



Associate Professor Eve McDonald-Madden wins 2021 Fenner Medal

Eve's work is supported by her lab filled with incredible people passionate about sustainability who bring their diverse skill sets from physics and mathematics to chemical engineering and ecology towards finding solutions.

The prestigious Fenner Medal honours **Eve McDonald-Madden's** research using innovative methods to deal with the complexity of environmental systems. She works to find robust and sustainable solutions at the interface of environmental, societal and economic endeavours.

Winning the 2021 Fenner Medal recognises three main areas of Eve's contribution: value of information, climate action and environmental decision-making.

Professor Frank J. Fenner AC CMG MBE FRS FAA was an Australian scientist renowned for his achievements in virology. These included overseeing the eradication of smallpox, and reducing Australia's rabbit plague that was ravaging agricultural land and dramatically impacting the environment through the introduction of myxoma virus. Each year the Australian Academy of Science awards the Fenner Medal in recognition of outstanding research in biology. Former CBCS-er Michael Bode won the medal last year, and Professor Hugh Possingham in 2000.

Watch the Australian Academy of Science video [here](#).

The value of information for decisions

A significant proportion of global environmental funds are directed to understanding

ecological systems and monitoring the outcomes of management endeavours. Rarely is it questioned whether these funds would be better directed to more management activities. Eve has pioneered approaches to inform such important and often controversial decisions.

Climate action

Eve believes the challenge for our global society is to move from debating the evidence for climate change and its impacts to formulating policies that help achieve sustainable long-term objectives, even if those responses have to be made in the face of uncertainty. She led the first optimisation of climate adaptation actions

in conservation. To ensure that climate policy is guided by the most up-to-date set of predictions, it is essential that we can detect when climate predictions are failing to capture what is actually happening in nature. Together with colleagues, Eve devised the first method for detecting the failure of climate predictions and applied it to predictions of sea ice change.

Eve is driven to tackle globally significant environmental challenges by fostering the next generation of environmental decision scientists.

Environmental decision-making in complex networks

Environmental decisions are made in a complex web of interactions, involving people and their different cultures, species, ecosystems and socioeconomic connections. Recently, Eve's research has expanded to include global connections in decision-making, such as the global dynamics of agricultural environmental impacts and global investment. Her team's early work on the novel notion of "uncontested agricultural lands"

for conservation and renewable energy siting uses remote detection of low-productivity lands. Using prioritisation, this work also informs land use to support food security, nature protection and the production and supply of sustainable energy. Through her 2018 "Where's the Beef?" Future Fellowship, Eve further innovates the way we think about where and how we produce food, and how we can minimise the impacts on industry while maximising other social needs and environmental protection.

Building decision analysis capacity

Eve is driven to tackle globally significant environmental challenges by building multi-disciplinary collaborations and fostering the next generation of environmental decision scientists. In 2018, she was nominated as the inaugural chair of the Environmental Decisions Alliance, a global entity of 14 world-leading member institutions, with the aim of building decision analysis capacity in the environmental sphere, sharing research advances and applications in this area, and catalysing the use of decision analysis for pressing global environmental challenges.

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.centre.uq.edu.au

Redefining success

This following is an edited excerpt of the welcome address delivered by CBCS's new director **Dr Daniel Dunn** on 12 January 2021.

“ I could start by introducing myself to you and giving you a better sense of who I am – but this position isn't about me, it's about us. It's about helping all of you achieve what you want to achieve. If each of you succeed, my tenure as CBCS Director will be a success.

Success is a funny word, though. Many of you hear that word and think of *Nature* papers. Others might think of policy changes ... or improved social conditions ... or developing an R package ... or topping Hugh's one-day bird count at Oxley Creek Commons. Over the next three years, I would like to broaden our collective view on success. The outstanding success that CBCS has experienced to date is, frankly, intimidating. We have set a very high bar and gained a reputation that precedes us, but doesn't always help us. Our desire to succeed leads to people pushing themselves and those around them hard and harder. The results can be fantastic, but they can also come with unintended consequences to individuals that feed back into our centre. In many ways, this problem is akin to having economic growth as a goal in and of itself. Where does it end if we define success as achieving just a bit more than those that came before us or those around us?

As soon as we compare ourselves to others, we start to take on their values and definitions of success. You are incredibly talented and creative individuals. Each of you has the ability to create your own definition of success, unconstrained by the way you perceive the person next to you, or CBCS, or UQ, to have defined the term.

We can, and we will, make CBCS what we want it to be.

My main jobs in this role are: 1) to provide a place where you feel safe and comfortable defining your own success; and 2) to help provide the means for you to achieve that success. And those jobs are scale-independent: the same goes for HDR students, academic staff and professional staff.

So, let me go back to my introduction. Not of myself, but of *us* – the next iteration of CBCS. We are the group that will chart the course from here and we will define success for CBCS. We are working off the successes of CBCS to date, but we are not limited by them. We can, and we will, make the centre what we want it to be.

