Australia's Environment | 2023 REPORT

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Overview

The year 2023 was one of opposites, with environmental conditions swinging from wet to dry and back.

Globally, climate change accelerated with greenhouse gas emissions accelerating and global warming shattering new records in sea level rise, sea ice loss and temperatures in the oceans and atmosphere.

For Australia, 2023 was the eighth hottest year on record. The year began wet with average temperatures, continuing the La Niña conditions of the previous three years. Northern Australia experienced a wet monsoon season, providing relief after the previous dry years.

Wet conditions gave way to dry and unseasonably warm weather from May to October. River flows, wetlands and water reservoirs all declined from the very high 2022 levels but were still well above average.

Growing conditions were generally very good because of high soil water reserves at the start of the year and the warm and sunny cool season.

The warm and dry winter months did cause an early start of the fire season, as early as August in NSW. An intense fire season was expected but averted when wet conditions returned in November, despite a switch to El Niño climate circulation.

In December, very warm ocean temperatures east of Australia contributed to a cyclone and several storm systems that caused flooding across Queensland and Victoria.

The recovering Great Barrier Reef remained stable, but the impact of the high temperatures, a cyclone and river-borne sediments later in the year is not known yet.

The number of threatened species increased sharply, mostly as a delayed effect of the 2019/20 Black Summer bushfires.

An update to the Threatened Species Index in 2023 revealed continuous and compounding declines for threatened bird populations across Australia.

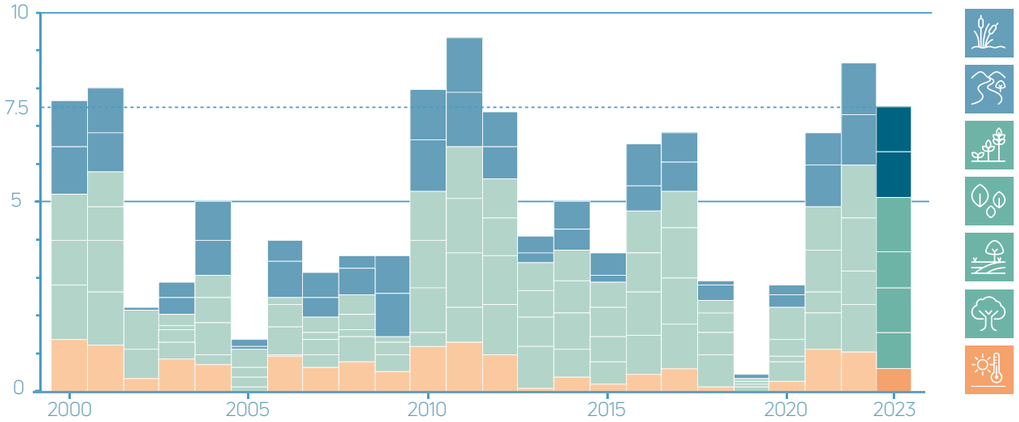
The greatest threats to Australia's biodiversity continue to be climate change, invasive species and habitat destruction. Among invasive species, the further spread of cane toads is of significant concern.

Averaged of the year, most environmental indicators declined somewhat from very high values in 2022 but remained well above average, contributing to an overall Environmental Condition Score of 7.5.

Yellow-footed rock wallaby - Endangered
Photo credit: Joshua Bergmak

Summary Indicators

A change from La Niña to El Niño conditions halfway through 2023 brought a change from wet to dry and relatively warm weather and a decline in environmental indicators, but overall conditions remained well above average.



National ECS and its components for 2000–2023

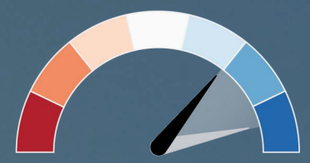
The National Environmental Condition Score (ECS) fell by 1.2 points out of ten to reach 7.5 points, which is still the second-highest score since 2011 after the high score in 2022.

The Environmental Condition Score is a score between 0 and 10 expressing condition relative to previous years. It is calculated as the average rankings of component scores (from top to bottom in the bar graph): inundation, streamflow (blue), vegetation growth, leaf area, soil protection, tree cover (green) and the number of hot days (orange).

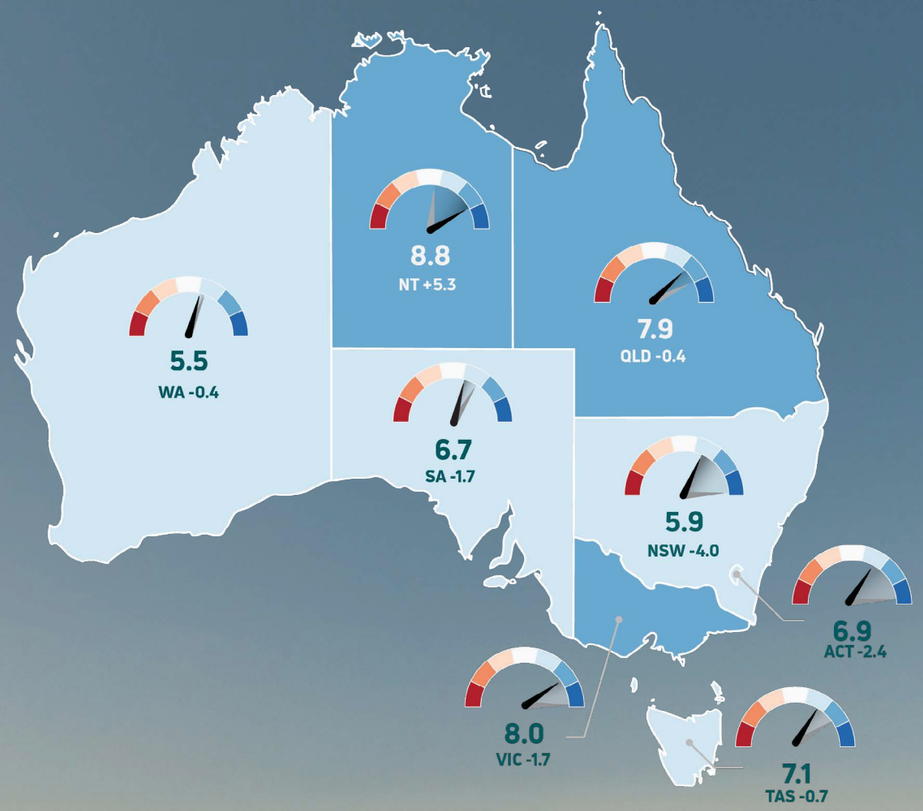
National and State Environment Condition Score (ECS)

ECS scores declined everywhere except in the Northern Territory, where it increased by 5.3 points to reach 8.8, the highest value of all states and territories after a very low score in 2021.

The largest decline of -4.0 occurred in NSW, where extremely high scores occurred the previous year. The lowest value overall was 5.5, recorded in WA where environmental scores declined for a second year.



7.5
AUS -1.2



ECS by State and Territory and change from the previous year

National Environment Indicators at a glance

Numbers represent the relative change from 2000–2023 average conditions. Such a change can be part of a long-term trend or be within normal variability. Details on each of the indicators shown are provided in this report.

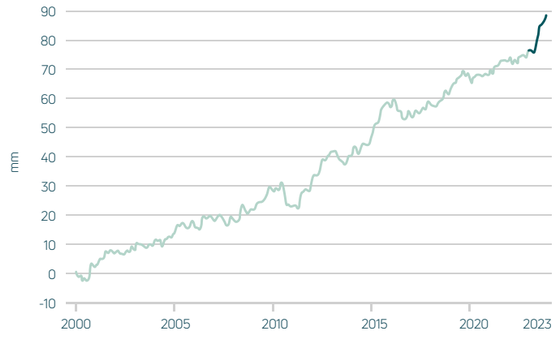
+5% Ozone hole	+0.09°C Ocean temperature	+19% Population	+0.26°C Mean temperature	+4% Days over 35°
+1% Rainfall	+61% Biomass burnt	+32% River flows	+32% Wetlands	+3% Soil moisture
+10% Soil protection	+3% Leaf area	+34% Plant growth	+7% Tree cover	+25% Threatened species

Change in abundance relative to 2000 (latest data are for 2020)

-55% Birds	-46% Mammals	-71% Plants	-61% All threatened species

Global Change

Globally, CO_2 emissions and climate change are accelerating. 2023 saw the highest temperatures in the atmosphere and in the oceans ever recorded, the least sea ice ever observed, and a rapid increase in sea level.



