

Indicator 3.1b: Area of forest burnt by planned and unplanned fire (2024)



This indicator is used to provide an understanding of the impact of fire on forests through the reporting of planned and unplanned fire. Fire is an important part of many forest ecosystems in Australia and may have either positive or negative impacts on forest health and vitality.

Context and definitions

Fire has been an important factor in the evolution of Australian ecosystems for millions of years, and much of Australia's native vegetation is tolerant of fire or requires fire to regenerate. Fire seasons vary significantly between northern and southern Australia. Unplanned fires can have serious impacts on forests and forest communities, but planned fire can be used to manage fire risk in some vegetation communities.

Fire regime: The frequency, intensity, seasonality and scale or patchiness of burning of an area or vegetation type over a period of time.

Planned fires: Fire started in accordance with a fire management plan or planned burning program, such as for fuel-reduction or prescribed burning.

Unplanned fires: Fire started naturally (such as by lightning), accidentally, or deliberately (such as by arson), but not in accordance with planned fire management prescriptions; also called bushfires or wildfires.

Full definitions are provided in [Australia's forests and forestry glossary](#).

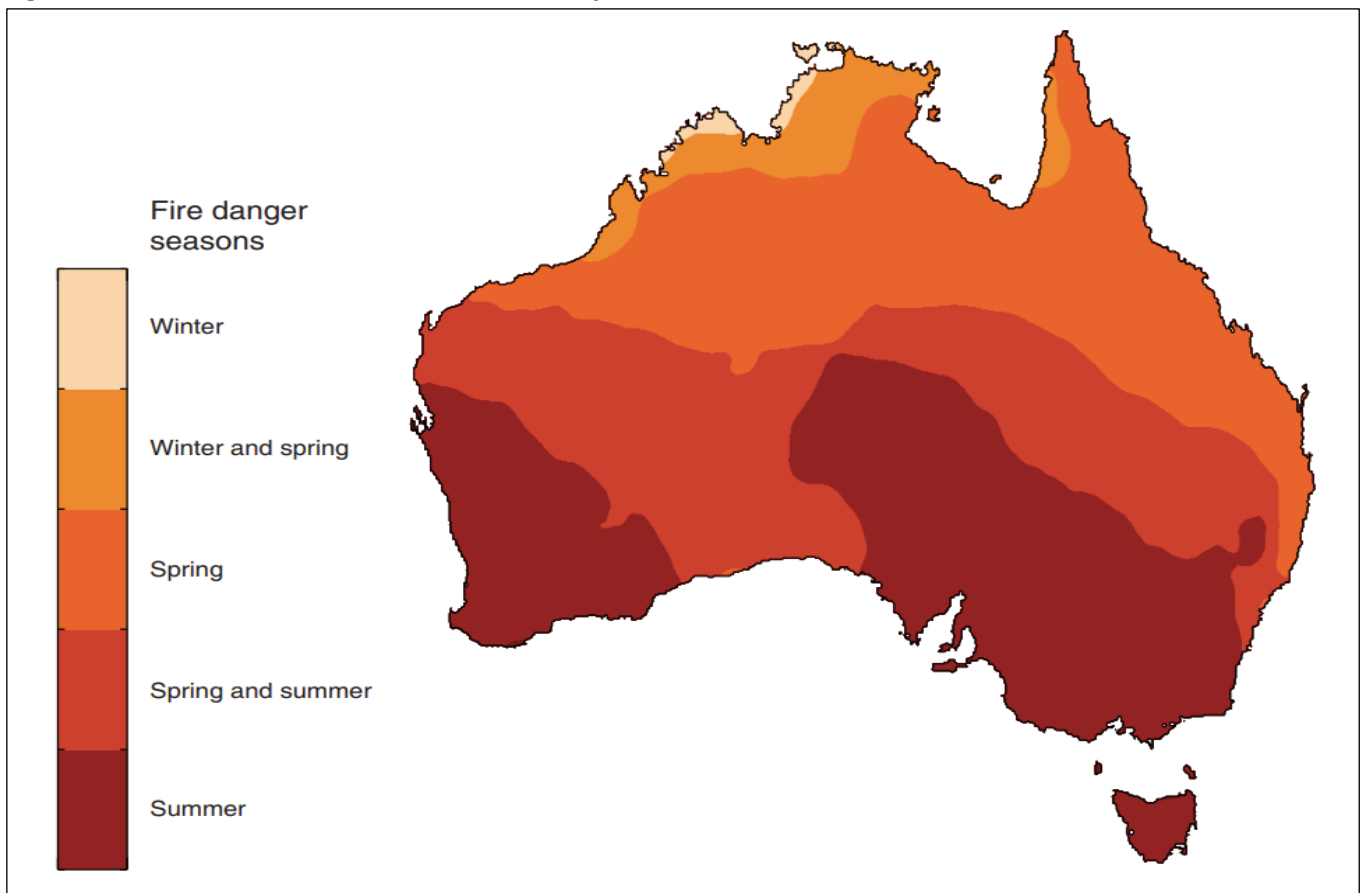
Key points

- Many of Australia's forests are flammable, particularly if dominated by eucalypts.
- Larger areas of frequent low intensity fires generally occur in northern Australia, and infrequent but more intense fires generally occur in eastern, southern and south-western Australia.
- Over the period 2016-17 to 2020-21,
 - a total of 46.9 million hectares (35%) of Australia's total forest area was burnt. The balance (65%) did not experience fire.
 - the largest national annual area of forest fire was 21.1 million hectares in 2019-20, of which 8.5 million hectares was burnt by the 2019-20 Black Summer bushfires in southern and eastern Australia.
 - the area proportion of fire that was unplanned fire was highest (79%) during 2019-20, driven by unusually large forest areas burnt by bushfires in southern and eastern Australia.
 - the lowest national annual area of forest fire was 10.5 million hectares in 2020-21.
 - the cumulative area of fire in forest was 77.4 million hectares when accounting for forest areas burnt in each year of the period, with 84% of the cumulative area of fire in forests in Queensland and the Northern Territory reflecting the high frequency of fire experienced in northern Australia.
- Of the cumulative area of fires in forests 35% was planned and 65% was unplanned over the period 2016-17 to 2020-21.

Fire in Australia's forests

Many of Australia's forests are flammable, particularly if dominated by eucalypts, and are adapted to a particular fire regime. Fires can be frequent but of relatively low intensity, as occur in much of northern Australia, or infrequent but more intense, as occur in eastern, southern and south-western Australia. Broadly, the incidence of fire in northern Australia usually occurs in winter and spring (monsoonal dry season) and is limited by fuel loads, while the incidence of fire in southern Australia usually occurs from spring into summer and is essentially limited by dryness of fuel (Figure 3.1b-1). For areas in northern New South Wales and southern Queensland, peak risk usually occurs in spring and early summer. The greatest extent of fire typically occurs in the Northern Territory and northern areas of Western Australia and Queensland, where large expanses of woodland forest are often ignited by lightning in the monsoonal dry season.

