

Indicator 2.1c: Annual removal of wood products compared to the volume determined to be sustainable for native forests, and future yields for plantations



This indicator measures the harvest levels of wood products in relation to future yields. The capacity to implement strategies to deal with changing demand for forest products based on future yields from both native and plantation forests is an integral part of sustainable forest management.

2.1c.i Sustainable yield and actual harvest levels (2024)

This part of Indicator 2.1c presents the calculated sustainable yields and actual harvested wood volumes of sawlogs from multiple-use public native forests, and the supplementation of sawlogs from hardwood plantations.

The two other parts of Indicator 2.1c are:

2.1c.ii Removals by log type

2.1c.iii Forecast national log availability

Context and Definitions

Sustainable wood yields are an integral component of sustainable forest management as they provide the certainty of supply needed for a competitive forest industry, while meeting ecologically sustainable development and conservation goals.

Sustainable yield: The yield of products (such as wood and water) from an area of forest that ensures the functioning of the forest ecosystem as a whole is maintained, and the flow of products can continue indefinitely under a given management strategy and suite of sustainable-use objectives.

Sawlog: A log harvested from a plantation or native forest used to manufacture sawn timber. High-quality sawlogs are sawlogs meeting specified size and quality (grade) specifications (including the amount of permissible defect). Low-quality sawlogs are sawlogs not meeting high-quality sawlog specifications.

Key points

- An average annual volume of 0.97 million cubic metres of high-quality sawlogs was harvested from multiple-use public native forests and other native forests where timber is owned by the Crown, during the period 2016-17 to 2020-21. Nationally, this was 23% below the calculated sustainable yield across this period, and within the allowable harvest levels in the states where harvesting occurred in publicly managed native forests: New South Wales, Tasmania, Queensland, Victoria and Western Australia. There is no native timber harvesting in the Australian Capital Territory and South Australia, and there is no multiple-use public forest in the Northern Territory.
- The average annual sustainable yield of high-quality sawlogs from multiple-use public native forests declined nationally by 16% since the 2011-12 to 2015-16 period, and by 25% since the 2006-07 to 2010-11 period, due to the transfer of areas of multiple-use public native forest to nature conservation

reserves, increase in the area of harvest restrictions, revised forest growth and yield estimates, and impacts of intense broad-scale bushfires.

Sustainable yield and actual harvest levels from public native forests

The concept of a sustainable level of forest production is that long-term environmental values and the productive capacity of forests are not compromised while providing for society's immediate needs. This applies to both wood and non-wood products.

A sustainable timber yield is calculated as the volume of wood (usually higher-grade sawlogs) that can be removed each year from an area of forest while ensuring maintenance of the functioning of the native forest system as a whole and the supply of the same range of wood products in similar proportions in perpetuity. States in which native forest harvesting on public land occurs have formal processes, backed by regulatory frameworks (such as legislation, management plans, codes of practice and policy), that inform calculation of sustainable sawlog yields for publicly managed native forests (primarily multiple-use public forests).

State agencies in New South Wales, Queensland, Tasmania, Victoria and Western Australia that manage multiple-use public native forests for wood production have been forecasting sustainable yields for many decades, with national reporting of sustainable yield commencing in *Australia's State of the Forest Report 1998*. The sustainable yield of wood products from native forest is usually calculated based on the production of high-quality products, with the quantity of wood harvested constrained so that future harvesting can occur on a non-declining yield basis. The systems used by state agencies to calculate future wood supply are periodically independently reviewed to support the validity of estimates (Brack and Vanclay 2011; Brack 2017).

The harvesting of wood products from native forests is not permitted in the Australian Capital Territory and South Australia. The Northern Territory has no multiple-use public forests. Data presented in this indicator are current to 2020-2021 and do not take into account the subsequent announcements to end some native wood harvesting in Victoria and Western Australia.

The quality and availability of log types from native forests vary depending on the forest type and species mix, and previous disturbance factors such as fire and harvesting.

High-quality hardwood sawlogs are graded to utilisation standards developed and used by state agencies, and are typically used for flooring, decking, cladding, panelling, furniture making and appearance grade structural timber.

Other high-quality hardwood log products include poles, piles, girders and other solid logs.

Native softwood sawlogs are cypress (*Callitris spp.*) pine sawlogs and are classed as high-quality or low-quality in New South Wales, and sawlog-grade in Queensland. Cypress pine sawlogs are typically used for flooring, house framing, cladding and joinery.

Low-quality sawlogs, pulplogs and other wood products are also harvested from native forest, usually as a residual product arising from the harvest of high-quality logs. Sustainable yields are generally not determined for these other products.

Miscellaneous wood products such as firewood, fuelwood, sleeper logs and fencing materials are also produced from Australia's native forests.

Sustainable sawlog harvest volumes are calculated using data on forest type and age-class, standing wood volumes, terrain, accessibility, tree growth and yield, and [net harvestable area](#). Calculations account for restrictions on harvesting imposed by codes of practice and other regulation, and risks associated with fire, disease, storm damage and aspects of climate change.

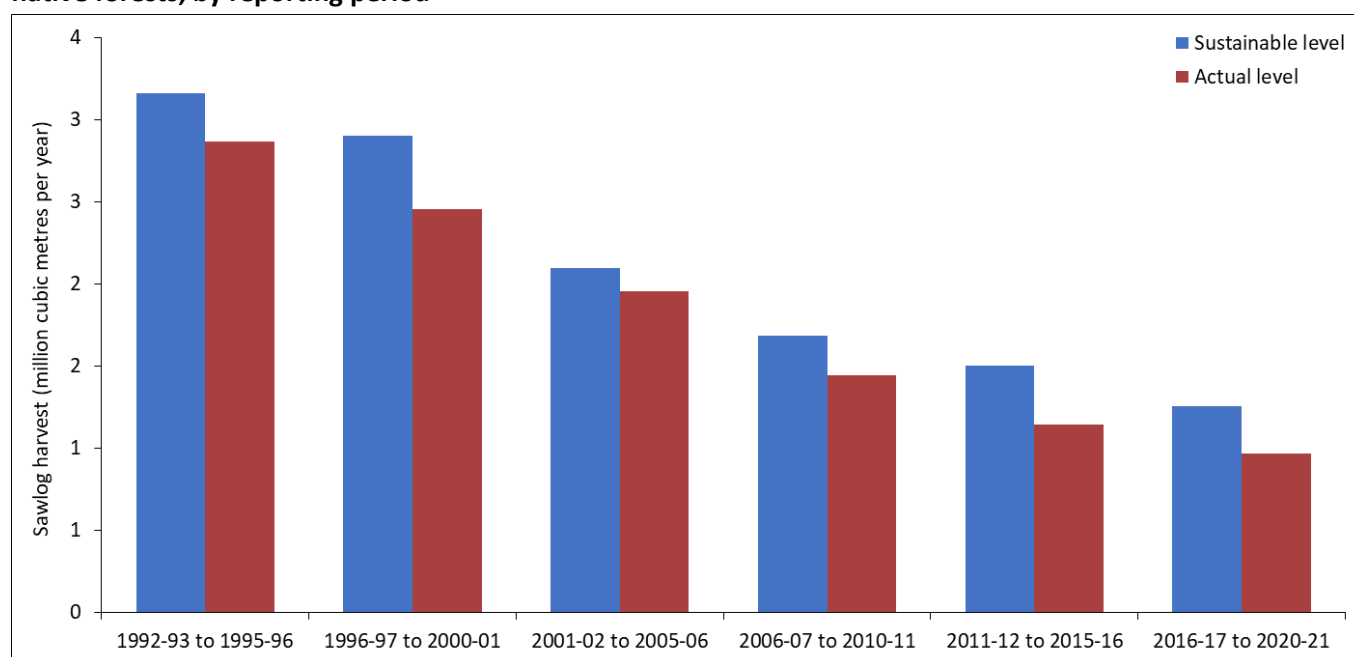
Sustainable harvest volumes will vary over time due to changing forest management strategies, changes to the net harvestable area and the availability of improved resource data. Thus, sustained yield calculations are reviewed periodically by forest scientists. Annual harvesting levels may fluctuate around sustainable volume, with overcuts in some years balanced by undercuts in others, to average a net harvest volume that is less than the sustainable yield level.

Due to the transfer of substantial areas of multiple-use public forest to nature conservation reserves over the last 30 years (Davey 2018, Jacobsen et al. 2020), several states have implemented transitional long-term sustainable wood supply strategies aimed at limiting disruption to the forest industry. These strategies included supplementation of public native forest wood with high-quality wood resources from public plantations, and from the purchase of private forests or logs from private forests. The harvest from public native forests under these long-term supply strategies is considered sustainable because they are designed to maintain the productive capacity of native forests to produce wood in perpetuity on a non-declining yield basis after a specified transition period.

Public native forests – National perspective

An annual average of 0.97 million cubic metres of high-quality sawlogs were harvested nationally from publicly managed native forests during the period 2016-17 to 2020-21 (Figure 2.1c.i-1). This continued the progressive decline from 1.96 million cubic metres in the 2001-02 to 2005-06 period, 1.44 million cubic metres in the 2006-07 to 2010-11 period, and 1.14 million cubic metres in the 2011-12 to 2015-16 period. The national level of actual harvest volume for 2016-17 to 2020-21 was 23% below the calculated sustainable yield. The decrease in actual annual harvest volumes over the six periods is consistent with the decrease in sustainable yields (Figure 2.1c.i-1).

Figure 2.1c.i-1: National average annual sustainable yield and actual harvest of sawlogs from publicly managed native forests, by reporting period



Sawlog includes only high-quality and sliced veneer hardwood and native cypress pine logs.

In all states other than Queensland, yield data apply only to multiple-use public native forests.

The most recent period includes Queensland's allowable cut estimates as the 'Sustainable level', while the 'Actual level' reports logs harvested from Queensland's 'Defined Forest Area' that includes harvests from leasehold land and freehold land where trees are owned by the State through a forest consent ('profit a prendre') agreement.

Data for the period 1992-93 to 1995-96 includes an updated adjustment applied to Victorian data as a D+ sawlog equivalent. Data for Victoria in all reporting periods are D+ sawlog equivalent.

Source: ABARES; state agencies.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.i-1.](#)

For the period 2016-17 to 2020-21, the national average annual sustainable yield from publicly managed native forests declined by 60% from that in the 1992-93 to 1995-96 reporting period. Declines ranged from 41% to 71% across the five states where harvesting occurred in publicly managed native forest (Table 2.1c.i-1). These declines have been due to:

- the transfer of multiple-use public native forests into nature conservation reserves, which reduced the area of native forest available for wood harvesting (see Davidson et al. 2008, Jacobsen et al. 2020)
- increased restrictions on wood harvesting in codes of practice and other regulatory instruments
- revised estimates of growth and yield due to improved resource information and incorporation of projected climatic effects on future forest growth
- the impacts of intense broadscale bushfires (FCNSW 2020; DJPR 2021).

Table 2.1c.i-1: Proportional change in average annual sustainable yields from multiple-use public native forests, by state

Jurisdiction	Change in sustainable yields from multiple-use public native forests from the 1992-93 to 1995-96 period (%)				
	1996-97	2001-02	2006-07	2011-12	2016-17
	to 2000-01	to 2005-06	to 2010-11	to 2015-16	to 2020-21
NSW	-16	-37	-42	-45	-48
Qld ^a	-11	-14	-37	-45	-41
Tas.	20	17	7	-30	-54
Vic.	-3	-33	-48	-52	-71
WA	-17	-60	-76	-73	-71
Australia	-8	-34	-47	-53	-60

^a Following Queensland Government policy decisions that commenced in 1999, harvesting of state-owned timber resources changed from a sustainable yield volume basis, to an allowable cut from Queensland's area available for wood production.

Product groups and standards used in determining sustainable yield are consistent across all periods in all states.

Source: State data.

[Click here for a Microsoft Excel workbook of the data for Table 2.1c.i-1.](#)

Across all states and all reporting periods, the average volumes harvested from publicly managed native forests were below the sustainable yield or allowable cut across all states and all periods, except for New South Wales in 1992-93 to 1995-96 and 2001-02 to 2005-06, and Queensland in 2006-07 to 2010-11 (Figures 2.1c.i-2 to 2.1c.i-6). 'Allowable cut' can be defined as the average quantity of wood, usually prescribed in a legislative instrument or an approved management plan, permitted to be harvested from a forest management planning unit or region, annually or periodically, under management for sustained yield. The specified allowable cut may be at, above, or below calculated sustainable yield levels depending on management objectives.

Public native forests – New South Wales

The actual average annual volume of high-quality sawlogs harvested in the period 2016-17 to 2020-21 was 269 thousand cubic metres, which was 37% below the calculated sustainable yield for the same period (Figure 2.1c.i-2). The average annual estimated sustainable yields have steadily declined since 1992-93.

The actual average annual volume harvested was slightly higher than the sustainable yield in two reporting periods (1992-93 to 1995-96 and 2001-02 to 2005-06), but was within allowable limits (Figure 2.1c.i-2). The regulations applicable to wood harvesting at the time permitted the forest management agency in New South Wales to harvest volumes above the sustainable yield in a particular year, provided this was balanced with undercuts in subsequent years. The net result was that volumes harvested were within the sustainable yield across a longer period.

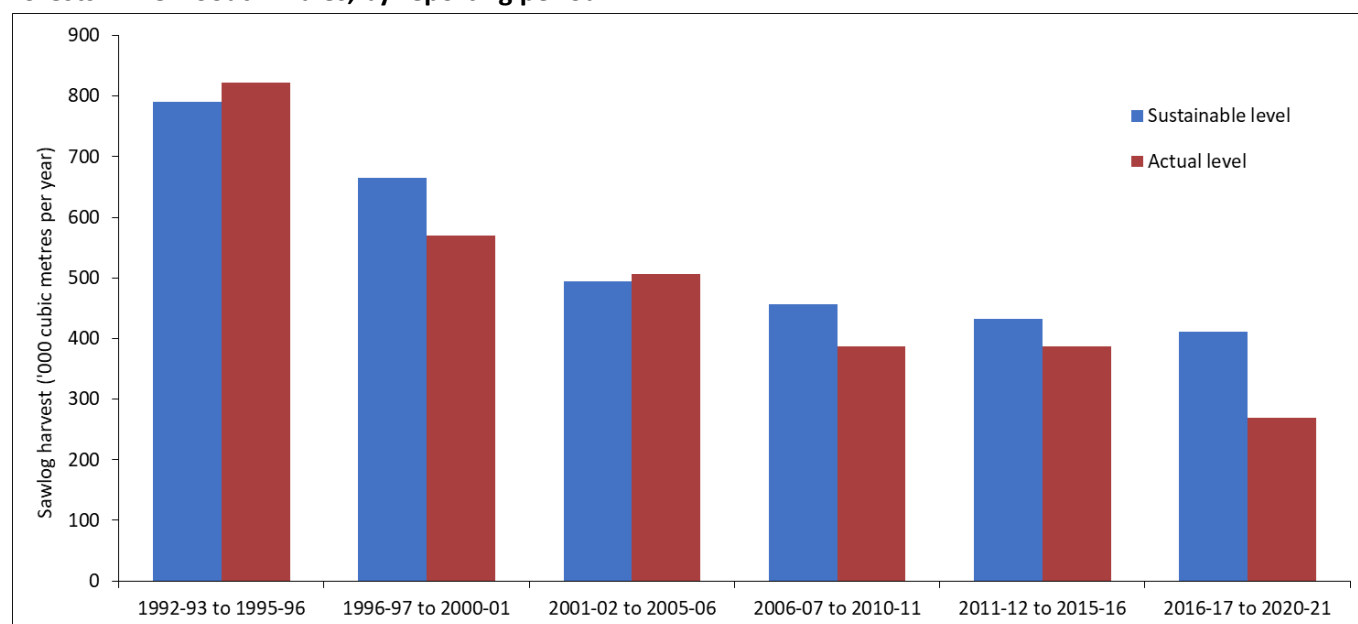
The 2019-20 bushfires had a significant impact on the high-quality sawlog volumes harvested from New South Wales multiple-use public native forest. The high-quality sawlog yields for 2019-20 and 2020-21 were 226 thousand cubic metres and 138 thousand cubic metres, respectively. This compares with an average annual harvest of 328 thousand cubic metres for the years between 2016-17 to 2018-19. The post-bushfire reduction in harvest volumes was due to a range of direct and indirect factors including:

- interruption of harvesting operations due to approaching fire-fronts

- diversion of harvesting machinery and personnel to fire-fighting efforts
- disruption to harvesting schedules
- augmentation of existing protection measures (*Coastal Integrated Forestry Operations Approval*) with additional environmental safeguards in recognition of threatened species concerns
- increased safety risks
- substitution of multiple-use public native forest sawlog supply with supply from public hardwood plantations to help facilitate recovery in fire-impacted native forests.

Sustainable yields and log supply were calculated for multiple-use public native forests in all regions of New South Wales for a 100-year period, 2010 to 2110 (Forests NSW 2010). An updated wood supply forecast was undertaken for coastal regions in 2018 (NSW DPI 2018). This update estimated an average annual yield of 412 thousand cubic metres of high-quality sawlog from multiple-use public native forests in coastal regions over the modelled 100-year period. Supplementation from public-owned hardwood plantations, predominately in the state's north-east, contributes to the wood supply.

Figure 2.1c.i-2: Average annual sustainable yield and actual harvest of sawlogs from multiple-use public native forests in New South Wales, by reporting period



Sustainable yields are for harvests from multiple-use public native forests, including supplementation from hardwood plantations on multiple-use public forest. Actual harvest levels do not include high-quality logs harvested from hardwood public plantations (see Figure 2.1c.i-7).