Global mean sea level rise from 2000 values (NOAA)

Atmospheric CO_2 concentration increased by 2.6 ppm, which is 41% faster than the previous year and 16% faster than the average 2000–2022 growth rate. The rapid increase was due to a combination of ever-increasing fossil fuel emissions and a change to El Niño conditions during 2023. The average CO_2 concentration reached 421 ppm, a 33% increase from 1960.

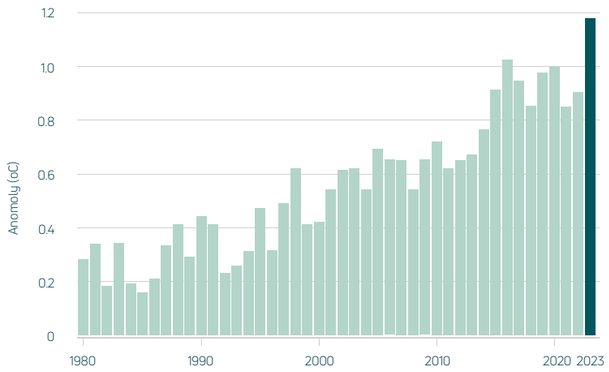
Global average air temperature was the highest on record by a considerable margin. It was 0.32 °C higher than the previous year and 1.18 °C above the 20th-century average. The last ten years (2014–2023) all rank as the ten warmest on record.

The maximum ozone hole extent was 2% smaller than the previous year. It was 5% larger than the 2000–2022 average but 13% below the maximum extent observed in 2000. The ozone hole has not shrunk over the last two decades but may have stabilised.

Oceans absorb 93% of excess heat from climate change. Global ocean heat content increased by 4.8% compared to the previous year. Globally, sea surface temperatures were the highest on record in 2023.

The global mean sea level rose by 11.7 mm in 2023; the most rapid rise since 2015. Sea level has increased by 85 mm since 2000 and 101 mm since 1993.

Sea ice extent was 2% less than the previous year in the Arctic and 8% less around Antarctica, where it broke the record set the previous year. Ice extent on both hemispheres combined was 5.0% less than the previous year, the lowest on record and 9.5% lower than the 2000–2022 average.



Global mean air temperature (difference from 1901-2000 average) (NOAA)

Global ocean warming

+4.8%

HEAT INCREASED FROM 2022

Oceans

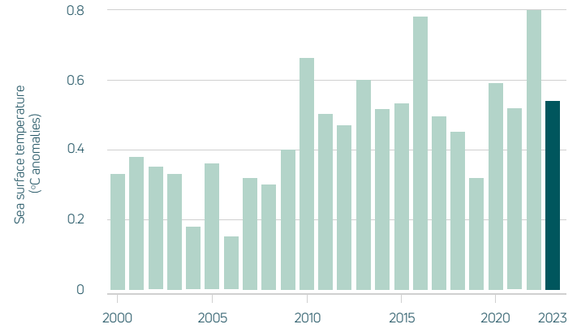
Ocean temperatures around Australia were below 2022 record values. The condition of the Great Barrier Reef remained stable.

Ocean surface temperatures were above average everywhere around Australia but below the record temperatures observed the previous year.

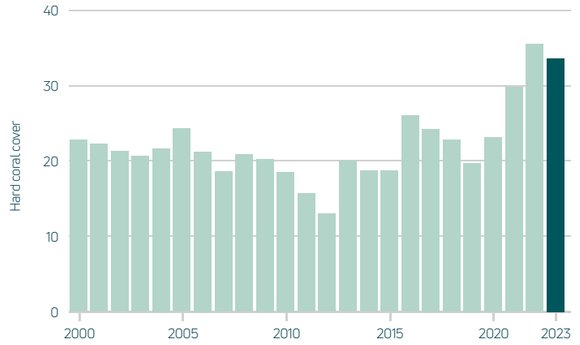
Mean sea surface temperature was 0.54 °C above 1961–1990 average, lower than the previous year and 0.09 °C above the 2000–2022 average. The increase in temperature is in line with clearly rising ocean temperatures since around 1970.

The Great Barrier Reef (GBR) did not experience a mass bleaching event in 2023. Marine surveys of hard coral cover, an indicator of overall reef health, are undertaken each year ending June. Data for 2022/23 showed that the recovery of hard corals after a bleaching event in early 2022 stabilised in 2022/2023. Relatively few crown-of-thorns starfish outbreaks were recorded.

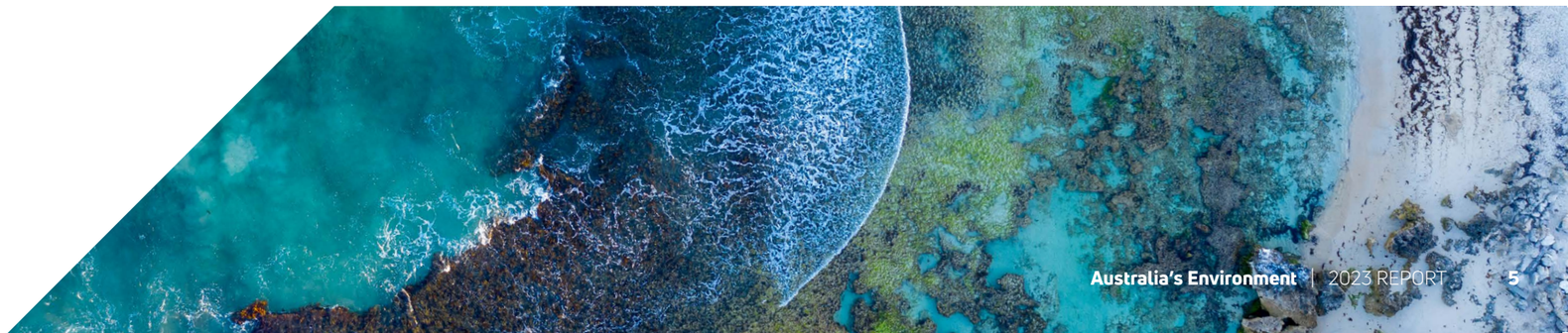
An El Niño developed in the second half of 2023, and sea temperatures increased towards the end of the year. In December, Tropical Cyclone Jasper caused potentially damaging wind speeds and high river flows. The impacts of these changes on the reef are not yet known.



Australian region average sea surface temperature expressed as the difference from 1961-1990 average values (BoM / NOAA)



Hard coral cover across the Great Barrier Reef (AIMS)

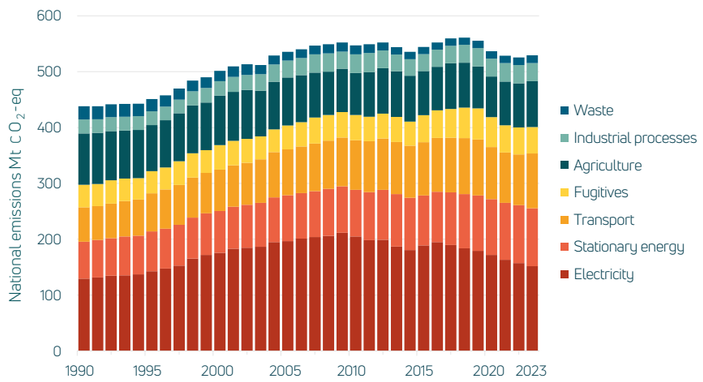


Australia's population

+41%

SINCE 2000

People



Australian greenhouse gas emissions by category (ex. land cover change) (DAWE)

Australia's population grew rapidly and carbon emissions increased after falling for four years.

