

Science for Saving Species

Research findings factsheet

Project 2.4



National Environmental Science Programme

An action plan for Australia's imperilled plants

In brief

Australia has a high degree of plant diversity and endemism (i.e., species found nowhere else), with more than 90% of species found nowhere else in the world. Plants comprise over 70% of all species listed as threatened in this country.

We compiled a list of the Australian plant species that are experiencing the most severe population declines, and outlined research and management actions to help prevent their extinctions.

We found that imperilled plant species were concentrated in highly

modified regions, where agricultural and urban landscapes meet habitats with a high abundance of endemic species. These are located in the east, south-east and south-west of Australia.

Threats to these species varied depending on location but were primarily habitat clearance and degradation, limited recruitment, inappropriate disturbances such as fire and herbivory, disease and climate change.

To prevent extinctions a range of actions will be needed, including

improving habitat quality, managing herbivores, weeds and disease, improving fire management, increasing monitoring, conducting targeted scientific research, establishing ex situ seed banks, undertaking translocations, purchasing land in perpetual conservation agreements, and continuing to align state and federal conservation status listings.

The results are detailed in the Action Plan for Australia's Imperilled Plants 2021. This factsheet presents a summary.

There are only 13 mature Woods Well spyridium (Spyridium fontis-woodii) plants in a single roadside population in an agricultural region of South Australia. This species is threatened by inappropriate disturbance regimes and lack of recruitment. Image: Daniel Duval South Australian Seed Conservation Centre



Background

Australia is home to more than 22,500 native plant species, of which more than 90% are found nowhere else in the world. Our diverse and distinct flora evolved over millions of years in response to changing climates and challenging and varied environmental conditions.

Australian plants have been observed, utilised, celebrated and altered by First Nations People for over 65,000 years. Since European colonisation, human-driven changes to vegetation have been drastically accelerated. Land clearing for agriculture and urbanisation, the introduction of alien plants, animals and diseases, and the interruption of ecological processes such as fire regimes, erosion and hydrology have had significant ramifications for plant communities.

Vascular plants underpin the structure and function of all terrestrial ecosystems, yet many of the Australian flora are cryptic, seldom observed and poorly known to western science. Every year, an estimated 250 flowering plants are newly described in Australia.

Plants comprise over 70% of species listed under the *Environment Protection and Biodiversity Conservation Act 1999*. A recent review found that twelve species are likely to have become extinct since European colonisation.

Recent conservation assessments of Australia's threatened flora suggest that, on average, their populations have declined by almost three-quarters over two decades. Many plant species are declining sharply toward extinction.

Research aims

We aimed to:

- identify Australia's most threatened plant species that require urgent conservation management to avoid extinction
- review their conservation status and identify appropriate recovery actions
- identify where critical information gaps compromise conservation status assessments and species management
- provide a baseline for measuring future changes in population characteristics, trends and conservation status for these imperilled plants.

*BELOW: Across six locations in south-western Western Australia, only 27 individual Foote's grevillea (*Grevillea calliantha*) plants remain. All are in heavily cleared agricultural landscapes. Image: Fred and Jean Hort*





BELOW: Fewer than 15 known individual Gaping teek-orchids (*Prasophyllum correctum*) remain; all in two small subpopulations along the Melbourne-Bairnsdale rail line.
Image: Jeff Jeanes State Botanical Collection Royal Botanic Gardens Victoria

What we did

This action plan builds on a large body of previous work in plant conservation science.

We compiled information on all Australian plant species listed as Critically Endangered and Endangered under the *EPBC Act 1999*, producing a candidate list of 1,135 plant species.

We sourced information from Australasian Virtual Herbarium records, recovery plans, conservation and listing advice, species profiles, reports, peer-reviewed literature and interviews with 125 experts between February 2016 and November 2017.

For each species, we collated conservation status, bioregion occurrence, current and former distributions, habitat preference and ecology and biology. We then assessed the estimated population and evidence of decline, threats and threat impacts, and adequacy of previous search effort.

To identify the plants at the most severe risk of extinction, we determined current population trends. This is challenging with plants, due to necessary comparisons over long timeframes. Where long-term data were unavailable, we relied on expert knowledge. During interviews, we asked species experts to justify or qualify their assessments to limit the interference of personal biases.

We scored each species with evidence of continuing decline in their population by:

- the abundance of the species
- the severity, magnitude and certainty of decline
- whether all known subpopulations were in decline
- associated extinction risk.

The final list of imperilled species included in the Action Plan was reviewed and corroborated by relevant experts throughout 2018–21, ensuring we presented the most current information.



Key findings

More than two-thirds of imperilled species are long-lived trees and shrubs. Eight are ground orchids, seven are perennial forbs (one fern) and two are annual forbs.

Imperilled species are concentrated in regions where heavily modified agricultural and urban landscapes meet regions with high rates of endemism (a high diversity of plants that have restricted distributions). These are located in the east, south-east and south-west of the continent. The threats to each of these species vary depending on location (see Figure 1).