Component values for hardwood, brushwood (rainforest species), native cypress pine and veneer logs from multiple-use public native forests are in 'quota sawlog equivalents' up to 1998-99, and values for hardwood high-quality large and small sawlog, veneer sawlog and native cypress pine from multiple-use public native forests are in 'high-quality equivalents' from 1999-2000. Poles, piles and girders from multiple-use public native forests are included in high-quality equivalents for calculating sustainable yield and reporting actual harvested level from 2006-07.

Source: ABARES; Forests NSW, Forestry Corporation NSW.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.i-2.](#)

Public native forests – Queensland

For the period 2016-17 to 2020-21, the actual average annual sawlog volume harvested in Queensland was 214 thousand cubic metres, which was 2% below the allowable cut of 218 thousand cubic metres for the same period (Figure 2.1c.i-3). Sawlog harvest volumes have steadily declined over all reporting periods (except the most recent period, 2016-17 to 2020-21), and have remained close to the sustainable yield (to 1999) and allowable cut levels (from 1999). The allowable cut and harvested volume of sawlogs in Queensland increased slightly in the 2016-17 to 2020-21 reporting period due to the under-cut in the preceding period.

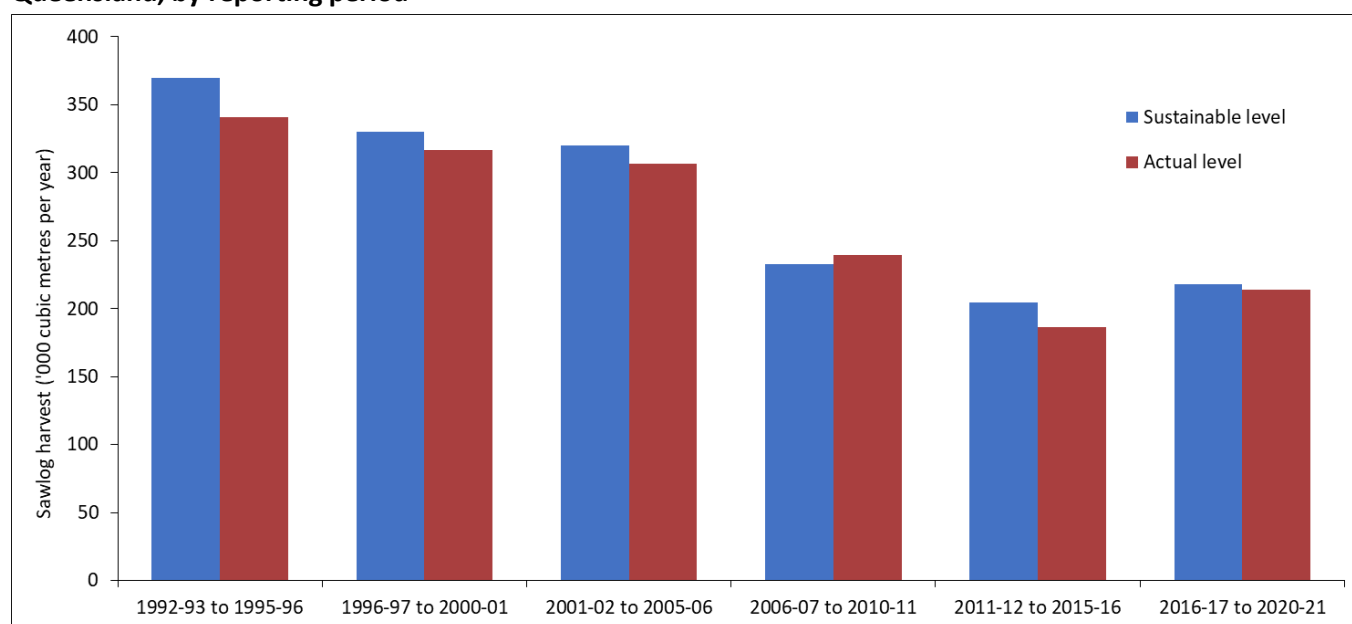
In Queensland, the area available for wood production by the state (the Crown) comprises all State Forest and Timber Reserves, large areas of other Crown land (including leasehold land, Forest Entitlement Areas and unallocated state-owned land) and some freehold land over which the state retains ownership of forest products.

In 1999, the Queensland Government signed the South East Queensland Forests Agreement (SEQFA). This agreement, along with arrangements in other regions, aimed to eventually end wood production in public native forests in the south-east of the state, Queensland's major wood-producing area. The intention was that these forests would subsequently be gazetted as protected area tenures.

At the commencement of the SEQFA, the Queensland Government also made a series of decisions on future harvesting levels and on reservation for nature conservation in other parts of the state. These decisions resulted in the exclusion of harvesting from additional areas of public native forest and are reflected in the sustainable yield volume (to 1999) and the allowable cut limit (from 1999) (Figure 2.1c.i-3). The systems used to forecast sustainable yield before 1999 are described in a 1998 report (Queensland Government 1998).

State-owned native timber production is scheduled to end in the South East Queensland Regional Plan area on 31 December 2024 (Queensland Government 2019). This area includes Brisbane, Moreton Bay, Lockyer Valley, Scenic Rim, Gold Coast, Redlands, Sunshine Coast and Noosa. The ending of state-owned native timber harvesting in South East Queensland impacts future national sustainable high-quality sawlog yields, as described in [Indicator 2.1c.iii](#). State-owned native timber harvesting will continue in the Eastern Hardwoods region (including areas around Wide Bay and most of South Burnett) until 31 December 2026 while resource assessment work is undertaken to assist with decisions around future wood harvesting in that region. Long term supply commitments currently exist for permit holders in the Western Hardwoods region until 2034, and sales permits are in place for native cypress pine until 2037 (Queensland Government 2019).

Figure 2.1c.i-3: Average annual allowable cut and actual harvest of sawlogs from state-owned native forests in Queensland, by reporting period



Sustainable yield values apply to 1999. After that date, values are 'Allowable cut'.

Data are for hardwood and native cypress pine sawlogs; other log categories (e.g. poles, fencing, sleeper and mining timber) are excluded.

Sources: ABARES; Queensland Department of Agriculture and Fisheries.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.i-3.](#)

Public native forests – Tasmania

For the period 2016-17 to 2020-21, the minimum annual high-quality sawlog volume (the sustainable yield) for Tasmania was set at 137 thousand cubic metres. The actual average annual volume of high-quality sawlogs harvested from multiple-use public native forest for 2016-17 to 2020-21 was 119 thousand cubic metres, which was 13% below the calculated sustainable yield for the same period (Figure 2.1c.i-4).

The average annual sustainable yield of high-quality sawlogs from multiple-use public native forests in Tasmania has reduced by 61% since 2001-02 as a result of the reduction in net harvestable area between 2001-02 and 2020-21 (Figure 2.1c.i-4).

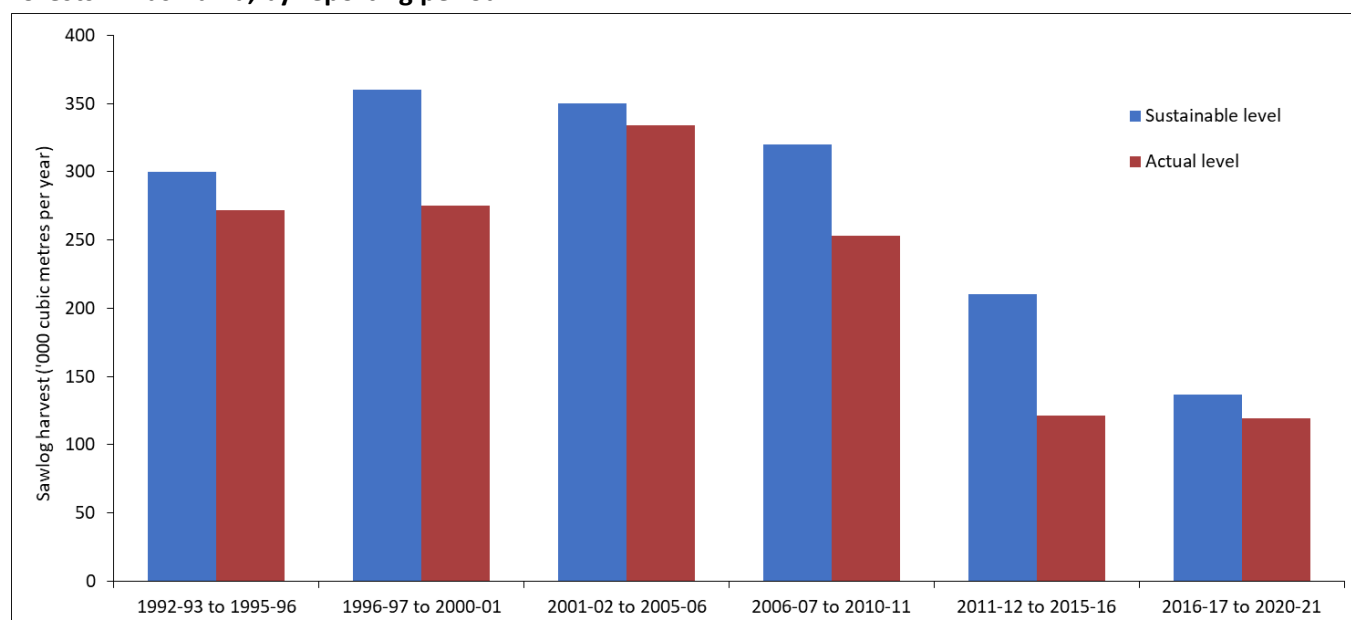
The minimum annual high-quality sawlog volume was set from the 2017 review of sustainable high-quality sawlog supply levels from Permanent Timber Production Zone (PTPZ) land undertaken by Sustainable Timber Tasmania. Reviews of sustainable high-quality sawlog supply levels are required by the Tasmanian Regional Forest Agreement. These wood supply forecasts inform a legislated minimum annual volume to be made available to industry, as detailed in Tasmania's *Forest Management Act 2013*. The 2017 sustainable yield review confirmed that this legislated high-quality sawlog volume was available on an ongoing basis from a mix of multiple-use public native forest and public hardwood plantations (STT 2017). Supplementation with high-quality sawlogs from public-owned hardwood plantations has formed part of the sustainable wood supply strategy since 1997.

After the signing of the Tasmanian Regional Forest Agreement in 1997, a non-declining yield for native forest sawlogs of 225 thousand cubic metres was forecast to be maintained up to and beyond 2020 (Forestry Tasmania 2002). Following the 2005 Tasmanian Community Forest Agreement, this sustainable yield was reduced to 145

thousand cubic metres after 2023 (Forestry Tasmania 2007). Subsequently, following the 2013 Tasmanian Forests Intergovernmental Agreement process, a further reduction in [net harvestable area \(Indicator 2.1a\)](#) led to the legislated yield being reduced to 137 thousand cubic metres.

The outcomes of the 2013 Tasmanian Forests Intergovernmental Agreement process were incorporated into the Sustainable Timber Tasmania 2017 and 2022 resource reviews (including the proposed Tasmanian Wilderness World Heritage Area extension). The 2022 resource review predicted the level of high-quality sawlog supply from multiple-use public native forest to be 130 thousand cubic metres until 2027, reducing to 58 thousand cubic metres to 2045, and then increasing slightly to about 68 thousand cubic metres until 2072 (STT 2022). Significant quantities of high-quality sawlogs from public hardwood plantations were included in the forecast to compensate for the decrease in native forest sawlogs after 2027. An area of 356 thousand hectares of native forest allocated as Future Potential Production Forest (FPPF) land under the *Forestry (Rebuilding the Forest Industry) Act 2014* was not included in the 2017 supply estimates.

Figure 2.1c.i-4: Average annual sustainable yield and actual harvest of sawlogs from multiple-use public native forests in Tasmania, by reporting period



Sustainable yield and actual harvest levels are of category 1 (first-grade mature) and category 3 (first-grade regrowth) sawlogs and veneer logs. Category 1 sawlog minimum dimensions are 360cm in length and 40cm under bark diameter. Category 3 minimum dimensions are 360cm in length and 30cm under bark diameter. Actual harvest levels are from multiple-use public native forest only. Any supplementation from hardwood plantation or other Crown forests is not included in the actual harvest levels.

Source: ABARES; FPA (2022); Forestry Tasmania and Sustainable Timber Tasmania annual and sustainability reports.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.i-4.](#)

Public native forests – Victoria

The actual average annual high-quality sawlog harvest was 241 thousand cubic metres from multiple-use public native forests in Victoria for the period 2016-17 to 2020-21. This was 11% below the calculated sustainable yield for the same period (Figure 2.1c.i-5).

Since the period 1992-93 to 1995-96, sustainable yields and actual harvest volumes in Victoria have both declined, with harvest volumes remaining below the calculated sustainable yields. The sustainable yield has

reduced from 945 thousand cubic metres to 271 thousand cubic metres since 1992-93 (a 71% reduction). Three intense, broad-scale bushfire events in eastern Victoria (2002-03, 2006-07, 2009) significantly contributed to decreases in sustainable yield during the corresponding reporting periods.

Periodic wood supply forecasts have been carried out for eastern Victoria to account for natural disturbance events such as fire, and to incorporate updated resource information. Resource outlooks have been published by VicForests (VicForests 2011; 2013; 2014; 2017). Forest Solutions (2013) reviewed the expected wood yields from multiple-use public native forests in Western Victoria.

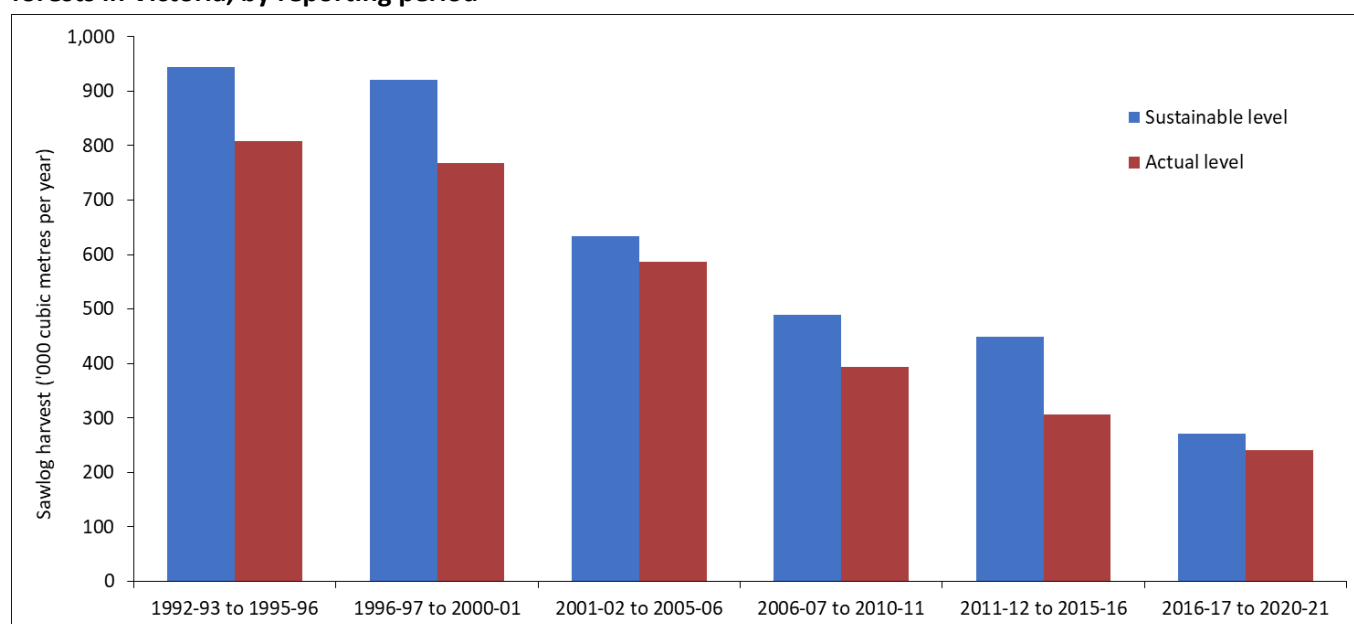
The calculated sustainable yield reported for the 2016-17 to 2020-21 period reduced by 40% from the preceding period due to:

- restrictions on harvesting in mountain ash (*Eucalyptus regnans*) forests imposed following concerns for Leadbeater's possum (*Gymnobelideus leadbeateri*) and other threatened species
- exclusion of all pre-1900 alpine ash and mountain ash 'old growth' stands
- exclusion of approximately 11 thousand hectares of net harvestable area assumed to be unavailable due to community and/or market concerns
- general updates to the forest zoning base by the regulator (VicForests 2017).

Following the 2019-20 'Black Summer' bushfires, the Victorian Government carried out a Harvest Level Review, as required under the Victorian Regional Forest Agreements (RFAs), to assess the impacts of the bushfires on harvest volumes in eastern Victoria (DJPR 2021). In the Victorian RFAs, 'harvest level' is defined as the volume of timber resources that can be harvested from native forests in RFA regions in any financial year, consistent with Ecologically Sustainable Forest Management principles, until the native forest harvesting end date. The review estimated reductions in the total operable inventory of 9% for D+ sawlog volumes in ash forest and 13% in D+ sawlog volumes from mixed-species forest (D+ sawlogs are high-quality sawlog grades A, B, C and D). The harvest level review concluded that post-fire standing high-quality sawlog volumes remained adequate to maintain Victoria's supply commitments until the 2030 native forest harvesting end date.

In 2019, the Victorian Government announced that wood harvesting on multiple-use public native forest would be phased out by 2030. In 2023, the Victorian Government announced the end date would be brought forward to 01 January 2024. The ending of wood harvesting on multiple-use public native forest in Victoria significantly impacts future national sustainable high-quality sawlog yields, as described in [Indicator 2.1c.iii](#).