Australia's population grew by 3.5% or more than 650,000 people to reach 27 million people by the end of 2023, a 41% increase since 2000. Population growth was the most rapid in decades, mainly due to immigration.

Building approvals provide a ready, if imperfect, measure of land and resource use for construction. Approvals in 2023 declined for a second year by 15% from the previous year. Approvals fell to the lowest level since 2012 and were 11% below the 2000–2022 average.

Greenhouse gas emissions (not including land use change) increased for the first time since 2018, by 0.7% from the previous year. They were still 1.7% below the 2000–2022 average.

Compared to the previous year, emissions continue to decrease in electricity generation (-3.5%), fugitives (-1.7%) and industrial processes (-0.6%) and remained nearly unchanged for waste and stationary energy (+0.1%), but increased for transport (+7.8%) and agriculture (+3.8%). The increase in transport emissions alone more than offsets the reductions achieved in other sectors.

According to Government statistics, new forests exceeded forest removals, resulting in a net uptake of 64 Mt CO_2 equivalents, identical to the preceding two years. This number is theoretical and only accounts for a small part of the landscape carbon balance. It does not include net gains or losses related to weather conditions or bushfires, for example.

Per capita emissions, expressed per individual, fell slightly, by -0.35% from the previous year to 19.6 tonnes CO_2-equivalents, 25% below the peak of per capita emissions around 2000-2005. This is because of rapid population growth in 2023.

Australia is the world's 15th largest emitter, contributing slightly over 1% of global emissions in 2023.

Per capita, Australians are the 10th worst greenhouse gas emitters, just after Saudi Arabia. Australians emits 3.3 times more than the global average and 2 times more than a Chinese person.

Weather

Rainfall was near average, despite a dry winter and spring.

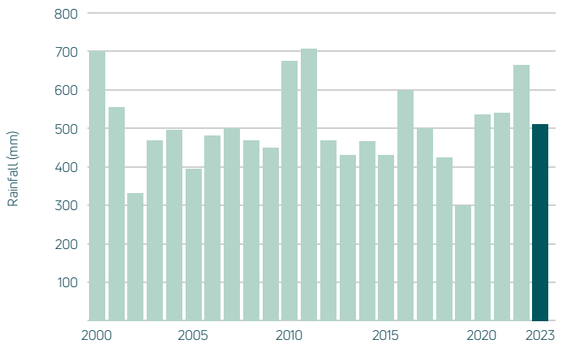
National average rainfall was 511 mm and very close (+1%) to the 2000–2022 average.

Rainfall was above average in parts of Northern Australia and the highest since at least 2000 in several areas north of Cairns in Far North Queensland.

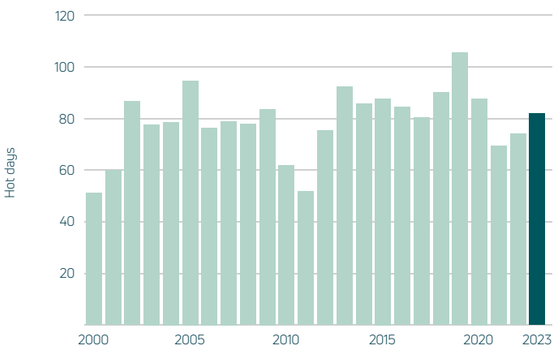
Rainfall was below average in the southwestern half of WA, on the NSW-Queensland central coast and in parts of Tasmania. Rainfall was the lowest since at least 2000 along the WA Coral Coast and the southwest coast of Tasmania.

Nationally, rainfall was above or near-average from January until April, but the months May to October were generally dry, and for part of the country, the driest on record. Rainfall increased again in November and December.

After two cooler years, annual average temperature increased again, in line with global warming. The national average temperature was 0.26°C above the 2000–2022 average and 0.98°C above the 1961-1990 average.



Annual rainfall across Australia



National average number of days above 35°C

The annual maximum temperature measured across Australia in 2023 was 41.6°C, 0.17°C higher than the previous year but 0.23°C below the 2000–2022 average. Maximum temperatures were especially muted along the southern coast. Maximum temperatures were above average in Northern Australia but no records were broken.

The number of days exceeding 35°C was 10.3% greater than the previous year. Nationally, there were on average 82 hot days: 3.6% or nearly 3 days more than the 2000–2022 average.

Nights were warmer than the previous year. The national average minimum temperature was the highest since 2016 and 0.34°C above the 2000–2022 average.

The average number of nights with frost was 11% more than the previous year and slightly below (-3%) the 2000–2022 average.

Snow cover was 56% less than previous year and the lowest since 2018. Total snow occurrence was 39% below the 2000–2022 average.

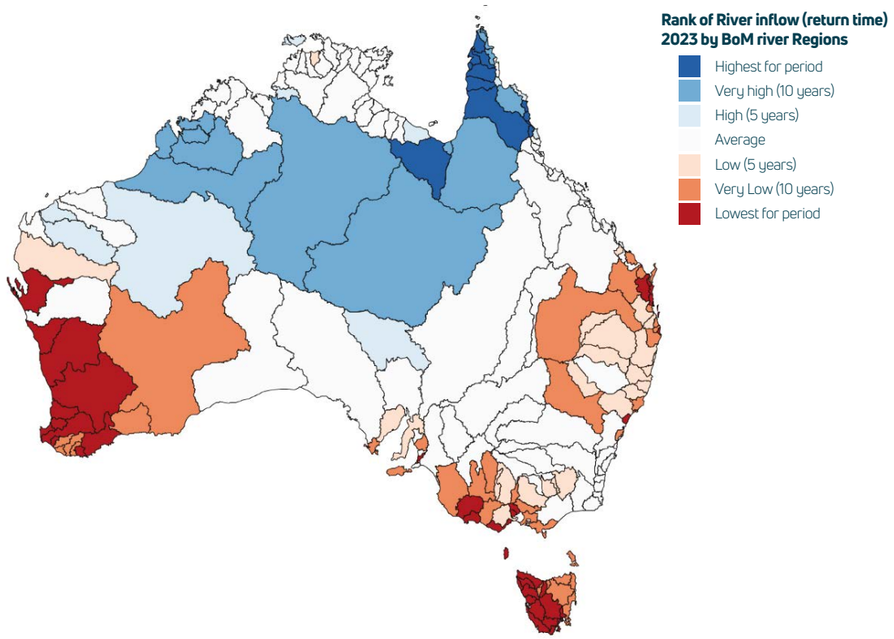
Water

River flows, wetlands and water reservoirs declined from the high 2022 levels but remained well above average.

National river inflows were 122 mm or 929,000 GL; 7% less than the previous year but 32% above the 2000–2022 average.

River inflows were well above average in Northern Australia and the highest since at least 2000 in some catchments around the Gulf of Carpentaria and in Far North Queensland.

Conversely, river inflows were below average -in some cases the lowest since 2000 - in the southern half of WA, in the Darling River tributaries, along the Queensland-NSW and SA-Victorian coastal regions and across Tasmania.



Rank of 2023 river flows by catchment

There were notably fewer flood events in 2023 than in the previous two years.

The first days of 2023 saw a continuation of flooding in the Fitzroy River in WA's Kimberley region and along the Darling River in NSW.

In February, heavy monsoon rains in eastern NT and nearby Queensland caused several rivers in the region to flood.