This year we will develop the next five-year strategic plan for CBCS and you will all have a role, if you want it, in guiding the direction of the centre. We want to hear your ideas. We want the new definition of success in CBCS to be *our* definition. I look forward to engaging with each and every

one of you over the next three years and learning from you. I strongly encourage you to jump in when opportunities arise to contribute to shaping the future of this centre that we all treasure. Stay tuned for news regarding next steps.

And, please, be safe as we navigate this next year and take care of each other.

Thanks,
Daniel

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PROFILE

Dr Laura Sonter

CBCS Senior Lecturer in
Environmental Management

Enhancing conservation outcomes from mining



I love asking questions – I always have – especially complicated ones that required my parents to answer, “Well, Laura, it depends”. As a kid,

I also spent a lot of time in nature. I grew up in Hervey Bay, Queensland, and spent weekends and school holidays in places like Fraser Island with my family. Given my love for the outdoors and an aptitude for asking questions, it’s no wonder I chose to study environmental science at The University of Queensland (UQ) and eventually returned to teach environmental management many years later.

An introduction to applied, interdisciplinary research

My journey into research began after graduating when I started working as a research assistant at UQ’s Sustainable Minerals Institute (SMI). Although early in my career, this experience really shaped the type of research I do now.

I often found myself working in interdisciplinary teams. Similar to conservation problems, sustainability challenges faced by the mining sector are rarely solved using the tools and

approaches of one discipline. I worked on projects seeking to design landscape management plans that would enhance mine site rehabilitation outcomes for biodiversity and ecosystem services, and enjoyed working with engineers, economists and social scientists.

These research projects were also highly applied. It became clear to me that the most impactful research was done in partnership with end users, and I quickly learnt how to communicate our findings across very different stakeholder groups.

Working internationally

My PhD research examined mining and tropical deforestation and I was lucky enough to conduct my work in Brazil. Brazil made sense for the research I wanted to do – it’s mineral-rich and biodiverse. But I found the value of working internationally extended far beyond an opportunity to do cool science. During my time in Brazil, I met an incredibly diverse group of people who not only introduced me to their country and culture but helped me understand the complexities of managing natural resources. Together we explored the true footprint of mining, including both positive and negative impacts on forest, and evaluated policies to enhance conservation outcomes.

Exploring mining and conservation issues at CBCS

After my PhD, I spent three years as a postdoc working on ecosystem services at the Gund Institute for Environment in Vermont in the US, before returning to UQ and CBCS in 2017. My current research at CBCS explores the links between mining and conservation, and I continue to work with colleagues in Brazil and the US. My hope is that our research will better integrate conservation science into decisions to extract minerals and ultimately improve outcomes for biodiversity in mining regions.



Laura canoeing the Rio Juma during the wet season in Amazonas, Brazil.
Photo: Laura Sonter



Fieldwork in the iron mining region of Minas Gerais, Brazil.
Photo: Allaoua Saadi

Iron mining operation (Mina de Fábrica) in Minas Gerais, Brazil. Photo: Hugo Cordeiro

Better mining outcomes for biodiversity conservation

The statement “mining threatens biodiversity” is not an overly contentious one among conservation scientists. We’ve all heard of cases where mining and mineral processing have negatively affected species and ecosystems.

For Dr Laura Sonter, UQ senior lecturer and lead of the CBCS research group on mining and conservation, a standout moment took place in Brazil in 2015: “I stood on the side of a road, looking down at Samarco’s tailings dam, thinking about possible impacts of a breach.” Three months later, 50 million cubic metres of mine waste spilled into the biodiverse Rio Dolce river basin and, eventually, the South Atlantic Ocean.

So, yes, mining threatens biodiversity. But the links between mining and conservation are complicated, and mineral production doesn’t need to be bad for biodiversity. In fact, some of us argue that achieving good conservation outcomes in the future will depend on ecologically responsible mining and close collaboration between conservation scientists and the mining sector.

What connects conservation, minerals and mining?

Delivering on many sustainable development goals (SDGs) – including those to conserve life on land and below water – require mineral resources. For example, mitigating climate change and associated biodiversity losses requires a boost in renewable energy production. However, these technologies are material-intensive, and growing the supply of wind, solar and hydropower requires new sources of lithium, cobalt, copper and nickel.

Producing these minerals in an ecologically responsible way will require new tools and conservation approaches. While the leading industry body, the

International Council on Mining and Metals, urges member companies to build SDG commitments into corporate policies, guidance is missing on how to operationalise best conservation practice at the scale of a mine site.

There is a huge opportunity to improve biodiversity outcomes from mining and much of this work will benefit from industry collaboration. These partnerships provide access to necessary knowledge, data and resources to conserve biodiversity in mineral-rich regions, which, in Australia, may cover 25% of our landscape.

