

# Science for Saving Species

## Research findings factsheet

### Project 3.1



National Environmental Science Programme

## A Threatened Mammal Index for Australia: 2020 Update



### Research in brief

This project has developed a Threatened Species Index (TSX) for Australia to assist policymakers, conservation managers and the public to better understand how population trends across Australia's threatened species are changing over time.

For the first time in Australia, the Threatened Mammal Index has combined data from multiple programs to tell us how Australia's threatened mammal species are faring through time, and which mammal groups and regions most need help.

People can examine the trends, compare the results of different functional groups, regions, or management categories, and explore the underlying data through the [TSX web-app](#).

### Background

More than 100 mammal species or subspecies are listed as threatened or extinct in Australia. Monitoring these species plays a critical role in assessing how populations are changing over time, and helps to identify where management actions are and are not working.

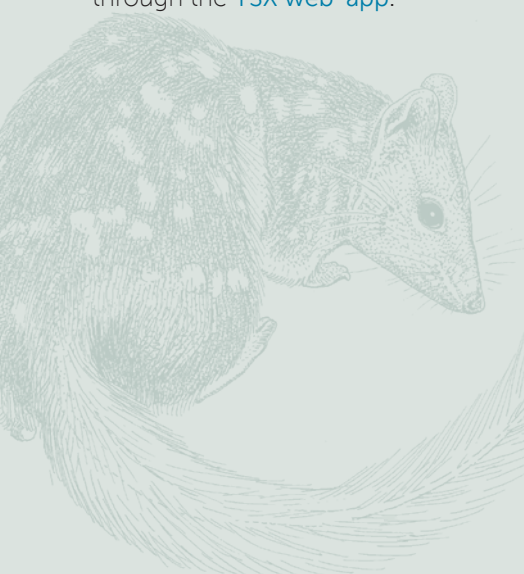
Hundreds of threatened species have been monitored over the years and across the country by dozens of different government and non-government and community groups, but previously there was no way to bring all of these data together to show us the bigger picture about how different groups of species across different regions are faring over time.

Australia's Threatened Species Index (TSX) is based on the [Living Planet Index](#), a method developed by World Wildlife Fund and the Zoological Society of London. The method enables trends from different species

to be aggregated together at a national scale, as well as at other levels (e.g. for each state and territory, and for different functional groups and management categories).

Assembling all of the data is a big job and is being staged. Data and trends for threatened birds and mammals were released in 2018 and 2019, respectively. In 2020, data and trends for threatened plants have been added, and the trends for birds and mammals have been updated.

The TSX allows Australian governments, non-government organisations, stakeholders and the community to better understand and report on how large groups of threatened species are changing over time. It will also potentially enable us to better understand the performance of high-level strategies and the return on investment in threatened species recovery efforts.



Tasmanian Devil. Image: JJ Harrison  
CC BY-SA 3.0 Wikimedia Commons





## A Threatened Species Index for mammals in Australia: 2020 Update

Here we present the national 2020 Threatened Mammal Index, which combines monitoring data on threatened species populations from across the country (Figure 1A).

The index includes data for taxa (meaning species and subspecies) that are Near Threatened, Vulnerable, Endangered or Critically Endangered under Australian legislation (EPBC Act) and/or internationally (on the [IUCN Red List](#) as of March 2020).

These data come from monitoring programs where mammal populations have been surveyed at the same place in multiple years with a standardised method; this makes it possible to detect changes over time.

Anyone monitoring threatened mammal populations in a systematic

way can upload data via a data provision template on the [TSX portal](#). Data that meet the [suitability criteria](#) will be added to the next iteration of the index.

For some sites and taxa, data custodians have also provided information on whether the site/taxa has received targeted conservation or management action. For mammals, this allows us to also look at trends for these sub-groups:

1. Sites subject to any management (e.g., introduced predator-free havens/islands and other dedicated conservation management; Figure 2),
2. Sites without introduced predators (islands and fenced exclosures; Figure 3), and
3. Sites with no (known) targeted management (Figure 4).

The index itself shows the average change in the population size of threatened mammal taxa compared to a baseline year. This baseline year of 1995 was chosen because very few of the ongoing monitoring programs originated before 1995.

