

# Science for Saving Species

## Research findings factsheet

### Project 3.1



National Environmental Science Programme

## Factsheet: A Threatened Plant Index for Australia



### 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 Plant Index has combined data from multiple programs to tell us how Australia's threatened plant species are faring through time, and which plant 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](#).



Wollemia nobilis.  
Image: Jaime Plaza, Botanic Gardens Trust, Saving our Species

### Background

Nearly 1,400 plant species or subspecies are listed as threatened or extinct in Australia. Monitoring of 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.

More data (and species) will be added to the index as they become available each year, increasing the representativeness and robustness of the findings.





## A Threatened Species Index for plants in Australia

Here, for the first time, we present the Threatened Plant 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 plant 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 plant 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 plants, this allows us to also look at trends for these sub-groups:

1. Sites subject to any management (e.g. herbivore control, weed management, pest or disease control, translocations) (Figure 2),
2. Populations that include translocated individuals (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 plant taxa compared to a baseline year. This baseline year of 1995 was chosen for the national index 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 TPX 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 TPX value of 1.5 indicates that on average population sizes are 50% above the baseline year.

## Key findings: Australian threatened plant trends

In this first iteration the Threatened Plant Index includes 112 taxa. This represents about 8% of Australia's EPBC-listed threatened plants. You can find a summary of the species included by clicking "Data summary" on the [TSX visualisation tool](#).

The overall TPX value in 2017 is 0.28. This means that on average the size of threatened plant populations in our dataset have decreased by 72% between 1995 and 2017 (Figure 1).

While the overall index value in 2017 is 0.28, 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 plants at sites that were subject to any management such as herbivore control, weed management, pest or disease control, or translocations, has 261 time series with data on 64 plant taxa. This index has a 2017 value of 0.40, which corresponds to a decrease of 60% between 1995 and 2017 (Figure 2).

The index for populations that include translocated plants is based on 43 time series and 11 plant taxa. This index has a 2017 value of 0.56, which corresponds to an average decrease of 44% between 2000 and 2017 (Figure 3).

The index for sites with no (known) targeted management is based on 350 time series and 74 plant taxa. The TPX value in 2017 is 0.20, which corresponds to a 80% decrease on average in relative plant abundance between 1995 and 2017 (Figure 4).



*Darwinia glossosema.*  
Image: Sarah Barrett

## What should we know about the data?

The overall TPX is based on 611 time series (defined as sites where data on taxa are recorded using the same methodology and a consistent monitoring effort though time) across 112 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 trend (e.g. for plant 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 the southern half of the continent. The majority of data so far supplied to the index is from monitoring programs in South Australia, Victoria, New South Wales and Western Australia (51%, 24%, 13% and 8% of time series respectively; Figure 1B).

