



## A New Way to Follow how Australia's Threatened Species are Faring

**Doctor Ayesha Tulloch**, Conservation Scientist, University of Sydney and **Doctor Micha Jackson**, Ecologist, University of Adelaide

Most of us have watched nightly news readers describe how Australia's economic health is trending, using measures like the Australian Securities Exchange and unemployment rates. It is no less important to track how Australia's native species are doing, as it is increasingly evident that healthy biodiversity is key to well-functioning natural ecosystems and people's health and livelihoods. Yet, there has never been a simple way for the public to consider how large groups of Australia's animals and plants are faring over time.

To determine how Australia's animals and plants are faring over time, a dedicated team of researchers from the Threatened Species Recovery Hub worked with more than forty partners from all of Australia's state and territory governments, major non-government, and not-for-profit conservation organisations such as BirdLife Australia, Australian Wildlife Conservancy, Bush Heritage Australia, and individual community members to develop the Australian Threatened Species Index. To build the index, the team spent five years collecting and combining data from hundreds of threatened species monitoring programs and created a database representing thousands of sites and species all around the country. The

data was fed into models that produced trend lines, showing how populations of threatened birds, mammals, and plants have changed over time. The next step was to ensure that anyone could access the data and visualise trends in different parts of Australia for different groups of threatened species. Consequently, a Threatened Species Index website, [tsx.org.au](http://tsx.org.au), was created for anyone to use and review how threatened species in their region are going.

The information that was discovered was worrying! On average, populations of threatened species in Australia declined to less than half of their abundance twenty years ago. Of the mammals, birds, and plants in the Threatened Species Index database, threatened plants had seen the worst declines, with populations decreasing by more than seventy percent on average in the last twenty years. In other words, seven out of every ten threatened plants have disappeared in just two decades.

### Building New Populations of Challenging Beauties

Some of the longest-spanning plant monitoring datasets identified are orchids, representing more than a quarter of all Australian Threatened Plant Index species. This charismatic

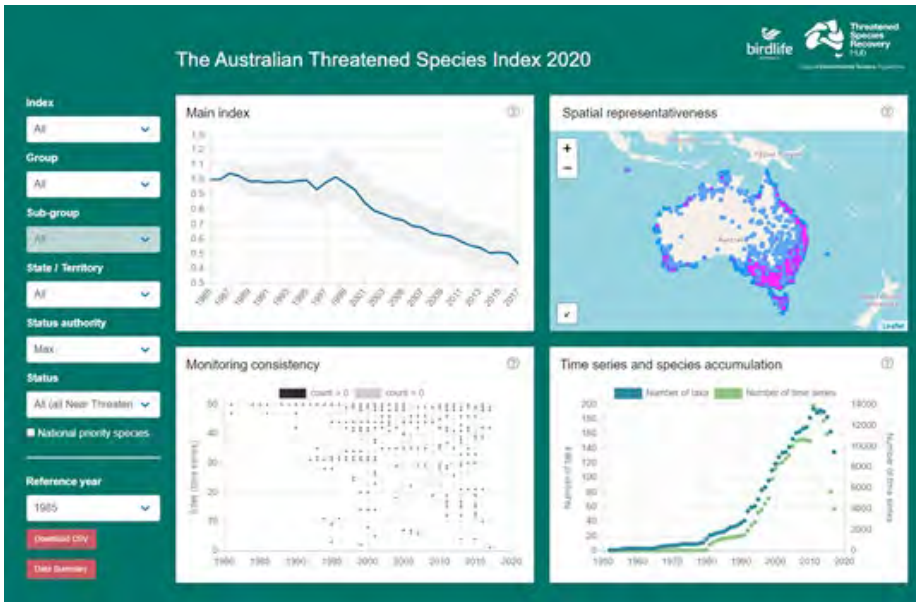


and diverse family has over 26,000 species worldwide. Australia alone has more than 1,800 orchids. They represent about six percent of all plant species in the country but, alarmingly, consist of seventeen percent of all plants listed as threatened – more than any other plant family. The index shows that more than six out of every ten individual orchids have disappeared since 2000.

