CBCS NEWS

A quarterly newsletter of the Centre for Biodiversity and Conservation Science

Issue 3 Spring 2020

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

CREATE CHANGE

Standing on the shoulders of giants

CBCS research fellow Amelia Wenger was announced in June by the Australian Academy of Sciences as the Australian nominee for the Asia-Pacific Economic Cooperation (APEC) ASPIRE Prize.

Fellow CBCS postdoctoral researcher **Jeremy Simmonds** was shortlisted as one of two Australian runners-up for this nomination.

Amelia joined 11 other finalists from APEC economies for the USD25,000 2020 ASPIRE Prize. This prestigious award was won by CBCS's Carissa Klein in 2013.

The theme of this year's ASPIRE Prize is "Biodiversity for a prosperous economy". This aligns closely with the research that Amelia and Jeremy do, yet they share much more in common than this.

They were officemates for two years after meeting in 2017, where they engaged in countless fruitful discussions about research ideas and the ECR experience. Moreover, they are going through the experience of being new parents at the same time – their daughters are in the same class at daycare.

Jeremy about Amelia: "I was obviously chuffed to get shortlisted but, honestly, I was more stoked to learn that Amelia had been nominated for the ASPIRE Prize. As an ECR, you look for people to emulate, and Amelia is definitely one such person for me. Everything she does is focused on making a difference on the ground (well, in the water!). She is a brilliant scientist, and one of my academic heroes. But most of all, she is a wonderful mentor, supporter and friend."

Amelia about Jeremy: "Jeremy has a unique perspective on environmental management, having worked as an environmental consultant for many years before starting his PhD. He has seen the power and the shortfalls of environmental policies and regulations in place, and that informs his research. I value Jeremy's insights on the best ways to balance development and biodiversity because he has seen first-hand what works and what doesn't. It's inspiring to see how motivated Jeremy is to influence environmental policy so that it works to protect biodiversity in Australia and abroad."

Amelia and Jeremy: "Contributing this piece to *CBCS News* gave us an opportunity to pause and reflect on the environment that has supported us. Our work cuts across multiple disciplines; and it is inspiring and hugely beneficial to our respective research to be surrounded by such a diversity of scientists in the Centre for Biodiversity and Conservation Science who are seeking solutions to a vast array of challenges. Recognition such as nomination for the APEC Aspire Prize is so much more than that of an individual award. It embodies the cliched but apt 'standing on the shoulders of giants', and so we gratefully thank you all in the CBCS community for your help, wisdom, support and friendship."

CBCS congratulates Professor Hugh Possingham as he takes on the role of Chief Scientist of Queensland.

More to come in Issue 4.