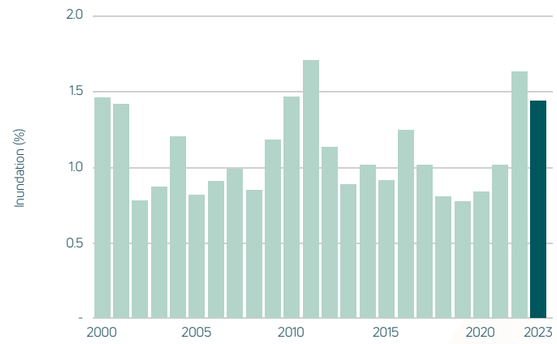
On 26 May, thunderstorms in the Newcastle (NSW) area caused local flash flooding. In June, extreme rainfall in the Adelaide Hills (SA) caused flash flooding.

In October, a frontal system brought heavy rainfall to north-eastern and eastern Victoria, causing widespread flash and river floods. From November onwards, a change to higher rainfall conditions brought thunderstorms and several localised flood events across the southern half of the continent and in southern Queensland.

On December 13, ex-tropical cyclone Jasper made landfall near Cape Tribulation and stalled over the Cape York Penisula, producing widespread and intense rainfall for several days that caused major flooding in several rivers in the region.

During the last week of 2023, several major storm systems caused flash floods and river flooding in southeast Queensland, the NSW south coast and parts of Victoria.

Storage in the various water reservoirs in the Murray-Darling fell from 96% to 84% of capacity, but remained above average. Reservoir storage in the Ord system in the Kimberley region increased for a second year, from 73% to 86% of capacity.



National percentage area inundated

Urban water supplies for Sydney, Melbourne and Canberra remained high for a second year, at 94-100% of capacity. Water supplies for Brisbane, Adelaide and Perth all declined by 10-17% of capacity, to 70%, 67% and 47%, respectively.

The area inundated during all or part of the year was 12% or 900,000 km^2 less than in 2022, but still 32% greater than the 2000-2022 average.

Maximum flood extent decreased or remained stable across most of Australia, with increases in some northern Australian catchments. The highest water extent since 2000 was observed in several catchments along the northern Australian coast and in Far North Queensland.

Soils

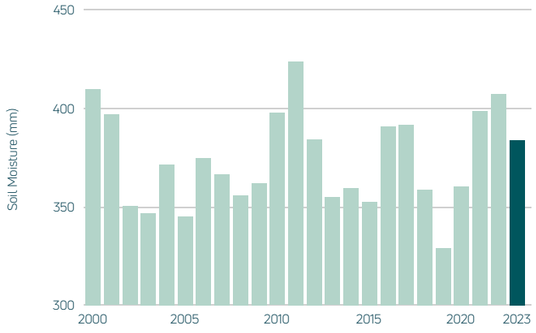
Soil moisture availability declined due to dry conditions in the middle of the year but average soil surface condition improved.

National average moisture availability in the top 6m of soil fell by 23 mm or 6% compared to 2022 values but still 3% above the 2000–2022 average.

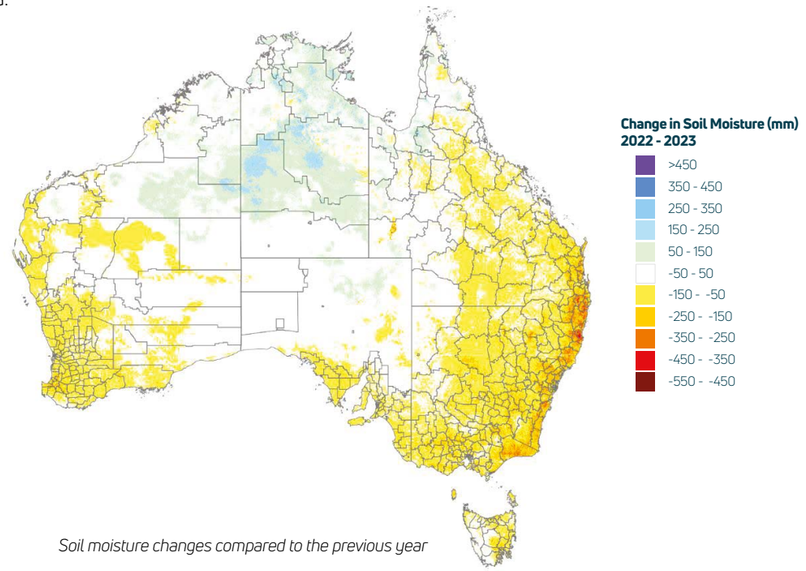
Soil moisture declined across most of Australia, with the greatest declines along the East coast and in southwest WA.

Increases in average soil water availability occurred in the northern NT.

Nationally, soil moisture remained high during the first months of 2023, then declined steadily until November, when it stabilised and increased again. Similar developments occurred across all states and territories except Tasmania.



National average soil moisture content



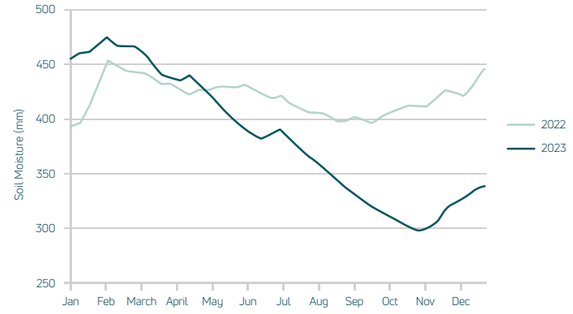
Soil moisture changes compared to the previous year

National average soil protection by vegetation and leaf litter improved for the fourth year in a row and was the best since 2016. Soil protection improved by 8% compared to the previous year and was 10% better than the 2000–2022 average.

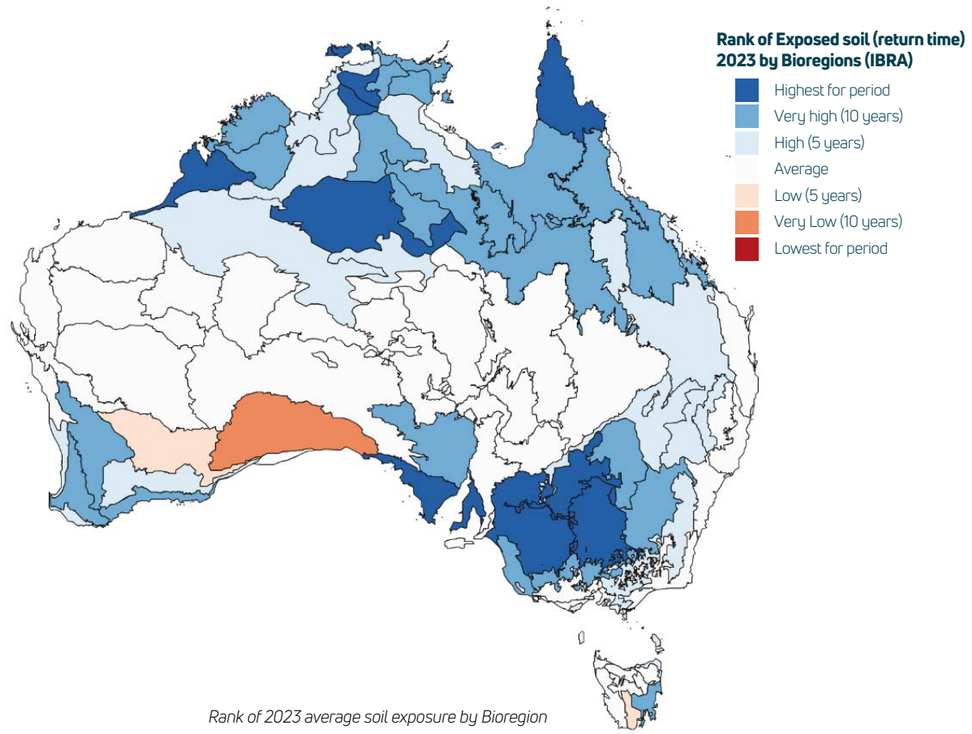
Near- or above-average soil surface protection was observed across most of Australia.