Figure 3.1b-1: Distribution of bushfire seasonality across Australia



Source: Dowdy (2020)

In Australia, planned fire is used by land managers to manage vegetation, and to protect properties from uncontrolled bushfire by reducing fuel loads. Indigenous Australians have long used fire as a land management tool, for example to maintain forest condition. The [National Bushfire Management Policy Statement for Forests and Rangelands](#) outlines Australian, state and territory governments' objectives and policies for the management of landscape-level fire in Australia's forests and rangelands. The statement was developed by the Forest Fire Management Group, a national body within the Australian Government ministerial council structure. A set of [Objectives and Key Performance Indicators](#) for the policy statement was released in October 2022.

Vegetation characteristics, weather patterns and their variability are among the key factors that affect the occurrence and severity of bushfires. Climate change is bringing more extreme weather conditions, longer bushfire seasons, and increasing occurrence of previously unusual events such as pyroconvection (the formation

of a thunderstorm within a fire plume), with higher summer temperatures and lower or more patchy rainfall increasing the risks of fire and the challenges associated with fire management. The elements of fire weather are described by the Australian Bureau of Meteorology [Fire Weather Knowledge Centre](#).

The fire area data used in this indicator were provided by state and territory agencies, and intersected by ABARES with the most recent forest extent dataset ([Forests of Australia \(2023\)](#)) to give the annual area of fire in forest in each jurisdiction for the five years from 2016-17 to 2020-21. Each year of data relates to Australia's financial year from 1 July to 30 June.

Most fire data were classified into planned and unplanned fires by the providing agency. If data were unavailable then ABARES attributed fires as planned or unplanned based on the fire season and the location of each fire.

Summary fire area data are reported both as the cumulative area of forest fire in the five years from 2016-17 to 2020-21 (i.e. the sum of the annual forest fire areas), and also as the total area of forest burnt during the five-year period (the net fire footprint over the five years, which can be a smaller area than the cumulative area as some forest areas are burnt in more than one year in that period). Reporting the cumulative area of forest burnt can provide insights into the total scale of fire in the landscape and as such the potential fire management effort, context for the dynamics of fire in the landscape, and implications for ecological impact within the reporting period.

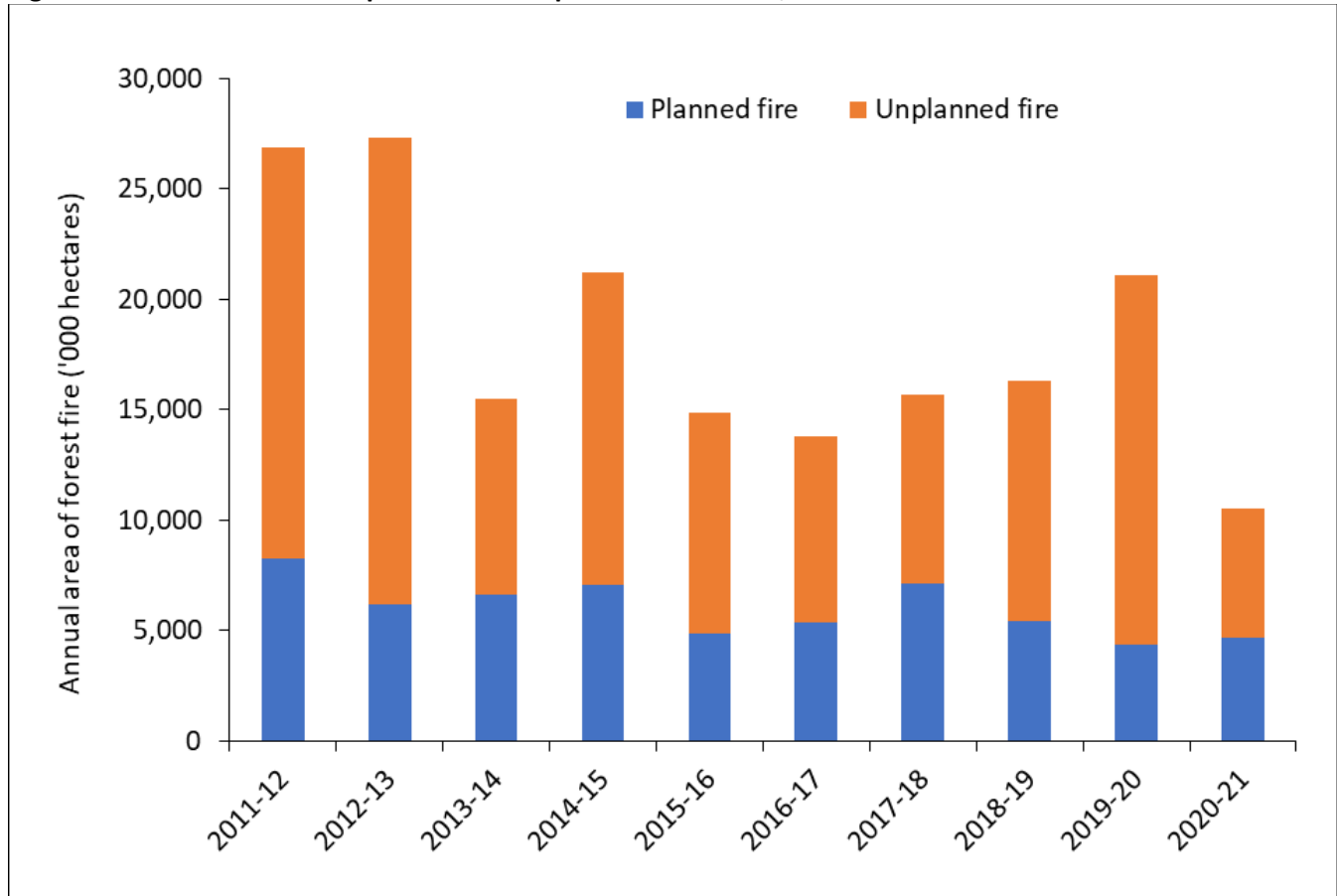
Comparisons to data published in [Australia's State of the Forests Report 2018](#) for the period 2011-12 to 2015-16 are also included to provide a 10-year overview as those data were collated by the same process.

Area of forest fire, by year and jurisdiction

The annual area of fire in Australia (planned and unplanned) varies substantially between individual years (Figure 3.1b-2). The largest national annual area of forest fire over the 10-year period from 2011-12 to 2020-21 was 27.3 million hectares in 2012-13 (Figure 3.1b-2). The lowest national annual area of forest fire in this period was 10.5 million hectares in 2020-21.

