Australian Government

THREATENED SPECIES STRATEGY

YEAR FIVE REPORT

ACKNOWLEDGEMENT OF COUNTRY

Photo: Kerry Cameron

THE DEPARTMENT OF AGRICULTURE, WATER AND THE ENVIRONMENT ACKNOWLEDGES THE TRADITIONAL OWNERS OF COUNTRY THROUGHOUT AUSTRALIA AND THEIR CONTINUING CONNECTION TO LAND, SEA AND COMMUNITY.

We pay our respects to them and their cultures and to their Elders both past and present. We are committed to working respectfully with Aboriginal and Torres Strait Islander peoples and give particular acknowledgement to their use, knowledge and custodianship of Australia's native plants and animals over countless generations.

The Department supports Aboriginal and Torres Strait Islander peoples and their aspirations to maintain, protect and manage their culture, language, land and sea country and heritage.

COMMISSIONER'S MESSAGE

WHEN I FIRST BEGAN IN THIS ROLE IN EARLY 2018, THE AUSTRALIAN GOVERNMENT'S INAUGURAL FIVE YEAR THREATENED SPECIES STRATEGY WAS ALMOST EXACTLY AT ITS HALFWAY POINT.

It has been a great privilege to have had carriage of the concluding half of this ambitious Strategy, to have had a hand in supporting Australia's most threatened species and to personally witness the positive impact of so many great projects that are working hard to recover threatened species.

Five years after the Strategy commenced, it's easy to forget how far we have come since those initial days of this new approach of focussed national attention on priority action areas for threatened species. Launching outcomes-based national targets for threatened species recovery was a bold and untried course in 2015, and it's very satisfying to see the progress made against these targets by mid-2020.

Many of the year five targets were deliberately very ambitious. They were intended to stretch us to do more than had been attempted before, therefore those we have met represent genuinely impressive achievements.

The level of ambition across all targets generated serious action in areas where national attention was critical, such as checking the escalating impact of feral cats on our native wildlife. This means that even where some targets were not fully met, the progress made towards them has led to real improvement in the prospects of many threatened species. Collectively, Australia's threatened species management community has much to be proud of in its pursuit of these targets and I'm thrilled to report on some of these efforts in the following pages. This Year Five Report does not shy away from the fact that there is much more work to do to ensure our native plants and animals thrive into the future, and this will require an ongoing collective effort.

Partnerships with so many great individuals and organisations in the threatened species research and management community has been a real highlight for me as the Threatened Species Commissioner. I'd like to extend my personal thanks to all of you who look after threatened species, who are on the ground doing the hard yards of caring, protecting and supporting, as well as those who have helped with monitoring and reporting on recovery progress. There are many challenges in recovering species that face multiple threats, and I think we do this best when we do it collaboratively.

Photo: Northern Hopping Mouse, Rebecca Diete

As this first Threatened Species Strategy concludes, I'm keen to retain the spirit of adventure and optimism that characterised its unfolding and implementation as we look ahead to the future. The next Threatened Species Strategy will be in place from 2021-31 and provides an excellent opportunity to refine our approaches and implement lessons learned over the last five years. There are areas of focus that we will continue with, to consolidate conservation gains already made or to sharpen our focus on areas where we have fallen short. Recognising the significant challenges facing Australia's threatened species, there will also be new focus areas to expand the new Strategy's reach.

Just as previous reports have done, this Year Five Report provides an annual update on activities and highlights from the July 2019 – June 2020 period. And, as the Strategy's fifth and final report, it also provides reflections on the Threatened Species Strategy as a whole.

I'm delighted that the first Strategy has delivered some great outcomes for Australia's threatened species, and I look forward to sharing some of those successes in this final report.

Dr Sally Box
Threatened Species Commissioner

Photo: Cassowary, Shutterstock

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Photo: Black Grevillea, Fagg, M

REVIEW OF THREATENED SPECIES STRATEGY APPROACH OVER 2015-2020

OVER THE PERIOD FROM 2015 TO 2020, THE AUSTRALIAN GOVERNMENT'S INAUGURAL THREATENED SPECIES STRATEGY MADE A REAL DIFFERENCE FOR AUSTRALIA'S MOST THREATENED FAUNA AND FLORA.

This is evidenced through quantifiable progress against ambitious, outcomes-based targets that were pursued over the Strategy's five years.

The targets were deliberately challenging, to push the envelope on support and investment in meaningful action for threatened species. They were also designed to sharpen national attention on key action areas to recover threatened species.

Setting ambitious targets with measurable outcomes galvanised action early, so that progress could be determined by the end. For some targets, five years has proved too short a timeframe to be met.

This was a known risk from the Strategy's outset, however, the bold action generated by the stretch goals has been positive for many threatened species.

These positive impacts will have lasting benefits as the work underway to fulfil the targets continues, even though the first Strategy has concluded. For example, while the target to eradicate feral cats from offshore islands was only met for one of the five identified islands by 2020, significant progress has been made and is ongoing on the remaining four islands. Confidence is high that all five of these islands (and three additional islands) will be feral cat-free in coming years, which will provide critical sanctuaries for threatened species.

Independent scientific assessment has been conducted of the trajectories of the Strategy's priority threatened birds, mammals and plants since 2015. This assessment concluded that overall, the Strategy had a positive impact on these species, even though some of the benefits will take longer than five years to manifest, particularly for long-lived species.

MAKING A DIFFERENCE

Recognising the devastating impact of feral cats on Australia's wildlife and the key threat they pose for many native species at risk of extinction, the Strategy unapologetically had a strong focus on feral cat control and management. The feral cat targets included national feral cat cull goals, targets for cat eradication on offshore islands and fenced mainland exclosures, and area targets for implementation of feral cat management across millions of hectares.

Progress against these targets has been impressive, but what has been equally important is the change in the national conversation about cats in Australia over the Strategy period. Through the Strategy, scientists have been supported to determine and communicate the extent of feral cat impacts, natural resource managers have been empowered and supported to reduce feral cat numbers, and more Australians are expressing support for responsible pet ownership, which benefits their family pets as well as wildlife.

Photo: Australasian Bittern chicks, Matt Herring

A significant contributor to improved species trajectories has been the Strategy's direction of Australian Government funding, particularly under the National Landcare Program's Regional Land Partnerships, which has included support for habitat improvement and restoration for priority threatened species, as well as management for weeds and feral predators.

The Strategy has championed Indigenous custodianship of threatened species, partnering with traditional owners to support 'right-way' recovery of priority threatened species. Right-way recovery integrates traditional ecological knowledge with contemporary practices, based on respect for different knowledge systems and an open approach to listening and learning. Working with Indigenous partners has been critical to the success of the Strategy, particularly as Indigenous-managed country is where many threatened species persist after contractions in other parts of their range.

The conservation and protection of threatened species is a shared responsibility, with the Australian Government, state and territory governments, and a range of non-government land and sea managers all playing a role. The Strategy's collaborative approach has highlighted the critical importance of working together to achieve the best outcomes for threatened species.

Partnerships and cooperation have been key to making a difference on a national scale, particularly with state and territory government colleagues. Working closely with the National Environmental Science Program (NESP) Threatened Species Recovery Hub has been critical in facilitating impactful research that will inform and improve threatened species management and threat mitigation now and into the future. Our progress against the Strategy's Year Five targets reflect the collective effort of many, and this report includes many case studies of partnership projects that are making a difference to our threatened species.

In the final summer of the Strategy, Australia experienced the catastrophic 2019-20 bushfires. These had a devastating impact on Australia's wildlife, and the full impact on some cryptic threatened species is yet to be determined. Australians collectively expressed great concern for wildlife affected by the fires, which helped facilitate swift and decisive actions to support threatened species' persistence and recovery. While there is more work to do to embed 'conservation is everyone's business' in the day-to-day decisions of all Australians, the national concern for wildlife post the 2019-20 bushfires is a source of ongoing hope and encouragement.

Reflecting on the successes and challenges of this first Strategy, there are lessons learned that have been incorporated into the next Strategy, which commences in 2021 and will extend for ten years.

The new Strategy is available here: **www.environment.gov.au/biodiversity/threatened/publications/strategy-home**

There are significant challenges facing Australia's native plants and animals, and a strengthened approach will be required to secure their future. The new Strategy will continue to focus on key threats, to consolidate and continue the important progress made towards controlling the impact of feral cats, but will also expand to direct attention to other serious threats. Further, recognising the conservation benefits conferred on species identified as priorities, the new Strategy will have more priority species, spread across a wider range of taxa. To ensure the new Strategy will benefit more species than those identified as national priorities, it will include a wider range of 'umbrella' species (species whose range overlaps with many others), as well as priority places for the first time.

Photo: Blue Mountains post 2019-20 fires, George Laffan

Implementation of the 2015 Strategy's priorities has been supported by Australian Government funding through programs including the National Landcare Program, 20 Million Trees and the Environment Restoration Fund. The new Strategy will be supported by current funding programs, such as $200 million Wildlife and Habitat Bushfire Recovery package, as well as new measures, such as the Oceans Leadership Package. Analysis of the outcomes of the first Strategy has helped set priorities for the new Strategy. Measures will also be taken to ensure threatened species not identified as Strategy priorities can still access Australian Government support as required.

The new Strategy will continue the approach of science, action and partnerships, which has provided the following great outcomes in the first Strategy.

UTILISING SCIENCE

Much of the science that helped inform and direct the Threatened Species Strategy was undertaken through the NESP, a long-term commitment by the Australian Government to environment and climate research. The NESP supports decision-makers to understand, manage and conserve Australia's environment with the best available information, based on world-class science.

The first phase of NESP invested over $145 million from 2014-2015 to 2020-2021 into 6 themed research hubs, and emerging priority research projects. The Threatened Species Recovery Hub (TSR Hub) hosted by the University of Queensland was initially supported by just under $30 million in NESP funding, with an additional $2 million provided to deliver important research to support wildlife, threatened species and habitat recovery in response to the 2019-20 bushfires.

Bringing together ecological expertise from across the Australian research community, the TSR Hub research has informed on-ground responses to reduce threats and promote the recovery of threatened species.

Examples

- Improving Australia's safe havens network – A national team of TSR Hub researchers identified which mammal species most urgently need the protection of a haven to support their persistence, and where Australia's future havens should be developed to provide the greatest conservation benefit across all mammal species that are susceptible to predation by feral cats and foxes. This important work helped guide the Australian Government's investment decisions to support new havens through the Environment Restoration Fund – Safe Havens Grants.
- Improving threatened species monitoring – TSR Hub senior researchers brought together over 70 experienced managers and scientists involved with monitoring programs in Australia to develop a framework, detailed guidance, case studies and book to support improved monitoring of threatened species and ecological communities. The Hub also worked with Indigenous groups on arid zone monitoring based on Traditional Ecological Knowledge and tracking skills, and supported Indigenous groups to develop practical monitoring programs targeted to their own biodiversity management priorities, such as Martu's Mankarr (Greater Bilby) monitoring program, and Karajarri's investigation of fire management effects on biodiversity.

Threatened species will continue to be a major focus under the second phase of the NESP, which will see an investment of $149 million from 2020-21 to 2026-27 into 4 new themed research hubs.

The Resilient Landscapes Hub will host the threatened species and ecological communities cross-cutting mission, embedding this important research priority across the entire program. This new hub will draw together a wide range of expertise to provide advice on increasing the resilience of our natural landscapes and biodiversity at continental, regional and local scales. It will provide national leadership on threatened species and will play a crucial role in bushfire preparedness and recovery of biodiversity and habitat.

Utilising science was also important in the Australian Government's response to the 2019-20 summer bushfires. In January 2020, the Minister for the Environment asked the Threatened Species Commissioner to convene an Expert Panel to assist in prioritising recovery actions for native species, ecological communities, natural assets and their cultural values to First Nations Australians, that were affected by the 2019-20 extreme bushfires. Over 2020, the Panel worked to assess bushfire impacts and guide the recovery of Australia's most fire-affected species, ecological communities, and places. The Panel supported and promoted collaboration and coordination across different government agencies, non-government organisations, scientific institutions, the private sector, the NESP, and the Threatened Species Scientific Committee.

SUPPORTING ACTION

Under the Strategy, the Australian Government committed to ensuring that actions to protect and recover threatened species and threatened ecological communities were based on prioritisation of resources and effort and backed by measurable targets.

Australian Government investments have incorporated Threatened Species Strategy priorities to guide specific, on-ground actions, supported by science, environmental data, and conservation planning documents.

The Australian Government has invested more than $535 million for projects supporting outcomes for threatened species and threatened ecological communities since 2014.

The National Landcare Program's Regional Land Partnerships enable communities and regional Natural Resource Management (NRM) organisations to take practical action to protect threatened species in all parts of Australia.

Effective recovery action has also relied on flexibility and responsiveness to rapid change when species were pushed close to extinction or faced significant impacts within a short timeframe. This was demonstrated in the aftermath of the 2019-20 bushfires when the Australian Government redirected efforts to immediately and strategically respond to help native wildlife and their habitats recover from the devasting impacts.

Photo: Norfolk Island Green Parrot getting banded, Parks Australia

Examples

- Regional Land Partnerships is the largest component of the Australian Government's National Landcare Program. Over five years from July 2018 to June 2023, the initiative is helping support efforts for the recovery of priority species identified under the Strategy. Around $180 million has been committed through the $450 million Regional Land Partnerships program for projects that directly support threatened species and threatened ecological community recovery activities. Many of these projects are supporting the recovery of the 20 priority birds, 20 priority mammals and 30 priority plants targeted under the Threatened Species Strategy. Several projects supporting priority species are highlighted in the species summaries in Appendix 1 (birds), Appendix 2 (mammals) and Appendix 3 (plants). Additional Regional Land Partnership project investments contributing to World Heritage and Ramsar wetland outcomes are also benefiting many of our threatened species. A list of projects can be found at: **www.nrm.gov.au/publications/regionalland-partnerships-project-listing**
- In 2020, the Australian Government announced a total investment of $200 million to support our native wildlife and their habitats to recover from the devastating impacts of the 2019-20 bushfires. The work of the Wildlife and Threatened Species Bushfire Recovery Expert Panel has helped guide these investments. Investment priorities are also being informed by local expertise, and many projects have been co-designed with bushfire-affected communities. This support will help secure the future of native animals, from the Koala to the Kangaroo Island Dunnart and the Northern Corroboree Frog, as well as unique plants such as the Wollemi Pine, Monga Waratah and Gippsland Bottlebrush.

Projects delivering outcomes for threatened species are continuing under the Australian Government's National Landcare Program - Regional Land Partnerships, Environment Restoration Fund, the Wildlife and Habitat Bushfire Recovery Program, and the second phase of the NESP.

FOSTERING PARTNERSHIPS

The Strategy acknowledged the importance of developing strong collaborations to enable effective action to be sustainable. It provided a framework for stakeholders to partner with the Australian Government, recognising that state and territory governments, volunteers, Indigenous land managers, community groups, scientists, and non-government organisations all have important roles in supporting action to recover threatened species.

The Australian Government has supported large-scale long-term projects, acknowledging that recovery is complex, can take many years, and requires coordinated effort to be effective. These projects can also lead to the development of productive and collaborative relationships that amplify conservation outcomes that endure well beyond the life of the project.

The Australian Government has also taken a leadership role in creating partnerships and bringing people together to solve complex environmental challenges. The development of innovative new approaches, such as financing through the Threatened Species Prospectus, and establishing and chairing national forums such as the Feral Cat Taskforce, helped bring together government, business, industry, scientists, and the philanthropic sectors. By working together, resources can be more effectively prioritised and maximised to achieve results for threatened species and ecological communities.

Examples

- The Threatened Species Prospectus was a first-of-its-kind initiative delivered by the Department of Agriculture, Water and the Environment. The Prospectus was an innovative financing tool that enabled partnerships to be formed over projects of common interest. The Prospectus was developed in consultation with stakeholders including state and territory governments, Indigenous groups, non-government organisations, zoos, and community groups to help foster collaboration on recovery efforts. It included 51 projects designed to deliver tangible benefits for Australia's threatened plants and animals. Since its launch in February 2017, more than $7 million was mobilised for projects featured in the Prospectus. Contributions have come from a variety of sources including the Australian Government, corporations, universities, non-profit originations, state and territory governments, zoos and private citizens contributing to crowdfunding campaigns. Prospectus projects have supported recovery actions benefiting more than 25 threatened plant and animal species including Morrisby's Gum, Mallee Emu-wren, Numbat, Matchstick Banksia, Golden-shouldered Parrot as well as the Platypus.
- A partnership that is achieving important outcomes for threatened species is Marna Banggarra, an ambitious project aiming to restore southern Yorke Peninsula's spectacular landscape and return locally extinct species to the area, such as the Brush-tailed Bettong. The multi-decade project is jointly funded by the Australian and South Australian governments, WWF Australia, and Foundation for National Parks and Wildlife. Many other partners are actively involved in developing and delivering the project.

YEAR FIVE – A YEAR IN REVIEW

Photo: Blue Mountains post 2019-20 fires, George Laffan

Year five of the Strategy covered the period from mid-2019 until mid-2020, a year that saw important work continue under our major programs, including the National Landcare Program's Regional Land Partnerships, the Environment Restoration Fund, and the NESP, and new projects rolled out to fill critical gaps. New initiatives include the construction of new aviaries for the Eastern Bristlebird at the Currumbin Wildlife Sanctuary, the commercialisation of threatened priority plants for public purchase through the nursery industry, and commencement of work to establish a second, geographically distinct population of the Helmeted Honeyeater.

Year five was also a year with unique and considerable challenges, including the summer of 2019-20, where Australia experienced extreme bushfires across many areas of the country. The number of fires, their severity and extent, and the damage caused to the environment was unprecedented. Many threatened species were pushed closer to extinction and species previously considered secure were suddenly imperiled. The Australian Government's response was immediate, with the establishment of the Wildlife and Threatened Species Bushfire Recovery Expert Panel to assist in prioritising recovery actions and a $200 million investment to help native wildlife and their habitats recover from the fires' devastating impacts.

COVID-19 also brought significant challenges to the way we work, including the delivery of on-ground projects. Projects experienced delays and alternative solutions were sought out. Safety precautions were undertaken in the field to ensure the health and safety of staff and volunteers was the primary focus.

Despite these challenges, important conservation work continues, and preparations are being made for future projects. The following pages reflect some specific examples from 2019-20 and into 2021, reflecting that the work of the first Strategy has continued even though its formal targets concluded in mid-2020.

This annual progress update captures actions and highlights during the final year of the Strategy. Annual progress reports for previous years can be found here: **environment.gov.au/biodiversity/threatened/publications**.

RAISING AWARENESS, BRINGING PEOPLE TOGETHER, AND COMMUNITY ENGAGEMENT

Raising awareness about our remarkable threatened species, engaging the community, and bringing people together to take recovery action are key priorities for the Threatened Species Commissioner. Australia's threatened fauna and flora are a huge part of our national identity, but many species have become so rare that most Australians are not even aware they exist. Protecting our remarkable species is a shared responsibility – no entity can do it alone, and we can greatly amplify conservation efforts and maximise threatened species outcomes when we work collectively. Over the last five years, the Office of the Threatened Species Commissioner has brought a new national focus and effort to address the growing number of plants and animals in Australia that are faced with extinction. Annual progress reports that capture the actions and highlights for years 2015-19 can be found here: **environment.gov.au/biodiversity/threatened/publications**.

Photo: Kerry Cameron

Photo: (L) Grassland Earless Dragon cake - Winner of the 2020 Threatened Species Bake Off - Elaine and Ray Lloyd (R) Button Wrinklewort cake - Winner of People's Choice Award 2020 Threatened Species Bake Off - Glenelg Hopkins CMA

Community engagement activities in early 2020 were focussed on visiting bushfire-impacted regions, from the NSW North Coast to Kangaroo Island, to gain a better understanding of what was needed on the ground, meet with local communities and witness the incredible recovery work underway powered by passionate and dedicated conservation professionals and volunteers.

Not long after the bushfire season ended, COVID-19 sharply and profoundly changed the way Australians connected with each other and, when previous channels for engagement and communication were closed by COVID-19 restrictions, the Office of the Threatened Species Commissioner developed new ways to raise awareness, connect with the community, and bring people together. Using online tools such as Zoom and Teams, the Commissioner and her team presented at several conferences and symposiums, met with scientists and practitioners, and took part in national days of celebration and awareness. Targeted online workshops were held on the development of the new Threatened Species Strategy and feedback sought from the public via a survey, which provided a wealth of information to inform the way forward.

The Commissioner also continued to bring people together, through roles as a convenor, by facilitating partnerships, and supporting coordinated, collaborative efforts. In addition to chairing the new Wildlife and Threatened Species Bushfire Recovery Expert Panel following the 2019-20 extreme fire events, the Commissioner continued to convene the Feral Cat Taskforce, which brings together scientists, representatives from each state and territory, as well as non-government organisations to share best practice, discuss common challenges and keep up to date with the latest science.

Traditional media remains an important conduit to Australians and helps to communicate why we should care about threatened species and what we need to do to recover them. The Commissioner gave several interviews over the last year, from discussing the impact of the 2019-20 bushfires and the important that work that is underway, to encouraging Australians to get involved in local and national practical conservation initiatives.

Social media continues to be a powerful instrument for championing threatened species, encouraging individual and community action, and broadcasting conservation efforts at a national level. The Commissioner's following has grown to over 56,000 followers across three channels (Facebook, Twitter, and Instagram). Social media is an important behaviour-change tool: over the last 12 months, the Commissioner's channels have promoted campaigns such as 'Bilbies not Bunnies' at Easter, drawn attention to the impact of cats on threatened species, promoted responsible pet ownership, and encouraged Australians to get involved in citizen science activities like FrogID and PlatypusSPOT. These channels have also helped raise awareness around some of Australia's lesser known and (arguably!) non-charismatic threatened species, including through a regular weekend 'Beastie Brain Buster' segment.

COVID-19 led to many Australians spending more time close to home, so the Commissioner's social media channels were used to encourage us all to research, celebrate, and engage with the threatened species found in our local environments, backyards and schools. This was through the increasingly popular 'Threatened Species Bake Off' and a new initiative called 'Craft A Critter', specifically developed for families getting to grips with home schooling for the first time. A new 'Ask an Expert' series on the Commissioner's channels saw leading experts talk about their research and bring the latest ecological research into people's newsfeeds and homes.

Anyone interested in being involved in the conversation about threatened species or would like to learn more about how Australia is fighting extinction, can follow the Commissioner on Facebook, Twitter and Instagram.

Highlights from 2020-2021:

- The 2019-20 bushfires had a devastating impact on many regions in south-east Australia, including Kangaroo Island. In February 2020, the Commissioner attended a productive workshop bringing together leading ecologists, government representatives, conservation groups and landholders to develop a recovery plan for bushfire-affected wildlife species on the island, such as the Kangaroo Island Dunnart and Glossy Black-cockatoo.
- The impact of COVID-19 saw many Australians spending more time at home. 'Craft a Critter' was an educational initiative that invited students to create an artistic depiction of a chosen threatened species. Supported by guest judge, amphibian expert Dr Jodi Rowley, the competition received over 100 entries from students and schools across Australia. Many entries were accompanied with beautiful words describing the importance of their chosen species.
- 'Ask an Expert' saw experts talk about their research and answer questions from the public on the Threatened Species Commissioner's social media channels. Topics were diverse and included Antarctica's ecology and ecosystems, native bees, captive breeding, migratory species, and restoration and orchids. The series was well-received, with hundreds of questions received from the public, and videos clocking up thousands of views.
- The '2020 Threatened Species Bake Off' was a fantastic opportunity to bring attention to lesser known threatened species such as the Grassland Earless Dragon and Pink-lipped Spider Orchid. The 2020 bake off event had a backyard focus to reflect COVID-19 travel restrictions and social distancing requirements, and was an opportunity for Australians to research and celebrate the threatened species found in their local environments, backyards and schools. There were over 300 entries from right across Australia, the most entries ever received in the history of the competition.
- The development of a new ten-year Threatened Species Strategy was announced in September 2020. Australians were invited to share their reflections on the first Strategy and provide their suggestions for the new Strategy through an online survey and written submissions. The feedback from this consultation was highly valuable and informed the development of the new Threatened Species Strategy.
- The Commissioner spoke at the North Queensland Threatened Species Symposium in Cairns in February 2021. The conference was one of the first in-person events in over a year and brought together leading scientists, traditional owners and Indigenous rangers working on country, government and NRM representatives, Recovery Team members, and passionate members of the community. The past year has resulted in limited opportunities to meet in person, so it was a valuable opportunity to connect face-to-face, share updates and exchange information and ideas.

Photo: Dr Sally Box on Kangaroo Island post 2019-20 fires, Oliver Tester

INDIGENOUS ENGAGEMENT

The knowledge and skills of traditional owners are critical in the recovery of many of our threatened species and threatened ecological communities. Many threatened species occur almost exclusively on lands owned or managed by Indigenous groups and working closely with Aboriginal and Torres Strait Islander peoples to incorporate traditional ecological knowledge is vital for research and informing actions.

Under the Threatened Species Strategy, the Australian Government recognises the importance of traditional ecological knowledge in the fight against extinction. Through the Strategy and complementary Australian Government initiatives, the Australian Government has partnered with traditional owners to help support right-way recovery of priority threatened species. Indigenous groups are being supported to undertake on-ground action and monitoring, as well as projects that are integrating traditional ecological knowledge into contemporary practices.

These partnerships continued to grow during year five of the Strategy.

COVID-19 restrictions did not stop Indigenous rangers working on desert country to come together. The annual Indigenous Desert Alliance (IDA) Conference provides rangers from across the Australian desert the chance to speak up for their country, connect with each other and share their experiences. The Threatened Species Commissioner presented at the virtual Indigenous Desert Alliance held during NAIDOC Week in November 2020, giving an update on the development of the Australian Government's new Threatened Species Strategy.

Important work continues on-ground. For example, Territory Natural Resource Management is working with Indigenous rangers and traditional owners to improve knowledge on the condition of the Central Australian Cabbage Palm, one of the Strategy's priority threatened plant species, and implement strategic actions to prevent further population decline.

Photo: Cabbage Palms after the rains, Palm Valley, March 2021, Kelly Dixon Territory NRM

Finke Gorge National Park rangers, Tjuwanpa rangers and Arid Edge's Indigenous land unit recently sprayed invasive grasses and removed palm fronds to give palm seedlings the best chance at growing. Traditional knowledge will also inform the development of management plans to ensure the long-term viability of remaining populations. The endangered Central Australian Cabbage Palm is the only palm species found in central Australia and it is of significant importance to central Australian Indigenous groups, being a food resource and cultural symbol.

The Australian Government continues to support the implementation of Indigenous-led cultural burning regimes. Managed burning practices in remote areas of Australia are important for the persistence of threatened species such as the Greater Bilby and Great Desert Skink. Traditional practices create a mosaic of burnt and unburnt habitat suitable for these threatened species and reduce the occurrence of large, destructive fires. For example, under the National Landcare Program, the Australian Government is supporting Indigenous Rangers and traditional owners to undertake appropriate fire management across 200,000 hectares in Western Australia to help protect the Greater Bilby and its habitat.

Knowledge-sharing and capacity building between traditional owners and non-Indigenous people is an important part of fire and land management. As part of the Australian Government's response to the 2019-20 bushfires, funding was made available through the $2 million Indigenous Fire and Land Management Workshops Program in June 2020. Supported projects include work to bring people together to heal Dharug Country through sharing knowledge of cultural burning, facilitating the sharing of cultural burning knowledge among Aboriginal youth in Koori, and developing a Gamilaroi cultural burning network.

Photo: Indigenous Ranger groups have formed the Western Cape Turtle Threat Abatement Alliance to coordinate a marine turtle protection program on western Cape York, supported by Cape York Natural Resource Management.

The Office of the Threatened Species Commissioner continues to use social media to share the perspectives of Aboriginal and Torres Strait Islander people and promote important work on country. For example, in 2020, Brad Moggridge, a Kamilaroi man from north-west New South Wales now living in Canberra, featured on the Ask an Expert social media initiative. He's an experienced water scientist and spoke about his research incorporating cultural values and perspectives of Aboriginal people into water planning and environmental water management. In his part time role as Indigenous Liaison Officer for the NESP Threatened Species Recovery Hub, Brad also worked alongside threatened species researchers, hub leadership, and Aboriginal communities on Indigenous engagement and culturally informed research for threatened species recovery.

Indigenous rangers manage nearly half of our nation's protected areas and other regional and remote landscapes and care for country that has enormous natural and cultural value. Their work on country contributes to the conservation of threatened species by protecting habitat, restoring traditional fire regimes, and managing feral pests. In 2020, the Australian Government announced a $700 million investment to extend the Indigenous rangers' program to 2028. This funding will continue support for more than 800 jobs, with the rangers delivering important environmental services such as feral species control, tackling invasive weeds, fire management, cultural site protection and of course dedicated threatened species actions.

Traditional owners also helped inform and shape the direction of the new Threatened Species Strategy during consultation from September to December 2020. Indigenous perspectives will be critical in designing and developing the Action Plan over the course of 2021, including prioritising threatened species and places, and supporting greater engagement with Aboriginal and Torres Strait Islander peoples.

YEAR FIVE HIGHLIGHTS

Back from the brink: Orange-bellied Parrots increased from an estimated 23 mature individuals in 2015 to over 40 returning to breed in Tasmania in 2020.

Numbats released into feral-free fenced area at Mallee Cliffs National Park.

More than 67 per cent of Australia's known threatened plant species stored in conservation seed banks, positioning Australia as a world leader in conservation seed banking.

Extinction averted: Central Rock-rat numbers increasing in the wild after intensive feral cat control.

Indigenous Desert Alliance annual conference convened virtually, enabling Indigenous desert rangers to connect and share experiences despite COVID-19.

Bandicoots released onto Dirk Hartog Island after cats eradicated.

More than 80,000 hectares of Kangaroo Island managed for feral cats since the 2019-20 bushfires.

First Norfolk Island Boobook Owl chicks in more than a decade survive to become fledglings.

Chuditch reintroduced to predator managed areas in South Australia.

Photo: Kerry Cameron

REPORTING AGAINST YEAR FIVE TARGETS

Photo: Matt White

The Strategy set ambitious targets to incentivise action and build momentum for species recovery. The Strategy's 2015 Action Plan set out four action areas, 71 priority species and measurable targets for years one, three and five of the Strategy. Previous annual reports have described progress against year one and year three targets, which are available here: **www.environment.gov.au/biodiversity/threatened/publications**.

There were 13 year five targets articulated in the 2015 Action Plan for achievement by 2020, in the following general categories:

- Reduction in the impacts of feral cats
- Improved trajectories for threatened mammals
- Improved trajectories for threatened birds
- Improved recovery actions and trajectories for threatened plants
- Improved recovery guidance and practices.

This report captures our progress against the final year five Strategy targets. This progress reflects a tremendous amount of work undertaken over the last five years including by delivery partners, different government agencies, non-government organisations, the scientific community (including the NESP and the Threatened Species Scientific Committee), the community and the private sector. We also recognise the vital support provided by many partners in collecting data, gathering evidence and helping us to assess what has been achieved on the ground towards the Strategy targets.

Of the 13 Strategy targets, five were successfully achieved (including one that was overachieved), three targets were partially met and five were not achieved. Detailed results and methodologies used to assess progress against targets are included in the following sections.

Note about 'Target partially met'. As defined in the Year Three Report, this is where significant progress has been made or some of the target components have been met.

SUMMARY OF TARGETS AND RESULTS

FERAL CAT TARGETS	
Feral cats eradicated from five islands	**Target not met** Feral cats eradicated from one island, with significant progress made towards eradication on seven more.
10 feral cat free mainland exclosures established	**Target met** 10 feral cat free mainland exclosures completed or in final stages of being established.
10 million hectares of feral cat action, using best techniques for each location	**Target exceeded** Feral cat control undertaken across more than 18 million hectares.
Best practice feral cat action implemented across 2 million hectares of Commonwealth land	**Target partially met** Best practice feral cat control has occurred across more than 1.9 million hectares of Commonwealth land.
Two million feral cats culled at the national level	**Target partially met** The estimated number of feral cats culled between July 2015 and July 2020 is over 1.5 million cats.
BIRD TARGET	
20 priority birds have improved trajectories	**Target not met** 6 priority bird species have improved trajectories.
MAMMAL TARGET	
20 priority mammals have improved trajectories	**Target not met** 8 priority mammal species have improved trajectories.
PLANT TARGETS	
At least 30 priority plant species have improved trajectories	**Target not met** 10 priority plant species have improved trajectories.
100 per cent of Australia's known threatened plant species stored in one or more of Australia's conservation seed banks	**Target partially met** More than 67 per cent of Australia's listed threatened species stored in conservation seed banks.
Recovery actions underway for at least 50 plants	**Target met** Recovery actions underway for more than 50 threatened plant species.
Recovery actions underway for at least 60 threatened ecological community sites	**Target met** Recovery actions underway for more than 60 threatened ecological community sites
IMPROVING RECOVERY PRACTICES TARGETS	
All states and territories operate under the common assessment methodology for species listing	**Target met** All jurisdictions actively involved in implementation of the common assessment method.
Based on updated work plan, effective and up-to-date recovery plans, conservation advices and threat abatement plans in place for all priority species and threats.	**Target not met** Up-to-date recovery plans and conservation advices are not in place for all priority species. Threat abatement plans and advices are in place where required.

TARGETS

Photo: Orange-bellied Parrot,
Dean Stojanovic

FERAL CAT TARGETS

Photo: Hugh McGregor

OVERVIEW

Feral cats pose a significant threat to Australia's wildlife. They prey on native species, spread diseases such as toxoplasmosis and sarcosporidiosis and reduce viable habitat for species most at risk. Since European arrival, feral cats have been implicated in the extinction of at least 20 mammal species and currently threaten a further 124 nationally listed species.

Recent research delivered under the NESP Threatened Species Recovery Hub has sought to quantify the toll of cats on Australia's wildlife. The estimates are sobering with on average feral cats taking 596 million reptiles, 92 million frogs, 316 million birds and 964 million mammals every year.

Since being introduced to the Australian landscape feral cats have spread across the country and now occur across 99.9 per cent of the Australian land area and 92 per cent of the nation's island area. They are highly adaptive pest animals, flourishing in even the most extreme of environments like snow-capped mountains to the harsh interior of the central deserts.