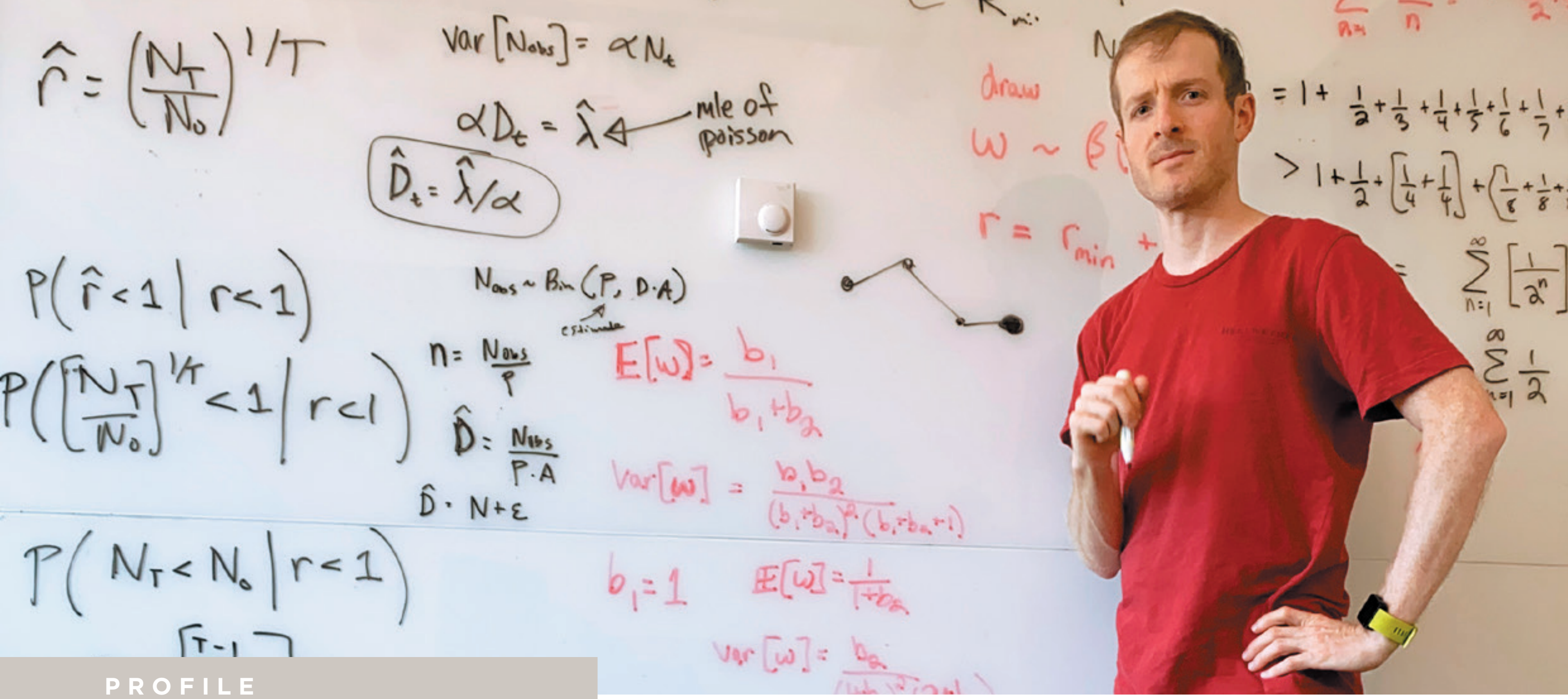
About CBCS

The Centre for Biodiversity and Conservation Science (CBCS) is a world-leading solution-oriented research centre for biodiversity conservation.

Based at The University of Queensland (UQ) in Brisbane, Australia, CBCS works in partnership with scientists, governments, non-governmental organisations and industry to help solve the most important conservation problems around the world.

CBCS has 22 Chief Investigators drawn from four UQ schools, 30 postdoctoral researchers and over 120 PhD students.

cbcs.centre.uq.edu.au



PROFILE
Matthew Holden
CBCS Lecturer and ARC DECRA Fellow

Dr Matt Holden found his way into a love of nature and conservation via mathematics.

Maths: my gateway to nature

"As a child growing up in Los Angeles, no-one would have pinned me for an ecologist, conservation scientist or mathematician. I rarely ventured outdoors, was terrified of wildlife, and on top of all that, I hated maths. During my first algebra class I couldn't for the life of me figure out how to "solve for *x*". On each exam I'd see a problem like:

Solve for *x*,
$7x + 10 = 38$

I had no idea what to do, despite my teacher having lectured me for months on the topic. So, I went my own way. I tried plugging in 0 for *x* in the above equation – and noted the left-hand side was 10. Clearly wrong. But this was a clue; *x* must be bigger than 0, since the left-hand side is less than 38 when *x* is zero. So, I plugged in 10, and the left side was now 80, which is bigger than 38. So, *x* must be between 0 and 10. I tried 5, and so on. Every time I guessed a new number, I shrunk the interval, until I eventually homed in on the answer.

I was scolded by my maths teacher for not doing as I was told – as he thought I wasn't doing maths at all. But later I would come to learn that I was actually solving the above equation exactly how a computer might solve it, and I somehow knew intuitively that my method was guaranteed to find the correct answer to the types of exam problems usually presented to me. I managed to pass a full year's worth of algebra without learning much algebra at all.

It was at this moment I fell in love with maths, without even realising it. I thought I was somehow cheating the school system. But what I was actually doing, discovering an algorithm to solve a real-world problem (how to successfully pass an algebra test, when you've been goofing off in class for a year) is actually exactly what maths is about. Maths is *not* about following a set of preordained rules. It is about solving problems and proving that your solution is right.

> After picking up a yellow jacket as a small child, I became terrified of anything that could fly, bite, or sting – and rarely ventured outside.