Distribution

Imperilled species are found in only 26 of Australia's 89 bioregions but are distributed across the country: 15 imperilled species are found in Western Australia, 13 in New South Wales, 11 each in Victoria and Queensland, three in Tasmania and two in South Australia.

The only arid zone species that we considered imperilled was the Great Artesian Basin spring endemic, *Eriocaulon aloefolium*. This species is restricted to a single, spring-fed wetland in central Queensland.

The majority of imperilled species are restricted to five habitat types.

Southern Australian heathlands and shrublands from Victoria to south-western Australia have been extensively cleared for agriculture, and contain 18 of the 50 imperilled species. Mountainous habitats host another 12 imperilled species. These species often occur on a single mountain peak or outcrop. Because their distributions are so highly restricted, they are highly vulnerable to local impacts as well as future climate change.

Key findings (continued)

Wetlands have been extensively cleared, altered and sown with pastures around Australia. They are now heavily grazed and vulnerable to climate change impacts. Eight species of imperilled plants are wetland specialists.

Temperate and subtropical fertile tussock grasslands and grassy woodlands of eastern and southern Australia contain another eight species that we considered imperilled. These landscapes have been extensively cleared for agriculture since European colonisation. Remnants of these habitat types are mostly contained to roadsides, rail lines and other tiny reserves.

Subtropical rainforests in eastern Australia host the remaining six species on the list. Of these, five are imperilled by the introduced pathogen, myrtle rust.

Threats

Ongoing habitat loss is a high-impact threat for six imperilled species. Following historical habitat clearance, over 60% of the imperilled plants now survive only as fragmented subpopulations in small patches of remnant vegetation. These patches often occur along road and rail corridors that are not managed for conservation and therefore face a high risk of further loss and degradation.

Many remnant shrub subpopulations comprise mature individuals with limited recruitment. Recruitment may be limited by competition with weeds and native vegetation, or disturbances like inappropriate fire or herbivory. Limited recruitment threatens 21 of the imperilled plant species. Without active management of disturbances, these species will likely go extinct. Some populations may have already fallen below the critical viable population size that is required for long-term persistence.

Approximately 40% of imperilled species occur in habitats that are less heavily modified, mostly mountain ranges and upland rainforests.