Between 2016-17 and 2020-21, the area of forest burnt by unplanned fire exceeded the area burnt by planned fire in each year (Figure 3.1b-2). Furthermore, over the reporting period the annual area of forest burnt by unplanned fire is more variable than the area burnt by planned fire. Between 2016-17 and 2020-21, the area proportion of fire that was unplanned fire was highest (79%) during 2019-20, driven by unusually large forest areas burnt by bushfires in southern and eastern Australia—especially in New South Wales, Victoria, Western Australia and the Australian Capital Territory—during that fire year, referred to as the Black Summer bushfires (Figure 3.1b-2 and Table 3.1b-5 in [Supporting information for Indicator 3.1b](#)).

Figure 3.1b-2: Annual area of planned and unplanned forest fire, 2011-12 to 2020-21



Source: State and territory spatial fire data; [Fires in Australia's forests 2011-16 \(2018\)](#) ABARES (2018); [Forests of Australia \(2023\)](#) (ABARES 2023a).

[Click here for a Microsoft Excel workbook of the data for Figure 3.1b-2.](#)

The total national cumulative forest fire area for the five fire seasons in the period 2016-17 to 2020-21 was 77.4 million hectares (Table 3.1b-1). This was calculated by summing the forest fire areas for the five individual years between 2016-17 and 2020-21. Of the cumulative forest fire area for 2016-17 to 2020-21:

- 50.6 million hectares (65%) was due to unplanned fire
- 26.9 million hectares (35%) to planned fire.

The Northern Territory and Queensland together accounted for 84% of the cumulative area of fire in forest for the five-year period 2016-17 to 2020-21, including 91% of the area of planned fire and 80% of the area of unplanned fire (Table 3.1b-5 in [Supporting information for Indicator 3.1b](#)).

The national cumulative forest fire area for the 2016-17 to 2020-21 period was 73% of the cumulative area reported for the previous five-year period (2011-12 to 2015-16) (Table 3.1b-1). This was driven by a reduction in fire areas across parts of northern Australia in both the Northern Territory (76%) and Queensland (61%). In contrast, the cumulative forest fire areas for each of the Australian Capital Territory, New South Wales and Victoria were substantially larger in the period 2016-17 to 2020-21 than in the period 2011-12 to 2015-16, driven by the unusually large areas of unplanned fire during 2019-20.

Table 3.1b-1: Cumulative areas of planned and unplanned forest fire, for the periods 2011-12 to 2015-16 and 2016-17 to 2020-21, by jurisdiction

Jurisdiction	Cumulative forest fire area ('000 ha)						Cumulative 2016-17 to 2020-21 fire area as a proportion of cumulative 2011-12 to 2015-16 fire area
	2011-12 to 2015-16			2016-17 to 2020-21			
	Planned fire	Unplanned fire	Total	Planned fire	Unplanned fire	Total	
ACT	17	0	17	4	83	87	512%
NSW	791	975	1,766	291	5,344	5,635	319%
NT	13,166	32,399	45,565	17,104	17,614	34,718	76%
Qld	13,159	36,743	49,902	7,289	23,034	30,323	61%
SA	24	279	302	17	200	217	72%
Tas.	60	147	208	74	160	234	113%
Vic.	526	498	1,025	225	1,653	1,878	183%
WA	5,184	1,837	7,022	1,871	2,463	4,334	62%
Australia	32,927	72,880	105,807	26,875	50,552	77,426	73%

Totals may not tally due to rounding.

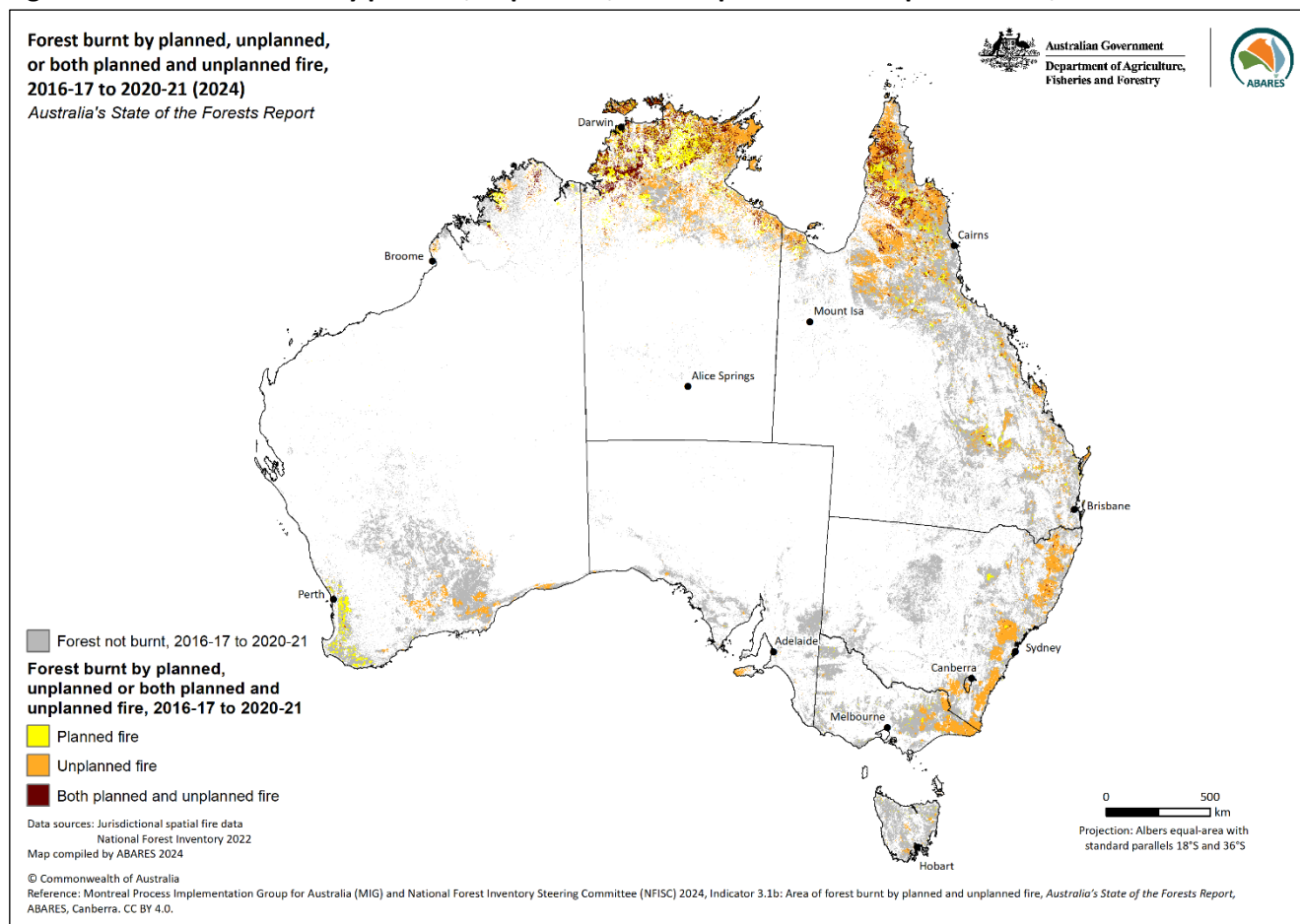
Source: State and territory spatial fire data; [Forests of Australia \(2023\)](#) ABARES (2023a).