The maths of conservation

Maths shows up everywhere in conservation. Some of my work has focused on maximising crop yield while simultaneously minimising the application of harmful pesticides. I've used maths to select the best spatial arrangement of traps to eradicate invasive pests, and also the best spatial arrangement of nature reserves. I get deep satisfaction from the mathematics, and the fact that my maths is benefiting the environment is a major side benefit.

The majority of my current research centres around understanding and predicting how animal populations exploited by humans change with respect to management actions. This includes both controversial actions

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Dr Holden documented over 630 species in his home and backyard during COVID-19 lockdowns.

Male blue-banded bees (*Amegilla cingulata*) in Dr Holden's yard. They sleep by grasping onto a branch with their mandibles and dangling off it. *Photo:* Andrew Rogers

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to save species threatened by poaching, and fisheries stock assessments. Can legal trade of wildlife products help drive down the price of products and save species threatened by poaching? Should the government decrease fishing quotas or close down certain areas in a fishery to protect the sustainability of a species? These are the sorts of questions I spend a lot of my time thinking about.

From apiphobia to living with 36 species of bees and wasps

Most mathematical ecologists enter the field via their love of nature. Their wonder about the natural world is what leads them to discover the world of advanced mathematics – the types of mathematics needed to understand some of the greatest problems in ecology and conservation. But for me it was the opposite! I started with maths and stumbled into conservation. After picking up a yellow jacket as a small child, I became terrified of anything that could fly, bite and/or sting – and I rarely ventured outside. But solving conservation-inspired maths problems has led me back to nature. I've even started documenting all the species in my home during COVID-19 lockdowns. Turns out the answer is over 630 species, including 36 different kinds of bees and wasps! ”

Professor Catherine Lovelock

Winner of ARC Laureate Fellowship and 2020 Georgina Sweet Australian Laureate Fellowship

Professor Catherine Lovelock has been awarded the 2020 Georgina Sweet Australian Research Council Laureate Fellowship, one of 15 Laureate Fellowships awarded in 2020.

Professor Lovelock's Laureate project "Activating blue carbon for coastal restoration" aims to enhance coastal sustainability to the benefit of coastal communities. Her research over the next five years will support restoration of coastal wetlands to increase storage of blue carbon, thereby helping to mitigate climate change.

Restoration of degraded coastal wetlands in Australia, and globally, will support local communities and their economies by improving water quality, sustaining fish populations and providing defence against sea level rise and wave energy, and have the important benefit of storing carbon. By enhancing knowledge of the benefits of restoring coastal wetlands for carbon sequestration, including financial opportunities for carbon farming and the role of blue carbon in meeting our national greenhouse gas emission targets, the project will help inform and improve coastal wetland management globally.

As a part of the Laureate Fellowship, Professor Lovelock will undertake an additional project to honour the legacy of the ground-breaking Australian scientist Professor Georgina Sweet (1875–1946), who was an early advocate for women in science and society. Professor Lovelock will engage with rural and remote coastal communities about the importance of coastal wetlands and the role and importance of environmental science for coastal management.

Through this project, she particularly hopes to inspire girls and women living in rural Australia, where they face significant challenges in accessing and succeeding in STEM education. Professor Lovelock and her team of early career researchers will visit rural and remote areas to talk with community groups and schools about their science.

ARC Future Fellowships

CBCS congratulates Dr Carissa Klein and Professor Jonathan Rhodes on winning ARC Future Fellow ships in a round with a success rate of only 15%.

They join other present CBCS ARC Future Fellows Dr Tatsuya Amano and Associate Professor Eve McDonald-Madden and past fellows Professor Richard Fuller, Professor Martine Maron and Professor Salit Kark.

Here Carissa and Jonathan explain what they aim to achieve in their Future Fellowships.

ARC Future Fellow Carissa Klein

What's the catch? Social and environmental sustainability of seafood

I stumbled upon the topic of my ARC Future Fellowship – seafood sustainability – nearly a decade ago. Two distinct events motivated me to dig a bit deeper into the topic. First, I noticed orange roughy on the menu at several restaurants in Queensland, a species that is also listed as conservation dependent under Australia's *Environmental Protection and Biodiversity Conservation Act 1999*. Second, I was at a large international conference about coral reefs where "reef fish" was being served (and happily consumed) at the conference dinner. The staff could not tell me what species of "reef fish" we were consuming – so I embarked on an investigation. I quickly realised that the seafood industry is fraught with problems related to sustainability.