The baseline year has an index value of 1. Changes in the index are proportional—a year with a TMX value of 0.5 indicates that on average the population size of each taxa has decreased to half the size they were during the baseline year; a TMX value of 1.5 indicates that on average population sizes are 50% above the baseline year.

### Key findings: Australian threatened mammal trends

In this second iteration the Threatened Mammal Index includes 75 taxa. You can find a summary of the species included by clicking “Data summary” on the [TSX visualisation tool](#).

The overall TMX value in 2017 is 0.69. This means that on average the size of threatened mammal populations in our dataset have decreased by 31% between 1995 and 2017 (Figure 1).

While the overall index value in 2017 is 0.69, the grey cloud around it represents variability in the trends of individual species that make up the overall multi-species index (Figure 1A). It is created by randomly sampling

species trends from all possible trends in the dataset 100 times, and dropping the 5 trends that are furthest from the average, resulting in a 95% “confidence limit”.

Note that the species included in the index are not necessarily a representative sample of all threatened species in Australia.

The index for threatened mammals at sites that were subject to any management has 248 time series with data on 37 mammal taxa. This index has a 2017 value of 1.40, which corresponds to an increase of 40% between 1995 and 2017 (Figure 2).

The index for populations that are in predator-free areas is based on 30 time series and 17 mammal taxa. This index has a 2017 value of 8.30, which corresponds to an average increase of 830% between 2000 and 2017 (Figure 3).

The index for sites with no (known) targeted management is based on 1,603 time series and 47 mammal taxa. The TMX value in 2017 is 0.42, which corresponds to a 58% decrease on average in relative mammal abundance between 1995 and 2017 (Figure 4).

### What should we know about the data?

The overall TMX is based on 1,851 time series (defined as sites where data on taxa are recorded using the same methodology and a consistent monitoring effort though time) across 75 taxa. Data quality was maximised

by 1) checking whether each dataset had been produced by standardised monitoring and 2) by sending surveys to custodians and requesting that they assess the trends produced for their datasets.

Only time series produced from standardised monitoring programs and with a minimum length of two years, collected between 1995 and 2017 inclusive, were used for index calculation. Sub-trends of the overall