Between July 2014 and July 2020, more than $32 million was mobilised for projects that have a primary focus on supporting practical, on-ground action and action-based research to reduce the impacts of feral cats.

This includes projects which are supporting:

- The eradication of feral cats on Kangaroo Island's Dudley Peninsula. The Australian Government has mobilised more than $2.7 million to support eradication efforts including the collection of baseline data, eradication planning and the roll out of on-ground control actions. Once complete, the island will be a threatened species safe haven for unique fauna like the Kangaroo Island Dunnart and Kangaroo Island Echidna.
- The commercialisation of feral cat control tools, Curiosity® bait for feral cats and the Felixer Grooming Trap. The Australian Government mobilised $2 million under the Environment Restoration Fund to deliver commercialisation activities such as tooling of machinery, research and development and securing of the required permits and approvals for large scale manufacture. These projects are shoring up availability of both control tools and increasing availability by reducing the cost to practitioners.
- The construction of Newhaven Sanctuary feral predator free fenced area. The Australian Government has mobilised $750,000 in partnership with the Northern Territory Government and the Australian Wildlife Conservancy to construct a 9,400 hectare feral predator free fenced area in central Australia. This is the first stage of an ambitious project aiming to ultimately protect 100,000 hectares from feral predators. Reintroductions of native wildlife have commenced with Mala, Numbat and Red-tailed Phascogale calling the sanctuary home.

Under the Threatened Species Strategy, the Australian Government is supporting national coordination and the removal of legislative barriers to effective feral cat control through the national Feral Cat Taskforce. Over the last five years, the Threatened Species Commissioner has chaired 10 meetings bringing together scientists, non-government organisations, governments and practitioners to share knowledge and focus efforts on supporting more effective feral cat control. Since 2015, significant progress has been made in this space including the listing of feral cats as pests in Western Australia and Victoria, the national registration of Curiosity® bait for feral cats and legislative reform to enable the use of baits and leg hold traps in Victoria.

The Australian Government has also invested in research to quantify the impacts of cats on Australia's environment and identify improved feral cat management techniques through the NESP Threatened Species Recovery Hub. This research has supported the conservation community in hosting constructive dialogue about the issues involved in controlling feral cats and reducing the impacts of domestic cats on wildlife. The research team was honoured as finalists in the 2020 Eureka Prize.

TARGET

FERAL CATS ERADICATED FROM FIVE ISLANDS

Photo: Bruny Island, Department of Agriculture, Water and the Environment

Feral cat target	Result
Feral cats eradicated from five islands	**Target not met** Since 2015, feral cats have been successfully eradicated from Dirk Hartog Island. Significant progress has been made towards the eradication of feral cats on Bruny Island, French Island, Kangaroo Island and Christmas Island. The Australian Government is also supporting eradications on West Island (NT), Flinders Island (SA) and Three Hummock Island (Tas).

Recognising the important role that islands play in conservation, the Threatened Species Strategy included a target to eradicate feral cats from five islands by 2020. This target was ambitious, as successful island eradications are highly complex and require long-term coordinated effort. Factors such as remoteness, level of community support, land use, accessibility, availability of fit-for-purpose control tools and the local species present all influence the planning and roll-out of successful eradications.

HOW DID WE GO?

A stocktake of action across the five islands found significant progress has been made towards achieving the target of feral cat eradication. While only one island achieved eradication by mid-2020, substantial work undertaken on the remaining islands position them well to achieve eradication in coming years.

The Australian Government continues to support the eradication of feral cats from priority islands (Kangaroo Island, Bruny Island, French Island) under the Regional Land Partnerships and Environment Restoration Fund programs through to June 2023. Work also continues through Parks Australia to rid feral cats from Christmas Island.

A SUMMARY OF ACTION OCCURRING ACROSS EACH OF THE IDENTIFIED ISLANDS

Dirk Hartog Island

- Dirk Hartog Island is Western Australia's largest island which originally was rich in mammal fauna.
- The Western Australian Government is delivering the 'Return to 1616' ecological restoration program to remove feral animals from the island and reintroduce threatened native wildlife. The project is supported by the Western Australian Government and the Gorgon Barrow Island Net Conservation Benefits Program.
- In October 2018, the Western Australian Government announced that the island was free of feral cats, goats and sheep, making it the world's largest successful island-based feral cat eradication project.
- An ambitious program to reintroduce threatened wildlife has commenced with Rufous and Banded Hare-wallabies released in 2017 followed by Dibblers and Shark Bay Bandicoot in 2019. Once finished, the island will be home to a bigger range of species including Chuditch, Mulgara, Greater Stick-nest Rat, Desert Mouse and Heath Mouse.

Kangaroo Island

- Kangaroo Island, Australia's third-largest island, is home to a diverse range of threatened species such as the endemic Kangaroo Island Dunnart and Kangaroo Island Echidna. Although rich in native fauna, the island is also home to feral cats which are estimated at 0.72 cats per km^2, more than ten-fold the density on mainland South Australia.
- The Kangaroo Island community has successfully eradicated feral deer and feral goats and is currently working towards the eradication of feral cats. Once complete, it will be one of the world's largest inhabited islands to be free of feral cats.
- Landscape South Australia Kangaroo Island is leading the feral cat eradication project, which is being delivered in multiple stages that sections the island into smaller management units. Eradication has commenced on the Dudley Peninsula on the eastern end of the island. A fence is being constructed across the isthmus to isolate the Dudley Peninsula from the remainder of the island in order to prevent the reincursion of feral cats.
- The eradication is supported by robust research to understand densities of feral cats across the island, recolonisation rates following control efforts, efficacy of control techniques and prevalence of native species.
- The Australian Government has been a significant partner in the eradication program, investing more than $2.7 million to undertake eradication planning and on-ground delivery of the Dudley Peninsula eradication.
- There is also significant feral cat control occurring on the western end of the island, including to protect important populations of threatened species, such as the Kangaroo Island Dunnart, following the 2019-20 summer bushfires.

Photo: Kingscote, Kangaroo Island, Department of Agriculture, Water and the Environment

- The Australian Government is supporting pest management, species assessment and habitat protection on the western end of the island under the $200 million investment in bushfire recovery for native wildlife and their habitat and the Environment Restoration Fund. This includes $450,000 to the Kangaroo Island Landscape Board for emergency pest mitigation and funding to South Australian Government for rapid species assessment and immediate risk mitigation on public land. Feral cat management and bushfire recovery activities are also being undertaken by Kangaroo Island Land for Wildlife, which is a voluntary, biodiversity conservation organisation supporting landholders to enhance conservation assets on private property.
- Post-fire monitoring and surveys have identified populations of critically endangered Kangaroo Island Dunnart persisting in some unburnt refuges. This work has enabled practitioners to focus feral predator control efforts around those important refuge sites to conserve remaining populations.

Bruny Island

- Bruny Island, located on Tasmania's south east coast is recognised for its high-quality tourism, agriculture and conservation values. Bruny Island is home to 12 of Tasmania's endemic bird species, including the endangered Forty-spotted Pardalote and critically endangered Swift Parrot. It is also known as a stronghold for the endangered Eastern Quoll.
- Bruny Island was identified as one of the five islands under the Threatened Species Strategy due to its high conservation values and support from community, government, industry, environmental and research partners to undertake the eradication.
- Australian Government funding of more than $680,000 supported the delivery of preliminary feral cat control and enabled pre-eradication baseline data to be collected. Information collected by partners Kingborough Council, University of Tasmania, the Tasmanian Government and Birdlife Tasmania has informed the deployment of a feasibility study and eradication plan which sets out the effective control actions required to achieve eradication.

- In early 2020, the project commenced eradication supported by a $1.5 million investment by the Australian Government under the Environment Restoration Fund and led by NRM South.
- The eradication is being delivered in stages. The first stage includes a focus of effort on the northern half of the island and at 'The Neck', a narrow isthmus that links North Bruny with South Bruny, home to a significant colony of migratory Shearwaters and Little Penguins.
- Weetapoona Aboriginal Corporation, a significant landholder on North Bruny, is supportive of the eradication program and is partnering to deliver the project.
- The eradication project is already seeing success with the removal of 11 (of an estimated 27) feral cats and 10 (of an estimated 30+) stray cats as at the end of February 2021 across the north of the island. Further control method trials are planned with Animal Ethics and Scientific research permits now in place.
- As part of the eradication, project lead NRM South, in partnership with Kingborough Council, Ten Lives Cat Centre, Bruny Island Community Association and Bruny Island Environment Network, has been working closely with island residents to encourage responsible pet ownership practices. By strengthening responsible pet ownership, domestic cats are less likely to kill native wildlife and breed with the existing feral and stray cat populations.
- As a result of this work, the uptake of responsible pet ownership practices by domestic cat owners has increased from 33 per cent (12 out of 36 households) to 53 per cent (19 out of 36 households) since the project commenced in 2020.
- Kingborough Council and Ten Lives Cat Centre have jointly funded a cat holding facility on the island which plays an integral role in cat management, enabling residents to bring in unwanted and stray cats to be assessed and cared for, and where possible, rehomed. The facility will also act as a 'shop front' for the eradication project, where people can find out more about what is being done across the island to manage pet cats, and how to control stray and feral cats. The centre will also offer incentives for island cat owners such as on-island desexing, containment and rehoming services.

French Island

- French Island, located in Victoria's Western Port Ramsar site, is an ecologically diverse island of high conservation value. Over 230 bird species have been recorded at the site including significant species such as the White-bellied Sea-eagle, King Quail and Orange-bellied Parrot, as well as 33 species of waders which forage along the coast at low tide. French Island also supports a large population of Long-nosed Potoroo, as well as containing a significant population of Koalas in Victoria.
- Australian Government funding has supported active feral cat control across French Island to restrict feral cat densities at low levels. Since feral cat management on the island was initiated in 2010, more than 900 feral cats have been removed. Baseline surveys of feral cat densities and native wildlife abundance have been undertaken to support eradication efforts.
- The suppression of feral cat densities enabled the successful release of Eastern Barred Bandicoots onto the island in October 2019. The 50 translocated animals were sourced from the captive breeding program, Churchill Island and Hamilton Community Parklands and released onto the island through a translocation initiative led by Zoos Victoria.
- An eradication plan has been developed by partners Zoos Victoria, Phillip Island Nature Park, French Island Landcare Group, Port Phillip and Westernport Catchment Management Authority, Parks Victoria, the Department of Environment, Land, Water and Planning and the Australian Government. The project has strong community support.

Photo: French Island, Port Phillip and Westernport Catchment Management Authority

- The Australian Government is investing $1 million in feral cat eradication activities under Regional Land Partnerships and has committed a further $335,000 under the Environment Restoration Fund Safe Havens Commitment to support eradication efforts.
- All preparatory work has now been completed and the on-ground commencement of full-scale eradication is scheduled for mid-2021. The eradication program is expected to take four years to achieve and will be delivered over three phases:
  - Reduction phase (May to June 2021): reduce the feral cat population by up to 80 per cent
  - Mop-up phase (July 2021 to December 2022): remove the last remaining cats
  - Validation phase (January 2023 to April 2024): monitoring and surveillance to confirm the eradication has been successful

Christmas Island

- Eradication efforts are underway across Christmas Island to reduce predation pressures on the island's unique and endemic wildlife, including the endangered Christmas Island Giant Gecko, Christmas Island Flying-fox and Christmas Island Emerald Dove.
- The Christmas Island community is supportive of island-wide feral cat eradication, and community members are undertaking responsible pet ownership practices including registration, microchipping and de-sexing of all pet cats. Community members actively report feral cat sightings to Parks Australia. No new domestic cats will be introduced to the island.

Photo: Christmas Island Flying Fox, Inger Van Dyke

- The first island-wide forest deployment of over 16,000 Eradicat® (1080) feral cat baits was completed in 2015. More than 200 feral cats were removed from the island in 2017, with a further 291 feral cats removed in 2020 using baiting, shooting and targeted trapping throughout the National Park and township.
- Management efforts will be intensified in future years, informed by trials in 2019 of a range of new methods, such as different lures and trap types that could be used to complement current approaches. Shooting trials using thermal scopes produced very good results particularly in areas of dense vegetation where there is limited ability to deploy other control tools.
- The program is also being supported through knowledge exchange with skilled practitioners from the Queensland Parks and Wildlife Service. This includes a staff member visiting Astrebla National Park to receive training in spotlighting and shooting techniques.

ACTION UNDERWAY ON OTHER ISLANDS

- Under the Strategy the Australian Government has also supported action to tackle the threat of feral cats on Norfolk Island, Flinders Island (SA), Three Hummock Island (Tasmania), West Island (Tasmania), Tiwi Islands (NT) and Groote Eylandt (NT). This includes activities such as promoting responsible pet ownership practices, establishing and implementing management plans, undertaking active feral cat control and supporting Indigenous rangers to manage and eradicate feral cats.

TARGET

10 FERAL CAT FREE MAINLAND EXCLOSURES

Photo: Eastern Quoll, Shutterstock

Feral cat target	Result
10 feral cat-free mainland exclosures established	**Target met** Ten feral cat-free mainland exclosures have been completed or are in the final stages of being established.

Safe havens are mainland exclosures or islands which act as arks of safety for our precious wildlife. They provide the long-term protection and resources needed to recover and increase species populations, through the permanent removal and exclusion of feral predators.

The Australian Government recognised the important role that safe havens play in conserving native fauna and set the target to establish 10 mainland feral cat-free fenced areas. This was a particularly ambitious target given the scale of planning and on-ground action required to construct conservation infrastructure and eradicate pests from within the fenced area.

HOW DID WE GO?

Between July 2015 and July 2020, ten feral cat-free mainland exclosures have been completed or in the final stages of completion. This is a collective effort where governments, non-government organisations, the private sector, scientists and the community are coming together to establish and maintain a national network of safe havens.

In 2019, the Australian Government boosted efforts to establish a national network of safe havens through a $10 million commitment under the Environment Restoration Fund. The commitment includes a focus on increasing the number of species not currently represented in the safe havens network, drawing on research from the NESP Threatened Species Recovery Hub. The research highlighted the need for a more strategic approach to the locations of new conservation safe havens, to secure species most at risk of predation by feral cats and foxes.

A summary of action can be found below:

Goorooyarroo Nature Reserve

- Located in Canberra's northern suburbs, Goorooyarroo Nature Reserve feral-free fenced area (801 hectares) borders with the already established feral-free fenced area at Mulligans Flat Nature Reserve (485 hectares).
- The combined reserves protect some of the largest, best-connected and floristically diverse Box-gum Woodlands in Australia including some of the last remnants of critically endangered White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland.
- The construction of the Goorooyarroo Nature Reserve fenced area was completed in December 2018 and efforts are now focussed on pest animal removal. This has been supported by the ACT Government, through funding from the Australian Government's National Landcare Program and the Woodlands and Wetlands Conservation Trust.
- Once feral predators have been removed, native species including the Eastern Quoll and Eastern Bettong will be reintroduced into the safe haven.
- The Australian Government has also supported strategic restoration of approximately 24 hectares of Box-gum Woodlands throughout the Goorooyarroo Nature Reserve under the 20 Million Trees program.

Newhaven Wildlife Sanctuary

- Newhaven Wildlife Sanctuary is located in the arid deserts of central Australia and is managed by the Australian Wildlife Conservancy to enhance the natural ecological values of the desert country.
- With Australian Government support of $750,000, the Australian Wildlife Conservancy has established a 9,400 hectare feral predator-free fenced area. This is the first stage of an ambitious project which is ultimately planned to be the largest feral cat eradication project in the world, covering at least 100,000 hectares.
- The 44 kilometre fence is made up of 85,000 pickets, 400 kilometres of wire and 130 kilometres of netting.
- In May 2019, the feral-free fenced area was declared feral predator-free following intensive pest management efforts with assistance from expert Indigenous cat hunters and local Warlpiri trackers.
- Reintroductions have commenced with Numbat, Red-tailed Phascogale and Mala now calling Newhaven home. A reintroduction plan is in place which will see threatened native mammals such as the Golden Bandicoot, Western Quoll and Bilby returned back into the desert ecosystem.

Wandiyali–Environa Wildlife Sanctuary

- The Wandiyali-Environa Wildlife Sanctuary is located near the township of Googong on the central tablelands of NSW and is owned and operated by the Wandiyali Restoration Trust.
- Australian Government funding under the Environment Restoration Fund is supporting construction of a predator-proof fenced area, which is expected to be completed by June 2021. This will be followed by feral predator eradications and reintroduction of native threatened fauna such as Eastern Quoll by June 2023.
- The fenced area will also protect populations of endangered Small Purple-pea by mitigating the impacts of grazing by over-abundant herbivores.
- The Wandiyali Restoration Trust is working with Ngunnawal traditional owners to restore Indigenous mosaic burning practices throughout the Wandiyali–Environa Wildlife Sanctuary.

Tidbinbilla

- Tidbinbilla Nature Reserve, located at the foot of the Brindabella Mountains is operated by the ACT Government as a community-focussed environmental education and conservation facility.
- The Reserve has an established threatened species captive breeding program which is supporting the recovery of species such as the Northern Corroboree Frog and Brush-tailed Rock-wallaby.
- A 120 hectare feral predator-free fenced area has been established at the Reserve, made possible through a conservation partnership between Zoos Victoria, the ACT Government and the Australian Government.
- The newly established safe haven will provide suitable habitat for a free-ranging insurance population of up to 100 Brush-tailed Rock-wallabies.

Aussie Ark

- In New South Wales' Barrington Tops, Aussie Ark was established to support the recovery of a range of species including Eastern Quolls, Long-nosed Potoroos, Rufous Bettongs, Southern Brown Bandicoots, Long-nosed Bandicoots and Parma Wallabies. The conservation facility has been made possible through generous donations from the private and philanthropic sectors.
- In November 2017, Aussie Ark celebrated the construction of a new 64 hectare feral predator-free sanctuary.

Photo: Wandiyali Restoration Trust

- The construction of an additional 400 hectare fenced area, the Barrington Wildlife Sanctuary, was completed in late 2019 and was officially opened in November 2020. Tasmanian Devil and Eastern Quoll were released into the sanctuary in 2020 and additional species are due to call the sanctuary home throughout 2021.
- Aussie Ark continues to plan an expansion of new sanctuary areas and is securing additional land as part of the organisation's conservation estate.

Mallee Refuge

- Mallee Refuge is a privately funded conservation facility located within Secret Rocks Nature Reserve on South Australia's Eyre Peninsula.
- The 900 hectare safe haven was completed in 2017. Foxes, cats, kangaroos, rabbits, goats and emus have been excluded to support the regeneration of the mallee landscape. Mallee Refuge has already seen success with a juvenile chick of the threatened Malleefowl identified for the first time at the site following eradication efforts.
- This sanctuary is also an important trial site for the Felixer Grooming Trap, a new innovative feral cat management tool which uses rangefinder sensors to differentiate between cats and non-target species such as other wildlife and humans. When a feral cat is detected, the trap deploys a measured dose of toxic gel onto the fur which is then consumed by the feral cat through grooming. Feral cats known from camera trap monitoring within Mallee Refuge were removed with Felixer Grooming Traps.
- Mallee Refuge was impacted by the 2019-20 summer bushfires with a 2 km length of fence and habitat damaged. The fenced area has subsequently been secured and restoration activities are ongoing.

Photo: Eastern Quoll, Shutterstock

Hunter Wetland Centre

- Located near Newcastle in NSW, the Hunter Wetlands Centre is part of the Hunter Estuary Wetlands Ramsar site and is Australia's longest-running community owned wetlands centre.
- In December 2017, the Centre celebrated the launch of a new 40 hectare feral predator-free sanctuary. The newly established fenced area will protect a wide range of wetland species including internationally recognised migratory waterbirds and shorebirds from the threat of feral cats, foxes and unrestrained domestic dogs.
- The project has been delivered by a group of dedicated volunteers in partnership with, the NSW Community Building Partnership Program, Conservation Volunteers Australia and the Australian Government's Green Army Program.
- Since construction of the feral predator-free sanctuary, the Centre has reported seeing increased evidence of bandicoots and successful fledging of predator-susceptible cygnets.

New South Wales – Reintroducing locally extinct mammals

The reintroduction of locally extinct mammals into national parks is an innovative measure under the NSW Government's Saving our Species program. The NSW Government has committed more than $40 million over 10 years to a scientific program that is exploring the responses of native species to predator control actions.

The project, delivered in partnership with the Australian Wildlife Conservancy and the University of New South Wales, has constructed three new feral predator-free exclosures at Sturt National Park, Pilliga National Park – State Conservation Area and Mallee Cliffs National Park.

Locally extinct species including the Bridled Nail-tail Wallaby, Brush-tailed Bettong, Burrowing Bettong, Crest-tailed Mulgara, Golden Bandicoot, Greater Bilby, Greater Stick-nest Rat, Mitchell's Hopping-mouse, Numbat, Plains Rat, Red-tailed Phascogale, Western Barred Bandicoot and Western Quoll are currently being reintroduced into the newly established safe havens.

This is the first time in New South Wales that locally extinct mammals have been released into large predator-free areas in national parks.

Photo: Crested-tailed Mulgara, Katherine Moseby

Sturt National Park

- Fence construction commenced at Sturt National Park in New South Wales in March 2018 and was completed in October 2018. The fenced area has been designed as two complementary replicates to support the scientific research program.
- In late 2020, Bilby and Crested-tailed Mulgara were released into the fenced area as part of the first stage of species reintroductions.

Pilliga National Park – State Conservation Area

- Fence construction commenced at Pilliga State Conservation Area in January 2018 and was completed in August 2018.
- In December 2018, the first reintroduction of Bilbies occurred inside the fenced area. This was the first time in more than a century that Bilbies were running wild in New South Wales.

Mallee Cliffs National Park

- Fence construction at Mallee Cliffs National Park has been completed. The 9,570 hectares fenced area is now the largest feral predator-free safe haven on mainland Australia and the largest re-wilding project ever to be undertaken in New South Wales.
- In late 2020, Numbats were released into feral free fenced area. Following further reintroductions and breeding this population is expected to grow to 270 individuals within the fenced area.

Additional New South Wales feral free fenced areas

In December 2020, the NSW Government announced that four additional feral free fenced areas would be constructed over coming years.

These feral free fenced areas will cover a combined 45,000 hectares and be built at Yathong Nature Reserve near Cobar in central NSW, Ngambaa Nature Reserve near Macksville in north-eastern NSW, the Eden Bombala region of the state's south-east and Castlereagh Nature Reserve in Sydney's west.

Other feral free fenced areas occurring across Australia

A number of other feral-free fenced areas have also been established, repaired or are in the process of being constructed across Australia, with significant contributions from the private sector, state governments, non-government organisations and the community.

These include the Currawinya Bilby fence (Qld), Wadderin Sanctuary (WA), Dryandra predator-proof fence (WA), Western River Refuge (SA, Kangaroo Island) and Ned's Corner Station predator-proof fence 'Pine Paddock' (Vic). Additional fenced areas are also being planned including fencing Wilson's Promontory National Park (Vic) and a conservation area at Orchard Hills (NSW) in Sydney's west.

TARGET

10 MILLION HECTARES OF FERAL CAT ACTION

Photo: Shutterstock

Feral cat target	Result
10 million hectares of feral cat action, using best techniques for each location	**Target exceeded** Feral cat control has been undertaken across more than 18 million hectares.

The Threatened Species Strategy's target to undertake 10 million hectares of best practice feral cat control recognised the need for focussed effort at the landscape scale, particularly given that feral cats occupy 99.9 per cent of the Australian land area. The need for landscape-level control tools has been a key driver in the development and national registration of Curiosity® bait for feral cats, to expand the range of on-ground control methods available to practitioners in different parts of Australia.

HOW DID WE DO?

Between July 2015 and July 2020, it is estimated that feral cat management has been undertaken across more than 18 million hectares of the Australian landscape. This is the area of land where feral cat management has been undertaken at least once in the five-year period.

Under the Threatened Species Strategy, funding mobilised for on-ground feral cat management has been focussed on delivering humane and effective best practice control across high conservation value areas. This includes the repetitive deployment of feral cat control tools so that feral cat densities are maintained at low levels reducing predation pressure on recovering native wildlife.

For example, in the West MacDonnell Ranges of central Australia, intensive feral cat control around the last remaining wild populations of critically endangered Central Rock-rat has safeguarded the species from extinction. Aerial bait drops using Eradicat® have been repeated since 2016 across Central Rock-rat habitat which have reduced predation pressures from feral cats on this iconic species by up to 96 per cent. Practitioners, government and researchers have put in place plans using the best available population research to enable animals from these populations to be harvested for a founder population within the nearby Newhaven feral predator-free sanctuary, which will further secure the species into the future.

Photo: Felixer Grooming Trap, Thylation

On Kangaroo Island, the 2019-20 black summer bushfires burnt almost a third of the island, including high quality habitat for species such as the Kangaroo Island Echidna and cryptic Kangaroo Island Dunnart. With support from the Australian Government through the $200 million bushfire recovery for wildlife and habitat package, the South Australian Government, local landholders and non-government organisations have intensively surveyed, monitored and managed feral cats in the remnant unburnt patches of habitat to protect and recover surviving native wildlife.

In the months since the fires, populations of species like the Kangaroo Island Dunnart have been located at multiple sites which is encouraging news for the long-term recovery of this iconic island species.

HOW WAS THE TARGET MEASURED?

Researchers from ICON Science at the Royal Melbourne Institute of Technology's (RMIT) School of Global, Urban and Social Studies conducted an updated assessment of national effort towards feral cat control using the methodology established to report against the Strategy's year one and three targets. This involved collating and evaluating available data from existing repositories, such as the FeralCatScan database and RSPCA records, conducting online surveys targeted at organisations and individuals, and stratifying results to deliver a bounded estimate of national feral cat action.

Through the stratification process, researchers were conservative in extrapolating from hard data, to mitigate the potential for over-estimation. This means that the estimates of area managed and feral cats culled are likely to represent a reliable minimum estimate.

The report from RMIT *An updated assessment of the national effort towards feral cat control (2020)* includes a detailed description of the methods and is available through RMIT.

The total area of 18 million hectares represents the unique area managed. It is the sum of the area of area where best practice feral cat management has been undertaken at least once since June 2015. On many sites, there has been repeated management across multiple years, which means that the cumulative area managed exceeds the unique area managed.

Photo: Dirk Hartog Island, Department of Agriculture, Water and the Environment

TARGET

2 MILLION HECTARES OF FERAL CAT ACTION ON COMMONWEALTH LAND

Photo: Christmas Island, David Stanley

Feral cat target	Result
Best practice feral cat action implemented across 2 million hectares of Commonwealth land	**Target partially met** Best practice feral cat control has been implemented across more than 1.9 million hectares of Commonwealth land. This is a conservative estimate which includes feral cat action on both the Department of Defence and Parks Australia estates.

The Commonwealth estate includes wide ranging habitats which support a myriad of native species. These properties contain some of the most highly valued conservation areas in the country, such as Norfolk Island National Park and Yampi Sound Training Area.

There is no set method of control to effectively manage feral cats across all Commonwealth properties. With a diverse range of habitat types and landscape pressures across these properties, each site requires a tailored approach to management to ensure feral cat control actions are fit-for-purpose so that conservation assets are preserved for the future.

Under this target, 'best practice management' describes the deployment of the most appropriate tools for humane, effective and justifiable feral cat control determined at each property, acknowledging this will differ from site to site.

HOW DID WE DO?

Between July 2015 and July 2020, best practice feral cat management was undertaken across more than 1.9 million hectares of Commonwealth land. This is a conservative estimate of area managed, as it only includes areas where feral cats are a focus of strategic or targeted control.

One example of cat control on Commonwealth land is at Fort Direction, at the mouth of the Derwent River in Tasmania. The site is part of the Defence estate and is home to one of the largest extant Short-tailed Shearwater rookeries on the Tasmanian mainland. This important nesting site is estimated to include around 80,000 breeding adult birds who breed in Australia over summer months and migrate to the northern hemisphere during the austral winter. Feral cats are a significant threat to the nesting shearwaters and are attracted to the rookery by the abundance of birds, eggs and chicks.

The Department of Defence supports efforts to mitigate the threat of feral and roaming domestic cats by undertaking annual trapping and camera monitoring in accordance with the Tasmanian Vertebrate Pest Management Plan. All trapped cats are taken to the local cat management facility where microchip checks and assessments are undertaken to determine if animals are feral or domestic.

While 1.9 million hectares fell just short of our target of two million hectares, it represents a significant effort to tackle the threat of feral cats on Commonwealth land. The Department of Agriculture, Water and the Environment will continue to work with Commonwealth partners to support an increased focus on best practice feral cat management and control across additional areas and properties. This will include leveraging investment to support on-ground action through new and ongoing partnerships, and supporting the development and deployment of innovative new feral cat control tools.

HOW WAS THE TARGET MEASURED?

Information on feral cat control actions across Commonwealth land was compiled by the Office of the Threatened Species Commissioner in collaboration with the Department of Defence and Parks Australia. Defence properties were included where pest management plans identified feral cats for strategic management and where feral cat control had occurred in the last five years. Properties were also included where targeted or strategic feral cat control was being undertaken by a third party such as a state government or contracted land manager. Parks Australia properties were included where feral cat management had occurred as part of an ongoing program, or specific project, in the last five years. Parks Australia's feral cat management is guided by best practice cat control under the *Threat Abatement Plan for predation by feral cats*.

The total area of 1.9 million hectares represents the unique area managed. It is the sum of the area of Commonwealth land where best practice feral cat management has been undertaken at least once since June 2015. On many sites, there has been repeated management across multiple years, which means that the cumulative area managed exceeds the unique area managed.

Photo: Hugh McGregor

TARGET

2 MILLION FERAL CATS CULLED NATIONALLY

Photo: Shutterstock

Feral cat target	Result
2 million feral cats culled at the national level	**Target partially met** The estimated number of feral cats culled between July 2015 and July 2020 is 1,581,544 cats.

The Threatened Species Strategy's target to cull two million feral cats has been an important tool to raise community awareness about the impact of feral cats on native wildlife and to mobilise effort towards management of feral cats in Australia. The target's ambition has focussed community attention on the scale of the problem and developed support for the deployment of humane and effective feral cat control tools. This has in turn delivered conservation outcomes for predator susceptible native wildlife.

When the target to cull two million feral cats was set in 2015, the national feral cat population was estimated to be 15 to 20 million cats. Research under the NESP Threatened Species Recovery Hub has since revised down the estimate of feral cats to 2.1 million cats when environmental conditions limit available resources, and up to 6.3 million cats in times of plenty. This has increased the level of difficulty in meeting this target.

HOW DID WE GO?

Between July 2015 and July 2020, an estimated 1,581,544 feral cats were removed from the environment, with plausible bounds between 1,493,520 and 1,669,568 cats.

This includes:

- 211,560 cats culled in 2015-16
- 316,188 cats culled in 2016-17
- 316,859 cats culled in 2017-18
- 368,374 cats culled in 2018-19
- 368,563 cats culled in 2019-20.

Although the 2 million target was not reached, the results have demonstrated that the feral cat culling efforts have been substantial, particularly given that drought conditions would have reduced the overall feral cat numbers.

Shooters, hunters and farmers are estimated to be the most significant cohort of feral cat cullers, removing more than 85 per cent of the 1.58 million cats culled over the five-year period. A national survey undertaken as part of the target assessment process further highlighted the contribution of farmers to the national feral cat control effort, finding that 50 per cent of individuals who responded identified that they undertook feral cat control in farmland habitat.

Qualitative data gathered as part of the target assessment process also identified that the impacts of both COVID-19 and the 2019-20 summer bushfires did not cause a significant reduction in culling activity by organisations involved in feral cat control.

It is anticipated that improved access to resources such as the Centre for Invasive Species Solutions' *Glovebox guide for managing feral cats* and ongoing removal of legislative barriers to feral cat control will continue to support land managers increasing feral cat control efforts over coming years. Similarly, increased availability of new tools such as the Curiosity® bait for feral cats and Felixer Grooming Traps, should support increased action in the future.

The Australian Government will continue to work with researchers, NGOs, state and territory governments and practitioners through the Feral Cat Taskforce to maintain momentum managing this invasive pest into the future.

HOW WAS THE TARGET MEASURED?

An updated assessment of national effort towards feral cat control was undertaken by researchers from ICON Science at the RMIT School of Global, Urban and Social Studies. The assessment was conducted using methodology established to report against the Strategy's year one and three targets. This involved collating and evaluating available data from existing repositories, such as the FeralCatScan database and RSPCA records, conducting online surveys targeted at organisations and individuals, and stratifying results to deliver a bounded estimate of national feral cat action.

Through the stratification process, researchers were conservative in extrapolating from hard data, to mitigate the potential for over-estimation. Researchers also noted that that the population estimate for the number of hunters and shooters in Australia could be much larger than originally assumed. Using the larger population estimate the number of feral cats culled would exceed 2.8 million feral cats. To maintain consistency between Threatened Species Strategy reporting periods (year 1, year 3 and year 5), the more conservative estimate of, the number of shooters was used.

RMIT's report *An updated assessment of the national effort towards feral cat control (2020)* includes a detailed description of the methods and is available through RMIT.

SPECIES TRAJECTORY TARGETS

Photo: Australasian Bittern, Wayne Butterworth

BACKGROUND AND METHODS

The Threatened Species Strategy set out to improve the trajectories of 20 threatened birds, 20 threatened mammals and 30 threatened plants over the period 2015-2020. The 70 species were identified in 2015 and 2016 along with an additional bird species, the Christmas Island Frigatebird, which brought the total number of the Threatened Species Strategy's priority species to 71. The ambitious target was to improve the trajectories of all these species. In 2020, analysis was undertaken to assess whether there had been an overall improvement in population trends for each priority species over the life of the Strategy.

Summaries of the trajectory assessments for each of the 21 priority birds, 20 priority mammals and 30 priority plants are provided in species profiles in Appendix 1 (birds), Appendix 2 (mammals) and Appendix 3 (plants). The full trajectory assessments will be published on the Department's website (see Appendices for details). Please note that these summaries, and the trajectory assessments that underpin them, are not statutory documents and do not replace approved Commonwealth or state and territory conservation advices or recovery plans for these species.

Further, the process for estimating changes in species trajectories before and after 2015 is different to, and separate from, the process for assessing the conservation status of species for listing as threatened under the *Environment Protection and Biodiversity Act 1999* (EPBC Act). For example, while a species listed as critically endangered may have been assessed as having an improved trajectory from 2015 to 2020, it may still meet the eligibility criteria for listing in the critically endangered category because the number of mature individuals remains extremely low or its geographic distribution is highly precarious.

