Science
for saving species

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Final edition
Issue 19

A golden opportunity realised, but so much more to do

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Reflections from our leaders and partners

Threatened Species Recovery Hub

National Environmental Science Programme

IMAGE: NICOLAS RAKOTOPARE

The Threatened Species Recovery Hub: Reflections

IMAGE: NT MUSEUM AND ART GALLERY

Dr Steve Morton,
Chair, Hub Steering Committee

Effective collaborations with owners and custodians of Country were critical to the success of the hub. Shown here is Professor Sarah Legge talking with people about the hub's Arid Zone Monitoring project at a workshop hosted by Paruku Rangers in 2018.

IMAGE: JAANA DIELENBERG

Hugh Possingham told me in 2015 about an exciting investment by the Department of Environment in a Threatened Species Recovery Hub. Hugh is most persuasive, and I soon found myself agreeing to chair the hub's Steering Committee. Seven years later, working now with Brendan Wintle after he succeeded Hugh as Director, what impressions do I retain?

Chief among them is a feeling of personal privilege at working with Brendan and his hub leadership team, a group comprising much of the cream of Australian conservation science. Further, there is satisfaction at the threatened species recovery that will be the hub's principal legacy, and which will be emphasised by those closer to the research – in short, many threatened species are far better off than they were seven years ago. My reflections, though, consider wider outcomes of the hub.

Foremost is the way in which the hub conducted its research. Every project was interrogated to ensure that it incorporated collaboration with the people fundamental to its use. My career has been a lifelong lesson in this requirement, for too often have I seen otherwise superb research disappear like smoke because those who might implement change in response to it had been poorly consulted. Not this time!

Of particular importance is collaboration with Aboriginal and Torres Strait Islander people. As the hub matured, so did its connections with owners and custodians of Country, thanks especially to Indigenous Liaison Officer Brad Moggridge's efforts in facilitation. I believe that Aboriginal and Torres Strait Islander people belong at the centre of our nation's life, and that the hub's scientists have, in their own small ways, contributed to the eventual realisation of such an ambition.

The third plank in effective collaboration is collegiality among scientists. Intellectual progress rests on competitive instincts; equally, though, benefits of research are maximised when scientists put common shoulders to a wheel. The hub has demonstrated collegiality through and through.

The collaboration will not stop here, for a major legacy lies in the hub's creation of a cadre of early career researchers who will take it for granted that this is the way things are done. I am envious of your experiences as young scientists and urge you to maintain these habits consciously into the future.

Finally, plaudits are due to the Department of Agriculture, Water and the Environment (DAWE) for its support of research, for the clarity of its governance, and for its insistence that the work be done in the ways described above. In developing long-term research through the hubs, DAWE continues to exert a profoundly beneficial effect on environmental science in Australia.

Best wishes to all our collaborators, and to the threatened plants and animals that depend on us.

Inside the final issue of *Science for Saving Species*

We acknowledge the Traditional Custodians of the land on which we live and work and pay respect to the Elders, past and present, and extend that respect to all Aboriginal and Torres Strait Islander people.

Scientists from The University of Western Australia have collaborated with Western Australian Government partners on research that aims to help several threatened species, such as the western swamp turtle, to persist as climate continues to change.

IMAGE: NICOLAS RAKOTOPARE

A golden opportunity realised, but so much more to do

IMAGE: NICOLAS RAKOTOPARE

Professor Brendan Wintle,
The University of Melbourne
Threatened Species Recovery Hub Director

The extinction crisis, like all of society's most wicked challenges, is daunting. However, unlike other existential threats such as climate change and pandemic, biodiversity loss has yet to attract financial and policy commitment that is adequate to address what is now a global crisis.

That is one of the reasons why the Threatened Species Recovery Hub, which was supported by $32M from the Australian Government's National Environmental Science Program and $40M in contributions from hub partners, was a unique and critically important opportunity to deliver science for saving Australia's species.

We were given six years to provide the science to improve the outlook of (over 1800) threatened species. No pressure. After 147 research projects, we have arrived at the end of an incredibly challenging, exciting and fulfilling journey. Together, the efforts of 260 staff and researchers, including 77 postdoctoral researchers and 82 students, collaborating with 250 wonderful partner organisations, including 65 Indigenous groups, has transformed science, influenced policy and raised the profile of threatened species.

You will get a taste of the incredible body of work that has been delivered in the following pages. At the national level this has included things like identifying our most immediately imperilled species to provide time to act, a threatened species index adopted as a core national biodiversity indicator and new state policies for biodiversity sensitive urban design.

But the issues confronting many species are local and for these we have delivered more than 100 on-ground collaborative projects, such as Martu-led monitoring of mankarr (bilby), award-winning cross-cultural conservation planning and IUCN Green Listing at co-managed Arakwal National Park, support for Kangaroo Island's post-fire recovery planning, genetic modelling to help inform mammal translocations to Dirk Hartog Island, and greatly improved detection methods for a range of cryptic species and new knowledge on their distributions.

The relationships we developed with the nation's land managers and policy-makers have allowed us to do the useful stuff – research with a direct pathway to impact. In many cases, these relationships were brokered or facilitated by our amazing knowledge brokering and Indigenous engagement teams, led by Rachel Morgain and Brad Moggridge.

The Kangaroo Island dunnart has greatly benefited from hub research led by Charles Darwin University which determined the most effective monitoring method for the cryptic species and applied it to extensive surveys.

IMAGE: JODY GATES

IMAGE: TEGHAN COLLINGWOOD

Research led by The University of Queensland identified Australia's 50 most imperilled plants, including Queensland's Capella potato bush, and developed a detailed plan to conserve them.

Our way of doing things included a commitment to engagement and co-design. Research was always done hand-in-hand with those people who want to use it. Each project built networks and relationships, communities of practice, trust and hope that will persist well beyond our hub's short life. Our way of doing things will live on in these networks and in the early career researchers who have absorbed the hub approach and grown their careers and networks. The Threatened Species Recovery Hub tint does not wash out easily.

The stories of our work have been told far and wide thanks to the skill and dedication of our amazing communications team, led by Jaana Dielenberg. There have been over 7,500 articles in the media on hub research with a reach of over 43M people and an estimated advertising value of $29M (if one was to buy that exposure) and these have made a crucial contribution to public discourse on threatened species.

In addition we have produced 135 project summaries, 250 findings factsheets, 125 reports, 100 videos, 19 magazines, over 300 online feature articles, data, models, prioritisation tools and a book or six. The rapid assimilation, synthesis and presentation of complex data and knowledge into management and policy-relevant information is one of our signatures.

Our immense body of work will live on as a future resource for conservation practitioners, accessible through the highly searchable hub website, as an Atlas of Living Australia (ALA) Biocollection and on the National Library's Trove platform.

The responsiveness of our hub to the pressing questions of the day has allowed us to make profound contributions, such as was embodied in our work to inform national priorities for bushfire recovery. But we have also shown vision by focusing on some more difficult things that weren't always directly requested, but rather for which we as scientists perceived the need. I think of offsets policy guidance, the national review of threatened species monitoring, an assessment of bushfire impacts on invertebrate species, and a collective assessment of the actions and resources required to secure our long list of threatened species against extinction.

Our submissions and presentations to every major biodiversity policy and legislative process ranging from the Faunal Extinction Senate Inquiry and Graeme Samuels' EPBC Act Review to the Feral Cat Inquiry have changed and led narratives and we are confident that they will continue to contribute to improvement in national policies.

I would like to extend my immense gratitude to our Steering Committee, led skilfully, diplomatically, and charmingly by Steve Morton. Our Indigenous and stakeholder reference groups also donated to us so much experience, wisdom, goodwill and guidance. Our incredible core team, led by Christine Fenwick, Heather Christensen, Jaana Dielenberg, Rachel Morgain and Brad Moggridge and their support teams were the spine of the hub. Their tireless commitment to the threatened species cause seemed to propel them so far beyond reasonable expectations. They provided the grunt and the gloss and must own much of the credit for what has been achieved.

Finally, I feel honoured and inspired to have been able to work with a leadership group of such prowess, good humour, and guts – Martine Maron, Sarah Legge, John Woinarski, Stephen Garnett, David Lindenmayer and, for a crucially formative time, Hugh Possingham. I can't imagine that I will again be part of such a team.

While the tenure of the hub is now complete, there has never been a more important time for brave and committed evidence-based investment in threatened species, co-designed solutions, and frank and fearless conversations.

While our threatened species index shows us that the trend in threatened species is downward, public support is rising. There is momentum for change evident in the media, the private sector and civil society. New leaders will emerge, perhaps driven by the need for nature-based climate mitigation and adaption, and they will need the backing of willing and committed scientists. There is so much more to do.

IMAGE: DEJAN STOJANOVIC

ABOVE: In Tasmania, Dr Dejan Stojanovic and his colleagues from The Australian National University have delivered a wide range of research to support the conservation of highly threatened orange-bellied parrots, swift parrots and forty-spotted pardalotes.

Swift parrot chicks.

IMAGE: DEJAN STOJANOVIC

Tiwi Land Rangers setting up cage traps for fauna surveys as part of a hub collaboration with Charles Darwin University scientists which has looked at trends in small mammals and cat occurrence and how these are influenced by fire management.

IMAGE: HUGH DAVIES

Building collaboration and two-way science

IMAGE: KATHERINE TUFT

Professor Sarah Legge,
The University of Queensland/
The Australian National University

Threatened Species Recovery Hub
Deputy Director

Let's be honest – the process of getting large Commonwealth-funded research hubs off the ground isn't suited to upfront consultation with Indigenous groups and communities. Once the main contract is signed, the first research plan needs to be developed very quickly, totally out of sync with the time needed to build the relationships and trust that are the foundation for co-developing a collaborative project with Indigenous partners.

So, at the start of the Threatened Species Recovery Hub, we had to put steps in place to build the trajectory towards the engagement and communication we were aiming for.
A key step was having Brad Moggridge join the team as the Indigenous Liaison Officer, to provide guidance to project teams. This guidance included developing a document with advice to early career researchers on how to develop respectful relationships with Indigenous people.