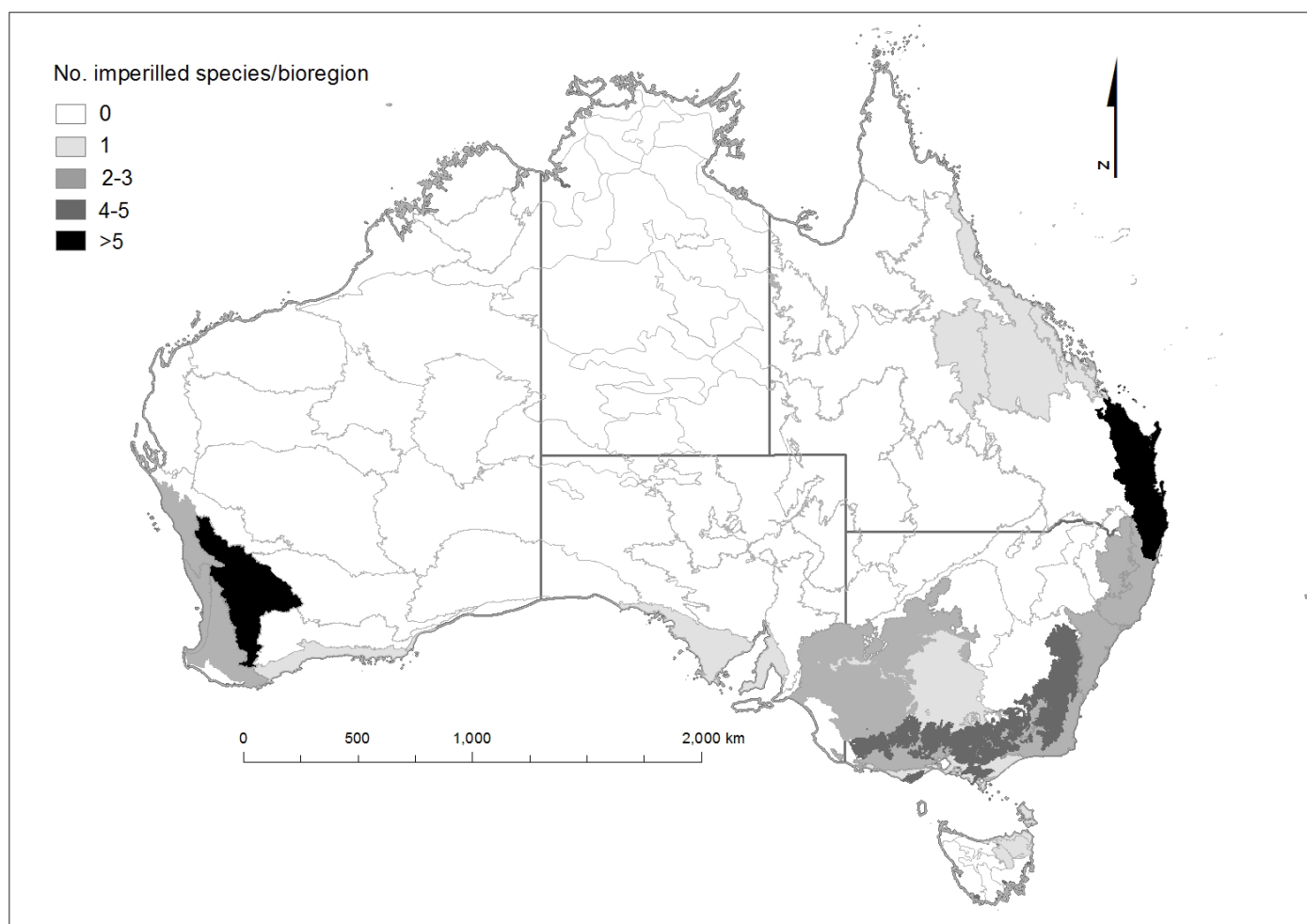


Figure 1: Number of imperilled species by biogeographic region (DAWE 2012), Australia.

Key findings (continued)

These plants are threatened by factors that are specific to site and species. These threats include infrastructure maintenance, herbivory, insect borers, mites and introduced pathogens. Increased bushfire frequency, severity and intensity is another major threat to certain habitat types, for example, to Koi Kyenunuruff (the Stirling Range) in south-western Australia, which is home to *Banksia montana*.

The impacts of a changing climate on many plant species are poorly understood, but predicted to be severe for geographically restricted species, particularly when in concert with other threats. Climate change is a high-impact threat for five imperilled species, and an emerging threat for many more.

The plant pathogens phytophthora (*Phytophthora cinnamomi*) and myrtle rust (*Austropuccinia psidii*) are directly responsible for the imperilled status of 10 species. Phytophthora is a soil-borne water mould that destroys the roots of infected plants. Myrtle rust impairs the growth of shoots, flowers, fruits and seeds, leading to reduced reproduction and eventually, death.

Interacting threats are likely increasing the risk of extinction for many of these imperilled plants.

Conservation

All of the imperilled species met the IUCN criteria for listing as Critically Endangered. Only six species have a geographic range greater than 100 km² and 31 are only found in an area less than 10 km².

Only five species are known to occur in more than five locations, while 32 species are known from a single location. All species are declining and/or projected to continually decline. The distributions of 39 species are severely fragmented.

A lack of currency and consistency between conservation listings may hinder the management of many of the species identified, with misaligned protections and conservation status between state and federal listings.

BELOW: Dalveen blue box (Eucalyptus dalveenica) is restricted to a small patch of remnant vegetation across three private properties and a roadside reserve. Image: John Neldner





Recovery actions, research and management priorities

Most of the imperilled species in the Action Plan have strong prospects for recovery with intensive site-based management, complemented by conservation and translocation efforts elsewhere. For many species, this will involve continuing and expanding on current recovery efforts. For some plants that are highly restricted with less than five known mature individuals, long-term recovery will be entirely dependent on *ex situ* options such as establishing seed banks and living collections.

Monitoring is a high priority for all imperilled species to prevent extinctions and encourage population growth. Given the restricted distributions and small populations of most imperilled species, monitoring will involve a complete census conducted regularly. Targeted research into each species' life history and ecology (such as seed biology and germination requirements, appropriate disturbance regimes and susceptibility to diseases) would be highly beneficial.

Distinguishing species from close relatives is critical for their continued conservation. Further taxonomic work is required to clearly define species that are difficult to differentiate based on morphology.

While 29 species are at least partly protected in reserves managed for conservation, 11 of these reserves are small and in highly fragmented landscapes. Many other species are restricted to heavily cleared and modified landscapes. Securing perpetual conservation agreements over these sites would vastly improve conservation prospects.

Recovery actions that would prevent population declines fall under the broad banners of:

- habitat protection, management and restoration
- fire management
- protection from herbivory
- invasive weed control
- protection from infrastructure maintenance activities
- disease management.

Fire management will be significant to the survival of 33 species, not only in preventing loss of mature plants and habitat, but also for active burning to stimulate recruitment and reduce competition.

Increasing stakeholder and community engagement in managing and detecting existing and new subpopulations is a priority for 32 species.

Ex situ seed banks and living collections in botanic gardens have been established for all but 10 imperilled species. Translocations have been attempted for many species, with varying success. As such, translocation attempts must only be implemented in conjunction with recovery management of wild populations.

Conservation listing of species underpins funding opportunities as well as protections from land clearing and development activities. Aligning listing status between separate jurisdictions and providing current and comprehensive risk assessments are an urgent priority for plant conservation.

Further Information

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