TRAJECTORY DEFINITION

A species' trajectory is the rate of change of its population over a particular time period. A species is demonstrating an improved trajectory if:

- its rate of population increase is significantly faster between two time periods,
- its rate of population decline is significantly slower between two time periods, or
- its population trend changes from declining to stable or increasing between two time periods.

Photos: (L) Numbat pouch young- Mark Cowan
(R) Numbat - Shutterstock

To assess progress against the year five targets, trajectory change in each priority species is measured by the difference in population trend in the 10 years prior to the Threatened Species Strategy (2005-2015) compared with the population trend in the five years since the launch of the Strategy (2015-2020). Improvements in trajectories for the period 2015-2020 are likely to be due to the collective management actions of all partners involved in the species' conservation before and after 2015, when the Threatened Species Strategy was launched. A species is considered to have an improved trajectory if population trend between 2005-2015 and 2015-2020 changed significantly, and that change was deemed positive in the analysis.

It is important to note that some research and management actions (e.g. habitat restoration) taken in the period 2015-2020 may deliver immediate benefit, but may also produce longer-lasting benefits that are not measurable in the short term.

TRAJECTORY METHODOLOGY

The population trajectories for 71 species were determined using a consistent and methodical approach. In partnership with the NESP Threatened Species Recovery Hub, the trajectory assessments reported here were based on the best information available in late 2020 quantified through a consistent expert elicitation process, following these steps:

1. Data gathering

Species scorecards were revised or prepared for all priority bird, mammal and plant species in late 2020. These scorecards included information on conservation history, monitoring, key threats and management actions, and were developed by collating available data on population numbers, as well as information on conservation actions underway and the extent to which such management may reduce the impacts of threats across the species' range.

Data current to mid-2020 were sought from species experts including recovery team members, regional natural resource management organisations, scientific researchers, conservation organisations and on-ground land managers and volunteer groups, as well as relevant government agencies in the states and territories in which each species occurs. Data collection templates were sent out to hundreds of recipients, including an open invitation for wider distribution.

All the information collected for each individual species was collated and synthesised by scientists from the NESP Threatened Species Recovery Hub.

2. Expert elicitation

The collated species scorecards were used to underpin an assessment of each species' trajectory through expert elicitation in early 2021. Expert elicitation involves obtaining species experts' judgement based on the systematic consideration of relevant evidence. It is a useful tool where there are data gaps or uncertainty and was well suited to the considerable variation in data quality and availability across the 71 priority birds, mammals and plants.

For this process, an established expert elicitation protocol[1] was followed, where a group of individuals used the same information set (the collated information on each species) to independently provide their best estimate of population size of the species at time X (in this case, for the years 2005, 2015 and 2020, and projected for the years 2025 and 2035), the upper and lower bounds of that estimate, and their confidence in the actual population size being within those bounds.

Experts were provided with feedback on how their estimates conformed or otherwise with the rest of the participants and were offered the opportunity to determine whether the aggregated outputs were a reasonable representation of the truth.

Photo: Oliver Tester

1 McBride MF et al (2012) Structured elicitation of expert judgments for threatened species assessment: a case study on a continental scale using email. Methods in Ecology and Evolution 3, 906-920. https://besjournals.onlinelibrary.wiley.com/doi/pdfdirect/10.1111/j.2041-210X.2012.00221.x

Photo: Cassowary, Shutterstock

These elicitation discussions provided further opportunity to share evidence, as well as opportunity for experts to revise and change their initial estimates if they considered that appropriate after collective discussion.

For every species, at least 6 experts contributed to the elicitation, with all elicitations conducted online. To help provide consistency across species, a set of 6 experts provided elicitations for all 21 priority birds and a set of 5 experts provided elicitations for all 20 priority mammals (with 3 experts participating in all 41 elicitations for animal species). Six experts provided elicitations for all 30 priority plants. These elicitations were then supplemented by a variable number of experts familiar with individual species.

3. Analysis

All data were aggregated across experts and converted from population size estimates at specified time points to relative percentage changes in population size over the same time points.

To determine if there had been a change in trajectory since implementation of the Threatened Species Strategy, the relative annual percentage change estimated for the 2005-2015 period (i.e. 10 years prior to implementation of the Threatened Species Strategy) was compared to the relative annual percentage change estimated for the 2015-2020 period (i.e. the time since implementation of the Threatened Species Strategy).

A species' trajectory was deemed to have changed where there was statistically significant agreement among experts on the direction of change in trajectory between 2005-2015 and 2015-2020.

The threshold for statistical significance was set at $p \leq 0.1$. Where statistically significant changes in trend were positive, these species have been assessed as having an 'improved trajectory'. In some cases, a trend for improvement (or deterioration) in trajectory from 2005-15 to 2015-20 was apparent, but was not considered significant (i.e. probability >0.1) if there was low concordance among experts. Such cases did not meet the threshold of 'improved trajectory' (or 'deteriorating trajectory').

INTERPRETING THE TRAJECTORY TARGETS

Among the 71 priority species, significantly improved trajectory was expressed in three different paths, shown in the table below. While this represents good news for all species with improved trajectories, clearly more work will be required to further arrest declines in species that are still declining, albeit at slower rates, to ensure their recovery and security into the future.

OVERVIEW OF RESULTS (BIRDS, MAMMALS AND PLANTS)

Species' trajectory improved	Species' trajectory not improved (either stable or changes not significant)	Species' trajectory deteriorated
Population decreasing in the period 2005-2015, but stable or increasing from 2015-2020. 	Changes in trajectory from 2005-2015 to 2015-2020 not deemed significant. 	Population increasing or stable in the period 2005-2015, but decreasing from 2015-2020. 
Population was decreasing in the period 2005-2015 and decreasing at a slower rate from 2015-2020. 	Trajectory change in both 2005-2015 and 2015-2020 less than 1 per cent per year, therefore population considered stable. 	Population was decreasing in the period 2005-2015 and decreasing more rapidly from 2015-2020. 
Population was increasing in the period 2005-2015 and increasing more rapidly from 2015-2020. 		Population was increasing in the period 2005-2015, but increasing less rapidly from 2015-2020. 

Photo: Matt White

Photo: Golden-shouldered Parrots, Graeme Chapman

According to the NESP Threatened Species Recovery Hub scientists who conducted this research, overall the Threatened Species Strategy has contributed positively to improvements in trajectories across the suite of 71 priority species. On average, birds showed the most improvement in population trajectories between the 2005-2015 and 2015-2020 periods, followed by plants, then mammals.

Population trajectories showed significant improvement from the 2005-2015 period to the 2015-2020 period for 24 of the 71 species (comprising 6 birds, 8 mammals, and 10 plants). In contrast, significant deterioration in trajectories was found for 15 species (comprising 6 birds, 5 mammals, and 4 plants).

Of the 24 species that had significantly improved trajectories, 12 species (2 birds, 3 mammals, 9 plants) moved from a trajectory of decline in 2005-2015 to a trajectory of increase in 2015-2020 (i.e., they were recovering), 7 species were still declining but at a significantly slower rate (3 birds, 3 mammals, 1 plant), and 3 species were recovering at a significantly faster rate (1 bird, 2 mammals).

With the individual trajectories of 24 of the 71 priority species having significantly improved since 2015, the researchers concluded that the targets given in the Threatened Species Strategy for all priority species to have improved trajectories by 2020 have not been met. However, they also noted:

- while many actions supported by the Strategy, (including habitat restoration, translocations and seed banking) provided few immediate benefits to improving trajectories in the 2015-2020 period, these actions can be expected to have longer-term legacy benefits
- many of the priority threatened species are subject to pervasive threats that cannot readily be removed in the short-term, especially if management actions only occur at local scales
- for many of the priority bird and mammal species, any benefits arising from management during the 2015-2020 Strategy period may have been outweighed by the detrimental impacts of drought and severe wildfire that also occurred in this timeframe
- for many of the priority species, monitoring is limited, rendering it difficult to discern and interpret population trajectories. The above-ground abundance of many plant species was particularly difficult, given dramatic fluctuations depending on season and time since fire.

These results provide some optimism for the future trajectories of priority species where actions already undertaken may have benefits that are yet to be realised. The population trajectories derived from this research also show that for many species, decline to extinction within 2 to 3 decades would be likely if current management ceased, highlighting the importance of ongoing efforts. However, even under current management, expected population trajectories indicate a high risk of extinction over this period for some species, suggesting that additional work and new approaches are likely to be necessary.

TARGET

20 PRIORITY BIRDS HAVE IMPROVED TRAJECTORIES

Photo: Helmeted Honeyeater, Bruce Tardif

Species trajectory target	Result
20 priority birds have improved trajectories	**Target not met** Six priority bird species assessed by independent experts as having an improved trajectory from the period 2005-2015 to 2015-2020.

Significantly improved trajectory	Trajectory stable or change not significant	Significantly declined trajectory
Alligator Rivers Yellow Chat	Christmas Island Frigatebird	Australasian Bittern
Golden-shouldered Parrot	Eastern Bristlebird	Eastern Curlew
Helmeted Honeyeater	Hooded Plover	Norfolk Island Boobook Owl
Norfolk Island Green Parrot	Mallee Emu-wren	Plains-wanderer
Orange-bellied Parrot	Malleefowl	Red-tailed Black Cockatoo (SE)
White-throated Grasswren	Night Parrot	Regent Honeyeater
	Southern Cassowary	
	Swift Parrot	
	Western Ground Parrot	

This target for the priority bird species has not been met, as only six of the 21 species were deemed to have improved trajectories. Nine bird species were not found to have significantly changed trajectories (four had trajectories that were reasonably stable, five had trajectories that may have changed but the change was not deemed significant) and six bird species had trajectories that had deteriorated over the Strategy period.

However, overall the species trajectory assessments found that the Strategy had provided a positive contribution to the population trends of priority birds, and across all priority species considered, the priority birds showed more improvement than plants and mammals. Since the Strategy commenced in 2015, many species have been heavily impacted by prolonged drought and then the 2019-20 bushfires. Following the fires, three of the 21 priority bird species – the Regent Honeyeater, the Eastern Bristlebird, and the Western Ground Parrot, were identified as priorities for urgent management intervention by the Wildlife and Threatened Species Bushfire Recovery Expert Panel because the fires likely had significant detrimental impacts on their population sizes. These species are now receiving targeted support for recovery.

While the outlook for some priority species remains concerning, there are also recovery wins to celebrate and learn from. Through targeted investment, mobilising external funding, and partnering with state and territory governments and on-ground conservation organisations, the Australian Government has helped prevent further extinctions and secure populations of some of Australia's most threatened birds, as seen in the improved trajectories for species such as the Norfolk Island Green Parrot and the Orange-bellied Parrot. The Norfolk Island Green Parrot has responded well to active Park management, with its range expanding beyond the borders of Norfolk Island, and collective efforts led to a record increase in Orange-bellied Parrot numbers since monitoring began in the 1990s.

Photo: Regent Honeyeater, Tim Williams

Since 2014, the Australian Government has funded hundreds of projects that support practical, on-ground action for Australia's birds, including but not restricted to the 21 priority threatened bird species. Significant efforts were directed towards the priority birds, with all 21 receiving targeted funding under Australian Government environmental programs. On-ground recovery actions to protect Australia's priority birds include monitoring, habitat restoration, tackling predators, such as feral cats and red foxes, supplemental feeding, and nest protection. These efforts align with conservation planning documents, including Recovery Plans and Conservation Advices.

Snapshot of some actions underway for Australia's threatened birds under the Threatened Species Strategy supported by the Australian Government

- Using right-way science to better understand and conserve the elusive Night Parrot. In 2020, the collaborative efforts of Martu Indigenous Rangers, the University of Queensland, and the Western Australian Department of Biodiversity, Conservation and Attractions resulted in the discovery of Night Parrots in remote salt lake country in Western Australia.
- Construction of a Regent Honeyeater holding aviary at Taronga Zoo, Sydney, to increase the breeding capacity of the Regent Honeyeater by 30 per cent and support conservation breeding of the species. This work was funded as part of the Australian Government's $200 million investment to help native wildlife and their habitats recover from the 2019-20 bushfires.
- Undertaking management action on Norfolk Island, including nest protection, nest box relocation, feral cat control and habitat improvement, contributed to a breakthrough for the endangered Norfolk Island Boobook Owl. In 2020, the first Boobook Owl chicks in more than a decade survived to become fledglings.

These are just a few examples of the hundreds of projects the Australian Government has invested in to support priority bird species. Information describing these actions is available in the trajectory assessments at Appendix 1, as well as in previous annual reports, available here: **www.environment.gov.au/biodiversity/threatened/publications**.

TARGET

20 PRIORITY MAMMALS HAVE IMPROVED TRAJECTORIES

Photo: Juvenile Chuditch, Melissa Jensen and the Arid Recovery program

Species trajectory target	Result
20 priority mammals have improved trajectories	**Target not met** Eight priority mammal species assessed by independent experts as having an improved trajectory from the period 2005-2015 to 2015-2020.

Significantly improved trajectory	Trajectory stable or change not significant	Significantly declined trajectory
Black-footed Rock-wallaby	Eastern Quoll	Kangaroo Island Dunnart
Brush-tailed Rabbit-rat	Gilbert's Potoroo	Mala
Central Rock-rat	Golden Bandicoot	Mountain Pygmy Possum
Christmas Island Flying-fox	Leadbeater's Possum	
Chuditch (Western Quoll)	Northern Hopping-mouse	Eastern Barred Bandicoot *
Greater Bilby	Western Ringtail Possum	Eastern Bettong *
Mahogany Glider	Woylie	
Numbat		

*Notably, two of the species whose trajectories met criteria for having significantly declined since 2015 are in fact still increasing in numbers. However, rates of increase have slowed in recent years as populations within fenced areas have reached carrying capacity. These species are the Eastern Barred Bandicoot and the Eastern Bettong.

This target for the priority mammal species has not been met, as only eight of the 20 species were deemed to have improved trajectories. Seven mammal species were not found to have significantly changed trajectories (one had a reasonably stable trajectory, six had trajectories that may have changed but the change was not deemed significant) and five mammal species had trajectories that had deteriorated over the Strategy period.

However, overall the species trajectory assessments found that the Strategy had provided a positive contribution to the population trends of priority mammals. Since the Strategy commenced in 2015, many species have been heavily impacted by prolonged drought and then the 2019-20 bushfires. Following the fires, two of the 20 priority mammal species – the Kangaroo Island Dunnart and Mountain Pygmy-possum, were identified as priorities for urgent management intervention by the Wildlife and Threatened Species Bushfire Recovery Expert Panel because the fires likely had significant detrimental impacts on their population sizes. These species are now receiving targeted support for recovery.

While the continued decline of some priority species remains a concern, in other cases, good progress was made which can be built upon and learnt from.

Through targeted investment, mobilising external funding, and partnering with state and territory governments and on-ground conservation organisations, the Australian Government has helped prevent further extinctions and secure populations of some of Australia's most threatened mammals, as seen in the improved trajectories for species such as the Central Rock-rat and Chuditch. Landscape-scale feral cat control supported by the Australian Government contributed to an improved population trajectory for the Central Rock-rat, and long-term feral predator control and translocations led to population increases for the Chuditch.

Preventing further extinctions and securing threatened populations of Australia's animal fauna has been a key focus of the Strategy. Since 2014, the Australian Government has funded hundreds of projects that support practical, on-ground action for Australia's mammals, including but not restricted to the 20 priority threatened mammal species. Significant efforts were directed towards the priority mammals, with all 20 receiving targeted funding under flagship environmental programs, such as the National Landcare Program. On-ground recovery actions to protect Australia's mammals include monitoring, habitat restoration and reducing the impact of predators such as feral cats and red foxes.

Photo: Mountain Pygmy Possum, Linda Broome

Where threats in the wild are too great for threatened mammals to persevere, establishing *ex situ* populations in predator-free safe havens has been supported through funding for captive breeding and translocation programs. These efforts align with conservation planning documents, including Conservation Advices and Recovery Plans.

Snapshot of some actions underway for Australia's threatened mammals under the Threatened Species Strategy supported by the Australian Government

- Completing construction of a new feral predator-free fenced area at Wandiyali Environa Sanctuary south of Canberra. Funded as part of the Australian Government's $10 million Environment Restoration Fund Safe Haven investment, the ambitious project aims to eradicate rabbits, foxes and feral cats and reintroduce species like the Eastern Bettong and Eastern Quoll into the Endangered Box Gum Woodland.
- Supporting the recovery of the endangered Mountain Pygmy Possum following the 2019-20 bushfires, which burnt more than 573,000 hectares of the Alpine region across the Australian Capital Territory, New South Wales and Victoria. On-ground recovery actions include supplementary feeding, feral pest control, and habitat restoration.
- Supporting Anindilyakwa Land and Sea Rangers to establish and undertake monitoring for the Northern Hopping Mouse on Groote Eylandt, in the Northern Territory. Surveys are contributing to knowledge of Hopping Mouse populations and helping inform future conservation management.

These are just a few examples of the hundreds of projects the Australian Government has invested in to support priority mammal species. Information describing these actions is available in the trajectory assessments at Appendix 2, as well as in previous annual reports, available here: **www.environment.gov.au/biodiversity/threatened/publications** .

TARGET

30 PRIORITY PLANTS HAVE IMPROVED TRAJECTORIES

Photo: Matchstick Banksia, Shutterstock

Species trajectory target	Result
At least 30 priority plant species have improved trajectories	**Target not met** 10 priority plant species assessed by independent experts as having an improved trajectory from the period 2005-2015 to 2015-2020.

Significantly improved trajectory	Trajectory stable or change not significant	Significantly declined trajectory
Blue-top Sun-orchid	Ant Plant	Black Grevillea
Caley's Grevillea	Bulberin Nut	Glossy-Leafed Hammer-Orchid
Fleurieu Leek Orchid	Button Wrinklewort	Southport Heath
Little Mountain Palm	Central Australian Cabbage Palm	Vincentia Banksia
Matchstick Banksia	Fairy Bells	
Mossman Fairy Orchid	Fitzgerald's Mulla-Mulla	
Scaly-Leaved Featherflower	Kakadu Hibiscus	
Shy Susan	Magenta Lilly Pilly	
Small Purple-pea	Mongarlowe Mallee	
Turnip Copperburr	Morrisby's Gum	
	Ormeau Bottle Tree	
	Purple Wattle	
	Silver Daisy Bush	
	Silver Gum	
	Spiny Rice Flower	
	Whibley's Wattle	

This target for the priority plant species was not met, as only ten of the 30 species were estimated to have significantly improved trajectories. However, a further 16 plant species were found to have either a reasonably stable trajectory or a non-significant change in trend. Four plant species had trajectories that had deteriorated over the Strategy period.

The results for the threatened plants are nuanced and reflect taxa-specific challenges when assessing threatened plant trajectories. For example, some species are slow-growing, and it can take decades for seedlings to become mature individuals. For species such as the Magenta Lilly Pilly and the Mongarlowe Mallee, trajectory improvements will take many years to manifest, despite dedicated conservation action between 2015-2020. Many species are also difficult to accurately monitor in the wild due to limited physical accessibility or low detectability – such as minute orchids or species that show inter-seasonal variability.

Increasing monitoring efforts over 2015-2020 led to discoveries of new populations for some plants, revealing them to be more common than originally assessed. For example, surveys showed the Fitzgerald's Mulla Mulla to be far more abundant and less threatened than was understood when the species was included as a priority under Strategy in 2015. This species was subsequently delisted under the EPBC Act and as a result, no further management action was funded under the Strategy. Therefore, while the species' population trajectory has not improved according to this target's definition, its long-term prospects have undeniably improved.

For four out of the 30 priority plant species, considerable doubts were raised about their taxonomic validity over the course of the Strategy: the Banksia Vincentia, Blue-top Sun-orchid, the Silver Daisy Bush, and the Scaly-leaved Featherflower. Taxonomic clarification is an urgent priority for these four species.

Photo: Fairy Bells, Department of Agriculture, Water and the Environment

Ascribing a species' taxonomic boundary can be a complex endeavour in threatened plant conservation, with many historical classifications based on physical characteristics or geographic locations now challenged by genetic analysis. Hybridisation is also a complicating factor, which is a natural and important evolutionary process in plants but may comprise the purity of remaining populations.

Overall, the species trajectory assessments found that the Strategy had provided a positive contribution to the population of priority plants. With ten plants found to have significantly improved trajectories, and many more stable, there is good progress to celebrate and reflect on. Through targeted investment, and partnering with state and governments, on-ground conservation organisations and botanic gardens, the Australian Government has helped secure threatened populations of plants in the wild, evident in the improved trajectories for species such as the Matchstick Banksia, the Caley's Grevillea, and the Small Purple-pea. Australian Government-funded translocation efforts led to marked population increases for the Matchstick Banksia, planned burns and translocation efforts resulted in Small Purple-pea increases, and habitat restoration and weed control helped improve the trajectory of the urban-dwelling Caley's Grevillea. For the four species assessed as undergoing significant decline, the need for more support was identified and acted upon during the period of the Strategy. Additional Australian Government funding was directed to three of these species in the 2019-20 financial year and these supplementary projects will continue to 2023. The summaries of the species trajectories in Appendix 3 provide further details. Additional information on action underway is captured in the following pages, as well as previous annual reports, available here: **www.environment.gov.au/biodiversity/threatened/publications**.

ADDITIONAL PLANT TARGETS

Year Five of the Threatened Species Strategy includes additional targets for threatened plants and ecological communities. For this reason, threatened plants were not subject to the same level of reporting as the mammals and birds at Year Three.

Overview

The naturalised flora in Australia is considered one of the most species rich in the world. Approximately 10 per cent of the world's plants occur in Australia and taxonomists are regularly describing new species. In 2019 alone, taxonomists discovered and described 117 new species of plants. About 85 per cent of our flowering plants are unique to Australia, including large number of species in ecologically significant genera such as Acacia, Eucalyptus, Melaleuca, and Grevillea.

Our plants and ecological communities form the backbone of our natural ecosystems, shape our landscapes, provide habitat for animals and invertebrates, and are critical to our health and wellbeing. Across Australia, about 4000 plants species were, and some still are, used by Indigenous Australians as food and medicine, equating to about 20 per cent of named Australian vascular plants. Charred plant foods at Madjedbebe rockshelter in northern Australia are dated to 53,000 – 65,000 years ago, indicating Australia's earliest known human population exploited a range of plant foods, including those that required processing.

Our plants and ecological communities have also experienced decline. The period since European settlement has seen a rapid change in land management practices and the introduction of an array of threats to Australia's native flora.

There are over 1380 plants and 80 ecological communities listed as threatened under the EPBC Act. Our native plants and ecological communities face many threats, and many suffer from the cumulative impact of multiple threats. The main threats to our native flora are clearing, fragmentation and declining quality of habitat, invasive species, climate change, and changed fire regimes. The impact of some threats, such as disease, is increasing. Phytophthora (*Phytophthora cinnamomi)* is a soil-borne water mould pathogen that destroys the roots of affected plants and is well documented across a range of ecosystems. In the eastern states, Myrtle Rust is an emerging threat that is already impacting rare and threatened species such as *Gossia gonoclada*.

The unprecedented 2019-20 summer bushfires also had a severe impact on our native plants and ecological communities.

Following the fires, 486 plant species and 19 threatened ecological communities were identified by the Wildlife and Threatened Species Bushfire Recovery Expert Panel as priority matters needing urgent management intervention. Fire entered areas of the Greater Blue Mountains World Heritage Area that had never burned previously. Over a third of the World Heritage-listed Gondwana Rainforests, which have existed for tens of millions of years, was also burnt.

The Year Five targets in the Threatened Species Strategy set an ambitious vision for Australia's threatened plants. While there exist a range of feasible and practical conservation actions for Australia's threatened plants, recovery still takes time, and the immediate threats can be difficult to combat.

The summaries of the species targets over the following pages provide further details.

Photo: Staff of the Royal Tasmanian Botanic Gardens collecting seed of the endemic *Anodopetalum biglandulosum* along the Franklin River. Tasmania Seeds were captured using a shower curtain to catch seeds from shaken branches - Royal Botanical Gardens Tasmania

TARGET

100 PER CENT OF PLANTS IN CONSERVATION SEED BANKS

Photo: Collecting seeds Eremophila spinescens - Luke Sweedman

Plant target	Result
100 per cent of Australia's known threatened plant species stored in one or more of Australia's conservation seed banks	**Target partially met** Recent research suggests almost one third of threatened plants are not amenable to traditional seed banking techniques, making this target difficult to meet without further research to identify alternative methods. With more than 67 per cent of Australia's listed threatened species stored in conservation seed banks, this is a significant result positioning Australia among the global leaders when it comes to seed banking.

	2018	2020
Number of EPBC-listed flora	1,355	1,373
Number of EPBC-listed flora secured in seed banks	826	930
Percentage of EPBC-listed flora secured in seed banks	61 per cent	67.7 per cent

Collecting and storing seed in seed banks is important for protecting the future of Australia's native flora and ecosystems. As our changing climate continues to impact biodiversity, the *ex situ* preservation of plants species has never been more vital.

For many of Australia's threatened plants, seed banking provides a practical safeguard against compounding threats that impact species *in situ*, such as pests, disease, fire, and climate change. Once collected, most seed can be used in various ways, including for scientific research to increase our understanding of seed germination and seed biology, and in restoration and translocation projects throughout Australia.

The devastating 2019-20 summer bushfires demonstrated the critical importance of seed banking in ecological recovery and restoration efforts. Collections held in seed banks and botanic gardens are being used to support the immediate survival and long-term recovery of fire-affected plants, through actions such as the reintroduction of threatened species using existing seed collections.

The Australian Government's Threatened Species Strategy includes an ambitious seed banking target, with the Year 5 target to have 100 per cent of Australia's known threatened plant species stored in one or more of Australia's conservation seed banks.

The Australian Seed Bank Partnership (ASBP) has led efforts to increase the representation of threatened flora in seed banks. The ASBP is a national collaboration of ten conservation seed banks and two flora-focused organisations. The ASBP follows internationally recognised protocols for collecting and storing the seed of Australian native plants, with all partners assessed against the Millennium Seed Bank Partnership's Seed Conservation Standards.

HOW ARE WE TRACKING?

As of June 2020, the ASBP secured collections from 930 of the 1,373 threatened plant species listed under the EPBC Act. This equates to 67.7 per cent of Australia's threatened flora.

This figure was determined by collating data held by the nine major conservation seed banks of the ASBP and comparing the total list of unique species against the listed threatened flora available on the Species Profiles and Threats Database (SPRAT). Some species are represented by multiple collections within an individual facility or across multiple seed banks. Collecting seed from multiple locations across a species range is one of the best ways of capturing a species' genetic diversity. A species' range may be as little as several metres or it may occur across multiple states and territories.

Despite the 100 per cent target not being met, the final result is a significant achievement that positions Australia among the global leaders when it comes to conservation seed banking. Recent research indicates that not all Australian plants are biologically compatible with storage in traditional conservation seed banks using current methods.

This research suggests almost one third of the world's threatened plant species are not amenable to traditional seed banking techniques and that more work is needed to better understand alternative methods for long term storage.

The table on page 47 provides a comparison of the number of species held in 2018 and 2020. It is important to note the total number of flora listed under the EPBC Act increased by 18 species, or 1.33 per cent, during the period. This placed downward pressure on the percentage of species banked by the Partnership. Furthermore, both the 2019-20 bushfires and the COVID-19 travel restrictions had a significant impact on collecting during the 2020 season. The Partnership has been back in the field throughout the 2020-21 season with collectors undertaking rapid flora surveys alongside their collecting activities. Information and seed collected this season will help to inform our understanding of post-bushfire recovery as well as regional and national collecting priorities in the seasons ahead.

Australia is well placed to improve conservation outcomes for Australia's threatened plants, with nearly two thirds of Australia's nationally listed threatened species represented in conservation seed banks.

Photo: Morrisby's Gum Seed, Royal Tasmanian Botanic Gardens

NEXT STEPS

Emerging pressures, such as climatic changes and unprecedented weather events, mean seed banking is more important than ever. The 2019-20 bushfires saw increased demand on germplasm (seed and living plant tissue) collections held in seed banks and botanic gardens to support recovery actions, such as translocations. Together with botanic gardens, the Australian Seed Bank Partnership played an important role in supporting the ecological recovery effort by making collections available to support restoration efforts and offering knowledge and advice.

Seed banking will remain a focus in the new 2021-2031 Threatened Species Strategy and Action Plan, and the Office of the Threatened Species Commissioner will continue to work closely with the Australian Seed Bank Partnership to ensure Australia's known threatened species are stored in conservation seed banks.

The size of a collection matters. While some threatened species are represented by multiple collections of suitable size, many species are represented by collections of less than 500 seeds. It will be important to continue to grow the collection size of these species to improve their long-term conservation value.

There is also a need to explore alternative methods for species that cannot be conserved via conventional seed banking techniques. The Australasian Seed Science Conference 2021 and concurrent Fenner Conference on the Environment - *'Exceptional times, exceptional plants: Ex situ conservation strategies for Australian plants that cannot be conserved by conventional seed banking methods'* - will combined provide an invaluable opportunity to form a stronger community of practice on *ex situ* methods of plant conservation and facilitate knowledge sharing.

TARGET

RECOVERY ACTIONS UNDERWAY FOR AT LEAST 50 PLANTS

Photo: Button Wrinklewort, Department of Agriculture, Water and the Environment

Plant target	Result
Recovery actions underway for at least 50 plants	**Target met.** There are recovery actions underway for all targeted plants under the Threatened Species Strategy, as well as actions underway for other threatened plant species under Australian Government programs such as the Environment Restoration Fund, Regional Land Partnerships and bushfire recovery for wildlife and habitat package.

HOW ARE WE TRACKING?

Action is underway for all 30 plants targeted for recovery under the Threatened Species Strategy, as well as hundreds of other plants listed as threatened under the EPBC Act.

Since 2014, the Australian Government has funded hundreds of projects that support practical, on-ground action for Australia's threatened plants and ecological communities. On-ground recovery actions to protect Australia's plants include monitoring, habitat restoration, weed control, seed banking, and using plant orchards and nurseries to help grow plants to be returned to the wild. Where threats in the wild are too great for threatened plants to persevere, or there is a chance of a stochastic event – like a bushfire event, establishing *ex situ* collections at seed banks and Botanic Gardens can provide an insurance policy against extinction. Translocations of threatened plant species are now commonly used to mitigate threatening impacts. Over 1000 translocations of threatened plants have occurred since 1950, with over 85 per cent of these occurring since 2000.

The Australian Government also provided funding for strategic on-ground investments to support the recovery of native plants and ecological communities following the unprecedented 2019-20 summer bushfires. For example, $5 million was provided to Greening Australia to increase the supply of seed and native plants for revegetation.

Snapshot of some actions underway for Australia's threatened plants under the Threatened Species Strategy supported by the Australian Government

Translocations

- Establishing a new translocated population in 2021 of the Black Grevillea (*Grevillea calliantha*) and monitoring and maintaining existing translocated populations. The Black Grevillea is one of Western Australia's rarest plants, occurring in just six locations. The establishment of 500 plants at three new sites has dramatically improved the species' long-term prospects.

Habitat protection

- Working with traditional owners and Indigenous Rangers to protect the Central Australian Cabbage Palm (*Livistona mariae*) outside Finke Gorge National Park in the Northern Territory. On-ground actions include removing Buffel grass and restricting horse access at known sites.

Monitoring and surveys

- Extensive surveys for the Purple Wattle *(Acacia purpureopetala)* in North Queensland resulted in the discovery of 4,300 individual plants with an area of occupancy of 130 km^2 and an extent of occurrence of about 850 km^2. Prior to this project, only 500 were thought to still exist in the wild.

Seed banking

- Increasing the size and diversity of the Fairy Bells (*Homoranthus darwinioides*) collection stored in the National Seed Bank at the Australian National Botanic Gardens. The size of a collection matters; there were only nine Fairy Bell seeds in storage in 2018.

Research and genetic testing

- Investigating seed viability and growing conditions for Leek Orchids, including the Fleurieu Leek Orchid (*Prasophyllum murfetii*). Leek Orchids are notoriously difficult to propagate. Microscopic orchid seeds must bond with symbiotic fungi to germinate, and research is focusing on better understanding this process.

Commercial propagation

- Funding the commercialisation of the Magenta Lilly Pilly (*Syzygium paniculatum*) and *Banksia vincentia* so both plants are available for purchase through the nursery industry. A portion of profits will be returned to the threatened plant conservation program at the Australian National Botanic Gardens.

Bushfire recovery

- Assessing, monitoring and supporting the post-fire survival of 19 bushfire-impacted plant species in north-east NSW. Management actions include propagating plants, alleviating pollinator competition from European Honeybees and wasps, and alleviating grazing pressure.

CASE STUDY:

CRACKING THE CODE IN PROPAGATING AUSTRALIA'S RAREST EUCALYPT

With only six individual plants left in the wild, the critically endangered Mongarlowe Mallee (*Eucalyptus recurva*) is the world's rarest Eucalypt. It is also one of the oldest. The size of the lignotubers on the remaining plants indicate they could be up to thousands of years old.

For decades, efforts have been made to explore ex situ conservation methods, such as attempting to germinate and propagate the Mongarlowe Mallee at botanic gardens.

Funded under the Australian Government's National Landcare Program's Regional Land Partnerships, NSW South East Local Land Services contracted the Australian National Botanic Gardens (ANBG) to attempt propagation using specialised grafting and assisted pollination techniques. There are now three seedlings from a small amount of fruit collected in March 2020. It represents a milestone for this project and the species, as successful germination of seed has not been achieved in more than 20 years. Previous attempts to grow seedlings resulted in a poor vigour and a high mortality rate.

The next steps will be to tackle the challenge of growing the seedlings to a more mature state and securing them as a longer-term component of the ANBG ex situ living collection.

As part of this project, NSW South East Local Land Services is also undertaking population health surveys and working to protect the remaining plants in situ.

The Mongarlowe Mallee was also marked and protected during the 2019-20 bushfires. As the Charley's Forest 'mega-fire' crept close to one of the trees in the southern tablelands, NSW Saving our Species staff quickly located and tagged the tree and its surrounding habitat. This mapping information was then sent to RFS fire control headquarters in Queanbeyan so the tree could be protected when fire containment lines were built.