[Click here for a Microsoft Excel workbook of the data for Table 3.1b-1.](#)

The annual forest fire areas by jurisdiction and planned/unplanned status for the period 2016-17 to 2020-21 are given in Table 3.1b-5 in [Supporting information for Indicator 3.1b](#).

Figure 3.1b-3 shows the distribution of forest areas burnt during the period 2016-17 to 2020-21, by planned/unplanned status. In south-eastern Australia, forest was burnt mostly by unplanned fire, whereas in south-western Australia forest was burnt mostly by planned fire. In northern Australia, significant areas were burnt by planned fire only, unplanned fire only, and by both planned and unplanned fire during this period.

Figure 3.1b-3: Forest burnt by planned, unplanned, or both planned and unplanned fire, 2016-17 to 2020-21



Source: State and territory spatial fire data; [Forests of Australia \(2023\)](#) ABARES.

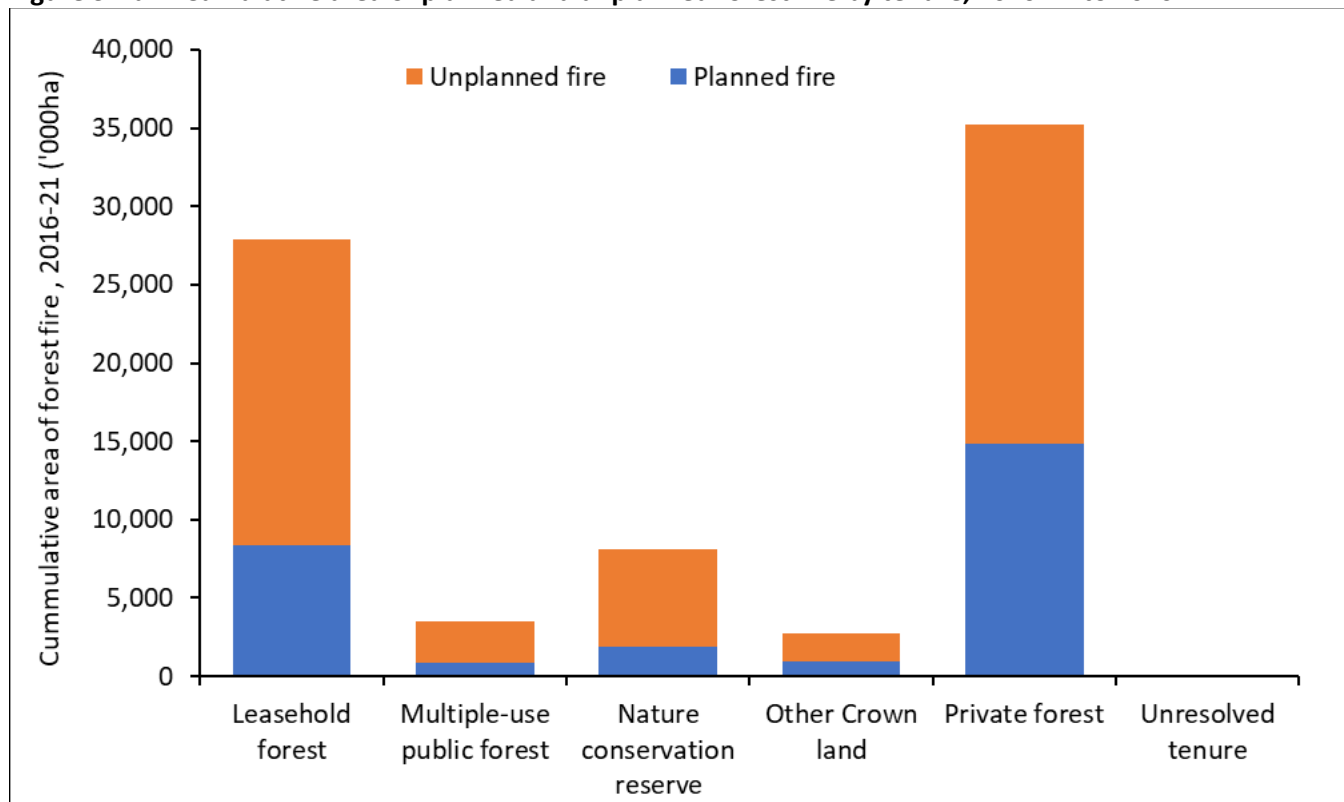
[Click here to download a high-resolution version of Figure 3.1b-3.](#)

Areas of forest fire by land tenure

The largest cumulative areas of fire in forest during the period 2016-17 to 2020-21 were in Private forests (35.2 million hectares) and Leasehold forests (27.8 million hectares) (Figure 3.1b-4).

Planned fire during this period consistently accounted for smaller proportions of total forest fire area than unplanned fire. By tenure class, the proportion of total forest fire area that was planned fire varied from 24% of forest in Nature conservation reserves and 25% in Multiple-use public forest, to 42% in Private forest. (See [Indicator 1.1a-ii for data and information on forests and land tenure](#)).

Figure 3.1b-4: Cumulative area of planned and unplanned forest fire by tenure, 2016-17 to 2020-21



Source: State and territory spatial fire data; [Forests of Australia \(2023\)](#) ABARES (2023a); [Tenure of Australia's forests \(2023\)](#) ABARES (2023b).

[Click here for a Microsoft Excel workbook of the data for Figure 3.1b-4.](#)

Areas of forest burnt one or more times, by year and jurisdiction

A total of 46.9 million hectares of forest (35% of Australia's total forest area) burnt one or more times in this period, with the largest areas in Queensland (18.1 million hectares) and the Northern Territory (17.5 million hectares) (Table 3.1b-2) (Figure 3.1b-5). This is substantially less than the cumulative area of forest burnt multiple times in this period (77.4 million hectares, Table 3.1b-1) because some areas of forest were burnt multiple times in the five-year period from 2016-17 to 2020-21.

Of the 46.9 million hectares of forest that burnt one or more times during the five-year period 2016-17 to 2020-21, 28.3 million hectares was burnt once, and 18.7 million hectares of forest burnt two or more times. Of the forest burnt multiple times, 10.4 million hectares was burnt twice, and 0.6 million hectares was burnt five times (the latter mostly in Queensland and the Northern Territory) (Table 3.1b-2). The largest areas of forest that burnt two or more times were in Queensland (7.6 million hectares) and the Northern Territory (10.3 million hectares), together comprising 96% of the area of forest burnt two or more times. Most areas of forest burnt in southern Australia burnt only once during this period (Figure 3.1b-5).

