

# Australia's Threatened Species Index 2022

## Summary of trends

### Threatened Species in Australia

Australian species may be listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), as either *Extinct*, *Extinct in the Wild*, *Critically Endangered*, *Endangered*, *Vulnerable* or *Conservation Dependent*. Currently, 562 fauna species are listed as threatened under the EPBC Act and 1,411 flora species. Of these, 110 are listed as National Priority Species under the Australian Government's Threatened Species Strategy.

Australian species may also be recognised as threatened under the International Union for Conservation of Nature (IUCN) Red List. However, the IUCN also designates species as near-threatened – those that meet some of the criteria for listing as threatened, but which do not formally qualify. Currently, 1,067 Australian fauna species are listed as threatened under the IUCN Red List and a further 438 listed as near-threatened. For flora, 791 species are listed as threatened and a further 258 listed as near-threatened.

### The Threatened Species Index (TSX)

The TSX aims to provide reliable and robust measures of change in the relative abundance of Australia's threatened and near-threatened species, with data currently collated for **birds, mammals and plants**. Understanding these changes in species populations is crucial for monitoring progress towards Australia's conservation targets.

The TSX is managed by the NCRIS-enabled Terrestrial Ecosystem Research Network (TERN) at The University of Queensland and supported by the Australian Government. It was established by the National Environmental Science Program's Threatened Species Recovery Hub and Birdlife Australia.

The TSX brings together thousands of monitoring datasets from across Australia and releases trend updates annually. Trends are calculated using the *Living Planet Index* methodology, developed by World Wildlife Fund and the Zoological Society of London. For more details, see [here](#).

### What is this document for?

This document provides government and non-government stakeholders from across Australia with a summary of the results from the *Threatened Species Index 2022*. The trends described below are the final trends, following a release of preliminary trends in December 2022.

Below you will find national trends along with a break-down of trends among species groups. Similar information is provided at the state and territory levels. The full set of trends can be viewed at [www.tsx.org.au/tsx2022](http://www.tsx.org.au/tsx2022)

Note that a 3-year lag is implemented, given erosion of data quality closer to the release year (as data takes time to reach us). **As such, the 2022 release includes trends up to 2019.**

### Further information

If you require clarification of any of the content in this document, would like more information about the project or become a *Friend of TSX* and receive updates on our progress of the project, please contact the TSX Team at [tsx@tern.org.au](mailto:tsx@tern.org.au).

## The Threatened Species Index 2022

### The dataset

<i>Species represented</i> .....	278 (up 24 in 2022)
○ <i>Birds</i> .....	70 species (up 3 in 2022)
○ <i>Mammals</i> .....	79 species (up 4 in 2022)
○ <i>Plants</i> .....	129 species (up 17 in 2022)
<i>EPBC listed species represented</i> .....	228
<i>National priority species represented</i> .....	30
<i>IUCN listed species represented (threatened)</i> .....	92
<i>IUCN listed species represented (near-threatened)</i> .....	42
<i>Total data sources</i> .....	230 (up 28 in 2022)
<i>Total number of time-series</i> .....	19,893 (up 625 in 2022)
<i>Total number of sites</i> .....	10,741

### Key findings: National trends

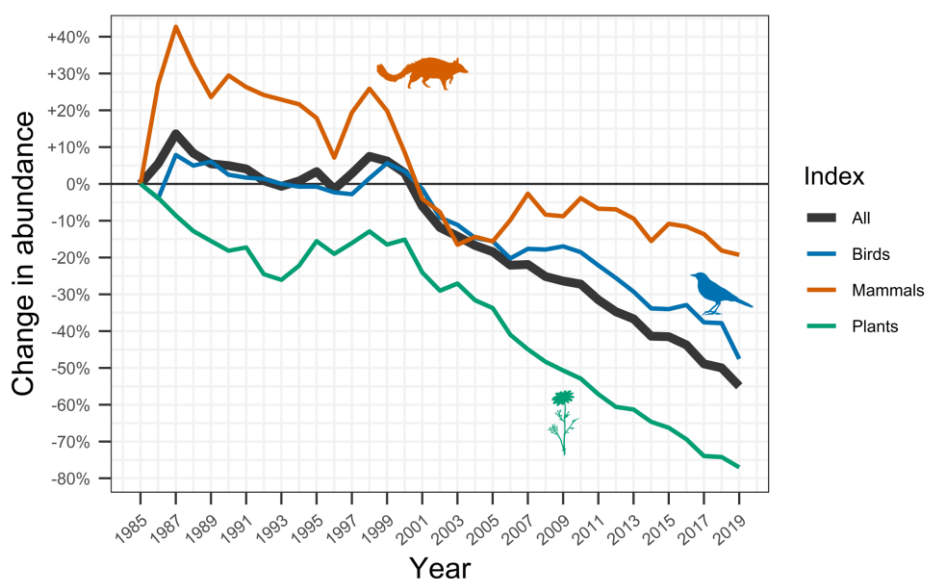
#### Overall trends

At the national scale, threatened and near-threatened species continue to trend downward, with an **average decline of 55% in abundance since 1985** for the 278 species represented (Figure 1). Overall, the abundance of threatened and near-threatened species in the TSX database has declined by 3% per annum since 2000.