Figure 2.1c.i-5: Average annual sustainable yield and actual harvest of sawlogs from multiple-use public native forests in Victoria, by reporting period



Actual harvest levels are from multiple-use public native forest only. Category D+ or equivalent sawlogs are used for all periods. 1992-93 to 1995-96 data includes an adjustment applied to Victorian data as a D+ sawlog equivalent (see *Australia's State of the Forest Report 2013*). D+ sawlogs are appearance and structural sawlogs of grades A, B, C and D (collectively referred to as D+ sawlogs). D+ sawlogs are any sawlogs with a minimum small end diameter under bark of 25cm.

Source: ABARES; VicForests.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.i-5.](#)

Public native forests – Western Australia

For the period 2016-17 to 2020-21, the calculated sustainable yield of high-quality sawlogs in Western Australia was 219 thousand cubic metres, while the actual average annual volume harvested was 124 thousand cubic metres, which was 57% of the calculated sustainable yield for the same period (Figure 2.1c.i-6).

Independent reviews of sustainable yield from multiple-use public native forests have supported the development of two 10-year forest management plans for south-west Western Australia (CCWA 2004; CCWA 2013). The forest management plans require forecasts of the sustainable yield for high-quality jarrah (*Eucalyptus marginata*) and karri (*E. diversicolor*) sawlogs and incorporate the allowable harvest for these species. Under each Forest Management Plan the annual harvest can exceed the average annual allowable cut in some years but must not, over the ten-year period of the plan, exceed the cumulative total allowable cut. Key performance indicators associated with each plan set the maximum amount by which the annual cut can exceed the average allowable cut: 10% for the *Forest Management Plan 2004-2013*; a progressive scaling down was introduced for the *Forest Management Plan 2014-2023* of 10% at year 3, 5% at year 6, and 3% at year 9.

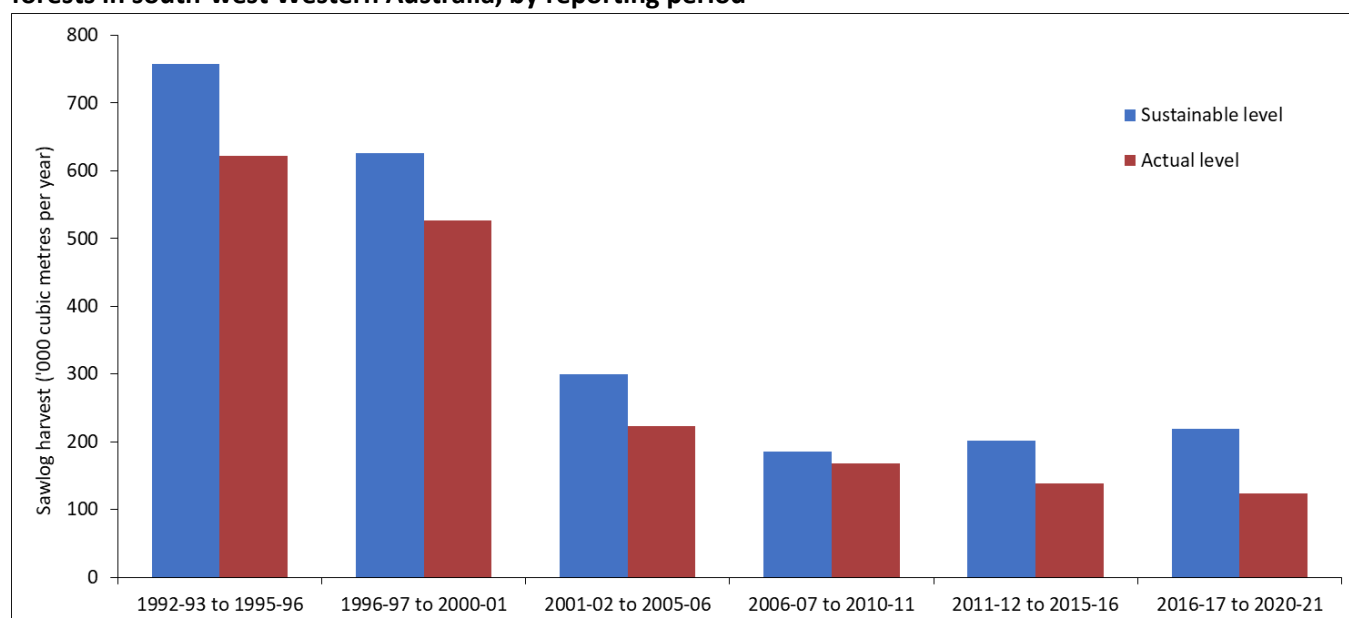
In addition, the *Forest Management Plan 2014-2023* specified an average annual allowable cut of sawlogs and other bole volume for jarrah, karri and marri (*Corymbia calophylla*) (Table 2.1c.i-2), and an upper limit for these should market opportunities arise. Setting the allowable cut below the sustainable yield allows for impacts of natural events such as bushfire, drought or disease. However, the allowable cut assumed current industry technologies, practices and markets for lower-grade products, whereas the upper limit provided for the potential expansion of silvicultural thinning programs in young regrowth and the development of markets for lower-grade products. The setting of an allowable cut below the sustainable yield allows for impacts of natural events such as

bushfire, drought or disease. The average annual allowable cut of 191 thousand cubic metres of jarrah and karri sawlogs is 13% below the combined upper limit forecast sustainable sawlog yield of 219 thousand cubic metres (Table 2.1c.i-2).

The calculated sustainable yield and actual harvest yield from multiple-use public native forests in Western Australia declined significantly following the implementation of the Western Australian Regional Forest Agreement and again after the adoption of the *Forest Management Plan 2004-2013* (CCWA 2004). Since 2006-07, the calculated sustainable yield has increased by 18%, while actual sawlog harvest volumes have decreased by 27%.

In 2021, the Western Australian Government announced that large-scale commercial wood harvesting would end on multiple-use public native forest from 01 January 2024. The ending of commercial wood harvesting on multiple-use public native forest in Western Australia significantly impacts future national sustainable high-quality sawlog yields, as shown in [Indicator 2.1c.iii](#).

Figure 2.1c.i-6: Average annual sustainable yield and actual harvest of sawlogs from multiple-use public native forests in south-west Western Australia, by reporting period



Sustainable yield and actual harvest levels are of first-grade and second-grade karri and jarrah sawlogs (see Table 2.1c.i-2 for definitions) from forests regulated under the relevant Forest Management Plan (CALM 1994, CCWA 2004, CCWA 2013).

Source: ABARES; CCWA (2012); DEC (2012); Department of Parks and Wildlife, and Department of Biodiversity, Conservation and Attractions.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.i-6.](#)

Table 2.1c.i-2: Western Australian average annual allowable cut derived from the sustainable yield for sawlogs for Forest Management Plans 2004-13 and 2014-23

Species/log grade	Cubic metres per year		
	WA FMP 2004-2013	WA FMP 2014-2023	
		Average annual allowable limit	Upper limit ^a
Sustained yield of sawlog			
Jarrah first-grade and second-grade sawlog ^{b,d}	131,000	132,000	160,000
Karri first-grade and second-grade sawlog ^{c,d}	54,000	59,000	59,000
Total sawlog ^d	185,000	191,000	219,000
Other (non-sawlog) volumes arising ^e			
Jarrah other bole volume ^f	534,000	292,000	521,000
Karri other bole volume ^f	160,000	164,000	164,000
Marri other bole logs ^f	196,000	140,000	254,000

FMP, Forest Management Plan.

^a Upper limit is only accessible through the development of new markets for lower-grade wood products and must be approved by the Western Australian Minister for Environment (CCWA 2013).

^b First-grade and second-grade jarrah sawlogs are logs cut from the bole of a jarrah tree that are a minimum of 2.1 metres in length, have a minimum under-bark diameter of 200 millimetres (first-grade) or 250 millimetres (second-grade), and have a minimum of 50% (first grade) or 30% (second grade) millable timber on the worst end-face.

^c First-grade and second-grade karri sawlogs are logs cut from the bole of a karri tree that are a minimum of 2.4 metres in length, have a minimum under-bark diameter of 300 millimetres, and have a minimum of 50% (first grade) or 30% (second grade) millable timber on the worst end-face.

^d Applicable to WA FMP 2014-2023, 'Annual allowable cut' category. Annual sustainable yield of 146 thousand cubic metres for jarrah and 70 thousand cubic metres for karri (combined total 216 thousand cubic metres) based on standard silviculture, sawlog utilisation and current markets were computed as the yields able to continue indefinitely. The average annual allowable cut is the sustained yield adjusted applying a 'safety margin' for first-grade and second-grade sawlog volume of 10% for jarrah and 15% for karri as recommended in Ferguson et al. (2013).

^e Bole log is a log extracted from the tree trunk between the ground and the crown break. Bole volume is the volume of a bole log. Other bole volume is the volume of bole log products not meeting first-grade or second-grade sawlog standards (CCWA 2013).

^f Applicable to WA FMP 2014-2023, 'Annual allowable cut' and 'Upper limit' categories. The supply of lower-grade wood products arising as a consequence of harvesting sawlog.

Source: CCWA (2004, 2013).

[Click here for a Microsoft Excel workbook of the data for Table 2.1c.i-2.](#)

Supplementation from hardwood plantations

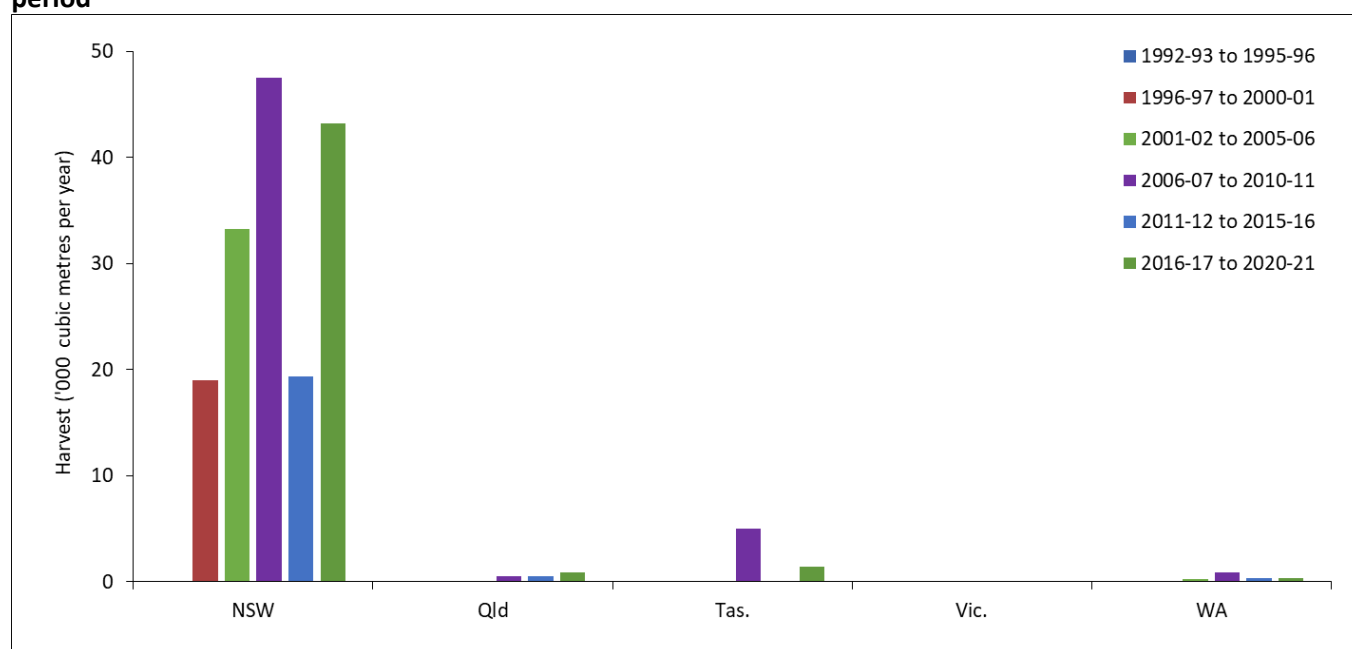
Sustainable yield estimates of high-quality sawlogs from multiple-use public native forests in New South Wales and Tasmania include supplementation with sawlogs of similar quality from public hardwood plantations. The supplementary component of sustainable yield estimates is based on projected yields of high-quality sawlogs from these plantations.

To date the annual plantation hardwood high-quality sawlog harvests have been relatively small for all states except New South Wales (Figure 2.1c.i-7). However, the supplementary quantities of high-quality sawlogs are forecast to increase significantly in New South Wales after 2024 and in Tasmania after 2026 (FCNSW 2020; STT 2022). In New South Wales, high-quality sawlogs (primarily *Eucalyptus pilularis*, *E. grandis* and *E. dunni*) have been harvested from public hardwood plantations in the north-eastern part of the state since 1997-98.

Following the implementation of the South East Queensland Forests Agreement (SEQFA) in 1999, the Queensland Government commenced a hardwood plantation planting program to provide an alternative hardwood sawlog resource to industry. However, the program was eventually abandoned due to a combination of issues (such as marginal site quality, climate variability and pest and disease) that led to generally poor plantation performance.

The individual years 2019-20 and 2020-21 saw large increases in volumes of high-quality sawlog harvested from New South Wales public hardwood plantations (73 thousand cubic metres and 79 thousand cubic metres, respectively), compared to the average annual volumes harvested during the 2011-12 to 2015-16 period (19 thousand cubic metres). This compensated for some of the shortfall of high-quality sawlog volumes harvested from New South Wales multiple-use public native forest in the years after the 2019-20 bushfires.

Figure 2.1c.i-7: Average annual harvest of high-quality hardwood sawlogs from public plantations, by reporting period



Plantation high-quality sawlogs are assessed against jurisdictional quality and size specifications for similar products from native forest. These specifications are similar between states.

No high-quality sawlogs were produced from plantations in the first period.

Victoria has reported no production of high-quality sawlogs from public plantations in all periods.

Source: ABARES; state data.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.i-7.](#)

Special-species timbers and sandalwood

The average annual volumes of special-species timbers harvested from public native forests have varied widely between years and between states since 1992-93 (Figure 2.1c.i-8). Tasmania has been the main source of special-species timbers nationally since the *Australia's State of the Forests Report* series began.

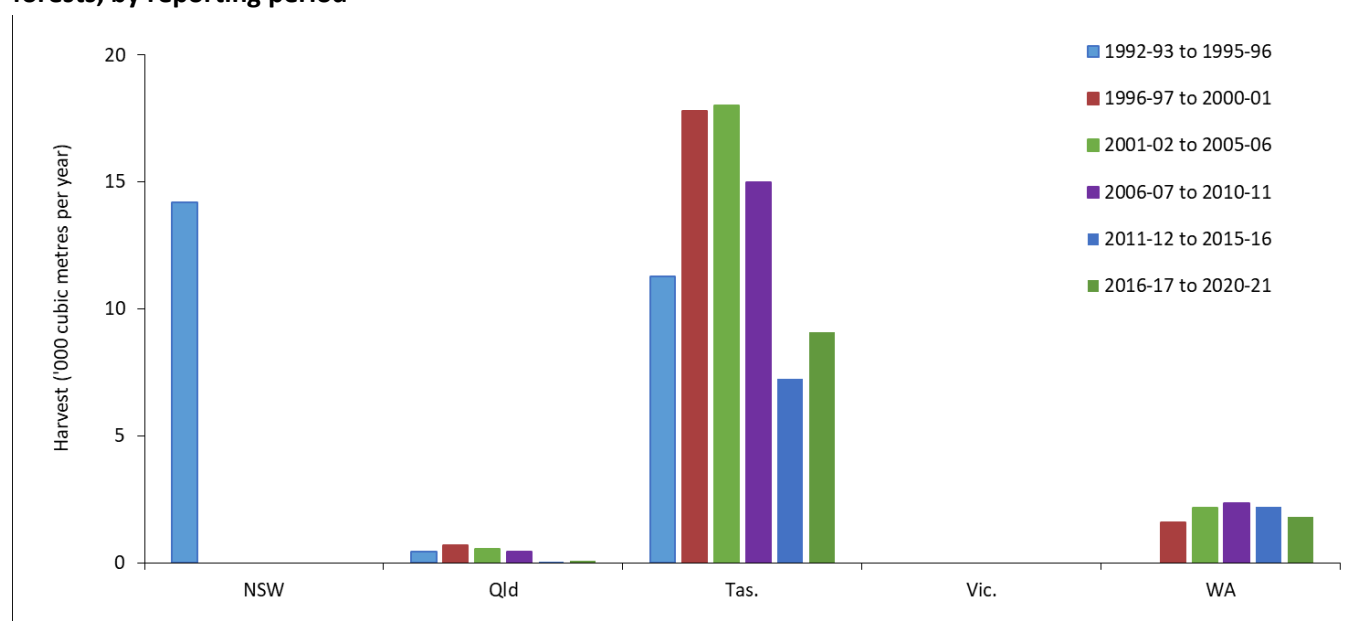
Native sandalwood is included as a special-species timber in Queensland and Western Australia. Harvesting rainforest timbers (typically higher-value species used in cabinet making and other speciality products) ceased in New South Wales after 1992-93. Special-species in Tasmania are defined in legislation as:

- blackwood (*Acacia melanoxylon*)
- silver wattle (*A. dealbata*)

- myrtle (*Nothofagus cunninghamii*)
- sassafras (*Atherosperma moschatum*)
- celery-top pine (*Phyllocladus aspleniifolius*)
- huon pine (*Lagarostrobos franklinii*).

