# Science for Saving Species

Research findings factsheet

Project 3.1

**Threatened Species Recovery Hub**

National **Environmental Science** Programme

# Factsheet: A Threatened Mammal Index for New South Wales

## Research in brief

This project is developing a Threatened Species Index (TSX) for Australia which can assist policy-makers, conservation managers and the public to understand how some of the population trends across Australia's threatened species are changing over time. It will inform policy and investment decisions, and enable coherent and transparent reporting on relative changes in threatened species numbers at national, state and regional levels. Australia's TSX is based on the Living Planet Index (www.livingplanetindex.org), a method developed by World Wildlife Fund and the Zoological Society of London. The TSX has been designed to be a dynamic tool to which new monitoring data are added and examined annually.
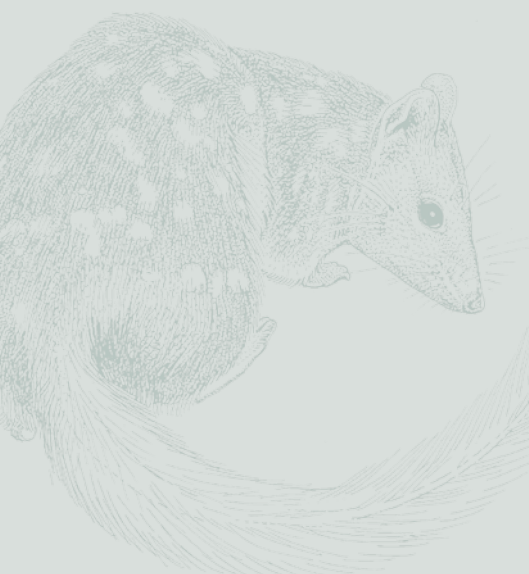
## How can the index be used?

For the first time in Australia, an index has been developed that can provide reliable and rigorous measures of trends across Australia's threatened species, or at least a subset of them. In addition to communicating overall trends, the indices can be interrogated and the data downloaded via a web-app to allow trends for different taxonomic groups or regions to be explored and compared. So far, the index has been populated with data for some threatened and near-threatened birds and mammals, and monitoring data for threatened plants are currently being assembled.

These indices will allow Australian governments, non-government organisations, stakeholders and the community to better understand and report on which groups of threatened species are in decline by bringing together monitoring data. It will potentially enable us to better understand the performance of high-level strategies and the return on investment in threatened species recovery, and inform our priorities for investment.

## A Threatened Species Index for mammals in New South Wales

Different taxonomic groups can be explored individually in the Threatened Species Index. Here, we present a report from the national Threatened Mammal Index (TMX) on trends for threatened and near-threatened mammals for New South Wales (Figure 1A). In its first iteration, this index incorporates data from five threatened and near-threatened mammal taxa (Near Threatened, Vulnerable, Endangered or Critically Endangered under the EPBC Act and/or IUCN – see Table 1). We used information from the Australian Species Profile and Threats Database and the international IUCN Red List as of July 2019 to make a decision about the currently listed taxa (143 taxa, which counts both species and subspecies).

Currently, data custodians in New South Wales are reviewing monitoring data collected in a range of formats over many years in order to contribute to the index in late 2020.

Data on these mammal taxa come from fixed sites where they have been repeatedly monitored in a systematic and standardised way. For some of the terrestrial sites, the data custodians provided information on whether they have been intensively managed and how. This information allowed us to look at the trend across all monitored sites, which is the overall Threatened Mammal Index (Figure 1), but also to drill down to look at the trends for:

## A Threatened Species Index for mammals in New South Wales (continued)

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

The division of sites/populations has been made solely on information provided by the custodians. This separation into subindices based on the type of intensive management is important especially for mammals monitored after being reintroduced into fenced or predator-free island areas. These areas are often more intensively monitored than extant populations, have fewer threats, and have the potential to significantly bias the population trends in the overall index. The reintroduced population trends may skew the overall result for a taxon and show the population as stable or increasing while in fact the extant population outside of the predator-free safe havens continues to decline, and thus needs to be examined carefully.