Trends for **birds** are similar to the main index, with an **average decline of 48% since 1985** across the 70 species represented (Figure 1). Since 2000, birds have declined by an average of 2.7% per annum.

Trends for **mammals** are less severe. Across the 79 species for which the TSX has data, the **average decline in abundance is 19% since 1985** (Figure 1). Since 2000, mammals have declined by 1.5% per annum but displayed a relatively stable trend since 2003.

Across the 129 **plants** for which the TSX has suitable data, the **average decline in abundance is 77% since 1985** (Figure 1). The decline since 2000 is steep and linear, averaging 3.25% per annum.

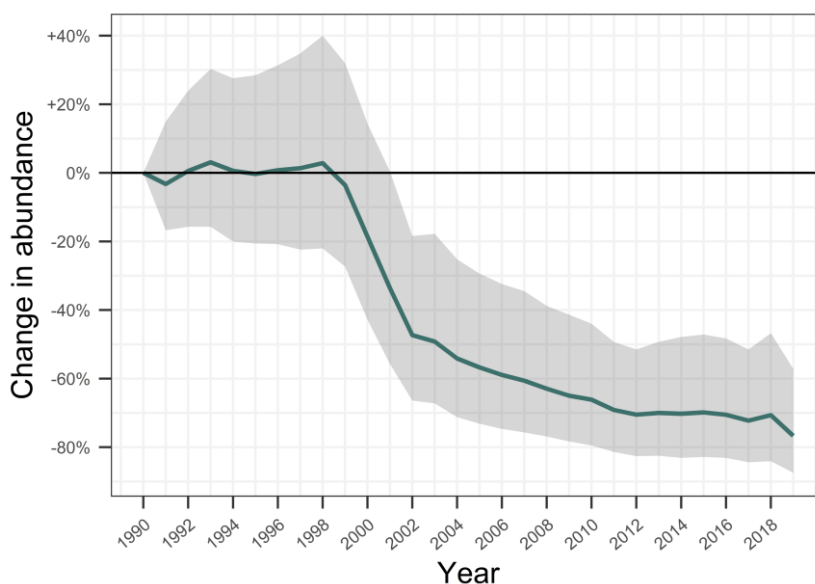


**Figure 1.** The *Threatened Species Index 2022*, showing trends up to 2019 across all species and separately for birds, mammals and plants.

### Trends for National Priority Species

The TSX holds time-series data for 30 of Australia’s 110 National Priority Species, as listed under the Australian Government’s Threatened Species Strategy. This includes 9 birds, 11 mammals and 10 plants (listed in the Appendix), totalling 1,927 time-series.

The average trend across these datasets is shown in Figure 2. On average, abundance of the 30 National Priority Species for which the TSX holds data has **declined by 77% since 1990**. Declines were relatively steep post 1998, with some stabilisation since 2004. Nevertheless, the trend continues to be one of decline.



**Figure 2.** The trend for National Priority Species between 1990 and 2019. The grey shading is a 95% confidence interval across species.

### Comparison of trends among species groups

Data collated for the TSX may be used to compare the trends for major phylogenetic, morphological or ecological species groups within the three major groups currently represented — birds, mammals and plants. Table 1 provides a comparison of trends for the species groupings monitored in the TSX, since the year 2000.

Greatest declines were observed among **Herbaceous Plants (84% since 2000)**, **Small Mammals <50 g body weight (84%)** and **Orchids (81%)**, with significant declines for **Terrestrial Birds (66%)** and **Shrubs (63%)**.

Datasets held for Marine Mammals and Large Mammals (>5000 g body weight) suggest significant population increases: trends of **+67% for Marine Mammals** and **+75% for Large Mammals** since the year 2000. However, sample sizes for these groups are relatively low. This is particularly problematic for **Marine Mammals**, for which very significant population growth of large cetaceans (e.g., Humpback Whale and Southern Right Whale) skew the data towards an upward trend overall.

**Table 1.** Species groups ranked according to their change in abundance since 2000. The number of species included in each group, and the number of monitoring datasets (time-series) available for each group, are also provided.

