management (SFM)	<ol style="list-style-type: none"> 1. A set of objectives, activities and outcomes consistent with maintaining or improving a forest's ecological integrity and contributing to people's wellbeing now and in the future. 2. The practice of stewardship and use of forests and forest lands in such a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity and vitality, and their potential to fulfil, now and in the future, relevant ecological, economic and social
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Although not defined in the SOFR 2018 Glossary, a national stakeholder platform is here taken to be a recognised procedure that a broad range of stakeholders can use to provide opinions, suggestions, analysis, recommendations and other input into the development of national forest policy.

Original data

Australia's underpinning policies, Acts and regulations that support Sustainable Forest Management at the National, state and territory and local scale:

National: A well-established policy framework, guided by Australia's National Forest Policy Statement 1992, supports the conservation and sustainable management of Australia's forests, both nationally and at state and territory levels. Through this statement and other regulatory mechanisms, Australia's national, state and territory governments are committed to the sustainable management of all Australia's forests, whether the forest is on public or private land, or within a conservation reserve or managed for wood production.

National Forest Policy Statement 1992 – Outlines agreed objectives and policies for Australia's public and private forests, based on 11 broad national goals to be pursued within a regionally based planning framework that integrates environmental and commercial objectives so that provision is made for all forest values. The policy also mandates the preparation of a report on the status of Australia's forests, agreed to by state and territory governments with the Australian Government in 1992, as "to produce and publish a 'state of the forests' review every five years". As a member of the Montreal Process Working Group (MPWG) for the sustainable management of temperate and boreal forests, Australia implements the MPWG framework of criteria and indicators for national reporting through its national Australia's State of the Forests Report (SOFR) series to report progress towards sustainable forest management. The SOFR series also serves as Australia's Country Report to the MPWG.

- National Indigenous Forestry Strategy 2005 – Encourages Indigenous participation in the forest industry and contributes to the overall sustainable development of Indigenous land and communities, addressing areas such as natural resource management, business development, cultural heritage, education, employment and training.
- Australia's Biodiversity Conservation Strategy 2010-2030 – Provides a guiding framework for conserving Australia's biodiversity over the coming decades for all sectors - government, business and the community.
- Australia's Strategy for the National Reserve System 2009-2030 – Provides national guidance for improved cross-jurisdictional coordination and supports collaborative action by protected area managers and key stakeholders to enhance the National Reserve System, included through strengthened partnerships and increased community support.
- The Australian Standard for Sustainable Forest Management – AS 4708-2013 – Provides a voluntary tool through which producers of forest products can demonstrate their social and environmental credentials.

Regional and Provincial (State and Territory): State and territory government organisations and agencies have responsibility for land management, and develop and implement their respective policies and strategies which support Sustainable Forest Management (SFM). The extent to which these arrangements provide for SFM varies among states and territories. Generally these arrangements apply comprehensively in public forests, but to a lesser extent in private and leasehold forests. State and territory policies and strategies supporting SFM include the following:

- New South Wales – Forestry Corporation of NSW Forest Management Policy; Environment Protection Authority, Crown Forestry Compliance Strategy 2013-2016
- Queensland – Queensland Government Department of Agriculture and Fisheries, Forest Products Forest Management Policy Statement; Queensland Government, Queensland Forest and Timber Industry Plan
- South Australia – Forest Industry Strategy: Vision 2050 Strategic Directions 2011-2016; Forestry SA Sustainable Forest Management Policy
- Tasmania – Tasmanian Government Policy for Maintaining a Permanent Native Forest Estate; Forestry Tasmania's Sustainable Forest Management Policy and Sustainability Charter
- Victoria – Victoria's Timber Industry Action Plan; Sustainability Charter for Victoria's State Forests; Victoria's Environmental Sustainability Framework
- Western Australia – Forest Products Commission Forest Management Policy.

Local: Numerous local governments throughout Australia have a role in sustainable forest management. The responsibilities of councils vary across jurisdictions, and reflect differences in state and territory legislative and regulatory frameworks. As managers of public land and as land use planners, local government is responsible for policy development and implementation of land use planning as well as regulating a wide range of activities that may impact upon sustainable forest management. Local government can also play a key role in translating the policies of Commonwealth and state/territory governments into on-ground projects.

Source: Adapted from SOFR 2018, Indicator 7.1b: 'Extent to which the institutional framework supports the conservation and sustainable management of forests', Table 7.5, pages 472 and 473.

National

Environment Protection and Biodiversity Conservation Act 1999 To provide a legal framework to protect and manage, among other things, nationally and internationally important flora, fauna, ecological communities and heritage places – defined in the Act as matters of national environmental significance.

Regional Forest Agreements Act 2002 To give effect to Commonwealth obligations under Regional Forest Agreements, which are 20-year plans for the conservation and sustainable management of Australia's native forests in the regions in which they apply. The legislation also requires the establishment of a comprehensive and publicly available source of information for national and regional monitoring and reporting in relation to all of Australia's forests, to support decision-making in relation to all of Australia's forests.

Aboriginal and Torres Strait Islander Heritage Protection Act 1984 To provide for the preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginals in accordance with Aboriginal tradition.

Illegal Logging Prohibition Act 2012 To support the domestic and international trade in legally harvested wood and wood products by giving consumers and businesses greater certainty about the legality of the wood products they purchase.

Australian Capital Territory

Nature Conservation Act 2014 (replaced Nature Conservation Act 1980) To make provision for the protection, conservation, enhancement and management of nature in the ACT, and for the management of reserves.

Environment Protection Act 1997 To establish an environmental duty of care in relation to water quality and other environmental pressures, and to protect soil and water quality during harvesting through the application of a pollution control licence.

Public Unleased Land Act 2013 To protect the amenity and natural value of, and to facilitate use of, unleased territory land that the public is entitled to use or is open to, or used by, the public, including nature conservation reserves and wilderness areas.

New South Wales

Forestry Act 2012a (replaced Forestry Act 1916 and Forestry and National Park Estate Act 1998) To provide for the dedication, management and use of State forests and other Crown-timber land for forestry; to constitute the Forestry Corporation of New South Wales as a statutory State-owned corporation and to specify its objectives and functions; to provide for forest agreements; and to provide for integrated forestry operations approvals for licensing operations in State forests and other Crown-timber lands for a period not exceeding 20 years.

National Parks and Wildlife Act 1974, as amended To conserve nature, including threatened species; conserve objects, places and features of cultural value; and foster public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation.