Brad was supported by the hub's Indigenous Reference Group. This powerhouse advisory group (Cissy Gore-Birch, Stephen van Leeuwen, Oliver Costello, Teagan Goolmeer, Larissa Hale and Gerry Turpin) fostered Indigenous collaborations and communication with the hub, and led or participated in some nationally important work. For example, they led the national conversation on culturally significant species (how to define them, and how to get them recognised in environmental policy and law) that fed through several pathways into the recent EPBC Act review.

Through discussions with Brad and the Indigenous Reference Group, project leaders were encouraged to consider the relevance of their work to Indigenous people, and how best to involve them in that research. Over time, the dynamic shifted, and by the final couple of annual research plans, projects were being proposed that were initiated and co-led by ranger groups. For example, the Karajarri Rangers began a project in 2018 with scientific support from the hub to improve fire management for threatened species and other fauna in their Indigenous Protected Area; the project has since grown to include the Ngurrara Rangers, Karajarri's neighbours in the Great Sandy Desert, and the two ranger groups have carried out joint surveys, sharing skills.

By the end of the hub's six-year program we had supported a diverse and productive range of research with Indigenous partners. For example, 65 Indigenous organisations had been engaged with hub research projects, and an average of 98 rangers per year worked

The locations of Indigenous groups that the hub engaged with

alongside hub researchers in two-way knowledge exchange. Over 70 communication products have been produced with and for Indigenous audiences, including videos, factsheets, posters, media and animations.

Projects with substantial Indigenous engagement were scattered right across Australia, from Martu in the west to Arakwal in the east, and from Tiwi in the north to Wurundjeri in the south. The projects that were Indigenous-led, or had substantial engagement, had developed enough momentum to withstand the disruption that COVID-19 caused to travel, but it remains extremely disappointing that the on-country trips and gatherings of the first four years had to be replaced in the last 18 months by online meetings and emails.

I hope one of the legacies of the hub will be the relationships that developed through the research projects, and what these lead to. Maybe these relationships will even oil collaborations in future hubs, supporting Indigenous groups and people to get involved in the planning processes earlier, and to drive the research agenda.

Hypochrysops piceatus female on *Allocasuarina luehmannii*

IMAGE: MICHAEL BRABY

A major step forward in preventing extinctions

When the Threatened Species Recovery Hub began, there was only a vague idea of what was under greatest threat from extinction. There was a long list of threatened species, but we could still have lost species simply because nobody had realised they were quite so scarce.

IMAGE: CDU

Professor Stephen Garnett,
Charles Darwin University

Threatened Species Recovery Hub
Deputy Director

That is no longer possible for vertebrates, plants and butterflies. Starting with birds and mammals, and working our way through snakes and lizards, freshwater fishes, butterflies, plants and finally frogs, we have honed lists of species to identify those at the very edge of existence.

For each group, we worked with experts from across the country, including scientists from state and territory governments, universities, museums, NGOs, consultancies and exceptional amateur scientists who hold substantial natural history knowledge in Australia.

In total, we identified 108 highly imperilled vertebrate species, and a final action has been for the country's threatened species managers to consider all of these at once. Their list of the 63 most threatened vertebrates is getting ready for publication.

For plants, we identified a list of the 100 most threatened plant species, and an action plan for the 50 most imperilled species is now available for threatened species managers.

Many invertebrate groups are still to be assessed, but for most groups we now know what requires most urgent care.

We also know that the Australian public abhors the idea of extinction. In economics, rarity equates with value. It transpires that the same principles apply to threatened species. Our research confirmed that the closer a species is to extinction, the more the Australian public is willing to pay to prevent that extinction occurring – whether that be a glamorous numbat or the humble boggomoss snail. Only a tiny proportion of the population thinks we should just let things go.

Our research also demonstrates that the public is willing to support strong measures to protect species. In a recent survey, we did not mince words when we asked whether people supported the killing of feral animals to save native species threatened with extinction. Over 71% of them did, 29% strongly so. They also supported captive breeding, translocation, various forms of genetic management – many actions about which some sectors of the community have expressed concerns.

Part of the reason may indeed be because of actions by the hub. For example, the extensive, detailed and extremely well communicated information on the role of cats may well have persuaded the undecided that we are better off without wild cats, and should keep our pet felines at home.

The vast majority of the public is onside to spend and do whatever is needed to prevent extinction. Historically, as a country, we have a poor record on extinctions, but with the new knowledge generated by the hub and strong public support, there is no reason for the list of extinct species to expand further.

Hub scientists have worked hard to share their findings to ensure the new knowledge they have developed has the very best chance of being used to help improve policy design and implementation.

IMAGE: JAANA DIELENBERG

The ups and downs of working at the science–policy nexus

IMAGE: MARTINE MARON

Professor Martine Maron,
The University of Queensland

Threatened Species Recovery Hub
Deputy Director

We only need to look at the debates swirling around CoP26 in Glasgow to know that science and evidence are not the only, or even the main, inputs to policy. Even when the very future of humanity is at stake, some decision-makers prevaricate and position, with vested interests or ideology tugging on their strings.

But we know science can play a big role. We've seen proof of that in the more successful responses to COVID-19 – responses that certainly saved tens of thousands of lives here in Australia.

There is only so much that researchers can do to maximise the chance that policy and its implementation is informed by the best available evidence. But making sure that quality evidence is available, and its relevance to policy is understood, by both decision-makers and the public they serve is a necessary, if not sufficient, condition.

Every piece of research conducted by the Threatened Species Recovery Hub is relevant to conservation policy in some way. The hub's work has identified problems needing policy responses; identified solutions to problems that policy can now help to resolve; and provided evidence of effective implementation of policy to protect, manage and recover our threatened species and ecological communities. Our researchers, by collaborating with end users and ensuring their findings were widely disseminated, have given the new knowledge they have developed the very best chance of being used to help improve policy design and implementation.

But for many of the environmental problems we face, we already have enough knowledge to achieve much, much better results than we currently are. The limiting factor is not the supply of knowledge, but its delivery and use. And so much of the hub's work, including within its policy theme, focused specifically on the nexus between evidence and policy. This space is dominated not by new discoveries about nature, but by understanding how policy users and policy-makers interact with evidence.

Some of the most impactful outputs from the hub have been those that take existing, dispersed data, and distil it into a form that makes it directly useful.

For example, the Threatened Species Index has been able to communicate the sheer scale and urgency of the decline in our threatened species – and in doing so, the failure of our policies so far to turn that around – in a way instantly understandable by anyone.

Policy-makers and those who interpret and implement policy are busy people, often working in environments of ever-decreasing resourcing and high staff turnover. For example, those working in environmental assessment are often expected to make judgements about highly complex ecological phenomena on short timeframes and with little access to relevant independent expertise. These are fundamental and systemic problems, the solutions to which the hub's researchers have been active in propounding – such as though our submissions to the Senate inquiry on faunal extinctions and Professor Graeme Samuel's review of the EPBC Act.

But faced with a fundamentally flawed system, researchers can still help. The hub's approach helped nurture a generation of policy-savvy researchers. It provided decision-support tools and data synthesis that ensures decision-making processes are transparent, logical and informed by the best available evidence. And it supported genuine collaboration with those who work tirelessly to improve the system from within. The hub helped forge a network of dedicated, kind and passionate people across government, business, academia and NGOs, and that network will live on.

Karajarri Rangers checking pitfall traps during a fauna survey on their desert Country.

IMAGE: NICOLAS RAKOTOPARE

Science to improve monitoring

Monitoring is a fundamentally important part of all aspects of environmental management and the conservation of biodiversity. Good monitoring is the only way to tell if species recovery efforts have been effective and if there has been good return on environmental investments.

IMAGE: J WALSH

Professor David Lindenmayer,
The Australian National University
Threatened Species Recovery Hub
Research Director

Given the critical importance of monitoring, it is perhaps not surprising that a lot of work in the Threatened Species Recovery Hub was dedicated to monitoring. That work included: understanding which species have and have not been monitored; what are the key features of good (and bad) monitoring programs; a framework to support good monitoring programs for threatened species; how monitoring can be tailored in response to major events (such as the 2019–20 wildfires); and ways to boost the involvement of First Nations people in robust monitoring programs.

Working with dozens of partners, we have collectively produced a book and more than 50 peer-reviewed scientific articles, reports and findings factsheets on a wide range of topics that can help improve many aspects of monitoring programs.

Overall, we found that monitoring efforts are limited or absent for the vast majority of threatened animals and plants in Australia. In addition, for those species which are monitored, monitoring programs are poorly designed and unable to provide useful information, such as whether they are responding to management interventions, like fencing, invasive species control, or reduced grazing pressure from domestic livestock.

Innovative new ways need to be found to cement the role of monitoring into all environmental management and biodiversity conservation programs. Some initiatives from the hub have helped point the way for doing this. For example, the development of natural resource accounts is a valuable approach for assembling not only biodiversity data, but also other kinds of information on the value of natural assets. This was done for the wet forests of the Central Highlands of Victoria and the temperate woodlands in the wheat–sheep belt of eastern Australia.

Another initiative which demonstrates additional values of good monitoring data is the Threatened Species Index. The index has proven to be a powerful way in which the data from monitoring programs and other kinds of studies can be harnessed to tell us about broad trends in biodiversity.

The hub has delivered ground-breaking research that can be used to underpin greatly improved threatened species monitoring in Australia. Implementing these innovations can support improved threatened species management, and reductions in resources wasted on ineffective management actions.

Some of our innovations can be implemented within existing resources, but nationally there is also a need for much greater effort and funding to increase the quality and number of species monitored. Indeed, work led by the hub has indicated that spending on threatened species conservation in Australia is only 10% of what is needed to arrest species declines and extinctions. Funding for monitoring is a key part of this spending shortfall to save the nation's biodiversity.

Species, ecological communities and ecosystems in Australia can be well managed and their conservation secured – but appropriate levels of funding, including funding for good monitoring, will be critical to achieving that goal. Levels of government spending reflect government priorities. Ensuring that funding levels match the scale of conservation problems will be fundamental to whether or not Australia conserves its natural heritage or whether much of it goes the way of the Tasmanian tiger and the 10% of the nation's mammals lost since European arrival.

A view across Kangaroo Island's Flinders Chase National Park following the fires in January 2020.

As we approach our next fire season, what have we learnt about how to minimise impacts to nature?