Tasmanian special-species timbers make an important contribution to the Tasmanian economy (DSG 2017). A strategy to ensure the continued long-term production of Tasmanian special-species timbers from public native forests was implemented in 2010 (Forestry Tasmania 2010). This was based on sustainable yield estimates for each of the key special-species (Table 2.1c.i-3). After the reduction in the public native forest production estate resulting from the 2013 Tasmanian Forest Agreement, the sustainable supply of Tasmanian special-species timbers was reviewed and supply levels recalculated for Permanent Timber Production Zone (PTPZ) land (Forestry Tasmania 2015). The updated supply estimates are provided in Table 2.1c.i-3. Forestry Tasmania (2017) and the *Tasmanian Special Species Management Plan* (DSG 2017) presented estimates of special-species timber volumes in other land management categories (including Future Potential Production Forest) and tenures, but these are not included in the supply estimates provided in Table 2.1c.i-3.

Figure 2.1c.i-8: Average annual harvest volumes of special-species timbers from multiple-use public native forests, by reporting period



Special-species timbers include cabinet rainforest timbers (New South Wales) until 1992-93, Tasmanian special-species timbers, and sandalwood (Queensland and Western Australia: cubic metre equivalent converted from tonnes). Values for Tasmanian special-species timbers only include millable sawlogs (category 4/utility sawlogs) and exclude non-specification logs and craftwood.

Source: ABARES; state data.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.i-8.](#)

Table 2.1c.i-3: Annual log supply, Tasmanian special-species timbers

Special-species timbers	Annual Supply (cubic metres)		
	2009-2015 ^a	2016-27 ^b	2027 onwards ^c
Blackwood (<i>Acacia melanoxylon</i>)	10,000	4,275	3,095
Silver wattle (<i>A. dealbata</i>)	500	70	0
Myrtle (<i>Nothofagus cunninghamii</i>)	500	270	225
Sassafras (<i>Atherosperma moschatum</i>)	500	90	50
Celery-top pine (<i>Phyllocladus aspleniifolius</i>)	500	130	10
Huon pine (<i>Lagarostrobos franklinii</i>)	500	Not estimated ^d	Not estimated ^d

^a Estimates from Forestry Tasmania (2010).

^b Estimates from Forestry Tasmania (2015), taking into account outcomes associated with the 2013 Tasmanian Forestry Agreement (including the proposed extension to the Tasmanian Wilderness World Heritage Area).

^c Estimates from Forestry Tasmania (2015). Reduction of supply is forecast from 2027 with the expected decrease in mature native forest harvesting and increase in eucalypt plantation harvesting.

^d No Annual supply reported, however there was an estimated 3,545 cubic metres of Huon Pine sawlog remaining in 'accessible' areas.

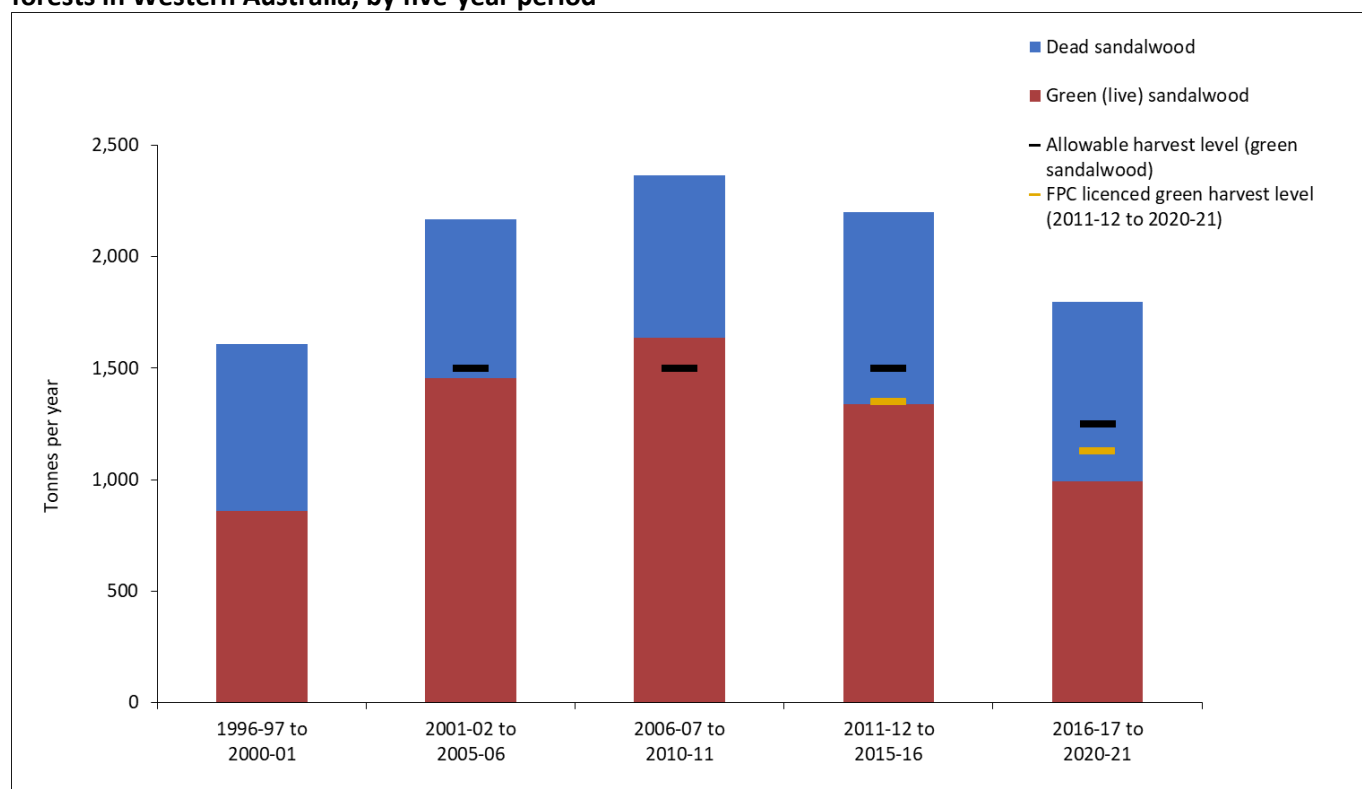
Source: Forestry Tasmania (2010, 2015).

[Click here for a Microsoft Excel workbook of the data for Table 2.1c.i-3.](#)

In Western Australia, harvest of Australian sandalwood (*Santalum spicatum*) comprise high-grade and low-grade green (live) sandalwood, sandalwood root and bark, and dead sandalwood under licence from public and private lands. The total annual allowable harvest level of green sandalwood is set by the *Sandalwood (Limitation of Removal of Sandalwood) Order (No. 2) 2015* (DAFF 2022). During the period 2016-17 to 2020-21, the total allowable harvest level of green sandalwood was up to 1,250 tonnes per annum, of which the Forest Products Commission (FPC) was licenced to remove 1,125 tonnes per annum. This quota applies until 2026, when sandalwood plantations are expected to begin to contribute significantly to the supply of sandalwood (FPC 2016; FPC 2021).

Figure 2.1c.i-9 shows the average annual sandalwood harvest by FPC from Western Australian public native forest by five-year periods. Notably, green (live) sandalwood trees produce more oil than dead trees and consequently have higher commercial value.

Figure 2.1c.i-9: Average annual harvest by Forest Products Commission of sandalwood from public native forests in Western Australia, by five-year period



The 2006-07 to 2010-11 green sandalwood production level included components of 'third-grade' and root products arising from improved utilisation not previously included in production figures.

Source: Western Australian Forest Products Commission annual reports.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.i-9.](#)

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More information

Learn more about [Criterion 2 of Australia's State of the Forests Report](#).

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

Download a [Microsoft Excel workbook of the data presented in Indicator 2.1c.i](#).

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Acknowledgement of Country

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

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Indicator 2.1c: Annual removal of wood products compared to the volume determined to be sustainable for native forests, and future yields for plantations



This indicator measures the harvest levels of wood products in relation to future yields. The capacity to implement strategies to deal with changing demand for forest products based on future yields from both native and plantation forests is an integral part of sustainable forest management.

2.1c.ii Removals by log type (2024)

This part of Indicator 2.1c presents harvested wood volumes for sawlogs, pulplogs and other wood products from native forests and commercial plantations.

The two other parts of Indicator 2.1c are:

2.1c.i Sustainable yield and actual harvest levels

2.1c.iii Forecast national log availability

Definitions

Sustainable yield: The yield of products (such as wood and water) from an area of forest that ensures the functioning of the forest ecosystem as a whole is maintained, and the flow of products can continue indefinitely under a given management strategy and suite of sustainable-use objectives.

Sawlog: A log harvested from a plantation or native forest used to manufacture sawn timber. High-quality sawlogs are sawlogs meeting specified size and quality (grade) specifications (including the amount of permissible defect). Low-quality sawlogs are sawlogs not meeting high-quality sawlog specifications.

Pulplog: A log harvested from a plantation or native forest that does not meet sawlog size or quality specifications and is designated to produce pulpwood.

Key points

- Australia harvested a total of 3.5 million cubic metres of native forest logs, 7.0 million cubic metres of plantation hardwood logs, and 16.7 million cubic metres of plantation softwood logs in 2020-21.
- Plantations contributed 87% of Australia's total sawlog and pulplog harvest in 2020-21.
- Softwood plantations supplied 82% of the total sawlog volume produced in Australia in 2020-21.
- Native forests remain the main source of hardwood sawlogs, producing 72% of the total volume in 2020-21.

National overview of logs harvested from native forests and plantations

A total of 3.5 million cubic metres of native forest logs, 7.0 million cubic metres of plantation hardwood logs and 16.7 million cubic metres of plantation softwood logs were harvested in 2020-21 from both public and private land tenures (Figure 2.1c.ii-1).

Of the total logs harvested in native forest in 2020-21, 48% by volume were sawlogs and 52% were pulplogs. Of the harvested hardwood plantation logs, 9% of the volume was sawlogs and 91% was pulplogs. For plantation softwood logs, 62% of the harvested volume was sawlogs and 38% was pulplogs. A comparatively small volume of other logs (not including firewood or fuelwood) account for the remaining total log harvest from native forests and plantations.

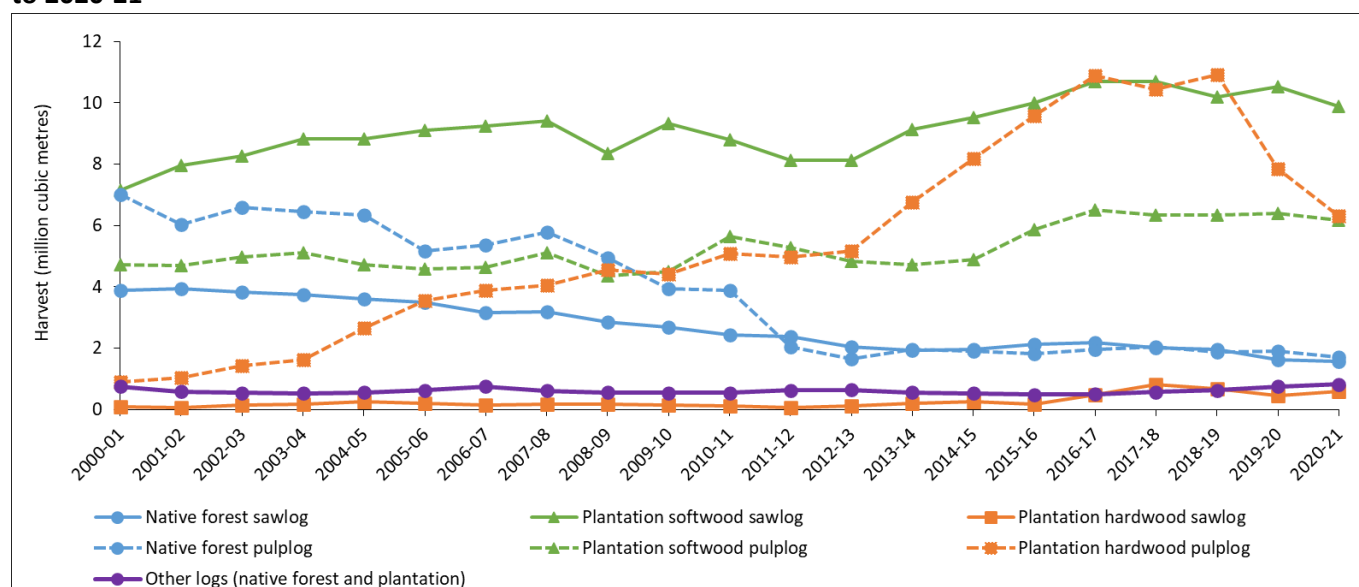
From 2000-01 to 2020-21, the sawlog and pulplog harvest from native forests steadily decreased (by 70%), while the harvest volume from plantations generally increased (by 79%, Figure 2.1c.ii-1). The harvest volume from private native forests followed a declining trend from 2000-01 to 2014-15, rising in 2015-16 and then remaining relatively steady over the 2016-17 to 2020-21 five-year period (Figure 2.1c.ii-2). The contribution of plantations to Australia's total combined sawlog and pulplog harvest volume steadily increased from 54% in 2000-01 to 87% in 2020-21.

Native forests remain the main source of hardwood sawlogs, producing 72% of the total volume in 2020-21, compared to 92% in 2015-16 (Figure 2.1c.ii-1). Although the overall proportion of hardwood sawlogs from plantations increased slightly since 2015-16, it remains low because most existing hardwood plantations are not managed to produce sawlogs, or are not able to produce sawlogs (due to factors such as species suitability and growth rates). Plantation grown hardwoods generally cannot be used to produce the feature-grade sawn timber products attainable from native forest hardwood sawlogs.

Softwood plantations supplied 82% of the total sawlog volume produced in Australia in 2020-21, compared to 64% in 2000-01 (Figure 2.1c.ii-1). This proportional increase was due to the reduction of harvest volumes in native forests over this time and additional softwood plantations reaching maturity.

A sharp reduction in harvested plantation hardwood pulplog harvest volumes was observed between 2018-19 and 2020-21 (42% reduction over that time) (Figure 2.1c.ii-1). As the majority of hardwood plantation pulplogs are exported as woodchips to markets in Asia, harvest levels are sensitive to global demand and competition. From 2018-19, international competition increased, and importers sought lower priced resource from alternative suppliers.

Figure 2.1c.ii-1: Annual harvest of sawlogs and pulplogs from Australia's native forests and plantations, 2000-01 to 2020-21



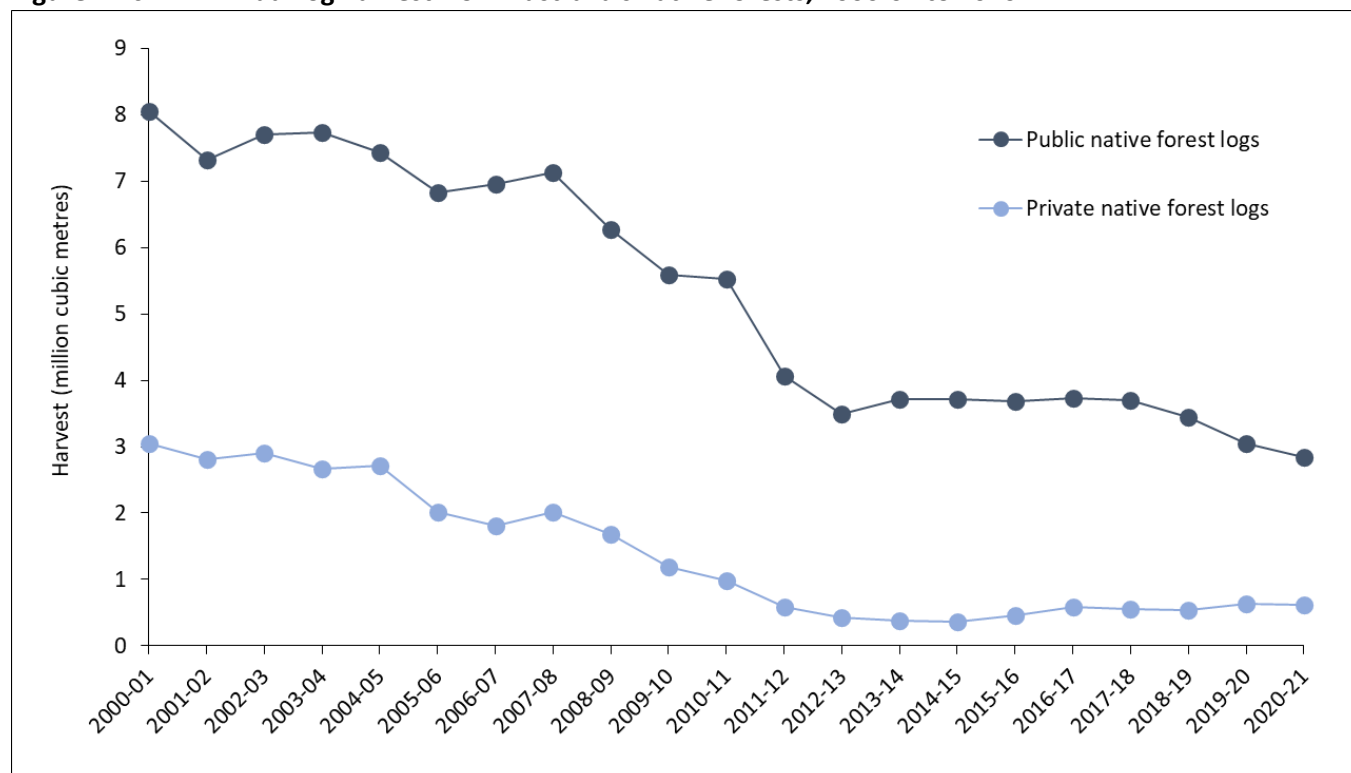
Native forest sawlog includes logs from both public and private tenures, and native cypress pine sawlogs.