## What should we know about the data? (continued)

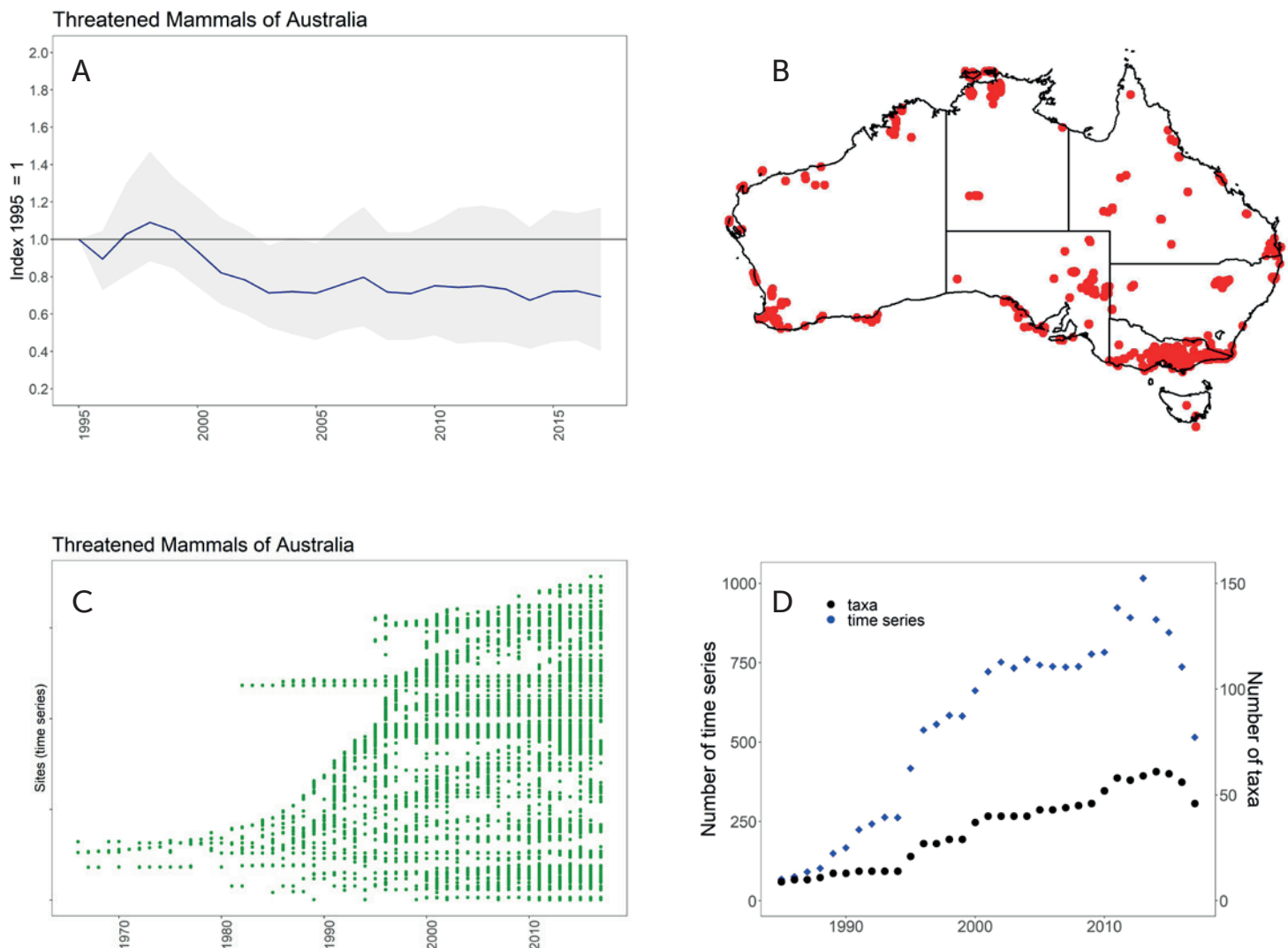
trend (e.g. for mammal functional groups, states and management categories) can be calculated if data on at least three taxa are available.

The index currently contains more data from coastal regions, and less data from arid zones (Figure 1B).

The number of monitored sites and taxa that met the TMX criteria (Figure 1C) has substantially increased since 1995 (Figure 1D).

Increasing the number of species, regions and mammal groups monitored, particularly in regional gaps, would strengthen the

representativeness of the index. Ongoing long-term monitoring programs allow for continuing capability to track changes in the relative abundance (and occurrence) of threatened and near-threatened mammal species.