A total of 86.6 million hectares of forest (65% of Australia's forest area) did not burn during the five-year period 2016-17 to 2020-21. South Australia (96%) and Tasmania (94%) had the highest proportions of forest area that was not burnt during this period.

Table 3.1b-2: Area of forest burnt by number of times burnt, by jurisdiction, 2016-17 to 2020-21

Jurisdiction	Total forest area ('000 ha)	Area of forest burnt by number of times burnt, 2016-17 to 2020-21 ('000 ha)							
		Not burnt	One time	Two times	Three times	Four times	Five times	One or more times	Two or more times
ACT	143	58	83	2	0	0	0	85	2
NSW	20,284	14,849	5,238	195	2	0	0	5,436	197
NT	23,333	5,866	7,187	5,366	3,217	1,340	355	17,467	10,280
Qld	51,976	33,873	10,502	4,425	2,032	847	297	18,104	7,602
SA	5,131	4,915	216	0.6	0	0	0	217	1
Tas.	3,707	3,478	225	4	0.03	0	0	229	4
Vic.	8,224	6,376	1,819	28	1	0.04	0	1,848	29
WA	20,766	17,223	2,981	369	162	31	1	3,543	563
Australia	133,565	86,637	28,250	10,391	5,415	2,218	653	46,928	18,678
Proportion of total national area of forest		65%	21%	8%	4%	2%	0.5%	35%	14%

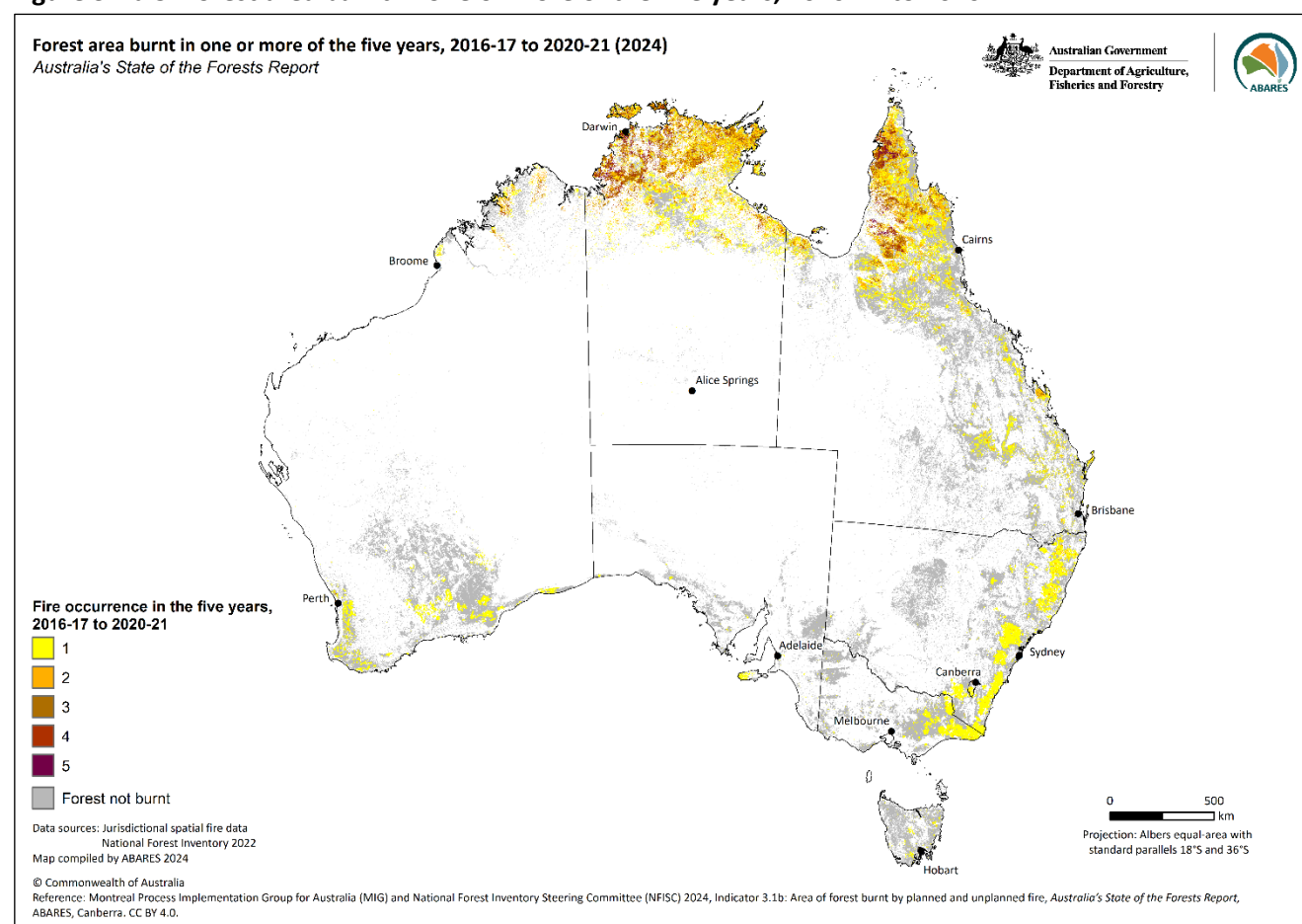
Includes both planned and unplanned fire.

Totals may not tally due to rounding.

Source: State and territory spatial fire data; [Forests of Australia \(2023\)](#) ABARES (2023a).

[Click here for a Microsoft Excel workbook of the data for Table 3.1b-2.](#)

Figure 3.1b-5: Forest area burnt in one or more of the five years, 2016-17 to 2020-21



Source: State and territory spatial fire data; [Forests of Australia \(2023\)](#) ABARES (2023a).

[Click here to download a high-resolution version of Figure 3.1b-5.](#)

Areas of forest burnt one or more times, by tenure and jurisdiction

Of the 46.9 million hectares of forest burnt in the period 2016-17 to 2020-21, the largest areas of forest that burnt were in Private forest (18.2 million hectares, 43% of the forest on that tenure) and Leasehold forest (16.6 million hectares, 35% of the forest on that tenure) (Table 3.1b-3). Forest burnt on these two typically privately managed tenures comprises 74% of the total area of forest burnt in Australia in this period.

Forest in Nature conservation reserves (6.7 million hectares, 30% of the forest on that tenure) and Multiple-use public forest (3.3 million hectares, 31% of the forest on that tenure) also had significant proportions of forest area burnt during this period.