The index itself shows the estimated yearly change in relative abundance of threatened and near-threatened mammal taxa in relation to a baseline year, for which 2010 was chosen, where the index is set to 1.0. This baseline year was chosen because very few of the ongoing monitoring programs originated before 2010. However, later baseline years are also available to support the specific needs of conservation managers and can be selected via the web-app. Changes in the index are proportional – a value of 0.5 indicates the multi-taxon relative abundance is 50% below the baseline value; a value of 1.5 indicates 50% above baseline.

For the index on all sites in the New South Wales where Australian threatened and near-threatened mammals were monitored, the TMX value in 2016 based on the current data is 1.72. This suggests that the relative abundance of threatened and near-threatened mammals for which we have information has increased by 72% between 2010 and 2016. While the overall index value in 2016 is 1.72, individual taxa have TMX values between 0.71 (a 29% decrease) and 4.48 (a 348% increase) (Figure 1A). It is expected that more data (and taxa) will be added as they become available each year, allowing the index to grow.

## What should we know about the New South Wales data?

This overall index on all monitored sites is based on 42 time series (defined as sites where data on a taxon are recorded using the same methodology and a consistent monitoring effort though time) across these five taxa. Data quality was maximised by: 1) checking whether each dataset had been produced by standardised monitoring; and 2) by sending surveys on 127 eligible datasets to custodians and requesting them to assess the trends produced for their datasets. Feedback was received for 74% of the datasets. Only time series that had been produced by standardised monitoring and with a minimum length of two years, collected between 2010 and 2016 inclusive, were used for index calculation. No index was possible for earlier reference years due to data availability. Sub-trends of the overall trend (e.g., for marine mammals) can be calculated if data on at least three taxa are available.

The data underlying the New South Wales index mostly derive from monitoring programs at the border with Queensland, Victoria and South Australia. There is no representation yet of monitoring data for overall New South Wales (Figure 1B).

The index corresponding to sites with no (known) targeted management contains the majority of data on sites and taxa. This index is based on 38 time series and three mammal taxa. The TMX value in 2016 is 3.86, which indicates a 286% increase on average in relative mammal abundance between 2010 and 2016 (Figure 2).

As more high-quality data become available they can be added, making the index more powerful, meaningful and representative. Increasing the number of taxa, regions and functional groups monitored would strengthen the value of the index. Ongoing long-term monitoring programs allow for continuing capability to track changes in the relative abundance of threatened and near-threatened mammal taxa.

*LEFT: Numbat. Image: dilettantiquity Flickr CC2-0 Perth Zoo*
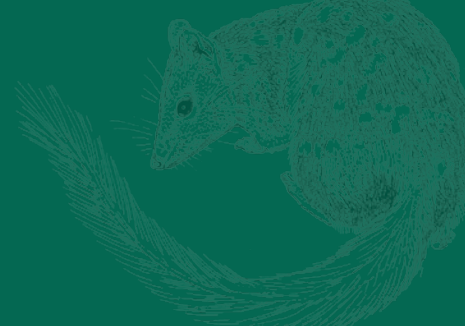
# Interpretational issues and constraints

- This composite index only includes data for threatened and near-threatened mammal taxa provided by the custodians endeavouring to meet the TMX criteria supplied. Inspection of these data indicate they are biased to the coastal areas of most states and are sparse for the arid zone. The index can be useful for also identifying strategic monitoring opportunities to increase the comprehensiveness of representation of threatened and near-threatened mammal taxa (see Table 1).

- There were limited appropriate monitoring data for remote areas available for inclusion in the index to 2016.

- Some mammal subgroups, such as bats and rodents are still underrepresented.

- The proportional representation of threatened and near-threatened mammal taxa, and spatial coverage, is low in comparison to data on threatened and near-threatened birds (Threatened Bird Index).