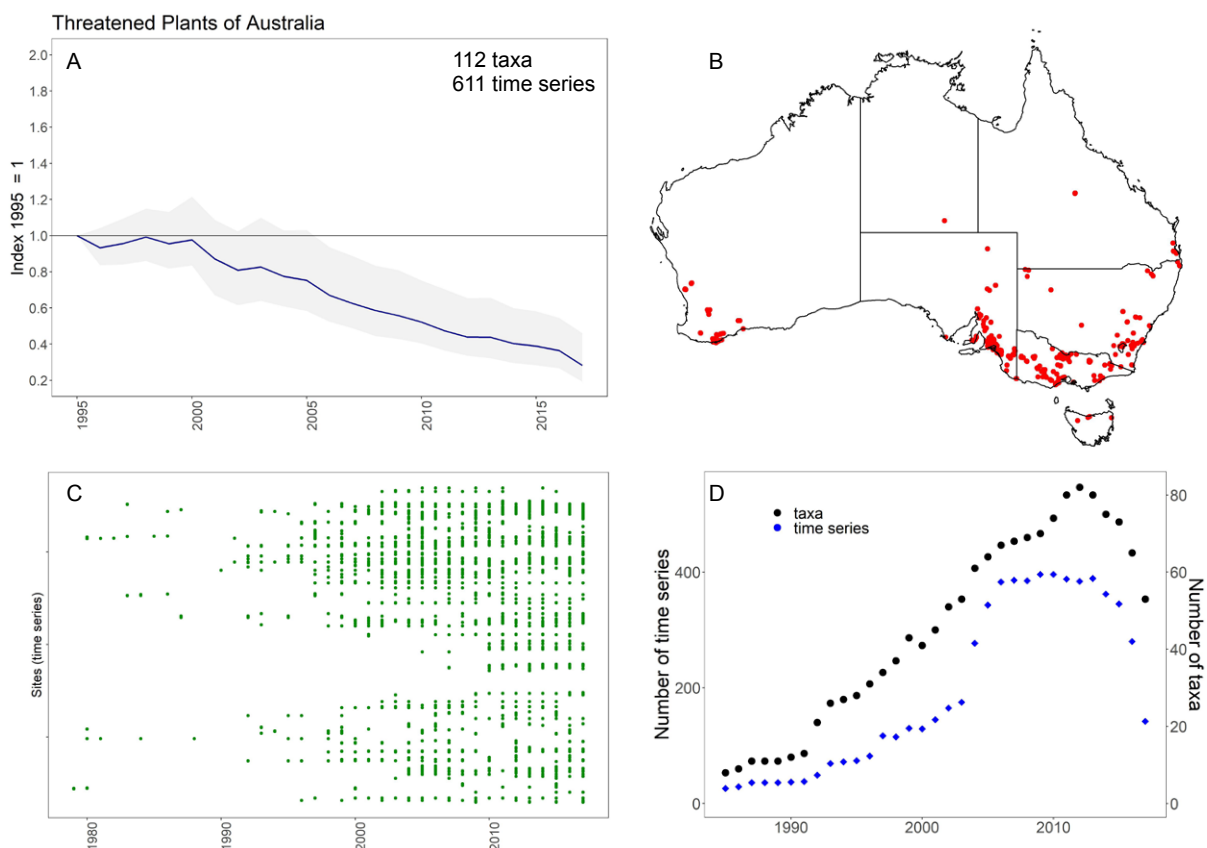
The number of monitored sites and taxa that met the TPX criteria (Figure 1C) has substantially increased since 1995 (Figure 1D).

Some plant functional groups, such as grasses and herbs, are still

underrepresented in comparison to others, such as orchids, which are very well represented.

Increasing the number of species, regions and plant groups monitored, particularly in regional gaps and for poorly represented plant groups 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 plant species.

Monitoring data is available for a smaller proportion of threatened plants compared with threatened birds or mammals ([view the 2020 index](#)).