Environmental Planning and Assessment Act 1979 To encourage the proper management, development and conservation of natural and artificial resources, for the social and economic welfare of the community and a better environment; to promote and co-ordinate the orderly and economic use and development of land; to protect the environment, including the protection and conservation of native animals and plants, including threatened species and ecological communities, and their habitats; ecologically sustainable development; to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and to provide increased opportunity for public involvement and participation in environmental planning and assessment.

Native Vegetation Act 2003 To provide for, encourage and promote the management of native vegetation on a regional basis in the social, economic and environmental interests of the State, and to prevent broad-scale clearing unless it improves or maintains environmental outcomes, protect native vegetation of high conservation value, improve the condition of existing native vegetation, encourage the revegetation of land, and the rehabilitation of land, with appropriate native vegetation, in accordance with the principles of ecologically sustainable development.

Protection of the Environment Operations Act 1997 To protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development.

Plantations and Reforestation Act 1999 To facilitate the reforestation of land, and to promote and facilitate development for timber plantations on essentially cleared land, and to codify best practice environmental standards, and provide a streamlined and integrated scheme, for the establishment, management and harvesting of timber and other forest plantations.

Northern Territory

Environment Assessment Act 1994 To provide for the assessment of the environmental effects of development proposals and for the protection of the environment.

Territory Parks and Wildlife Conservation Act 2006 To provide for the establishment and management of parks and reserves (including sanctuaries and joint management parks or reserves), and the study, protection, conservation and sustainable use of wildlife. Also controls commercial harvesting of native vegetation throughout NT, not just in national parks and reserves.

Pastoral Land Act 1992, as amended To make provision for the conversion and granting of title to pastoral land and the administration, management and conservation of pastoral land.

Planning Act 1999 To provide for appropriate and orderly planning and control of the use and development of land. Also establishes the NT Planning Scheme, which specifies performance criteria for the clearing on native vegetation.

Queensland

Forestry Act 1959 To provide for forest reservations; the management, silvicultural treatment and protection of state forests; the sale and disposal of forest products and quarry material, which are the property of the Crown in state forests and timber reserves, and on other lands; and to grant exclusive rights to state plantation forests through a plantation licence.

Nature Conservation Act 1992 To conserve nature using an integrated and comprehensive conservation strategy for the whole state while allowing for the involvement of indigenous people in the management of protected areas in which they have an interest under Aboriginal tradition or Island custom.

Vegetation Management Act 1999 To regulate the clearing of vegetation in a way that conserves remnant vegetation, conserves vegetation in declared areas, ensures that clearing does not cause land degradation, prevents the loss of biodiversity, maintains ecological processes, manages the environmental effects of clearing and reduces greenhouse gas emissions.

South Australia

Forestry Act 1950 To provide for the creation, management and protection of state forest reserves, including the conservation, development and management of native forest reserves.

National Parks and Wildlife Act 1972 To provide protection measures for endangered and vulnerable plants and animals, and to provide for the establishment of reserves for public benefit and recreation.

Native Vegetation Act 1991 To preserve native vegetation, including through legislative controls on native vegetation clearance.

Natural Resources Management Act 2004 To promote the sustainable and integrated management of the state's natural resources and make provision for the protection of the state's natural resources, including the control of significant plantation water use through licensing or a forest permit system.

Environment Protection Act 1993 To promote the principles of ecologically sustainable development based on sound environmental practices and policies that protect, restore and enhance the quality of the environment.

Tasmania

Forest Management Act 2013 (replaced Forestry Act 1920) To provide for the declaration of Crown land as permanent timber production zone land required for the supply of forest products, and its management.

Forest Practices Act 1985 To establish the Forest Practices Code and forest practices system to provide for the sustainable management of forests on any land subject to forest operations; and to enable the establishment of private timber reserves on private land to provide security of longterm forestry use for landowners.

Nature Conservation Act 2002 To provide for the declaration of national parks and other reserved land, and set out the values and purposes of each reserve class with respect to the conservation and protection of fauna, flora and geological diversity.

National Parks and Reserves Management Act 2002 To provide for the management of national parks and reserves under the *Nature Conservation Act 2002*, according to management objectives for each reserve class.

Forestry (Rebuilding the Forest Industry) Act 2014 (replaced Tasmanian Forests Agreement Act 2013) To provide for future potential production forest land and its possible conversion to permanent timber production zone land, and to provide for special species timber harvesting, including requiring the preparation of a special species management plan within three years of commencement of the Act.

Victoria

Forests Act 1958, as amended To provide for the management of state forests, including timber harvesting and fire management; for timber harvesting to comply with a code of practice; and for the protection of state forests and forest produce as property of the Crown.

National Parks Act 1975, as amended To provide a framework for the establishment and management of national parks, and to make provision for certain other parks, including harvesting in selected parks.

Conservation, Forests and Lands Act 1987 To provide a framework for a land-management system and to make necessary administrative, financial and enforcement provisions.

Flora and Fauna Guarantee Act 1988 To provide the framework for the conservation of threatened species and ecological communities and management of processes threatening Victoria's native flora and fauna.

Catchment and Land Protection Act 1994 To set up a framework for the integrated management and protection of catchments, including forested catchments.

Sustainable Forests (Timber) Act 2004 To provide a framework for sustainable forest management and sustainable timber harvesting in state forests.

Western Australia

Conservation and Land Management Act 1984, as amended To make provision for the use, protection and management of certain public lands and waters, and their flora and fauna, and to establish responsible authorities.

Forest Products Act 2000 To provide for the harvesting and sale of forest products from native forests and plantations on state forest and timber reserves, and their regeneration or replanting, in specified areas in the south west of the state.

Environmental Protection Act 1986 To provide for the assessment of the environmental impacts of forest management proposals, and to set conditions on implementation of proposals to moderate adverse impacts; and to provide offences for unlawful environmental harm, including the clearing of native vegetation.

Sandalwood Act 1929 To regulate the quantity of sandalwood to be pulled or removed from Crown and other land, with sandalwood being the wood of any tree of the genera *Santalum* or *Fusanus*, and any other species of aromatic wood which is or may be used as a substitute for sandalwood.

Wildlife Conservation Act 1950 To provide for the conservation and protection of wildlife, with wildlife being flora and fauna native to the state.

Source: Adapted from SOFR 2018, Indicator 7.1a: 'Extent to which the legal framework supports the conservation and sustainable management of forests', Table 7.1, pages 462-464, plus also see narrative and other tables on pages 461-470.