During my Future Fellowship, I hope to improve the social and environmental sustainability of wild-caught seafood globally. I plan to generate new knowledge in the area of seafood trade and sustainability using interdisciplinary approaches that account for social sustainability concepts and the displacement of fishing impacts. This project should provide significant benefits to the ocean, by proposing innovative ways for protecting the ocean through improving the sustainability of trade policies, and to the billions of people who depend on a healthy ocean for their health and livelihood.

ARC Future Fellow Jonathan Rhodes

Going with the flow: the benefits of ecosystem services

I work on understanding the impact of land use change and climate change on biodiversity and ecosystem services (the benefits people get from nature) and on seeking environmentally sustainable policy solutions.

I will use my Future Fellowship to better understand how land use change, climate change, and global flows of ecosystem services interact to drive benefits for people. The direct effects of land use and climate on the ecosystem processes that generate potential benefits for people are reasonably well known. Yet, the spatial flows of these benefits to people are complex and occur at a range of spatial scales from local scales (e.g., for subsistence hunting) to global scales (e.g., for international trade of agricultural products). How these flows interact with the effects of land use and climate will drive the spatial distribution of ecosystem service benefits and the spatial and temporal trade-offs among services.

By gaining a better understanding of these interactions, through this Future Fellowship I will aim to identify policy settings that lead to more sustainable and equitable ecosystem service outcomes. Although not envisioned in the original proposal of course, the COVID-19 pandemic may also provide an opportunity to understand the implications of disruptions to the flows of ecosystem services for people.

I will collaborate on this Future Fellowship with the Natural Capital Project – Stanford University; iDiv – Leipzig; the Land, Environment, Economics and Policy Institute – University of Exeter; the University of São Paulo; and the Chinese Academy of Sciences.

NEWS IN BRIEF

Bushfires could trigger 14% rise in threatened native species

The catastrophic 2019–20 Australian bushfires burned about 97,000 km^2 of vegetation in southern and eastern Australia, with that land considered habitat for at least 832 native animal species. Twenty-one threatened species – including the Kangaroo Island dunnart and long-footed potoroo – are among 70 animals which have had much of their habitat significantly affected by the blazes. Lead author PhD candidate **Michelle Ward** said many of the species impacted by these fires were already declining in numbers because of drought, disease, habitat destruction and invasive species. The team found that 49 species not currently listed as threatened, including Kate's leaf-tailed gecko and the short-eared possum, now warrant assessment for listing under the *Environment Protection and Biodiversity Conservation Act 1999*. If these assessments find that all 49 animals meet listing criteria, the number of threatened Australian terrestrial and freshwater animals would increase by 14%. Read more **here**.

Tropical waterbirds imperilled by climate change

In a *Nature Climate Change* article, CBCS Chief Investigator **Dr Tatsuya Amano** led an international team to analyse 1.3 million records of 390 waterbird species, and found that temperature increases are drastically affecting species abundance in the tropics. The authors showed that 69% of the tropical species responded, on average, negatively to temperature increases, while most temperate species showed positive responses. The study provides empirical evidence about the impacts of temperature increases on tropical ecosystems, which are also threatened by other anthropogenic factors. Read the paper **here**, and its abstract in Spanish, Portuguese, French, simplified Chinese and Japanese **here**.

Conservation epidemiology and zoonotic spill-over

CBCS-ers led by **Dr Chris O'Bryan** in collaboration with the **Spatial Epidemiology Lab** at UQ and the **McMadLab** have had a comment piece published in *The Lancet Planetary Health*. The piece discusses the importance of a conservation epidemiology approach for reducing zoonotic disease risk. It focuses on predators and scavengers because they are not only known reservoir hosts of many deadly pathogens but they may also limit other reservoir hosts and therefore reduce the prevalence of zoonoses, diseases maintained in animal populations but that can be transmitted to humans. Conservation epidemiology will drive discovery on the link between the effectiveness of conservation action on zoonotic spill-over, and thus the effect of species conservation on human health. Read more **here**.