- This index may not be displayed in the web-app because the latest reference year that can be selected is currently 2000.
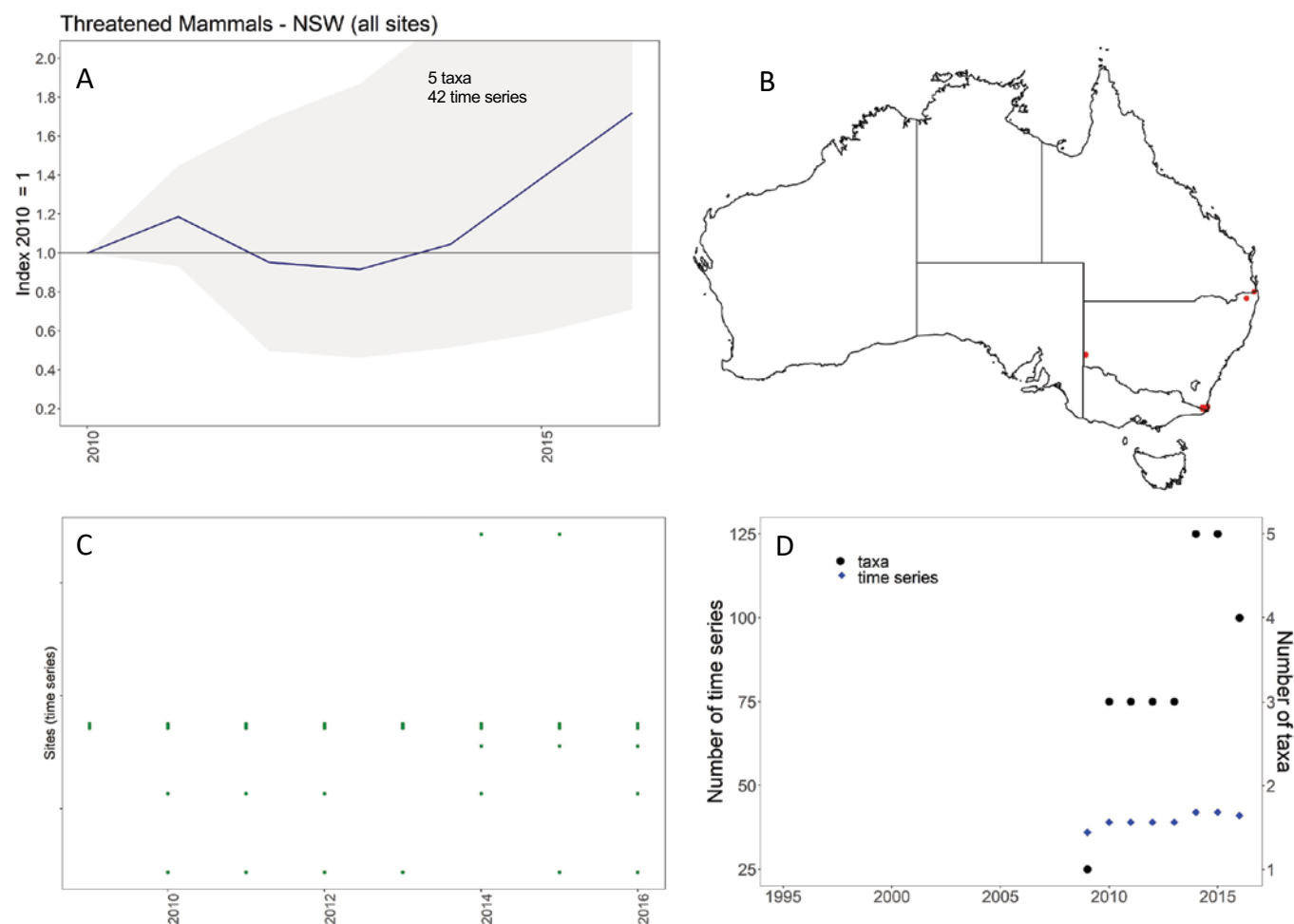


**Figure 1:** *A) The Threatened Mammal Index (TMX) for New South Wales, including data from all sites where threatened and near-threatened mammal taxa were provided. The blue line shows the change in mammal abundance relative to the baseline year of 2010, where the index is set to 1.0. The grey cloud shows the range of trends for the individual taxa that make up the overall multi-taxon index. It can be seen as the variability between single-taxon trends that contribute to the composite (i.e., it is not statistical confidence).*

*B) A map showing where threatened and near-threatened mammal data were recorded in New South Wales. The red dots indicate repeatedly monitored fixed sites.*