Platform that promotes or allows for stakeholder participation in forest policy development:

The Australian Government utilises a range of formal and informal consultation mechanisms in supporting the development of national forest policies. Examples of these consultation mechanisms include:

- Public consultation undertaken by the Australian and state governments as part of the five yearly reviews of Regional Forest Agreements (RFAs). RFAs are 20-year agreements with four state governments for the conservation and sustainable management of ten regions covering Australia's commercial native forests the Forestry and Forest Products Committee, a committee of government officials from Australian, state, territory agencies responsible for the development and implementation of forest policy.
- Forest Industry Advisory Council which is a forest industry advisory body that acts as a formal means of liaison between forest and wood products industry stakeholders and the Australian Government the ongoing and inclusive stakeholder consultation that has been undertaken in developing and implementing the Australian Government's illegal logging policy.

Forest certification: the voluntary, independent assessment of forest management activities and operations in a particular area of forest against a credible standard that has criteria, requirements and indicators encompassing environmental, economic, social and cultural values. Certification schemes can require forest management practices to be more stringent than required by law alone. Forest certification assures consumers, governments and enterprises that the forest and wood products they buy are legally harvested from sustainably managed forests. It also provides for community consultation in the management of forests covered by certification.

Source: Adapted from SOFR 2018, Indicator 7.1a: 'Extent to which the institutional framework supports the conservation and sustainable management of forests', pages 461-470.

Traceability system (s) for wood products:

Two forest certification schemes operate in Australia: the Australian Forest Certification Scheme (AFSC), renamed the Responsible Wood Certification Scheme (RWCS) in November 2017, and a scheme operated by the Forest Stewardship Council (FSC). Both the AFSC/RWCS and the scheme operated by FSC Australia have forest management standards and chain-of-custody standards. Forest management standards establish thresholds for sustainable forest management through a range

of economic, social, environmental and cultural criteria and requirements for wood production in native and plantation forests. A chain-of-custody standard has criteria and requirements to assess the process for tracking wood and forest products originating in certified forests through all phases of ownership, transportation and manufacturing, from a defined forest area to the final product and delivery to the consumer. In addition to forest certification, most multiple-use public forest and some private forests and plantations are managed in accordance with codes of forest practice (SOFR 2018, Indicator 7.1a), as well as recognised environmental management systems (EMSs). EMSs are independently certified by accredited, third-party certification bodies to the International Organization for Standardization (ISO) standard 14001 *Environmental Management Systems—Requirements with Guidance for Use*. An EMS under ISO 14001 is a tool for managing the impacts of an organisation's activities on the environment, and provides a structured approach to the planning and implementation of environmental protection measures.

Source: Adapted from SOFR 2018, Indicator 7.1b: 'Extent to which the institutional framework supports the conservation and sustainable management of forests', pages 476-478.

Indicate the existence of	Boolean (Yes/No)	
	National	Sub-national
Policies supporting SFM	Yes	Yes
Legislations and regulations supporting SFM	Yes	Yes
Platform that promotes or allows for stakeholder participation in forest policy development	Yes	Yes
Traceability system(s) for wood products	Yes	Yes

Comments

In Australia, all states and territories and the Australian Government have legislation that supports the conservation and sustainable management of Australia's forests. Some of this legislation is administered jointly by, and requires coordination between state, territory and local governments, statutory authorities and regional management authorities. Primarily responsibility for land management, including forest management, lies at the jurisdictional level. At the national level the Australian Government also has certain powers and responsibilities.

For detailed descriptions and additional information on Australia's legislation, policies and national platform for stakeholder participation in forestry, please see FRA 2020 'Original data' section above or alternatively SOFR 2018, Indicators 7.1a–7.1c, pages 461–490.

6b Area of permanent forest estate

National Data

Data sources + type of data source eg NFI, etc

Data were sourced Australian Bureau of Agricultural and Resource Economics and Sciences, SOFR 1998, 2003, 2013 and 2018, National Forestry Inventory and PSMA Australia Ltd.

National classification and definitions

The area of permanent forest estate is taken as the sum of native forest in two tenure categories, Multiple-Use public Forest (MUF) and Nature Conservation Reserve (NCR). Areas are calculated by applying the proportions of native forest in these tenures (from each SOFR report) to the total forest area over time (the derived native forest extent) as explained in FRA 2020 Question 1a.

Original data

Sources: SOFR 1998, 2003, 2013 and 2018.

Forest Area 1990: Calculated using FRA 2020 derived native forest area 1990 of 132,408.99 ('000 hectares)

	SOFR 1990 % of total native forest area	Area calculated from FRA 2020 derived native forest area for 1990 ('000 hectares)
Multiple-use public forest	9	11,344.00
Nature conservation reserve	11	14,937.27
Combined total	20	26,281.28

Forest Area 2000: Calculated using FRA 2020 derived native forest area 2000 of 129,887.72 ('000 hectares)

	SOFR 2003 % of total native forest area	Area calculated from FRA 2020 derived native forest area for 2000 ('000 hectares)
Multiple-use public forest	7	9,098.05
Nature conservation reserve	13	17,158.94
Combined total	20	26,256.99

Forest Area 2010: Calculated using FRA 2020 derived native forest area 2010 of 127,104.99 ('000 hectares)

	SOFR 2013 % of total native forest area	Area calculated from FRA 2020 derived native forest area 2010 ('000 hectares)
Multiple-use public forest	8	10,520.80
Nature conservation reserve	17	22,242.91
Combined total	25	32,763.70

Forest Area 2015: Calculated using FRA 2020 derived native forest area 2015 of 130,676.72 ('000 hectares)

	SOFR 2018 % of total native forest area	Area calculated from FRA 2020 derived native forest area for 2015 ('000 hectares)
Multiple-use public forest	7	9,667.52
Nature conservation reserve	16	21,486.78
Combined total	23	31,154.30

Note: Totals may not tally due to rounding.

FRA 2020 categories	Forest area (1000 ha)					
	Applicable?	1990	2000	2010	2015	2020
Area of permanent forest estate	Yes	26 281.28	26 256.99	32 763.70	31 154.30	

Comments

The area of permanent forest estate is taken as the sum of native forest in two tenure categories, Multiple-Use public Forest (MUF) and Nature Conservation Reserve (NCR). Areas are calculated by applying the proportions of native forest in these tenures (from each SOFR report) to the total forest area over time (the derived native forest extent) as explained in FRA 2020 Question 1a. The above data exclude private and leasehold forest, as well as forest on other public tenures, as Australia is unable to determine the permanency of such forest nationally.

Australia's National Forest Policy Statement 1992 has a national goal "to maintain an extensive and permanent native forest estate in Australia", and two of the principal objectives of the Statement are "the maintenance of an extensive and permanent native forest estate in Australia and the protection of nature conservation values in forests". However, the only forest tenures for which permanency of forest can be taken are MUF and NCR, as above.