IMAGE: NICOLAS RAKOTOPARE

We live in a land of fire. Over deep time, the country has been shaped by it. But the pace and direction of this shaping is changing, alarmingly. The 2019–20 wildfires of eastern and southern Australia crystalised this concern. These fires started much earlier than normal. They burnt over an unprecedented extent, and an exceptional amount was burnt at high severity. They burnt into environments that very rarely face fire and are unsuited to it. Much of the time, they were uncontrollable.

IMAGE: ANNY WELLS

Professor John Woinarski,
Charles Darwin University
Threatened Species Recovery Hub
Deputy Director

More so than previous fires, these fires exacted a heavy toll on biodiversity. We know that the fires caused at least one extinction, and it is feasible that there were many others. Recovery of many of the species that survived as fire-depleted populations will be challenging. This is in part because the 2019–20 fires were not a singular aberrant event; rather, they were a predictable (and predicted) consequence of changing climate; and hence these fires are indicative of the future we are likely to face – of recurrent catastrophic fire, of escalating biodiversity loss, of a world less beautiful, less healthy, less liveable.

Recovery from fires will also be subverted in many cases by compounding threats, such as disease, weeds and pests, that may further reduce plant and animal populations that survived the fire, and limit post-fire recruitment. Furthermore, biodiversity losses will fall disproportionately on already threatened and restricted species; on environments less tolerant of fire; on species with preferences for the diminishing refuges of long-unburnt habitat; and on many of our plant and animal groups of greatest antiquity, whose lives are adapted to a slow rhythm now ill-matched to the tempo of frequent and more intense disturbance. The future will winnow our nature, and we will lose much that forms the essence of our land.

These scarring fires were confronting, but they do signal an opportunity that we have and need to take: if we are to avoid inflicting such a dystopia on future generations, and on nature, we need to far more robustly and effectively combat the underlying cause – the greenhouse gas emissions that are driving climate change. This is one fragile hope we can craft from these fires. There are others.

The response made across all elements of our society to the impacts of these fires was extraordinary. It showed that our community – indeed people across the world – valued dearly our nature, felt its loss deeply, and wanted very much to heal it.

The response was also strategic, collaborative, well resourced, well led and rapid: based in large part on expert assessments, much recovery effort was appropriately directed towards those components of biodiversity that most needed support, and at places where such actions were most needed. This effort undoubtedly did much to help recovery, although that journey will still be long.

There is hope also that this effort offers an invaluable opportunity for research to build an extensive evidence base on the process of post-catastrophe recovery, with monitoring of the effectiveness of management responses to help better understand and guide the process next time around. There is hope also in learning other lessons from these fires, that we could have better limited the biodiversity losses in fire by providing more proactive and operational protection to key biodiversity assets, and by better control of compounding threats.

The magnitude of these fires should also encourage us all to reflect more on the prospect that Indigenous land management may offer an expertise more finely attuned to the needs of Country than the management systems that are now imposed. The 2019–20 fires were a landmark in the environmental history of this country; it is in our hands now to look forward from the perspectives that this landmark offers, and to change course.

What difference has the **Threatened Species Recovery Hub** made?

With **147 projects** and over **250 research partners** from government and conservation NGO, Indigenous, industry and community groups the Threatened Species Recovery Hub has contributed enormously to the improved management of many of Australia's threatened species and communities. Here we take a look at some of our key achievements.

Night parrot.

University of Queensland PhD Student Nicholas Leseberg setting up an acoustic recorder at Bush Heritage Australia's Pullen Pullen Night Parrot Reserve. The new knowledge about habitat preferences and how to detect night parrots developed by the hub was actively shared with Indigenous land managers in central Australia leading to new detections.

IMAGE: BUSH HERITAGE AUSTRALIA.

Improving detection and tracking of how species are doing


IMAGE: JODY GATES

Kangaroo Island dunnart.

Robust monitoring is essential to knowing whether species are recovering, stable or declining; whether management is working; and which species are in greatest need of assistance. Hub research led by The Australian National University has evaluated the extent of monitoring for Australia's threatened species and enhanced the state of knowledge and capacity in Australia for threatened species monitoring and management and placed this knowledge into the hands of the agencies and people on the ground through collaborations with 112 partners, including 28 government agencies, over 30 Indigenous groups and a wide variety of NGO and community groups.


IMAGE: LACHLAN MCBURNEY

A thermal camera image of a Leadbeater's possum.

Projects investigated and trialled applications of new technologies like infra-red (thermal) cameras and eDNA; developed robust methods to detect species that had been rarely sighted in decades; collaborated with Indigenous Rangers and Traditional Owners on monitoring approaches that build on traditional tracking skills; and developed tools to improve the efficiency and effectiveness of large-scale regional monitoring programs. We also developed and successfully trialled a platform to bring all of Australia's threatened species monitoring data together in one place, to tell the community about the bigger picture of how threatened species are faring.

Impact snapshots

New methods for hard-to-detect species

It is hard to conserve species you can't find. The hub has developed new effective detection and monitoring methods for many elusive threatened species, including the night parrot, silver-headed and dusky antechinuses and south-eastern red-tailed black-cockatoos. Although the Kangaroo Island dunnart had rarely been detected in 20 years, a hub project led by Charles Darwin University developed an effective monitoring method which has led to many new detections and a much greater understanding of its trends and where the species persists on the island. Following the catastrophic 2019–20 bushfires on Kangaroo Island, this new knowledge has helped to underpin the establishment of a haven to protect the species.

Arid zone wildlife monitoring

Over the past 20 years, almost 50,000 records of desert species have been made during 15,000 sandplot surveys, carried out by over 40 Indigenous and non-Indigenous groups working across Australia's deserts. Working collaboratively with these groups to collate and analyse these data for the first time, a hub project has sharpened knowledge about the distributional limits and population trends for threatened species such as bilbies and great desert skinks. By examining where species occur, and how often they are detected, the project has also provided guidance about the most efficient sampling designs for meeting local, regional and national monitoring objectives.

Better-designed monitoring programs

The hub has undertaken a wide range of research to help improve monitoring programs, from single-species monitoring programs such as for the brush-tailed rabbit-rat, wiliji (west Kimberley rock-wallaby), night parrot, black-cockatoos, and research by The University of Melbourne has underpinned a redesign of monitoring across five national parks in the Northern Territory and will also be applied to other national parks such as Christmas Island. Hub scientists from The University of Melbourne also worked with the Malleefowl Recovery Team to redesign a national malleefowl monitoring program implemented by citizen scientists and other partners across 140 sites. The findings have led to new conservation actions for malleefowl.

Threatened Species Index

Before the hub, there was no way to look at overall trends for threatened biodiversity in Australia or to understand which species groups or regions are doing better or worse. The Threatened Species Index team led by scientists from The University of Queensland and The University of Sydney developed a platform that could address this gap and worked with over 70 organisations and individuals to collect and analyse monitoring data on over 250 threatened species from across the country. It has revealed that, over the last two decades, the population sizes of threatened mammals have declined by one-third, threatened birds by half and threatened plants by two-thirds, on average.

Providing safe havens and bringing species back

The Australian Wildlife Conservancy undertook a suite of research in conjunction animal reintroductions at Mt Gibson Wildlife Sanctuary.

Translocations are an increasingly important conservation tool for threatened plants and animals, but they present many challenges, and many attempts fail. Hub research has filled major knowledge gaps around if and when to translocate species, the best methods, genetic considerations, impacts to existing species at a site, monitoring and evaluation and national priorities. For example, the hub's analysis has resulted in guidance on where predator exclosure projects should be implemented to maximise benefits to threatened mammal conservation nationally, while minimising costs.

To ensure the research meets the practical needs of Australia's on-ground conservation managers, projects have been undertaken in collaboration with over 100 partners, many of whom are expanding their translocation programs. This includes Commonwealth and state agencies, local governments, national parks, zoos, botanic gardens, NGOs like the Australian Wildlife Conservancy, haven managers, Indigenous groups, NRM organisations, 20 universities and the CSIRO. Together, we have undertaken pivotal field trials for over 30 threatened species, such as the eastern quoll, blue-tailed skink, western swamp turtle and roundleaf honeysuckle. The findings will aid the successful establishment and resilience of translocated populations for many threatened species.

Impact snapshots

Ensuring new havens go in the most beneficial places

A systematic review of safe havens (sites without introduced predators) undertaken by a collaboration of seven university partners has identified the 29 threatened mammal species in most urgent need for inclusion in future havens and the most strategic regions for new havens to be established. The findings have helped to inform the design of the Australian Government's Environment Restoration Fund – Safe Havens grants and $7 million in funding to expand Australia's havens network. The new havens will help conserve at least 24 threatened species around the country, with at least nine of these species, such as the kowari, not currently represented in any safe haven across Australia.

Supporting Yawuru to explore a haven for their Country

The hub provided support to Nyamba Buru Yawuru, whose traditional lands cover 5300sq km of tropical coastline and inland savannah country around Broome in Western Australia, to explore opportunities to develop a feral predator-free wildlife sanctuary on their Country. This has included scientific support, community consultation and helping Yawuru Rangers and Traditional Owners to travel to an established haven and talk with Traditional Owners there. If a fenced haven was established on Yawuru Country it would be the first in northern Australia and the first to be led and managed by an Indigenous organisation.

Improving the success of animal reintroductions

There are still many unknowns with threatened species reintroductions. Using an 'adaptive management' approach where reintroductions are set up like experiments offers an opportunity to learn from and improve methods. Along with many other partners the hub scientists from The Australian National University supported Parks Australia in a trial reintroduction of eastern quolls to Booderee National Park. Detailed tracking of the released animals by the hub revealed the factors most influential to the long-term survival and establishment of the animals; this led to changes in park management for the animals; and has provided critical information to inform reintroductions in Booderee and elsewhere.

Improving threatened plant translocations

Translocations are an important tool in preventing extinctions. A partnership between plant scientists at the Western Australian Department of Biodiversity, Conservation and Attractions, The University of Queensland and the Australian Network for Plant Conservation has led a wide range of research which has greatly increased the capacity for successful plant translocations nationwide. This has included a review of every plant translocation undertaken in Australia over the last 30 years; revised and expanded national guidelines; genetic research for species with small and fragmented populations; field trials with the Western Australian Government for five species and subspecies; and investigation of measures of translocation success that consider how effectively genetic variation has been captured.