*C) This dot plot shows the particular years for which monitoring data were available to compile the index. Each row represents a time series where a taxon 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.*
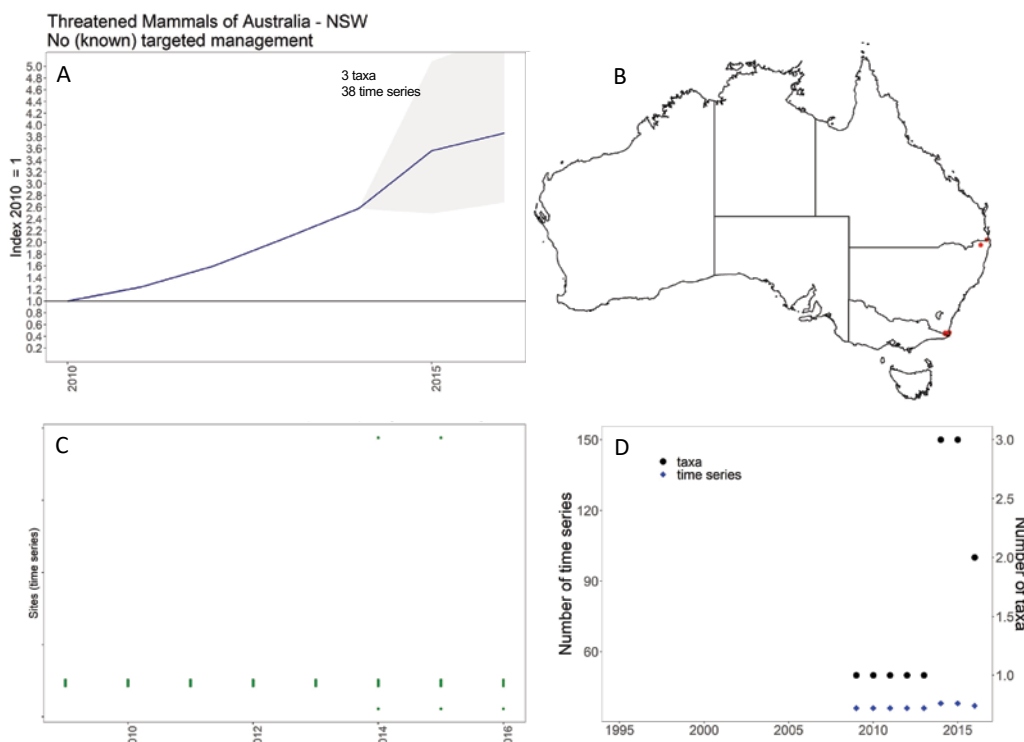
Figure 2: A) The subindex of the Threatened Mammal Index (TMX) for New South Wales that includes monitoring data on sites without targeted management of threatened and near-threatened mammal taxa or for which no information on management was provided by the custodians. Taxa included in this trend are: black-tailed antechinus, long-nosed potoroo and yellow-bellied glider.

B) A map showing where threatened and near-threatened mammal data with no (known) targeted management were recorded.

C) This dot plot shows the particular years for which monitoring data were available to compile the index. Each row represents a time series where a taxon 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.

Table 1: Data on threatened and near-threatened mammal taxa included in the TMX for New South Wales.

**Times-series length (mean ± SD): 7.5 ± 1.4**
**Number of samples (year) per time series (mean ± SD): 7.4 ± 1.6**
**Number of data sources in index: 5**
**Number of data taxa in index: 5**

| Taxon common name | Taxon scientific name | Functional Group | IUCN Status | EPBC Status | # data sources | # time series | Mean time-series length |
|---|---|---|---|---|---|---|---|
| Bilby | *Macrotis lagotis* | Terrestrial:50-5000g | Vulnerable | Vulnerable | 1 | 2 | 7.0 |
| Black-tailed antechinus | *Antechinus arktos* | Terrestrial:50-5000g | | Endangered | 1 | 1 | 2.0 |
| Long-nosed potoroo | *Potorous tridactylus* | Terrestrial:50-5000g | Near Threatened | | 1 | 36 | 8.0 |
| Numbat | *Myrmecobius fasciatus* | Terrestrial:50-5000g | Endangered | Endangered | 1 | 2 | 5.0 |
| Yellow-bellied glider | *Petaurus australis* | Terrestrial:Volant:50-5000g | Near Threatened | | 1 | 1 | 3.0 |

## 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

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 (e.g., Australian Wildlife Conservancy and Arid Recovery) and consultants. Visit this web page for more information: tsx.org.au

Go to the web-app to access and explore the data behind the TMX and to produce reports tailored to your particular needs.

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