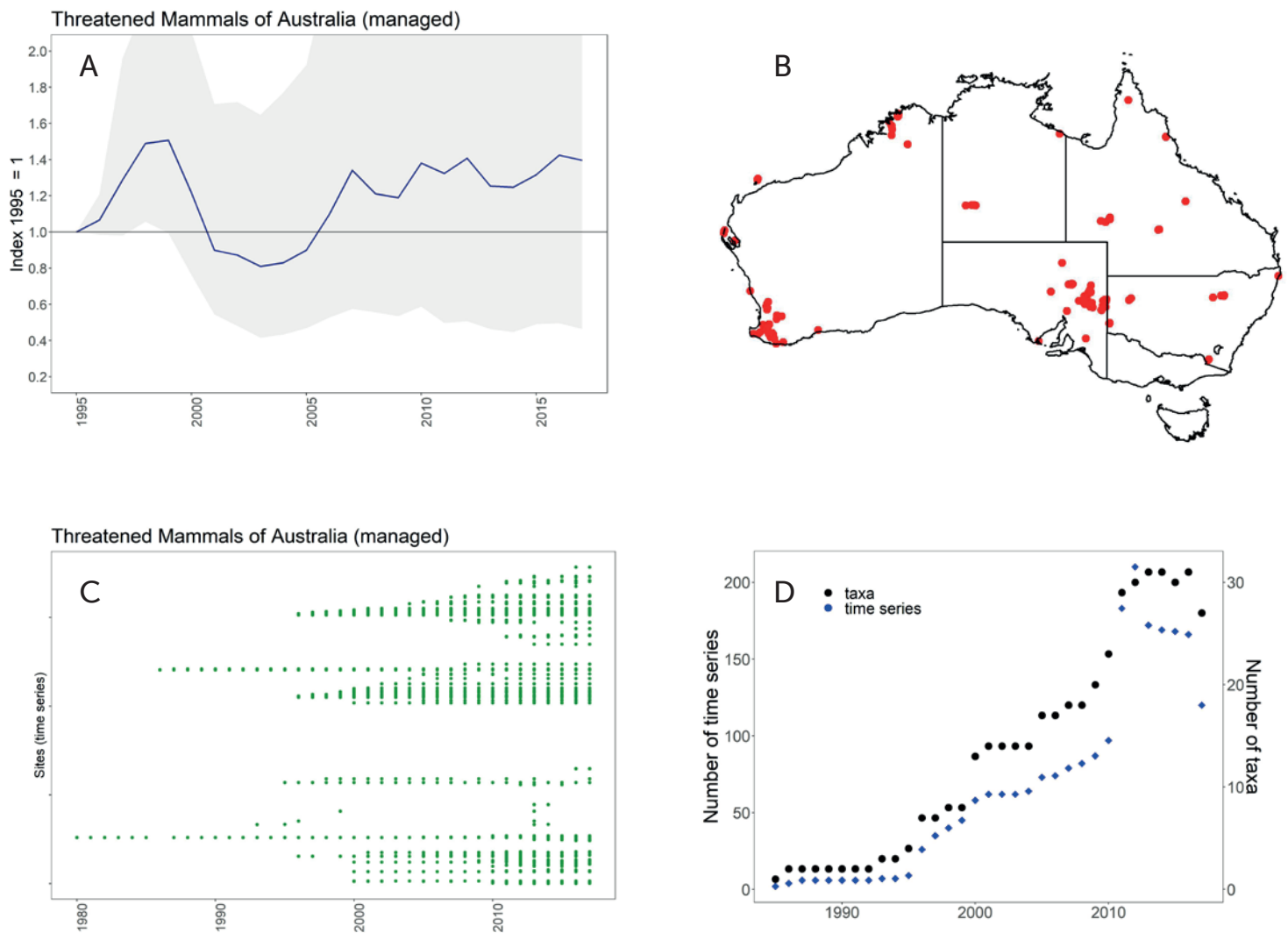
**Figure 1:** A) The Threatened Mammal Index (TMX) including data from all sites where threatened and near-threatened mammal taxa were provided. The blue line shows the change in mammal abundance relative to the baseline year of 1995, where the index is set to 1.0. The grey cloud shows the confidence limit.

B) A map showing where threatened and near-threatened mammal data were recorded in Australia. The red dots indicate repeatedly monitored fixed sites. Far offshore islands have been excluded from the map but are included in the index.

C) This dot plot shows the years for which monitoring data were available to compile the index. Each row represents a time series where a species was monitored with a consistent method at a single site.

D) The number of taxa (in black circles) and number of time series (in blue diamonds) used to calculate the index for each year.