Plant translocation field trials occured for the feather-leaved banksia (*Banksia brownii*)

Reducing threats to species and ecosystems to promote recovery

Identifying and effectively controlling the threats facing threatened species is crucial to their conservation, but there are still many gaps in knowledge about how to most effectively manage these threats. The hub has developed a wide range of new knowledge and tools to support conservation managers to solve complex threat management issues with sophisticated science. It also undertook strategic national planning, mapping the major threats facing every threatened species, to underpin a national roadmap to prevent extinctions and promote recovery of Australia's threatened species.

Hub research, led by Charles Darwin University and The University of Queensland, to better understand and manage the impact of feral and pet cats on Australian wildlife was shortlisted for the prestigious Eureka Prize for Applied Environmental Research. One part of the research examined and quantified the impact of pet cats on native wildlife and examined policies for cat management in over 500 councils. The findings and their promotion have contributed to much greater national awareness of the impact of roaming pet cats and to the establishment of cat containment policies for many new and existing suburbs, in Victoria, the Australian Capital Territory and the Northern Territory. On average, each suburb where cats are not allowed to roam will save over 20,000 native animals per year.

Impact snapshots

Tackling diseases

Myrtle rust.

The hub has undertaken pivotal research to understand and manage a range of introduced diseases which threaten the survival of many species. This work has included understanding the diseases, the conditions that favour them, the species at greatest risk, trialling treatments, interactions with other threats, identifying refuges, and supporting emergency captive breeding programs for species at imminent risk. The research is benefiting trees and shrubs threatened by myrtle rust (by The Queensland Department of Agriculture and Fisheries and The University of Queensland); Christmas Island reptiles threatened by an *Enterococcus* bacterium (The University of Sydney); wombats threatened by mange (The University of Melbourne); and frogs threatened by chytrid fungus (The University of Melbourne and The Australian National University).

Better management of foxes

Red foxes are one of the greatest threats to Australia's native mammals and pose a major risk to livestock. To combat this, Australia spends more than $16 million per year on red fox control, but when control programs aren't strategic, fox numbers can quickly recover. Collaborating with Parks Victoria and the Victorian Department of Environment, Land, Water and Planning, a hub team at The University of Melbourne developed the FoxNet app, which land managers can use to test different bait station layouts, frequencies and timings on simulated fox populations. FoxNet is now being used by government and non-government agencies to evaluate and plan fox management programs for conservation across Victoria.

European red fox.

Helping species adapt to climate change

The Critically Endangered white-bellied frog.

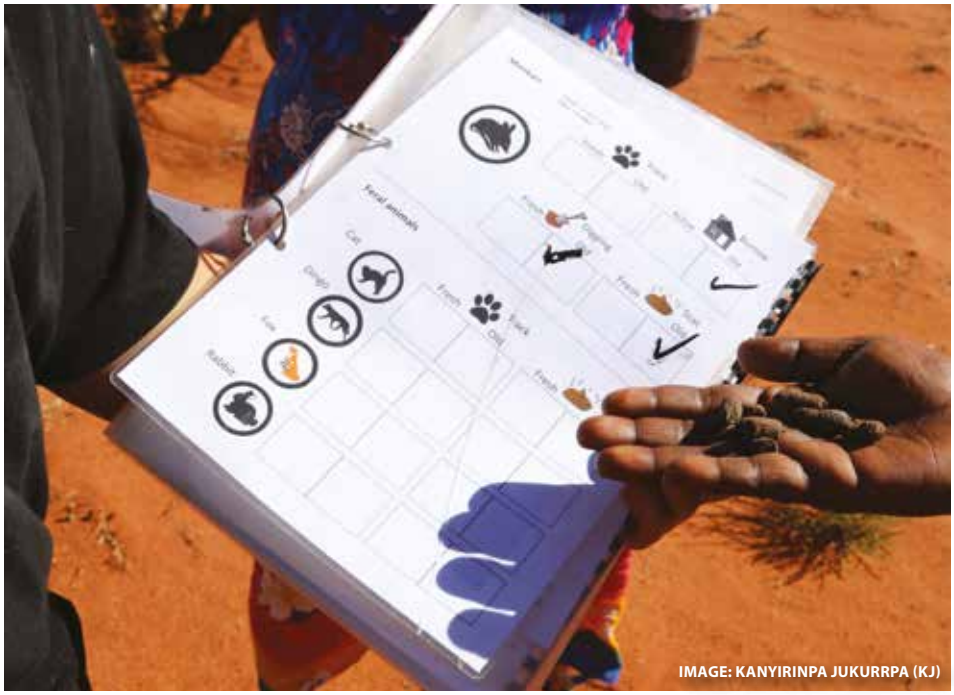
Climate change is a current and increasing threat for many species. A wide variety of hub projects will contribute to the better management of climate impacts on threatened species. For example, a team from The University of Western Australia have collaborated with Western Australian Government managers of the western swamp tortoise to test assisted colonisation to cooler southern wetlands; established the micro-climate requirements of the white-bellied frog to inform the selection of translocation sites, while a collaboration between The University of Queensland and The University of Western Australia has developed a model to determine the ideal timeframe for when threatened montane frog species could be relocated to suitable habitats that are currently outside their natural range.

Overcoming barriers to fish movements

A significant cause of native fish declines is barriers to fish movement, which can lead to population fragmentation and loss of access to important habitat. Hub researchers at The University of Queensland used a biohydrodynamics laboratory to fill critical knowledge gaps about the swimming ability and behaviour of key native fish species and tested new and existing designs for fishways. The research is applicable nationwide to help reduce the impact of manmade barriers that limit native fish movement and will underpin the New South Wales Department of Primary Industries Fisheries' new Road Crossing Design Guidelines.

Dr Jabin Watson and his colleagues from The University of Queensland have advanced our knowledge of barriers to fish passage and how to overcome them.

Supporting Indigenous-led research for threatened and culturally significant species



Martu rangers and Traditional Owners are using traditional tracking skills to find signs of mankarr (bilbies) and their threats during timed searches then record this on a data collection sheet.

An Indigenous Reference Group (IRG) supported the hub to strengthen the engagement and participation of Indigenous people in hub projects. The IRG also worked to draw attention and support for the management of culturally significant species.

A key priority of the hub has been empowering Indigenous leadership and management of significant plants and animals. The hub has collaborated with 45 Indigenous groups on 25 research projects covering 21 Indigenous Protected Areas, four national parks and other Indigenous lands.

These collaborations value Traditional Ecological Knowledge and support two-way science approaches. They have resulted in a wide range of new and improved tools and knowledge to support improved management of threatened and culturally significant species and ecological communities across Australia.

Sixty percent of threatened species occur on Indigenous managed land. The hub's Healing Country report quantifies current and potential Indigenous involvement in managing species that are significant for conservation across Australia and identifies four ways that Indigenous leaders and practitioners can be supported to empower their rights and responsibilities to heal Country for significant species.

Impact snapshots

Martu-developed mankarr (greater bilby) monitoring program

Martu Traditional Owners are custodians of one of the last strongholds of the greater bilby. Martu people collaborated with hub scientists from The University of Melbourne to co-design and establish a robust and practical monitoring program for bilbies and pest species which is based on Traditional Ecological Knowledge and tracking skills. The monitoring program is helping Martu people to evaluate the effectiveness of their land management strategies for bilbies and contributes to national recovery planning. Their 2017 and 2018 surveys found bilby signs at 80% of sites and cat signs at over 50%.

Karajarri and Ngurrara led fire research for their IPAs covering >41,000km²

Karajarri and Ngurrara Rangers and Traditional Owners have led research projects to support culturally informed fire management over the pirra (desert) of the Karajarri and Warlu Jilajaa Jumu Indigenous Protected Areas. The rangers collaborated with scientists from The Australian National University, Charles Darwin University and Environs Kimberley to use old aerial photography to understand fire regimes of the past, and to set up a biodiversity monitoring program to measure management outcomes. The monitoring is helping the rangers to set clear management targets for fire-sensitive species and to tell their communities about their work.

Arakwal shape IUCN Green Listing

Arakwal National Park is owned by the Arakwal people and is governed through a joint management agreement. Two of the park's significant values are the Graminoid Clay Heath Endangered Ecological Community and the associated Byron Bay orchid. A CSIRO project supported an Arakwal-led approach underpinned by IUCN Green List evaluation frameworks to develop an effective cross-cultural planning process and seasonal planning calendar for the park and orchid. The guidelines can also be applied to other species and locations and have been recognised by the IUCN as good practice, and are now shaping how Green Listings are done.

Tiwi Rangers use fire to reduce cat impacts

A collaboration between The Tiwi Land Rangers and Charles Darwin University has investigated how cats, fire and habitat conditions interact to impact native mammals on the Tiwi Islands. The findings have given the Tiwi Land Rangers confidence that their new fire management strategies will help conserve native Tiwi mammals. They have begun implementing island-wide programs of low-intensity burning in the early dry season. This will help to decrease the frequency and extent of high-intensity wildfires late in the dry season, while also leaving plenty of patches of unburnt vegetation, to help species like the brush-tailed rabbit-rat survive in a world with cats.

Tiwi Land Ranger Colin Kerinaiua setting fire to pandanus as part of early dry season burining on the Tiwi Islands.

Using social and economic opportunities for the conservation of threatened biodiversity

Australasian bittern in a rice field.

Threatened species occur across a wide variety of land tenures. Many species have all or most of their distribution outside conservation reserves, including across agricultural, urban and industrial areas. Effective conservation of all species therefore requires meaningful engagement with a wide variety of land managers. In addition, human behaviour and choices are a major driver of the threats to nature, so engaging the broader community can play a major role in biodiversity outcomes. Implementing recovery actions also supports jobs, particularly in remote and regional areas. Hub research co-led by the CSIRO and The University of Queensland found that if action was taken to conserve all of Australia's threatened species it would generate 900,000 jobs.

Good policy requires robust evidence of costs and benefits. Hub research by The University of Queensland and Charles Darwin University has filled major knowledge gaps in this area by developing tools and data that can be used to more accurately estimate the cost of recovery programs, and quantified community willingness to pay and public preferences for threatened species programs. The latter has highlighted that the community do not want to see species extinctions and are willing to contribute financially to prevent them.