Photo: Mongarlowe Mallee, Crisp, M.D.

TARGET

RECOVERY ACTIONS UNDERWAY FOR AT LEAST 60 THREATENED ECOLOGICAL COMMUNITIES

Photo: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological community, Chris Tzaros

Plant target	Result
Recovery actions underway for at least 60 threatened ecological community sites	**Target met.** There are recovery actions underway for more than 60 threatened ecological community sites, via Australian Government programs such as 20 Million Trees, Regional Land Partnerships and bushfire recovery for wildlife and habitat package.

Australia has a diverse range of ecological communities, including grasslands, woodlands, shrublands, forests, wetlands, ground springs and cave communities.

An ecological community is a naturally occurring group of native plants, animals and other organisms that interact as a unique habitat. Species within each ecological community interact with and depend on each other – for example, for food or shelter. Ecological communities provide vital connections as wildlife corridors and habitat refuge for many threatened plant and animal species.

As well as being important because of their unique biodiversity and place within the Australian landscape, ecological communities provide a range of ecosystem services, including the reduction or control of erosion and salinity and carbon storage.

Together with threatened species, ecological communities are protected as one of several Matters of National Environmental Significance under the EPBC Act. There are 84 ecological communities listed as threatened under the EPBC Act.

Action is underway to conserve and restore the species diversity and ecological functions provided by threatened ecological communities at well over 60 sites across Australia, with projects funded through a range of Australian Government programs.

This was determined by reviewing the number of threatened ecological communities supported by projects funded under Australian Government programs since 2015. Under the National Landcare Program's Regional Land Partnerships initiative alone, recovery actions are being undertaken at 32 different threatened ecological community sites across Australia. Under 20 Million Trees, recovery actions took place at 54 different sites.

The 2019-20 bushfires had a devastating impact on Australia's ecological communities. More than 7.7 million hectares were burnt in the bushfires that swept across southern and eastern Australian. More than 60 per cent of the Greater Blue Mountains World Heritage Area and 40 per cent of the Gondwana Rainforest World Heritage Area burnt. Nineteen threatened ecological communities were identified as needing urgent management intervention. The Australian Government has since provided funding for 16 of the 19 priority threatened ecological communities.

Photo: Karst Springs and Associated Alkaline Fens of the Naracoorte Coastal Plain Bioregion ecological community, Matt White

Snapshot of some actions underway for Australia's threatened ecological community sites supported by Australian Government programs

National Landcare Program – Regional Land Partnerships

- Working with landholders to improve conservations outcomes on private land for the critically endangered Tasmanian Black Gum and Brookers Gum Forests and Woodland, including through mapping the ecological community's distribution in the region and increasing the total area of the ecological community under permanent protection.

Environment Restoration Fund

- Supporting landholders and the community to help improve the condition of the Eucalypt Woodlands of the Western Australian Wheatbelt and the Banksia Woodlands of the Swan Coastal Plain through actions such as weeding, regeneration and pest management.

Bushfire Funding

- Assisting in the recovery and resilience of the bushfire-impacted endangered Alpine Sphagnum Bogs and Associated Fens in NSW and Victoria through actions such as targeted weed and erosion control, and traditional land manager techniques to foster the recovery of Country.

CASE STUDY:

TRADITIONAL OWNERS LEADING THE RECOVERY OF BUSHFIRE-AFFECTED COUNTRY

The unprecedented summer bushfires of 2019 had a devastating impact on our native wildlife and their habitats. The Wildlife and Threatened Species Bushfire Recovery Expert Panel identified the critically endangered Lowland Rainforest of Subtropical Australia as requiring urgent management intervention, estimating 30-50 per cent of the ecological community's distribution was within fire-affected areas.

The Lowland Rainforest of Subtropical Australia ecological community was once one of Australia's largest rainforests but, since European settlement, much of it has been cleared or degraded. The recent fires have put them at further risk of degradation through loss of biodiversity and ecosystem function. The surviving remnants of the Lowland Rainforest ecological community provide vital habitat for many native species including threatened wildlife such as Coxen's Fig-parrot and the Red-legged Pademelon.

On the NSW North Coast, Aboriginal land managers and traditional owners are supporting the healing of bushfire-affected Country. The project is helping improve the condition of bushfire-impacted Lowland Rainforest of Subtropical Australia through cultural burning and fire management, pest animal and weed control, threatened species and habitat protection, and habitat augmentation. Traditional owner-led healing techniques are critical to this project and Aboriginal communities and people are designing and leading this work in consultation with local communities.

This project is being supported through the Australian Government's $200 million bushfire recovery funding package.

Photos: Lowland Rainforest of Subtropical Australia ecological community, Matt White

IMPROVING RECOVERY PRACTICES TARGETS

Photo: Kerry Cameron

OVERVIEW

Successful recovery requires collaborative and effective governance structures to coordinate and rigorously monitor recovery action. The Australian Government is committed to improving the recovery of our threatened plants and animals through its established statutory planning documents: conservation advices, recovery plans and threat abatement plans, as well as through providing resourcing and practical support for recovery teams. The Australian Government also ensures that projects supported under Australian Government programs are aligned with the priorities set out in these planning documents.

Working cooperatively with state and territory colleagues who manage threatened species is also a high priority for the Australian Government. Over the period of the Threatened Species Strategy, significant improvements to alignment of species listing processes across Australia has occurred, with all jurisdictions now actively involved in the implementation of the Common Assessment Method.

Photo: Kerry Cameron

TARGET

ALL STATES AND TERRITORIES OPERATE UNDER COMMON ASSESSMENT METHOD

Photo: Fairy Bells, Department of Agriculture, Water and the Environment

Improving recovery practices target	Result
All states and territories operate under the common assessment methodology for species listing	**Target met** All jurisdictions are actively involved in the implementation of common assessment method.

TARGETS IN FOCUS - ALIGNING THREATENED SPECIES LISTINGS

The common assessment method is a successful collaboration between the Australian, state and territory governments, which is providing a consistent and harmonised approach to threatened species listing across Australia.

The Common Assessment Method is based on the best-practice standard developed by the International Union for Conservation of Nature (IUCN). By agreeing to apply the same criteria and share information on threatened species assessments, the Australian, state and territory governments are working together to list nationally threatened species in a more consistent and streamlined manner. Each species is assessed by only one jurisdiction and is listed in the same national threat category in all jurisdictions where it occurs. This approach is leading to better outcomes and greater certainty for businesses, industry and the environment.

Photo: Kangaroo Island, Oliver Tester

HOW DID WE GO?

An intergovernmental Memorandum of Understanding to give effect to the Common Assessment Method commenced in 2015. Since then, eight of the nine Australian jurisdictions have signed the memorandum and all jurisdictions are actively involved in implementation. Jurisdictions are making the administrative and legislative changes needed to fully implement the method, including adopting the agreed listing categories and criteria. Progressively, all currently listed threatened species are being reviewed and new assessments are being undertaken using the Common Assessment Method, leading to the alignment of lists across Australia.

More than 100 threatened species assessments prepared by the states and territories have been formally considered under the EPBC Act since 2015. These assessments have led to species being listed, transferred between threat categories and removed from the list, in line with current scientific evidence. Similarly, assessments prepared by the Australian Government are being considered under state and territory legislation to achieve list alignment.

The national collaboration through the Common Assessment Method agreement is ensuring that the best science is used in threatened species assessments, providing for appropriate protection and targeted conservation actions. Consistent and accurate lists of threatened species are the first step in turning the trajectory around for Australia's plants and animals at most risk of extinction.

CASE STUDY

WESTERN UNDERGROUND ORCHID

The Western Underground Orchid (*Rhizanthella gardneri*) is a cryptic species known only from a small area east of Perth in Western Australia. It has tiny pink or purple flowers, no leaves and occurs almost entirely underground, obtaining nutrients from a mycorrhizal fungus.

This species was listed as Endangered under the EPBC Act in 2000. At that time, it was known to occur in two areas approximately 300 kilometres apart, however a recent taxonomic study found that the individuals in the south were in fact a distinct species, which was named the South Coast Underground Orchid (*Rhizanthella johnstonii*).

In 2018, Western Australia assessed both species using the Common Assessment Method, finding them eligible for inclusion in the Critically Endangered category. Based on these assessments, the Western Underground Orchid was transferred from Endangered to Critically Endangered and listed the South Coast Underground Orchid as Critically Endangered under the EPBC Act – consistent with the listings of these two remarkable species under Western Australian state legislation.

Photo: Jean and Fred Hort

TARGET

UP-TO-DATE CONSERVATION PLANNING DOCUMENTS FOR ALL PRIORITY SPECIES AND THREATS

Photo: Numbat, Shutterstock

Improving recovery practices target	Result
Based on updated work plan, effective and up-to-date recovery plans, conservation advices and threat abatement plans in place for all priority species and threats	**Target not met** All listed priority threatened species had a recovery plan and/or a conservation advice in force, but not all recovery plans and conservation advices were up-to-date as at 30 June 2020. Threat abatement plans and advices were in place where required.

CONSERVATION ADVICES AND RECOVERY PLANS

Conservation advices and recovery plans are statutory planning documents prepared under the EPBC Act to provide guidance on recovery action for listed species and ecological communities. All species listed as threatened under the EPBC Act require a conservation advice and some species require a recovery plan.

These plans are generally prepared to operate over a five-to-ten year period with a review process required for recovery plans that begins at five years. A comprehensive multi-year forward work plan steers the Department's work program in meeting EPBC Act requirements for listing threatened species and ecological communities and developing conservation advices and recovery plans. Within this work program, the Department prioritised the development of up-to-date conservation advices and/or recovery plans for the Strategy's priority species.

For the purpose of this report, recovery plans and conservation advices were considered up-to-date as at 30 June 2020 if they had been approved or reviewed and updated within the preceding five year period.

Photo: Bilby, Queensland Department of Environment and Science

HOW DID WE GO?

Since the commencement of the Threatened Species Strategy, the Department has prioritised the development of updated conservation advices and recovery plans for the priority 20 mammals, 21 birds and 30 plants.

As at 30 June 2020, all listed priority mammals, birds and plants had a recovery plan and/or conservation advice in force under the EPBC Act. Two priority species were not listed as threatened at the end of the Strategy, and therefore do not require a plan. Up-to-date plans (that were approved or updated within the five-year period) were in place for 9 mammals, 13 birds, and 10 plants as at 30 June 2020. For the remaining priority species, recovery plans or conservation advices have been progressively reviewed at the five-year implementation mark and new planning documents are being prepared where required.

The status of conservation planning documents for priority species at the conclusion of year five of the Strategy, and a contemporary assessment of progress to update plans are listed below.

For the 21 priority bird species, 13 had current recovery plans and/or conservation advices in place as at 30 June 2020. Of the remaining birds, at the time of publication:

- the Cassowary, Malleefowl and Red-tailed Black Cockatoo have revised recovery plans being drafted.
- the Eastern Bristlebird and Western Ground Parrot recovery plans have had a five-year review undertaken.
- the conservation advices for Helmeted Honeyeater, White-throated Grasswren, Hooded Plover and Eastern Curlew are currently being updated.

For the 20 priority mammal species, 10 had current recovery plans and/or conservation advices in place as at 30 June 2020. The Eastern Bettong was assessed under the IUCN criteria and was found not eligible for listing under the EPBC Act in February 2019. Consequently, it does not require a recovery plan or conservation advice. Of the remaining 9 priority mammals, at the time of publication:

Photo: Alligator Rivers Yellow Chat, Keith Lightbody

- the revised recovery plan for Mahogany Glider and the Victorian Government-led revised recovery plan for Eastern Barred Bandicoot are being finalised
- five-year reviews of the recovery plans for the Western Quoll, Mala and Black-footed Rock-wallaby have been undertaken
- new or updated Conservation Advices are currently being drafted or finalised for the Eastern Quoll, Golden Bandicoot, Christmas Island Flying-fox and Kangaroo Island Dunnart.

For the 30 priority plant species 10 had current recovery plans and/or conservation advices in place as at 30 June 2020. The Fitzgerald's Mulla Mulla was assessed under the IUCN criteria and was found not eligible for listing under the EPBC Act in May 2018. Consequently, it does not require a recovery plan or conservation advice. Of the remaining priority plants, at the time of publication:

- conservation advices are currently being finalised for 18 species
- a recovery plan for the Bulberin Nut (a macadamia nut) is close to finalisation.

The plans in place for each priority mammal, bird or plant is identified in the species summaries in Appendix 1 (birds), Appendix 2 (mammals) and Appendix 3 (plants).

THREAT ABATEMENT PLANS

Threat abatement plans are another instrument for conservation, designed to reduce the impact of listed key threatening processes on native species and ecological communities. Threat abatement plans establish national frameworks to guide and coordinate Australia's response to key threatening processes, identifying the research, management and other actions needed to ensure the long-term survival of affected native species and ecological communities.

Threat abatement plans have a statutory review point at five years. For the purposes of this report, a threat abatement plan is considered up-to-date if it had had its five-year review.

HOW DID WE GO?

The Threatened Species Strategy identifies the impacts of invasive species such as feral cats and weeds, inappropriate fire regimes, climate change and the loss of habitat as key pressures on threatened species. Threat Abatement Plans that address threats to the Strategy's priority species are:

- Predation by the European red fox
- Predation by feral cats
- Competition and land degradation by rabbits
- Competition and land degradation by unmanaged goats
- Predation, habitat degradation, competition, and disease transmission by feral pigs
- Reduce the impacts of exotic rodents on biodiversity on Australian offshore islands of less than 100 000 hectares
- Disease in natural ecosystems caused by *Phytophthora cinnamomi*
- Reduce the impacts on northern Australia's biodiversity by the five listed grasses: Gamba Grass (*Andropogon gayanus*), Para Grass (*Urochloa mutica*), Olive Hymenachne (*Hymenachne amplexicaulis*), Mission Grass (*Cenchrus polystachios* syn. *Pennisetum polystachion*) and Annual Mission grass (*Cenchrus pedicellatus* syn. *Pennisetum pedicellatum*).

Many of these threats are related to invasive species that are also identified in the Key Threatening Process of *Novel biota and their impact on Australia's biodiversity*. A non-statutory Threat Abatement Advice provides guidance about threat abatement for this Key Threatening Process.

All plans currently in place have had their five-year review except the plan, *Reduce the impacts on northern Australia's biodiversity by the five listed grasses* (2012), which has a review in progress.

The Threatened Species Scientific Committee is currently assessing *Fire regimes that cause biodiversity decline* as a Key Threatening Process under the EPBC Act. Completion of the assessment is one of the priority actions in the Committee's *10 point Bushfire Response Plan* published in March 2020.

Climate change and loss of habitat are recognised as key threatening processes. However, threat abatement plans have not been made for these two pressures as other government policies and processes are providing the mechanisms to address these two threats in a holistic way.

Photo: Shutterstock

WHERE TO FROM HERE

Reflecting on the successes and challenges of this first Strategy, there are lessons learned that have been incorporated into the next Strategy, which commences in 2021 and will extend for ten years.

The new Strategy will be underpinned by two consecutive five-year Action Plans, that will describe actions under the eight identified focus areas and will also articulate new targets. Consultation for the first Action Plan (2021-2026) will take place in mid-2021.

Recognising the conservation benefits conferred on species identified as priorities, the new Strategy will have more priority species, spread across a wider range of taxa. A number of species identified as priorities in the first Strategy that need ongoing support will continue as priorities in the new Strategy.

Others that have not been found to have particularly benefited from the Strategy's approach will not be included, where other mechanisms are effectively securing them.

To ensure the new Strategy can benefit more species than just those identified as national priorities, it will also include a wider range of 'umbrella' species (species whose range overlaps with many others), as well as priority places for the first time. The selection of all species and places will take place during 2021, and will be conducted in consultation with independent scientists and key stakeholders, in a transparent process with opportunity for public input.

To follow progress of the new Strategy and Action Plans, please visit the Department's website here: **www.environment.gov.au/biodiversity/threatened/publications/strategy-home**

LINKS TO OTHER INFORMATION

The Australian Government's Threatened Species Strategy
environment.gov.au/biodiversity/threatened/publications/strategy-home

Threatened Species Commissioner
environment.gov.au/biodiversity/threatened/commissioner

Threatened Species Strategy – reports on progress
environment.gov.au/biodiversity/threatened/publications

Australian Seed Bank Partnership
seedpartnership.org.au

Common Assessment Method
environment.gov.au/biodiversity/threatened/cam

Environment Restoration Fund
environment.gov.au/biodiversity/conservation/environment-restoration-fund

Glovebox guide for managing feral cats
pestsmart.org.au/wp-content/uploads/sites/3/2021/03/CISS-Glovebox-Guide-Cat-web-1.pdf

Key threatened processes under the EPBC Act
environment.gov.au/biodiversity/threatened/key-threatening-processes

Monitoring, Evaluation, Reporting and Improvement Tool
fieldcapture.ala.org.au/

National Environmental Science Program
environment.gov.au/science/nesp

National Landcare Program
nrm.gov.au/

Species Profiles and Threats Database
environment.gov.au/cgi-bin/sprat/public/sprat.pl

Threatened Species Recovery Hub
nespthreatenedspecies.edu.au

Threat Abatement Plans
environment.gov.au/biodiversity/threatened/threat-abatement-plans

APPENDIX 1
SPECIES PROFILES FOR 21 PRIORITY BIRDS

Credit: Mallee Emu-wren, Tom Hunt

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Alligator Rivers Yellow Chat

Photo: Keith Lightbody

Significant change in trajectory from 2005-15 to 2015-20? Yes, although ongoing trajectory is declining, the rate of decline has significantly lessened.

Improved trajectory?

The Alligator Rivers Yellow Chat (*Epthianura crocea tunneyi*) is a small insectivorous bird that now occurs mostly within Kakadu National Park. Despite recent increased surveys and monitoring efforts, its population size is not well understood. However, the species' range and numbers are thought to have declined after habitat loss from cattle grazing, and habitat degradation caused by feral pigs and water buffalo. The total population size is now likely very small, however declines have lessened.

Inclusion in the Threatened Species Strategy has specifically raised the profile of the Alligator Rivers Yellow Chat, encouraging research by other organisations that is critical in improving understanding of the species' needs.

Found in	Northern Territory
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2016)
2020 population estimate	250 mature individuals
Confidence in 2020 estimate	Low
Recovery partners	NT and Australian governments (including Parks Australia), traditional owners, National Environment Science Program's (NESP) Threatened Species Recovery Hub, Charles Darwin University, Territory Natural Resource Management (NRM).

Tackling Threats to the Yellow Chat in Kakadu

Parks Australia undertook targeted control of feral pigs in Kakadu National Park, as well as ongoing control of the invasive Prickly Mimosa and controlled burning to reduce the occurrence of high-intensity fires late in the dry season that may also threaten the species.

This improved environmental management may have slowed the decline of Alligator Rivers Yellow Chat, and with ongoing support, the population could increase in future. Territory NRM is also working with traditional owners and Indigenous rangers on managing habitat, including fire and weed management, and are also leading a project targeting Alligator Rivers Yellow Chat recovery.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Australasian Bittern

Photo: Matthew Herring

Significant change in trajectory from 2005-15 to 2015-20? Yes, appeared generally stable between 2005-2015, but decline apparent between 2015-2020

Improved trajectory?

The Australasian Bittern (*Botaurus poiciloptilus*) is a large, heron-like bird that was once widespread across reedy wetlands of southern Australia but loss and degradation of its preferred habitat caused substantial declines. This has been made worse by the increased frequency and length of droughts, with severe drought impacting the species between 2015-2020. In some places drying conditions have even it possible for fires to damage remaining wetland habitat. Australasian Bittern chicks and juveniles are also vulnerable to predation by foxes.

The largest population now nests in irrigated rice paddies in the Riverina, where industry partners have significantly contributed to recovery activities, including through encouraging rice farmers to use bittern-friendly methods.

Recovery efforts are also focussing on restoring natural wetlands, with active management of reed beds to maximise habitat suitability. Provision of environmental water flows and control of foxes are also important for securing the future of Bitterns.

Found in	NSW, Qld, SA, Tas, Vic, WA
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2019)
2020 population estimate	1,300 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	SA, Victorian, NSW, WA and Australian governments, BirdLife Australia, Rice Growers Association, irrigation farmers, NRM and CMA groups, local conservation groups, NESP Threatened Species Recovery Hub, Charles Darwin University.

Bitterns in the Rice

The largest remaining Australasian Bittern populations co-exist with agricultural wetlands, in a great example of the conservation and agriculture sectors working together to achieve positive outcomes for biodiversity. Australian rice growers can produce over 10 tonnes of rice per hectare, helping to feed our growing population here and internationally. The Australasian Bittern can also be found in New Zealand and New Caledonia, but about 40 per cent of the global population is found in the Riverina area in NSW which is also where the majority of Australia rice is grown.

The Bitterns in the Rice project commenced in 2012 and is a collaboration between key industry players, NGOs, NRM organisations, conservationists, and governments. This project has included research on Bittern abundance and use of rice paddies, development of innovative monitoring techniques such as using thermal drones for chick monitoring, awareness raising and conservation advice for the rice growing industry. In 2019 the project rolled out a Bittern-friendly rice incentive program supported by funding from the Australian Government's National Landcare Program. The program offered incentives for implementing measures to provide better Bittern habitat such as increasing the length of inundation, inclusion of grassy banks and carrying out fox control. Incentive sites attracted four times as many Bitterns as control sites, even in drought conditions, and so it will be exciting to see the program evolve over coming years to help rice growers support Bittern recovery.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Christmas Island Frigatebird

Photo: Andrew Silcocks

Significant change in trajectory from 2005-15 to 2015-20? No significant change, ongoing trajectory of slow decline.

Improved trajectory?

Christmas Island Frigatebirds (*Fregata andrewsi*) forage over the Indian Ocean and into the Indo-Malay Archipelago, but only breed in rainforest trees on Christmas Island. The breeding population has declined substantially due to historic habitat clearance and secondary impacts from phosphate mining on the island, and ongoing off-island impacts including hunting, marine pollution, bycatch in fisheries and reduced prey availability as fish stocks have been depleted.

Threats on Christmas Island are being mitigated through effective management by Parks Australia and island partners, and constraints on ongoing clearing. However, threats are still active beyond the breeding sites, when the birds are foraging or resting. Managing these threats will require ongoing cooperative work with foreign fishing communities and authorities to reduce direct mortality of frigatebirds, as well supporting sustainable fisheries management to halt overfishing and subsequently reduce prey depletion.

Found in	Christmas Island (Indian Ocean Territories)
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2020)
2020 population estimate	3,700 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	WA and Australian governments (including Parks Australia), Christmas Island Seabird Project, NESP Threatened Species Recovery Hub, CSIRO, University of Hamburg, Indonesian conservation groups.

Collaboration to manage threats to the Christmas Island Frigatebird

The Australian Government, through Parks Australia, has been working on several management actions for the Christmas Island Frigatebird. One of the key management actions is working with the Christmas Island community to develop a long-term recovery plan to manage and protect Christmas Island's unique threatened species.

This has included a workshop on the research and management priorities for CI Frigatebirds by the NESP Threatened Species Recovery Hub, drawing together all those with knowledge of and interest in the species, including from Indonesia. As a consequence, CSIRO is now working in partnership with Indonesian researchers to test whether fish abundance in Jakarta Bay is sufficient to maintain the frigatebird populations using the site. Trialling new ways to use current and emerging technology is an important part of threatened species management. Parks Australia is trialling drones to monitor and obtain population estimates to help inform population status and future monitoring efforts.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Eastern Bristlebird

Photo: David Cook Wildlife Photography

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods, however ongoing trajectory indicates slight improvement.

Improved trajectory?

The Eastern Bristlebird (*Dasyornis brachypterus*) comprises three distinct populations that occupy different habitat types and are managed separately.

The northern population is found only in grassy forest habitat in south-east Queensland and north-east NSW. This habitat depends on a particular fire regime to maintain suitable grassy patches. Active management, including habitat restoration, targeted fire management and captive breeding efforts, has halted decline in recent years and numbers are slowly increasing in managed areas.

The central and southern populations have experienced significant range contraction from southern coastal NSW and are now found in small pockets of suitable heathland habitat in south-east NSW and far-eastern Victoria. The central population appears either stable or increasing, mostly as a result of intensive fire and exotic predator management. Under similar management, the southern population was stable to slightly increasing prior to the 2019-20 bushfires, however post-fire recovery is still being assessed. Eastern Bristlebirds were identified as a priority for urgent management intervention by the Wildlife and Threatened Species Bushfire Recovery Expert Panel and are receiving targeted support for bushfire recovery, including via support for a species coordinator to coordinate bushfire recovery efforts across the species' range.

Found in	Qld, NSW, Vic
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2014)
2020 population estimate	Northern – 25-40 mature individuals in the wild, 19 in captivity; Central and southern – 3,000 mature individuals in the wild
Confidence in 2020 estimate	Northern – high Southern – low
Recovery partners	Qld, NSW, Victorian and Australian Governments (including Parks Australia), NESP Threatened Species Recovery Hub, Sydney University, Qld University of Technology, Healthy Lands and Water, Currumbin Wildlife Sanctuary, Zoos Victoria, volunteers, Monash University, University of Wollongong.

Improving the trajectory of the Eastern Bristlebird in north-eastern NSW

Altered fire regimes, habitat fragmentation and degradation and genetic bottlenecks threaten Eastern Bristlebird populations. With support from the Australian Government, North Coast Local Land Services have partnered with the Recovery Team, the NSW Government, scientists and landholders to improve Eastern Bristlebird habitat and increase the genetic diversity and resilience of birds in the northern captive breeding program.

To inform possible future translocations, genetic diversity was evaluated between a captive-bred population at Currumbin Wildlife Sanctuary and a wild population. The project is also developing fire management plans, managing weeds such as Lantana, and working with landholders to restore habitat. Midstory shrubs will be managed to restore grassy tussock habitat, which is used for nesting sites.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Eastern Curlew

Photo: Dean Ingwersen

Significant change in trajectory from 2005-15 to 2015-20? Yes, ongoing marked decline that has worsened.

Improved trajectory?

The (Far) Eastern Curlew (*Numenius madagascariensis*) is a large wading bird that breeds in China and Russia and then migrates to coastal regions in Australia, south-east Asia and Papua New Guinea. Global populations are declining steadily, primarily due to loss of intertidal mudflats around the Yellow Sea which provide critically important staging and stopover sites during migration. Additional threats include coastal development in non-breeding range, hunting, bycatch in fishing nets, disturbance of nest sites and degradation of coastal mudflats.

Recovery efforts in Australia focus on coastal habitat restoration, raising community awareness and protecting important foraging and roosting sites, while research to improve understanding of the species' needs is underway to inform better management. However, overall Eastern Curlews are still decreasing and more work to protect the species is needed, particularly overseas. Internationally, the Australian Government and conservation partners are working through the Convention on Migratory Species, JAMBA, CAMBA and ROKAMBA to help protect key intertidal habitats.

Found in	Coastal areas, all states
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2015)
2020 population estimate	22,500 mature individuals
Confidence in 2020 estimate	High
Recovery partners	NT and all state governments, Australian Government, East Asian - Australasian Flyway Partnership, Australasian, Queensland and Victorian Wader Study Groups, BirdLife Australia, Hunter Local Land Services (LLS), NESP Threatened Species Recovery Hub, Australian Trust for Conservation Volunteers, Charles Darwin University, University of Queensland, Griffith University, International governments, particularly Japan, China and the Republic of Korea.

Improving saltmarsh habitat and reducing threats to the Eastern Curlew

COVID-19 has made conservation efforts difficult for many groups. Despite challenging conditions with COVID-19 restrictions, Hunter LLS found ways to continue work to protect the Eastern Curlew and other migratory bird species. As face-to-face workshops were not possible under restrictions, stakeholders contributed their local knowledge through video conferencing sessions.

The project is developing a coordinated approach to manage the species, such as the development of new Shorebird Site Action Plans for three estuaries. Other work includes feeding and roosting habitat improvement and feral pest management. Human disturbance is also being targeted, including the removal of marine debris to reduce the threat of entanglement.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Golden-shouldered Parrot

Photo: Graham Chapman

Significant change in trajectory from 2005-15 to 2015-20? Yes, although ongoing trajectory is declining, the rate of decline has significantly lessened.

Improved trajectory?

The Golden-shouldered Parrot (*Psephotus chrysopterygius*) is a significant cultural species for Indigenous peoples in far north Queensland. The species once occurred in tropical savanna woodland over much of Cape York Peninsula, but the range has now contracted to two small areas totalling less than 2000 km^2 following changes in fire regimes and reduction, by cattle grazing, of the abundance of wet season seeding grasses.

From the late 1990s, recovery efforts for Golden-shouldered Parrots focused on habitat restoration through strategic burning, vegetation and feral animal management, as well as some destocking of cattle. Since 2016, specific activities have been undertaken through the 'Bringing Alwal Home' program (Alwal is the species' name in Olkola language), including training for Olkola rangers, feral cat control, improved fire management, supplementary feeding and research on breeding success and predation. Australian Government funding has supported this program and the Golden-shouldered Parrot Recovery Team. Early signs are that these activities should stabilise the decline of Golden-shouldered Parrots but more work will be needed to secure the species into the future.

Found in	Queensland
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2004), Conservation Advice (2017)
2020 population estimate	940 mature individuals in the wild; unknown numbers in captivity
Confidence in 2020 estimate	Medium
Recovery partners	Olkola Aboriginal Corporation, traditional owners, Artemis Station, Queensland Parks and Wildlife Service, Recovery Team, Bush Heritage Australia, Australian Government, NQ NRM Alliance, Cape York NRM, Northern Gulf RMG, University of QLD, environmental NGOs, land managers, NESP Threatened Species Recovery Hub.

Biodiversity Bright Spot projects in Cape York and the Northern Gulf

Under two Australian Government Regional Land Partnership projects, NQ NRM Alliance, through Cape York NRM and Northern Gulf Resource Management Group (RMG) are working with the Golden-shouldered Parrot Recovery Team, traditional owners, scientists, land managers and the Queensland government to further conservation efforts for the Golden-shouldered Parrot. Part of the project aims to increase scientific, local and cultural knowledge of the parrot to better inform threat management actions. Land managers, including traditional owners, and other groups will be supported in parrot recovery efforts to address key existing and emerging threats.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Helmeted Honeyeater

Photo: Bruce Tardif

Significant change in trajectory from 2005-15 to 2015-20? Yes, escalating rate of increase.

Improved trajectory?

The Helmeted Honeyeater (*Lichenostomus melanops cassidix*) is a small woodland bird from central southern Victoria. Its distribution and numbers contracted dramatically after historic land clearing and altered hydrological regimes, while subsequent agricultural development and increased fire frequency have caused ongoing habitat loss and degradation.

Almost the entire remaining population is now in the Yellingbo Nature Conservation Reserve, where intensive and continuous recovery efforts since the late 1980s have increased total numbers from 70 to around 200 and rising.

Protection and enhancement of critical habitat at Yellingbo has been central to recovery efforts. Activities such as supplementary feeding, tree planting, nest protection and management of invasive species have been led by the Friends of the Helmeted Honeyeater volunteer group with support from the Victorian and Australian Governments. Additional recovery efforts include attempted establishment of additional wild populations outside Yellingbo and a captive breeding program led by Zoos Victoria.

Found in	Victoria
EPBC Act status	Critically Endangered
Conservation planning	Recovery Plan (2008), Conservation Advice (2014)
2020 population estimate	250 mature individuals
Confidence in 2020 estimate	High
Recovery partners	Victorian and Australian governments, Recovery Team, Friends of the HeHo, Zoos Victoria, Port Phillip and Westernport CMA, Trust for Nature, Greening Australia, Monash University, University of Melbourne, Port Phillip & Westernport Cathcment Management Authority (CMA), and local councils.

Good Friends of the HeHo

In 1989, a group of concerned citizens came together to form the Friends of the Helmeted Honeyeater group. Since that time the group has been a key leader and partner in recovery projects, raising public awareness and lobbying for greater protection.

Over the years Friends of the HeHo have helped revegetate habitat within and surrounding Yellingbo Nature Conservation Reserve. In the 1990s the group established a nursery to support their work which has grown to provide about 90,000 plant stock each year to supply plants to many other stakeholders. Projects and initiatives the Friends have worked on include captive breeding and release, land purchases for habitat, nest protection, enlisting private properties for habitat restoration and protection, deer control, propagation and revegetation of food trees.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Hooded Plover (eastern)

Photo: Dean Ingwersen

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods, although ongoing trajectory of slow decline.

Improved trajectory?

The Hooded Plover (Eastern) (*Thinornis rubricollis rubricollis*) is a small beach-dwelling bird. Widely dispersed along coastal south-east Australia including Tasmania and the Bass Strait Islands, they are easily disturbed while nesting on sandy beaches and numbers have fallen over time in areas where human activity has increased. In much of its mainland range, the species is also threatened by fox predation.

BirdLife Australia and its partners have played leading roles in coordinating recovery efforts for Hooded Plovers. Australian, state and local governments, CMAs and LLS organisations, and community coalitions formed with the help of BirdLife Australia have led public education campaigns, mobilised local volunteers, and led on-ground action to protect and monitor the species. Community and volunteer support has been central to these efforts.

Recovery efforts have helped reduce the rate of population declines, but trends are variable across the species' range and without the continuation of interventions, even more declines are likely.

Found in	NSW, Vic, Tas, SA
EPBC Act status	Vulnerable
Conservation planning	Conservation Advice (2014)
2020 population estimate	3,000 mature individuals
Confidence in 2020 estimate	High
Recovery partners	NSW, Victorian, Tasmanian, SA and Australian Governments, BirdLife Australia, Friends of the Hooded Plover and other volunteer groups, SA Landscape Boards, CMAs and LLS organisations, Landcare, Deakin University, Crimestoppers, local councils, land and park managers, industry groups.

Communities tackling threats to the Hooded Plover

With support from the Australian Government, local community groups have played a critical role in the conservation of the Hooded Plover.

Human activity on beaches has been a key driver of Hooded Plover decline, including unleashed dogs and activities such as riding horses or driving vehicles in nesting areas. Local community groups continue to make a difference by educating beach goers, changing behaviours, and implementing on-ground measures to protect Hooded Plovers through co-existence.

Other work is underway to replace educational signs and protective fencing lost in the 2019-20 Kangaroo Island bushfires, to protect Hooded Plover nests and chicks.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Mallee Emu-wren

Photo: Tom Hunt

Significant change in trajectory from 2005-15 to 2015-20? No significant change, ongoing trajectory of decline.