**Figure 1:**

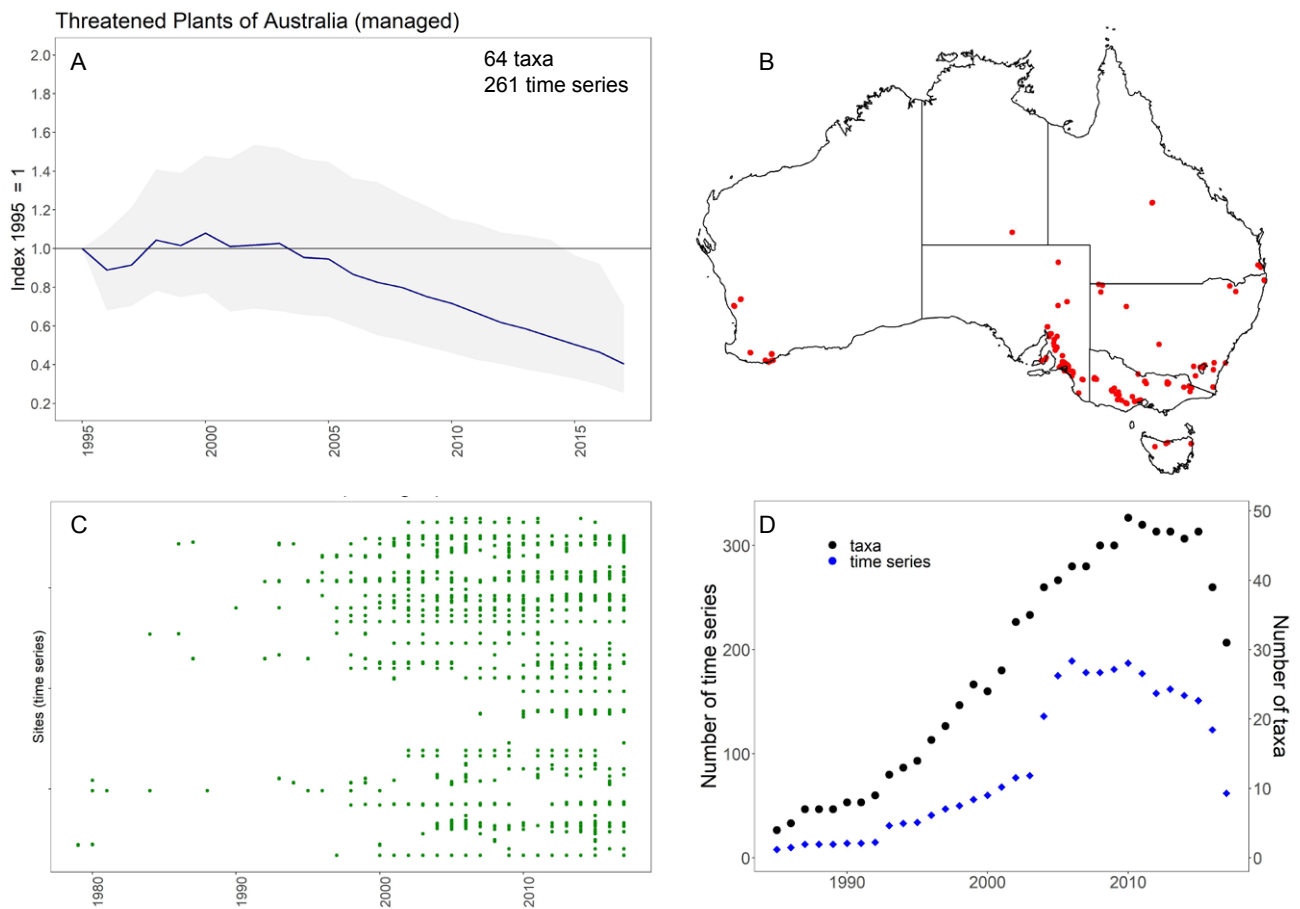
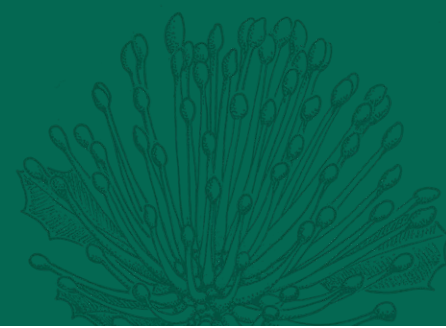
A) The Threatened Plant Index (TPX) based on all data provided on threatened and near-threatened plants. The blue line shows the change in plant abundance relative to the baseline year of 1995, where the index is set to 1.0. The grey cloud shows the confidence limit.

B) A map showing where threatened plant data were recorded in Australia. The red dots indicate repeatedly monitored fixed sites.

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





**Figure 2:**

- A) The Threatened Plant Index (TPX) based only on data from managed sites (including herbivore control, weed management, pest or disease control, or translocations and other dedicated conservation management).
- B) A map showing where threatened and near-threatened plant taxa on sites subject to any conservation management were recorded.
- 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 species (in black circles) and number of time series (in blue diamonds) used to calculate the index for each year.