The best conditions since at least 2000 were measured in parts of Northern Australia and inland southeast Australia, where soil conditions improved for the fourth year in a row.

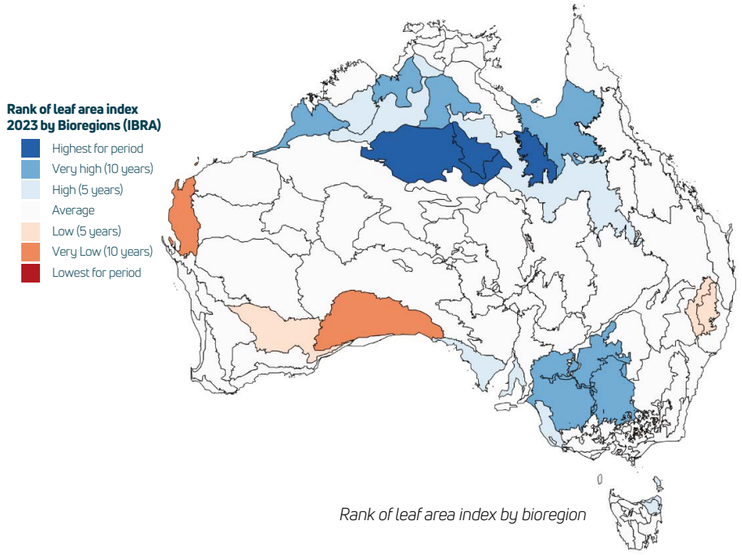
Soil surface conditions were well-below average and declined for the third year in a row in inland southern WA.



National average soil moisture content



Rank of 2023 average soil exposure by Bioregion



Rank of leaf area index by bioregion

Vegetation

Vegetation conditions and tree cover declined from high levels the previous year but remained above average.

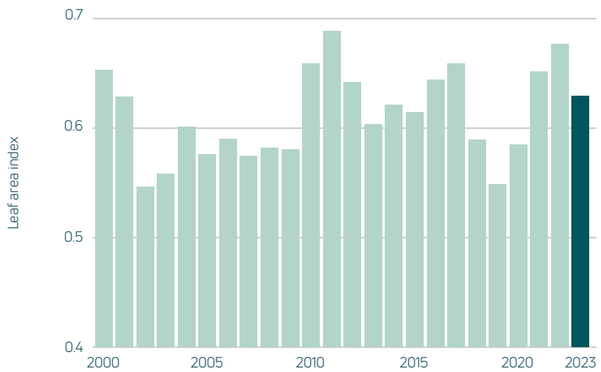
National vegetation condition fell 7% compared to the previous year but remained above the 2000–2022 average for a third year, by 3%.

Across most of the country, vegetation condition returned from high 2022 values to more average values in 2023. Well above average conditions were observed across most of inland Northern and southeast Australia.

Well below-average vegetation conditions were observed in the Carnarvon region in north-west WA and in inland southern WA.

Vegetation growth rates are estimated from a combination of weather and satellite data. National growth rates were the best since the earliest estimates in 2000

This could be attributed mostly to good monsoon rainfall in Northern Australia and optimal growing conditions in southern Australia due to wet and relatively cool summer months and warm, sunny winter months. The model estimates also include a small long-term increasing trend due to growing CO_2 concentrations.



National average leaf area index

Nationally, growth was estimated to be 4% better than the previous year and 34% above the 2000–2022 average.

Growing conditions were near or above average across the country, except for the north-west coast of WA.

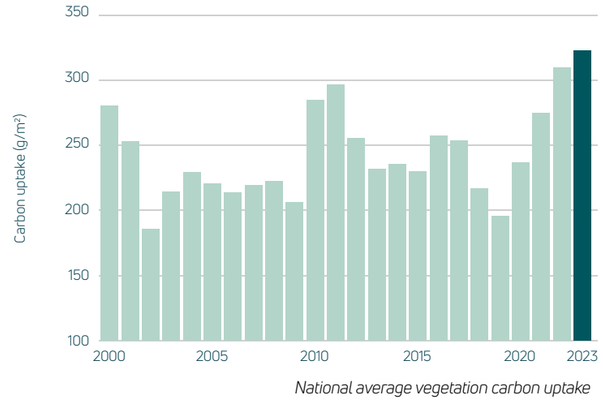
Vegetation primary production was high across all land use sectors. Growth conditions were the best since before 2000 in production forests (45% above 2000–2022 average conditions), natural vegetation (+28%) and intensive agricultural, industrial and urban land uses (+38%). Primary production was near-identical to the high values for previous year in dryland cropping (+49%) and slightly less but still well above average in grazing (+31%) irrigated agriculture (+31%).

Tree cover, the canopy fraction of vegetation >2 m tall, declined by 5% or 2.9 Mha from the previous year. Values almost equalled those of 2021 and were 7% above the 2000–2022 average extent.

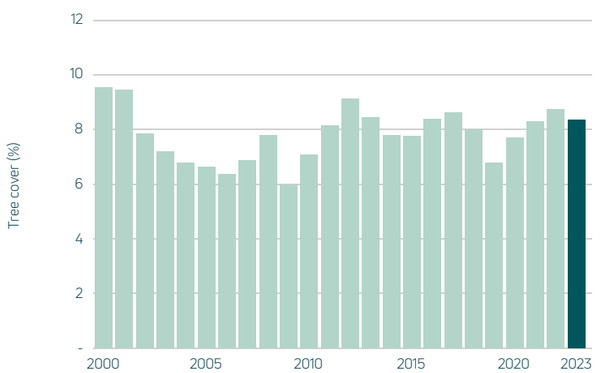
Tree cover can decline in response to natural factors such as reduced water availability, pest outbreaks and bushfires or because of human actions such as forest harvesting, thinning or clearing for agriculture or residential development.

Tree canopy cover declined most in northern NSW and southeast Queensland. Tree cover also declined in the remainder of NSW, central and eastern Victoria and south-western WA. Tree cover increased in NT and northern WA. These changes can mostly be attributed to changes in water availability.

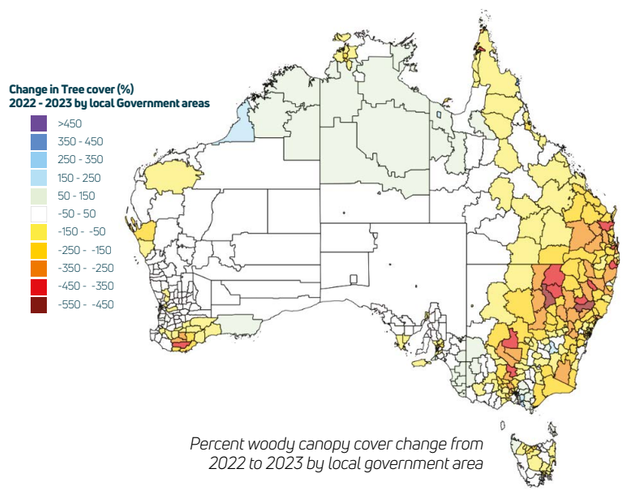
Nationally, the net 2.9 Mha decline in woody cover was associated with grazing land (-2.4 Mha), cropland (-1.0. Mha), production forests (-0.3 Mha) and residential areas (-0.1 Mha), while tree cover increased in natural environments (+0.9 Mha).