Most of the forest burnt in the period 2016-17 to 2020-21 in southern Australia occurred on publicly managed tenures of Nature conservation reserve and Multiple-use public forest (with most of this by unplanned fire). In Queensland and the Northern Territory, most of the forest burnt was on Private and Leasehold tenures, and was burnt by a combination of planned and unplanned fire.

Table 3.1b-3: Area of forest burnt one or more times, by tenure and jurisdiction, in the five-year period 2016-17 to 2020-21

Jurisdiction	Forest area burnt one or more times in the five-year period 2016-17 to 2020-21 (‘000 hectares)							Proportion of total area burnt
	Leasehold forest	Multiple-use public forest	Nature conservation reserve	Other Crown land	Private forest	Unresolved tenure	Total	
ACT	2	1	81	0.05	0.01	0	85	0.2%
NSW	25	969	2,867	129	1,445	1	5,436	12%
NT	5,996	0	8	409	11,045	8	17,467	37%
Qld	10,342	671	1,388	232	5,467	3	18,104	39%
SA	47	1	116	2	49	0	217	0.5%
Tas.	0.03	85	57	22	64	0	229	0.5%
Vic.	0	1,088	679	6	75	0	1,848	4%
WA	218	533	1,495	1,239	58	0	3,543	8%
Australia	16,631	3,349	6,692	2,040	18,203	13	46,928	100%
Forest area burnt as a proportion of total forest area on that tenure	35%	31%	30%	22%	43%	6%	35%	

Includes both planned and unplanned fire. Forest areas burnt on multiple occasions are counted only once in the total forest area burnt. Totals may not tally due to rounding.

Source: State and territory spatial fire data; [Forests of Australia \(2023\)](#) ABARES (2023a); [Tenure of Australia’s forests \(2023\)](#) ABARES (2023b).

[Click here for a Microsoft Excel workbook of the data for Table 3.1b-3.](#)

Area of commercial plantation burnt

A total of 228 thousand hectares of commercial plantation area were burnt during the period 2016-17 to 2020-21. This represents 13% of Australia’s commercial plantation area (Table 3.1b-4). The area of commercial plantation burnt comprises bushfires, post-harvest burns, and light ground burns to reduce fuel loads.

The largest area of commercial plantation burnt during the period 2016-17 to 2020-21 was in New South Wales (97 thousand hectares), which is 43% of the total area of commercial plantation burnt in Australia during this period, and 26% of the area of commercial plantation in New South Wales.

Of the commercial plantation area burnt during this period, 61% (139 thousand hectares) was burnt during 2019-20. During that year, New South Wales (88 thousand hectares), South Australia (18 thousand hectares) and Victoria (10 thousand hectares) had the largest areas of commercial plantation affected by fire.

The potential impacts of the 2019-20 fire on forestry and the wood processing sector are reported in [ABARES Insights paper - Issue 6, 2020](#).

Table 3.1b-4: Area of commercial plantation burnt, by jurisdiction and by year, in the five-year period 2016-17 to 2020-21

Jurisdiction	Area of commercial plantation ('000 hectares)	Area of fire in commercial plantation ('000 hectares)					Total fire 2016-17 to 2020-21	Proportion of total area of fire in jurisdiction's commercial plantation, 2016-17 to 2020-21
		2016-17	2017-18	2018-19	2019-20	2020-21		
ACT	10	0.3	0.2	0.1	0.01	0	1	6%
NSW	368	4	3	1	88	2	97	26%
NT	47	2	7	7	6	6	27	58%
Qld	214	3	2	3	4	3	15	7%
SA	176	<0.01	<0.01	0.4	18	0.04	19	11%
Tas.	288	3	4	8	7	3	26	9%
Vic.	403	<0.01	1	3	10	0.01	14	4%
WA	317	5	7	6	6	6	29	9%
Australia	1,821	17	24	28	139	19	228	13%

Total area of fire in commercial plantation is the sum of the five annual area totals.

Totals may not tally due to rounding.

Differences between the numbers reported here and those reported in *State of the Forests Tasmania Report 2022* are a result of different input datasets for plantations.

Source: State and territory spatial fire data; [Forests of Australia \(2023\)](#) ABARES (2023a).

[Click here for a Microsoft Excel workbook of the data for Table 3.1b-4.](#)

Supporting information for Indicator 3.1b: Area of forest burnt by planned and unplanned fire

Area of forest fire by year, jurisdiction and planned/unplanned status, 2016-17 to 2020-21: full table

The area of planned fire remained relatively constant in most jurisdictions over the period of 2016-17 to 2020-21 (Table 3.1b-5). The area of unplanned fires was also relatively constant in the Northern Territory and Queensland. However, the area of unplanned fires in the other jurisdictions varied widely, mostly reflecting the 2019-20 bushfires across southern and eastern Australia.

Table 3.1b-5: Annual area of fire in forest by jurisdiction, for planned and unplanned fire, 2016-17 to 2020-21

Fire type and jurisdiction	Area of fire in forest ('000 hectares)					Cumulative area of fire in forest, 2016-17 to 2020-21	Proportion of cumulative area of fire in forest, 2016-17 to 2020-21
	2016-17	2017-18	2018-19	2019-20	2020-21		
Planned Fire							
ACT	1	1	2	0	0.1	4	0.02%
NSW	13	240	3	4	31	291	1%
NT	3,158	4,987	3,202	2,598	3,158	17,104	64%
Qld	1,253	1,514	1,885	1,525	1,111	7,289	27%
SA	8	2	2	1	4	17	0.1%
Tas.	17	17	14	12	14	74	0.3%
Vic.	43	36	56	23	67	225	1%
WA	859	343	224	191	255	1,871	7%
Australia	5,352	7,140	5,388	4,355	4,639	26,875	100%
Unplanned fire							
ACT	0	0.1	0.2	82	0	83	0.2%
NSW	168	22	230	4,912	12	5,344	11%
NT	1,798	3,645	4,936	4,567	2,668	17,614	35%
Qld	6,272	4,421	4,860	4,384	3,097	23,034	46%
SA	14	6	3	171	8	200	0.4%
Tas.	5	9	111	33	2	160	0.3%
Vic.	7	38	194	1,411	4	1,653	3%
WA	202	402	597	1,184	77	2,463	5%
Australia	8,466	8,543	10,931	16,743	5,868	50,552	100%
All fire							
ACT	1	1	2	82	0.1	87	0.1%
NSW	181	262	233	4,917	43	5,635	7%
NT	4,956	8,632	8,138	7,165	5,827	34,718	45%
Qld	7,525	5,935	6,745	5,909	4,208	30,323	39%
SA	22	7	5	172	11	217	0.3%
Tas.	22	26	125	45	16	234	0.3%
Vic.	50	74	250	1,434	71	1,878	2%
WA	1,061	745	821	1,374	332	4,334	6%
Australia	13,818	15,683	16,319	21,098	10,508	77,426	100%

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.