Group	Percent change since 2000	Number of species	Number of time-series
Herbaceous Plants	-84.2%	20	147
Small Mammals	-83.9%	12	215
Orchids	-80.8%	32	158
Terrestrial Birds	-66.3%	40	9,016
Shrubs	-62.9%	72	524
Shoreline (Migratory) Birds	-42.8%	13	6,987
Trees	-42.7%	12	45
Marine Birds	-37.0%	15	587
Terrestrial Mammals	-34.0%	72	2,186
Critical Weight Range Mammals	-29.4%	54	1,919
Marine Mammals	+67.3%	7	57
Large Mammals	+74.8%	13	309

### Key findings: State and Territory trends

A comparison of the average trend across all species for Australia’s states and territories is provided in Table 3 for the period 2000–2019. Considering the significant variation in species and ecosystems represented by these jurisdictions, there is remarkable consistency in trends. **Queensland, ACT + New South Wales, South Australia, Western Australia** and the **Northern Territory** all display **average declines in abundance of between 42% and 58%**. The most significant declines were in **Victoria**, with an **average decline of 63%** across the 63 species represented for that State. Data held for **Tasmania** suggest an **average decline of 28%** in the abundance of its threatened and near-threatened species.

**Table 3.** Comparison of trends for Australia’s states and territories. The average trend from 2000–2019 is shown across all species for each jurisdiction. ‘spp’ = species; ‘ts’ = time-series.

State	All species
Queensland	-49% (49 spp, 2,925 ts)
ACT + New South Wales	-58% (95 spp, 2,947 ts)
Victoria	-63% (63 spp, 4,237 ts)
Tasmania	-28% (33 spp, 600 ts)
South Australia	-49% (69 spp, 2,014 ts)
Western Australia	-42% (72 spp, 2,510 ts)
Northern Territory	-54% (28 spp, 452 ts)

Table 4 provides a breakdown of the overall trends displayed in Table 3 for birds, mammals and plants, again for the period 2000–2019.

For **birds**, notable trends include **declines of 64%** in the **ACT + New South Wales**, and **55% in Queensland and South Australia**. No State or Territory had an average increasing trend for birds, although declines in **Western Australia** were significantly less than elsewhere (**14%**).

Trends for **mammals** are highly variable across jurisdictions. Strongest declines in abundance were seen in the **Northern Territory** for the period 2000–2019, at **69%** on average across species. Significant declines were also apparent in **Victoria (54%)**. Data for **Tasmania** and **South Australia** suggest considerable increases in the abundance of threatened and near-threatened mammals covered by the TSX, with a trend of **+81%** and **+98%** respectively from 2000–2019. These increases reflect the benefits of active management for terrestrial mammals, with the species and locations represented for these States including sites where re-introduction and predator control or exclusions are occurring.

Trends for **plants** reflect the declines noted at the national level. **Insufficient data** is available to produce trends for threatened and near-threatened plants for **Queensland, Tasmania** and the **Northern Territory**. For the remaining jurisdictions, significant declines are apparent in the data for plants in **Victoria (88%)** and **Western Australia (73%)**. The average extent of decline is also high for the **ACT + New South Wales (60%)**. In **South Australia**, the average decline across the 30 species represented was **44%**.

**Table 4.** Comparison of trends across states and territories for the species groups currently included in the Threatened Species Index. The average trend from 2000–2019 is shown for each group for each jurisdiction. ‘ID’ = insufficient data to generate a reliable trend; ‘spp’ = species; ‘ts’ = time-series.

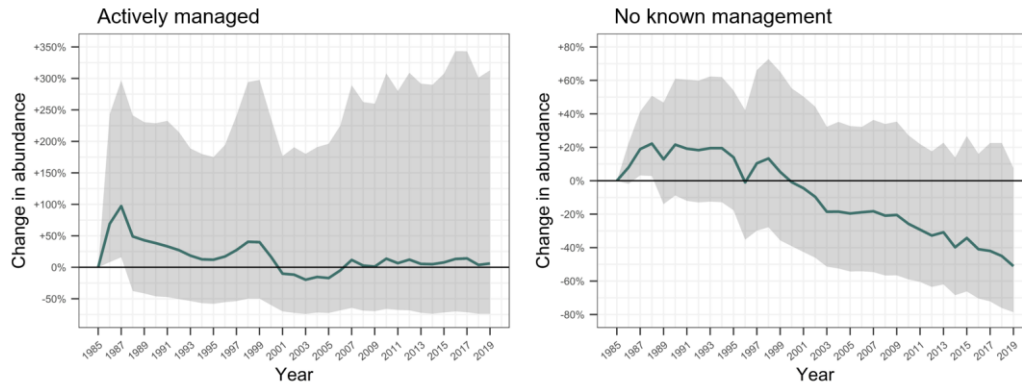
State	Birds	Mammals	Plants
Queensland	-55% (24 spp, 2,774 ts)	-22% (22 spp, 135 ts)	ID
ACT + New South Wales	-64% (34 spp, 2,396 ts)	-26% (17 spp, 269 ts)	-60% (44 spp, 282 ts)
Victoria	-43% (30 spp, 3,142 ts)	-54% (9 spp, 940 ts)	-88% (24 spp, 155 ts)
Tasmania	-23% (23 spp, 437 ts)	+81% (6 spp, 158 ts)	ID
South Australia	-55% (25 spp, 1,487 ts)	+98% (14 spp, 216 ts)	-44% (30 spp, 311 ts)
Western Australia	-14% (23 spp, 2,218 ts)	-35% (24 spp, 213 ts)	-73% (25 spp, 79 ts)
Northern Territory	-41% (17 spp, 245 ts)	-69% (10 spp, 206 ts)*	ID