National average vegetation carbon uptake



National average woody vegetation cover faction



Percent woody canopy cover change from 2022 to 2023 by local government area

BIOMASS BURNT

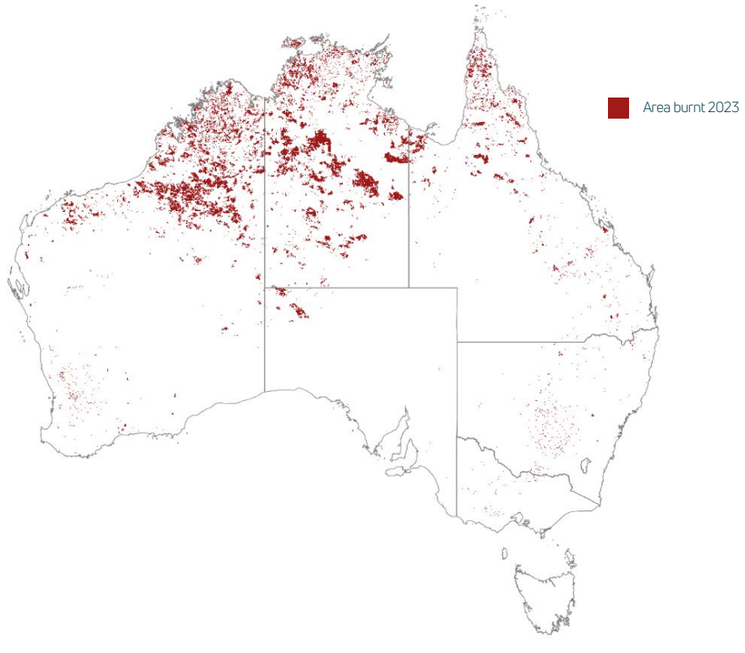
+61%

Above 2000-2022 Average

Fire

Fire activity was close to normal
despite an early start to the fire season.

Bushfires occurred mainly between August and October of 2023, when developing El Niño conditions contributed to dry and relatively warm conditions and rapid vegetation drying. The fire season started already in August in NSW with 70 active fires, and started in the subsequent weeks in Queensland, NT and WA. The greatest loss of homes and life occurred in Queensland, NSW and WA.



Areas burnt in 2023

In southern NSW, a fire on 3 October threatened Bermagui and destroyed 2 homes. Hot conditions during the second half of October led to numerous bushfires across Queensland and northern NSW. From 14-16 October, separate fire incidents across NSW caused 2 fatalities and destroyed 15 homes, followed on 31 October by several further fires destroying 4 homes. On 14-15 November, a fire near Walgett destroyed 6 houses and caused one fatality.

In Queensland, numerous fires broke out from 22-31 October, many of them caused by dry lightning. Fires near Tara in southern Queensland destroyed 58 homes and took two lives. Elsewhere across the state, the fires claimed 12 homes. The north-westerly winds also carried smoke to Queensland and NSW coastal cities. In WA, a fire on 22 November on the northern edge of Perth burnt 18 homes.

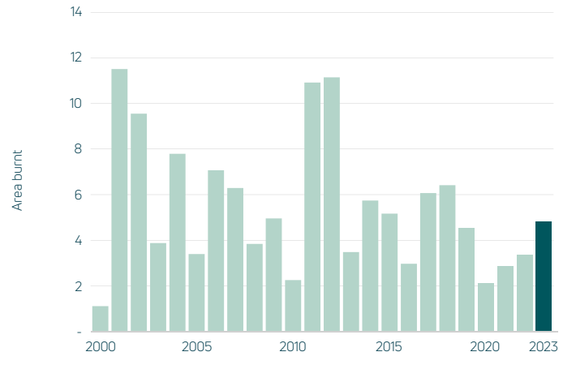
Nationally the area burnt was greater than the previous year but remained below average. The total area burnt was 37 Mha, 44% more than the previous year but 12% below the 2000–2022 average.

Fire activity was near average across most of Australia. Fire activity was above average in western NSW and South Australia and below average in Victoria.

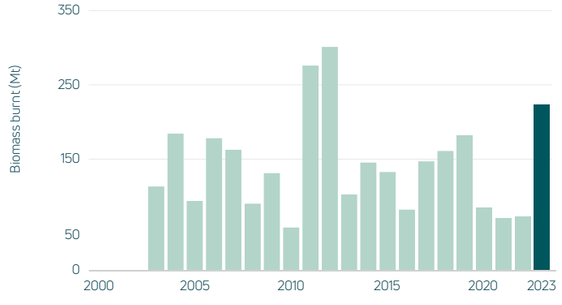
Remotely sensed fuel moisture content provides a measure of landscape flammability. Nationally, the minimum value observed during the year was 6% lower than in 2022 but remained 3% above the 2000-2022 average, indicating relatively unfavourable conditions for bushfires.

Regionally, the lowest fuel moisture conditions since at least 2000 were observed in inland and north-west WA and in inland southern Queensland and Northern NSW.

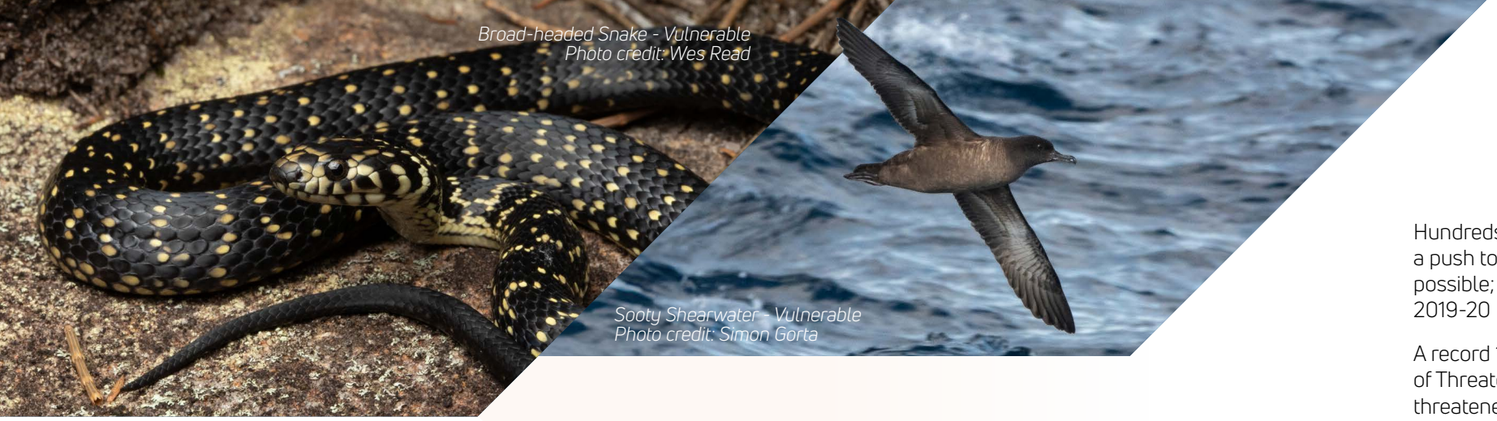
Total fire carbon emissions were 209 Mt carbon. They were 2.1 times greater than in 2022 and 61% above the 2000–2022 average emissions. As in other years, savanna fires in northern Australia were responsible for the majority of fire emissions.



National percentage of area burnt



National biomass burning emissions



Broad-headed Snake - Vulnerable
Photo credit: Wes Read

Sooty Shearwater - Vulnerable
Photo credit: Simon Gorta

Biodiversity

A record number of species were added to the Threatened Species List. The abundance of Threatened Species continues to decline. Invasive species, habitat destruction and climate change remain the greatest threats.

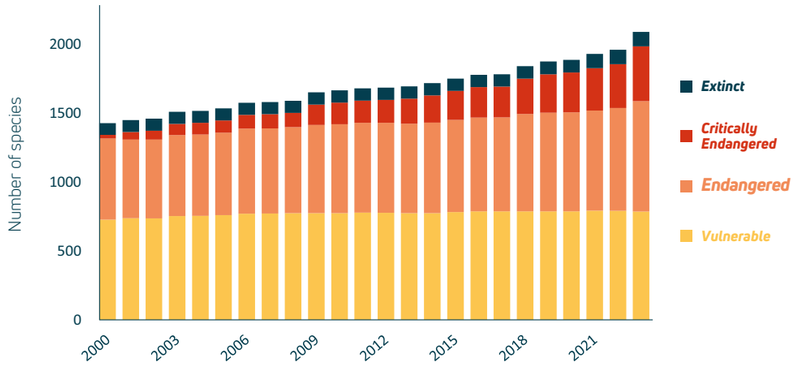
Despite generally good wetland conditions, dry conditions in winter and spring may have contributed to waterbird breeding activity an order of magnitude lower than 2022.