Predators play a role in maintaining ecosystem structure and reducing zoonotic risk. *Photo:* Alex Braczkowski

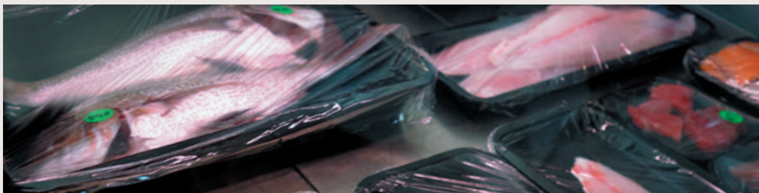
The overlap in species traits predicts impacts of the common myna. *Photo:* Andrew Rogers

Understanding the drivers of invasive species impacts

Dr Andrew Rogers and colleagues have published a paper in the *Journal of Applied Ecology* exploring competition between native and invasive birds for nesting sites in tree hollows. This work identified which birds are likely to be impacted most by competition with the invasive common myna (*Acridotheres tristis*). The approach used in this study can be used to predict where invasive cavity-breeding bird impacts are likely to be the greatest. Read more **here**.

CBCS and applied work: Saving our Species

In August 2020, the **Saving our Species program** collaborated with the New South Wales Department of Planning, Industry and the Environment on a series of workshops on designing conceptual models for managing species. The workshops follow up on last year's NESP Threatened Species Recovery Hub **Guidelines for estimating and evaluating species' response to management**. Over 40 people attended an online seminar, and program members are now working individually with managers for a range of threatened species and threatened ecological communities to help them build their conceptual modelling skills.



It is legal to catch, sell and buy species that are threatened with extinction. *Photo:* Leslie Roberson

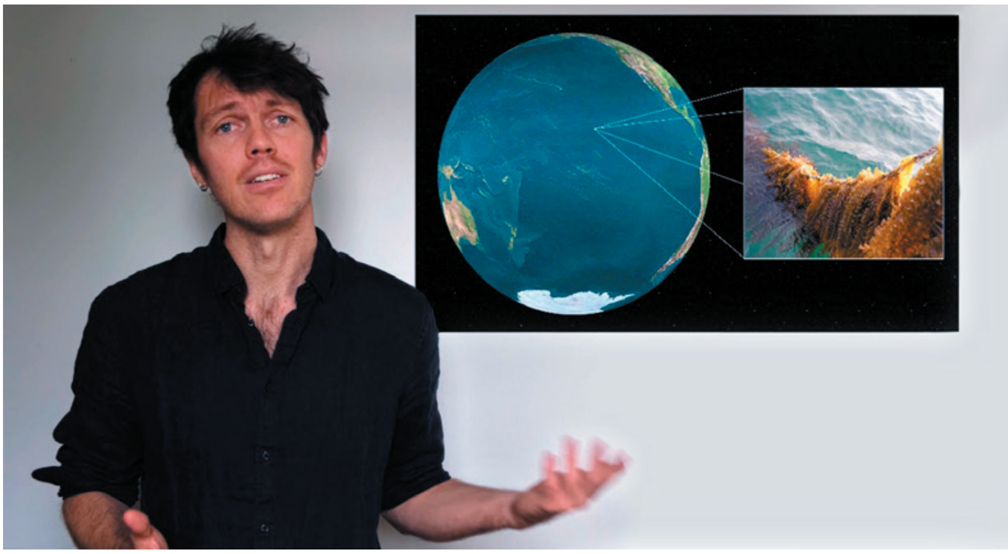
Industrial fishing of threatened species

In a new paper coming out in *Nature Communications*, **Leslie Roberson** and **Carissa Klein** explore the extent of industrial fishing of threatened species. They find that over 200 countries participate in the fishing or importing of 92 threatened fish and invertebrates. The true numbers are much higher because seafood documentation is universally poor. It is not illegal to catch, buy, or sell threatened seafood – which is at odds with global conservation commitments. Read more on the ***UQ News*** site.

Mapping cumulative pressures of food production

CBCS researcher **Dr Caitie Kuempel** has led a paper published in *One Earth*. The paper describes a methodology for combining life cycle assessment analysis with cumulative impact mapping to better understand the spatial variation in cumulative environmental pressures of global food production. This work is part of the Global Food Systems working group at the National Center for Ecological Analysis and Synthesis at UC Santa Barbara. Read more **here**.

Scott Spillias takes home SEES 3MT awards



Scott presenting his winning Three-Minute Thesis presentation, in August 2020. *Photo:* Scott Spillias

Can you sum up everything you've done and everything you hope to do over the course of a three-year career in just three minutes?