Impact snapshots

Bitterns benefiting from research with rice growers

In the New South Wales Riverina, hub scientists from Charles Darwin University have collaborated with rice growers and irrigation communities to identify practical ways that growing practices can be adjusted to support the Australasian bittern to successfully breed. The work has also explored the commercial opportunities of 'bittern-friendly rice'. Riverina rice growers are the custodians of 60% of the national Australasian bittern population and 40% of the global population so this work will make a major contribution to the long-term survival of this species.

Restoring species within box gum grassy woodland agricultural landscapes

South-eastern Australia's box gum grassy woodlands are a threatened ecological community that also supports many other threatened plants and animals. In partnership with the Sustainable Farms initiative, a team from The Australian National University has worked with farmers across the region on: research which has revealed how revegetation plantings can be improved to benefit threatened birds and plants; planting and grazing trials for the Yass daisy; rocky habitat restoration trials for the pink-tailed worm-lizard; a trial cull of noisy miners to benefit woodland birds; and investigated the effectiveness of nest boxes for threatened species.

Researchers from The Australian National University survey for reptiles on an agricultural property in New South Wales.

Biodiversity sensitive urban design: The future of cities

Conserving nature in cities has benefits for human health and wellbeing as well as for biodiversity. A team from RMIT University and The University of Melbourne developed an innovative framework to support local governments, developers, urban planners and architects to implement Biodiversity Sensitive Urban Design (BSUD). The framework underpins the South Australian Government's Green Adelaide BSUD policy, urban development plans in established and growth areas, such as Fisherman's Bend and Averley and voluntary performance tools such the Green Building of Australia's Green Star Communities.

Ecosystem accounts quantify trade-offs to support better policy

Ecosystem accounts provide information on the economic value of land-use activities in a format that allows for quantitative comparison and analysis of trade-offs. They are a powerful tool to guide policy-making about regional land management issues. A case study by The Australian National University on the Victorian Central Highlands showed that their contributions to regional GDP included the agriculture ($312m), water supply ($310m) and tourism ($260m) industries. The value of water supply and tourism industries greatly surpassed the native forest industry contribution ($12m) and demonstrated a strong economic incentive to protect the forests on which we depend.

Preventing extinctions through emergency action


IMAGE: MARC FREESTONE

The Endangered maroon leek-orchid.

Some recent extinctions in Australia were predicted yet occurred nonetheless because management responses were enacted too slowly, ineffectively, or not at all. To support management agencies, land managers, and environment and community groups to prevent extinctions the hub has identified plants and animals with a high probability of extinction in the next 20 years, and the critical management responses required to avert their extinctions.

The hub undertook a wide range of research for species at critical risk of extinction. On Christmas Island, researchers from The University of Western Australia and The University of Sydney supported Parks Australia in their conservation efforts for Lister's gecko and Christmas Island blue-tailed skink, which are Extinct-in-the-Wild. This included investigating and trialling a semi-wild reintroduction of blue-tailed skinks on the Island and translocations to two islands in the Cocos (Keeling) archipelago.

In Tasmania, projects by The Australian National University included emergency field trials of innovative recovery actions for three highly imperilled species. For orange-bellied parrots, several projects were undertaken including interventions to improve reproductive success and ecological burning to increase food abundance. Chicks of forty-spotted pardalotes were successfully protected from a deadly parasite by nesting-feathers laced with bird-safe insecticide, which parent birds carried back to nests from a dispenser. In the trial, chick survival increased to 95% compared to only 8% in untreated nests. And for swift parrots our research previously found that in some regions half of nesting females, chicks and eggs were being killed by sugar gliders. We trialled techniques such as automated solar powered doors to reduce predation by sugar gliders at nest boxes, and we provided new information about how to use nest boxes more effectively in restoration projects.

Impact snapshots

Identifying species on the brink


IMAGE: MICHAEL WILLIAMS, ITS A WILDLIFE PHOTOGRAPHY

The spotted tree frog is among Australia's most imperilled species.

Workilng with over 100 threatened species experts across the country, a project led by Charles Darwin University identified the Australian birds, mammals, freshwater fish, snakes, lizards, frogs, butterflies and plants at greatest risk of extinction within the next 20 years. In response, new management actions, surveys and research have been initiated for many of the most imperilled species identified, including the King Island brown thornbill, Fassifern blind snake and northern bettong. This work has raised community awareness about the potential loss of many species and informed the species prioritisation process for the second Threatened Species Strategy.

Bushfire response

The 2019–20 wildfires caused a loss of extraordinary magnitude to Australian biodiversity. Through the hub, over 34 organisations contributed to rapid scientific support to government management agencies for emergency planning for threatened biodiversity impacted by the fires.
The work included identifying the most impacted animals (vertebrates and invertebrates) and ecological communities, designing new rapid survey methods, and advising on priority recovery actions. It also included new research on managing compounding threats, like cats, feral herbivores, myrtle rust in fire-affected landscapes and research for specific faunal groups, such as how ash and sediment post-fire affects native fish, frogs and crayfish.

Genetic rescue of imperilled populations

Hub research is helping species that are facing genetic issues, such as the eastern bristlebird, western ringtail possum, Norfolk Island morepork and mainland eastern barred bandicoot. For example, a trial at Mt Rothwell supported by University of Melbourne geneticists has used breeding to introduce Tasmanian genes to the mainland eastern barred bandicoot population, which was suffering from inbreeding. It has greatly improved the health and breeding success of over 200 offspring so far, which represents more than 10% of the mainland population, and will eventually improve the viability of the entire mainland population. The increased genetic diversity will also better enable the population to adapt to future environmental conditions.

A propagation technique for highly imperilled leek-orchids

Australia has 38 threatened leek-orchids. Before the hub they could not be propagated in nurseries, which was a major impediment to recovery programs. Hub research undertaken in partnership with the Royal Botanic Gardens Victoria has unlocked the secret of how to propagate leek-orchids. The technique is expected to allow most of Australia's 38 nationally threatened leek-orchids to be propagated. The method has already been used to propagate hundreds of plants of seven different species of highly imperiled leek-orchids, including five which were badly impacted by the 2019–20 bushfires.

Kangaroo Island bushfire recovery project

IMAGE: OFFICE OF THE THREATENED SPECIES COMMISSIONER

Supporting the Australian Government's Black Summer bushfires response

The Black Summer bushfires of 2019–20, their extent and severity, and the devastation they caused to the environment were unprecedented. Coordination and collaboration with researchers from the National Environmental Science Program's Threatened Species Recovery Hub has been key to the government's rapid and informed response.

Glenn Block,
Principal Director, Bushfire Recovery Programs Branch, Department of Agriculture, Water and the Environment

While the fires still burned in January 2020, the Minister for the Environment convened a Wildlife and Threatened Species Bushfire Recovery Expert Panel to assist in prioritising recovery actions for fire-impacted native animal and plant species, and ecological communities.

Over nine months and 20 meetings, the Expert Panel identified 810 priority species for urgent management intervention. This included 305 animals (92 vertebrates and 213 invertebrates), 19 ecological communities and 486 plants. In consultation with other experts, the Expert Panel also provided advice on the types of actions that would support their recovery (such as emergency rescue and rehabilitation, feral animal and weed control, habitat protection and captive breeding) and supported development of robust spatial data on fire intensity and species distribution.

The Expert Panel included four researchers from the Threatened Species Recovery Hub; Professor John Woinarski, Dr Libby Rumpff, Professor Sarah Legge and Associate Professor Dale Nimmo. Their ability to provide rapid expert advice, leverage their extensive professional networks and capitalise on their familiarity with the department's work enabled a rapid and targeted response under extreme circumstances.

The hub's research has also informed decision-making around the assessment and listing of bushfire-affected species. The Minister for the Environment directed $2 million to the hub to undertake a series of bushfire-related research projects which are being used by the Threatened Species Scientific Committee to evaluate the impacts of the 2019–20 bushfires on populations of animals, plants and ecological communities. The committee plays a critical role in the Australian Government's protection of native species and ecological communities, and management of key threatening processes, by providing independent scientific advice to the Minister for the Environment.

For example, the hub's *Assessment of the Impacts of the 2019–20 Wildfires of Southern and Eastern Australia on Invertebrate Species, Final Report*, identified and prioritised fire-affected species for assessment and inclusion on the threatened species list (such as the Kangaroo Island assassin spider and Kangaroo Island micro trapdoor spider) which have since been prioritised for assessment by the committee.

IMAGE: DAWE

Wildlife and Threatened Species Expert Panel

This practical link between post-bushfire assessment and ongoing management and protection of species is testament to the quality of the hub's research, and the researchers who were a part of this project. It is just one of many examples of how hub research will contribute to the longer-term survival of bushfire-affected species, as well as to future emergency response planning.

Collaboration across a range of government, non-government, scientific and community sectors has enabled immediate action to support longer-term recovery.

These ground-breaking actions have been acknowledged globally and will act as a guide for those responding to future catastrophic events.

Collaboration benefits threatened species in national parks

IMAGE: ELISABETTA MARIN

Nicholas Macgregor,
Science Manager, Parks Australia

A number of hub research projects have benefited the Christmas Island blue-tailed skink.

IMAGE: RENATA DE JONGE

From reintroducing animals not seen in the wild on mainland Australia for around half a century to bringing back species from the brink of extinction, Parks Australia and the Threatened Species Recovery Hub have worked together over the years to make a significant contribution to conservation efforts.

At Booderee National Park, two decades of fox control by the park's managers and a long-running partnership with hub researchers provided the foundation for a pilot project to reintroduce eastern quolls to the wild on the Australian mainland. Captive-bred quolls released into the park survived translocation shock, found food, bred and raised young. This offers great hope for establishing a sustainable population of this threatened species in the park.

On Christmas Island, Christmas Island National Park staff have brought the endemic Lister's gecko and blue-tailed skink back from the brink of extinction. Just before invasive predators including Asian wolf snakes and giant centipedes eliminated the reptiles from the wild, 43 Lister's gecko and 66 Christmas Island blue-tailed skinks were rescued by park staff for captive breeding.