Orchids face many threats, including land clearing, changed fire regimes, competition from weeds, and climate change. They also face unique challenges due to their dependence on specific pollinators and fungi, which themselves can be under threat. For example, the endangered coloured spider-orchid (*Caladenia colorata*) is pollinated by only a single thynnine wasp or flower wasp species, to which the orchid provides a small amount of nectar reward. The orchid also relies on only one species of symbiotic mycorrhizal fungi to germinate in the wild. If these essential interactions with other species in the ecosystem are disrupted, orchid populations could decline to extinction.

**Above Left:** The endangered Tasmanian devil (*Sarcophilus harrisi*) has been declining due to the deadly devil facial tumour disease that was first spotted in 1996. Image: Micha Jackson.

**Above Right:** The critically endangered Brindabella midge orchid (*Corunastylis ectopa*). Image: Tom North, Australian National Botanic Gardens.



The Australian Threatened Species Index in 2020, showing how populations of threatened mammals, birds, and plants have decreased in abundance by fifty-five percent on average since 1985. Image: tsx.org.au



Volunteer birdwatchers played a vital role in collecting the information in the Threatened Species Index. Image: Idelies Govett.



Translocation is an essential tool used to assist in the conservation of many plants. Western Australian Department of Biodiversity, Conservation and Attractions Threatened Flora Officers collect cactus dryandra (*Banksia anaton*) seeds to propagate plants for a threatened species translocation program. After translocation, plants are protected with guards and monitored to track their survival – the information is fed into the Threatened Species Index. Images: Rebecca Dillon and Leonie Monks.

The remaining eleven populations of the coloured spider-orchid mostly occur on privately-owned farms. There, vegetation clearing and grazing by cattle and rabbits continue to threaten its survival. Yet, even for such a challenging species, recovery is possible. Scientists from the Royal Botanic Gardens Victoria identified sites in western Victoria where the coloured spider-orchid could be re-introduced – by searching for places where the orchid’s wasp pollinator was present. They propagated new orchids in a laboratory, using the orchid’s symbiotic fungus, and translocated 883 propagated plants onto a private Trust for Nature covenanted property between 2013 and 2019. Each planted orchid was tagged for monitoring, protected with a cage, and had ongoing weed removal. These populations have started to flower and recruit and are now self-sustaining, increasing the total number of known coloured spider-orchids in the wild from 1,000 to 2,286 plants – a fantastic achievement in such a short time.

### Management Does Pay Off

By comparing trends across different species groups, important discoveries were made about whether conservation actions were working or not. Six out of every ten plants have disappeared in sites where weeds and introduced herbivores like rabbits and cattle have been managed. However, it worsens to eight out of every ten plants having disappeared in areas where no conservation actions have occurred. Therefore, the result suggests that conservation actions have reduced the rate of decline at management sites. Unfortunately, efforts have not yet



been enough to halt or reverse declines overall; not all plants receive the level of care of the coloured spider-orchid.

The benefit of management is more evident for threatened mammals. Mammal populations at many sites with targeted conservation actions, such as poison baiting of introduced foxes and feral cats, or ecological fire management, have increased over the last twenty years. However, mammal populations have declined at sites with no conservation actions, showing a sixty percent decline on average. Yet, remarkably, between 2000 and 2016, populations of fifteen threatened mammals at feral predator-free sites increased five-fold. These results highlighted the effectiveness of Australia's safe havens network of predator-free islands and fenced conservation areas, where threatened mammals such as the bilby (*Macrotis lagotis*) and numbat (*Myrmecobius fasciatus*) are protected from introduced predators.

### How Can You Help?

The Threatened Species Index currently includes data from anywhere in Australia on threatened birds, mammals, and plants. Almost ten times more monitoring data is available for threatened birds than mammals and plants, primarily due to the fantastic efforts of community birdwatchers coordinated by groups like Birdlife Australia. However, birds make up only four percent of Australia's threatened species, and plants make up seventy-seven percent – 1,342 of Australia's 1,800 listed species.