In addition, the Tasmanian Government has a "Policy for Maintaining Permanent Native Forest Estate". This policy is implemented by Tasmania's Forest Practices Authority through the Authority's consideration of applications for approval of Forest Practices Plans under the Tasmania's Forest Practices Act 1985, and ensures that Tasmania maintains a permanent forest estate that comprises areas of native forest managed on a sustainable basis both within formal reserves and within multiple-use forests across public and private land. The additional areas in Tasmania managed as permanent forest are not included here.

The difference in permanent forest estate reported in FRA 2020 compared with Australia's response to FRA 2015 is a direct consequence of the effect of the change in the baseline area of forest for 2013 (125 million hectares) compared with the baseline of 134 million hectares as reported for 2016 (see Question 1a and 1b). In this regard, the area figures in Australia's FRA 2020 response are not comparable with the area figures in Australia's FRA 2015 response, even though the area proportions of MUF and NCR are comparable. The proportion of total forest that was MUF and NCR was 7% and 16% in SOFR 2018, compared with 8% and 17% in SOFR 2013 (noting that the total area of forest in SOFR 2018 is greater than that in SOFR 2013 but the increase was in tenures other than MUF and NCR).

7 Employment, education and NWFP

7a Employment in forestry and logging

National Data

Data sources + type of data source eg NFI, etc

National data on forest sector employment are derived from Australian Bureau of Statistics (ABS) Census of Populations and Housing.

National classification and definitions

Source: SOFR 2018, Indicator 6.5a: 'Direct and indirect employment in the forest sector', pages 430-434.

Full-time	refers to persons who usually worked 35 hours or more in a week
Part-time	refers to persons who usually worked less than 35 hours in a week

Original data

Source: SOFR 2018, Indicator 6.5a: 'Direct and Indirect employment in the forest sector', page 431.

	Number of persons employed				Total forestry sector
	Forestry and logging	Forestry support services	Wood product manufacturing	Pulp, paper and converted paper product manufacturing	
2011					
Full time	4,219	1,293	34,403	16,170	56,087
Part time	810	753	5,694	2,258	9,508
Away from work	372	116	1,575	934	2,996
Total	<u>5,399</u>	<u>2,168</u>	41,670	19,364	68,596
2016					
Full time	4,769	1,783	24,348	11,839	42,733
Part time	903	1,044	3,766	1,586	7,301
Away from work	355	127	922	540	1,946
Total	<u>6,027</u>	<u>2,957</u>	29,035	13,962	51,983
Total employment includes people employed in the sum of the following sectors: forestry and logging; forestry support services; wood product manufacturing; and pulp, paper and converted paper product manufacturing. Total employment may be different from the sum of the three individual employment categories because the ABS randomly adjusts some small values published in the Census of Population and Housing to avoid release of confidential data. Total national employment in the forestry sector also includes a very small number of persons employed in external territories of Australia.					
'Away from work' refers to persons who were employed but away from work and for whom hours worked were not given.					
Source: ABS (2006, 2011, 2016b).					

Only data for forestry and logging and forestry support services are reported in FRA 2020. Wood product manufacturing and pulp, paper and converted paper product manufacturing were excluded from the numbers reported in FRA 2020 as they do not fall under the FAO definition of forestry and logging.

FRA 2020 categories	Full-time equivalents (1000 FTE)											
	1990			2000			2010			2015		
	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male
Employment in forestry and logging							7.57			8.98		
...of which silviculture and other forestry activities												
...of which logging												
...of which gathering of non wood forest products												
...of which support services to forestry							2.17			2.96		

Comments

Australia does not have national data on the employment of females and males within each of the sub-categories of employment in 'forestry and logging'.

Total national employment in 'forestry and logging' as presented above is the sum of employees within the 'Forestry and logging' and 'Forestry support services' sectors as defined in Australia.

Data provided here are for the absolute number of people employed within the reporting period (sum of full-time, part-time and away-from-work employees). FTE (Full-time equivalents) for these categories are not available for Australia.

Note: As defined in SOFR 2018, Indicator 6.5a: 'Direct and indirect employment in the forest sector', pages 430-434:

Full-time	refers to persons who usually worked 35 hours or more in a week
Part-time	refers to persons who usually worked less than 35 hours in a week

For the purpose of FRA 2020, single-year data for the two subsectors 'forestry and logging' and 'forestry support services' are reported. Three-year average data are not available.

- FRA reporting period 2010 was data for 2011, as reported in SOFR 2018, Table 6.50
- FRA reporting period 2015 was data for 2016, as reported in SOFR 2018, Table 6.50

Data for 1990 and 2000 are not presented as the data collection and reporting for these earlier years are inconsistent with data collected and reported for more recent years.

For more information please refer to SOFR 2018, Indicator 6.5a: 'Direct and indirect employment in the forest sector', pages 430-434.

7b Graduation of students in forest-related education

National Data

Data sources + type of data source eg NFI, etc

Data were sourced from Australian Government Department of Education and Training, Higher Education Statistics Collection, 2017, as published in SOFR 2018.

National classification and definitions

Source: SOFR 2018, Indicator 7.1b: 'Extent to which the institutional framework supports the conservation and sustainable management of forests', pages 478–481.

Australia does not have national data for separate forest-related degrees (doctoral, masters and bachelors degrees). Qualifications are therefore reported simply as postgraduate and undergraduate degree completions. Southern Cross University offers the undergraduate forestry degree 'Bachelor of Forest Science and Management'. The Australian National University undergraduate course 'Bachelor of Science (Forest Sciences)' has ceased to be offered, but that university continues to offer post-graduate courses and forestry-related subjects as part of environmental science qualifications. The University of Melbourne offers a Forest Science major as part of a Bachelor of Science and a Bachelor of Science (Extended). Post-graduate forest-related degrees are also offered at each of the above universities, and at the University of the Sunshine Coast.

Australia reports on number of national completions in government-funded forestry-related Vocational Education and Training (VET) for years 2006-15, in the Technician certificate/diploma category.

Postgraduate degree	Includes Honours, Graduate Diploma, Masters and Doctoral degrees. These are offered to students after they have completed an undergraduate degree.
Undergraduate degree	Includes all degrees that are given to students as their first degree.
VET (Vocational Education and Training)	Vocational Education and Training (VET) enables students to gain qualifications for all types of employment, and specific skills to help them in the workplace. Source: https://www.asqa.gov.au/about/australias-vet-sector
FWP (Forest and Wood Products)	One of two training packages offered by the industry-owned, not-for-profit organisation ForestWorks. These packages offer vocational education and training in technical qualifications at certificate level and at diploma level, to support those sectors of industry.