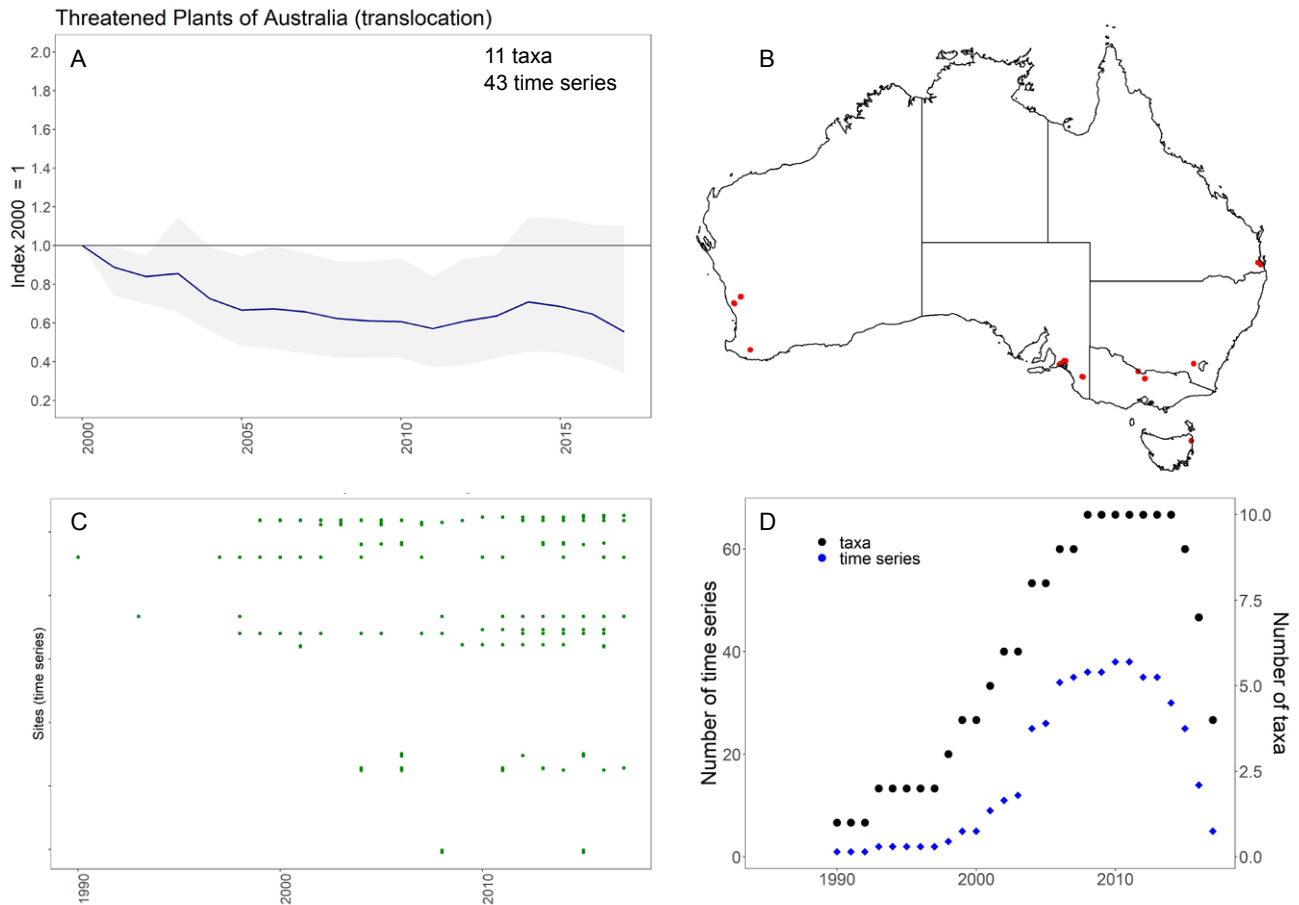
*Swainsona recta*.  
Image: Tom North,  
Australian National Botanic Gardens