Many of Australia's threatened species are impacted by human disturbance, historically by poaching and collection activities. Consequently, it is vitally important to ensure that the monitoring of threatened species does not further endanger them by disturbing their habitat or enabling wildlife collectors to access sensitive and protected wildlife populations. Therefore, protocols guide how the location of threatened species can be shared. The Threatened Species Index presents information to the public on trends at a regional scale, protecting the individual monitoring sites of threatened species – some of which might still be vulnerable to collection activities and the illegal wildlife trade, despite heavy fines.

There are, however, many threatened species populations that are known to local conservation groups and councils. Many of which are found in and around urban areas. If you are keen to get involved in monitoring threatened plant species, which are most in need



Macquarie University PhD student Tom Pyne is undertaking a flora survey in Ku-ring-gai Chase National Park, New South Wales. Image: Rachael Gallagher.



The nationally threatened golden-shouldered parrot (*Psephotus chrysopterygius*), or Alwal in Olkola language, is a significant cultural species for Indigenous peoples in Far North Queensland. Image: Micha Jackson.



Australian Department of Biodiversity, Conservation and Attractions Threatened Flora Officer, Leonie Monk, surveying Foote's grevillea (*Grevillea calliantha*). Image: Rebecca Dillon.



**Left:** the endangered pink-lipped spider orchid (*Caladenia behrii*). Image: Bob Bates.



**Above Right:** the coloured spider orchid (*Caladenia colorata*). Image: Noushka Reiter, Royal Botanic Gardens Victoria.



**Bottom Right:** the vulnerable leafy greenhood (*Pterostylis cucullate*). Image: Bob Bates.

of additional monitoring effort, it involves just a few simple steps. With the help of your local council or state or national native plants society (e.g., [anpsa.org.au](http://anpsa.org.au)), locate a patch that contains a threatened plant species, and count the number of individual plants in a well-defined area. Revisit your patch once or twice a year and use the same searching method and the same amount of effort each visit. Take great care not to disturb the plant or its habitat when looking for it. Then tally up your numbers and contribute your data to the Threatened Species Index using the online submission template. It is important to monitor species at the same place using the same approach over many years, even if that does not sound like too much fun. However, without this rigour, we cannot accurately assess how species are doing over time.

### Moving Forward to Save Australia's Threatened Species

Australia's plants and animals are unique – many are found nowhere else in the world. Many threatened species, particularly plants, lack data on their trends and have limited to no conservation funding and no recovery plans to guide how funding might be spent if funds became available in the future. Australia needs a radical overhaul of how much funding is allocated to conserving our unique natural heritage. Without such change, it is likely that many threatened animal and plant populations will continue to decline at an alarming rate. Extinctions are irreversible and have flow-on effects on the ecosystem around them – the loss of native species impacts humans and future generations. We lose essential services that those species provide, like pollination, and lose one more part of the ecosystem that can no longer bring us joy and enrich our world.

The last few years have been tough for native species. The 2019-2020 bushfires pushed more than a hundred of Australia's threatened species, like the Kangaroo Island dunnart (*Sminthopsis aitkeni*), closer to extinction. The coronavirus pandemic has had global consequences on economies and environmental spending. Despite these challenges, there is a reason for hope. Insights from the Threatened Species Index shows that it can pay off where dedicated conservation management is being implemented. The Threatened Species Index aims to help build public knowledge and awareness of the plight of threatened species, inform what species require urgent recovery action, engage individuals, groups, and governments in conservation action, and motivate collective action to stop further declines of native species before it is too late.

The development of the Threatened Species Index was supported by the Threatened Species Recovery Hub of the Australian Government's National Environmental Science Program and BirdLife Australia. It is the first of its kind in Australia, providing an evidence-based national-level understanding of threatened species trends.