'Other logs' does not include firewood or fuelwood.

Source: ABARES.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.ii-1.](#)

Figure 2.1c.ii-2: Annual log harvest from Australia's native forests, 2000-01 to 2020-21



Volumes do not include firewood or fuelwood logs.

Source: ABARES.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.ii-2.](#)

Wood products from native forests

Since the [Australia's State of the Forests Report](#) series began in 1998, the average annual harvest of total wood products from all native forests managed for wood production in Australia fell by 60% from 10.4 million cubic metres in 1996-97 to 4.2 million cubic metres in 2020-21 (Figure 2.1c.ii-3). The largest component of this was the decrease in the national average annual pulplog harvest, from 6.1 million cubic metres to 1.9 million cubic metres for the same period (a 69% decrease) (Figure 2.1c.ii-4). The national average annual sawlog harvest (including peeler logs) fell from 4.1 million cubic metres to 1.9 million cubic metres for the same period (a 54% decrease) (Figure 2.1c.ii-5). Note the composition of products in each category differ to those presented in sections of [Indicator 2.1c.i](#) (refer to notes for Figures 2.1c.ii-1 and 2.1c.ii-3 to 2.1c.ii-6).

For all reporting periods except 2011-12 to 2015-16, Tasmania produced the largest volume of wood products from native forests. Proportionally, 40% of the total volume of wood products harvested from native forests in Australia since 1996-97 has come from Tasmania. This high level was due primarily to the production of high pulplog volumes between 1996-97 and 2010-11 (Figure 2.1c.ii-4). Outcomes of Tasmanian Forest Agreements in 1997 and 2013, and disruptions to pulplog and woodchip export markets, resulted in significant declines in total harvested volumes.

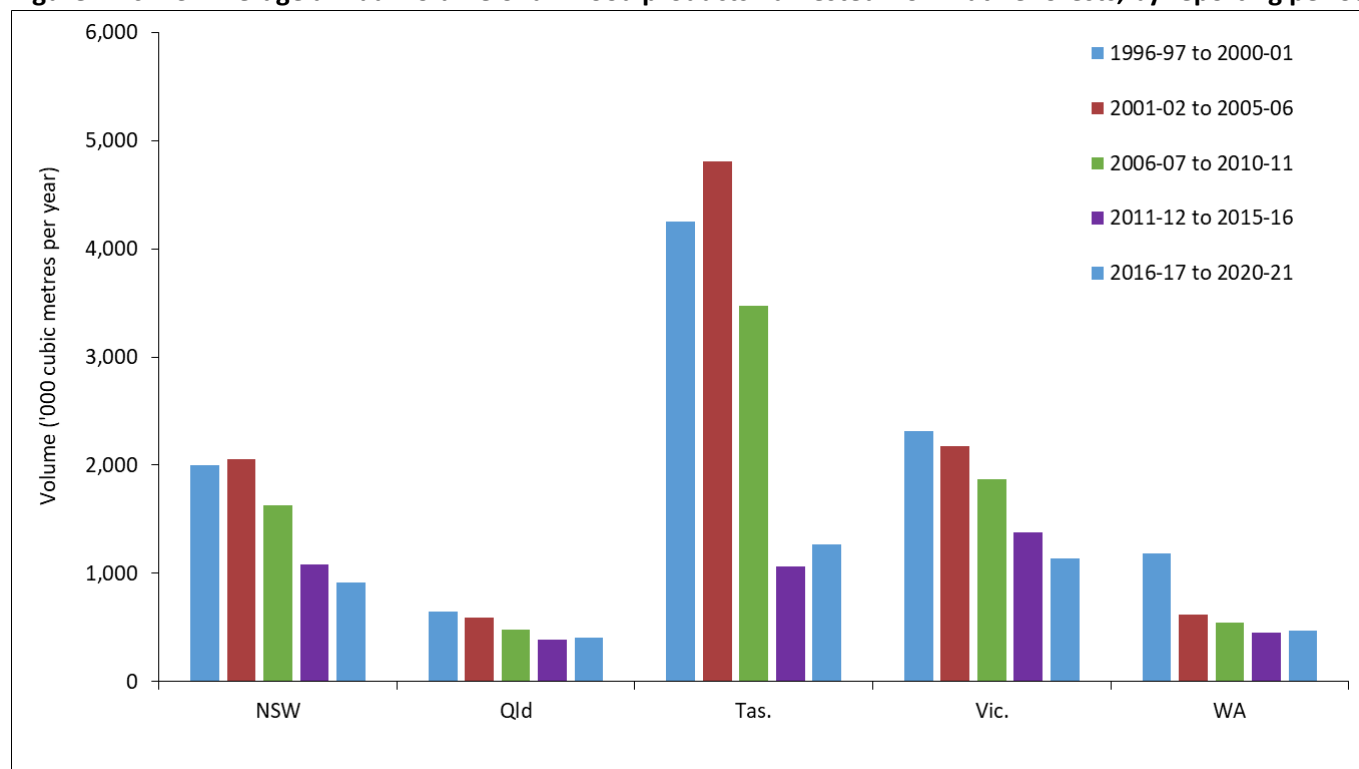
Since 1996-97, New South Wales has consistently been the highest producer of sawlogs from native forests, followed by Victoria. Together these two states have contributed 56% of the total sawlog volume harvested from native forests in Australia (Figure 2.1c.ii-5).

Tasmania and Victoria have been the highest producers of pulplogs from native forests since the *Australia's State of the Forests Report* series began in 1998 and together have contributed 84% of the total harvested volume of pulplogs in Australia between 1996-97 and 2020-21. During the most recent five-year reporting period these two states produced 82% of Australia's total harvested pulplog volume from native forests. The majority of pulplogs harvested from native forests in Victoria have been processed locally and used in the production of paper, with the remainder exported as woodchips. Most pulplogs harvested from native forests in Tasmania, New South Wales and Western Australia have been exported as woodchips, primarily to Asia. Queensland has not produced pulplogs from native forests since the 1996-97 to 2000-01 reporting period because harvested tree species from these forests are generally not suitable for use in paper production.

All five states produce a range of 'other log products' from native forests such as poles and piles, fencing timbers, firewood and fuelwood (Figure 2.1c.ii-6). The 2016-17 to 2020-21 five-year reporting period saw an increase in 'other log product' volume harvested in native forests from the preceding five-year period in all states except New South Wales (3% decrease) and Queensland (36% decrease). The increases in Tasmania, Victoria and Western Australia were primarily due to an increase in reported harvest volumes of firewood/fuelwood.

Poles and piles represent a comparatively high proportion of the 'other log product' volumes harvested in New South Wales native forests. Between 2016-17 and 2020-21 an average annual volume of 27.1 thousand cubic metres of poles and piles were harvested in New South Wales, primarily for use as high-value power poles. Since 1996-97, New South Wales has produced 59% and Queensland 22% of the total volume of poles and piles harvested from native forests in Australia.

Figure 2.1c.ii-3: Average annual volume of all wood products harvested from native forests, by reporting period

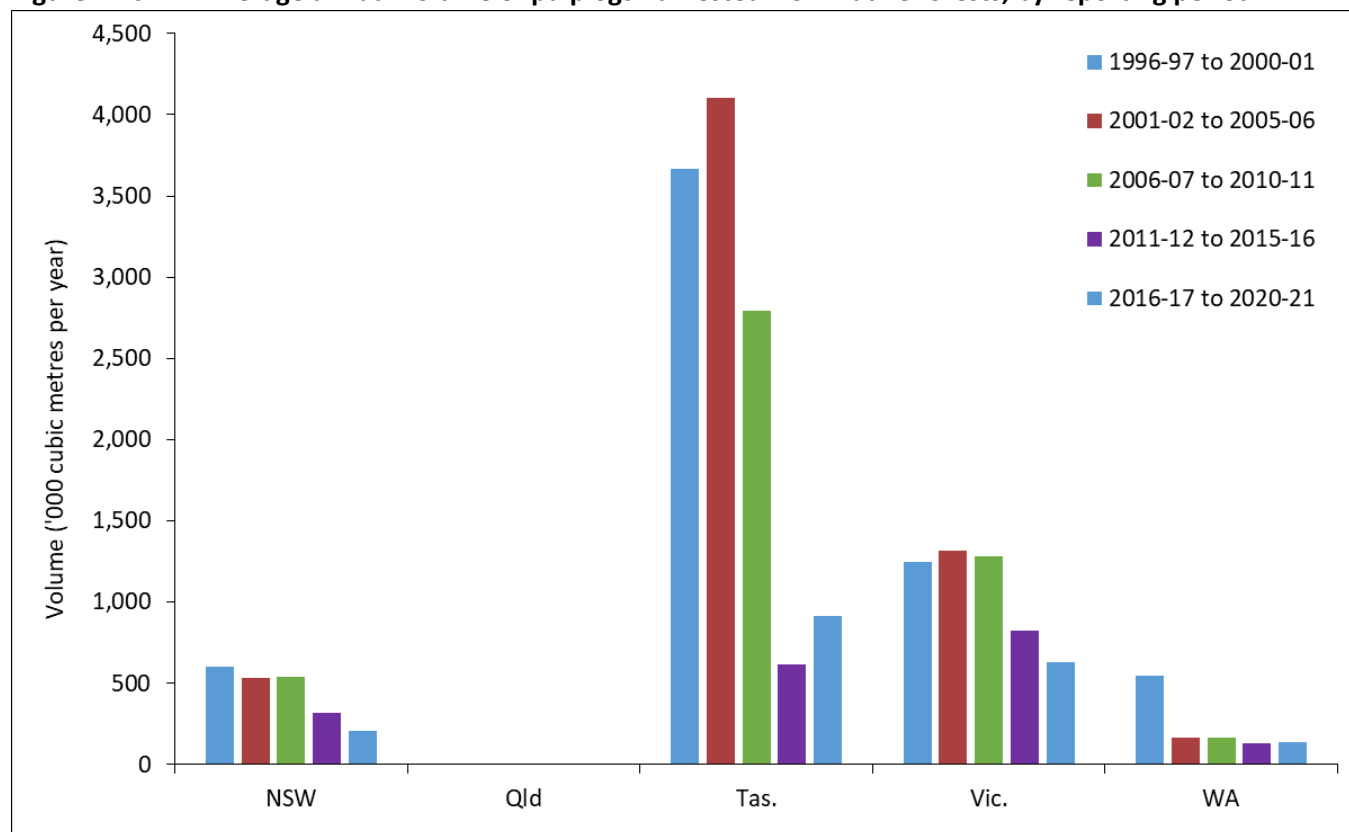


Total native forest production is the sum of the production of sawlog and peeler log, pulplog, and other log products from both public and private tenures.

Source: ABARES; state agencies.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.ii-3.](#)

Figure 2.1c.ii-4: Average annual volume of pulplogs harvested from native forests, by reporting period



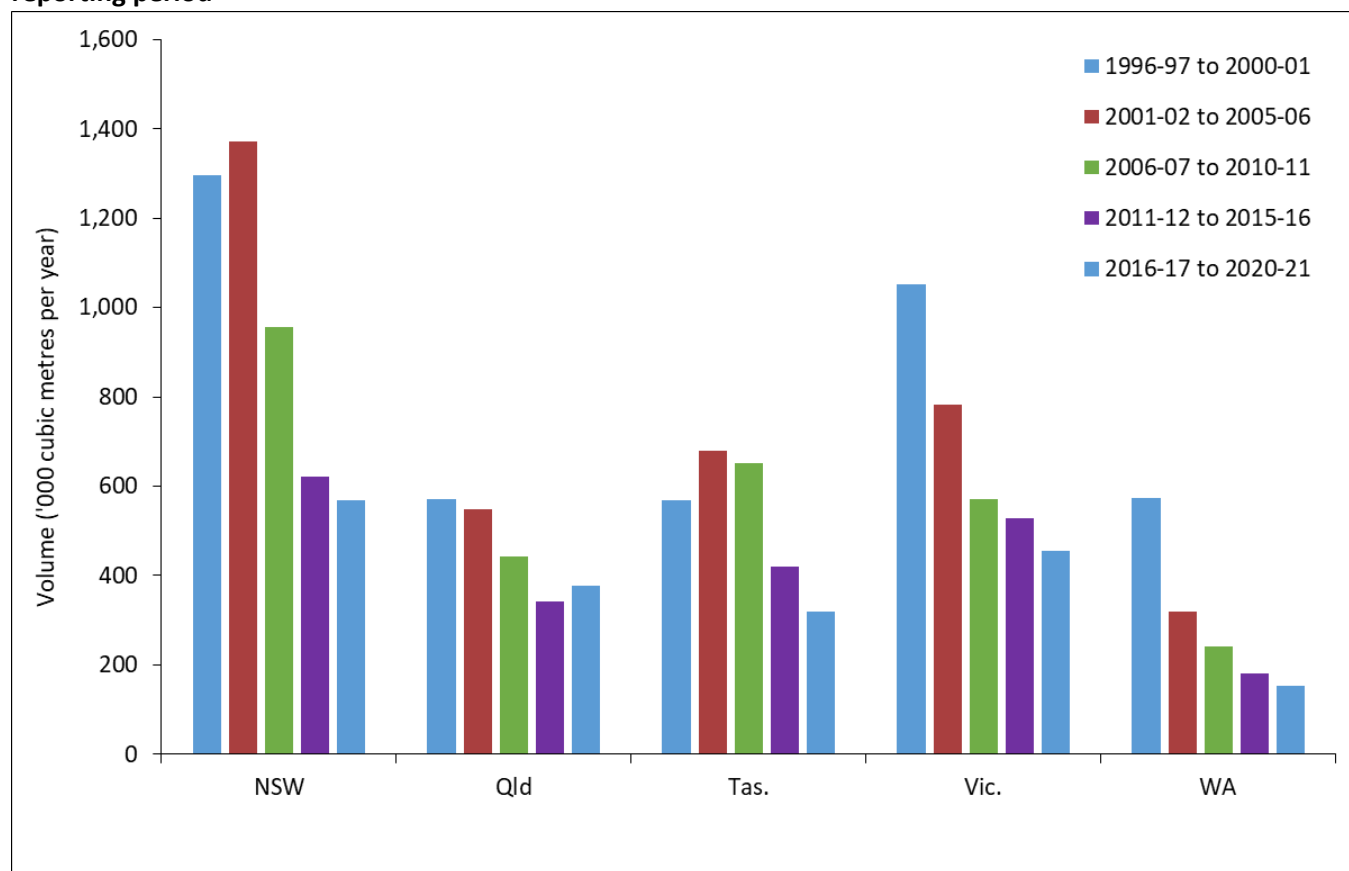
Pulplogs are logs used in domestic hardboard or paper production, or exported as pulplogs or woodchips.

Volumes are from both public and private tenures.

Source: ABARES; state agencies.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.ii-4.](#)

Figure 2.1c.ii-5: Average annual volume of sawlog and peeler products harvested from native forests, by reporting period



Sawlog includes all categories of domestically used or exported sawlogs and veneer logs from both public and private tenures.

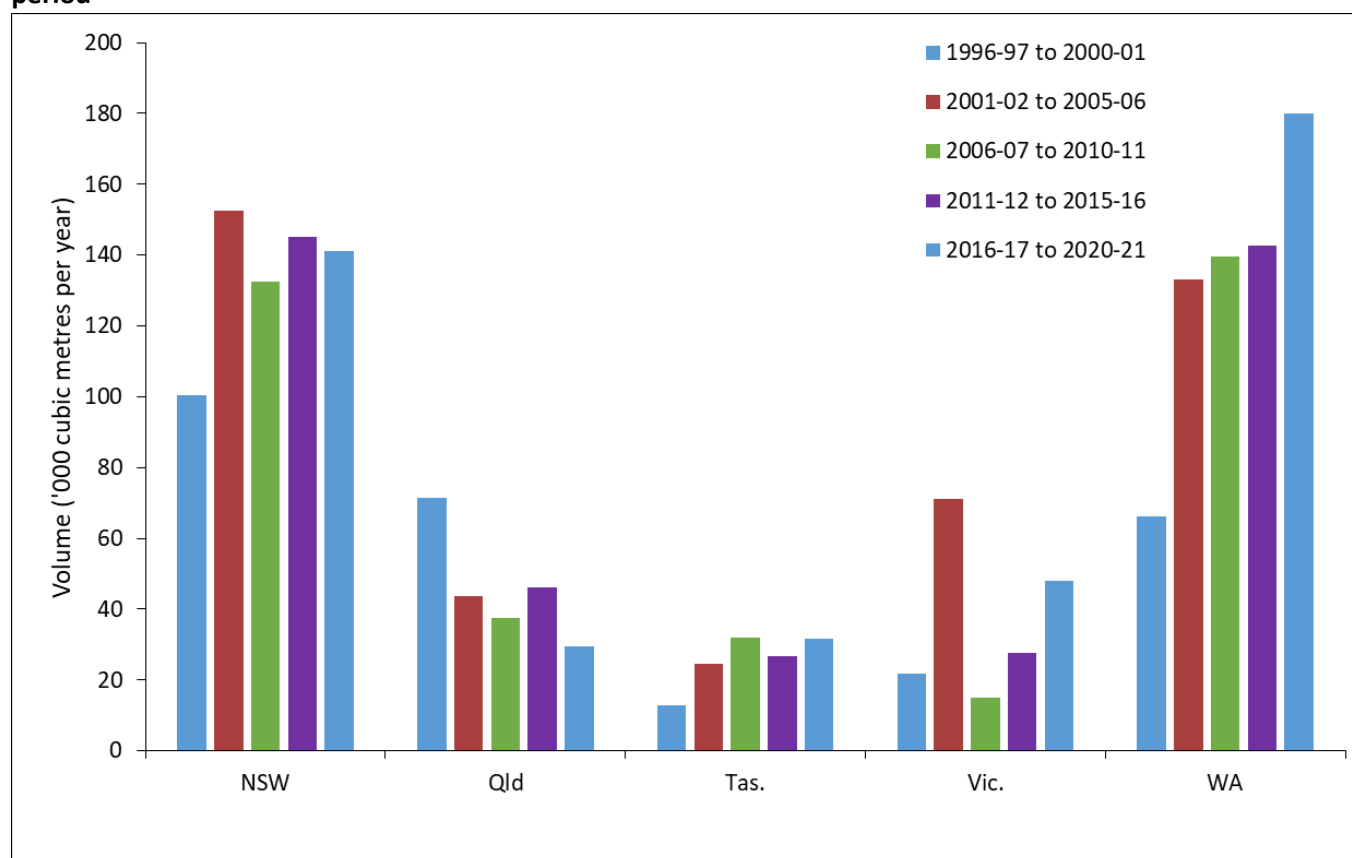
Sliced peeler logs for the domestic market are grouped with sawlogs even though they can be a mix of sawlog or pulplog quality; this log category is only recorded as a separate product category in Tasmania.