The University of Queensland's Three-Minute Thesis competition (submitted virtually for the first time in the competition's history) asks PhD students to do just that.

This year, CBCS's **Scott Spillias** won both First Prize and People's Choice award in the School of Earth and Environmental Science 3MT, and then went on to take home the second place prize in the next round against other school winners within the Faculty of Science.

In his three-minute presentation, Scott suggested that, despite all that humans have accomplished on Earth, when it comes to the oceans, modern human societies are still just hunting and gathering. He laid out a vision for how seaweeds cultivated throughout the world's oceans could lead to revolutionary change in the way we live on Earth. This seaweed revolution may go towards improving food security, regenerating ecosystems and fighting climate change, but it may have as-yet unforeseen social and ecological trade-offs, too.

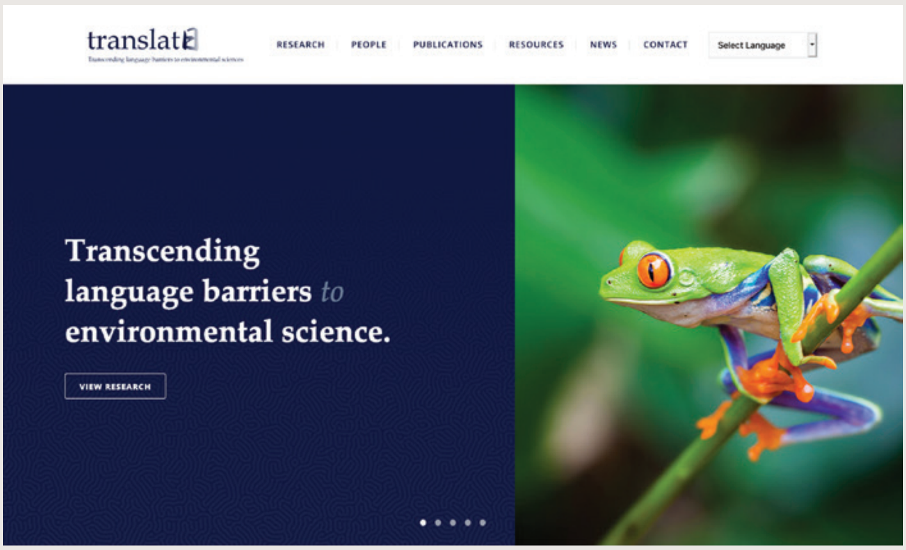
Scott's work peers into this uncertain future by using a combination of systems modelling and stakeholder engagement to help chart a course that decision-makers and practitioners can use to navigate us towards a more prosperous future for people and the oceans.

Website launch for the translatE project

The translatE (transcending language barriers to environmental sciences) project, led by CBCS Chief Investigator Dr Tatsuya Amano and funded by ARC, applies scientific approaches to addressing language barriers in the environmental sciences.

The aim of translatE, simply put, is to maximise the scientific contribution to global biodiversity conservation. CBCS and the translatE team are excited to announce that the website of the translatE project was officially launched in July 2020: **translatesciences.com**.

The website consists of five sections – **Research**, **People**, **Publications**, **Resources** and **News**.



Research outlines why language barriers matter when tackling global challenges like the biodiversity crisis, and what the project aims to do. **People** lists key UQ members of the project (currently Dr Tatsuya Amano, **Ms Violeta Berdejo Espinola** and **Dr Pablo Negret**) and over 40 individual collaborators covering 15 different languages from across the globe. **Publications** highlights peer-reviewed papers as well as media coverage and presentations from the project. The project's bimonthly updates, including preliminary results from ongoing studies, can be found in the **Resources** section. This section also provides a growing list of academic articles on language barriers – the first of its kind – which showcases the consequences of language barriers in evidence syntheses, science communication/education, and publishing/career development. Finally, **News** features new publications and calls for collaborators.

The translatE team hope that the website will become a global platform where anyone can learn about the consequences of language barriers in biodiversity conservation and, more broadly, in science. Visit the website and explore this exciting and important project.

Dr April Reside: 2020 Queensland Young Tall Poppy

The Tall Poppy Syndrome is (according to Wikipedia) a cultural phenomenon in Australia and New Zealand which involves mocking people who think highly of themselves. The Australian Institute of Policy and Science decided to tackle the apparent cultural reluctance to celebrate achievement, and created the Tall Poppy Campaign to "to recognise and celebrate Australian intellectual and scientific excellence and to encourage younger Australians to follow in the footsteps of our outstanding achievers".