Another mass mortality event of millions of fish occurred on the Darling River at Menindee, NSW, in part due to receding floodwater and resulting algal and bacterial blooms.

Hundreds of migrating seabirds washed up dead or dying on eastern beaches in November due to a marine heatwave. The sooty shearwater was listed as Vulnerable in 2023, with climate change impacts on food supply cited as the main reason for their decline, along with drowning as bycatch in fisheries. An emergency collection of 25 Critically Endangered red handfish occurred in December to save them from a catastrophic marine heatwave in Tasmanian waters.

The Victorian grassland earless dragon was rediscovered after 50 years but was 'uplisted' from Endangered to Critically Endangered. The primary threat to this species is Melbourne's urban sprawl across the also critically endangered Victorian volcanic grasslands.

At least 40 new species were discovered. They were mostly invertebrates; it is estimated that only a third of Australia's invertebrates have been named. Others were similar-looking species not previously understood to be distinct. Among the discoveries was a giant trapdoor spider from central Queensland, *Euoplos dignitas*, which is likely to be listed as Endangered due to land clearing in its Brigalow Belt habitat. Citizen science data helped describe two new species of frogs: the Otway smooth frog and the Western laughing tree frog.



Number of threatened species by threat category. Data from EPBC lists (DCCEEW)

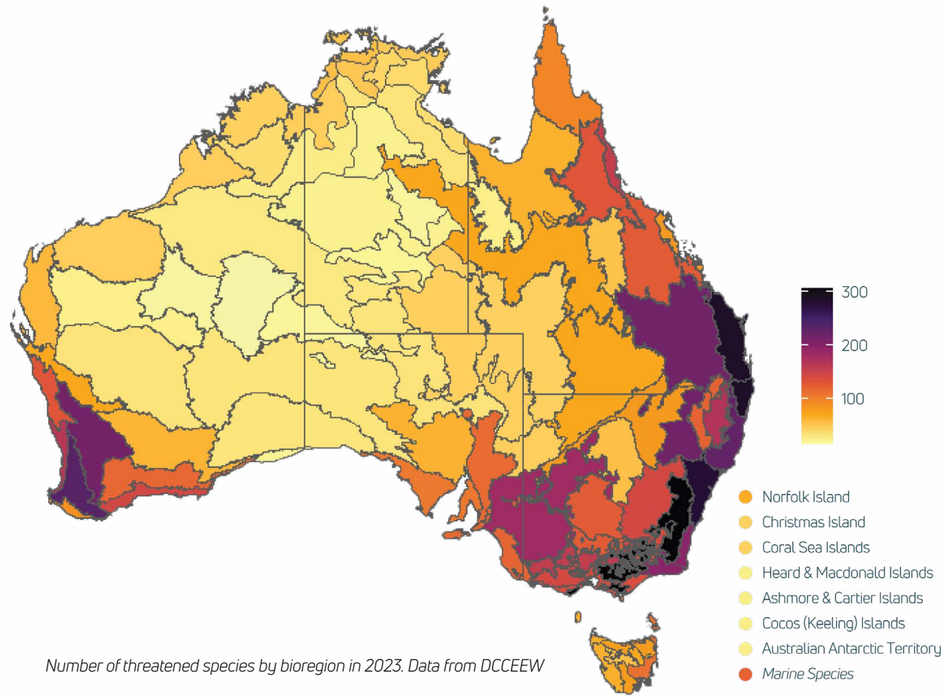
Hundreds of species were assessed in 2023 in a push to make the EPBC lists as accurate as possible; a move precipitated by the catastrophic 2019-20 bushfires.

A record 130 species were added to the EPBC Act List of Threatened Species, bringing the total number of threatened species to 2,098 – a 47% increase since 2000. The previous highest number of additions was 62 species in 2009. Of the 130 newly listed species, nearly half (64) were directly impacted by the 2019-20 bushfires. Of these, 58% were plants, 20% were freshwater crayfish and 10% were freshwater fish.

Another 33 species were uplisted to a higher threat category and no species were downlisted.

Three ecological communities were added to the EPBC Act List of Threatened Ecological Communities, bringing the total number to 106. The Empodisma peatlands of south-western Australia were listed as Endangered, having been assessed as under considerable threat from a drying climate, high-frequency fires and damage from feral pigs.

Frogs are the most threatened class of vertebrates worldwide, with 40% of species threatened globally and 20% of Australian species threatened with extinction. While disease and habitat loss drove previous declines, climate change now drives most of the deterioration in status. Six frog species were added to the threatened species list in 2023



Number of threatened species by bioregion in 2023. Data from DCCEEW

Otway Smooth Frog - Critically Endangered
Photo credit: Nick Gale

Threatened Species Index

The Threatened Species Index (TSX) estimates the changing abundance of threatened and near-threatened species in Australia, with data for birds, mammals and plants currently included. A major update for threatened birds in 2023 revealed continuous and compounding declines across Australia.

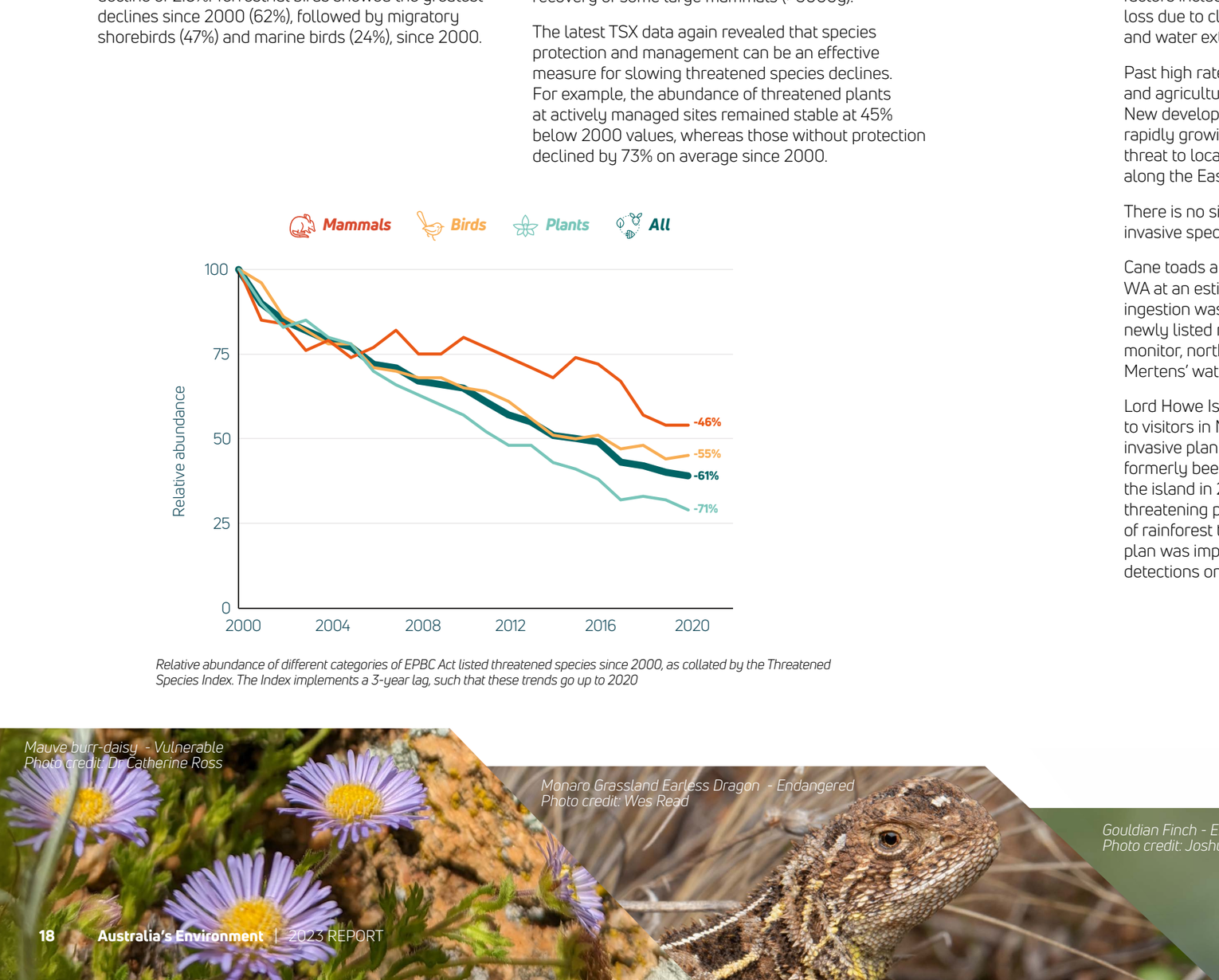
Among bird species listed as threatened under the Australian Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and included in the TSX, abundance in 2020 was 55% lower on average than the year 2000, with an average annual rate of decline of 2.8%. Terrestrial birds showed the greatest declines since 2000 (62%), followed by migratory shorebirds (47%) and marine birds (24%), since 2000.