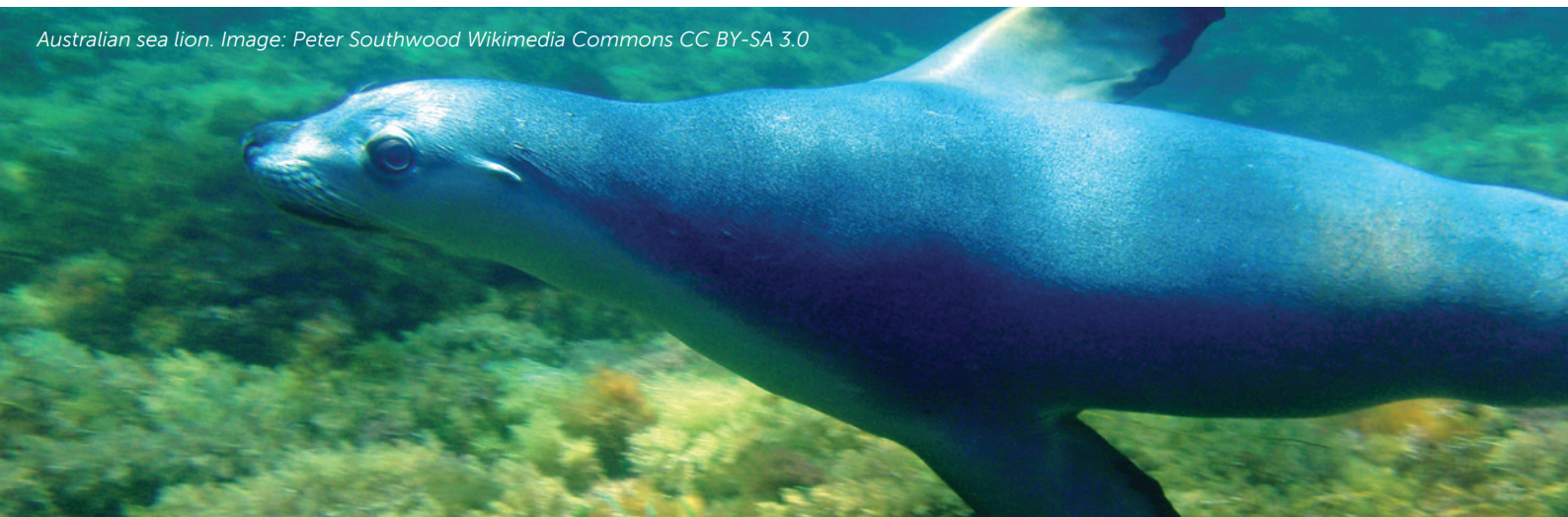
**Figure 2:** A) The Threatened Mammal Index (TMX) based only on data from managed sites.

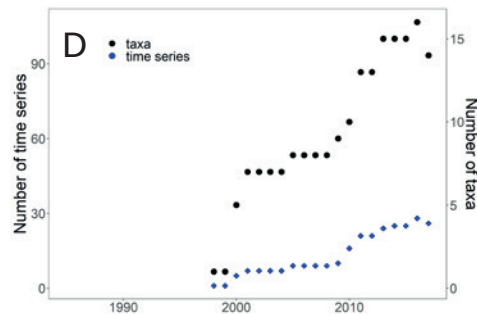
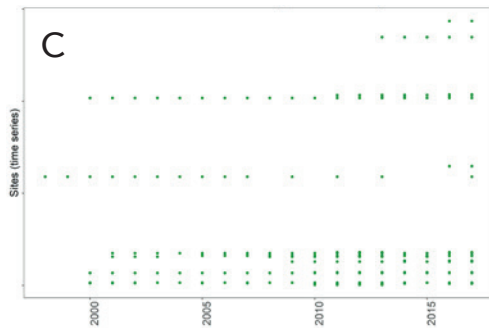
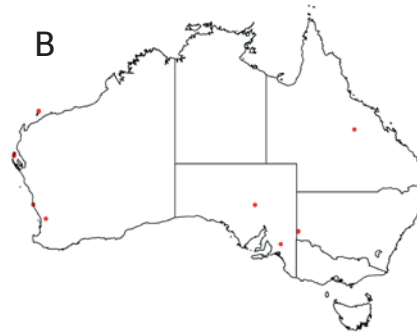
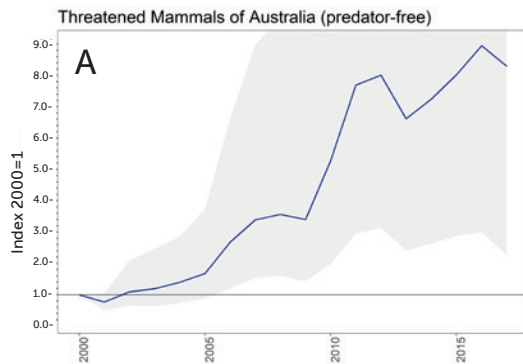
B) A map showing where threatened and near-threatened mammal taxa on sites subject to any conservation management were recorded. Far offshore islands have been excluded from the map but are included in the index.

C) This dot plot shows the years for which monitoring data were available to compile the index. Each row represents a time series where a species was monitored with a consistent method at a single site.

D) The number of taxa (in black circles) and number of time series (in blue diamonds) used to calculate the index for each year.