Improved trajectory?

The Mallee Emu-wren (*Stipiturus mallee*) is a tiny insectivorous bird that forages among mature spinifex hummocks in the Mallee regions of south-eastern Australia. Once more widespread, their habitat and numbers have been significantly reduced by agricultural land clearing and altered fire regimes.

Mallee Emu-wrens are not strong flyers and do not traverse open patches such as cleared land or fire scars, so remaining populations are further threatened by fragmentation and impacts of fire. In 2014, the entire SA population was lost in a single large-scale fire event in Ngarkat Conservation Park.

Conservation efforts for Mallee Emu-wrens have traditionally focused on habitat restoration, including fire management and reducing grazing pressures by native and introduced herbivores. More recently, a cross-jurisdictional consortium with support from the Australian Government has trialled translocations from the Victorian population to re-establish Mallee Emu-wren in SA. Zoos SA has also undertaken preliminary work to establish a captive breeding program. These intensive management measures have helped to reduce the rate of decline, however the species remains at severe risk from wildfire and drought.

Found in	Vic, SA
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2008), Recovery Plan (2016)
2020 population estimate	6,600 mature individuals
Confidence in 2020 estimate	Low
Recovery partners	Victorian, SA and Australian governments, BirdLife Australia, Conservation Action Plan Implementation team, Zoos SA, Zoos Victoria, Rotary Australia, La Trobe University, Monash University, Murraylands and Riverland Landscape Board.

Returning the Mallee Emu-wren to South Australia

Following a large fire in 2014, the Mallee Emu-wren is now locally extinct in South Australia. Key future actions for the species include monitoring, fire management, research as well as returning the species back to Ngarkat Conservation Park. Currently only found in Victoria, seeing a sustainable population occupy previous habitat in South Australia would be a great benefit to the species reduced to only three subpopulations.

Over the last five years recovery partners have taken actions to investigate and trial translocation to the Ngarkat Conservation Park. After pre-translocation studies were undertaken in 2015, the initial trial phase of a translocation plan in 2018 resulted in an initial release of 78 birds from Victoria into suitable habitat in Ngarkat Conservation Park. These birds were successfully translocated and fledged young shortly after their release. Unfortunately, no birds were found in Ngarkat Conservation Park during targeted surveys in July 2019. However, with the learnings and data from this project it is hoped that work to return the Mallee Emu-wren to South Australia will continue in the near future.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Malleefowl

Photo: Sharon Gillam

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods, although ongoing trajectory of slow decline.

Improved trajectory?

The Malleefowl (*Leipoa ocellata*) is a large ground dwelling bird found in semi-arid to arid shrublands and woodlands across southern Australia. The population has declined sharply since European settlement, initially because of agricultural land clearing, altered fire regimes, introduced predators and competition with introduced herbivores, and more recently due to a long term trend of declining rainfall.

The Malleefowl has a strong multi-jurisdictional recovery team and one of the best and longest running monitoring efforts of any species in Australia. Across the country, a well-coordinated army of volunteers and professionals undertake on-ground works and annual surveys of the species' distinctive nesting mounds. Significant interventions include improving management of remaining habitats and mitigating direct threats, particularly fire, large feral herbivores, weed species and predation from foxes and cats, as well as the purchase, covenanting and revegetation of lands connecting Malleefowl populations by NGOs and regional NRM organisations.

These considerable research, monitoring and recovery efforts may have slowed the rate of Malleefowl decline in recent years but overall numbers continue to fall and this species will require ongoing support under changing climatic conditions.

Found in	NSW, Vic, SA, NT, WA
EPBC Act status	Vulnerable
Conservation planning	Recovery Plan (2010)
2020 population estimate	25,000 mature individuals
Confidence in 2020 estimate	High
Recovery partners	Vic, SA, WA, NSW and Australian governments, Recovery Team, community groups and volunteers, private landholders, regional NRM groups, BirdLife Australia, Trust for Nature, Bush Heritage, Australian Wildlife Conservancy, Indigenous rangers, NESP Threatened Species Recovery Hub

Improving connectivity for Malleefowl

Land clearing has contributed to fragmented habitat, which limits dispersal between the resulting smaller populations of Malleefowl. With support from the Australian Government, Mallee CMA is leading a multifaceted project in partnership with the Victorian Government, the National Malleefowl Recovery Team, the Victorian Malleefowl Recovery Group, Landcare, Indigenous and community groups, Trust for Nature, LGAs, private and public land managers and local stakeholders. Part of the project is reconnecting Malleefowl habitat by creating corridors to connect populations. The project is also removing threats to Malleefowl and associated habitat, including foxes, goats, weeds and rabbits.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Night Parrot

Photo: Steve Murphy

Significant change in trajectory from 2005-15 to 2015-20? No significant change, ongoing trajectory of slow decline.

Improved trajectory?

The Night Parrot (*Pezoporus occidentalis*) is a medium-sized ground dwelling bird associated with mature Spinifex habitat in arid and semi-arid regions. Presumed extinct for a century, a population was rediscovered in 2013, but it remains one of Australia's most cryptic species. Its distribution and population numbers declined severely after European settlement, Night Parrots are now known only in isolated populations in south-west Queensland and inland WA. Key threats are predation by feral cats, altered fire regimes, and habitat degradation associated with overgrazing and changing climatic conditions.

A fundamental challenge in protecting and recovering the Night Parrot is simply locating existing populations, which requires significant research and monitoring effort in remote locations. Conservation activities have focused on effective management of fire, feral cats and grazing pressures to maintain suitable Night Parrot habitat. The overall population and distribution of Night Parrots is not well known, but the rediscovery and subsequent protection efforts provides hope for the future of the species.

Found in	Qld, NT, SA, WA
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2016)
2020 population estimate	200 mature individuals
Confidence in 2020 estimate	Low
Recovery partners	Qld, WA, SA, NT and Australian governments, Bush Heritage Australia, Recovery Team, Australian Wildlife Conservancy, NESP's Threatened Species Recovery Hub, traditional owners, Indigenous groups and rangers, University of Queensland, Birds SA, universities, research and academic groups, CMA and LLS organisations, environmental NGOs, land managers, landholders, pastoralists, community groups.

Searching for the Night Parrot

Night Parrots are elusive and nocturnal, making the species difficult to find and study. Rangelands NRM with funding support from the Australian Government is working closely with traditional owners and Indigenous rangers to improve the knowledge and understanding of Night Parrots, including distribution, preferred habitat and occupancy. This knowledge will assist land managers in future conservation efforts. Indigenous ranger groups are being trained to locate, monitor and manage Night Parrot habitat.

To locate Night Parrots, the project will use scientific and traditional approaches, such as sound monitoring, motion sensor cameras and expert ranger tracking.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Norfolk Island Boobook Owl

Photo: Amy Svendsen

Significant change in trajectory from 2005-15 to 2015-20? Yes, deteriorating decline as population failed to breed over most of the Strategy period.

Improved trajectory?

The Norfolk Island Boobook Owl (*Ninox novaeseelandiae undulata*), also known as the Norfolk Island Morepork, nearly became extinct in the 1980s, when it was discovered that only a single female remained after extensive historic clearing of vegetation and harvesting of large trees destroyed most suitable nesting sites on the island. Two males of a different subspecies were introduced from New Zealand and the subsequent current population of approximately 25 Boobooks is highly inbred.

Very few natural nesting sites remain in Norfolk Island's limited forest habitat so recovery efforts for the Boobook have focused on securing nest sites, through provision of nest boxes and active culling of nest competitors, such as introduced rosellas.

In 2020, the first Norfolk Island Boobook Owl chicks born in more than a decade survived to become fledglings. Prior to their discovery there had been no known successful breeding observed since 2012. Parks Australia, the Australian National University, the University of Melbourne and Monash University are analysing the genetic structure and health of the species. This critical knowledge will help to inform future management, such as potential translocations and population management.

Found in	Norfolk Island
EPBC Act status	Endangered
Conservation planning	Norfolk Island Region Recovery Plan (2010), Conservation Advice (2016)
2020 population estimate	25 mature individuals
Confidence in 2020 estimate	High
Recovery partners	Parks Australia, Australian Government, Australian National University, the University of Melbourne, Monash University

A Bird on the Edge

After over a decade without fledglings, 2020 saw Norfolk Island Boobook Owl chicks survive to become fledglings. After an emergency meeting, extra monitoring was carried out and more nest boxes were installed. This success was a fantastic example of partnerships in action, with Parks Australia, the Norfolk Island Community, Monash University, and researchers from the NESP Threatened Species Recovery Hub. With continued investment and good management, it is hoped that the species will slowly recover in the decades to follow.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Norfolk Island Green Parrot

Photo: Caroline McAllen

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was declining, now increasing markedly.

Improved trajectory?

The Norfolk Island Green Parrot (*Cyanoramphus cookii*) was a common forest bird when the island was settled by humans in the late 1700s, but after extensive clearing of trees and introduction of feral predators, only four breeding pairs survived in 1988. Following predator control and nest-protection, the numbers increased to over 200 in 2009, however, the population declined again to 10 females by 2013, after a period when active management was not undertaken. Fortunately, emergency intervention since 2014, including the predator proofing of suitable nesting sites, has allowed the population to recover a second time.

In recent years, the Norfolk Island Green Parrot population has responded well to recovery activities, even expanding beyond the borders of the Norfolk Island National Park to which its range had contracted. Recovery efforts have included pest and weed control, research and habitat rehabilitation. However, the population fluctuations over recent decades indicate the species' sensitivity to predation from rats and cats, as well as nesting site competition with introduced species such as rosellas. Ongoing control of these threats therefore remains important.

Found in	Norfolk Island
EPBC Act status	Endangered
Conservation planning	Norfolk Island Region Recovery Plan (2010), Conservation Advice (2016)
2020 population estimate	440 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	Parks Australia, Australian Government, Green Parrot Advisory Panel, BirdLife Australia, Australian National University, the University of Melbourne, Monash University.

Research and Threat Management for the Green Parrot

Parks Australia has worked hard to secure the Norfolk Island Green Parrot through maintaining predator-proof nest sites, restoring habitat and controlling rats, cats and rosellas. Under the Threatened Species Strategy, the Australian Government has mobilised funds for rodent control and feral cat management.

The Australian Government and NESP Threatened Species Recovery Hub also contributed funding towards a project run by Parks Australia, Australian National University, the University of Melbourne, and Monash University. The project aims to improve understanding of population size and structure, range movements and breeding success, and analysing genetic samples to better understand the genetic structure and health of the species. The results will inform conservation management decisions in relation to population management and threat abatement carried out by Parks Australia.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Orange-bellied Parrot

Photo: Dejan Stojanovic

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was declining, now increasing.

Improved trajectory?

The Orange-bellied Parrot (*Neophema chrysogaster*) is a small migratory bird that breeds in south-west Tasmania in summer and spends the rest of the year in coastal regions of the south-eastern Australian mainland. A combination of threats has caused a precipitous decline in numbers over the past 100 years and fewer than 50 mature individuals remain in the wild. A large, multi-jurisdictional recovery effort has prevented the extinction of the species, but its perilously small population and loss of genetic diversity means threat of extinction remains high.

Significant recovery efforts have been underway since the 1980s, with management actions and recovery interventions escalating in recent years, particularly around the critical breeding area of Melaleuca, Tasmania. Recent actions include release of captive bred Orange-bellied Parrots to augment the wild population, increased fire and predator management around nesting sites, supplemental feeding, and habitat restoration. The high level of investment and intensive management has reduced population declines and prevented extinction. However, without maintained effort the current wild population will not be sustained.

Found in	Tasmania, SA, Victoria
EPBC Act status	Critically Endangered
Conservation planning	Recovery Plan (2016)
2020 population estimate	~40 mature individuals in the wild ~580 in captivity
Confidence in 2020 estimate	High
Recovery partners	Tasmanian, Victorian, SA and Australian Governments, Recovery Team, Captive Management Group, Zoos Victoria, Zoos SA, Zoos and Aquarium Association, BirdLife Australia, Australian National University Difficult Bird Research Group, Sydney University, Charles Sturt University, Moonlit Sanctuary, NESP Threatened Species Recovery Hub, Priam Psittaculture Centre, OBP Veterinary Technical Reference Group, regional NRM: CMA and LLS groups, volunteer groups, environmental NGOs, community groups, Indigenous groups, traditional owners, industry groups, research and academic groups, landholders, land managers.

Research informing Orange-bellied Parrot breeding and release programs

Management actions for the Orange-bellied Parrot include breeding and release programs to increase populations. Understanding nesting behaviour and genetics to inform these programs was the focus of a research project run by the Australian National University with funding support from the Australian Government. Researchers ran a competitor control experiment to learn more about nest site competition between Tree Martins and Orange-bellied Parrots. During the breeding season, nests were monitored to determine fertility, accurate egg-laying dates, and nestling growth and survival to assess the potential for fostering opportunities in future. Genetic analysis research will inform captive breeding facilities on the reproductive quality of captive-bred birds to assist with planning the release of captive birds.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Plains-wanderer

Photo: Patrick Kavanagh

Significant change in trajectory from 2005-15 to 2015-20? Yes, ongoing decline that has worsened.

Improved trajectory?

The Plains-wanderer (*Pedionomus torquatus*) is a ground-dwelling bird that lives in grasslands. Once widespread across south-east Australia, declines were first observed in the 1960s, from overgrazing during droughts and predation by introduced carnivores and native birds of prey. Habitat loss and degradation also remain key threats, exacerbated by a warming climate and small population size.

The species is cryptic and difficult to monitor, so population trends are hard to measure. Declines have been recorded at intensively monitored sites, but trends of populations away from the two key strongholds of the NSW Riverina and the Patho Plains of Victoria are unknown.

Recovery efforts have focused on habitat management, including improved grassland stewardship and the management of feral cats and foxes. The Threatened Species Strategy has contributed to Plains-wanderer conservation by assisting with the establishment of captive breeding and also by supporting habitat management projects across their range. While the Plains-wanderer's trajectory has not improved during 2015-2020, these actions to support the species are expected to lead to an improved trajectory over the next few years.

Found in	NSW, Vic, Qld, SA
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2015), Recovery Plan (2016)
2020 population estimate	250 mature individuals in the wild 57 mature individuals in captivity
Confidence in 2020 estimate	High
Recovery partners	NSW, Victorian, SA and Australian governments, local councils, local governments, Recovery Team, Taronga Zoo, Zoos Victoria, Zoos South Australia, Featherdale Wildlife Park, NRM, LLS and CMA groups, Trust for Nature, universities and academic groups, Landcare groups, private landholders, land managers, traditional owners, Indigenous groups, community groups, environmental NGOs, industry groups.

Landholders driving recovery efforts for the Plains-wanderer

Much of the Plains-wanderer's current habitat is under threat from habitat loss and land use intensification, and landholders can play a significant role in recovery efforts. With funding support from the Australian Government, Riverina LLS and Murray LLS are working to improve the trajectory of the Plains-wanderer by working closely with landholders and the NSW government. Landholders are offered incentives and guidance to implement on-ground works to manage Plains-wanderer habitat, including improving grazing practices and controlling feral cats, foxes and weeds.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Red-tailed Black Cockatoo (south-eastern)

Photo: Bob McPherson

Significant change in trajectory from 2005-15 to 2015-20? Yes, ongoing slow decline that has worsened.

Improved trajectory?

The single south-eastern population of Red-tailed Black Cockatoos (*Calyptorhynchus banksii graptogyne*) is found in limited numbers in south-east SA and south-west Victoria. The species is highly dependent on seeds from just three tree species, as well as deep hollows in old eucalypt trees for nesting sites that can take centuries to form. It is therefore very sensitive to habitat loss through tree decline caused by steadily drying climatic changes and disturbance from fire.

Recovery actions over more than a decade have focused on habitat protection and regeneration, with local communities, governments, private landholders and industry partners making significant contributions to landscape rehabilitation and the protection of nesting sites. While many hard-working people have planted thousands of important food trees for Red-tailed Black Cockatoos to connect and expand habitat so that the long-term future of this iconic species can be secured, the number of young birds joining the population in recent years has been falling for reasons that are still unclear.

Found in	SA, Vic
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2007)
2020 population estimate	1,400 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	SA, Victorian and Australian governments, Recovery Team, regional NRM, LLS and CMA organisations, environmental NGOs, BirdLife Australia, WWF, Conservation Council SA, Zoos SA, Nature Glenelg Trust, Charles Sturt University, local councils, Indigenous groups, traditional owners, community and volunteer groups, schools and universities, landholders, industry groups.

Working together to secure the future of the South-eastern Red-tailed Black Cockatoo

Limestone Coast Landscape Board, Birdlife Australia, Trees For Life and Zoos South Australia are working with landholders, community volunteers, Indigenous groups and school groups to improve South-eastern Red-tailed Black Cockatoo habitat.

The project is delivering on-ground actions and work with landholders to revegetate feeding habitat, improve existing habitat and manage fire regimes. Enhancing nesting habitat is also a focus and includes protecting existing nests and establishing 50 artificial nests. This work is being supported by the Australian Government.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Regent Honeyeater

Photo: Mark Gallow

Significant change in trajectory from 2005-15 to 2015-20? Yes, ongoing decline that has worsened.

Improved trajectory?

The Regent Honeyeater (*Anthochaera phrygia*) is a striking black and yellow bird endemic to eucalypt woodlands of mainland south-east Australia. Once abundant and ranging from Adelaide to south-east Queensland, much of its habitat was cleared and the species now moves between widely spaced patches of remnant habitat and its population has declined severely.

Recovery actions include habitat protection, restoration and revegetation at key habitat sites and the release of captive bred birds, combined with volunteer surveys and the use of cutting edge science such as satellite tracking.

High nest failure rates may have contributed to ongoing decline over recent years and are the subject of ongoing research. This species was also impacted by the 2019-20 bushfires and was identified as a priority for urgent management intervention by the Wildlife and Threatened Species Bushfire Recovery Expert Panel and is receiving targeted support for bushfire recovery.

Found in	Qld, NSW, ACT, Vic
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2015), Recovery Plan (2016)
2020 population estimate	250 mature individuals in the wild; 20 captive bred birds released in June 2020 at lower Hunter Valley
Confidence in 2020 estimate	Medium
Recovery partners	Victorian, NSW, ACT and Australian governments, local governments, Recovery Team, Taronga Conservation Society, Zoos Victoria, Adelaide Zoo, Taronga Zoo, Australian Reptile Park, BirdLife Australia, Nature Conservation Trust, CMA and LLS organisations, Landcare Australia, Australian National University Difficult Bird Research Group, La Trobe University, University of New England, Trust for Nature, traditional owners, Indigenous groups, community groups, volunteers, schools, academic institutions, landowners, land managers, farmers, industry groups.

Quiet Places for Regent Honeyeaters

The Noisy Miner (*Manorina melanocephala*) is a key threat to Regent Honeyeaters. Though Noisy Miners are a native bird species, they are a predator of Regent Honeyeater nests and thrive in fragmented landscape, where they aggressively exclude other species.

Funded by the Australian Government, Central Tablelands, North West and Northern Tablelands LLS organisations is leading a project to manage Noisy Miner populations in Regent Honeyeater habitat, including the removal of 100 per cent of Noisy Miners from key Regent Honeyeater breeding sites during breeding season. Other work includes habitat improvement and the release of captive-bred birds to boost populations. Central Tablelands LLS is working with the National Regent Honeyeater Recovery Team, the NSW government, NRM regions, and research partners including the Australian National University Difficult Bird Research Group. In Victoria, North East CMA are also working with a range of partners including Trust for Nature, traditional owners, local government, Parks Victoria, and private landholders to control Noisy Miners alongside habitat improvement. This work is also supported by the National Landcare Program - Regional Land Partnerships.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Southern Cassowary

Photo: Shutterstock

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods.

Improved trajectory?

The Southern Cassowary (*Casuarius casuarius johnsonii*) is a flightless bird and the largest native animal in Australian rainforests. Cassowaries have an important function in maintaining the rainforest plant diversity and community structure through dispersing large seeds.

In Australia, Southern Cassowaries are found in Queensland's Wet Tropics and Cape York Peninsula, but occurrence within their natural range was greatly reduced and fragmented by historical forest clearance. Since the 1990s, habitat protection and rehabilitation of the Wet Tropics rainforest by many people, including natural resource managers, Indigenous and conservation groups, private landholders, local councils and the Queensland Government, have reduced the threat of ongoing habitat loss and cassowary populations currently appear stable.

Found in	Qld
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2007)
2020 population estimate	2,900 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	Qld and Australian governments, Australian Wildlife Conservancy, NQ NRM Alliance (delivering projects in Terrain NRM), Cape York NRM, Northern Gulf NRM, traditional owners, Cassowary Recovery Team, Biotropica, Kuranda Conservation, Mission Beach Cassowaries, CSIRO, James Cook University, Charles Darwin University.

Expansion and Connection of Cassowary Habitat

Through the Threatened Species Strategy, the Australian Government has contributed to expansion of rainforest rehabilitation areas, to join up previously fragmented rainforest blocks and provide greater habitat connectivity for Southern Cassowaries.

Ongoing action includes NQ NRM Alliance's work to improve and increase habitat, manage fire and weeds, reduce vehicle strikes, and increase knowledge of Cassowary distribution, habitat and threats. Landholder agreements are also being developed to increase the Cassowary's range. Much of this work is being done in partnership with recovery groups, traditional owners and landholders, and with support from the Australian Government.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Swift Parrot

Photo: JJ Harrison

Significant change in trajectory from 2005-15 to 2015-20? No significant change, ongoing trajectory of decline.

Improved trajectory?

Swift Parrots (*Lathamus discolor*) breed in Tasmania during spring and summer and migrate to woodlands across south-east mainland states for the rest of the year. Swift Parrots are nomadic, with varied nesting sites and winter foraging from SA to southern Queensland depending on nectar availability.

Clearing of high quality breeding and foraging habitat has been a key driver of population declines over the past 150 years. Additional threats include nest predation by Sugar Gliders and habitat degradation from altered fire regimes, timber harvesting and changing climatic conditions.

Swift Parrots' geographically complex life cycle is challenging for conservation. Traditionally, effort has focused on habitat improvement through tree planting and weed control, which are important for long-term recovery, but have limited short-term benefits. Actions to improve habitat, including limiting harvest of old growth nesting trees and winter feeding habitat, and also attempts to reduce the impacts of Sugar Gliders, are of greater immediate benefit but will need to be rapidly amplified.

Found in	Tas, Vic, SA, NSW, ACT, Qld
EPBC Act status	Critically Endangered
Conservation planning	Recovery Plan (2012), Conservation Advice (2016)
2020 population estimate	750 mature individuals in the wild; About 260 in captivity
Confidence in 2020 estimate	Medium
Recovery partners	Tasmanian, Victorian, NSW, ACT, Queensland, SA and Australian governments, local governments, Recovery Team, NESP Threatened Species Recovery Hub, Australian National University, Charles Sturt University, NSW Environmental Trust, Trust for Nature, Indigenous groups, traditional owners, Natural Resources Management, Local Land Services and Catchment Management Authority groups, Landcare and community groups, BirdLife, schools, industry groups, landholders, land managers, farmers.

Establishing secure breeding habitat for Swift Parrots

NRM South in Tasmania is currently leading a multifaceted project with support from the Australian Government to improve the breeding capability of the Swift Parrot. This involves a pilot study to determine whether predation of Swift Parrot eggs, nestlings or adults by Sugar Gliders is occurring. If predation occurs, further Sugar Glider management will be implemented. The project is also protecting habitat by establishing conservation covenants with private landowners, and nest boxes will be provided in areas where there are few suitable nesting sites.

In 2020, The Tasmanian Government excluded nearly 10,000 hectares of potential Swift Parrot nesting habitat from wood production and maintained their policy of not harvesting on Bruny Island, which is free from Sugar Gliders.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

Western Ground Parrot

Photo: Abby Berryman

Significant change in trajectory from 2005-15 to 2015-20? No significant change, ongoing trajectory of decline.

Improved trajectory?

The Western Ground Parrot (*Pezoporus flaviventris*) is a medium-sized ground dwelling parrot confined to near-coastal regions of south-western WA. The species is currently known from only one location, with initial declines caused by habitat loss and degradation exacerbated by higher fire frequencies, predation from introduced vertebrate pests and, more recently, sustained reductions in rainfall. During the 2019-20 bushfires, a significant proportion of known Western Ground Parrot habitat was burned and the species was subsequently identified as a priority for urgent management intervention by the Wildlife and Threatened Species Bushfire Recovery Expert Panel.

Recovery actions have focused on protecting wild populations from fire and introduced predators and attempted captive breeding at Perth Zoo. Predator baiting through the WA Government's Western Shield program and more locally focused programs to reduce feral cat abundance have improved the outlook for Western Ground Parrots. Local conservation groups deliver on-ground recovery activities and undertake important work to raise awareness and community support.

Considerable investment and action in recent years has averted the extinction of Western Ground Parrots. However, the small remaining wild population and the vulnerability of the small area of occupied habitat to fire present considerable recovery challenges and the situation for this species remains perilous. Immediate priorities for the species include implementation of a translocation strategy, habitat protection and predatory control.

Found in	WA
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2013), Recovery Plan (WA south coast birds) (2014)
2020 population estimate	150 mature individuals in the wild; <10 in captivity
Confidence in 2020 estimate	High
Recovery partners	WA Government, Friends of the Western Ground Parrot, BirdLife WA, Recovery Team, Perth Zoo, South Coast NRM, Charles Sturt University, South Coast NRM, State NRM (WA), Biofund, Caring for our Country, South Coast Threatened Birds Recovery Team, Indigenous rangers, traditional owners, community.

Western Ground Parrot Recovery

South Coast NRM with funding from the Australian Government is working with a range of partners, including Indigenous groups and the WA Government, on a current project which includes recovery actions to maintain the current population within 3,000 hectares of Western Ground Parrot habitat. On-ground actions include extensive feral animal trapping to complement Western Shield aerial cat and fox baiting and community volunteer-based monitoring of the Western Ground Parrot population.

THREATENED SPECIES STRATEGY – BIRDS AT A GLANCE

White-throated Grasswren

Photo: Peter Cooke

Significant change in trajectory from 2005-15 to 2015-20? Yes, although ongoing trajectory is declining, the rate of decline has significantly lessened.

Improved trajectory?

The White-throated Grasswren (*Amytornis woodwardi*) is a small ground-dwelling bird that historically occurred across the Arnhem Land sandstone plateau and escarpment. However, due to its reliance on large unburnt spinifex patches and the fire history of the habitat, numbers are likely to have declined as the habitat has become fragmented.

Intensive fire management in Arnhem Land over the last decade has been extended to Kakadu National Park since 2016 by Parks Australia. This has reduced the total area affected by destructive late season fires, allowing more spinifex to mature to an age when it can support White-throated Grasswren.

Inclusion in the Threatened Species Strategy has raised the profile of the species, with recent increasing efforts to find and monitor the birds, particularly in Kakadu National Park and Wardekken and Djelk Indigenous Protected Area, where improved fire management is assumed to be supporting improvement in the species' trajectory.

Found in	NT
EPBC Act status	Vulnerable
Conservation planning	Conservation Advice (2014)
2020 population estimate	1,100 mature individuals
Confidence in 2020 estimate	Low
Recovery partners	Parks Australia (Kakadu National Park), Australian Government, traditional owners and rangers of the Warddeken and Djelk Indigenous Protected Areas, Northern Territory Government, pastoral land managers.

Fire Management for the Grasswren

New work is underway led by Territory NRM, and funded by the Australian Government, within and around Kakadu National Park, to secure the Grasswren's future. Territory NRM is working with the Northern Territory Government, Parks Australia, landowners, Indigenous rangers and traditional owners to address fire, weed and feral animal management. The first project which commenced in 2018 a focusses on buffer zones surrounding the park and will see fire management improve the condition of approximately 5,000 ha of shrubland, including Grasswren habitat. Building upon this work is a three-year project which started in 2020 that will facilitate targeted surveys and strategic fire management for the Grasswren inside and outside Kakadu National Park. These two projects are addressing key threats as well as research for adapting fire management approaches for the species.

APPENDIX 2
SPECIES PROFILES FOR 20 PRIORITY MAMMALS

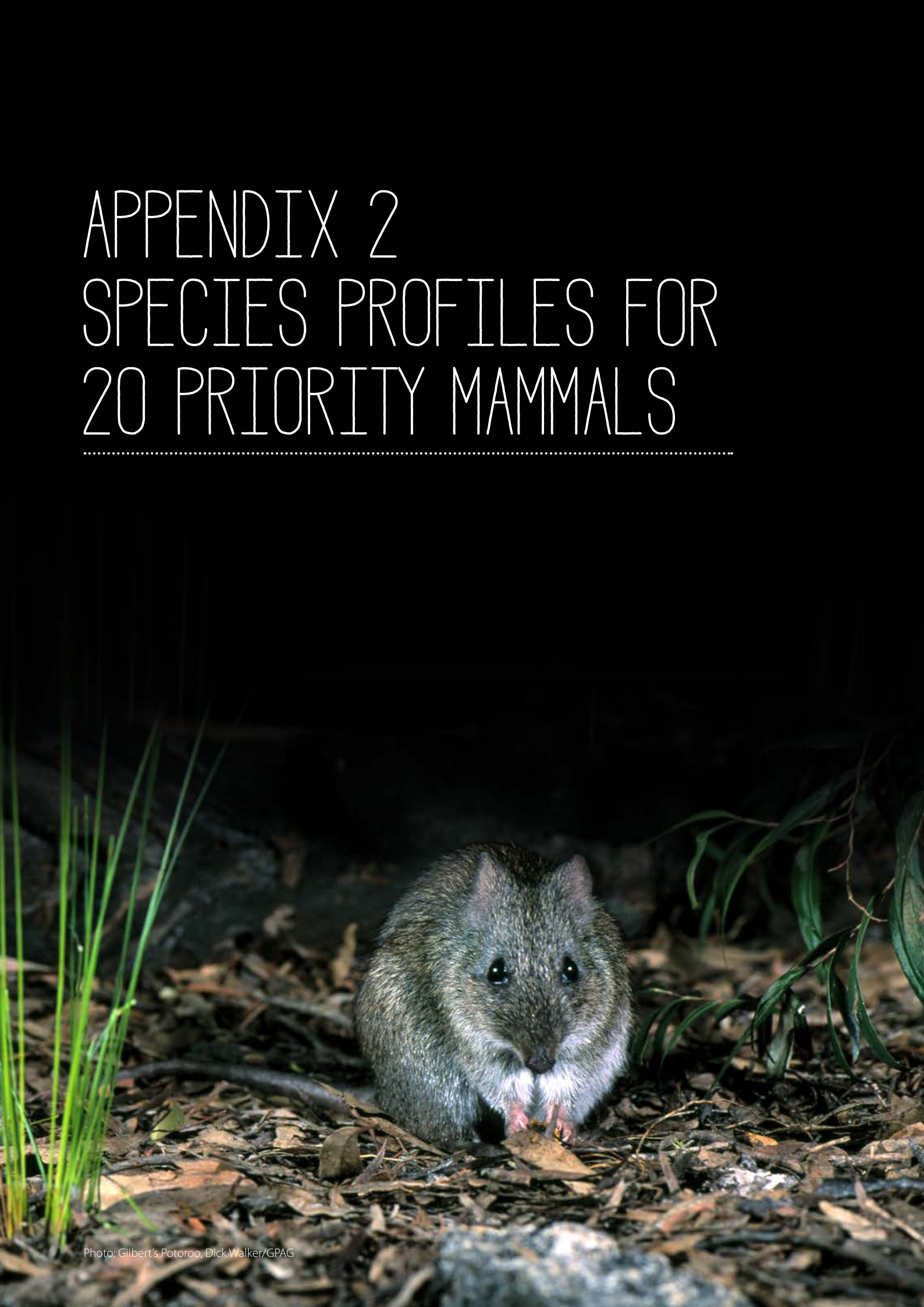

Photo: Gilbert's Potoroo, Dick Walker/GPAG

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Black-footed Rock-wallaby

Photo: Paul Balfe

Significant change in trajectory from 2005-15 to 2015-20? Yes, although ongoing trajectory is declining, the rate of decline has significantly lessened.

Improved trajectory?

The Black-footed Rock-wallaby (*Petrogale lateralis*) is a small, nocturnal wallaby. Predation by foxes, wild dogs and feral cats has fragmented and contracted its range to isolated rocky habitats across inland Australia, parts of coastal WA and SA, and some islands. Other ongoing threats include habitat degradation, competition with introduced herbivores and fire. The species complex now comprises five recognised subspecies with varying distributions, population sizes, threats, management priorities and conservation statuses. Population decline is ongoing, with the overall species trend largely driven by the decline of *Petrogale lateralis centralis* (the subspecies with a distribution extending patchily across arid SA, NT and WA).

Effective control of introduced predators is helping facilitate the recovery of the Black-footed Rock-wallaby in a number of locations. This is important to continue, as intensive and sustained control of foxes and feral cats has allowed stabilisation and even increases of subpopulations at some sites. Translocations of Black-footed Rock-wallabies to mainland sites where introduced predators are effectively controlled have succeeded in re-establishing some new subpopulations and bolstering dwindling subpopulations.

Found in	WA, NT, SA
EPBC Act status	Varied, different subspecies are Endangered/ Vulnerable/not listed
Conservation planning	Recovery Plan (2014), Conservation Advices (2010 & 2016)
2020 population estimate	~10,000 mature individuals
Confidence in 2020 estimate	Medium (varies across range between subspecies)
Recovery partners	SA, WA, NT and Australian governments, Warru Recovery Team, Alinytjara Wilurara Landscape Board, WWF, Australian Wildlife Conservancy, Greening Australia, Wheatbelt Natural Resource Management (NRM), Indigenous landholders and ranger groups, volunteers.

Returning the Warru to Country

One of five Black-footed Rock-wallaby subspecies, *P. l. centralis* or Warru represents about 55 per cent of the total species population. Sitting alongside threat and habitat management, translocations can help establish new populations, bolster and enhance genetic diversity of existing subpopulations. Throughout the Strategy period, the Australian Government has supported Warru translocations in SA under two Australian Government funded projects led by the SA Warru Recovery Team, Anangu Pitjantjatjara Yankunytjatjara (APY) Land Management and Warru Rangers.