Data from Northern Territory are not shown because the quantities harvested are too small to display in chart.

Source: ABARES; state agencies.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.ii-5.](#)

Figure 2.1c.ii-6: Average annual volume of other log products harvested from native forests, by reporting period



Other log products include sleeper logs, poles, piles, fencing, mining timber, other log types not included elsewhere, and fuel logs for industrial and domestic use (firewood) from both public and private tenures.

The 'Other log products' category differs from the 'Other wood products' category by including fuelwood logs and firewood.

Source: ABARES; state agencies.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.ii-6.](#)

Sawlog harvest from private native forests

For all [Australia's State of the Forests Report](#) reporting periods, the supply of sawlogs from private native forests has been significant in New South Wales, Queensland and Tasmania, and comparatively small in Victoria and Western Australia (Figure 2.1a.ii-7). The Northern Territory only reported private native forest sawlog production in two of the past six reporting periods. The harvesting of sawlogs from private native forests is not permitted in the Australian Capital Territory or South Australia.

In the 2016-17 to 2020-21 period, the volume of sawlogs harvested from private native forests increased by 87% in New South Wales, 8% in Queensland, 56% in Tasmania, and 185% from a very low volume in Victoria (harvested volumes are small in that state) from the 2011-12 to 2015-16 period (Figure 2.1c.ii-7). These increases are partly due to the processing industry taking a more proactive approach to the sourcing of resource from private native forests as an alternative to the diminishing supply from multiple-use public native forests.

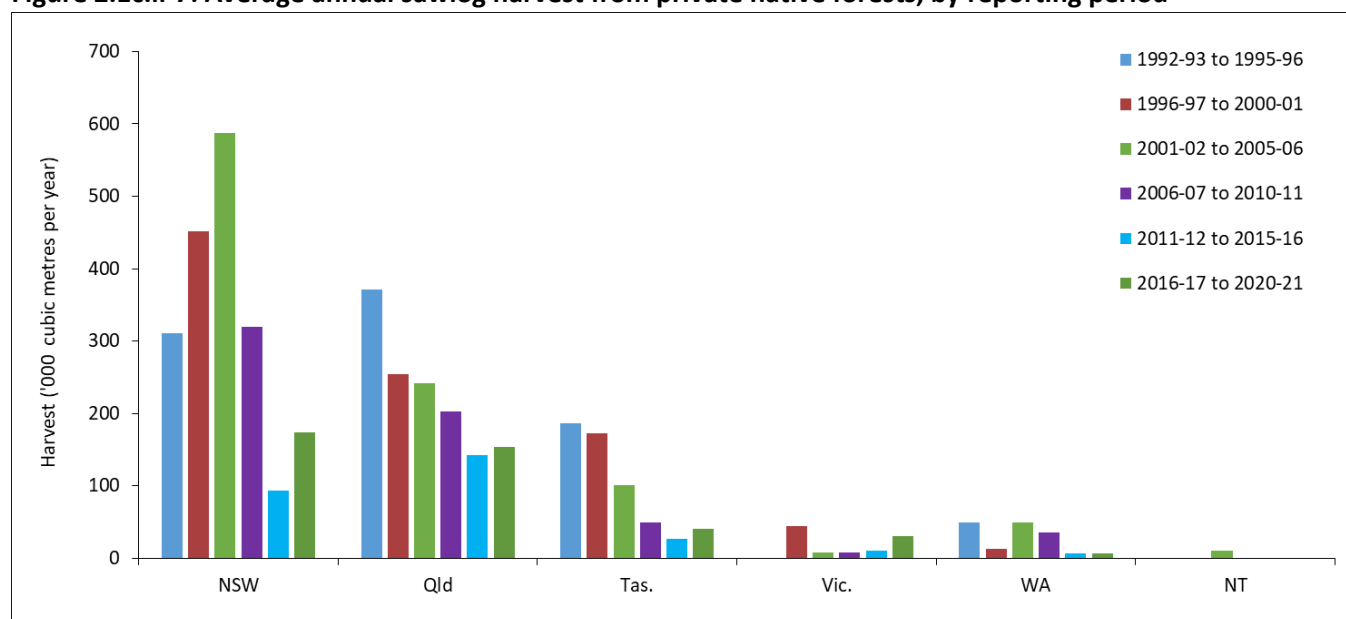
For the period 2016-17 to 2020-21, the Northern Territory reported a small amount of sawlog production from native forests in East Arnhem Land under Indigenous ownership. An average annual of 240 cubic metres of hardwood sawlog (primarily Darwin stringybark – *Eucalyptus tetrodonta*) was processed at a small sawmill owned by Gumatj Corporation Ltd.

There is no calculated sustainable yield for wood production from native forests on private land for any state or territory, and there is insufficient information to adequately assess whether the current or future rate of wood harvest from private native forests is sustainable. Increased harvesting restrictions in all states over time have led to a general reduction in wood volumes harvested from private native forests.

In practice, most private native forest owners/managers make limited use of their native forests for wood production and only react to immediate needs and market opportunities (Commonwealth of Australia 2016). A study by Dare et al. (2017) found that only 20% of private native forest owners in northern New South Wales intended to carry out commercial wood harvesting in their native forests at some stage in the future. In a similar study by Dare and Eversole (2013), Tasmanian private native forest owners were surveyed to estimate future harvesting intent. This study found that 88% of respondents did not intend to harvest their forests in the three years following the survey.

A national assessment of the role, values and potential of private native forests completed in 2009 provided estimates of the contribution of private native forests to regional wood supply (Parsons and Pritchard 2009). This assessment found that despite adequate information on the area of private native forests, there was little information on their quality, condition, value, current management regime and future management intent. Although there has been no similar national-scale study since 2009, private native forest resource assessments have been carried out for the important wood producing regions of north-eastern New South Wales (NSW DPI 2019), Tasmania (Wilson and Tys 2020) and south-eastern Queensland (Francis et al. 2023). A 2024 study also examined the commercial potential for native forest wood harvesting in Indigenous-owned forests of East Arnhem, Northern Territory (Meadows et al. 2024).

Figure 2.1c.ii-7: Average annual sawlog harvest from private native forests, by reporting period



Sawlogs harvested from private forests include high-quality and low-quality hardwood sawlog, hardwood 'veneer sawlog' and native cypress pine sawlog.

Data for Queensland do not include private forests where timber rights are owned by the Crown.

Data are unavailable for the 1992-93 to 1995-96 reporting period for the Northern Territory and Victoria. Data for Tasmania and Western Australia are incomplete for the same period.

Harvesting of wood from native forests is not permitted in the Australian Capital Territory or South Australia.

Source: ABARES; state and territory data.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.ii-7.](#)

Pulplog harvest from public and private native forests

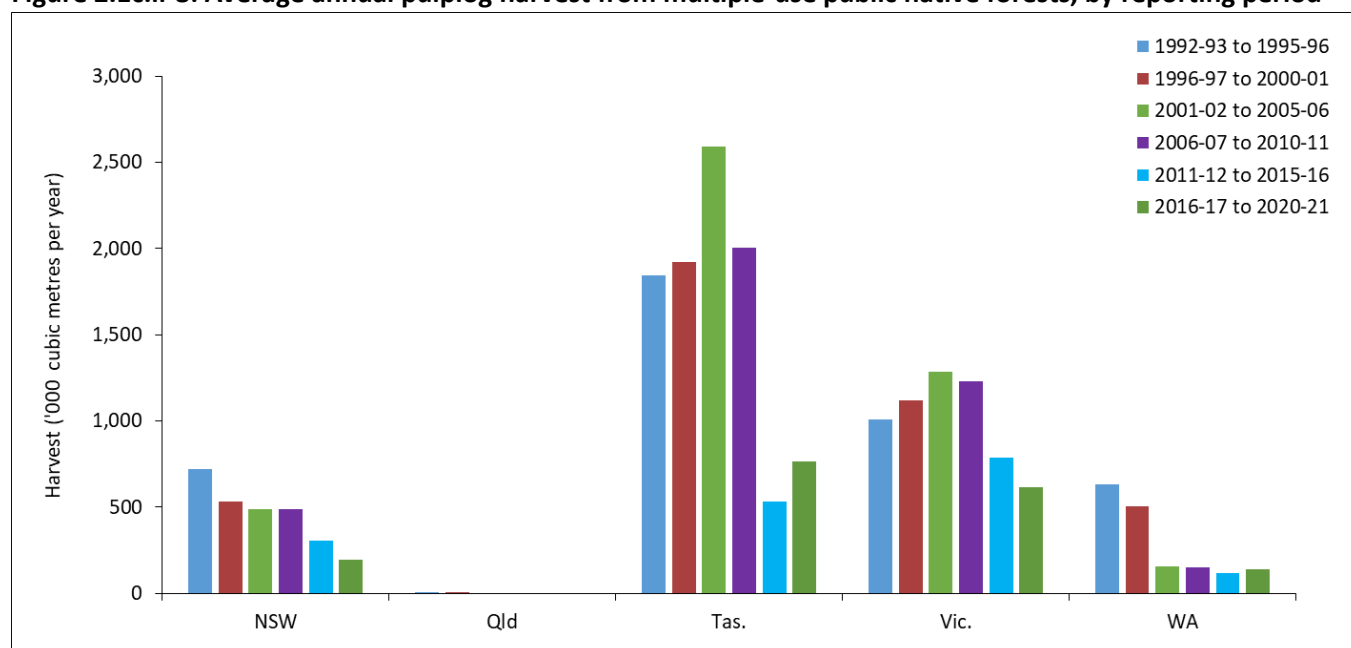
Pulplogs, low-quality sawlogs and other wood products are usually residual products from public and private native forest harvesting operations targeting high-quality products (such as high-quality sawlogs and veneer). Sometimes these lower-quality logs are produced during silvicultural operations such as thinning which is aimed at promoting the growth of future high-quality sawlogs. Thus, sustainable yields are not determined specifically for pulplogs and other lower quality wood products, which instead are usually treated as arisings from the high-quality sawlog harvest yields.

During the period 2016-17 to 2020-21, the average annual volume of pulplogs harvested from public native forest (Figure 2.1c.ii-8) in:

- Australia was 1.72 million cubic metres, a decrease of 59% since the reporting period 1992-93 to 1995-96
- New South Wales was 196 thousand cubic metres, a 35% decrease compared to the 303 thousand cubic metres in the preceding five-year period (2011-12 to 2015-16)
- Tasmania was 765 thousand cubic metres, a 44% increase compared to the 532 thousand cubic metres in the preceding five-year period
- Victoria was 616 thousand cubic metres, a 22% decrease compared to the 789 thousand cubic metres in the preceding five-year period
- Western Australia has remained relatively consistent since the 2001-02 to 2005-06 period.

In Queensland no pulplogs have been harvested from public native forests since a small amount was reported in the 1996-97 to 2000-01 period.

Figure 2.1c.ii-8: Average annual pulplog harvest from multiple-use public native forests, by reporting period



Pulplog includes logs sold for pulp or equivalent, and for woodchip.

Source: ABARES; state agencies.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.ii-8.](#)

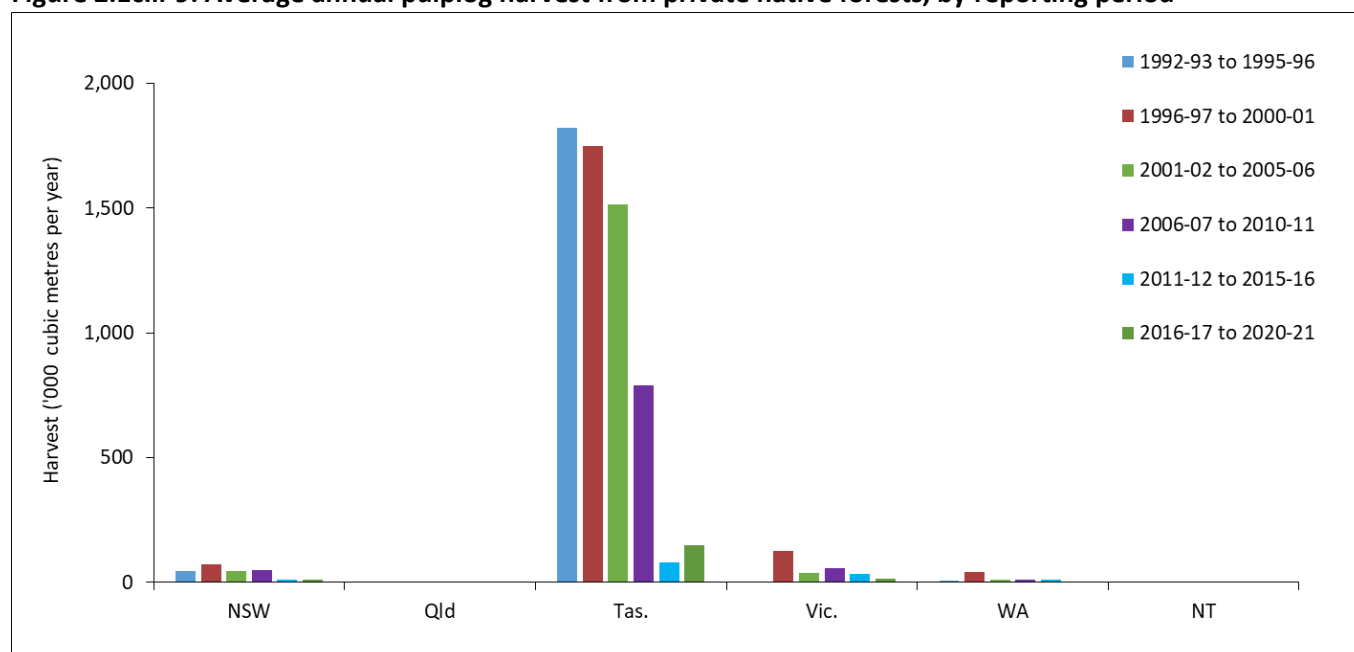
During the period 2016-17 to 2020-21, the average annual volume of pulplogs harvested from private native forests in Australia was 178 thousand cubic metres. This represents a decrease of 90% from 1996-97 to 2000-01 levels.

During the period 2016-17 to 2020-21, the average annual volume of pulplogs harvested from private native forest (Figure 2.1c.ii-9) in:

- New South Wales remained relatively steady compared to the 2011-12 to 2015-16 reporting period
- Tasmania increased from 82 thousand cubic metres for the reporting period 2011-12 to 2015-16 to 148 thousand cubic metres (80% increase)
- Victoria decreased from 33 thousand cubic metres for the period 2011-12 to 2015-16 to 17 thousand cubic metres (48% decrease).

Limited pulplogs were harvested from private native forests in Western Australia during the period 2016-17 to 2020-21 and none were harvested in any period in Queensland or the Northern Territory.

Figure 2.1c.ii-9: Average annual pulplog harvest from private native forests, by reporting period



Data are unavailable for the 1992-93 to 1995-96 period for all states and territories other than New South Wales and Tasmania, and limited data are available for Western Australia for the same period.

Pulplog includes logs sold for pulp or equivalent, and for woodchip.