Original data

Source: SOFR 2018, Indicator 7.1b: 'Extent to which the institutional framework supports the conservation and sustainable management of forests', Figure 7.5, page 479.

Year	Tertiary education completions	
	Postgraduate	Undergraduate
2006	29	44
2007	25	71
2008	21	37
2009	33	38
2010	32	28
2011	28	28
2012	34	21
2013	33	13
2014	31	22
2015	52	31
2016	42	13

Source: SOFR 2018, Indicator 7.1b: 'Extent to which the institutional framework supports the conservation and sustainable management of forests', Table 7.8, page 481.

Jurisdiction	VET Program	Completions										
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
ACT	FWP	0	0	0	0	0	0	0	0	0	0	0
NSW	FWP	111	56	72	63	76	101	114	37	68	37	39
NT	FWP	10	0	0	2	0	0	0	0	0	0	0
Qld	FWP	25	20	9	17	191	230	83	23	27	138	71
SA	FWP	28	2	25	21	10	26	10	14	3	17	22
Vic.	FWP	55	33	47	28	83	47	195	204	105	75	93
Tas.	FWP	64	40	52	69	44	34	22	2	3	17	27
WA	FWP	73	88	90	95	120	56	63	33	48	61	48
Total	FWP	368	227	298	291	527	492	483	314	259	342	301

FWP, Forest and Wood Products training package

Notes: FWP includes the former Forest and Forest Products Industry (FPI) training package. Values for 2016 are preliminary (as at 29 June 2018). All values are indicative only, because the National Centre for Vocational Education Research relies on providers to supply data.

Source: National Centre for Vocational Education Research, VOCSTATS, *VET program completions 2003–2016* database.

Note: Australia's reported data on completions in the PPM (Pulp & Paper Manufacturing) Industry training package are not included above (and are small compared to the number of completions in the FWP (Forest and Wood Products) training package above).

FRA 2020 categories	Number of graduated students											
	1990			2000			2010			2015		
	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male
Doctoral degree							32.00			52.00		
Master's degree												
Bachelor's degree							28.00			31.00		
Technician certificate / diploma							437.00			301.00		
Total							499.00			364.00		

Comments

Australia does not have national data for separate forest-related degrees (doctoral, masters and bachelors degrees). Qualifications are therefore reported simply as postgraduate and undergraduate degree completions. Southern Cross University offers the undergraduate forestry degree 'Bachelor of Forest Science and Management'. The Australian National University undergraduate course 'Bachelor of Science (Forest Sciences)' has ceased to be offered, but that university continues to offer post-graduate courses and forestry-related subjects as part of environmental science qualifications. The University of Melbourne offers a Forest Science major as part of a Bachelor of Science and a Bachelor of Science (Extended). Post-graduate forest-related degrees are also offered at each of the above universities, and at the University of the Sunshine Coast.

For the purpose of FRA 2020, the reported SOFR 2018 categories are equivalent to FRA 2020 categories:

SOFR 2018 Categories	SOFR 2018 Definitions	FRA 2020 Categories
Postgraduate degree	Includes Honours, Graduate Diploma, Masters and Doctoral degrees. These are offered to students after they have completed an undergraduate degree.	Doctoral Degree
Undergraduate degree	Includes all degrees that are given to students as their first degree.	Bachelor's Degree
VET (Vocational Education and Training)	Vocational Education and Training (VET) enables students to gain qualifications for all types of employment, and specific skills to help them in the workplace. Source: https://www.asqa.gov.au/about/australias-vet-sector	Technician certificate/diploma
FWP (Forest and Wood Products)	One of two training packages offered by the industry-owned, not-for-profit organisation ForestWorks. These packages offer vocational education and training in technical qualifications at certificate level and at diploma level, to support those sectors of industry.	Technician certificate/diploma

Australia reports on number of national completions in government-funded forestry-related Vocational Education and Training (VET) for years 2006-15, in the Technician certificate/diploma category.

Adapted table from National data section to include re-classification of SOFR 2018 categories into FRA 2020 categories.

Totals for Doctoral degree include Doctoral degrees, Master's degrees and Graduate Diplomas, reported in SOFR 2018, Indicator 7.1b: 'Extent to which the institutional framework supports the conservation and sustainable management of forests', Figure 7.5, page 479.

3-year averages are based on 1 year either side of the year that is the title of the reporting year:

- FRA reporting period 2010 contain data calculated as average graduations 2009, 2010 and 2011
- FRA reporting period 2015 contain data calculated as average graduations 2014, 2015 and 2016

Australia does not nationally report or have sufficient data for number of graduated students in either 1990 or 2000 time periods, nor a breakdown of numbers by gender.

7c Non wood forest products removals and value 2015

National Data

Data sources + type of data source eg NFI, etc

Data were sourced from state, territory and Australian Government agencies and organisations. Many Australian non-wood forest products (NWFPs) are commercialised, and supply domestic and export markets. However, for most NWFPs there are insufficient data available for reporting on complete measures of harvested quantities, market value and usage. The best available national information is published in Australia's State of the Forests Report (SOFR) 2018.

National classification and definitions

Source: SOFR 2018, Indicator 6.1b: 'Values, quantities, and use of non-wood forest products', pages 343-351.

Non-wood forest products (NWFPs) are products of biological origin other than wood that are derived from forests. In Australia, many NWFPs have been commercialised and are traded both domestically and internationally.