Totals may not tally due to rounding.

Source: State and territory spatial fire data; [Forests of Australia \(2023\)](#) ABARES (2023a).

[Click here for a Microsoft Excel workbook of the data for Table 3.1b-5.](#)

Mapping the area of forest affected by planned and unplanned fire

Australia has no ongoing, nationally coordinated approach to the systematic mapping and reporting of fire areas. Geoscience Australia produced the [Historical Bushfire Boundaries](#) dataset in response to the 2019-20 bushfires, which aggregates burnt areas data supplied by states and territories from the early 1900s through to 2023 (excluding the Northern Territory).

For this national update, which was recommended by the [Forest Fire Management Group](#) (FFMG) and applied for reporting in [Australia's State of the Forest Report 2018](#), spatial coverages of fires were sourced from each state and territory, either by direct provision by relevant state or territory agencies or by accessing the relevant data portal. Most states and territories create their fire area dataset from multiple sources, including satellite imagery, aerial photography, aerial reconnaissance, and operational and on-ground knowledge and measurement (Table 3.1b-6).

State and territory datasets were separated into financial years (1 July to 30 June) and converted to a 100-metre raster (grid) dataset. Each pixel in each annual raster dataset was attributed with one of three possible fire type values: Planned fire, Unplanned fire, or Unburnt. Fire data were already attributed into these classifications for all states and territories except Queensland and the Northern Territory. In these two jurisdictions, fires occurring between December and July were classified as planned fire and fires occurring between August and November as unplanned fire. The classified datasets were then combined with the [Forests of Australia \(2023\)](#) and [Tenure of Australia's forests \(2023\)](#) datasets to generate statistics on forest area affected by fire in each financial year, by fire type (planned or unplanned), forest type (including commercial plantations) and tenure. Each hectare was only counted once in any given year, even if it burnt more than once in that year.

Table 3.1b-6: Sources of fire data for the five-year period 2016-17 to 2020-21, by state and territory

Jurisdiction	Brief description of fire data
ACT	Fire data, in vector format and classified into planned and unplanned fire, were supplied by the ACT Parks and Conservation Service. The original data were captured from a combination of high-resolution satellite imagery, aerial photos and ground-based mapping.
NSW	Fire data, in vector format and classified into planned and unplanned fire, were supplied by the NSW Rural Fire Service. The original data were captured from a combination of high-resolution satellite imagery, aerial photography and ground-based mapping.
NT	Fire data, in raster format and not classified into planned and unplanned fire, were downloaded from the Northern Australian Fire Information website. The original data were captured from a combination of MODIS, Landsat and Sentinel-2 satellites. Based on advice from NT Department of Environment, Parks and Water Security, ABARES classified fires occurring between December and July to planned fire, and fire occurring between August and November to unplanned fire.
Qld	Queensland data were downloaded from the Queensland Department of Environment and Science data portal . Queensland Parks and Wildlife Service data are vector format and classified into planned and unplanned fire. The original data were captured from a combination of field GPS mapping and digitisation of aerial photos. Queensland Department of Environment and Science data are in raster format and not classified into planned and unplanned fire. The original data were captured from fires scars detected and mapped by Landsat and Sentinel-2 satellites. Based on advice from Queensland Department of Environment and Science, ABARES classified fires occurring between December and July to planned fire and fires occurring between August and November to unplanned fire. Each dataset was converted to a 100-metre raster for each year, which were then combined. Where a pixel was identified as burnt by both sources, preference in the classification as being planned or unplanned fire was given to the Queensland Parks and Wildlife Service dataset.

Jurisdiction	Brief description of fire data
SA	Fire data, in vector format and classified into planned and unplanned fire, were downloaded from the South Australia Government Data Directory . The original data were captured from a combination of high-resolution satellite imagery, aerial photos and ground-based mapping.
Tas.	Fire data, in vector format and classified into planned and unplanned fire, were supplied by the Department of Natural Resources and Environment Tasmania. The original data were captured from a combination of high-resolution satellite imagery, aerial photos and ground-based mapping.
Vic.	Fire data, in vector format and classified into planned and unplanned fire, were downloaded from the Victorian government data portal, DataVic . The original data were captured from a combination of high-resolution satellite imagery, aerial photography and ground-based mapping.
WA	Fire data, in vector format and classified into planned and unplanned fire, were downloaded from the Western Australian data portal, Data WA . The original data were captured from a combination of MODIS, Landsat and Sentinel-2 satellite imagery, high-resolution aerial photography and ground-based mapping.

Case study: the 2019-20 Black Summer bushfires in southern and eastern Australia

Bushfires in southern and eastern Australia in 2019-20 started during Australia’s hottest and driest year on record (Australian Government 2020). Much of the country was in drought, and the first bushfire started on the east coast in August 2019, before the start of the official summer bushfire season. Through the second half of 2019, southern and eastern Australia experienced multiple large-scale and intense fires, in what became known as the ‘Black Summer bushfires’. The bushfires had major impacts on many rural communities, causing property, farm, livestock and wildlife losses and affecting local tourism and economies (Davey and Sarre 2020). During the peak of the fires in January 2020, ash and smoke from the fires were reported in New Zealand, and smoke was reported near South America (Putman 2020). NASA reported that 80% of Australians were exposed to poor air quality as a direct result of the fires (NASA 2020). A total of 33 people died as a direct result of the fires, including nine firefighting personnel comprising three American aircrew and three Rural Fire Service volunteer firefighters in New South Wales, and three members of Forest Fire Management Victoria (Davey and Sarre 2020). According to the [Royal Commission into National Natural Disaster Arrangements Report](#):

Many Australians were impacted, directly or indirectly, by the fires. Tragically, 33 people died and extensive smoke coverage across much of eastern Australia may have caused many more deaths. Over 3,000 homes were destroyed. Estimates of the national financial impacts are over \$10 billion. Nearly three billion animals were killed or displaced and many threatened species and other ecological communities were extensively harmed.

A total of 10.3 million hectares in southern and eastern Australia were affected by fire to the end of April 2020, of which 8.5 million hectares (82%) was forest comprising 8.3 million hectares of native forest, 130 thousand hectares of commercial plantation and 22 thousand hectares of other forest (ABARES 2020). Fire extent and severity data between July 2019 and June 2020 can be derived from the [Australian Google Earth Engine Burnt Area Map](#) (DCCEEW 2022).

The national extent of areas affected by fire between 1 July 2019 and 22 June 2020 is shown in Figure 3.1b-6. This shows a typical fire season in northern Australia plus the atypical fire season in southern and eastern Australia. Relative to historical bushfires, the spatial extent and severity of the Black Summer bushfires of 2019-20 is consistent with the progressive influence of climate change on bushfire regimes globally (Lindenmayer et al. 2023).