The first project saw the Royal Zoological Society of SA support Warru reintroductions to Wamitjara in 2017 and 2020, strengthening the Musgrave Ranges subpopulation. Post-reintroduction Warru have survived on Wamitjara and they are breeding. Building on the success of this project, Warru are proposed to be introduced to (APY) Lands in 2021-22 in a project led by the Alinytjara Wilurara Landscape Board. Importantly, both projects sit alongside a program of threat management and habitat improvement to help safeguard translocated individuals and their offspring.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Brush-tailed Rabbit-rat

Photo: Hugh Davies

Significant change in trajectory from 2005-15 to 2015-20? Yes, although ongoing trajectory is declining, the rate of decline has significantly lessened.

Improved trajectory?

The Brush-tailed Rabbit-rat (*Conilurus penicillatus*) is a medium-sized rodent with a distinctive long brush-tipped tail. Formerly spread across tropical woodlands and open forests of northern Australia, it has declined extensively, most likely because of predation by feral cats and frequent high-intensity fires. Brush-tailed Rabbit-rats are now only found in some higher rainfall areas and on a few islands.

Overall decline in Brush-tailed Rabbit-rats is continuing, however the rate of decline has slowed since 2015 and data indicate populations in the Kimberley are stable or increasing. WA and NT governments, Indigenous groups and other organisations have worked hard to manage feral cats and reduce fire threats. Australian Government support has contributed to fire management activities in the Kimberley, research on Groote Eylandt, conservation research and management of the species on the Tiwi Islands.

Found in	NT, WA
EPBC Act status	Vulnerable
Conservation planning	Conservation Advice (2016), Recovery Plan (2019)
2020 population estimate	Not available. 2015: ~45,000 mature individuals
Confidence in 2020 estimate	N/A
Recovery partners	NT, WA and Australian governments (including Parks Australia), Indigenous ranger groups, Tiwi Land Council, Dambimangari Aboriginal Corporation, WWF, Charles Darwin University, NESP Threatened Species Recovery Hub.

Mitigating cat impacts on the Brush-tailed Rabbit-rat

In 2018 the NESP Threatened Species Recovery Hub commenced a research project to investigate feral cat populations, habitat and fire relationships with the Brush-tailed Rabbit-rat. Working with the Tiwi Land Council, Tiwi Land Rangers, Charles Darwin University and the NT Government the project already has helped inform predator impacts on this and other threatened species.

Our understanding of the Brush-tailed Rabbit-rat ecology has improved during the project, which is helping to optimise detections during surveys and monitoring. Wrapping up in 2021, this project will help us understand feral cat impacts and management at a landscape scale as well as how fire can influence mammal density which will support future conservation planning.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Central Rock-rat

Photo: Michael Barritt & Karen May

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was declining, now slowly increasing.

Improved trajectory?

The Central Rock-rat (*Zyzomys pedunculatus*) is a medium-sized rodent confined to arid areas in central Australia. It has experienced extreme declines in range and population size, and a recent analysis ranked it as the mammal taxon most likely to go extinct in the next 20 years. Key threats are predation by feral cats and extensive fires which can remove cover and reduce food availability across the entire current range of the species. Due to its very small population and distributional extent, the species' persistence is highly sensitive to these threats.

Recovery efforts have focused on landscape-scale feral cat control at refuge sites for the Central Rock-rat. This work has been undertaken by the NT Government with support from the Australian Government, and has contributed to the improved population trajectory for the species since 2015. Ongoing management of feral cats and fire will be important to prevent future declines.

To further safeguard the population in the longer-term, the Australian Government also provided funding to the Australian Wildlife Conservancy for a cat-proof exclosure at Newhaven Wildlife Sanctuary in the NT, which is one of several potential future translocation sites for the Central Rock-rat.

Found in	NT
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2018), Recovery Plan (2019)
2020 population estimate	650 mature individuals
Confidence in 2020 estimate	Low
Recovery partners	NT, WA and Australian governments, Central Land Council, Australian Wildlife Conservancy, Territory NRM.

Protecting the Central Rock-rat

This National Landcare Program-funded project led by Territory NRM builds upon years of research and management to address key threats to the species, particularly feral cats. Running from 2018 until 2023, the project has already held three stakeholder forums to facilitate collaboration and information sharing between key recovery partners along with over 8,000 hectares of feral cat management within Central Rock-rat sites.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Christmas Island Flying-fox

Photo: Inger Van Dyke

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was declining, now increasing.

Improved trajectory?

The Christmas Island Flying-fox (*Pteropus natalis*) is the last remaining endemic mammal known to be persisting on Christmas Island. Roughly a quarter of the species' habitat has been lost since the late 1880s due to mining and other developments. Probable ongoing threats include predation by feral cats, poisoning from environmental contaminants and physical disturbance and habitat change caused by Yellow Crazy Ants.

Conservation management is carried out by Parks Australia and overseen by the Christmas Island Flying-fox Advisory Panel and has focused on control of introduced animals and habitat restoration. Over 1,000 feral cats have been culled since 2010 and there have been major control efforts for Yellow Crazy Ants. Rehabilitation of nearly 200 hectares of rainforest habitat over former mine sites since 1989 has included plantings of specific native fruiting trees to provision frugivores, including the Christmas Island Flying-fox. This species has been the subject of an intensive research effort over the last few years that has helped clarify population status, habitat use and threats. Work is ongoing to identify the main threats to the species and to prioritise management options to support recovery.

Found in	Christmas Island (Indian Ocean Territories)
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2014)
2020 population estimate	1,035 mature individuals (based on 2018 surveys)
Confidence in 2020 estimate	Medium
Recovery partners	Parks Australia, CSIRO, Christmas Island Shire, Christmas Island Phosphates, Taronga Conservation Society, Royal Botanic Garden Sydney, LaTrobe, Sydney and Western Sydney universities, NESP Threatened Species Recovery Hub.

Parks Australia on Christmas Island

The Australian Government has funded threat management and monitoring for the Christmas Island Flying-fox, with Parks Australia working with the state and local governments to improve the outlook for this Critically Endangered species. Feral cat predation is the second largest threat to the species, and over recent years significant progress has been made towards eradicating cats from the island. Parks Australia is currently leading work to improve population assessments to help inform species conservation including close-kin-mark-recapture genetic analysis as well as to improve habitat by increasing food source plants.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Chuditch (Western Quoll)

Photo: Todd Soderquist

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was declining, now increasing.

Improved trajectory?

The Western Quoll (*Dasyurus geoffroii*), or Chuditch, is a carnivorous marsupial similar in size to a small domestic cat. Chuditch used to occupy most of continental Australia, but disappeared from >90 per cent of this range after European settlement and the introduction of foxes and feral cats. Chuditch have persisted across a range of forest and woodland habitats in south-western Australia, thanks to broad-scale control of foxes and feral cats.

Given the long term and ongoing nature of these feral predator control programs, such as Western Shield, populations of Chuditch in south-west WA have remained stable or increased over the last 20 years. Translocations of Chuditch from these populations to other predator managed areas, such as Bounceback and Arid Recovery in SA, have also allowed for the reintroduction of the species back into former parts of its range. As these translocated Chuditch establish breeding populations, the population trajectory is likely to continue increasing, if introduced predators are effectively controlled.

Found in	WA and SA
EPBC Act status	Vulnerable
Conservation planning	Recovery Plan (2013)
2020 population estimate	4,400-6,200 mature individuals (2018 estimate); ~20-30 mature individuals in fenced exclosures
Confidence in 2020 estimate	Medium
Recovery partners	WA, SA and Australian governments, WWF, Foundation for Australia's Most Endangered Species, WA Recovery Team, Australian Wildlife Conservancy, Arid Recovery, South Australian Arid Lands Landscape Board.

Bounceback and Beyond

The Australian Government is contributing funding to SA Arid Lands Landscape Board's Bounceback program, which is supported by the SA government. Bounceback has supported the recovery of the Chuditch through reintroductions and landscape-scale feral predator management. The project is working to establish new populations of Chuditch. A population was recently reintroduced in the northern Ikara-Flinders Ranges, with extensive feral predator management to support the introduction. Planning for a further reintroduction of Chuditch in the Vulkathunha-Gammon Ranges in late 2021 is currently well advanced.

Bounceback is also undertaking widescale fox management and continuing feral cat management. Ongoing work to control feral predators in unfenced areas where Chuditch have been reintroduced is critical to the species' long-term survival.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Eastern Barred Bandicoot (mainland)

Photo: JJ Harrison

Significant change in trajectory from 2005-15 to 2015-20? Yes, rapid increases prior to 2015 have slowed. Population growth continues, but at a lesser rate.

Improved trajectory?

The Eastern Barred Bandicoot (*Perameles gunnii*) is a small, nocturnal marsupial that inhabits grasslands and grassy woodlands. The Threatened Species Strategy focus is on recovery of the mainland subspecies in Victoria, following near-extinction in the late 1980s due to predation by foxes and feral cats, habitat loss, and impacts from livestock grazing. The species also occurs in Tasmania.

A very effective multi-organisational recovery team formed in 1989 and Zoos Victoria commenced a captive breeding program in 1991. This has produced over 960 captive-bred Eastern Barred Bandicoots, 577 of which have been released to 11 different translocation sites. Of the earlier translocation attempts, only the translocation to Mt Rothwell has persisted continuously, but more recent translocations to Hamilton Community Parklands and Churchill Island have been successful, and a recent translocation to Phillip Island appears promising. Currently, ~1000 Eastern Barred Bandicoots persist in three fenced mainland exclosures (Mt Rothwell, Hamilton Community Parkland, Woodlands Historic Park), and two islands (Churchill and Phillip). After coming back strongly from the brink of extinction, these new sites have significantly improved recovery prospects for the mainland subspecies with reintroductions recently commenced (including French Island) or planned at additional sites.

Found in	Vic, Tas
EPBC Act status	Endangered (Victorian subspecies)
Conservation planning	Recovery Plan (2011)
2020 population estimate (mainland)	1,169-1,634 mature individuals in the wild and ~50 in captivity (Victorian subspecies) <20,000 mature individuals in the wild (2018 estimate) and ~15 in captivity (Tasmanian subspecies)
Confidence in 2020 estimate	High (Victorian subspecies and captive individuals); Low (wild Tasmanian subspecies)
Recovery partners	Victorian and Australian governments, Zoos Victoria and wildlife parks, regional NRM groups, agricultural industry, conservation foundations, Southern Grampians Shire Council, Conservation Volunteers Australia and other volunteer groups, Mt Rothwell Biodiversity Interpretation Centre, Odonata, University of Melbourne, University of Tasmania, Australian National University, NESP Threatened Species Recovery Hub, Phillip Island Nature Parks, French Island Landcare Group, Eastern Barred Bandicoot Recovery Team.

Safeguarding Northern Tasmania as a Refuge

Northern Tasmanian Natural Resource Management Association, in collaboration with the Tasmanian Land Conservancy and University of Tasmania, are working towards expanding the distribution and improving the quality of habitat for the Eastern Barred Bandicoot in Northern Tasmania. Ending in 2023, this National Landcare Program project is on track to improve 40 hectares of remnant vegetation by removing grazing pressure and engage with over 100 rural and urban landholders to undertake species-specific on-property actions to reduce threats.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Eastern Bettong (mainland)

Photo: Woodlands and Wetlands Trust

Significant change in trajectory from 2005-15 to 2015-20? Yes, rapid increases since the re-establishment of a population on the Australian mainland in 2011 have slowed, and population in mainland exclosure now stable.

Improved trajectory?

The Eastern Bettong (*Bettongia gaimardi*) is a small, kangaroo-like marsupial. Its pre-European range included eastern Tasmania and a broad coastal strip from south-east Queensland to south-east SA. However, the mainland subspecies was extinct by the 1920s due to predation by foxes and feral cats, habitat loss and degradation, and persecution. The Threatened Species Strategy focus is on restoring the important ecological function of Bettongs to the mainland, which is occurring through translocations of the Tasmanian subspecies.

Tasmanian Bettongs were brought to the ACT in 2011 and 2012 to begin captive colonies at Tidbinbilla Nature Reserve and Mulligans Flat Woodland Sanctuary. In 2020, in an emergency response to impending risk from wildfire, the bettong colony at Tidbinbilla was moved to Mt Rothwell Biodiversity Interpretation Centre in Victoria. The population at Mulligan's Flat is now well established having increased from the founding 32 adults to a self-sustaining population of between 100-200 individuals. Population growth has slowed due to space limitations, but should increase when Bettongs are soon released into an adjacent fenced area, three times the size of Mulligan's Flat (Goorooyarroo Woodland).

Found in	Tas, Vic and ACT (reintroduced)
EPBC Act status	Subspecies (mainland) Extinct, Subspecies (Tasmania) not listed
Conservation planning	N/A
2020 population estimate (mainland)	Mature individuals in fenced exclosures; ~150 at Mulligan's Flat, ACT (2018 estimate) and 26 at Mt Rothwell, Victoria (2020 estimate)
Confidence in 2020 estimate	High
Recovery partners	ACT and Australian governments, Woodlands and Wetlands Trust, James Hutton Institute, NESP Threatened Species Recovery Hub, CSIRO, Australian National University, James Cook University.

Eastern Bettongs on the Mainland

All Eastern Bettongs on mainland Australia are in exclosures, only found at Mulligans Flat Woodland Sanctuary in the ACT and Mt Rothwell in Victoria. The Australian Government has funded projects to help expand upon this network in NSW. The Wandiyali Swainsona National Landcare Program project led by the Trustee for Wandiyali Restoration Trust protected over 100 hectares Box Gum Grassy Woodland in preparation for Eastern Bettong introductions. Building upon this hard work, a $1.2 million grant to the Wandiyali–Environa Wildlife Sanctuary to complete construction of a 400 hectares feral free area will see the introduction of the Eastern Bettong to NSW by 2023.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Eastern Quoll

Photo: Shutterstock

Significant change in trajectory from 2005-15 to 2015-20? No significant change, ongoing trajectory of decline.

Improved trajectory?

The Eastern Quoll (*Dasyurus viverrinus*) is a medium-sized carnivorous marsupial that was once found throughout south-east Australia, and in Tasmania. It disappeared from the Australian mainland last century, due to disease, predation by foxes, feral cats and domestic dogs, poisoning and persecution. Original wild populations remain only in Tasmania, where declines occurred up until the early 2000s, in association with several years of unusual weather. Other threats such as feral cats and vehicle strike in some areas appear to now constrain recovery across Tasmania, except on Bruny Island, where the population has at least partly recovered and remains stable.

Conservation for Eastern Quolls depends on effective cat management in Tasmania, biosecurity to prevent disease introductions, especially for the Bruny Island population, and ongoing expansion and management (including genetic management) of populations on islands and within mainland fenced areas that are cat- and fox-free. Over the last few years, populations of Eastern Quolls have been reintroduced from Tasmania to Booderee National Park and a fenced site near Barrington Tops, NSW.

Found in	Tas, NSW, Vic (fenced), ACT (fenced)
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2015)
2020 population estimate	Wild: <10,000 mature individuals; Exclosures: ~200 mature individuals;
Confidence in 2020 estimate	Wild population: Low; Enclosed populations: High
Recovery partners	ACT and Tasmanian governments, Australian Government (including Parks Australia), Mt Rothwell Biodiversity Interpretation Centre, Odonata, Australian National University, James Cook University, Woodlands and Wetlands Trust, Rewilding Australia, WWF Australia, Taronga Conservation Society, Eastern Quoll Mainland Recovery Team, Wreck Bay Community, Aussie Ark, NESP Threatened Species Recovery Hub.

Reintroducing the Eastern Quoll

Since 2002, Eastern Quolls have been reintroduced to three mainland sites: Mt Rothwell Biodiversity Centre in Victoria, Mulligan's Flat (Goorooyarroo Woodland) in the ACT (both fenced), and Booderee National Park in NSW (unfenced). With support from the Australian Government, feral predator control is underway to facilitate the reintroduction of the Eastern Quoll into the expanded Mulligans Flat Woodland Sanctuary, increasing the population of Eastern Quolls within the sanctuary. Captive breeding and translocations are likely to form part of continuing conservation efforts for the species, including Devils at Cradle and Trowunna Wildlife Sanctuary in Tasmania, Aussie Ark in NSW and Mt Rothwell in Victoria.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Gilbert's Potoroo

Photo: Dick Walker/ GPAG

Significant change in trajectory from 2005-15 to 2015-20? No significant change, rate of increase reduced.

Improved trajectory?

Gilbert's Potoroo (*Potorous gilbertii*) is the rarest marsupial in the world, with around 100 individuals. It was once locally abundant around the WA south-west coast, however declined rapidly from the mid-1800s, shrinking to only one small population at Mt Gardner, in Two Peoples Bay.

The WA Government has led recovery efforts, first by establishing two insurance populations at Bald Island from 2005, and in a fenced enclosure in Waychinicup National Park from 2009. This timely intervention prevented disaster in 2015, when an intense wildfire burnt most of the Gilbert's Potoroo's habitat at Mt Gardner. Seven surviving Potoroos were translocated for safety, and intensive control of foxes and feral cats was undertaken around the Mt Gardner site to reduce predation risk for remaining Potoroos. Another population was established on Middle Island in 2017, with support from the Australian Government.

Although the original wild population at Mt Gardner has declined severely as a result of the 2015 fire, the populations that had earlier been established elsewhere and the new translocations to Middle Island have improved the overall population size for Gilbert's Potoroo. However, with such low numbers the future of this species is precarious and will require ongoing careful management.

Found in	WA
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2016)
2020 population estimate	>75 mature individuals in the wild >60 mature individuals in exclosures or islands
Confidence in 2020 estimate	High
Recovery partners	WA Government, Australian Government, Gilbert's Potoroo Action Group, Gilbert's Potoroo Recovery Team, DNAZoo Australia, South Coast NRM, community volunteers.

Securing Gilbert's Potoroo

The WA Government has led and delivered a multitude of conservation actions for the Gilbert's Potoroo, ranging from translocations to habitat and threat management to, more recently, partnering with DNAZoo Australia and Gilbert's Potoroo Action Group to produce a reference genome. The Australian Government has been able to support state government species conservation efforts for this rare species throughout the life of the Strategy. In 2017, the funding was provided to the Gilbert's Potoroo Action Group to assist the WA Government to monitor and establish new populations on Middle Island as an additional insurance population. Additional support was provided to South Coast NRM under the National Landcare Program - Regional Land Partnerships in 2018 for a project running until 2023 which will build on all the great work to date. This project supports habitat improvement (invasive species control, fencing, revegetation), Gilbert's Potoroo monitoring and community engagement, and already the project has seen a small number of individuals translocated to Waychinicup National Park.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Golden Bandicoot

Photo: R Knowles

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods.

Improved trajectory?

The Golden Bandicoot (*Isoodon auratus*) was previously widespread across the mainland, but now has a highly fragmented distribution near coastal areas and islands of north and north-west Australia, following declines due to predation by feral cats and foxes and altered fire regimes.

Recovery efforts have focused on maintaining Golden Bandicoots in protected areas through predator control and appropriate fire management. Many of these management actions have been undertaken by traditional owners, with Indigenous rangers helping with control of feral animals, managing fire and undertaking biological surveys. The Australian Government has provided support for feral cat control and fire management in the north-west Kimberley through the Threatened Species Recovery Fund.

Translocations of Golden Bandicoots to predator-free sites, including islands, have also been successful. From 2010, individuals from Barrow Island have been reintroduced to a large predator-free exclosure at Matuwa in mainland WA. Breeding inside the fence has been successful, and there have been some releases outside the exclosure.

Found in	WA, NT
EPBC Act status	Vulnerable
Conservation planning	Conservation Advice (2015)
2020 population estimate	60,000 mature individuals
Confidence in 2020 estimate	Low (varied across range)
Recovery partners	WA, NT and Australian governments, traditional owners, Indigenous ranger groups, Indigenous Protected Areas, Aboriginal Corporations, WWF, Australian Wildlife Conservancy, Bush Heritage, Chevron.

Creating one of Australia's Largest Fenced Feral Cat and Fox Free Areas

Newhaven Wildlife Sanctuary, just north-west of Alice Springs, will become one of Australia's largest feral cat and fox-free areas. Announced at the Threatened Species Summit in 2015, and in partnership with the Australian Wildlife Conservancy, the Australian Government provided $750,000 in funding to support this project. The two-stage project will establish a 100,000 hectare enclosure to protect at least nine threatened mammals, including the Golden Bandicoot. Once completed, Newhaven will host an estimated population of more than 32,000 Golden Bandicoots. The project is being delivered in collaboration with the traditional owners of Newhaven, the Ngalia Warlpiri people. Their specialist cat hunting skill and participation in land management will be integral to the success of the project.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Greater Bilby

Photo: Queensland Department of Environment and Science

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was reasonably stable, now gradually increasing.

Improved trajectory?

The Greater Bilby (*Macrotis lagotis*) once ranged over three-quarters of Australia, mostly in semi-arid and arid areas, but contracted to 20 per cent of this original distribution following European settlement. Its decline coincided with the spread of foxes, which remain a key threat today, along with habitat changes from introduced herbivores (especially rabbits), changed fire regimes and predation by feral cats, with the relative importance of these threats varying geographically.

Recovery actions have focused on maintaining or restoring traditional patchwork fire regimes and controlling introduced predators. Translocations into predator-free exclosures and a predator-free island have allowed for further increases in population and re-establishment into the species' former range, with more translocations planned in future.

Overall, while the total population size of Greater Bilbies is not well resolved, numbers have been roughly stable for more than a decade and may now be gradually increasing in some parts of the species' range. With the growth of targeted management for bilbies on Indigenous land, and the expansion of populations within fenced areas, populations should slowly grow in the future.

Found in	WA, NT, NSW, SA, Qld
EPBC Act status	Vulnerable
Conservation planning	Recovery Plan (2007), Conservation Advice (2016)
2020 population estimate	Wild: (>10,000?) Enclosures: ~3,500 mature individuals Many bilbies also in captivity
Confidence in 2020 estimate	Very low High for enclosed populations
Recovery partners	WA, NT, SA, Qld, NSW and Australian governments, Central Land Council, Indigenous Desert Alliance, Indigenous rangers, landholders and community groups, conservation and sanctuary groups, zoos and research community, industry partners, Save the Bilby Fund, Australian Wildlife Conservancy, Arid Recovery, Recovery Team.

Tjurabalan Native Title Lands – Knowledge Sharing to Protect the Bilby

Bilbies are culturally significant for many Indigenous groups and around 70 per cent of current Bilby populations are on Indigenous lands. The persistence of Bilbies in some local areas is linked to ongoing land management carried out by Indigenous communities and Indigenous people have a critical role in Bilby conservation.

The Kimberley Land Council Aboriginal Corporation is working with the Paruku Rangers and Tjurabalan traditional owners to identify and manage Bilby habitat. Key recovery actions include the management of feral cats and foxes, sharing knowledge on fire regimes, mosaic and buffer burning, and engaging with stakeholders to deliver sustainable outcomes. WWF and Rangelands NRM with funding support from the Australian Government, are also partners on this project.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Kangaroo Island Dunnart

Photo: Jody Gates

Significant change in trajectory from 2005-15 to 2015-20? Yes, ongoing decline that has worsened.

Improved trajectory?

The Kangaroo Island Dunnart (*Sminthopsis fuliginosus aitkeni*) is a small carnivorous marsupial, now found only on Kangaroo Island. It is difficult to sample so determining population trends is challenging. This species is likely to have suffered major declines due to historic land clearing, but since the 1970s much of the western part of Kangaroo Island has been protected in conservation reserves and a significant amount of private land is now under Heritage Agreement.

Approximately 95 per cent of known habitat was burned in the 2019-20 bushfires. Significant effort has since been made to locate surviving populations and help recover them, mostly through intensive surveys and targeted feral cat management including exclosure fencing, trapping and baiting. This is building upon the work of partners over recent years to tackle threats including controlling the impact of feral cats, managing the spread of Phytophthora, engaging private land owners in conservation activities, and improving methods for monitoring the Kangaroo Island Dunnart.

Found in	SA
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2012)
2020 population estimate	No reliable estimate
Confidence in 2020 estimate	N/A
Recovery partners	SA and Australian governments, Terrain Ecology, Kangaroo Island Landscapes Board, Kangaroo Island Land for Wildlife, NESP Threatened Species Recovery Hub, Recovery Team, Foundation for Australia's Most Endangered Species, Wettenhall Environment Trust, Charles Darwin University, Australian Wildlife Conservancy.

Emergency Actions for the Kangaroo Island Dunnart

Sadly the Kangaroo Island Dunnart population was significantly impacted by the 2019-20 bushfires, but with extensive management efforts Kangaroo Island Dunnart numbers are likely to increase in the future. The Australian Government is supporting projects with the SA Government, Kangaroo Island Landscape Board and Kangaroo Island Land for Wildlife Association to undertake actions including protecting unburnt habitat, feral animal control, disease control, fire management plan development and species surveys to determine the distribution of the species. A Recovery Team was established in 2020 to oversee future conservation actions.

These vital management efforts build upon and are informed by preceding years of work by recovery partners including species research, awareness raising and threat management, particularly investigations into feral cat control on the island.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Leadbeater's Possum

Photo: Dan Harley

Significant change in trajectory from 2005-15 to 2015-20? No significant change, ongoing trajectory of decline.

Improved trajectory?

Leadbeater's Possum (*Gymnobelideus leadbeateri*) is a small marsupial restricted to an area of about 3,000 km^2 in the Victorian Central Highlands and a lowland swamp forest at Yellingbo. The distribution and numbers of Leadbeater's Possum have varied over time, with episodic severe declines associated with extensive wildfire, notably in 1939 and 2009. Other threats include timber harvesting and climate change, with some recent evidence also demonstrating predation by feral cats.

Conservation actions have focused on survey and monitoring, and managing forested areas. This includes mitigation of timber harvesting impacts through pre-harvest survey programs and management prescriptions for timber harvesting areas. Habitat augmentation with artificial tree hollows and nesting boxes has been undertaken in some limited areas, and a specific reserve system for Leadbeater's Possum is in place; a small captive population is also held at Healesville Sanctuary. Intensive efforts to enhance habitat have been undertaken for the small population at Yellingbo, however that population continues to decline, and the population of the species as a whole continues to decline.

Found in	Victoria
EPBC Act status	Critically Endangered
Conservation planning	Recovery Plan (2000), Conservation Advice (2019)
2020 population estimate	2,500 - 10,000 mature individuals ~ 10 individuals in captivity
Confidence in 2020 estimate	Low (wild estimate)
Recovery partners	Victorian and Australian governments, Zoos Victoria, Friends of Leadbeater's Possum, Trust for Nature, Biosis, Deakin, Monash and Melbourne Universities, Australian National University, NESP Threatened Species Recovery Hub.

Adaptive Management in the Victorian Central Highlands

Robust evidence is vital to species conservation, and the NESP Threatened Species Recovery Hub is currently wrapping up a research project to inform adaptive management of the Leadbeater's Possum in Victoria. Led by The Australian National University in collaboration with the Victorian Department of Environment, Land, Water and Planning, Parks Victoria and Healesville Sanctuary, the project used long-term monitoring data and new field-based experimental research and radio-tracking to improve the evidence base of conservation strategies. For example, this research has shown that not all species respond to pressures the same way, where disturbance from harvesting operations around a site can have a positive impact on the Sugar Glider but a negative effect on Leadbeater's Possum.

The results are informing reservation and conservation strategies, and strategies that attempt to integrate the conservation of these species with wood production. In 2019, the Victorian Government announced it would immediately protect 96,000 hectares from timber harvesting to preserve habitat for more than 35 forest dependent species, including Leadbeater's Possum.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Mahogany Glider

Photo: Wet Tropics Management Authority

Significant change in trajectory from 2005-15 to 2015-20? Yes, although ongoing trajectory is declining, the rate of decline has lessened.

Improved trajectory?

Mahogany Gliders (*Petaurus gracilis*) are arboreal marsupials, found in a small narrow band of wet sclerophyll forest along the Queensland coast north of Townsville. While the species' overall range has remained stable, available habitat within this area has been severely reduced and fragmented due to clearing for agriculture, roads and residential development. Mahogany Gliders are also threatened by road and fence strike and predation by cats and dogs, while their limited distribution makes them vulnerable to extreme weather events that affect continuity of their habitat and availability of nectar.

Recovery efforts have included revegetation projects, fire management to maintain the quality of glider habitat on private and state lands, as well as installation of glide pole crossings across roads and easement corridors, and community engagement projects to raise awareness of Mahogany Gliders' habitat requirements. These efforts have helped reduce declines in the species, however further work is needed to recover the species in future.

Found in	Queensland
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2008)
2020 population estimate	1,500-2,000 mature individuals
Confidence in 2020 estimate	Low
Recovery partners	Queensland and Australian governments, NQ NRM Alliance (delivering programs in Terrain NRM), Girringun Aboriginal Corporation, Townsville City Council, Recovery Team, Wildlife Preservation Society of Queensland, James Cook University, Brettacorp Inc.

Glider Corridors for Conservation

Gliders are poor dispersers across habitat gaps, so to address the risk of populations in smaller habitat patches disappearing over time, conservation efforts have focused on restoring and managing habitat corridors. With support from the Australian Government's 20 Million Trees program, Brettacorp Inc. led a revegetation project to enhance and expand habitat for the Mahogany Glider and other threatened species. NQ NRM Alliance with support from the Australian Government is currently working with the Recovery Team, traditional owners, landholders and the community to improve remnant habitat connectivity through the revegetation of corridors and improving existing habitat.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Mala

Photo: Babs & Bert Wells

Significant change in trajectory from 2005-15 to 2015-20? Yes, species was increasing between 2005-2015, but decline apparent between 2015-2020.

Improved trajectory?

Mala (*Lagorchestes hirsutus*), a central Australian subspecies, are small marsupials with reddish-orange fur. Following European settlement, Mala suffered catastrophic declines throughout arid and semi-arid Australia, due to predation by foxes and feral cats and altered fire regimes. The last population was removed from the wild in 1991, with some individuals then translocated to Trimouille Island off the WA Pilbara coast. All surviving Mala are now in managed areas where introduced predators are excluded, either on Trimouille Island, or in predator-free fenced exclosures.

Between 2005-2015 populations increased due to translocations but have decreased since 2015 due to drought impacting the largest subpopulation on Trimouille Island. Watarrka and Scotia fenced area populations were translocated to Newhaven Sanctuary in 2017, 2018 and 2020 so active Mala exclosures now include Newhaven, Matuwa and Uluru. While overall numbers are still very low and suffered recent declines, the trajectory of Mala is expected to improve with the end of a drought period improving conditions at Trimouille Island, and expansion likely in some exclosures. Limited genetic diversity remains an ongoing issue for active management, as all existing Mala populations are descended from a small number of individuals from the last wild population sourced for captive breeding.

Found in	WA, NT, NSW (translocated captive population)
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2012)
2020 population estimate	<250 mature individuals on an island ~440 mature individuals within fenced areas ~20 captive bred mature individuals
Confidence in 2020 estimate	Low (wild) Medium (exclosure)
Recovery partners	WA and NT governments, Australian Government (including Parks Australia), Australian Wildlife Conservancy, Recovery Team, Martu traditional owners, Conservation Volunteers Australia, volunteer groups.

Mala Breeding Facilities in Alice Springs Desert Park

For over 20 years Mala have relied upon captive breeding and predator-free managed areas. The only captive breeding population is maintained at the Alice Springs Desert Park which is currently home to about 20 Mala, and over the life of the Strategy the Australian Government has supported improvements to this site via the Green Army program.

In 2015 funding was provided to the Alice Springs Desert Park for Conservation Volunteers Australia to construct breeding pens which increased the captive breeding capacity at the park. Further facility improvements were supported by the Australian Government in 2018, with Conservation Volunteers Australia delivering new and improved fencing, fauna surveys, weed treatment and community engagement for the NT Government. Maintaining this important facility has supported translocations in other areas, such as translocations to Newhaven Sanctuary in 2019.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Mountain Pygmy-possum

Photo: Linda Broome

Significant change in trajectory from 2005-15 to 2015-20? Yes, appeared generally stable between 2005-2015, but decline apparent between 2015-2020.

Improved trajectory?

The Mountain Pygmy-possum (*Burramys parvus*) is a very small possum endemic to the snow-covered alpine regions of Victoria and New South Wales. Fossil evidence shows the species was formerly more widely distributed, but its range has reduced and its population has declined due to predation by feral cats and foxes, habitat changes arising from introduced herbivores, habitat loss, drought, changing climatic conditions, altered fire regimes and bushfires, loss of genetic diversity and declines in a main food source (the Bogong Moth, whose populations declined catastrophically in 2017).

Most of these threats are being managed to some extent, through a range of actions to control feral cats and foxes, reconstruct habitat and undertake genetic rescue in some populations. Following the 2019-20 bushfires, the Australian Government is investing in further surveys, pest management and habitat recovery.

Loss of genetic diversity remains a threat and over future decades, the species is likely to become increasingly impacted by climate change. Intensive and long-lasting monitoring of Mountain Pygmy-possums is undertaken in both NSW and Victoria and has guided effective management activities. Managing feral cats and foxes, particularly in fire-affected areas, will be crucial to the species' recovery, as will addressing food shortages and habitat improvement.

Found in	NSW, Vic
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2016), Conservation Advice (2018)
2020 population estimate	950 mature individuals in NSW Victorian population estimates not available in 2020 possibly ~1,650 ~40 mature individuals in captivity
Confidence in 2020 estimate	Medium (varies across populations)
Recovery partners	NSW, Victorian and Australian governments, Zoos Victoria, Recovery Team, Cesar, Goulburn Broken CMA, North East CMA, South East LLS, Wombaroo, Taungurung Land and Waters Council, alpine resorts, traditional owners, schools, community volunteers, nutritionists and veterinarians, detector dog handlers/trainer, industry groups.

Protecting a Key Food Source

The Bogong Moth is the Mountain Pygmy-possum's main food source following hibernation and during breeding season. The moths migrate to the Australian Alps each spring, but numbers are collapsing due to several factors including loss of habitat, drought and artificial lighting.

The 2019-20 bushfires have also impacted the species. With support from the Australian Government's Bushfire Recovery Fund, the NSW government provided supplemental water and feeding stations for the possums in fire-affected areas of Kosciusko National Park. Local school children helped to bake Bogong biscuits, which were developed to match the nutritional content of Bogong moths. Bogong biscuits suitable for feeding wild populations were developed by staff from Zoos Victoria's Healesville Sanctuary in collaboration with veterinarians and Wombaroo.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Northern Hopping-mouse

Photo: Rebecca Diete

Significant change in trajectory from 2005-15 to 2015-20? No significant change, although rate of decline likely reduced.