Crocodile products	The crocodile farming industry in Australia depends on the commercial harvesting of eggs from the wild (including mangrove and melaleuca forests), incubating these eggs, and raising hatchlings, a process known as ranching. Crocodile hatchlings are used primarily to raise crocodiles for skin products and meat. Most crocodile farms raise saltwater crocodiles (<i>Crocodylus porosus</i>), although a few farms also raise freshwater crocodiles (<i>C. johnstoni</i>). Other parts of the crocodile (such as teeth, skulls and feet) are used in components in accessories, jewellery, medicine, and the production of oils.
Mud crabs	Mud Crabs (<i>Scylla spp.</i>) have a direct link to forests as adult mud crabs and nursery stock dwell in mangrove forests. The commercial harvesting of adult mud crabs is localised to the Northern Territory and Queensland. Tabular data were sourced from Queensland Fisheries and no data were collected from Northern Territory Fisheries.
Deer	Wild (feral) deer are common and widespread in parts of Queensland, South Australia, Tasmania and Victoria, and their numbers are increasing in New South Wales; they are less common in the Northern Territory and Western Australia. Six species have established populations within Australia. The three primary species include are fallow deer (<i>Dama dama</i>), red deer (<i>Cervus elaphus</i>) and sambar (<i>Rusa unicolor</i>). The main products from deer farming are venison and velvet antler. Tabular data reflects the amount of venison production and exports, as well as the number of deer hides exported.
Game pigs	The game pig industry is based on the harvest of feral pigs (<i>Sus scrofa</i>), primarily in forests in northern and eastern Australia, where pigs are more prevalent. Game pigs are hunted for their meat, as a recreational activity and as a pest management practice. Almost all the production is exported.
Eucalyptus oil	Eucalyptus oil is an essential oil that is extracted from the leaves of several species of the genus <i>Eucalyptus</i> . It has a wide range of commercial applications and may be found in perfumes, pharmaceutical products, and as a food additive and industrial chemical. Eucalyptus oil is harvested from plantations and from native forest under permit. Most Australian eucalyptus oil is produced from blue mallee (<i>Eucalyptus polybractea</i>), with smaller quantities obtained from narrow-leaved peppermint (<i>E. radiata</i> subsp. <i>radiata</i>) and oil mallee (<i>E. kochii</i>). Other potential products from eucalyptus oil, such as jet fuel, or other biochemicals, have been tested in Australia for proof-of-concept but are not currently commercial.
Tea-tree oil	Australian tea-tree oil from narrow-leaved paperbark (<i>Melaleuca alternifolia</i> ; also called narrow-leaved tea-tree) is harvested principally from plantations in northern New South Wales and Queensland, and there is also a small harvest from natural stands on flood plains. Tea-tree oil has a wide range of uses that relate mainly to its antiseptic, anti-inflammatory and other healing properties. Approximately 85% of tea-tree oil production in Australia is exported for use in the cosmetics and pharmaceuticals industry. The remaining oil is used domestically as pure oil or as an ingredient in products such as soaps, shampoo and other personal products.
Native bush foods	The native (bush) food industry spans a wide variety of Australian species, including lemon myrtle (<i>Backhousia citriodora</i>), mountain or native pepper (<i>Tasmannia lanceolata</i>), bush tomato (<i>Solanum centrale</i>), anise myrtle (<i>Backhousia anisata</i>), finger limes (<i>Citrus australasica</i>), Kakadu plum (<i>Terminalia ferdinandiana</i>), desert limes (<i>Citrus glauca</i>), quandong (<i>Santalum acuminatum</i>), muntries (<i>Kunzea pomifera</i>), wattleseed (<i>Acacia victoriae</i>), riberry (<i>Syzygium leuhmannii</i>), Davidson's plum (<i>Davidsonia spp.</i>) and lemon aspen (<i>Acronychia acidula</i>). Australia does not have a national data set for native bush foods, and so limited information is available about production levels and value for individual species or the sector as a whole.
Sandalwood products	Australia's current sandalwood production comes primarily from harvesting native sandalwood (<i>Santalum spicatum</i>) in Western Australia, based on an allowable cut as specified in the <i>Sandalwood (Limitation of Removal of Sandalwood) Order (No. 2) 2015</i> . Harvest from plantation sources is low but increasing. Australia does not have a national dataset for market values and usage of sandalwood. Sandalwood is harvested for wood and also oil, and harvesting has increased over the period 2011-16. Overall, 70% of total production was exported in this period.
Honey and beeswax	There is a significant beekeeping industry in most states of Australia, producing products such as honey, dried pollen, beeswax, royal jelly, propolis and bee venom. The industry also performs (often paid) pollination services, and there is a trade in queen and packaged bees. An estimated 80% of Australia's honey is derived from eucalypts and related species. Honey and beeswax production has the highest reported gross value of production of any NWFP. The market value has steadily increased over time, to \$110 million in 2015-16.

Original data

Source: SOFR 2018, Indicator 6.1b: 'Values, quantities and use of non-wood forest products', Tables 6.4, 6.6, 6.7 6.8, 6.9, 6.11, 6.13, 6.14, 6.16 and 6.17, pages 345-350.

Sector	2011-12 ^a	2012-13	2013-14	2014-15	2015-16
Crocodile products	51,859	-	-	-	28,100

Mud crabs ^b	22,900	21,400	21,300	19,000	15,900
Deer	1,688	1,818	2,148	2,177	2,245
Game pigs	9,456	1,719	1,490	3,124	5,757
Eucalyptus oil	1,260	-	-	-	-
Tea-tree oil	12,132	-	-	-	28,582
Native bush foods	17,915	-	-	-	-
Sandalwood	14,740	-	-	-	-
Honey and beeswax	79,376	88,374	88,037	100,553	110,241

-, not available

^a Figures for deer, game pigs and honey and beeswax for 2011–12 differ slightly from those in SOFR 2013 due to updated production and or price data.

^b Queensland only

Note: Gross value of production (GVP) is the value placed on recorded production at the wholesale prices realised in the marketplace, where the marketplace is at a market point to be consumed locally or exported, or refers to a raw material for a secondary industry, or is at a market point before being value-added by an industry. In many cases, the value of production of an industry will be less than the value of exports because of substantial value-adding through processing before export.

Source: MIG and NFISC (2013); Foster (2014); DAF (2017); ABARES (2018).

Table 6.6: Australian crocodile hide production and exports, 2011–12 to 2015–16

Product statistic	Metric	2011–12	2012–13	2013–14	2014–15	2015–16
Production	Number of hides (saltwater and freshwater)	48,532	-	-	-	41,852
Exports	Number of hides (saltwater and freshwater)	36,560	59,518	52,461	37,524	35,111
Exports	Value of hides \$ million	14.7	28.4	25.2	23.6	22.2

-, not available

Source: MIG and NFISC (2013); ABS (2017d); Northern Territory Department of Primary Industry Fisheries; Queensland Department of Environment and Heritage Protection.

Table 6.7: Australian crocodile meat production and exports, 2011–12 to 2015–16

Product statistic	Metric	2011–12	2012–13	2013–14	2014–15	2015–16
Production	Tonnes	243.0	-	-	-	132.3
Exports	Tonnes	25.9	29.3	24.0	17.1	26.4
Exports	\$ '000	321	369	259	182	317

-, not available

Source: ABS (2017d); ABARES (2018).

Table 6.8: Venison production and exports, and exports of deer hides, 2011–12 to 2015–16

Metric	2011–12	2012–13	2013–14	2014–15	2015–16
tonnes ^a	224	243	326	286	265
tonnes ^a	160	170	230	200	185

number	2422	-	-	-	-
-, not available					
^a Venison production and exports are reported as hot carcass weight.					
Note: Export figures for 2011–12 differ from those in SOFR 2013 due to updated levies data.					
Source: ABS (2011); Department of Agriculture and Water Resources (Levies section).					