*\*This trend is for 2000–2018 given an unreliable final data point (one species from one location)*

### Key findings: The importance of management

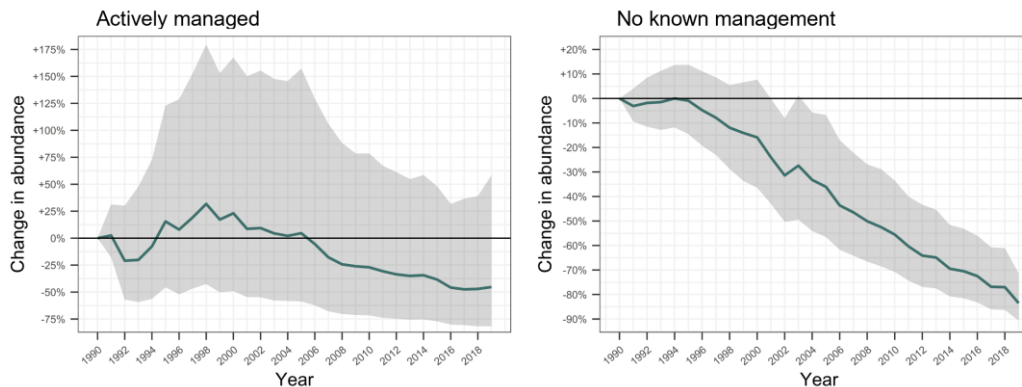
The Threatened Species Index is a crucial source of information on the impacts of management on the trajectories of Australia’s threatened and near-threatened species. At present, time-series for mammals and plants have been categorised as stemming from sites that are either ‘actively managed’ for conservation purposes or at which there is ‘no known management’. Figures 3 and 4 provide a comparison of trends between these management categories and show that trends are considerably better at actively managed sites.

For mammals (Figure 3), those from actively managed sites have, on average, stabilised: the index value for 2019 is a 6% increase from 1985, and this trend has been largely flat since 2001. Some species at some sites are still declining (as shown by the 95% confidence interval being below 1). However, the weight of the confidence intervals above 1 suggests more species trajectories are improving than declining. By comparison, the trend across sites with no known management shows an ongoing decline, with an average decline of 51% since 1985 (Figure 3).



**Figure 3.** The difference in trends for **mammals** from actively managed sites (*left*) versus those from sites with no known management (*right*) since 1985. The grey shading is a 95% confidence interval across species.

For plants, abundance at actively managed sites is on average, 47% lower than in 1990 (Figure 4; note that trends cannot be generated for plants with a 1985 baseline due to limited data in that year). Nevertheless, the rate of decline has been significantly reduced at these sites, and the trend since 2016 indicates some stabilisation and perhaps even improvement. Moreover, the 95% confidence interval suggests some populations at actively managed sites have higher abundance than in 1990. This is not true at sites with no known management, at which abundance has been falling in a linear fashion since ~1996 and the confidence intervals demonstrate that all populations have significantly depressed abundance relative to 1990 (Figure 4). On average, populations at sites with no known management have declined by 83% since 1990.



**Figure 4.** The difference in trends for **plants** from actively managed sites (*left*) versus those from sites with no known management (*right*) since 1985. The grey shading is a 95% confidence interval across species.