Improved trajectory?

The Northern Hopping-mouse (Notomys aquilo) is a rodent currently only found on Groote Eylandt in the NT. It was previously known on the Australian mainland, most recently in Arnhem Land in 1973, but declined due to a number of threats including inappropriate fire regimes that impact food availability, predation by feral cats and habitat loss and modification.

The Anindilyakwa Rangers recently commenced surveys for the Northern-Hopping Mouse to better define its distribution on Groote Eylandt, as well as improve knowledge about its ecology and threatening processes. The species is likely to be still decreasing in numbers, and ongoing and increased conservation efforts are required to conserve it. A recent Groote Archipelago Threatened Species Management Plan will help prioritise and deliver conservation actions.

Recovery efforts for the Northern Hopping-mouse have focussed on ongoing fire management, species surveys, habitat assessment and habitat restoration.

Found in	NT
EPBC Act status	Endangered (uplisted from Vulnerable in February 2021)
Conservation planning	Conservation Advice (2021)
2020 population estimate	780 mature individuals
Confidence in 2020 estimate	Low
Recovery partners	NT and Australian governments, Anindilyakwa Land Council, Groote Eylandt traditional owners, GEMCO, Dhimurru rangers (Arnhem Land).

Protecting the Hopping-mouse in the Top End

Surveying Northern Hopping-mouse numbers is challenging due to the remoteness of the species' habitat, with many areas difficult to access. Supported by the Australian Government, Territory NRM worked with the Anindilyakwa Land and Sea Rangers, the NT government and scientists to improve knowledge of the species' population distribution, which will help to inform future conservation actions. Surveys show the species is present on Groote Eylandt in several locations where it had not been previously recorded, possibly due to the remoteness of the areas.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Numbat

Photo: Shutterstock

Significant change in trajectory from 2005-15 to 2015-20? Yes, rate of increase has improved.

Improved trajectory?

Numbats (*Myrmecobius fasciatus*) are small, striped marsupials that were once widespread across mainland Australia. Numbats declined to only about 300 individuals in WA by the late 1970s, primarily due to predation by foxes and habitat loss. Additional threats include predation by feral cats, and frequent and intense fires.

Long term fox control undertaken at Dryandra and other specific key sites by the WA Government has benefited Numbats, in parallel with the broad-scale Western Shield Program for fox and feral cat baiting, supported by the Australian Government. Along with careful fire management, these recovery efforts have increased Numbat populations in WA.

Translocations to other sites in WA to re-establish Numbats in parts of their former range have been successful at some sites although not all. Translocations to a fenced area in SA and in NSW have resulted in self-sustaining populations. Recent translocations to fenced areas in WA look promising, and more translocations to predator-free exclosures in SA, NSW and the NT are underway or being considered.

These intensive and long-term recovery efforts have increased the total population to over 1,400 wild mature individuals. Ongoing work will ensure each subpopulation persists, particularly the unfenced populations in WA, and that additional subpopulations are established and genetic health and diversity is maintained.

Found in	WA, SA (fenced), NSW (fenced)
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2017), Conservation Advice (2018)
2020 population estimate	1,430 mature individuals in unfenced areas; 750 mature individuals in fenced exclosures (2018 estimate); ~15 in captive breeding (2018 estimate)
Confidence in 2020 estimate	Medium
Recovery partners	WA, SA, NSW, NT and Australian governments, Project Numbat, Perth Zoo, WA Recovery Team, Australian Wildlife Conservancy, Murdoch University, Numbat Taskforce.

Numbat Neighbourhood

Peel-Harvey Catchment Council's Numbat Neighbourhood is a 5-year project funded under the Australian Government's National Landcare Program - Regional Land Partnerships which brings together stakeholders and partners to improve the trajectory of the Numbat and other threatened species. Running until 2023, the project aims to boost Numbat numbers through Perth Zoo's breeding program, improve habitat and manage threats such as introduced weeds, feral pests and Dieback. The project is also supporting stakeholders and the community to implement Numbat recovery actions, such as protecting habitat and reducing threats on private land. Project leaders will work with the Noongar community and experts to develop a fire management plan, to address the threat of altered fire regimes.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Western Ringtail Possum

Photo: Adrian Wayne

Significant change in trajectory from 2005-15 to 2015-20? No significant change, ongoing decline appears less steep.

Improved trajectory?

The Western Ringtail Possum (*Pseudocheirus occidentalis*) is an arboreal, herbivorous marsupial endemic to the south-west of WA. It depends on high quality forage mostly from myrtaceous tree species. Western Ringtail Possums disappeared from at least 80 per cent of their pre-European range by 1980, and their distribution and population size has continued to decline due to habitat loss and fragmentation, timber harvesting, changed fire regimes, and predation by cats, foxes and dogs in some areas. Declines are likely to continue as climatic conditions become drier and warmer, as this affects the nutritional quality of the possums' preferred foliage, further changes fire regimes, causes overheating in the Possums, and changes their behaviour in ways that increase predation risk.

Conservation actions have included control of introduced predators, reducing impacts from timber harvesting and prescribed fire, and awareness-raising events to minimise the impact of human activities on Western Ringtail Possums where the species co-exists near people.

Found in	Western Australia
EPBC Act status	Critically Endangered
Conservation planning	Recovery Plan (2017), Conservation Advice (2018)
2020 population estimate	13,000 to >20,000 mature individuals
Confidence in 2020 estimate	Medium-high
Recovery partners	WA and Australian governments, Nature Conservation Margaret River, NESP Threatened Species Recovery Hub, local government and community groups, University of Western Australia, WA Recovery Team.

Creating safe havens for the Western Ringtail Possum

South West Catchment Council is working with a wide range of stakeholders to implement a recovery actions for the Western Ringtail Possum. The multifaceted project funded by the Australian Government includes improving the quality of habitat through weed control and revegetation, and the establishment of fauna crossings and vegetated corridors. Fauna crossings and corridors enable wildlife to move between populations, increasing gene flow and therefore improving the genetic health of populations. The translocation of ten individuals will also increase genetic variance and health.

Numerous organisations are undertaking education and awareness-raising events to minimise the impact of human activities on Western Ringtail Possums where they co-exist in urban and peri-urban areas. South West Catchment Council's project is also engaging the community through citizen science opportunities and educating the community on the risks pets can pose to possums.

THREATENED SPECIES STRATEGY – MAMMALS AT A GLANCE

Woylie

Photo: Babs & Bert Wells

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population still increasing but rate of increase reduced.

Improved trajectory?

Woylies (*Bettongia penicillata*) are small, brush-tailed marsupials that were once the most widely distributed of all the Bettongs, occurring across much of the mainland. Woylies rapidly declined after European settlement and were restricted to four areas in south-west WA by the 1960s. Population recovery as a result of broad scale fox baiting was observed in the 1990s, but this was followed by sudden population decline again in the 2000s, mostly due to increased cat predation.

Implementation of integrated broad scale fox and feral cat control using Eradicat, aerially deployed over 15,000 km^2 each year, is again facilitating the recovery of Woylies in south-west WA, via the WA Government's Western Shield program.

Other management actions have included translocations to intensively managed areas that are free of introduced predator or where predators are strongly controlled. Woylies are currently extant on three SA islands (all cat- and fox-free), within eight cat- and fox-free fenced exclosures, and in one fenced peninsula where some feral cats are present.

Found in	WA, SA, NSW (fenced)
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2012), Conservation Advice (2018)
2020 population estimate	50,000 – 95,000 mature individuals; 7,200 mature individuals in fenced exclosures and on islands One captive breeding population at Kanyana
Confidence in 2020 estimate	High
Recovery partners	WA, SA and Australian governments, Australian Wildlife Conservancy, Wheatbelt NRM, Northern and Yorke Landscape Board, Shire of Narembeen, WWF, Zoos SA, University of Adelaide, community groups.

Marna Banggara: Rewilding Yorke Peninsula

With support from the Australian Government, Northern and Yorke Landscape Board is working with various partners to reintroduce the Woylie within its former range on southern Yorke Peninsula. To prepare the release site, the team is managing cats and foxes, restoring habitat, controlling weeds and engaging the community to highlight the importance of vertebrate pest control to the environment and agriculture. This action is one of the key immediate species priorities going forward.

APPENDIX 3
SPECIES PROFILES FOR 30 PRIORITY PLANTS

Photo: Erin Lake

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Ant Plant

Photo: Fagg, M

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods.

Improved trajectory?

The Ant Plant (*Myrmecodia beccarii*) is an epiphyte that grows in the Wet Tropics of Queensland, where it occurs patchily from the Iron Range to Ingham. The Ant Plant has a fascinating symbiotic relationship with the Golden Ant which lives in the chambers of the tuber, and the Apollo Jewel Butterfly which lays its eggs on the plant. Key threats to this species include lowland paperbark woodland clearing, urbanisation, altered fire regimes, and cyclones. The Ant Plant appears relatively stable in National Parks but has been declining in the Cardwell and Ingham area for reasons that are not well understood.

Recovery actions have focused on *ex situ* germination and propagation techniques. Researchers from James Cook University investigated recovery options for the species, informing project development and determining that long-term seed storage is unlikely to be viable, so this species has not been banked. Under the Australian Government's National Landcare Program - Regional Land Partnerships work is also underway to improve Ant Plant habitat, improve knowledge, and undertake further monitoring.

Found in	Queensland
EPBC Act status	Vulnerable
Conservation planning	Conservation Advice (2008)
2020 population estimate	Unknown number of individuals. Two subpopulations in >50 locations
Confidence in 2020 estimate	Low
Recovery partners	Queensland and Australian Governments, James Cook University, Cape York Natural Resource Management (NRM), North Queensland NRM Alliance, Queensland Herbarium, Australian Tropical Herbarium, Takarah Gardens Nursery
Seed banked	No – seeds are non-orthodox (not amenable to traditional seed banking techniques, will require further research).

Tropical plant recovery research

With funding support from the Australian Government, in 2018 James Cook University led a research project to better understand the Ant Plant and its habitat. The project improved understanding of the species by providing a population census, informing propagation techniques and seed banking viability, as well as establishing *ex situ* conservation priorities. Although previous studies have investigated the evolution and ecological significance of the Ant Plant and the ant and ant-butterfly relationship, they have not focused on identifying where in the broader landscape the species occurs or investigated the basic horticultural requirements for *ex situ* conservation: this project helped fill these important knowledge gaps.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Black Grevillea

Photo: Fagg, M

Significant change in trajectory from 2005-15 to 2015-20? Yes, ongoing decline that has worsened.

Improved trajectory?

The Black Grevillea (*Grevillea calliantha*) also known as Foote's Grevillea, occurs in a very restricted area near Cataby in the Geraldton Sandplains bioregion of south-western Australia. It is known from seven subpopulations within a 24 km^2 range. Key threats include habitat loss, inappropriate fire regimes, infrastructure maintenance, and browsing from native and feral animals. Recruitment has been rare or absent at most subpopulations since monitoring began in 1988, therefore declines are ongoing.

Recent conservation efforts have focused on research and monitoring, installing roadside markers to prevent accidental clearing, herbivore exclusion fencing, seed banking and live *ex situ* collection. Translocations have also been undertaken and plants have survived to produce seed that germinated, but unfortunately the seedlings died soon after. There is potential for recovery post-2020 due to translocation, habitat protection and fire management.

Found in	Western Australia
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2008)
2020 population estimate	27 mature individuals
Confidence in 2020 estimate	High
Recovery partners	WA and Australian Governments, Northern Agricultural Catchments Council (NACC), Murdoch University, Botanic Gardens and Parks Authority (WA), WA Seed Centre (Kings Parks and Kensington)
Seed banked	Yes – WA Seed Centre (Kings Park and Kensington).

Undertaking translocations

With so few remaining plants in the wild, establishing new populations of the Black Grevillea is a priority for its future recovery. In 2017-2018, the WA Government translocated nearly 300 plants to three secure locations within the species' historical range. Plants were grown from seeds under strict hygiene conditions, planted into suitable habitats, and irrigated over the critical first summer. To protect these new plants, herbivore exclusion fencing was installed around the new sites and exclusion cages around each plant. Seeds were also collected and are now banked at the Threatened Flora Seed Centre in WA. This work was part of a larger project funded under the Australian Government's Threatened Species Recovery Fund to help recover four threatened Western Australian plants. Additional, targeted work for this species is continuing under the Australian Government's National Landcare Program - Regional Land Partnerships. NACC are leading work to monitor habitat, collect seed, and manage threats at known sites.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Blue-top Sun-orchid

Photo: Robert Bates

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was declining, now increasing.

Improved trajectory?

The Blue-top Sun-orchid (*Thelymitra cyanapicata*) is currently known from three small subpopulations on the Fleurieu Peninsula of South Australia. It is a terrestrial orchid which grows in Manna Gum (*Eucalyptus viminalis*) swampy woodland. The subpopulations are surrounded by pine plantations, and key threats include habitat loss and degradation, invasive weeds, competition with native vegetation, human visitation, and hybridisation.

Recent recovery efforts include fencing, weed control and population monitoring, as well as collection of seeds and associated mycorrhizal fungi to establish *ex situ* populations. Weed management and prevention of further habitat loss have helped mitigate decline and increase abundance of the species.

The taxonomic validity of the species is under question, and taxonomic review is the major research priority.

Found in	South Australia
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2008)
2020 population estimate	~90 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	SA and Australian governments, Royal Botanic Gardens Victoria, Adelaide Botanic Gardens, SA Botanic Gardens and State Herbarium, Hills and Fleurieu Landscape Board, Australasian Native Orchid Society, SA Seed Conservation Centre, Victorian Conservation Seed Bank
Seed banked	Yes – SA Seed Conservation Centre, Victorian Conservation Seed Bank.

Establishing *ex situ* collections

Establishing *ex situ* insurance populations of the Blue-top Sun-orchid will greatly assist the species' long-term survival. With support from the Australian Government's Threatened Species Recovery Fund, Royal Botanic Gardens Victoria delivered a project to help safeguard the Blue-top Sun-orchid from extinction. In 2018-19, *ex situ* collections were established at Royal Botanic Gardens Victoria with 800 seeds sown from genetically representative populations. Mycorrhizal fungi were also collected which are essential for the germination of terrestrial orchids. The Blue-top Sun-orchid subsequently germinated in large numbers in the laboratory, a milestone for the project. These genetically diverse *ex situ* collections will be important for future reintroductions. This work is part of a broader project to help in the recovery of four orchid species across SA and Victoria.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Bulberin Macadamia Nut

Photo: Fagg, M

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods.

Improved trajectory?

The Bulberin Macadamia Nut Tree (*Macadamia jansenii*, also known as Bulberin Nut) is the rarest of Australia's four *Macadamia* species. Wild populations are only found in Bulburin National Park, south-east Queensland. There are currently 210 plants known to exist in the wild, 20 plants in four translocated subpopulations, and several insurance populations at Botanic Gardens.

Key threats to this species include inappropriate fire regimes, burn incursion, weed invasion, and a lack of recruitment. Several plants were destroyed in the 2019-20 bushfires, but post-fire survivorship was higher than initially thought with many plants re-sprouting from the base.

Recent recovery efforts include the establishment of four *ex situ* populations, surveys to locate new plants, population monitoring, post-fire surveys, and fire and weed management. Most of the population is considered stable under current management, although declines would be likely if management ceases. The effect of recovery actions will take decades to manifest due to the slow-growing nature of the species.

Found in	Queensland
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2008), Recovery Plan (2009)
2020 population estimate	~120 mature individuals (102 juveniles)
Confidence in 2020 estimate	Low
Recovery partners	Queensland and Australian governments, Macadamia Conservation Trust, Bundaberg Botanic Gardens, Brisbane Botanic Gardens, Australian National Botanic Gardens (ANBG), Tondoon Botanic Gardens, Gayndah Agricultural Research Station, Foundation for Australia's Most Endangered Species (FAME), Hinkler Park Macadamia Plantation, Friends of the ANBG, Sunshine Coast University, Gidarjil Land Rangers
Seed banked	No – seeds are non-orthodox (not amenable to traditional seed banking techniques, will require further research).

Ensuring the future of the Bulberin Macadamia Nut Tree through strong partnerships

The 2019-20 bushfires damaged about a third of 150 individuals in Bulburin National Park. Three adult trees and a number of seedlings were lost. While many of the trees damaged by the fire have since re-sprouted, they remain vulnerable to weeds and fire. The risk of catastrophic fire events highlights the importance of supporting work to establish insurance populations of threatened plant species.

The Macadamia Conservation Trust is leading a project which has so far resulted in the establishment of four genetically distinct *ex situ* populations at four botanic gardens in Australia. The Australian Government provided initial funding under the Threatened Species Recovery Fund. The Government also brokered a partnership between the Macadamia Conservation Trust and the Foundation for Australia's Most Endangered Species, which led to more investment and the discovery of new populations of the species.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Button Wrinklewort

Photo: Erin Lake

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods.

Improved trajectory?

The Button Wrinklewort (*Rutidosis leptorhynchoides*) is a perennial daisy that grows in grassland and woodland communities in the ACT, NSW, and Victoria. It was once widespread in south-eastern Australia, but now occurs as subpopulations in restricted patches. Threats include ongoing habitat loss, competition with native grasses due to lack of fire, grazing and browsing, invasive weeds, climatic drying and low genetic diversity.

Button Wrinklewort is currently known at over 50 sites, some of which are successful translocation sites. Many of the larger subpopulations are stable with some increasing due to improved site management, however, some smaller subpopulations are declining. The total population is considered stable at present, but declines are predicted if management does not continue.

Recent conservation efforts have focused on monitoring and research, *ex situ* conservation, genetic research, reservation and land management agreements, ecological and site-based management, and weed control. Collection and collation of data across the range of the species would improve estimate of recent population trends.

Found in	ACT, NSW, Vic
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2012)
2020 population estimate	>213,000 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	ACT and Australian governments, South East Local Land Services (LLS), ACT NRM, Glenelg Hopkins Catchment Management Authority (CMA), Corangamite CMA, Australian PlantBank, Australian Botanic Garden, National Seed Bank, ANBG
Seed banked	Yes - Australian PlantBank (NSW), National Seed Bank (ACT).

Improving Button Wrinklewort habitat and raising awareness

Glenelg Hopkins CMA is delivering a 5-year project that aims to improve the condition of Natural Temperate Grassland of the Victorian Volcanic Plain, alongside several associated species, including the Button Wrinklewort. Funded under the Australian Government's National Landcare Program - Regional Land Partnerships, the project includes improved burning at three sites, seed banking and genetic analysis of seven populations, controlling vehicle access at one site, and identification of sites for establishing populations of Button Wrinklewort.

The project also has a strong community engagement component and has established a successful social media page to raise awareness and promote work being undertaken to help recover the species: www.facebook.com/buttonwrinklewort. Aptly named the 'lonely Button Wrinklewort' the page has brought the story of the Button Wrinklewort to new audiences and helped raise the profile more broadly for threatened plant conservation. The team running the page even won the People's Choice Award in the 2020 Threatened Species Bake Off, having baked a giant Button Wrinklewort cake and galvanising their new following to cast a vote.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Caley's Grevillea

Photo: Erin Lake

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was declining, now increasing.

Improved trajectory?

Caley's Grevillea (*Grevillea caleyi*) grows only in the northern suburbs of Sydney in the Terrey Hills area. It can be found in and around school grounds and other community facilities, including the gardens at the Bahá'í Temple at Ingleside. The main threats to this grevillea include habitat loss, inappropriate fire regimes, seed predation, and grazing by native and feral animals. The population undergoes extreme fluctuations as mature individuals become senescent in the absence of fire, which in turn stimulates mass recruitment of soil-stored seed.

Schools and the Bahá'í Temple carefully maintain grevilleas in their areas. Recent recovery actions have included appropriate fire management, weed control, and improving habitat quality. These actions appear to have ameliorated declines and contributed to some population increases, however plants may be lost in the future due to planned road widening.

To maintain populations, priority actions include continuing to implement appropriate fire regimes, reinforcing wild subpopulations with propagated individuals, protecting young seedlings and sites, and maintaining and expanding the existing seed collection.

Found in	New South Wales
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2018)
2020 population estimate	1,000 – 3,000 mature individuals
Confidence in 2020 estimate	High
Recovery partners	NSW and Australian governments, Pittwater and Warringah Local Councils, NSW RMS, community groups/organisations including Ingleside Bahá'í Temple and local schools, Greater Sydney LLS, Australian PlantBank, Australian Botanic Garden
Seed banked	Yes – Australian PlantBank (NSW).

Habitat restoration for the Caley's Grevillea

Caley's Grevillea is found only in urban areas, in northern Sydney. In 2018 Greater Sydney LLS commenced a 5-year project to improve the habitat of the Caley's Grevillea across its restricted distribution. The project is focusing on weed management, particularly weed infestations in known Caley's habitat and adjacent buffer zones, and revegetating habitat through planting local natives. Recovery actions have been undertaken at public sites such as Terrey Hills Oval, Bahá'í Temple, and Terrey Hills Primary School and have seen a high level of community engagement. This project is funded under the Australian Government's National Landcare Program - Regional Land Partnerships, with significant support from NSW Saving Our Species and community volunteers.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Central Australian Cabbage Palm

Photo: Erin Lake

Significant change in trajectory from 2005-15 to 2015-20? No significant change.

Improved trajectory?

The Central Australian Cabbage Palm (*Livistona mariae*) is the only palm found in central Australia and is separated by ~1000 km from any other member of its genus. It is important to central Australian Indigenous groups, being a food resource and cultural symbol. It is restricted to a small portion of the Finke River in the West MacDonnell Ranges in the Northern Territory. Most of the population occurs within Finke Gorge National Park.

A key threat to the Central Australian Cabbage Palm is invasive grasses, mostly buffel and couch, which increase fire risk and limit palm seedling recruitment. The species is also threatened by feral horse and cattle impacts, visitor impacts, erosion, and changed hydrology at the southern-most location. However, where monitoring data are available, subpopulations show no declines in mature individuals and some recruitment, despite poor habitat quality at some sites.

Recent recovery actions have included population monitoring, control of invasive grasses, habitat restoration, control of feral herbivores, seed collection, and collaborating with traditional owners to utilise traditional knowledge to better manage the species. Control of feral horses has improved plant health and density within Finke Gorge National Park and the overall population is likely stable under current management.

Found in	NT
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2018), Recovery Plan (2008)
2020 population estimate	~2,100 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	NT and Australian Governments, Territory NRM, traditional owners and Aboriginal Ranger groups, George Brown Darwin Botanic Gardens and Australian PlantBank, Australian Botanic Garden
Seed banked	Yes - George Brown Darwin Botanic Gardens conservation seed bank (NT) and Australian PlantBank (NSW).

Restoring central Australian water places

The Central Australian Cabbage Palm is reliant on groundwater and springs. With support from the Australian Government's Threatened Species Recovery Fund, the NT Government worked with landholders and Aboriginal groups to restore key water places where the palms are growing. Training has enabled Indigenous rangers to continue to manage these vital springs and the Central Australian Cabbage Palms growing in the area. The project also resulted in the development of management guidelines for significant water places in central Australia.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Fairy Bells

Photo: Erin Lake

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods.

Improved trajectory?

Fairy Bells (*Homoranthus darwiniodes*) occurs in woodland habitats with shrubby understoreys around the western slopes and central tablelands of New South Wales, including in the nationally listed threatened Box Gum Grassy Woodland Ecological Community. Populations of the species once existed in Wollemi National Park, but these are now presumed extinct. The species flowers throughout the year with graceful yellow and pink flowers.

Listed threats to Fairy Bells include inappropriate fire regimes, drought, grazing and browsing impacts, and myrtle rust, but the impacts of these threats are not well documented. Recent conservation efforts have included rabbit and goat control, seed collection, propagation trials, educating and working with the community to manage the species, and drawing on Indigenous fire management knowledge.

The species is considered stable under current management, although abundance fluctuates with time since fire. Timeseries monitoring and targeted ecological research will help document population trends and response to threats and management.

Found in	New South Wales
EPBC Act status	Vulnerable
Conservation planning	Conservation Advice (2008)
2020 population estimate	>100,000 mature individuals
Confidence in 2020 estimate	Low
Recovery partners	NSW and Australian governments, Hunter LLS, landowners, traditional owners and Aboriginal Ranger groups, Hunter Aboriginal Riverkeeper Team, Landcare groups, WA Threatened Flora Seed Centre, National Seed Bank
Seed banked	Yes – National Seed Bank (ACT).

Landcare and farmers restoring Fairy Bells habitat

Under the Australian Government's National Landcare Program - Regional Land Partnerships, Hunter LLS is leading a 5-year project to restore key Fairy Bells habitat (Box Gum and Grey Box Grassy Woodlands) in the upper Hunter region. The project is supporting farmers and local landcare to undertake revegetation and pest and weed control activities on private land. As part of this project, surveys are being conducted for Fairy Bells and seed collected to increase the diversity of the existing collection at the National Seed Bank. An extra 500-1,000 plants were located through field surveys in October 2019 and more than 600 seeds collected in 2020 (only 9 seeds were previously stored for this species).

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Fitzgerald's Mulla-mulla

Photo: Fagg, M

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods. Species is now considered common and has been delisted under the EPBC Act.

Improved trajectory?

Fitzgerald's Mulla-mulla (*Ptilotus fasciculatus*) is a perennial herb with woolly flowers. It was presumed extinct until it was rediscovered in 1987, and the species was listed as Endangered under the EPBC Act in 2006. Substantial survey effort since the species was included as a priority species under the Threatened Species Strategy in 2015 found the species in more locations and in higher numbers than previously estimated, with 14 new subpopulations found by volunteers. With these significantly higher numbers, the species no longer met listing criteria and was delisted from the EPBC Act in 2018. At the time of inclusion in the Threatened Species Strategy there were estimated to be about 3,000 plants, by 2020 that estimate had been revised to over 60,000.

Recent conservation efforts have included extensive surveys, seed collection and storage alongside habitat creation. The species is not considered to be declining with 19 of the 29 subpopulations occurring in nature reserves, so no immediate recovery action is required.

Found in	Western Australia
EPBC Act status	Not listed (de-listed in 2018)
Conservation planning	Not required
2020 population estimate	~ 65,000 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	WA and Australian Governments, Greening Australia, WA Seed Centre
Seed banked	Yes - WA Seed Centre (Kensington).

Improving Fitzgerald's Mulla Mulla habitat

From 2016 to 2018, Greening Australia led a large-scale project to revegetate 330 hectares of previously cleared farmland within the Yarra Yarra catchment. Over 300,000 plants survived to mature height. The increase in native vegetation cover created habitat for Fitzgerald's Mulla Mulla and allowed for opportunistic observations in the project area to locate new populations. This project was funded under the Australian Government's 20 Million Trees program.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Fleurieu Leek Orchid

Photo: South Australian Seed Conservation Centre

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was declining, now increasing.

Improved trajectory?

The Fleurieu Leek Orchid (*Prasophyllum murfetii*) is a tall, flowering orchid that occurs in the Critically Endangered Swamps of the Fleurieu Peninsula Threatened Ecological Community. The species' swamp habitat has changed over time due to land use alteration and water extraction. The orchid is now only found in tiny vegetation remnants on private property. Other key threats to this species include inappropriate fire regimes, grazing from native and feral animals, and competition from invasive weeds.

Recovery actions have included population monitoring and targeted searches, improving habitat quality through fire and weed control, and establishing exclosure fencing around subpopulations. Recent efforts have also focused on *ex situ* propagation research and expanding seed collections – 4.3 million seeds are now held in conservation seed banks.

Proactive management, particularly planned burns to promote recruitment, has led to an increase in flowering plants at many subpopulations and additional subpopulations are being located with targeted searches. The population was estimated to comprise 100-150 plants in 2006, but only three flowering plants were detected by 2014. This increased to 488 by 2020. Ongoing management will help maintain this trajectory.

Found in	The Fleurieu Peninsula, SA
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2008), Recovery Plan (2009)
2020 population estimate	~490 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	SA and Australian Governments, Royal Botanic Gardens Victoria, Adelaide Botanic Gardens, SA Botanic Gardens and State Herbarium, National Environmental Science Program's (NESP) Threatened Species Recovery Hub, Hills and Fleurieu Landscape Board, Australasian Native Orchid Society, National Parks and Wildlife Service fire team, SA Seed Conservation Centre
Seed banked	Yes - SA Seed Conservation Centre.

Growing the Fleurieu Leek Orchid in the laboratory

Scientists from the Australian Government's NESP Threatened Species Recovery Hub and the Royal Botanic Gardens Victoria are investigating growing leek orchids *ex situ*. Growing orchids in the laboratory is complex. Their microscopic seeds mean all orchids depend on a symbiotic fungus that lives in their roots and needs to inoculate their seed, so it can germinate. For most orchids, this relationship can be mimicked by growing the fungus in petri dishes in the laboratory, however, leek orchid seed seldom germinates when added. This research is helping better understand the conditions required to grow leek orchids, including the Fleurieu Leek Orchid, *ex situ*, and may provide future opportunities to establish insurance populations in new locations.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Glossy-leaved Hammer-orchid

Photo: Myles H. M. Menz, Ryan D. Phillips, Kingsley W. Dixon, Rod Peakall and Raphael K. Didham

Significant change in trajectory from 2005-15 to 2015-20? Yes, ongoing decline that has worsened.

Improved trajectory?

The Glossy-leafed Hammer-orchid (*Drakaea elastica*) was once widely found across the Swan Coastal Plain in south-western Australia. It has declined due to habitat loss for agriculture and urbanisation. It now grows at only 41 locations with a total population size of around 1,170 plants (with >90 per cent of plants occurring in seven locations), noting that the species is hard to find and has large inter-annual fluctuations, leading to uncertainty in population estimates. Nonetheless, declines are apparent and ongoing due to a range of threats, including ongoing habitat loss and degradation, inappropriate fire regimes, invasive weeds, grazing, and *Phytophthora cinnamomi*. However, one larger population appears stable.

Recent conservation actions have included exclosure fencing and the hand pollination of flowers. Populations are projected to stabilise with ongoing, intensive management post-2020. With more than 50 per cent of subpopulations occurring on private land, engaging with local stakeholders and regular population monitoring are priorities for management.

Found in	WA
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2009)
2020 population estimate	1,170 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	WA and Australian Governments, Perth NRM, WA's Threatened Flora Seed Centre, SA Seed Conservation Centre, Adelaide Botanic Gardens, SA Botanic Gardens and State Herbarium
Seed banked	Yes - WA Threatened Seed Centre (Kensington), SA Seed Conservation Centre.

Using limestone bridges to prevent dieback infestation

In 2018-2019, Perth Region NRM undertook management actions to protect the known population of the Glossy-leafed Hammer-orchid and supporting habitat (totalling 103 hectares) in the Paganoni Swamp Reserve. The focus was on protecting the orchid from the impacts and spread of *Phytophthora cinnamomi* dieback. A dieback management plan was developed, and access controlled through the installation of 1.3 km limestone green bridges on existing tracks. Green bridges are a thick limestone layer installed over the top of a track where it crosses a dieback infestation. *P. cinnamomi* is deterred from infesting limestone due to its alkalinity, so the surface reduces the spread of dieback across the reserve. This project was supported under the Australian Government's National Landcare Program - Regional Land Partnerships.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Kakadu Hibiscus

Photo: Craven, L.A.

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods.

Improved trajectory?

The only known wild population of Kakadu Hibiscus (*Hibiscus brennanii*) is on Mount Brockman in west Arnhem Land, within Kakadu National Park in the Northern Territory. It is found in small patches on sandstone cliffs, in gullies, and on broken sandstone pavement. It is a short-lived plant that may be sensitive to changing fire regimes, as it is no longer found in unburnt areas. Despite fluctuations due to fire, overall the species is considered to be stable although timeseries monitoring data would help inform trends.

Recent recovery efforts have focused on seed banking and establishing *ex situ* insurance populations. Propagation trials for the species have shown promising results and assessing options for the establishment of an *ex situ* population could be a future action, in consultation with traditional owners and Aboriginal Ranger groups. Further surveys are recommended to locate additional subpopulations, particularly after fire, in conjunction with research into the biology of the species and response to fire.

Found in	Kakadu National Park, NT
EPBC Act status	Vulnerable
Conservation planning	Conservation Advice (2008)
2020 population estimate	450 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	NT and Australian Governments (including Parks Australia - Kakadu National Park and the ANBG), traditional owners and Aboriginal Ranger groups, George Brown Darwin Botanic Gardens conservation seed bank, National Seed Bank
Seed banked	Yes - National Seed Bank (ACT), George Brown Darwin Botanic Gardens conservation seed bank (NT).

Establishing insurance populations in botanic gardens

Parks Australia worked with the Office of the Threatened Species Commissioner to establish an *ex situ* insurance population of the Kakadu Hibiscus at the ANBG. As part of the project, seeds were collected by Parks Australia (Kakadu) staff and traditional owners and Aboriginal ranger groups, the National Seed Bank at the ANBG, and the Darwin Botanic Gardens. After successful propagation trials, Kakadu Hibiscus were germinated and grown at the ANBG. The development of an *ex situ* insurance population helps to safeguard the species against extinction and may provide opportunities for future reintroductions or cultivation for commercial sale.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Little Mountain Palm

Photo: Peter Woodard

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was declining, now increasing.

Improved trajectory?

The Little Mountain Palm (*Lepidorrhachis mooreana*) is found only on the summit of Mt Gower on Lord Howe Island. It grows to 3 metres in height, and it is found in an area of less than 4 km^2. Invasive pests, such as rats and weeds, have been a major threat. Until 2020, black rats consumed many seeds and juvenile plants, severely limiting recruitment.

Recovery efforts have included a comprehensive program to eradicate rodents from the island, weed control, community education around biosecurity, and actions to protect the species' habitat. The number of plants increased sharply over the Strategy period, primarily due to rapidly declining rodent populations, after rats had been common on the island for approximately 90 years.

While strong suppression of rodents has led to significant increases in the Little Mountain Palm, the species remains sensitive to climate change impacts, which are likely to cause slow decline over time. Monitoring to inform long-term population trends in response to threats and management actions, and investigating conservation options for the species under climate change scenarios should be ongoing priorities.