The successful captive breeding program led to the trial of releases in predator-free environments on Christmas Island. The Christmas Island reptile recovery program has formed part of a larger program of integrated research on the island's threatened species with the hub and other partners

Meanwhile, on Norfolk Island, the hub and Parks Australia have worked with partners to protect threatened bird and plant species.

Research and conservation on the endemic Norfolk Island green parrot and the morepork owl populations continues, with green parrot numbers healthy and morepork owls breeding successfully in recent years.

Recent research on the nest preferences of green parrots has provided valuable insights that are expected to improve conservation outcomes for the species. For the morepork owl, ecological and genetic research will help us identify the most appropriate conservation options.

Also on Norfolk Island, local threatened plants have received a tremendous boost over recent years. Hub researchers have worked with the Norfolk Island National Park and Australian National Botanic Gardens teams to investigate the ecology and recruitment barriers for some of Norfolk Island's most endangered plants. One outcome of this research is a handbook titled *A Guide to Propagating Norfolk Island's Native Plants and Seeds*, which builds on the expertise of the National Seed Bank and brings local knowledge and scientific literature together to understand how to store and grow native seeds. It is a unique and valuable resource for those involved in conserving plant species or interested in planting Norfolk Island's native trees and shrubs. The information will help optimise germination success, improve seedling establishment and expand seed-based restoration efforts.

An important factor in the success of all these projects has been the close collaboration between Threatened Species Recovery Hub researchers and Parks Australia scientists and conservation managers. These collaborations have also allowed Parks Australia to contribute data to national-level projects by the hub, particularly the Threatened Species Index.

BELOW: UQ PhD candidate Leah Dann has been investigating the recruitment barriers for some of Norfolk Island's most endangered plants.

IMAGE: LYDIA GUJA

A pair of banded hare-wallabies released on Dirk Hartog Island.

IMAGE: RICHARD MANNING

Science for the West

The Western Australian Department of Biodiversity, Conservation and Attractions (DBCA), Parks and Wildlife, Kings Park Botanical Garden and Perth Zoo were active partners in a range of Threatened Species Recovery Hub research which has been beneficial to Western Australian threatened species and also has implications nationally.

IMAGE: DBCA

Dr Margaret Byrne,
Executive Director, Biodiversity and Conservation Science, Western Australian Department of Biodiversity, Conservation and Attractions

DBCA scientists co-led an extensive program of research to advance the science and practice of threatened plant translocation nationally, which culminated in the revision and expansion of the *Guidelines for Translocation of Threatened Plants in Australia*. For the many long-lived threatened plant species targeted for translocation in Australia, measuring success is challenging. The project undertook a review of translocations made across Australia and the factors influencing success, providing a basis for future translocations. One aspect of the research investigated the use of alternative measures of translocation success, such as evaluating how effectively genetic variation has been captured in translocated populations to provide information on seed sourcing strategies and/or where strategic mixing of seed sources to maximise genetic variation may be required. This approach can be used in newly established translocations of other species.

Research undertaken in partnerships with the University of Western Australia on genetic management and population modelling of translocated fauna was valuable for informing and validating the translocation strategy for banded hare-wallabies to Dirk Hartog Island. For example, the modelling showed that a better result would be achieved by translocating most of the animals in one year, so plans were changed to achieve this.

The project also highlighted the value of Population Viability Analyses (PVAs) for translocation planning, which have driven similar collaborative projects for Shark Bay mice, greater stick-nest rats and western grasswrens. The PVAs provided additional justification for recent translocation proposals for Shark Bay mice and greater stick-nest rats.

Other beneficial research has included understanding the micro-climate needs of the white-bellied frog, testing assisted colonisation for the western swamp turtle, and understanding public preferences for feral cat and fox control in Dryandra Woodland, which is home to wild populations of numbats and woylies.

BELOW: The genetic diversity and mating systems of translocated populations of the Scott River Plains subspecies of the Endangered round leaf honeysuckle were compared with wild populations.

IMAGE: ANDREW CRAWFORD

Supporting the work of the Australian Government's Threatened Species Commissioner

Boodies in the Arid Recovery safe haven

IMAGE: HUGH MCGREGOR AND ARID RECOVERY

The Australian Government's first Threatened Species Strategy (2015–20) set an ambitious, action-based approach to achieving a collaborative, national effort for the recovery of threatened plants and animals. The Threatened Species Recovery Hub under the National Environmental Science Program made an important contribution to outcomes delivered by the 2015 Strategy and to the science underpinning threatened species management and conservation.

IMAGE: OFFICE OF THE THREATENED SPECIES COMMISSIONER

Dr Fiona Fraser,
Acting Threatened Species Commissioner

The Threatened Species Recovery Hub delivered impactful, evidence-based research to support conservation efforts and strengthened our capabilities to measure the effectiveness of our actions. Research that had a significant impact on outcomes from the 2015 Strategy included estimating the impacts of feral cats on Australia's wildlife and identifying species with most urgent need for protection in predator-free havens. These projects not only vastly improved our understanding of the scale of the problem, they also supported governments and the conservation community to change the national dialogue about the impacts of feral and domestic cats on our native fauna. This research has also underpinned the design of recent Australian Government programs, such as the Environment Restoration Fund Safe Havens Grants.

Drawing on robust evidence forms an integral part of species conservation. The department has drawn extensively from the hub's research to develop the new five-year Action Plan that underpins the Threatened Species Strategy 2021–31. The list of 100 priority species in the new Action Plan used data from a number of hub projects, including the national database of threatened species across all of Australia's islands and the knowledge synthesis to inform a national approach to fighting extinction and species most at risk of extinction. Other hub initiatives, such as the Threatened Species Index, which is now integrated into our corporate reporting, are helping us to identify the plants and animals in most pressing need of support and to track Australia's progress in reducing the risk of species extinctions.

The Australian Government recognises the invaluable role that the Threatened Species Recovery Hub has played in supporting and guiding recovery efforts, bringing together ecological expertise from across Australia, and delivering research that has supported decision-makers to better understand, manage and conserve Australia's environment with world-class science.

Managing jilas and fire on Ngurrara Country

Sumayah Surprise during ground-based and aerial burning.

ALL IMAGES: YANUNIJARRA ABORIGINAL CORPORATION

Doing rightway fire on our Country keeps Country healthy and is really important to protect and bring back bush plants, food and resources for animals.

Chantelle Murray, Ngurrara Women Rangers Co-ordinator and **Sumayah Surprise,** Ngurrara Ranger, Yanunijarra Aboriginal Corporation

Ngurrara people have been caring for our Country for many thousands of years, but some things have changed. We now have feral animals like camels that can damage our jilas, which are important desert waterholes.

Fire patterns have also been changing. When our old people were living on the desert they did a lot of small patch burning and fire was used as a tool for hunting and cleaning country. People spend more time in towns now and we are seeing bigger fires.

But in addition to traditional ground-burning methods we now also have new techniques. A couple of years ago our Ngurrara Women Rangers were the first all-women, all-Indigenous aerial burning team in Australia, starting cool season patch fires with an incendiary machine from a chopper.

Engaging with our Traditional Owners, scientists and partners helps our ranger program to do fire management carefully and that allows us to care for the plants and animals on our Country in the right way.

Our Threatened Species Recovery Hub research project gave us training about how to monitor biodiversity and collect data that can help us make good decisions about caring for jilas and doing rightway fire. This work also complements land management Certificate 2 and 3 training that rangers have been doing. These are skills rangers need and want to learn about.

We worked with Karajarri Rangers, Sarah Legge and Environs Kimberley to learn how to set traps for fauna surveys and record data.

Sumayah: I enjoyed learning how to conduct fauna surveys and about new species and how to identify them. For example, some lizard species look the same but are different, and I have learnt how to tell them apart using microscopes to examine small differences in scales. I enjoy the fire management work and learning more about what fire management different animals need.

Chantelle: I enjoyed having time for my own personal growth and healing, by spending extra time visiting and caring for Country. It's great to work with a team of rangers and explore different species during this survey, and each time the rangers identify animals they get excited. Healing Country through rightway fire and biodiversity work heals rangers and other people as well. As the women ranger co-ordinator, this healing and growth is important to give me the strength to look after the rangers and the ranger program.

The research collaboration has been just the start for us. We want to grow this program and bring in schools in future and have two-way learning between Traditional Owners, Rangers and school kids.

Chantelle Murray during a fauna survey and leading survey planning discussions with rangers.

This is a priority for our women and men rangers.

There are still so many questions and each biodiversity survey visit tells a different story. We are always learning when we are out on country.

The next generation of Australian researchers: Our amazing students

Fifty-nine PhD and 29 Masters and Honours students made a major contribution to the work of the Threatened Species Recovery Hub. Students were embedded in collaborations with senior scientists and on-ground conservation partners tackling a wide variety of Australia's most pressing threatened species conservation challenges.

Our students were also encouraged and supported to share their findings with the groups that can apply their research findings in order to maximise their impact. The experiences these students had as part of the hub are excellent preparation for them to continue to make a positive impact in future roles. We wish them all the best.

Here are some of the topics hub students covered.

Jessica Agius,
PhD, USyd
Jessica investigated the emergence and treatment of a novel and 100% fatal bacterium threatening Critically Endangered and Extinct-in-the-Wild reptiles endemic to Christmas Island.

Stephane Batista,
PhD, QUT
Steph compared different detection techniques and the use of conservation detection dogs to locate antechinus species in new locations, determine fine-scale ecology information and update their distribution range.

Richard Beggs,
PhD, ANU
Richard examined an experimental cull of noisy miners in remnant woodland patches in the South West Slopes bioregion of NSW to see if this was an effective form of control of this overabundant native species.

Donna Belder
PhD, ANU
Donna examined the breeding success and persistence of woodland birds in restoration plantings in a NSW region and the effects of factors such as the size and shape of plantings.

Jeremy Bird,
PhD, UQ
Jez examined the recovery of threatened seabird populations on Macquarie Island following investment in invasive species management on the island.

Jarrod Cameron,
Hons, UQ
Jarrod researched the impacts of bushfires on freshwater crayfish, focusing on the impact that elevated temperatures, hypoxia, ash and sediment have on crayfish physiology.

Rachael Collett,
PhD, UQ
Rachael examined causes behind the limited distribution of threatened and range-restricted species of antechinus that only occur on mountain-tops in Queensland.