*Grevillea nodosa*.  
Image: Allthingsnative,  
CC BY-SA 4.0 Wikimedia Commons



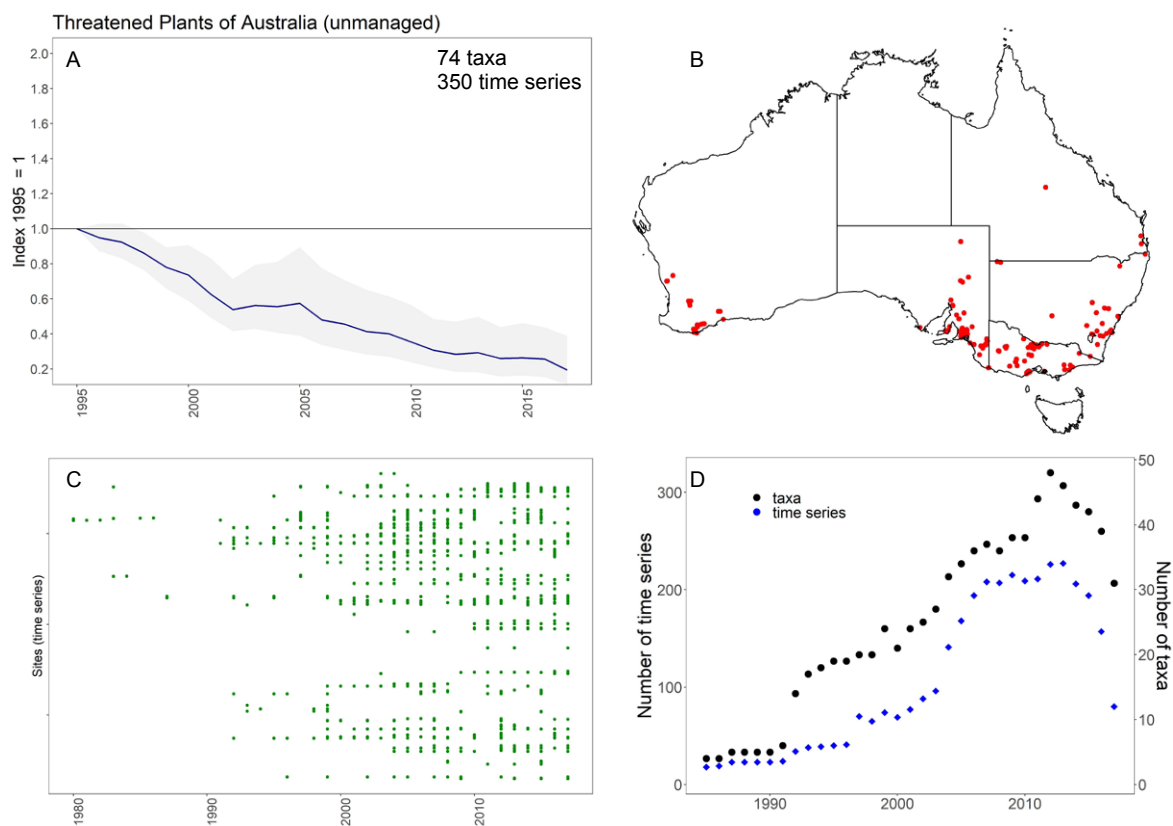
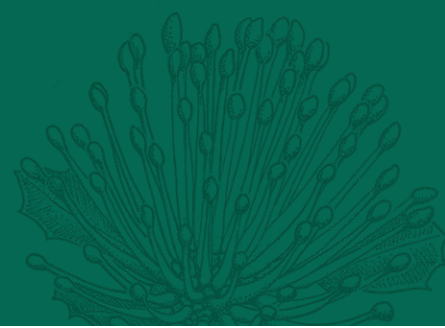




**Figure 3:**

- A) The subindex of the Threatened Plant Index (TPX) that includes only data from populations that include translocated individuals. Note that where one of these taxa also occurs elsewhere, data from those sites (which do not include translocated plants) is not included in this subindex.
- B) A map showing where populations that include translocated individuals were recorded.
- 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 species (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 Plant Index (TPX) that includes monitoring data on sites without targeted management of threatened and near-threatened plant taxa or for which no information on management was provided by the custodians.
- B) A map showing where threatened plant data with no (known) targeted management were recorded.
- 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 species (in black circles) and number of time series (in blue diamonds) used to calculate the index for each year.

## 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. Visit [this web page](#) for more information.

Go to the [web-app](#) to access and explore the data behind the TPX 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](#).