## What we should know about the data

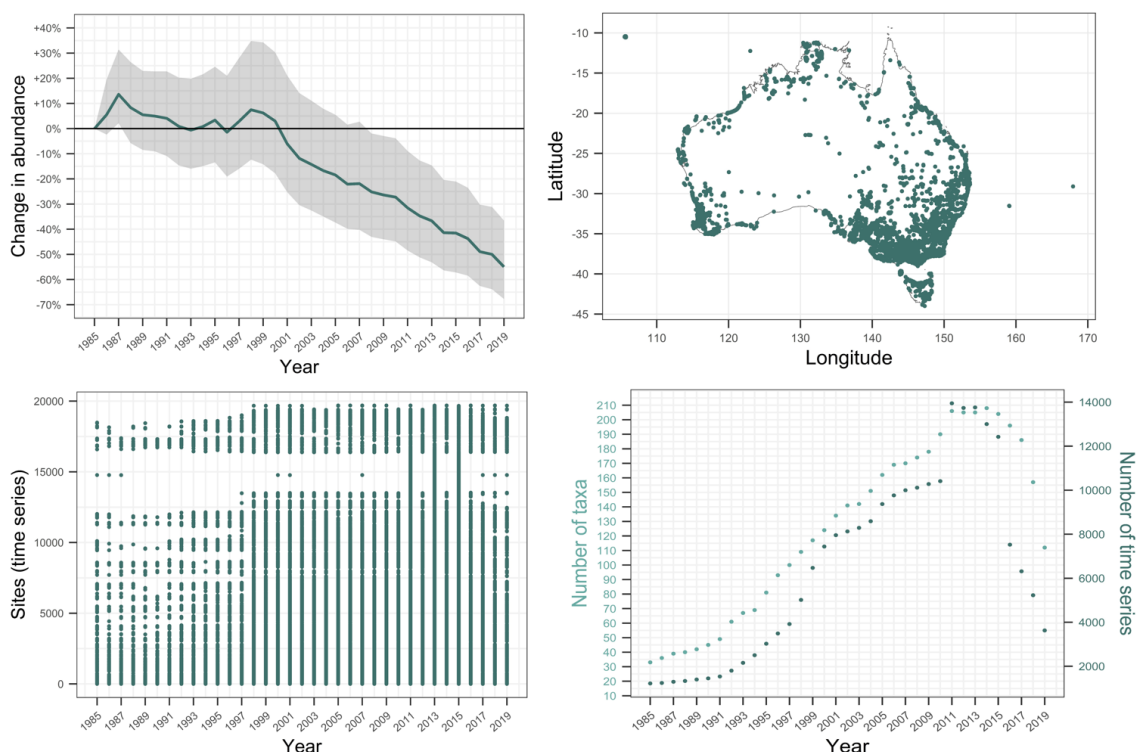
The trends listed above represent the best available data on abundance trends for Australia’s threatened and near-threatened species. Data quality was maximised by 1) checking whether each dataset had been produced by standardised monitoring and 2) by assessing the trends in collaboration with data custodians. Nevertheless, it is important to consider the taxonomic, spatial and temporal biases when interpreting the trends generated from these data, and the uncertainty around the trends.

### National dataset

The National trends are based on monitoring data for 278 species, collected at 10,741 sites and 19,893 time-series datasets. However, these data stem largely from the south and east of the continent, with less representation of inland areas and limited representation of arid Australia (Figure 5). While this means the more developed parts of the country are represented, it is also true that the distribution of threatened species aligns with this spatial pattern.

The temporal accumulation of data must also be considered when interpreting the national trends. In 1985 (the reference year), data were available for 33 species (12% of total) from 1,312 time series (6% of total). Species and time-series included in the calculation of the index grew rapidly after 1990 before declining in more recent years (Figure 5). In turn, data quality is weakest early and late in the time-series.

Perhaps of greatest importance for interpreting the national trends is the dominance of birds in the dataset. Birds make up 25% of species represented in the index and 84% of time-series datasets. As such, the overall national trend closely follows the trend for birds (see Figure 1).