Source: ABARES; state agencies.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.ii-9.](#)

Other wood products

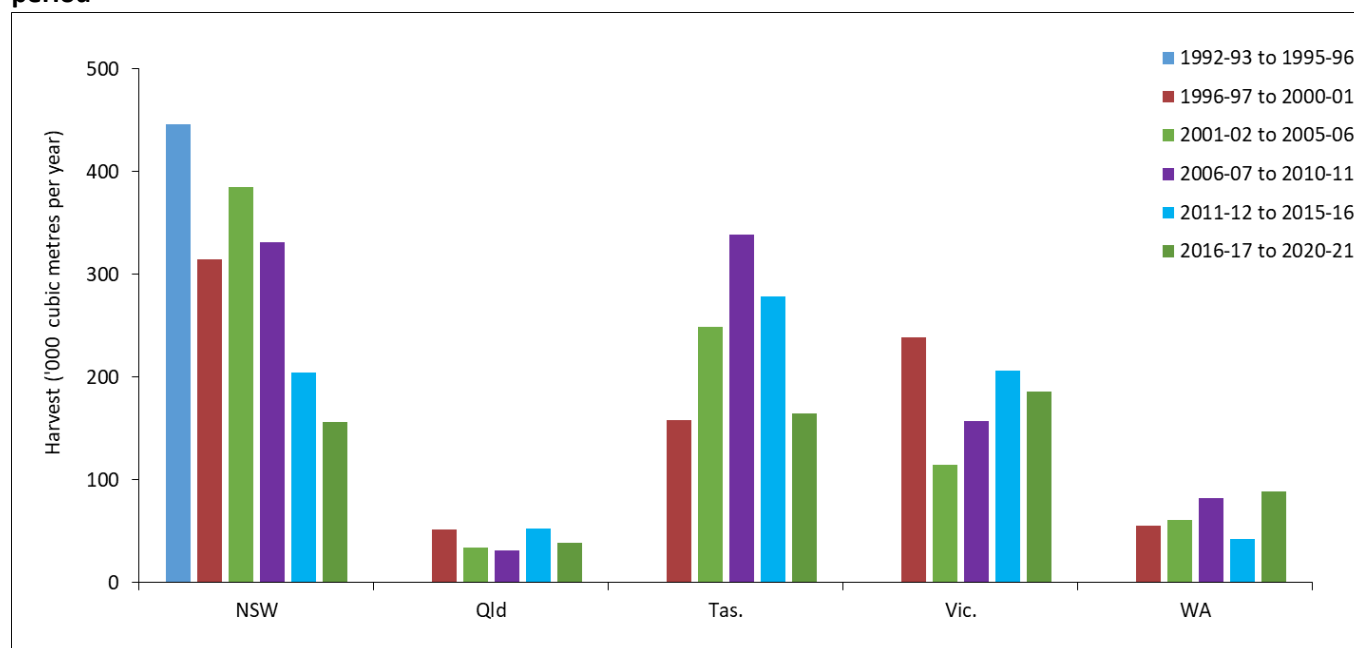
The national average annual harvest volume of 'other wood products' from public native forests for the period 2016-17 to 2020-21 was 634 thousand cubic metres. This compares with 818 thousand cubic metres for the 1996-97 to 2000-01 period, a decrease of 22% (Figure 2.1c.ii-10). Limited data are available for these products from private native forests, and from plantations.

The supply of 'other wood products', such as low-quality sawlogs, girders, poles, piles, as well as wood used in mines, split and round posts, bush sawn/hewn timber and sleepers (but excluding fuelwood logs and firewood) from native forests, varies by state. Although generally considered of lower quality than high-quality sawlogs and

veneer, these products are nonetheless important for meeting the needs of Australian society. For example, hardwood timber pallets made from low-quality sawlogs are used to transport much of the nation's food and other consumer goods. Most power poles currently in use to transmit electricity across the grid are made from hardwood timber sourced from public and private native forests. Hardwood power poles are preferred over concrete and metal alternatives due to cost, conductive properties and carbon footprint. As at 2006, an estimated 5 million (mostly hardwood) timber power poles were in-service across Australia, compared to 570 thousand poles made from concrete or metal (Qld DPIF 2006).

Fuelwood and firewood are treated separately and are discussed in the earlier section Wood products from native forests, and in [Indicator 6.1d](#).

Figure 2.1c.ii-10: Average annual harvest of 'other wood products' from public native forests, by reporting period



Data are unavailable for the period 1992-93 to 1995-96 for all states other than New South Wales. Values for all periods are from multiple-use public native forests for all states, except for Queensland from 2011-12 onwards, which relate to Queensland's Defined Forest Area and include timber harvested from leasehold land and freehold land where trees are owned by the State through a forest consent ('profit a prendre') agreement.

'Other wood products' are products that are not included under high-quality sawlogs and veneer logs, special-species timbers or pulplogs; they include lower grades of sawlog and peeler logs but not firewood and fuelwood.

Poles, piles and girders are included other than in New South Wales where these products are reported as high-quality sawlogs.

Source: ABARES; state agencies.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.ii-10.](#)

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Indicator 2.1c: Annual removal of wood products compared to the volume determined to be sustainable for native forests, and future yields for plantations



This indicator measures the harvest levels of wood products in relation to future yields. The capacity to implement strategies to deal with changing demand for forest products based on future yields from both native and plantation forests is an integral part of sustainable forest management.

2.1c.iii Forecast national log availability (2024)

This part of Indicator 2.1c presents forecast sustainable yields and log supply from native forests and commercial plantations.

The two other parts of Indicator 2.1c are:

2.1c.i Sustainable yield and actual harvest levels

2.1c.ii Removals by log type

Definitions

Sustainable yield: The yield of products (such as wood and water) from an area of forest that ensures that the functioning of the forest ecosystem as a whole is maintained, and the flow of products can continue indefinitely under a given management strategy and suite of sustainable-use objectives.

Sawlog: A log harvested from a plantation or native forest used to manufacture sawn timber. High-quality sawlogs are sawlogs meeting specified size and quality (grade) specifications (including the amount of permissible defect). Low-quality sawlogs are sawlogs not meeting high-quality sawlog specifications.

Pulplog: A log harvested from a plantation or native forest that does not meet sawlog size or quality specifications and is designated to produce pulpwood.

Key points

- The forecast supply of high-quality logs from public multiple-use native forests will continue to decrease following the ending of commercial wood harvesting in some states in 2024 and from the impact of the 2019-20 bushfires on growing stock.
- The annual plantation log availability is forecast to gradually increase to the year 2060, albeit more slowly than previously forecasted following impacts from the 2019-20 bushfires and a decrease in the area of hardwood plantations.
- Total plantation softwood log availability (most of which is sawlogs) is forecast to increase from 15.3 million cubic metres per year in the period 2020-24 to 19.2 million cubic metres per year in the period 2050-54. Sawn timber from softwood plantations is typically used for housing and general construction.

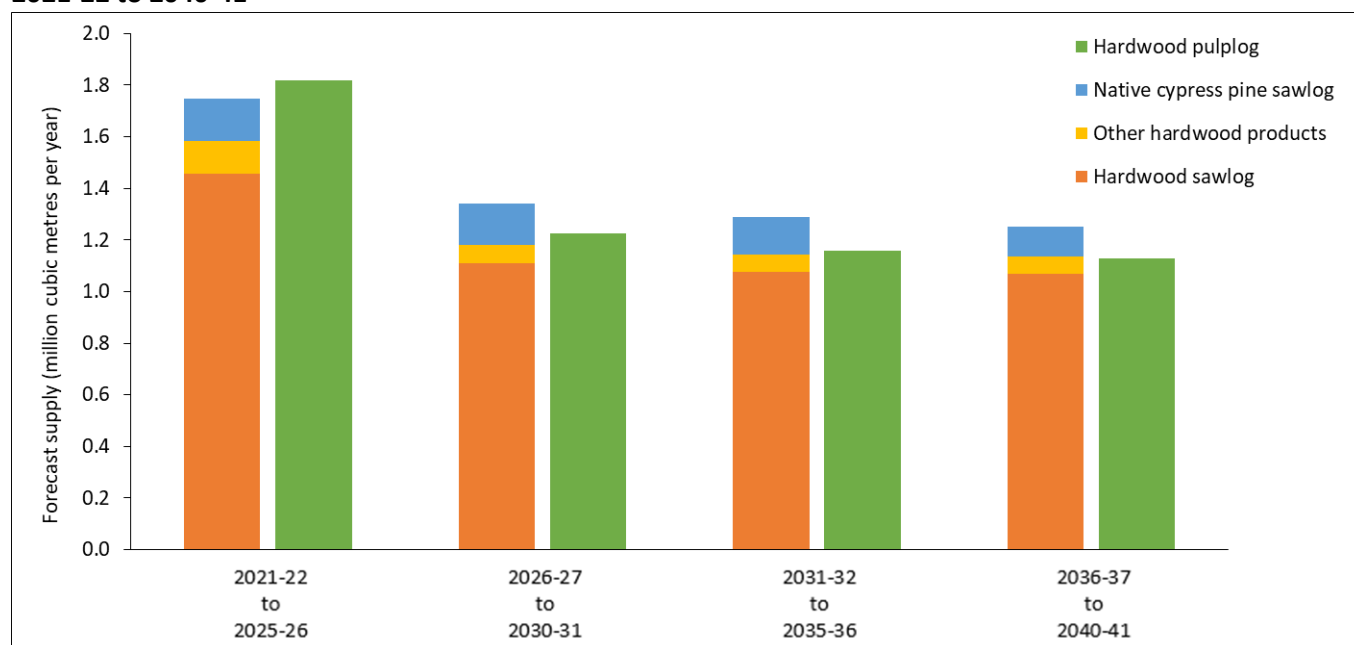
- Total plantation hardwood log availability (most of which is pulplogs) is forecast to range between 9.5 and 11 million cubic metres per year for the entire 2020-64 forecast period. Hardwood plantations are typically managed for the production of pulplogs for use in the production of paper and paperboard.

Forecast national native forest log supply

The forecast annual native forest hardwood sawlog supply is 1.5 million cubic metres from 2021-22 to 2025-26 and then dropping to 1.1 million cubic metres from 2026-27 (Figure 2.1c.iii-1). Supply of pulplogs is forecast at 1.8 million cubic metres per year from 2021-22 to 2025-26 and then dropping to 1.2 million cubic metres per year in the following period (Figure 2.1c.iii-1). This compares with the average of 1.7 million cubic metres of native forest hardwood sawlogs and 1.9 million cubic metres of native forest pulplogs harvested per year between 2016-17 and 2020-21 ([Indicator 2.1c.ii](#), Figures 2.1c.ii-5 and 2.1c.ii-4).

The forecast decrease of supply reflects the ending of commercial wood harvesting in multiple-use public native forests in some states, and the impact of the 2019-20 bushfires on growing stock. The forecast combines both the decrease in sustainable yield of native forest sawlogs from multiple-use public forests over the forecast period and an anticipated increase in supply from private native forests as processors who have traditionally sourced wood from public native forests seek raw materials from other sources. The trend of an increase in sawlog supply from private native forests during the reporting period 2016-17 to 2020-21 is expected to continue. The forecast supply from private native forests is based on likely proportional increases to historical harvest levels, however, the actual supply from private native forests will depend on market forces, the objectives and goals of private forest owners, and the relevant native forestry regulatory framework at the time.

Figure 2.1c.iii-1: Forecast annual log supply from native forest on public, private and leasehold land in Australia, 2021-22 to 2040-41



Native cypress pine is *Callitris glaucophylla*.

'Other hardwood products' includes poles, piles, girders and other logs. Firewood and industrial fuelwood are not included in the forecast projections.

'Hardwood sawlog' includes high-quality and low-quality sawlogs and veneer products.

Source: ABARES; state agencies.

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.iii-1.](#)

The average annual sustainable yield of high-quality sawlogs from publicly managed native forests in the 2016-17 to 2020-21 reporting period (1,257 thousand cubic metres) was reduced to 40% of the sustainable yield in the 1992-93 to 1995-96 reporting period (3,164 thousand cubic metres). A further reduction to 16% of the estimated sustainable yield in the first period is forecast from 2036-37 (510 thousand cubic metres) onwards (Table 2.1c.iii-1). These forecasts are supplied by the five states that have traditionally harvested high-quality sawlogs from public native forest: New South Wales, Queensland, Tasmania, Victoria and Western Australia.

Table 2.1c.iii-1: Average annual sustainable yield of high-quality sawlog equivalents from publicly managed native forests by reporting period to 2020-21, then five-year forecast periods to 2060-61

Period	Average annual sustainable yield ('000 cubic metres)	Proportion of 1992-96 sustainable yield (%)
Actual		
1992-93 to 1995-96	3,164	100
1996-97 to 2000-01	2,902	92
2001-02 to 2005-06	2,098	66
2006-07 to 2010-11	1,684	53
2011-12 to 2015-16	1,500	47
2016-17 to 2020-21	1,257	40
Forecast		
2021-22 to 2025-26	937	30
2026-27 to 2030-31	622	20
2031-32 to 2035-36	552	17
2036-37 to 2040-41	510	16
2041-42 to 2045-46	510	16
2046-47 to 2050-51	520	16
2051-52 to 2055-56	512	16
2056-57 to 2060-61	510	16

'Actual' data are from Indicator 2.1c.i, Figure 2.1c.i-1.

Forecasts do not include any supplementation with high-quality sawlogs from public hardwood plantations.

Source: Indicator 2.1c.i; state data.

[Click here for a Microsoft Excel workbook of the data for Table 2.1c.iii-1.](#)

The sustainable yield forecasts for publicly managed forests presented in Table 2.1c.iii-1 factor in:

- Victorian Government policy to end commercial wood harvesting in public native forests in Victoria from 01 January 2024
- Western Australian Government policy to end large-scale commercial wood harvesting in public native forests in Western Australia from 01 January 2024
- Queensland Government policy regarding the ending of commercial wood harvesting in public native forests within the South East Queensland Regional Plan area from 01 January 2025
- the transition of high-quality hardwood sawlog supply from predominately native forests to predominately hardwood plantations in Tasmania from 2028 onwards, and the associated reduction in forecasted native forest volumes
- the impact of the 2019-20 bushfires on growing stock and sustainable yields in New South Wales (FCNSW 2020).

The Western Australian *Forest Management Plan 2024-2033* (CPC 2023) provides for limited ongoing supply of logs sourced from clearing of public native forests for mining or infrastructure, and ecological thinning operations. However, there is uncertainty at this stage about the likely volume by log grade and species mix that may arise, and this source has not been included in the forecasts.

These forecasts assume that there are no further reductions, or additions to [net harvestable area](#), beyond those listed above. Sustainable yield forecasts are subject to change and are regularly reviewed at the state level to incorporate further changes in reservation, code prescriptions, disturbance and climate change.

The forecasts also assume the ongoing satisfactory management of risk from bushfire, disease and climate impacts. However, the frequency of high-intensity, large-scale bushfires is predicted to increase in Australia with climate change (Abram et al. 2021). Depending on species, mature trees have varying responses after bushfire. Some species recover well after being impacted by bushfire (such as spotted gum, *Corymbia maculata*, and ironbark spp.), while others are killed outright by even moderate intensity fires (such as alpine ash, *Eucalyptus delegatensis*). Generally, high-intensity fire will compromise young regrowth stems and cause a level of defect in future log products. Therefore, increasing frequency of high-intensity fires may further reduce sustainable yields. There is also evidence that increasing temperature may reduce the growth rates of some important commercial Australian hardwood species (Bowman et al. 2014; Wardlaw 2024).

Forecast national plantation log availability

The potential average annual plantation log availability is forecast to increase from 24.9 million cubic metres in the 2020-24 period to 29.0 million cubic metres by the 2055-59 period (Table 2.1c.iii-2). There has been a decrease in the log availability estimates across the early forecast periods from previous ABARES (2016) estimates due to tree mortality after the 2019-20 'Black Summer' bushfires and a decrease in the hardwood plantation estate area.

Plantation softwood log availability is forecast to gradually increase from 15.3 million cubic metres per year in the 2020-24 period to a peak of 19.2 million cubic metres per year in the 2050-54 period (Table 2.1c.iii-2). The peak is primarily associated with softwood plantations replanted after the 2019-20 bushfire season reaching maturity.

Most of the sawn timber used for housing and general construction in Australia is sourced from plantation softwood sawlogs. The availability of plantation softwood sawlogs is forecast to increase from 10.5 million cubic metres per year in the 2020-24 period to 14.3 million cubic metres per year in the 2050-54 period (Table 2.1c.iii-2).

Australia's commercial plantations are primarily based in 15 National Plantation Inventory (NPI) regions (Figure 2.1c.iii-2). The Western Australia, Green Triangle and Tasmania NPI regions each contain estates of more than 200 thousand hectares of commercial plantations. The Green Triangle, Murray Valley and South East Queensland NPI regions are forecast to produce the majority of the plantation softwood sawlogs available over the entire forecast period 2020-2064, contributing an average of 27%, 18% and 15% of the total national available softwood sawlog volume respectively (Figure 2.1c.iii-3).

Plantation softwood pulplog availability is forecast to vary around an average annual volume of 4.7 million cubic metres throughout the forecast period (Table 2.1c.iii-2). The Murray Valley, Green Triangle and Tasmania NPI regions are forecast to be the main softwood pulpwood producing regions, contributing an average of 22%, 18% and 14% of the total national available pulplog volume, respectively (Figure 2.1c.iii-4).