The most significant declines across bird species included in the TSX were in South Australia (76%) and Queensland (67%). The ACT and New South Wales recorded a decline of 59%, Western Australia 51%, Victoria 51%, and Tasmania 33%. The trend for the Northern Territory showed a decline of 13% overall but with considerable uncertainty in the trend, driven strongly by data for migratory shorebird species.

Among species listed as threatened under the EPBC Act and included in the TSX, abundance in 2020 was 46% lower for mammals and 71% lower for plants. The abundance of threatened mammals has stabilised in recent years, driven strongly by the stabilisation of many small mammal (<50g) populations and the recovery of some large mammals (>5000g).

The latest TSX data again revealed that species protection and management can be an effective measure for slowing threatened species declines. For example, the abundance of threatened plants at actively managed sites remained stable at 45% below 2000 values, whereas those without protection declined by 73% on average since 2000.

Relative abundance of different categories of EPBC Act listed threatened species since 2000, as collated by the Threatened Species Index. The Index implements a 3-year lag, such that these trends go up to 2020



Threatening processes

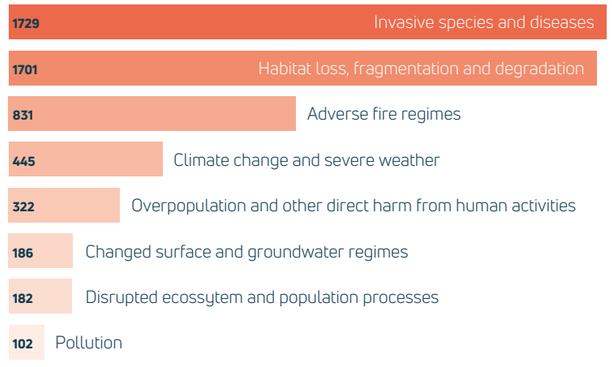
The greatest threats to Australia's Environment continue to be climate change, invasive species and habitat destruction. Climate change was the major driver of new listings, threatening 87% of newly listed and uplisted species. For the remaining 13% of species, extinction risk factors included cane toad poisoning, habitat loss due to clearing and mining, myrtle rust and water extraction.

Past high rates of habitat destruction for forestry and agriculture appear to be gradually declining. New developments to accommodate Australia's rapidly growing population pose a particular threat to local ecosystems and species, especially along the East Coast.

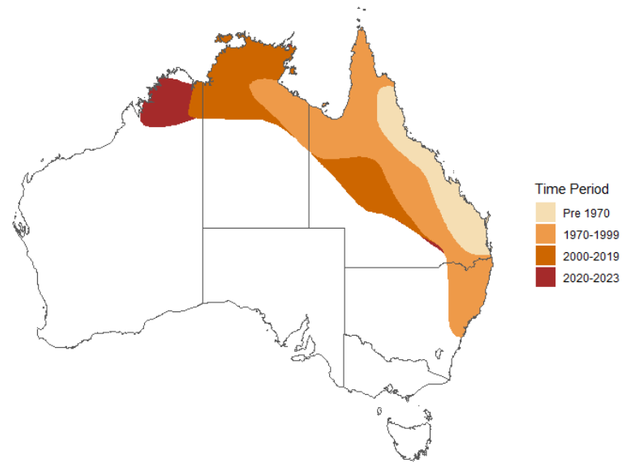
There is no single solution for Australia's many invasive species.

Cane toads are moving westward across northern WA at an estimated 40-60 km per year. Cane toad ingestion was listed as the primary threat to three newly listed reptile species: Mitchell's water monitor, northern blue-tongued skink and Mertens' water monitor.

Lord Howe Island (NSW) temporarily closed to visitors in March following detection of the invasive plant-killing myrtle rust fungus. It had formerly been detected and eradicated from the island in 2016. Myrtle rust is listed as a key threatening process and has pushed 15 species of rainforest trees towards extinction. A control plan was implemented and there were no further detections on the island in October 2023.



Data from taxon–threat–impact dataset (Ward et al. 2021) and EPBC profiles (DCCEEW)



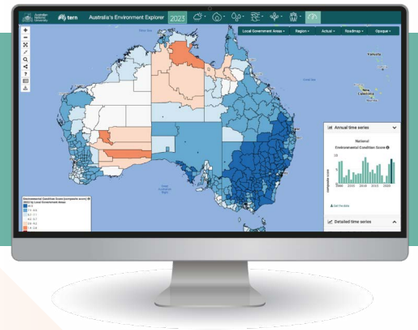
Spread of cane toad population over time. Data from Atlas of Living Australia

About this report

The annual Australia's Environment Report summarises a large amount of observations on the trajectory of our natural resources and ecosystems.

On the website (*www.ausenv.tern.org.au*) you can find a national summary report, as well as report cards for different types of administrative and geographical regions.

In the accompanying data explorer, the spatial data can be viewed as maps, accounts or charts by region and land use type and downloaded for further use.



visit the data explorer here

Acknowledgements

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Cover Image: Southern Emu-wren by Sam Gordon

Photographs were provided by: Wes Read, Simon Gorta, Nick Gale, Joshua Bergmark, Nicolas Rakotopare and Adobe Stock Imagery

About the data

Measures of the condition of natural resources and ecosystems were derived from several spatial data sources.

Weather data was derived by combining station, satellite and weather forecast model data. Data on land cover, inundation, fire, soil condition and vegetation leaf area were derived by automated interpretation of satellite imagery.

Biodiversity analysis was based on the Threatened Species Index (TSX), providing measures of change in the relative abundance of Australia's threatened and near-threatened species at national and regional levels.

The other indicators were estimated by combining the weather and satellite data in ANU's environmental data assimilation system, OzWALD.

For further details on data and methods, to download the data, or to access the data explorer visit the website (*www.ausenv.tern.org.au*).

About Us

Australia's Environment is produced annually by the Terrestrial Ecosystem Research Network (TERN) and the Australian National University (ANU).

ANU's Centre for Water and Landscape Dynamics develops new methods to measure, monitor and forecast climate, water availability and landscape conditions by combining satellite and field measurements using biophysical modelling and machine learning.

TERN is Australia's long-term ecosystem observatory, an NCRIS-enabled National Research Infrastructure that provides long-term preservation and access to analysis-ready ecosystem data for researchers and decision-makers to help Australia prepare for the future.

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