> I am extremely fortunate to follow in the footsteps of others from CBCS to join the alumni of Tall Poppies.

I was extremely fortunate to be nominated for this award by Professor Martine Maron for my research and outreach on recovery of threatened species, and to follow in the footsteps of Dr Alienor Chauvenet, Dr Morena Mills and others from CBCS to join the alumni of Tall Poppies.

Dr April Reside (right) accepting her Queensland Young Tall Poppy Award. *Photo:* Queensland Government

In the ceremony on 27 August I had the opportunity to meet the Hon. Leeanne Enoch, Minister for Environment and the Great Barrier Reef, Minister for Science and Minister for the Arts – and the group of talented and inspiring Queensland Tall Poppy 2020 winners.

What will it take to save all of Australia's animals and plants?


Dr Reside with a horned frog (*Ceratophrys cornuta*) in the field. Her work focuses on the threat posed by climate change to imperilled species. *Photo:* Eric Vanderduys

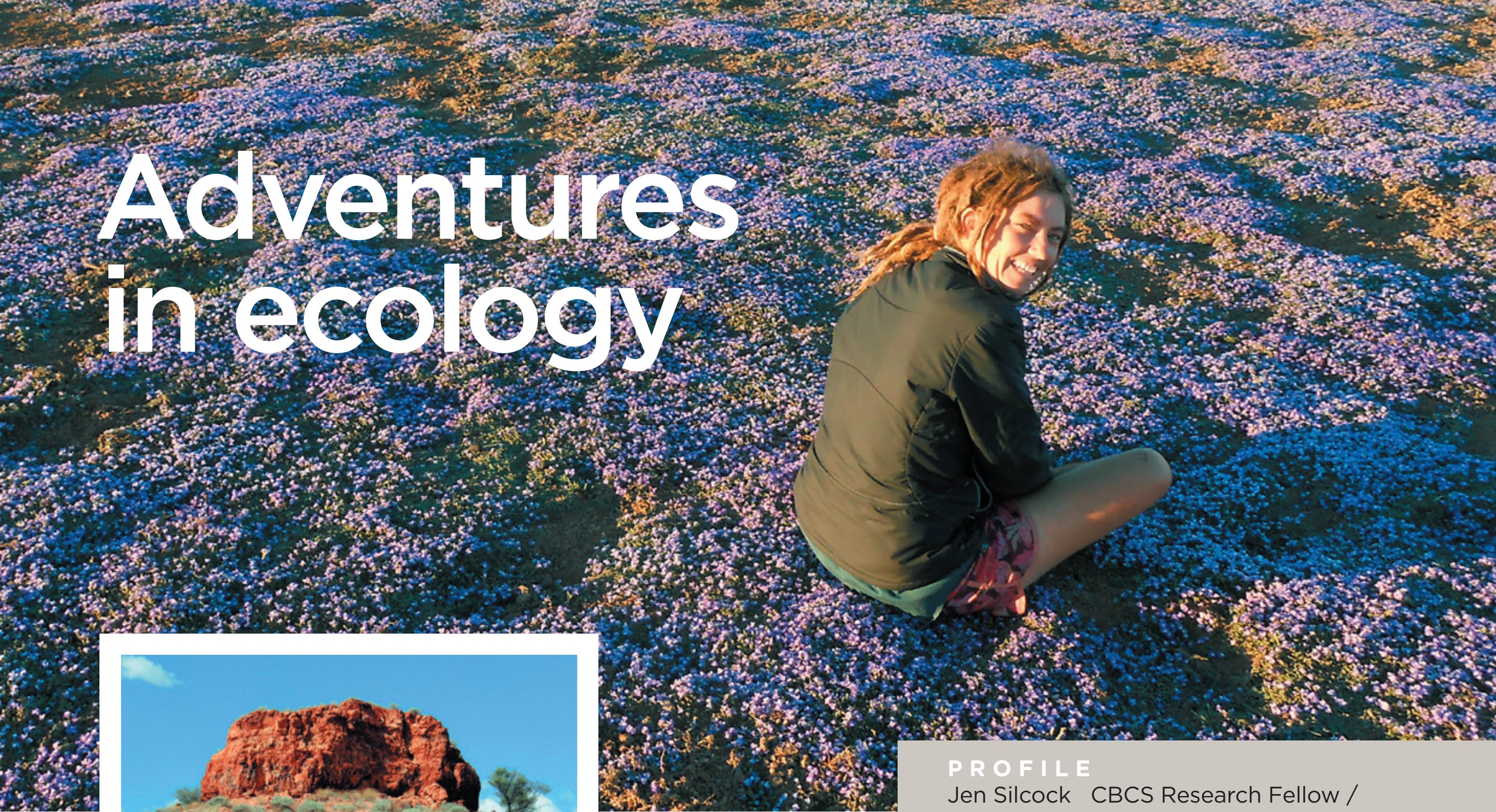
Dr April Reside's research brings together information on species, particularly those threatened with extinction, and their threats and required corresponding actions. By examining the costs and benefits of different actions that address these threats, we can be more effective at saving our native species.