Table 2.1c.iii-2: Forecast potential average annual plantation log availability, Australia, 2020-24 to 2060-64

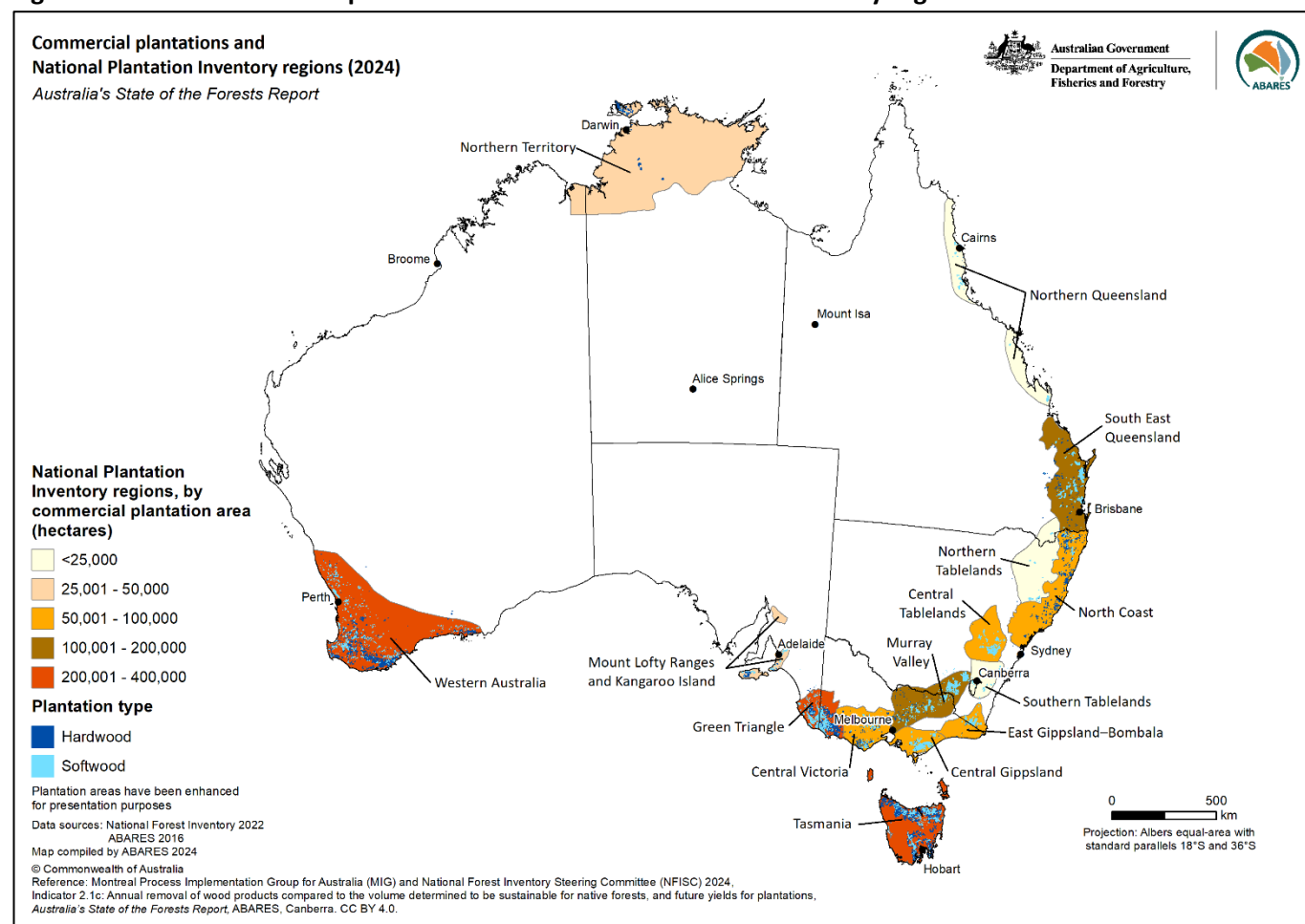
Log type	Volume ('000 cubic metres)								
	2020-24	2025-29	2030-34	2035-39	2040-44	2045-49	2050-54	2055-59	2060-64
Hardwood									
Pulplog	8,996	9,877	9,943	9,434	8,591	9,057	8,695	9,292	8,913
Sawlog	663	990	1035	948	948	905	819	814	819
Subtotal	9,659	10,867	10,978	10,382	9,539	9,962	9,514	10,106	9,732
Softwood									
Pulplog	4,733	4,656	4,626	4,765	4,515	4,502	4,878	4,712	4,622
Sawlog	10,531	11,140	11,797	13,777	13,513	13,821	14,330	14,212	13,332
Subtotal	15,264	15,796	16,423	18,542	18,028	18,323	19,208	18,924	17,954
Total	24,923	26,663	27,401	28,924	27,567	28,285	28,722	29,030	27,686

Sawlogs include all quality classes of plantation sawlogs.

Source: ABARES (2021).

[Click here for a Microsoft Excel workbook of the data for Table 2.1c.iii-2.](#)

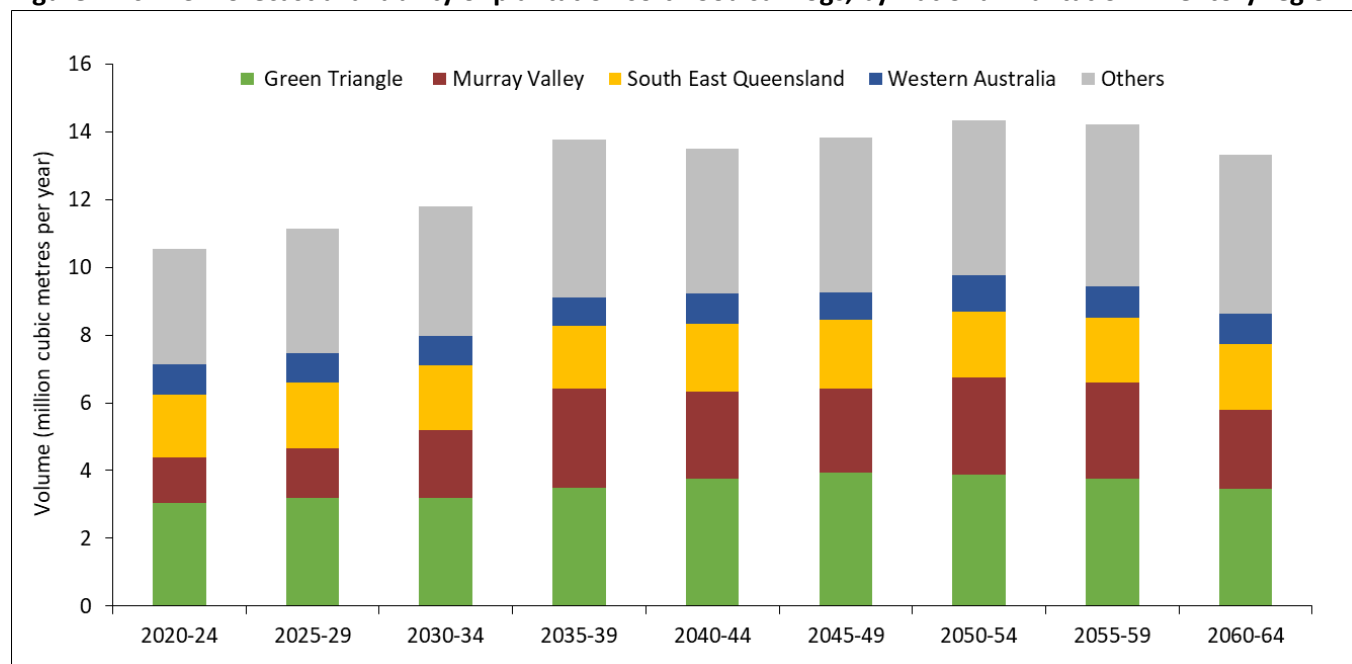
Figure 2.1c.iii-2: Commercial plantations and National Plantation Inventory regions



Source: ABARES, National Plantation Inventory.

[Click here for high-definition copy of Figure 2.1c.iii-2.](#)

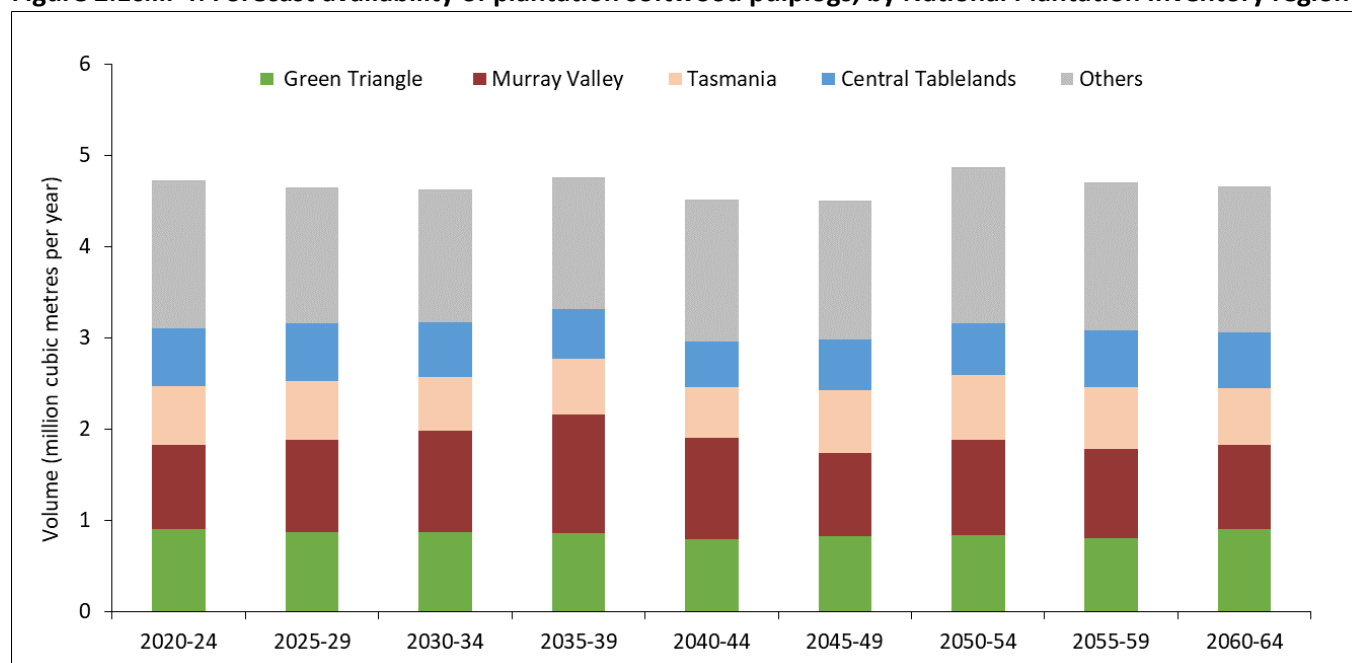
Figure 2.1c.iii-3: Forecast availability of plantation softwood sawlogs, by National Plantation Inventory region



Source: ABARES (2021).

[Click here for a Microsoft Excel workbook of the data for Figure 2.1c.iii-3.](#)

Figure 2.1c.iii-4: Forecast availability of plantation softwood pulplogs, by National Plantation Inventory region



Source: ABARES (2021).

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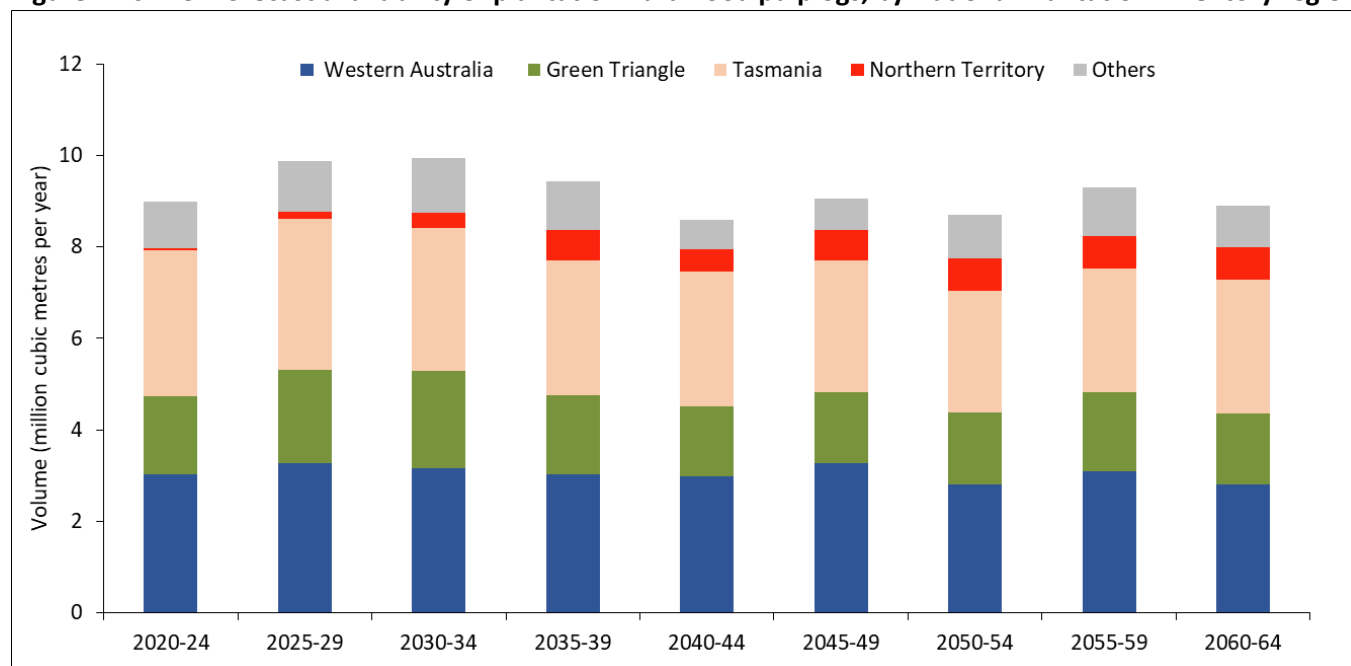
Total plantation hardwood log availability is forecast to hover between 9.5 million cubic metres and 11.0 million cubic metres per year for the entire 2020-64 forecast period (Table 2.1c.iii-2). Hardwood plantations in Australia are primarily managed for growing pulplogs for use in the production of paper and other related products.

Plantation hardwood pulplog availability is forecast to vary around an annual average of 9.2 million hectares for the 2020-64 forecast period (Table 2.1c.iii-2). The Tasmania, Western Australia and Green Triangle NPI regions are forecast to be the main hardwood pulplog producing regions accounting for 32%, 33% and 19% of the national total respectively (Figure 2.1c.iii-5). The Northern Territory NPI region is also forecast to supply significant volumes of hardwood pulplogs from 2035-39 as higher yielding plantations are established in the second rotation (ABARES 2021).

To date, increases in area of hardwood plantations have not resulted in substantial increases in harvested sawlog volume. However, plantation hardwood sawlog availability is expected to increase from an annual average of 0.66 million cubic metres in 2020-24 to 1.0 million cubic metres in 2030-34 (36% increase). From 2035-39, the average annual plantation hardwood sawlog yield is forecast to vary around an annual average of 0.88 million cubic metres (Table 2.1c.iii-2 and Figure 2.1c.iii-6). Tasmania and North Coast NPI regions are forecast to be the main sources of plantation hardwood sawlogs throughout the entire 2020-64 forecast period, with 64% and 17% of national total availability respectively. The Central Gippsland NPI region is forecast to supply significant volumes during 2020-39, and modest volumes are forecast to become available from the Northern Territory NPI region from the 2025-29 period (Figure 2.1c.iii-6).

The forecast potential future log availability from existing plantations to 2060-64 (Table 2.1c.iii-2) assume that most harvested areas will be replanted with the same plantation species after harvesting (ABARES 2021). For each type of plantation, log availability forecasts consider the area of existing plantations by year of establishment and the assumed rotation length, silvicultural regimes (including thinning), and growth rates. However, commercial plantation estates are managed as businesses, so the timing and volume of log harvests is determined mainly by market forces, rotation length and thinning regimes. Thus, market supply and demand will influence the actual volumes that are harvested at any given time and plantation replanting.

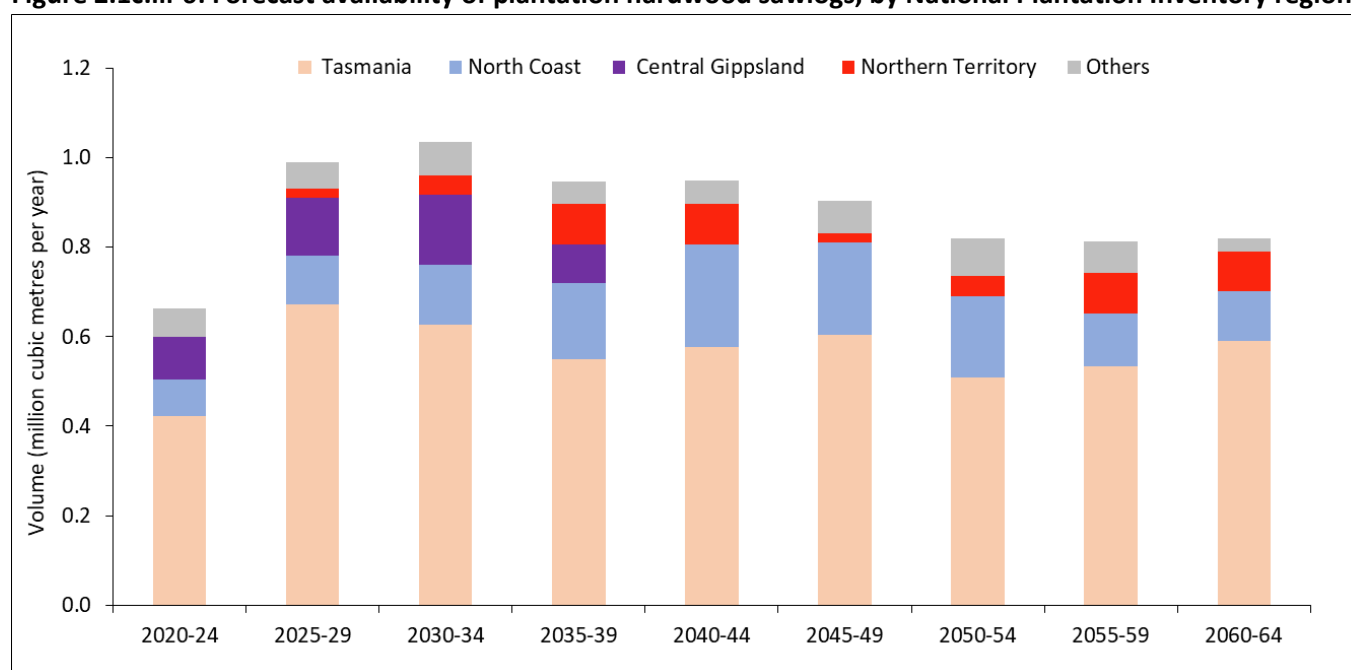
Figure 2.1c.iii-5: Forecast availability of plantation hardwood pulplogs, by National Plantation Inventory region



Source: ABARES (2021).

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Figure 2.1c.iii-6: Forecast availability of plantation hardwood sawlogs, by National Plantation Inventory region



Source: ABARES (2021).

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