Found in	Lord Howe Island, NSW
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2015)
2020 population estimate	16,000 - 47,000 mature individuals
Confidence in 2020 estimate	Low
Recovery partners	NSW and Australian Governments, Lord Howe Island Board, North Coast LLS, Lord Howe Island community, Australian PlantBank, Australian Botanic Garden
Seed banked	Yes - Australian PlantBank (NSW).

Biosecurity efforts and pest eradication key to Little Mountain Palm survival

In 2019, island-scale aerial and ground baiting control contributed to the decline of exotic rodents (house mice and black rats). Black rats are a major threat to the Little Mountain Palm as they predate on the seeds. This large-scale project was supported under World Heritage Grants. Further work targeting the Little Mountain Palm is also underway. Supported under the Australian Government's National Landcare Program - Regional Land Partnerships, a 5-year project is focusing on eradicating weeds over a minimum of 280 hectares across Mountain Palm habitat. Educating locals and tourists about biosecurity is included in this project, as exotic pests can make their way onto the island through transport such as ferries. Another potential threat to the species is the impact of climate change, and the project aims to better understand and protect the island's oceanic cloud forests, as well as increase the resilience of Mountain Palm habitat to climate change.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Magenta Lilly Pilly

Photo: Erin Lake

Significant change in trajectory from 2005-15 to 2015-20? No significant change.

Improved trajectory?

The Magenta Lilly Pilly (*Syzygium paniculatum*) is a rainforest tree found on the east coast of NSW. Its bright pink edible fruit are dispersed by flying foxes and rainforest birds. Ongoing threats include habitat loss and urbanisation, fire and drought stress, low genetic diversity, and invasive weeds.

Recovery efforts have included plantings, targeted surveys, genetic research, improving habitat quality via weed control and revegetation, and commercialisation of the species for garden nurseries. Recent surveys have identified significant subpopulations at Jervis Bay that have altered understanding of the species' taxonomy and its historical use by Indigenous people. Although up to 1,000 additional trees were located, these trees and many others, are potentially hybrids, therefore ongoing genetic research is required.

The trajectory changes for this species are non-significant as the species is long-lived and slow growing. It will take many years for the number of mature individuals to increase, so recovery actions are unlikely to manifest as positive improvements to the population's trajectory for at least 10 years.

Found in	NSW
EPBC Act status	Vulnerable
Conservation planning	Recovery Plan (2012)
2020 population estimate	Unknown (abundance likely to change with recent surveys and genetic research to distinguish hybrids)
Confidence in 2020 estimate	Low
Recovery partners	NSW and Australian Governments (including Parks Australia – Booderee National Park, ANBG), south-east NSW bioregion partnership, Greater Sydney LSS, South East LLS, traditional owners and Aboriginal Ranger groups, National Seed Bank
Seed banked	Yes - National Seed Bank (ACT).

Commercialisation of the Magenta Lilly Pilly and the Banksia Vincentia

The Office of the Threatened Species Commissioner and the ANBG are working together to commercialise the Magenta Lilly Pilly and Banksia Vincentia. Following horticultural trials and the selection of suitable individual plants to cultivate, both species will be available for purchase through the nursery and garden industry across Australia. A portion of profits will be returned to the threatened plant conservation program at the ANBG.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Matchstick Banksia

Photo: Shutterstock

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was declining, now increasing.

Improved trajectory?

The Matchstick Banksia (*Banksia cuneata*) grows in the Avon Wheatbelt in south-western Australia. There are only about 440 plants left in the wild at 18 different sites, with much of the species' habitat historically cleared for agriculture. Major threats to this species include inappropriate fire regimes, *Phytophthora*, ongoing habitat degradation, and invasive weeds. Minimal recruitment has been observed at all subpopulations since monitoring began in the 1980s.

Recent recovery efforts have included population monitoring and targeted searches, seed collection, and exclosure fencing. Translocation efforts funded under the Threatened Species Strategy resulted in marked population increases. Stimulation of recruitment in natural and translocated populations will be important to maintain these increases and prevent future declines.

Found in	WA
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2009)
2020 population estimate	450 mature individuals (these estimates exclude translocated individuals, which have not yet recruited)
Confidence in 2020 estimate	High
Recovery partners	WA and Australian Governments, Shires of Brookton, Quairading and Cuballing, Badjaling Wanderers Aboriginal group, Wheatbelt NRM, WA's Seed Centre (Kings Park and Kensington), Botanic Gardens and Parks Authority, National Seed Bank, ANBG
Seed banked	Yes - WA Seed Centre (Kings Park and Kensington), Australian PlantBank (NSW), National Seed Bank (ACT).

Translocating the Matchstick Banksia

In 2017-2018, the Western Australian Government led a project to help recover four threatened WA plant species, including the Matchstick Banksia. A translocation plan was developed for the Matchstick Banksia, 473 seedlings were translocated to a secure location, and herbivore exclusion fencing installed to protect the seedlings. Seedling health and survival was regularly monitored at reintroduction sites. Seed was also collected and stored at the WA's Threatened Flora Centre. This project was funded under the Australian Government's Threatened Species Recovery Fund.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Mongarlowe Mallee

Photo: Crisp, M.D.

Significant change in trajectory from 2005-15 to 2015-20? No significant change, possible shift to slightly declining trajectory.

Improved trajectory?

The Mongarlowe Mallee (*Eucalyptus recurva*), also known as 'the ice age gum', is the rarest eucalypt, with only six individuals remaining at four sites in New South Wales. It is an extremely long-lived tree, and the existing plants could be over 10,000 years old. In recent years, two of the six have deteriorated in health due to dieback, and the cause is not well-understood. Other threats include extremely low genetic diversity and weed invasion and habitat degradation due to mining at some sites.

Recent recovery efforts include *ex situ* propagation trials, aerial surveys for additional plants, weed control, and local site-based management, including the installation of fencing. In 2020, the Australian National Botanic Gardens successfully germinated the Mongarlowe Mallee *ex situ*. The next steps will be growing the seedlings to a more mature state and investigating options to augment the wild population with additional individuals. Improvements to the population's trajectory will only occur in the long-term due to the time taken for this slow-growing species to reach maturity.

Found in	NSW
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2015), Recovery Plan (2010)
2020 population estimate	Six mature individuals
Confidence in 2020 estimate	High
Recovery partners	NSW and Australian governments (including Parks Australia – ANBG), South East LLS, landholders, Australian PlantBank, Australian Botanic Garden
Seed banked	Yes – Australian PlantBank (NSW).

Ex situ and *in situ* recovery actions for the Mongarlowe Mallee

South East LLS, working in partnership with the Australian National Botanic Gardens (ANBG) and the New South Wales government, is delivering a five-year project to help in the long-term recovery of the Mongarlowe Mallee. The project includes both *in situ* and *ex situ* recovery actions. The ANBG, using specialist propagation techniques, is working to establish a successful method of growing the species to support the establishment of an *ex situ* insurance population. The project also involves field surveys to identify additional plants in the wild and fencing to restrict public access. This project is funded under the Australian Government's National Landcare Program - Regional Land Partnerships.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Morrisby's Gum

Photo: Shaun Brooks

Significant change in trajectory from 2005-15 to 2015-20? No significant change, ongoing trajectory of decline.

Improved trajectory?

Morrisby's Gum (*Eucalyptus morrisbyi*) is found in only two places in south-eastern Tasmania. In the early 1990s there were nearly 2,000 plants, but the species declined by over 90 per cent between 2011 and 2016. While the species' habitat has changed over time due to land use conversion, the recent declines are likely to be primarily driven by climatic drying, exacerbated by ongoing incremental habitat loss, animal browsing and hybridisation.

Both *ex situ* (seed banking, translocations) and *in situ* (weed control, exclosure fencing) management actions have been undertaken in recent years. Ongoing work is focusing on improving the gene flow between populations, establishing more *ex situ* populations, and undertaking site-based management including fencing. Declines continued during the 2015-2020 period but may have slowed compared to before 2015. Stabilisation and slow increases are predicted post-2020 as recovery actions take effect, but the species will remain management dependent.

Found in	South-east Tasmania
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2016), Recovery Plan (2006)
2020 population estimate	19 mature individuals (does not include translocated individuals)
Confidence in 2020 estimate	Medium
Recovery partners	Local, Tasmanian, and Australian governments, NRM South, Derwent Catchment NRM committee, Threatened Flora Link, Conservation Volunteers Australia, Greening Australia, Threatened Plants Tasmania, landowners, traditional owners and Aboriginal Ranger groups, University of Tasmania, Tasmanian Seed Conservation Centre, Royal Tasmanian Botanic Gardens, Australian PlantBank, National Seed Bank, ANBG
Seed banked	Yes - Tasmanian Seed Conservation Centre, Australian PlantBank (NSW), National Seed Bank (ACT).

A chance discovery for the Morrisby's Gum

Work to help recover the Morrisby's Gum has a strong emphasis on community involvement and engaging landholders. After promoting their work to help protect the Morrisby's Gum on social media in 2017, NRM South was contacted by a private landholder who was involved with recovery efforts in the 1990s, and who had planted out a section of their property with seedlings. The 20-year-old plantation was found to hold hundreds of healthy adult trees, many of which were producing seed. This was an exciting development for recovery efforts, adding valuable genetic diversity to a small gene pool. These plants will not be considered mature individuals until they recruit (produce a new generation): this will take many years as the species is slow-growing. The work being undertaken by NRM South was supported under the Australian Government's Threatened Species Recovery Fund.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Mossman Fairy Orchid

Photo: Ashley Field

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was declining, now slightly increasing.

Improved trajectory?

The Mossman Fairy Orchid *(Oberonia attenuata)* was presumed extinct until it was rediscovered in 2015. It is found only within the Mossman River Gorge in Daintree River National Park, in Queensland. Past population trends are not well understood, but historical decline can be inferred as the orchid is apparently absent from its original 1956 collection site. Declines are also inferred due to illegal collection.

Recent conservation actions have included research on the species' distribution, habitat, and ecology, as well as *ex situ* actions, such as seed collection and establishing living collections. The population is considered relatively stable under current management, with recent evidence suggesting recruitment is occurring and the population may be increasing. There are also large areas of unsurveyed, and in some cases inaccessible, habitat where the species may occur. Further surveys and timeseries monitoring will be important to improve understanding of population trends.

Found in	Mossman River Gorge, Qld
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2019)
2020 population estimate	261 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	Queensland and Australian governments, James Cook University, Queensland Herbarium, Australian Tropical Herbarium
Seed banked	No – seeds are non-orthodox (not amenable to traditional seed banking techniques, will require further research).

Ex situ conservation research

The ability to propagate plants in *ex situ* locations is a key recovery method for plant species and understanding species' requirements for propagation is crucial to informing management actions. Following the exciting rediscovery of the Mossman Fairy Orchid, the Australian government invested in research through James Cook University to inform recovery efforts. The research investigated the development of *ex situ* propagation techniques and establishing seed and tissue collection guidelines. While the research established several recommendations for *in situ* and *ex situ* conservation, it also highlighted the challenges involved in propagation methods for this species.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Ormeau Bottle Tree

Photo: Courtney Dunn Photography

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods.

Improved trajectory?

The Ormeau Bottle Tree (B*rachychiton* sp. Ormeau) is a rainforest tree with a distinctive, swollen, bottle-like trunk that is found along creeks and rivers in a very restricted area of south-east Queensland. It is a long-lived species, with individuals taking over 20 years to reach maturity and reproduce. Key threats to the Ormeau Bottle Tree include habitat loss and fragmentation, fire incursion, and invasive weeds. Low genetic diversity was assumed due to the low number of individual trees, however a recent study found active recruitment and no evidence of inbreeding.

Recent recovery efforts include surveys, weed and fire management, seed collection and propagation, negotiation with landholders to improve protection of trees, and habitat mapping. Surveys for the Ormeau Bottle Tree in 2019 found 121 mature trees, similar to a previous survey in 2009, as well as an additional 350 juvenile trees. The population is considered stable, with increases expected post-2035 as these juveniles reach maturity. Ongoing weed and fire management will help ensure the survival of these juvenile plants.

Found in	South-east Qld
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2013)
2020 population estimate	~120 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	Qld and Australian governments, Healthy Land and Water Ltd, Gold Coast Sustainability Ltd, Friends of the Ormeau Bottle Tree, Gold Coast Botanic Gardens, City of Gold Coast, North East Albert Landcare, Brisbane Botanic Gardens Conservation Seed Bank, industry groups, private landholders
Seed banked	Yes – Brisbane Botanic Gardens.

Healthy Ormeau Bottle Tree juveniles discovered

In 2019, Healthy Land and Water discovered 350 juvenile Ormeau Bottle Trees, more than doubling the known population. This discovery was part of a broader project implementing priority actions to help recover the Ormeau Bottle Tree. Project leaders worked closely with land managers to guide them in on-ground actions, such as weed and fire control, to contribute to the conservation of the species, including newly found individuals. This project was funded under the Australian Government's National Landcare Program's - Regional Land Partnerships.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Purple Wattle

Photo: R, Hotchkiss

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods.

Improved trajectory?

The Purple Wattle (*Acacia purpureopetala*) is the only Australian wattle with purple flowers. It grows on the rocky slopes on the Einasleigh Uplands in north-eastern Queensland and flowers between May and September. Prior to its inclusion as a priority species under the Threatened Species Strategy, the population of Purple Wattles was estimated at ~500 individual plants, however surveys funded under the Strategy found over 7,000 mature individuals in 14 subpopulations. Other recovery efforts have included propagation trials, sensitive fire management, and seed collection and banking. The species is now considered stable and there is no evidence of ongoing decline.

Found in	North-east Qld
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2014)
2020 population estimate	>7,000 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	Qld and Australian governments, Bush Heritage Australia, CSIRO, Vegetation Management Science, National Herbarium of New South Wales, Australian PlantBank, Australian Botanic Garden
Seed banked	Yes – Australian PlantBank (NSW).

An exciting and significant discovery

With support from the Australian Government's Threatened Species Recovery Fund, Bush Heritage Australia worked with CSIRO, the National Herbarium of New South Wales and Vegetation Management Science to support the recovery of the Purple Wattle and evaluate its range and threats. The project resulted in the discovery of thousands of individual plants, providing a significant boost to known population numbers. In addition, the project undertook genetic research, as well as investigated seed germination techniques. Researchers found strong genetic variance between the three populations surveyed. Seed germination was effective, showing the Purple Wattle can be efficiently propagated. These results provide the opportunity to establish *ex situ* populations to further safeguard the species.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Scaly-leaved Featherflower

Photo: Northern Agricultural Catchments Council

Significant change in trajectory from 2005-15 to 2015-20? Yes, although ongoing trajectory is declining, the rate of decline has significantly lessened.

Improved trajectory?

The Scaly-leaved Featherflower (*Verticordia spicata* subsp. *squamosa*) grows in tiny fragmented subpopulations in mallee shrublands near Geraldton in Western Australia. The taxon may always have been naturally rare. The main threats include habitat loss, lack of recruitment, the impacts of rabbits, and invasive weeds.

Recovery efforts have included translocations, targeted surveys, herbivore exclosure fencing, pest control, and seed banking. Management actions have slowed the rate of decline and should continue to benefit the species into the future, particularly translocations and exclosure fencing.

Recent genetic research has found that the Scaly-leaved Featherflower should no longer be regarded as a distinct subspecies. Finalising this research is a priority to confirm the species' taxonomic and conservation status.

Found in	Geraldton, WA
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2016)
2020 population estimate	~110 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	WA and Australian Governments, Northern Agricultural Catchments Council, landowners, the local community, WA's Seed Centre
Seed banked	Yes – WA Seed Centre (Kensington).

New discoveries and translocations

The Australian Government has supported two recent, targeted projects to help in the recovery of the Scaly-leaved Featherflower. One project was led by the Northern Agricultural Catchments Council and involved 8 plant surveys, which helped to discover two new sub-populations in 2018. The WA Government led the second project, which saw seed banked and 85 plants translocated to two secure locations in 2017-2018. The collective work of both projects has increased the species' chance of survival by increasing the population and improving genetic diversity. Both projects undertook habitat restoration and protection from pests, including constructing herbivore exclusion fencing.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Shy Susan

Photo: Royal Tasmanian Botanical Gardens

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was declining, now increasing.

Improved trajectory?

The Shy Susan (*Tetratheca gunnii*) is a purple-flowering shrub that occurs on rocky outcrops near Beaconsfield in Tasmania. It was presumed extinct until its rediscovery in 1985. The species is naturally rare and there are currently 150 mature plants known from a range of less than 5km^2. The main threats include habitat loss, inappropriate fire regimes, a low seed set, and grazing by rabbits and macropods. The population fluctuates with time since fire, with post-fire increases observed from 2015-2020. Fire is important for seed germination and for maintaining open habitat required for this species to complete its life cycle.

Recent recovery efforts have included targeted surveys, exclosure fencing to prevent grazing and seed collection. Translocations have also been attempted, although with very low success. Monitoring in 2018 led to the discovery of a new subpopulation of 80 mature individuals, however ongoing management will be important to maintain the population.

Found in	Tasmania
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2016)
2020 population estimate	>150 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	Tasmanian and Australian governments, NRM North, Threatened Plants Tasmania, Tasmanian Seed Conservation Centre, Royal Tasmanian Botanic Gardens, community volunteers
Seed banked	Yes - Tasmanian Seed Conservation Centre.

Annual monitoring leads to discovery

One of the key threats to the Shy Susan is its restricted range and small numbers, which is why searching for new populations is important for the species' future. The Australian Government provided funding to NRM North for a targeted Shy Susan project that includes searching for new populations. During an annual survey in 2018, NRM North, Threatened Plants Tasmania and local volunteers located a new and healthy population of Shy Susan. New populations are significant as they may increase genetic diversity in the species.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Silver Daisy Bush

Photo: Fagg, M

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods.

Improved trajectory?

The Silver Daisy Bush (*Olearia pannosa* subsp. *pannosa*) is found across southern South Australia, where it is scattered in small subpopulations throughout agricultural areas. Recent genetic analysis indicates the species may also extend into Victoria.

The main threats to the Silver Daisy Bush include habitat loss, grazing by domestic livestock, and low genetic diversity. There is also concern climatic drying will reduce the species' range. However, the impacts of these threats are not well-documented. Recent recovery efforts have included the translocation of 3,000 individuals, seed collection, habitat restoration focusing on weed control and population monitoring.

Overall, the population is considered relatively stable, with the species' abundance expected to increase post-2020 due to management actions.

Found in	SA
EPBC Act status	Vulnerable
Conservation planning	Conservation Advice (2013)
2020 population estimate	~4,460 mature individuals
Confidence in 2020 estimate	Low
Recovery partners	SA and Australian governments, Trees for Life, Limestone Coast Landscape Board, University of Adelaide, Goolwa To Wellington Local Action Planning Group, Murraylands and Riverland Landscape Board, Eyre Peninsula Landscape Board, Northern & Yorke Landscape Board, Hills and Fleurieu Landscape Board, Kangaroo Island Landscape Board, Worlds End Conservation, SA Seed Conservation Centre, Adelaide Botanic Gardens, SA Botanic Gardens and State Herbarium, National Seed Bank, ANBG
Seed banked	Yes – SA Seed Conservation Centre, National Seed Bank (ACT).

Plantings across 5 NRM regions

Research conducted by Trees for Life, University of Adelaide and the South Australian Government identified low genetic diversity as a bigger threat to this species than invasive weeds. Trees for Life worked with its partners, including 5 NRM regions, to plant 3,000 seedlings and increase the genetic diversity of populations. Planting sites for seedlings were informed by climatic modelling undertaken by the University of Adelaide. The project was also nominated as a finalist in the Australian Government's Landcare Partnerships Award. It was supported under the Australian Government's Threatened Species Recovery Fund.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Silver Gum

Photo: John Tann

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods.

Improved trajectory?

The Silver Gum (*Eucalyptus crenulata*), or Buxton Gum, is a small eucalypt, known for its greenish-grey leaves and white to cream flowers that appear in spring. It is known from only two subpopulations with a total population of ~ 660 mature individuals. The species appears to be naturally rare but has declined in the past due to conversion of its habitat for agriculture, and changed hydrology associated with regulating flows of the Yarra River.

Recent recovery efforts have included invasive weed control, revegetation, public access walk diversion, seed banking, and population monitoring. The overall population is considered stable because of a seed orchard and translocation funded under the Threatened Species Strategy.

Timeseries monitoring data will help accurately discern population trends. Further management actions will assist to improve habitat quality at both subpopulations.

Found in	Victoria
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2016)
2020 population estimate	~660 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	Victorian and Australian governments, Goulburn Broken CMA, Victorian Land Corporation, Euora Arboretum, Taungurung Land and Waters Council, Victorian Conservation Seedbank, Royal Botanic Gardens Victoria, Australian PlantBank, Australian Botanic Garden, National Seed Bank, ANBG, landowners
Seed banked	Yes – Victorian Seed Conservation Centre, Australian PlantBank (NSW), National Seed Bank (ACT).

Establishing a seed orchard for the Silver Gum

The Victorian Land Corporation, in partnership with Euroa Arboretum and species experts, led a project which saw the establishment of a seed orchard at Marysville and the discovery of a new sub-population of Silver Gum on private land at Acheron. To improve species security, 110 plants were successfully planted at the seed orchard plus a further 16 at two private land sites. A report was also produced to inform future conservation work under climate change scenarios. This project was supported under the Australian Government's Threatened Species Recovery Fund.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Small Purple-pea

Photo: Fagg, M

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory was slightly declining, now increasing.

Improved trajectory?

The Small Purple-pea (*Swainsona recta*) was once widespread across south-eastern Australia occurring in grassy woodlands and open forests. This habitat has been extensively cleared for agriculture and the species is now found only in small, and often isolated, subpopulations in the ACT, NSW, and Victoria. Ongoing threats include habitat loss and degradation, invasive weeds, and domestic stock grazing. Recruitment is also low across the population.

Recovery efforts have included weed control, exclusion fencing, fire management, seed collection, *ex situ* propagation of plants, and translocation. The overall population is considered relatively stable with large subpopulations now secure. In response to recovery actions, some subpopulations increased over the 2015-20 period, particularly due to planned burning and translocation. Recent good rainfall also contributed to population increases, with over 6,000 plants detected in one subpopulation in a 2020 survey. Abundance fluctuates seasonally, and ongoing monitoring and collation of timeseries data will assist in accurately inferring population trends and responses to management.

Found in	NSW, ACT, Vic
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2012)
2020 population estimate	>10,000
Confidence in 2020 estimate	Low
Recovery partners	NSW, ACT, Vic and Australian governments (including Parks Australia – ANBG), Royal Botanic Gardens Victoria, North East CMA, Central Tablelands LLS, Central West LLS, ACT NRM, Goulburn Broken CMA, Trust for Nature, The Trustee for Wandiyali Restoration Trust, Mount Rothwell Conservation and Research Centre, Australian Wildlife Conservancy, Landcare and Friends groups, Woodlands and Wetland Trust, Mulligans Flat-Goorooyarroo Woodland Experiment, Canberra Nature Map, Conservation Volunteers Australia, Molonglo Catchment Group, Australian PlantBank, Australian Botanic Garden, Victorian Conservation Seedbank, National Seed Bank
Seed banked	Yes – The Australian PlantBank, Australian Botanic Garden (NSW), Victorian Conservation Seedbank, National Seed Bank (ACT).

Encouraging citizen science and the discovery of new Small Purple-pea populations in NSW

With support from the Australian Government, Central West LLS and Central Tablelands LLS are leading projects and working together to help recover the Small Purple-pea. The projects have a strong citizen science component, producing brochures and signs to generate interest in the community and educate the public in identifying and reporting Small Purple-pea finds.

Through the Central Tablelands LLS-led project, two new populations of Small Purple-pea were discovered in the Central Tablelands, NSW, in late 2018. Both projects aim to increase community and landholder involvement and involve seed banking, *ex situ* translocations, pest and weed control, monitoring, and habitat management. Project partners include the NSW government, Australian National Botanic Gardens, the community, and landholders.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Southport Heath

Photo: Erin Lake

Significant change in trajectory from 2005-15 to 2015-20? Yes, ongoing decline that has worsened.

Improved trajectory?

The Southport Heath (*Epacris stuartii*) is a small, hardy heath endemic to south-east Tasmania. The only known wild population occurs on Southport Bluff. The species is thought to be so restricted because of the short range of its seed dispersal, which is less than a few metres per plant. Key threats to the Southport Heath include inappropriate fire regimes, grazing by native vertebrates, climate change, and *Phytophthora* dieback.

An *ex situ* population was established on Southport Island in 2000, but is not yet considered self-sustaining. A recent survey found this insurance population is healthy, but the original wild population showed increased decline between 2015-20. However, this was partly due to a management burn, which should stimulate recruitment and thus stabilise and possibly increase this population post-2020. Invasive weed management and installing and maintaining exclosure fences will help protect post-fire seedlings.

Found in	Southport Bluff, Tasmania
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2016), Recovery Plan (2001)
2020 population estimate	~180 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	Tasmanian and Australian governments, NRM South, Tasmanian Seed Conservation Centre, Royal Tasmanian Botanic Gardens, Threatened Plants Tasmania, Pakana Services, Conservation Volunteers Australia
Seed banked	Yes - Tasmanian Seed Conservation Centre.

Volunteers help tackle a key threat

With support from the Australian Government's Threatened Species Recovery Fund, Conservation Volunteers Australia led a project working with volunteers to help address key threats to the Southport Heath. Over 2018 and 2019, volunteers travelled to remote sites to carry out vegetation surveys, undertake weed control, and reinstate or repair fences. This work helps improve our understanding of the species, improve habitat, and address key threats by reducing disturbance, and the likelihood of *Phytophthora* introduction.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Spiny Rice Flower

Photo: Neville Walsh/ Royal Botanic Gardens Board

Significant change in trajectory from 2005-15 to 2015-20? No significant change, population reasonably stable in both periods.

Improved trajectory?

The Spiny Rice Flower (*Pimelea spinescens* subsp. *spinescens*) is a small shrub found only in the grasslands of central-western Victoria. It is typically associated with the Critically Endangered Natural Temperate Grassland of the Victorian Volcanic Plain Ecological Community. The species mostly occurs in small patches of remnant vegetation following historical land clearing for agriculture and urbanisation. Ongoing threats include inappropriate fire regimes, habitat loss and fragmentation, invasive weeds, and infrastructure maintenance, particularly around roadside subpopulations.

There have been concerted efforts to recover the species, including through the establishment of the Pimelea Conservation Trust Fund which has supported habitat management, translocation, and research. Overall, the species currently appears relatively stable and has good recovery prospects if management continues.

Found in	Victoria
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2016), Recovery Plan (2006)
2020 population estimate	>88,000 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	Victorian and Australian governments, Spiny Rice Flower Recovery Team, Pimelea Conservation Trust, Trust for Nature, Goulburn Broken CMA, North Central CMA, Glenelg Hopkins CMA, Corangamite CMA, Indigenous organisations, private landowners, Victorian Conservation Seedbank, Royal Botanic Gardens Victoria
Seed banked	Yes - Victorian Conservation Seedbank.

Propagating the Spiny Rice Flower

Understanding the most effective means to propagate plant species is critical in developing management practices. Supported by the Australian Government's Threatened Species Recovery Fund, Trust for Nature worked with Indigenous organisations, private landholders, and the Victorian Government to ensure the future of the Spiny Rice Flower, including undertaking research to determine the best way to propagate plants. Germinating the seeds failed due to the species' low germination rate. Growing the plant from fresh cuttings was more successful and 150 seedlings were ready to be planted in 2019. The project established eight new populations of Spiny Rice Flower across the Victorian Riverina and Victorian Volcanic Plains in protected areas. Flowering was reported in 2019, with over 650 individuals at six sites counted during 2018-19 surveys. Trust for Nature worked with Indigenous organisations such as the Wathaurong Aboriginal Cooperative, which enabled the sharing of knowledge and strong engagement opportunities.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Turnip Copperburr

Photo: Australian Network for Plant Conservation

Significant change in trajectory from 2005-15 to 2015-20? Yes, trajectory has changed from gradual decline to gradual increase.

Improved trajectory?

The Turnip Copperburr (*Sclerolaena napiformis*) is a member of the saltbush family and grows mainly in grassland and remnant Buloke woodland habitat. It was thought once to be widespread through the Riverina and Murray Darling regions in Victoria and NSW. It now occurs at approximately 40 sites, which are likely to represent less than 1 per cent of the species' original distribution. Key threats include habitat loss, invasive weeds, inappropriate fire regimes, and infrastructure maintenance, particularly for road-side subpopulations.

Recovery actions have focused on surveys, weed control, and grazing exclusion. Recent monitoring indicates the two largest subpopulations in NSW are stable. One of these sites contains more than 95 per cent of the total population, and this is on secure tenure with few threats.

Found in	NSW and Victoria
EPBC Act status	Endangered
Conservation planning	Recovery Plan (2010)
2020 population estimate	>100,000 mature individuals
Confidence in 2020 estimate	Medium
Recovery partners	NSW, Victorian and Australian governments, Trust for Nature, Royal Botanic Gardens Victoria, North Central CMA, Goulburn Broken CMA, La Trobe University, Australian PlantBank, Australian Botanic Garden, Victorian Conservation Seedbank, Royal Botanic Gardens Victoria
Seed banked	Yes – Australian PlantBank (NSW), Victorian Conservation Seedbank.

Securing the future of the Turnip Copperburr

With support from the Australian Government's Threatened Species Recovery Fund, the Royal Botanic Gardens Victoria led a project from 2017 to 2019 to improve conservation outcomes for the Turnip Copperburr through research to increase understanding of the species. Genetic surveys quantified gene-flow among sites and degree of population vulnerability, and research showed the species can self-pollinate. Researchers modelled the current species distribution as well as future distribution based on climate predictions, work which will contribute to evidence-based decisions on management and choosing sites for future translocations. Conservationists collected 33,800 seeds from 27 populations and developed an *ex situ* population at the Royal Botanic Gardens Victoria, and the project also supplied plants to Trust for Nature for translocation work. Community involvement was an important part of the project, with landholders involved in conservation efforts via permanent monitoring plots set up on their properties.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Vincentia Banksia

Photo: Corinne Le Gall/ Parks Australia

Significant change in trajectory from 2005-15 to 2015-20? Yes, ongoing decline that has worsened.

Improved trajectory?

Vincentia Banksia (*Banksia vincentia*) is only found at a single coastal location near Vincentia in the Jervis Bay area of New South Wales. Only four mature individuals and six seedlings are known. The species was stable at very low numbers between 2005-2015, but declined from 2015-2020 despite active management, due to the death of mature plants and limited recruitment. Additional threats to this species include habitat loss, inappropriate fire regimes, and *Phytophthora* dieback.

Extensive population monitoring has occurred since 2008 and *ex situ* populations have been established in botanic gardens with over 1,000 plants now in cultivation. Re-introductions have been trialled with 10 cultivated individuals planted into the wild population. Further translocations could support increases in the wild population post-2020, however taxonomic work is first required to clarify the species' taxonomic status.

Found in	NSW south coast
EPBC Act status	Critically Endangered
Conservation planning	Conservation Advice (2018)
2020 population estimate	Four mature individuals (does not include translocations)
Confidence in 2020 estimate	High
Recovery partners	NSW and Australian governments (including Parks Australia - ANBG, Booderee Botanic Gardens), South East Bioregion Working Group, Australian PlantBank, Australian Botanic Garden
Seed banked	Yes – Australian PlantBank (NSW).

Seed orchard success

With support from the Office of the Threatened Species Commissioner, Parks Australia is constructing new seed orchards at Booderee National Park and the Australian National Botanic Gardens, to help secure the future of the *Banksia vincentia*. Booderee has propagated over 1,200 plants of eight different genotypes, with the goal of having 800 planted within the Booderee orchard by 2021. The seed orchards will help enable future reintroductions, translocations to new sites, and commercial propagation.

THREATENED SPECIES STRATEGY – PLANTS AT A GLANCE

Whibley's Wattle

Photo: Fagg, M

Significant change in trajectory from 2005-15 to 2015-20? No significant change, possible shift to slightly increasing trajectory.

Improved trajectory?

The Whibley's Wattle (*Acacia whibleyana*) is found only near Tumby Bay in the south-eastern Eyre Peninsula, South Australia. It is a dense shrub which grows up to 2.5m high and is inconspicuous for most of the year, apart from when flowering in September. The seeds of this wattle are dispersed by ants, and the species is associated with the Peppermint Box Grassy Woodland ecological community. The key threats to this species include habitat loss and fragmentation, a lack of recruitment, low genetic diversity, inappropriate fire management, and invasive weeds.

Population estimates have recently expanded, however, this is due to increased survey effort rather than increases in plant numbers. Since 2015 the number of known subpopulations has increased from four to five, possibly six (pending further surveys). This was the result of increased community awareness and targeted plant surveys. Nevertheless, declines between 2005-2015 were somewhat reversed due to management between 2015-2020, including active disturbance management to promote recruitment and translocation. This management, along with timeseries monitoring, will assist in informing future population trends in response to threats and management.

Found in	The Eyre Peninsula, South Australia
EPBC Act status	Endangered
Conservation planning	Conservation Advice (2013)
2020 population estimate	~910 mature individuals
Confidence in 2020 estimate	High
Recovery partners	SA and Australian governments, Eyre Peninsula Landscape Board, South Australian Seed Conservation Centre, Black Hill Flora Centre, Adelaide Botanic Gardens, SA Botanic Gardens and State Herbarium, University of Adelaide, Greening Australia, Tumby Bay Area School, District Council of Tumby Bay, Australian PlantBank, Australian Botanic Garden, National Seed Bank, ANBG
Seed banked	Yes – SA Seed Conservation Centre, Australian PlantBank (NSW), National Seed Bank (ACT).

Multifaceted recovery for the Whibley's Wattle

Eyre Peninsula Landscape Board partnered with the University of Adelaide, the South Australian government, Greening Australia, landowners, Tumby Bay Area School and the District Council of Tumby Bay on a multifaceted recovery project between 2018 and 2019. The project led to the discovery of an additional 891 individuals, bringing the population count to over 1,800 plants (not all of these are mature individuals). The team also developed a management plan and community education tools, such as flyers, posters, social media posts and roadside markers. As part of the project, the University of Adelaide undertook genetic research on four sub-populations. Research showed the sub-populations are genetically distinct, with no evidence of in-breeding. This project was supported under the Australian Government's National Landcare Program - Regional Land Partnerships.