Daniel Gomez Isaza,
PhD, UQ
Daniel investigated the responses of freshwater species to environmental stressors, and how nitrate interacts with other stress-ors to affect physiological function, performance and tolerance limits.

Emily Gregg,
PhD, RMIT
Emily's research took a strategic communication approach to conservation messaging, exploring ethical considerations, barriers to engagement, and strategic changes to species' common names.

Reneé Hartley,
PhD, ANU
Renée investigated the impact of herbivorous mammals on the nationally Endangered alpine she-oak skink and the high elevation grasslands that support them.

Lorna Hernandez-Santin,
PhD, UQ
Lorna researched threats to northern quolls in the Pilbara, including introduced predators, northern quoll population dynamics, interactions with other dasyurids, and habitat quality.

Emily Hoffmann,
PhD, UWA
Emily examined the environmental and physiological needs of two threatened and range-restricted frog species, to guide conservation actions, such as translocations, in a drying climate.

Stephen Kearney,
PhD, UQ
Stephen's research looked at the threatening processes that imperil Australia's threatened species as well as the diet of predators and the distribution of feral cats on Pullen Pullen Reserve.

John Keep,
Hons, UQ
John investigated fish behaviours around barriers to movement, such as abrupt changes in ambient light levels, and the optimisation of novel culvert remediation design to promote fish passage.

Alex Kusmanoff,
PhD, RMIT
Alex applied economics and psychology to test how framing information in different ways can influence the success of conservation communications.

Anna Lemon,
Hons, CDU
Anna investigated canopy greenness and fire history of Endangered monsoon vine thicket communities on the Dampier Peninsula in WA, using remote sensing platforms to detect changes over time.

Robin Leppitt,
PhD, CDU
Robin studied the Alligator Rivers yellow chat, trying to determine just how rare it truly is and the reasons for that rarity…turns out, it is very rare!

Nick Leseberg,
PhD, UQ
Nick focused on the recently rediscovered night parrot, including how to find it using acoustic surveys, its current distribution and effective management strategies.

Erica Marshall,
PhD, UM
Erica has examined how the metrics used in biodiversity offsets can be improved to more to accurately measure biodiversity loss and ensure species persistence through better offsetting procedures.

Courtney Melton,
PhD, UQ
Courtney investigated recovery options for the declining woodland bird community of eastern Australia via managing sub-canopy vegetation as a resource and potential deterrent of noisy miners.

Leonie Monks,
PhD, MU
Leonie evaluated plant translocations in WA, using genetics, mating systems and population viability analysis as measures of translocation success and investigated the influence of source populations.

Callum Mulvey,
Hons, UQ
Callum examined impacts of bushfire runoff on freshwater fishes, such as the effects of ash, sediment, temperature and hypoxia on critical tolerances, aerobic physiology and swimming performance.

Bryony Palmer,
PhD, UWA
Bryony looked at how reintroduced digging mammals, like bandicoots and bettongs, interact with and influence soil processes, vegetation communities and introduced plants and animals.

Monique Parisi,
PhD, UQ
Monique investigated the impacts of temperature consistent with cold water pollution on the physiological performance and compensation capacity of native freshwater fishes in the Murray-Darling Basin.

Christopher Pocknee,
PhD, UQ
Chris is researching the response of the northern bettong to fire and the threat that feral cats pose to the species in its stronghold in the Lamb Range in Queensland's wet tropics.

Linda Riquelme,
PhD, UM
Linda examined methods to estimate grassy biomass over space and time, such as clipping and remote sensing, to help manage grazing and promote regeneration in Endangered buloke woodlands.

Emma Spencer,
PhD, USyd
Emma looked at whether animal carcasses could be placed in an arid region to increase dingo activity and reduce the impacts of feral cats on ground nesting birds, including Endangered night parrots.

Meena Sritharan,
PhD, ANU
Meena's research looks at understanding how different environmental factors influence plant rarity, with a particular focus on plant species in Booderee National Park.

Nick Tan,
MSc, UM
Nick compared the efficiency of spotlight and thermal image monitoring methods to detect arboreal marsupials, including greater gliders and bobuck possums, in temperate forests.

Daniella Teixeira,
PhD, UQ
Daniella undertook bioacoustic monitoring of breeding in the Endangered Kangaroo Island glossy black-cockatoo and south-eastern red-tailed black-cockatoo.

Alana Toms,
Hons, UQ
Alana's research looked at the effect of cold water pollution on the physiological performance of invasive freshwater fishes.

Patrick Webster,
PhD, UQ
Patrick investigated the conservation status of the buff-breasted button-quail of the Cape York Peninsula, and found the species is likely one of Australia's most threatened birds.

Rosalie Willacy,
PhD, UQ
To support decision-making for invasive species monitoring and management on Christmas Island, Rosie's research investigated interactions between cats, black rats and native birds.

Matthew Wintour,
Hons, UQ
Matthew looked at the impacts of bushfires on native Australian frog species, focusing on the growth, development, locomotor performance and survival of frogs across all life stages.

ANU – The Australian National University, CDU – Charles Darwin University, MU – Macquarie University, QUT – Queensland University of Technology, RMIT – Royal Melbourne Institute of Technology University, UM – The University of Melbourne, UQ – The University of Queensland, USyd – The University of Sydney, UWA – The University of Western Australia.

What was your hub student experience like?

Here is what a few of our students had to say.

Emily Hoffmann,
PhD candidate, University of Western Australia

I have spent the past four years crawling and climbing around swamps to study the Critically Endangered white-bellied frog, which is restricted to a small area in the south-west of Western Australia.

Being a part of the Threatened Species Recovery Hub community has been an asset to my PhD experience. To have multi-year funding from the outset was a huge advantage. It also connected me to numerous researchers and projects as well as providing important networking and workshop opportunities.

The hub's communications team also offered a unique PhD experience through their support and encouragement to produce some very shiny and professional-looking factsheets and articles for my project. These have been perfect for sharing with project partners and stakeholders, and to distribute my research more widely (so it's not just my mum that reads about my work).

My project was highly collaborative with the Western Australian Government (Department of Biodiversity, Conservation and Attractions, Parks and Wildlife Service and Perth Zoo) and the *Geocrinia* Recovery Team. This was probably the most essential part of my project, other than the frogs. The long-term knowledge and historical data they provided was pivotal. It also meant that the project could have a really applied angle – excitingly, conservation managers are already using our findings to identify new potential translocation sites that are more likely to support viable populations.

I have recently submitted my thesis (last week as I write!) and so am now looking forward to a new challenge.


IMAGE: CALLIE NICKOLAI

Emily Hoffmann conducting frog surveys.


IMAGE: CHARLEY POLLARD

Jessica Agius,
PhD candidate, The University of Sydney

Being part of the hub supported me to fulfil the conservation aims of my PhD research on a bacterial infection threatening Critically Endangered Christmas Island reptiles and to develop the skills needed to help conserve Australia's threatened species.

The hub also gave me support, tools and opportunities to improve my research engagement and outreach, and enabled me to showcase my research to a wide range of relevant and interested stakeholders.

During the project I engaged extensively with key stakeholders. Parks Australia provided me with foundational knowledge of Christmas Island, its flora and fauna, and conservation importance, and thanks to their support and collaboration all field work seasons were a success and incredibly enjoyable.

The Australian Registry of Wildlife Health at Taronga Conservation Society Australia were also of vital importance and through their expertise and ongoing collaboration I was able to develop essential reptile, laboratory and field work skills.

The hub's 2018 postgraduate conference was a major highlight. The combination of workshops, training, presentations and fun field adventures provided a great opportunity to learn new things, develop collaborations, and build research and career opportunities.

I also met researchers with similar interests who became great friends and collaborators.

I am now undertaking postdoctoral research at the Centre for Infectious Diseases and Microbiology – Public Health at Westmead Hospital, New South Wales in the SARS-CoV-2 genomics team. My primary focus is understanding SARS-CoV-2 evolution and mutations; however, I am also involved in other projects looking at zoonotic diseases with a wildlife focus.


IMAGE: DAVID PHALEN

Jessica Agius in the field spotlighting geckos on Christmas Island.

Callum Mulvey,
Honours, The University of Queensland

My honours degree research on the impacts of bushfires on freshwater fish contributed to a Threatened Species Recovery Hub research project by the Franklin ECO-lab. There are significant gaps in our understanding of how fires can impact freshwater fauna, and the need to fill these gaps became very apparent in the wake of the 2019–20 Black Summer. My project used experimental techniques to understand how fire-associated environmental changes can affect fish aerobic physiology and performance.

Completing an honours degree was an incredibly rewarding experience. Not only was it an exciting opportunity to develop new practical skills and understanding while working alongside scientists who I'd always admired, but I was able to make a meaningful contribution to science at the same time. I am deeply passionate about conservation, so it was a real privilege for me to be able to take part in threatened species research.

My work was aimed at improving post-fire conservation management actions in Australia, so one of the best aspects of working with the hub for me was the opportunity to connect with and present my final research findings to invested research end-users from around Australia. This enabled me to deliver my project's most important take-aways directly to the people who need to know and can apply them. I'm currently progressing toward publishing my first manuscript from my honours research.

After finishing honours, I worked in the hub's science communication team writing developing communication knowledge products such as findings factsheets. This gave me exposure to the findings of a wide variety of the other research projects. As the hub draws to a close, I am about to start a policy officer role with the Australian Government Department of Agriculture, Water and the Environment, which will focus on assessing threatened species listings.

Callum Mulvey assessing the health of juvenile fish in the field.

Daniella Teixeira,
PhD candidate, The University of Queensland

I was lucky to be part of the Threatened Species Recovery Hub during my PhD research. As an early career researcher, I really appreciated the many opportunities to meet and collaborate with the conservation community beyond my university.

In my research on black-cockatoos, I worked closely with partners like the Victorian and South Australian Governments. These collaborations were critical for keeping my research outcome-focused. Further, many of the people I worked with have since become friends or longer-term colleagues, and we continue to work together today.

I'm also so thankful for the hub's communications "dream team"; their expertise in creating comms materials, connecting me to the media and generally encouraging me helped extend the reach of my research.