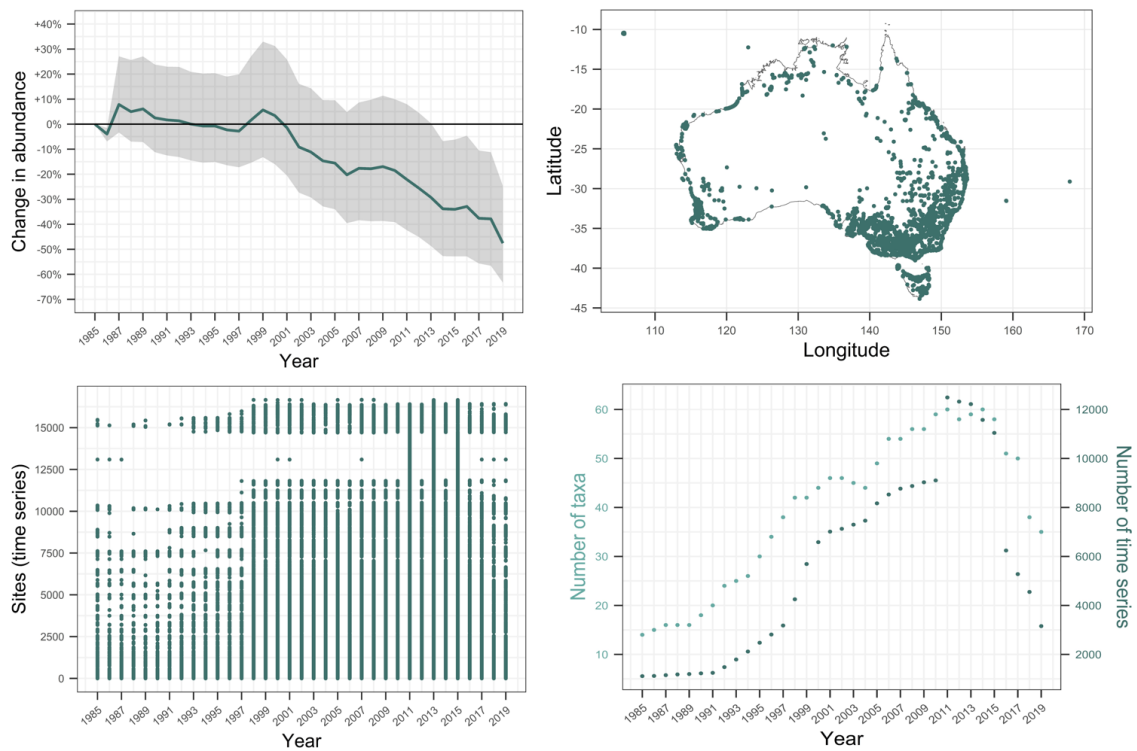


**Figure 5.** *Top-left:* Trend for all threatened and near-threatened species. *Top-right:* Map showing where the monitoring data were collected from. *Bottom-left:* A dot plot showing the years for which monitoring data were available (each row represents a site where a species was monitored with a consistent method). *Bottom-right:* The number of species and number of time series for each year.

**Data for birds**

Data for birds covers 70 species from 7802 sites across Australia, for a total of 16801 time-series. As in previous years, the data for birds are representative of most eastern states but are marginal for Western Australia and the Northern Territory (Figure 6). The number of sites and species monitored has substantially increased since 1985, at which time there were only 1,143 time series (7% of total) for 14 species (20% of total). Data are also relatively sparse for the most recent years, after 2015 (Figure 6).

Data for birds are dominated by Terrestrial Birds (40 species, 9,016 time-series) and Shoreline (Migratory) Birds (13 species, 6,987 time-series). Data for Terrestrial Birds are dominated by Island Endemics (9 species, 3,662 time-series) and Woodland Birds (8 species, 3,046 time-series), with 4 or less species represented for the remaining terrestrial categories (Grassland Birds, Heathland Birds, Rainforest Birds, Mallee Birds and Tropical Savanna Birds).



**Figure 6.** *Top-left:* Trend for threatened and near-threatened birds. *Top-right:* Map showing where the bird monitoring data were collected from. *Bottom-left:* A dot plot showing the years for which bird monitoring data were available (each row represents a site where a species was monitored with a consistent method). *Bottom-right:* The number of bird species and number of time series for each year.