Table 6.9: Velvet antler production and exports, 2011–12 to 2015–16

Product statistic	Metric	2011–12	2012–13	2013–14	2014–15	2015–16
Production	kg	13,287	12,325	10,405	11,434	12,127
Exports	kg	12,092	8,157	4,582	9,760	11,356
Proportion exported	%	91	66	44	85	94

Note: Production figures for 2011–12 differ slightly from those in SOFR 2013 due to updated levies data.

Source: Department of Agriculture and Water Resources (Levies section).

Table 6.11: Number of game pigs killed, and game pig meat production and exports, 2011–12 to 2015–16

Product statistic	Metric	2011–12	2012–13	2013–14	2014–15	2015–16
Animals killed	Number	119,100	23,500	21,000	41,900	63,800
Meat production	Tonnes	1,488	294	262	523	798
Meat export	Tonnes	1,468	274	242	503	778

Note: Figures for 2011–12 differ from those in SOFR 2013 due to updated or revised levies data.

Source: Department of Agriculture and Water Resources (Levies section); ABARES.

Table 6.13: Australian honey production, export and value, 2011–12 to 2015–16

Activity	Product statistic	Metric	2011–12	2012–13	2013–14	2014–15	2015–16
Production	Amount	Tonnes	21,989	23,585	22,167	18,166	18,211
	Gross value of production	\$million	79.4	88.4	88.0	100.6	110.2
Exports	Honey	Tonnes	4,879	4,641	4,373	4,178	4,479
	Beeswax	Tonnes	207	358	358	268	266

Note: Production figure for 2011–12 differs from SOFR 2013 due to updated data from industry.

Source: ABS (2017d); ABARES.

Table 6.14: Tea-tree oil production and exports, Australia, 2011–12 and 2015–16

Metric	2011–12	2015–16
Tonnes	400	783
Tonnes	373	688

Source: ABS (2017d); ABARES.

Table 6.16: Sandalwood production, Australia, 2011–12 to 2015–16

Product statistic	Metric	2011–12	2012–13	2013–14	2014–15	2015–16
Wood production	tonnes	5,200	5,300	4,700	4,300	4,600
Harvested for domestic production	tonnes	3,200	3,300	3,100	2,900	3,200
Exported	tonnes	2,000	2,000	1,600	1,500	1,300
Oil production	kg	n.d.	1,100	1,300	1,600	2,600
Oil exported	kg	n.d.	900	1,100	500	2,100

n.d., no data

Note: Totals may not tally due to rounding.

Source: ABARES.

Table 6.17: Mud crab production, Queensland, 2005 to 2016

Year	Total catch (tonnes)	Gross value of production (\$ million)
2005	969	15.5
2006	955	15.3
2007	931	14.9
2008	1,007	16.1
2009	1,044	16.7
2010	1,240	19.8
2011	1,439	23.0
2012	1,429	22.9
2013	1,340	21.4
2014	1,329	21.3
2015	1,189	19.0
2016	994	15.9

Source: DAF (2017b).

	Name of NWFP product	Key species	Quantity	Unit	Value (1000 local currency)	NWFP category
#1	Crocodile hides (includes both saltwater and freshwater crocodiles)	Crocodylus porosus and C. johnstoni	41 852	Number of hides (saltwater, freshwater)	28 100	10 Hides skins and trophies
#2	Crocodile meat production	Crocodylus porosus and C. johnstoni	132	Tonnes		12 Wild meat
#3	Mud crabs	Scylla spp.	994	Total catch (tonnes)	15 900	12 Wild meat
#4	Deer (value also includes antlers - see Comments)	Dama dama, cervus elaphus and Rusa unicolor	265	Venison (tonnes)	2 245	12 Wild meat
#5	Game pigs	Sus scrofa	798	Meat (tonnes)	5 757	12 Wild meat
#6	Eucalyptus oil	Eucalyptus polybractea, E. radiata subsp. radiata and E. kochii				3 Raw material for medicine and aromatic products
#7	Tea-tree oil	Melaleuca alternifolia	783	Oil (tonnes)	28 582	3 Raw material for medicine and aromatic products

	Name of NWFP product	Key species	Quantity	Unit	Value (1000 local currency)	NWFP category
#8	Native bush foods	Solanum centrale, Backhousia anisate, Citrus australasica, Terminalia ferdinandiana, Citrus glauca, Santalum acuminatum, Kunzea pomifera, Acacia victoriae, Syzygium leuhmanii, Davidsonia spp. and Acronychia acidula				1 Food
#9	Sandalwood	Santalum spicatum, S. lanceolatum and S. album	4 600	Wood (tonnes)		3 Raw material for medicine and aromatic products
#10	Honey and beeswax		18 211	Honey (tonnes)	110 241	11 Wild honey and bee wax
All other plant products						
All other animal products						
Total					190 825	

Name of currency	Australian Dollars
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Comments

Australia does not have a comprehensive national dataset for non-wood forest products (NWFPs), and so provides instead an overview of selected commercialised NWFPs; there are insufficient data to report on the full range of NWFPs. In addition, some tree-based industries are not reported because they are regarded as horticulture, rather than forest-based industries. Some other forest species (e.g. flowering shrubs) that are only commercialised outside forests are also not included, because none of their production derives from forest. Most of the data presented here are for the period 2015-16.

Non-wood forest products (NWFPs) are products of biological origin other than wood that are derived from forests. In Australia, many NWFPs have been commercialised and are traded both domestically and internationally, and are described as:

Crocodile products	The crocodile farming industry in Australia depends on the commercial harvesting of eggs from the wild (including mangrove and melaleuca forests), incubating these eggs, and raising hatchlings, a process known as ranching. Crocodile hatchlings are used primarily to raise crocodiles for skin products and meat. Most crocodile farms raise saltwater crocodiles (<i>Crocodylus porosus</i>), although a few farms also raise freshwater crocodiles (<i>C. johnstoni</i>). Other parts of the crocodile (such as teeth, skulls and feet) are used in components in accessories, jewellery, medicine, and the production of oils.
Mud Crabs	Mud Crabs (<i>Scylla</i> spp.) have a direct link to forests as adult mud crabs and nursery stock dwell in mangrove forests. The commercial harvesting of adult mud crabs is localised to the Northern Territory and Queensland. Tabular data were sourced from Queensland Fisheries and no data were collected from Northern Territory Fisheries.