The long-term impacts of the 2019-20 bushfires on biodiversity outcomes are not yet known. However, the area burnt overlaps with substantial proportions of the ranges of a number of threatened and migratory species, some of which are listed as Critically Endangered, including the Regent Honeyeater (*Anthochaera phrygia*), Swift Parrot (*Lathamus discolor*), northern (Pseudophryne pengilleyi) and southern corroboree frog (*P. corroboree*), Wollemi pine (*Wollemia nobilis*), Bago leek-orchid (*Prasophyllum bagoense*) and Brandy Marys leek-orchid (*P. innubum*) (Ward et al. 2020; DEE 2020). The fires on Kangaroo Island occurred across 89% of the range of Kangaroo Island Southern Emu-wren (*Stipiturus malachurus halmaturinus*) and 69% of the range of the Glossy Black-cockatoo (Kangaroo Island) (*Calyptorhynchus lathami halmaturinus*) (DAWE 2020). The Kangaroo Island dunnart (*Sminthopsis aitkeni*) had 96% of its range burnt at high severity (DAWE 2020).

The Australian Government invested \$200 million in the emergency response and to support the recovery of ecosystems and threatened species after the 2019-20 bushfires. A list of [species and threatened ecological communities](#) prioritised for urgent management intervention (92 vertebrate fauna, 213 invertebrates, 486 flora, and 19 threatened ecological communities) was developed by an expert panel to target recovery actions. Recovery actions include installing nest boxes, targeted pest and weed control, and erosion control. For example, on Kangaroo Island work to promote the recovery of the Kangaroo Island dunnart includes feral cat control, fencing of critical areas and habitat restoration.

In Australia, state and territory governments have primary responsibility for the protection of life, property and the environment. New South Wales, South Australia, Victoria and the Australian Capital Territory conducted inquiries into the 2019-20 bushfires. At the national level, a senate inquiry and the Royal Commission into National Natural Disaster Arrangements were established, with the Royal Commission making recommendations on reforms and actions required to enable state and territory governments to be better prepared for future emergencies. Australian Government responses included:

- establishing the [National Emergency Management Agency](#) to coordinate and manage national-level emergency responses
- funding research to address the major challenges arising from natural hazards, including bushfires, floods, cyclones, heatwaves and storms
- establishing the Wildlife and Threatened Species Bushfire Recovery Expert Panel to provide scientific input and contribute to the assessment of fire impacts on animals, plants, ecological communities and other natural assets, and to identify priority species and recovery actions.

In Victoria, the Commonwealth and Victorian Governments undertook a [Major Event Review](#) to assess the impacts of the fires and identify remedial actions to address the impact of the 2019-20 bushfires in relation to Regional Forest Agreement Regions.

Figure 3.1b-6: National indicative aggregated extent of 2019-20 bushfires

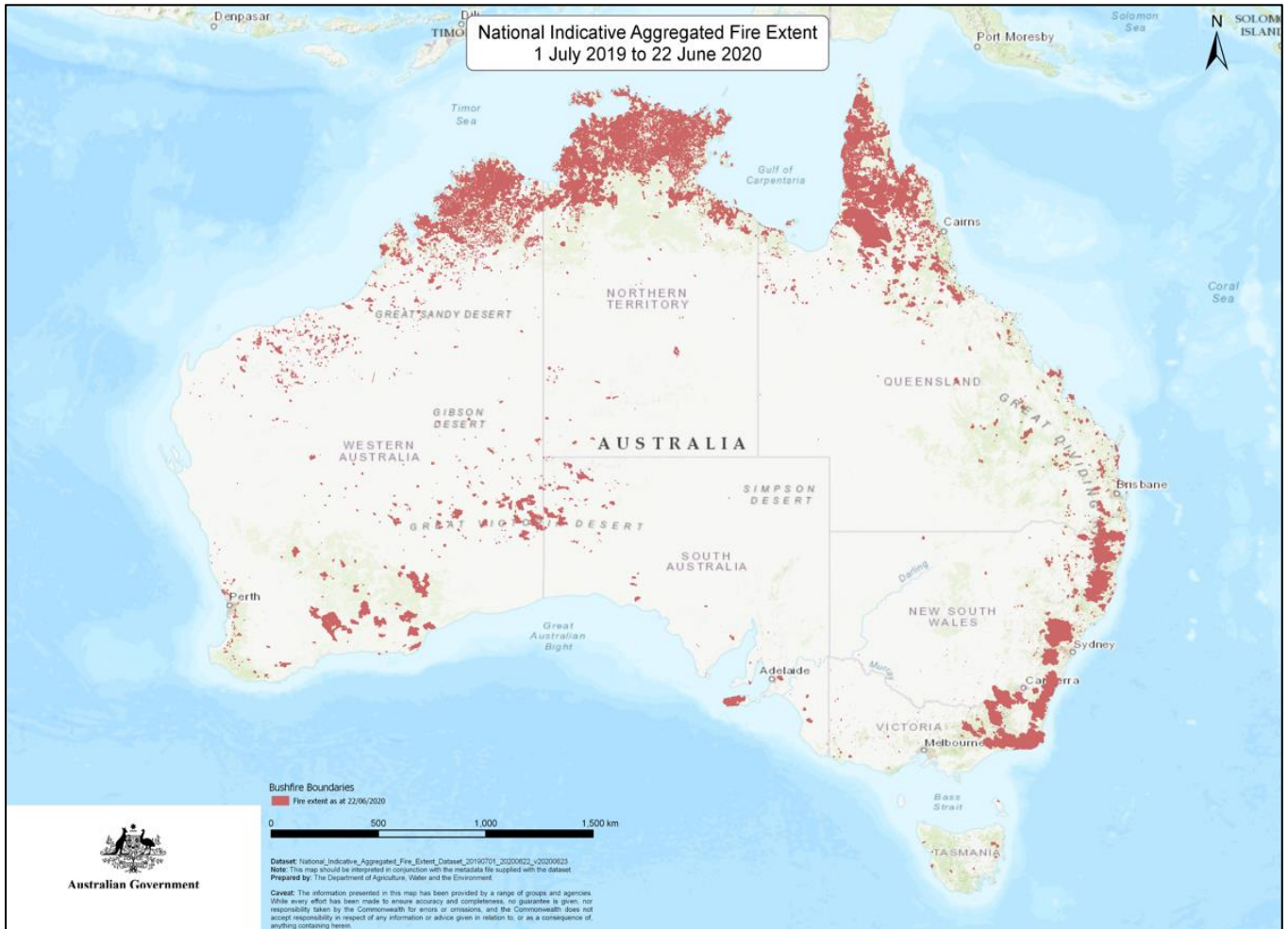


Image is based on the National Indicative Aggregated Fire Extent Dataset ([NIAFED v20200623.zip](#)).

Source: DCCEEW (2022)

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More information

Learn more about the [Criterion 3 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 3.1b.](#)

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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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