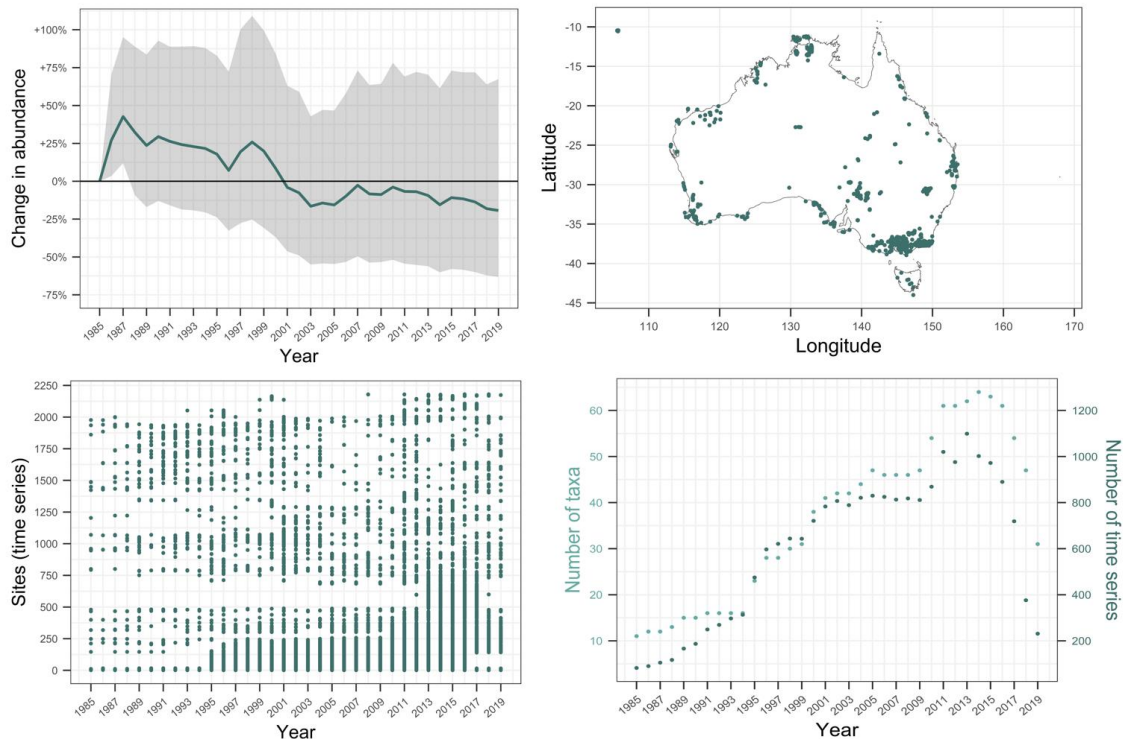
**Data for mammals**

Mammals are represented in the index by 79 species from 2,096 sites, with a total of 2,243 time-series. Data for mammals are spatially patchy (Figure 7), with major clusters of sites from south-east Queensland, north-central New South Wales, southern Victoria, central Tasmania, inland and coastal South Australia (including offshore islands), south-western Western Australia, Pilbara and coastal areas of central Western Australia, the Kimberley and the Top End of the Northern Territory. Scattered sites occur in the southern Northern Territory and western Queensland; however, inland (particularly arid) areas are poorly represented.



Time-series and species have accumulated in a roughly linear fashion since 1985. For that year, monitoring data are available for 11 species (14% of total), from 142 time-series (6% of total). Data are again sparse for the most recent years, after 2016 (Figure 7).

Data for mammals primarily come from Terrestrial Mammals (70 species, 2,186 time-series), with few Marine Mammals currently included (7 species, 57 time-series). Among Terrestrial Mammals, Small Mammals (<50 g body weight) are represented by 10 species and 116 time-series and Large Mammals by 6 species and 252 time-series. Critical Weight Range Mammals therefore dominate the Terrestrial Mammal dataset (54 species, 1719 time-series); however, these species make up a high proportion of Australia’s threatened mammals.



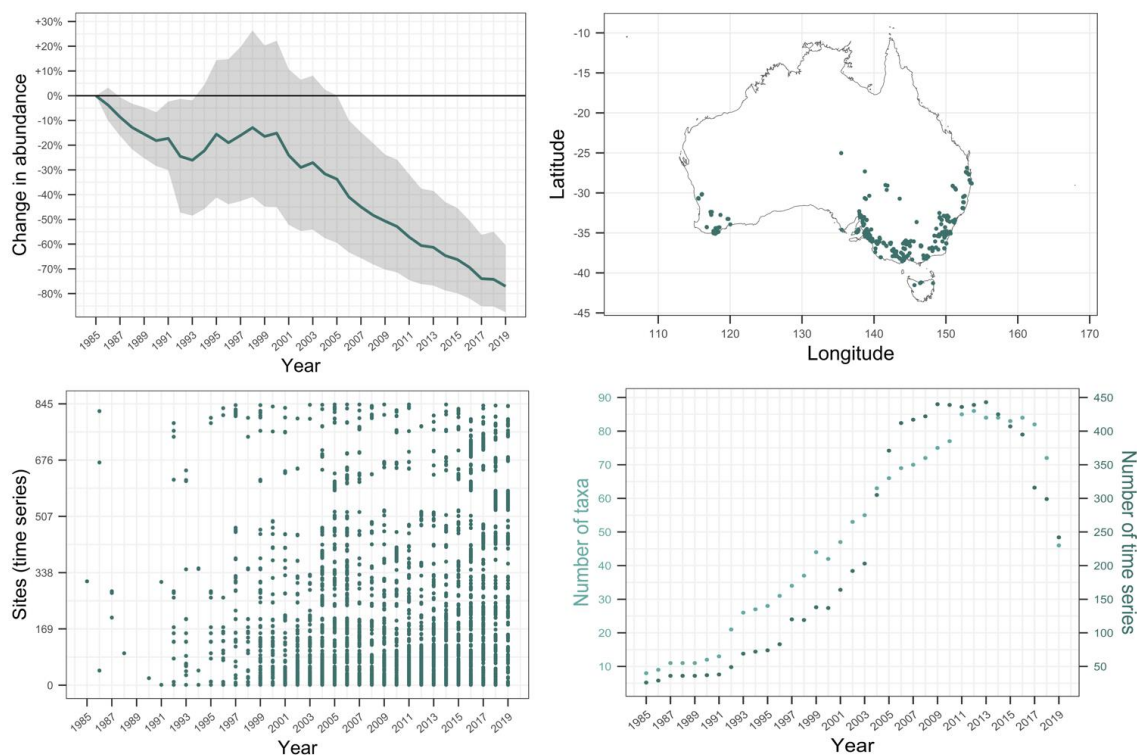
**Figure 7.** *Top-left: Trend for threatened and near-threatened mammals. Top-right: Map showing where the mammal monitoring data were collected from. Bottom-left: A dot plot showing the years for which mammal monitoring data were available (each row represents a site where a species was monitored with a consistent method). Bottom-right: The number of mammal species and number of time series for each year.*