In the hub, I felt part of a diverse network of researchers, working on many various projects. Such a network, I believe, is critical for keeping an open mind and doing good science. There were so many great experiences; from attending Higher Degree Research (HDR) get-togethers, to being invited to give talks on my research, and contributing to conservation efforts outside of my research (such as being involved in the Kangaroo Island Bushfire Recovery Workshop). I am grateful for my time in the hub.

Glossy black-cockatoos

Daniella Teixeira setting up an automated acoustic recording device.

Some of our early career scientists


IMAGE: RYAN TAYLOR

Dr Leigh-Ann Woolley,
Research Associate, Charles Darwin University

I'm a wildlife ecologist and discovered my love for nature while growing up in the African bush. From the African elephant to the smallest native rodents in northern Australia, I have dedicated my life to solving conservation problems to help protect these animals and the complex landscapes they live in.

As a Research Associate at Charles Darwin University, I was part of a Threatened Species Recovery Hub project looking at the impact of feral, stray and pet cats across Australia. In particular, I modelled large datasets of cat diet studies to quantify the impact of cats on birds, mammals, reptiles, frogs and invertebrates and to find out whether common characteristics determined the likelihood of an animal being killed by cats.

Being part of the hub gave me mentorship from some of the best conservation scientists in Australia, vital network connections throughout the country, and absolutely invaluable experience to progress my career. I'm now based in the spectacular Kimberley and managing WWF's Western Australian species team, where we're partnering with Indigenous rangers to find innovative solutions to the threats faced by the unique wildlife of this special wilderness region. Unless we change the way we care for our environment and look for sustainable solutions by integrating both Traditional and Western science, we'll continue to lose a lot more of our world's extraordinary biodiversity.


IMAGE: TEIGAN CREMONA

Leigh-Ann bagging a northern brushtail possum during a trapping exercise with Charles Darwin University.


IMAGE: DAMIAN KELLY

Hamsini Bijlani,
Ecologist, Environs Kimberley

I've been supporting the Ngurrara and Karajarri Rangers to undertake a project which has been exploring interactions between fire and biodiversity on their desert Countries. As an ecologist, I provided training and technical scientific support to the rangers where needed, for things like designing, planning and carrying out surveys, ecological trapping methods, species identification and data management.

It is an exciting project to be working on for a number of reasons. The Great Sandy Desert is very poorly studied in terms of Western science, so we are filling massive 'Western science' knowledge gaps. We are using a two-way learning approach and also documenting cultural knowledge about desert biodiversity and fire at a crucial time when groups like Ngurrara still have pre-contact elders. Lastly, the findings will be used to directly inform management decisions by these groups, who are important land managers, and part of one of the largest and most important conservation workforces in Australia.


IMAGE: HANNAH CLIFF

Ngurrara Ranger Emily checking pitfall traps during a survey.

There is interest in this project among other groups, so although we have come to the end of the Threatened Species Recovery Hub I hope that we can find a way for the project to continue and expand.

I have learnt so much and enhanced my skills as an ecologist, shared amazing experiences with the rangers, formed important relationships, and learnt a lot about the cultural aspects of fire and biodiversity from rangers and elders. I have also fallen in love with the desert's very remote and beautiful landscapes.

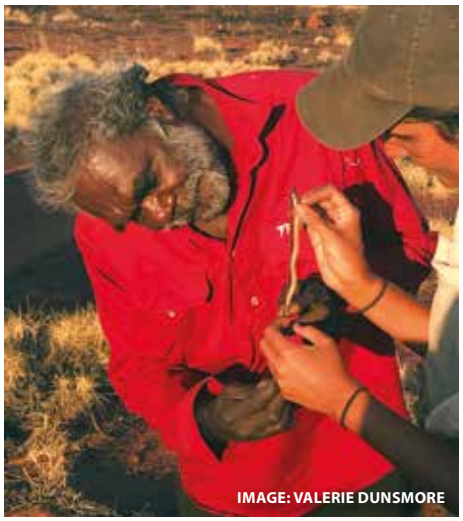


IMAGE: VALERIE DUNSMORE

Alfie and Hamsini measure a legless lizard trapped during a survey on Ngurrara Country.


IMAGE: MALCOLM LINDSAY

Hamsini, Alfie and Elton discuss the tallies of different species during a survey on Ngurrara Country.


IMAGE: GERMAN SCHOLARS ORGANISATION

Dr Elisa Bayraktarov,
Research Fellow, The University of Queensland

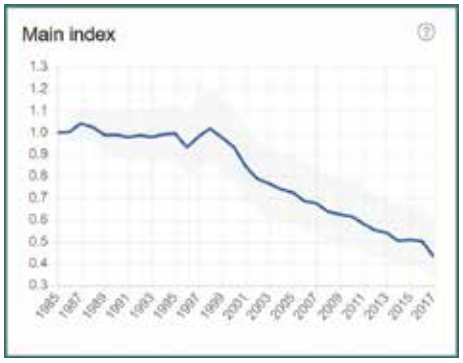
As part of the Threatened Species Recovery Hub, I worked closely with talented and visionary scientists at The University of Queensland and The University of Sydney, as well as with an extended team of 49 project partners, to create the world's first Threatened Species Index (TSX). The index tracks and reports on Australia's threatened species in the same way that the ASX tracks changes in the health of our economy. There is no doubt that the TSX will be Australia's No 1 reporting tool for telling us how our threatened species are faring.

Among the things that I enjoyed most about being part of the hub were the close collaboration with data custodians, including BirdLife Australia and many other government agencies and non-government groups. In total, we worked with over 300 data custodians. This close collaboration was essential for the success of the project and its continuation beyond the hub's lifetime. The partnership with the web app developer Planticle was also essential to building the workflow that turns vast amounts of monitoring data from 406,000 surveys over more than 50 years at 20,000 locations across Australia into synthesised and explorable trends. The TSX has become the largest threatened species data collection made from standardised monitoring.

My hub role gave me the experience, networks and relationships to establish a national reputation for expertise in developing biodiversity indicators, models and web visualisation tools. During my time at the hub, I also learned a great deal about effective communication of research findings to decision-makers and the public. I am now employed at Griffith University as the manager of the national digital innovation program, EcoCommons Australia, where I lead a team of software engineers (DevOps), scientists, science communicators, trainers and analysts to build the platform of choice for ecological and environmental modelling.


IMAGE: GLENN EHMKE

Gouldian finches are one of 67 bird species with data in the index



The trend for population sizes of threatened birds, plants and mammals between 1985 and 2017 based on all available monitoring data. Credit: TSX.org.au


IMAGE: PAYAL BAL

Payal Bal,
Postdoctoral Research Fellow, The University of Melbourne

I grew up in a city in India with sparkling views of the Himalayas. This inspired awe for nature from a very early age. Since my early investigations of insects in our garden, and the curiosity about the diversity of life instilled in me by my dad's collection of *National Geographic* magazines, I have meandered through India, Scotland and Australia studying or working in conservation. Now, I am an early career researcher with the Quantitative and Applied Ecology group, where I develop integrated ecological–economic models for large-scale biodiversity assessments.

As part of the NESP Threatened Species Recovery Hub, I worked as a spatial analyst evaluating the impact of the 2019–20 wildfires on Australian invertebrates. This work revealed the plight of Australian invertebrates following the wildfires: habitat loss for at least 14,000 species of invertebrates; at least one species considered likely extinct (*Banksia montana* mealybug in Western Australia); and a doubling of the number of species recommendations for Australia's list of nationally threatened invertebrates.

While the insights gained were disheartening, to say the least, I thoroughly enjoyed working on this project thanks to an incredibly knowledgeable project team who made for a stimulating, inclusive and encouraging research environment. I enjoyed the problem-solving aspects of the work (i.e., dealing with large and messy species datasets, and finding efficient ways of running spatial analyses for many thousands of species) and gained motivation from the fact that the insights from our analyses had immediate relevance for national and regional conservation decision-making. The work has drawn new collaborations, helping me to expand my network and give me new ideas to chart my course in conservation science.


IMAGE: RICHARD GLATZ

The Kangaroo Island marauding katydid is only known from Kangaroo Island and large portions of its known range were impacted by fire.

Kowari one of the first species to benefit from hub havens analysis

Dr Katherine Tuft,
General Manager, Arid Recovery

The most impactful Threatened Species Recovery Hub research for us has come from the combined forces of the kowari project (led by Professor Chris Dickman) and the safe havens analysis (led by Professor Sarah Legge et al.). The work to identify gaps in the adequacy of the current safe haven network to protect species vulnerable to cat and fox predation highlighted the kowari as a species not yet represented in any haven.

Then the kowari project work quantified the extinction risk for the species, adding weight to a nomination to the Threatened Species Scientific Committee to uplist the kowari from Vulnerable to Endangered under the EPBC Act and the momentum to do more for the species. As a result, we had funding success in the Department of Agriculture, Water and the Environment's recent Environment Restoration Fund Safe Haven grant round to reintroduce the kowari to Arid Recovery by 2023, thanks to how the funding round targeted improved representation of species in the safe haven network.

The other hub research that has been incorporated into our operations is the field experimental work led by Dr Hugh McGregor to understand whether and how cats 'prey-switch' after rabbit control. That research identified an important moment when cat baiting should be most successful – after a knockdown in rabbits. We've incorporated that understanding into our feral animal monitoring and cat management planning in the halo outside the fenced reserve so we can be more targeted with cat control.

IMAGE: WILLIAM LA MARCA

Dr Katherine Tuft with a kowari.

***COVER IMAGE:** A PROJECT LED BY BIOSECURITY QUEENSLAND SCIENTISTS IN COLLABORATION WITH THE QUEENSLAND PARKS AND WILDLIFE SERVICE AND THE UNIVERSITY OF QUEENSLAND CONDUCTED THE FIRST BROADSCALE TRIAL OF ERADICAT® BAITING IN EASTERN AUSTRALIA AT TAUNTON NATIONAL PARK (SCIENTIFIC), WHICH IS THE STRONGHOLD OF THE ENDANGERED BRIDLED NAIL-TAIL WALLABY. LEARN MORE ABOUT THE HUB'S WORK TO REDUCE THREATS TO SPECIES AND ECOSYSTEMS TO PROMOTE RECOVERY ON P13. CREDIT: NICOLAS RAKOTOPARE*

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Science for saving species

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