Dr Reside's research has focused on one of the major threats to species: climate change. Using scenarios of future climate, and models of how mobile species such as birds or sharks move according to local conditions, she has made predictions about where habitat for species will be in the future.

From this, she has identified the best actions to protect these key habitats, and the species within, into the future. Importantly, solid policy and legislation frameworks that support these actions are needed.

For example, smart policy can lead to preventing severe climate change – through protection of existing vegetation with high carbon value and planting more trees to sequester more carbon – as well as helping species to survive climate change, through protecting their habitat.

Adventures in ecology



PROFILE
Jen Silcock CBCS Research Fellow / Department of Environment and Science

Above: Revelling in a purple carpet of creeping monkey flower (*Mimulus repens*) at sunset in Lake Bindegolly National Park, August 2017. *Photo:* Russell Fairfax

Left: Pondering deserts and life in the Gibson Desert near Macpherson's Pillar, shortly after returning from the much harsher deserts of north Africa and the Middle East. *Photo:* Clare Silcock

"I grew up in the closely settled agricultural landscape of Queensland's eastern Darling Downs, a gentle land of rolling hills and crops thriving on rich blacksoil plains. I used to run around dirt tracks on the outskirts of town and climb trees to watch the sunset, encountering the odd koala, and was involved in local environmental projects during my school years. But it was in the wilder semi-desert country to the west where I fell in love with the natural world, and wanted to find out everything I could about it.

Exploring the "dead heart"

And so began a decade of an intrepid desert life: camping out in my swag for months at a time, walking through the desert with camels, collecting thousands of plant specimens, searching for rare plants and lost artesian springs, chasing bilbies across the inland plains, mapping and kayaking muddy rivers and waterholes, and pulling thousands of *Sclerolaenas* (a ubiquitous genus of inland burrs) from my feet. Between trips, I lived in the outback towns of Longreach and Charleville. I worked for the Department of Primary Industries, then the Queensland Herbarium, before enrolling in a PhD.

My thesis examined ecological change in inland eastern Australia since pastoral settlement – an often murky and contentious area, because frontier history was so swift and violent in most areas that we have no idea what the country looked like before the pastoral invasion and cessation of Aboriginal management.

> I feel lucky to have a job that allows me to learn about and explore Australia's unique biological and cultural heritage.

After my PhD, I worked on a project mapping Great Artesian Basin springs in western Queensland and New South Wales. I also travelled to other deserts – in Egypt, the Middle East and Western Australia.

Night parrots, endangered plants and ethnobotany

Through the various twists and turns of life, I now find myself living in a beautiful little valley in the lush green forests of south-east Queensland, working part-time in a mostly desk-based job and caring for my 18-month-old son. At present, I am compiling an Action Plan for Australia's most Endangered plants and contributing to the Common Assessment Method (CAM) process to align state and federal listings of threatened species.

I also enjoy collaborating on a variety of projects, including investigating the ecology and conservation of the elusive night parrot in the Channel Country and long-term monitoring of the enigmatic yellow-footed rock wallaby in the beguiling stony hills north-west of Charleville. I am also involved with some fascinating ethnobotanical and archaeological projects. I feel lucky to have a "job" that allows me to learn about and explore Australia's unique biological and cultural heritage, share the knowledge I have acquired about it, and hopefully contribute to its appreciation and conservation."

Centre for Biodiversity and Conservation Science

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