**Data for plants**

Some 129 species of plants are represented in the TSX from 843 sites, for a total of 849 time-series. Of the three groups currently in the index, plant data are the most spatially biased, with all data coming from the southern half of the continent (Figure 8). The monitoring data almost entirely originate from south-eastern Queensland, eastern New South Wales, southern Victoria, eastern South Australia and south-west Western Australia.

Plant monitoring data in the index also display a stronger temporal bias than for birds or mammals. Data are sparse before 1995, and time-series have accumulated in an exponential fashion since 1985 (Figure 8). In that year, monitoring data are available for 8 species (6% of total) from just 27 time-series (3% of total). However, data are not as sparse for more recent years relative to birds and mammals, with a less significant drop off in time-series after 2015 (Figure 8).

Plants covered by the index are dominated by Shrubs and Orchids. In total, 72 species of Shrubs are represented in the index from 524 time-series, with 32 Orchids from 158 time-series. Herbaceous plants are represented by 19 species (147 time-series) and Trees by 12 species (45 time-series).



**Figure 8.** *Top-left:* Trend for threatened and near-threatened plants. *Top-right:* Map showing where the plant monitoring data were collected from. *Bottom-left:* A dot plot showing the years for which plant monitoring data were available (each row represents a site where a species was monitored with a consistent method). *Bottom-right:* The number of plant species and number of time series for each year.

## Appendix

### National Priority Species currently included in the Threatened Species Index

#### 1. Birds

Species	EPBC Status	Number of time-series
Orange-bellied Parrot <i>Neophema chrysogaster</i>	Critically Endangered	7
Far Eastern Curlew <i>Numenius madagascariensis</i>	Critically Endangered	679
Plains-wanderer <i>Pedionomus torquatus</i>	Critically Endangered	3
Western Ground Parrot <i>Pezoporus wallicus flaviventris</i>	Critically Endangered	2
Christmas Island Goshawk <i>Accipiter fasciatus natalis</i>	Endangered	225
Australasian Bittern <i>Botaurus poiciloptilus</i>	Endangered	135
Black-eared Miner <i>Manorina melanotis</i>	Endangered	122
Carnaby's Black-Cockatoo <i>Zanda latirostris</i>	Endangered	206
Malleefowl <i>Leipoa ocellata</i>	Vulnerable	159

#### 2. Mammals

Species	EPBC Status	Number of time-series
Mountain Pygmy Possum <i>Burramys parvus</i>	Critically Endangered	10
Leadbeater's Possum <i>Gymnobelideus leadbeateri</i>	Critically Endangered	19
Northern Hairy-nosed Wombat <i>Lasiorhinus krefftii</i>	Critically Endangered	1
Western Ring-tailed Possum <i>Pseudocheirus occidentalis</i>	Critically Endangered	1
Northern Quoll <i>Dasyurus hallucatus</i>	Endangered	104
Numbat <i>Myrmecobius fasciatus</i>	Endangered	4
Australian Sea-lion <i>Neophoca cinerea</i>	Endangered	48
Chuditch, Western Quoll <i>Dasyurus geoffroii</i>	Vulnerable	29
Bilby <i>Macrotis lagotis</i>	Vulnerable	13
Koala Qld + NSW <i>Phascolarctos cinereus</i>	Vulnerable	111
New Holland Mouse <i>Pseudomys novaehollandiae</i>	Vulnerable	8

### 3. Plants

Species	EPBC Status	Number of time-series
Davies' Wax Flower <i>Phebalium daviesii</i>	Critically Endangered	2
Wollemi Pine <i>Wollemia nobilis</i>	Critically Endangered	1
Giant Andersonia <i>Andersonia axilliflora</i>	Endangered	2
Stirling Range Dryandra <i>Banksia montana</i>	Endangered	2
Angle-stemmed Myrtle <i>Gossia gonoclada</i>	Endangered	7
Footo's Grevillea <i>Grevillea calliantha</i>	Endangered	13
Small-flowered snottygobble <i>Persoonia micranthera</i>	Endangered	4
Stiff Groundsel <i>Senecio behrianus</i>	Endangered	4
Forked Spyridium <i>Spyridium furculentum</i>	Endangered	5
Waddy <i>Acacia peuce</i>	Vulnerable	1