Australian sea lion. Image: Peter Southwood Wikimedia Commons CC BY-SA 3.0



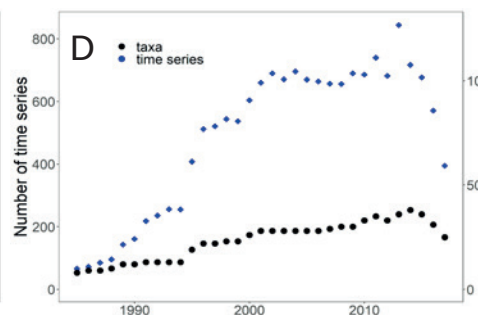
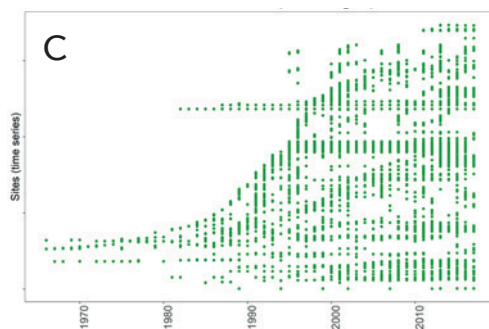
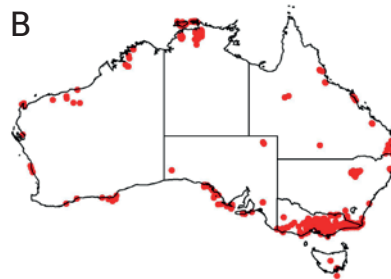
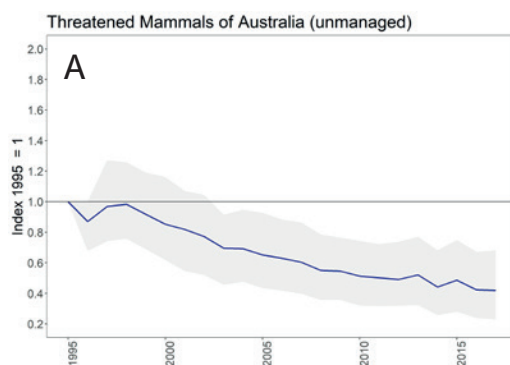


**Figure 3:** A) The subindex of the Threatened Mammal Index (TMX) that includes only data from populations that are in predator-free areas. Note that where one of these taxa also occurs elsewhere, data from those sites is not included in this subindex.

B) A map showing where populations that include individuals in predator-free areas were recorded. Far offshore islands have been excluded from the map but are included in the index.

C) This dot plot shows the years for which monitoring data were available to compile the index. Each row represents a time series where a species was monitored with a consistent method at a single site.

D) The number of taxa (in black circles) and number of time series (in blue diamonds) used to calculate the index for each year.



**Figure 4:** A) The subindex of the Threatened Mammal Index (TMX) that includes monitoring data on sites without targeted management of threatened and near-threatened mammal taxa or for which no information on management was provided by the custodians.

B) A map showing where threatened and near-threatened mammal data with no (known) targeted management were recorded. Far offshore islands have been excluded from the map but are included in the index.

C) This dot plot shows the years for which monitoring data were available to compile the index. Each row represents a time series where a species was monitored with a consistent method at a





*An eastern barred bandicoot at Mt Rothwell in Victoria, one of Australia's predator-free areas.  
Image: Nicolas Rakotopare / Mount Rothwell*

## Further Information

For more information or to become a Friend of the Index and receive updates on the progress of the project please contact the TSX Team at [tsx@uq.edu.au](mailto:tsx@uq.edu.au).

The data underpinning the index were contributed by many different individuals and organisations, including Commonwealth, state and territory agencies, research institutions and environmental non-government organisations and consultants. The full citation for all data included in the index can be viewed by clicking "Download csv" (bottom left) on the [TSX visualisation tool](#).

Go to the [web-app](#) to access and explore the data behind the TMX and to produce reports tailored to your particular needs.

This project is supported through funding from the Australian Government's National Environmental Science Program and BirdLife Australia.

Do you have monitoring data on nationally threatened species that has been collected in a standardised way and repeated through time? You can download the TSX data upload template [here](#) and upload it together with your data to be considered for next year's index [here](#). A video tutorial on filling out the template can be viewed [here](#).