Deer	Wild (feral) deer are common and widespread in parts of Queensland, South Australia, Tasmania and Victoria, and their numbers are increasing in New South Wales; they are less common in the Northern Territory and Western Australia. Six species have established populations within Australia. The three primary species include are fallow deer (<i>Dama dama</i>), red deer (<i>Cervus elaphus</i>) and sambar (<i>Rusa unicolor</i>). The main products from deer farming are venison and velvet antler. Tabular data reflects the amount of venison production and exports, as well as the number of deer hides exported.
Game Pigs	The game pig industry is based on the harvest of feral pigs (<i>Sus scrofa</i>), primarily in forests in northern and eastern Australia, where pigs are more prevalent. Game pigs are hunted for their meat, as a recreational activity and as a pest management practice. Almost all the production is exported.
Eucalyptus Oil	Eucalyptus oil is an essential oil that is extracted from the leaves of several species of the genus <i>Eucalyptus</i> . It has a wide range of commercial applications and may be found in perfumes, pharmaceutical products, and as a food additive and industrial chemical. Eucalyptus oil is harvested from plantations and from native forest under permit. Most Australian eucalyptus oil is produced from blue mallee (<i>Eucalyptus polybractea</i>), with smaller quantities obtained from narrow-leaved peppermint (<i>E. radiata</i> subsp. <i>radiata</i>) and oil mallee (<i>E. kochii</i>). Other potential products from eucalyptus oil, such as jet fuel, or other biochemicals, have been tested in Australia for proof-of-concept but are not currently commercial.
Tea-tree oil	Australian tea-tree oil from narrow-leaved paperbark (<i>Melaleuca alternifolia</i> ; also called narrow-leaved tea-tree) is harvested principally from plantations in northern New South Wales and Queensland, and there is also a small harvest from natural stands on flood plains. Tea-tree oil has a wide range of uses that relate mainly to its antiseptic, anti-inflammatory and other healing properties. Approximately 85% of tea-tree oil production in Australia is exported for use in the cosmetics and pharmaceuticals industry. The remaining oil is used domestically as pure oil or as an ingredient in products such as soaps, shampoo and other personal products.
Native bush foods	The native (bush) food industry spans a wide variety of Australian species, including lemon myrtle (<i>Backhousia citriodora</i>), mountain or native pepper (<i>Tasmannia lanceolata</i>), bush tomato (<i>Solanum centrale</i>), anise myrtle (<i>Backhousia anisata</i>), finger limes (<i>Citrus australasica</i>), Kakadu plum (<i>Terminalia ferdinandiana</i>), desert limes (<i>Citrus glauca</i>), quandong (<i>Santalum acuminatum</i>), muntries (<i>Kunzea pomifera</i>), wattleseed (<i>Acacia victoriae</i>), riberry (<i>Syzygium leuhmannii</i>), Davidson's plum (<i>Davidsonia</i> spp.) and lemon aspen (<i>Acronychia acidula</i>). Australia does not have a national data set for native bush foods, and so limited information is available about production levels and value for individual species or the sector as a whole.
Sandalwood products	Australia's current sandalwood production comes primarily from harvesting native sandalwood (<i>Santalum spicatum</i>) in Western Australia, based on an allowable cut as specified in the Sandalwood (Limitation of Removal of Sandalwood) Order (No. 2) 2015. Harvest from plantation sources is low but increasing. Australia does not have a national dataset for market values and usage of sandalwood. Sandalwood is harvested for wood and also oil, and harvesting has increased over the period 2011-16. Overall, 70% of total production was exported in this period.
Honey and beeswax	There is a significant beekeeping industry in most states of Australia, producing products such as honey, dried pollen, beeswax, royal jelly, propolis and bee venom. The industry also performs (often paid) pollination services, and there is a trade in queen and packaged bees. An estimated 80% of Australia's honey is derived from eucalypts and related species. Honey and beeswax production has the highest reported gross value of production of any NWFP. The market value has steadily increased over time, to \$110 million in 2015-16.

Quantity and Unit:**Crocodiles**

- The value of Crocodile production of \$28,100,00 for reporting year 2015 is understood to capture the combined value of Crocodile hides of 41,582 (number of hides of both saltwater and freshwater crocodiles) and Crocodile meat production of 132 tonnes, as outlined in categories #1 and #2.

Deer

- The value for Deer of \$2,245,000 for reporting year 2015-16 is understood to capture the combined value of Venison production of 265 tonnes and Velvet antler production of 12,127 kgs.

Value (1000 local currency):

NWFP figures from SOFR 2018 for 2015-16 were entered above for FRA 2020 reporting year 2015, to maintain data consistency across FRA 2020.

No recent data are available for cells left blank.

For additional information on Australia's NWFPs please refer to SOFR 2018, Indicator 6.1b: 'Values, quantities and use of non-wood forest products', pages 343-351.

8 Sustainable Development Goal 15

8a Sustainable Development Goal 15

SDG Indicator 15.1.1 Forest area as proportion of total land area 2015

Indicator	Percent							
	2000	2010	2015	2016	2017	2018	2019	2020
Forest area as proportion of total land area 2015	17.16	16.86	17.32	17.45	17.44	17.44	17.44	17.44

Name of agency responsible	Australian Government Department of Agriculture
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SDG Indicator 15.2.1 Progress towards sustainable forest management

Sub-Indicator 1	Percent						
	2000-2010	2010-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Forest area annual net change rate	-0.17	0.54	0.70	-0.01	-0.01	0.00	0.00

Name of agency responsible	Australian Government Department of Agriculture
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Sub-Indicator 2	Forest biomass (tonnes/ha)							
	2000	2010	2015	2016	2017	2018	2019	2020
Above-ground biomass stock in forest	85.56	86.36	84.56	83.96	83.97	83.98	83.98	83.98

Name of agency responsible	Australian Government Department of Agriculture
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Sub-Indicator 3	Percent (2015 forest area baseline)							
	2000	2010	2015	2016	2017	2018	2019	2020
Proportion of forest area located within legally established protected areas	13.22	16.73	17.96	18.09	18.09	18.09	18.09	18.09

Name of agency responsible	Australian Government Department of Agriculture
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Sub-Indicator 4	Percent (2015 forest area baseline)							
	2000	2010	2015	2016	2017	2018	2019	2020
Proportion of forest area under long-term forest management plan	–	21.66	32.28	32.51	32.51	32.50	32.50	32.50

Name of agency responsible	Australian Government Department of Agriculture
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Sub-Indicator 5	Forest area (1000 ha)							
	2000	2010	2015	2016	2017	2018	2019	2020
Forest area under independently verified forest management certification schemes	0.00	10 021.64	10 580.18	26 921.68	24 241.88	8 898.98	–	–