Recent CBCS highlights

So, what are we doing about this? CBCS research on mining and conservation issues falls across three main topics – here are a few highlights from 2020:

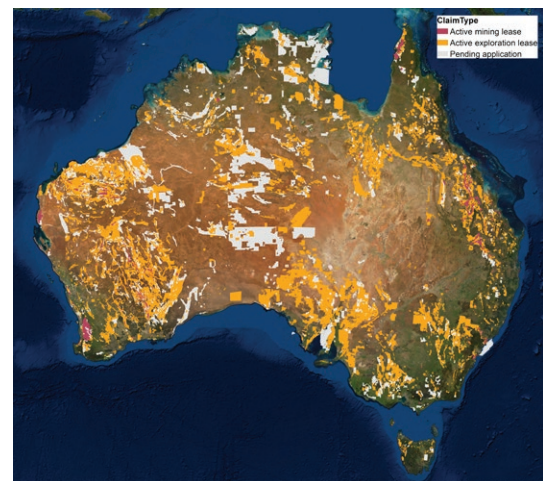
Understanding mining threats to biodiversity

Mining is an important driver of tropical deforestation, habitat loss and fragmentation. PhD student Juliana Siqueira-Gay’s work in the Brazilian Amazon has shown that government proposals to open protected areas to mining may damage culturally significant areas and the valuable ecosystem services these places supply (Siqueira-Gay et al. 2020a, 2020b). Further, preliminary findings from PhD student Tom Lloyd suggest that mineral-rich areas are more biodiverse than sites unaffected by mining. In Colombia, Dr Pablo Negret’s research has revealed a correlation between mining operations and deforestation rates, and

that these impacts may have particularly acute consequences for some species and ecosystems if left unprotected (Negret et al. 2019).

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Mining tenure, including active mining and exploration leases and pending applications, in Australia. Map: S&P Global Market Intelligence 2021



Juliana Siqueira-Gay visiting the Jari Ecological Station, a protected area in north-eastern Brazil currently under pressure from mining operations. Photo: Juliana Siqueira-Gay



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Improving policies to conserve biodiversity in mining regions

Compensating for biodiversity impacts of mining will require more conservation effort than is typically required by policies, and the limits to compensation must be factored into decisions to expand mines. In a large collaborative effort to evaluate compensation policies in four countries, including Australia, we showed that there may be insufficient land available to recover the biodiversity needed to achieve No Net Loss (NNL) from mining (Sonter et al. 2020a). Complementing this, Masters of Conservation Biology student Adam Garthwaite investigated potential for biodiversity offsets in Queensland to provide social and ecological co-benefits, showing that more land may be needed if compensation goals extend beyond biodiversity (Garthwaite et al. in prep).

Consequences of mining and conservation for people

The impacts of mining on biodiversity also affect ecosystem services and their contribution to human wellbeing. PhD student Robyn Boldy led a review of mining impacts on ecosystem services to reveal that, of the few analyses conducted in mining regions, the focus has been on a limited set of services of little real value to local communities (Boldy et al. 2021). Robyn's case study research on bauxite mining in western Cape York is also shining light on opportunities to improve mine site rehabilitation outcomes for ecosystem services valued by local Indigenous people. Contributing to a similar goal, PhD student Jaramar Villarreal-Rosas developed a framework for incorporating ecosystem services, and specifically their contributions to people, into systematic conservation plans (Villarreal-Rosas et al. 2020).

What's next?

A key focus for our research group will be the role of mining in mitigating climate change. Important deposits of energy transition minerals (needed to generate and distribute renewable energy) coincide with conservation sites and priorities (Sonter et al. 2020b). But we don't yet know how and where to mine these materials so that they avoid causing additional impacts on biodiversity.

Beyond this, there is plenty more research needed to improve biodiversity outcomes of mining and now is a great time to work on this topic. Data and technologies are enabling analyses across the global mining sector and proposed state and national policies provide interesting future scenarios to analyse. Reach out if you'd like to join us!



Native seed mix used to rehabilitate one of the bauxite mining sites at Hey Point, Queensland, including species that are of cultural significance for bush food and used for timber. Photo: Robyn Boldy.



Robyn Boldy in the field with Angus Kerindun, senior Wik Waya Traditional Owner and Indigenous Lead/Machine Operator for Wik Timber, identifying plant species of cultural significance around Hey Point near Weipa. Photo: Robyn Boldy

Mining and conservation research group at CBCS.

From left to right: Tony Fahey, Adam Garthwaite, Robyn Boldy, Laura Sonter, Pablo Negret and Tom Lloyd. Absent: Jaramar Villarreal-Rosas and Juliana Siqueira-Gay.

Photo: Tom Lloyd

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NEWS IN BRIEF

Local stressors impacting coral reef recovery

In a *Proceedings of the Royal Society* paper, CBCS PhD candidate **Ama Wakwella** and the **Marine Spatial Ecology Lab's** Dr George Roff and Professor Peter Mumby explore how overfishing and increased sedimentation impact the recovery of coral reef communities. They identify critical thresholds in sediment loading that overwhelm the effects of herbivory and drive changes in benthic community structure, creating cascading effects on coral recruitment. Read more [here](#).

Dr Amelia Wenger wins a Thomas Davies Research Grant

Dr Amelia Wenger was awarded the 2021 Thomas Davies Research Grant for marine, soil and plant biology. Her project will review wastewater discharge standards and water quality guidelines for coastal and marine environments to inform policy, management and implementation of appropriate interventions for tropical coastal ecosystems. The outputs of this research will be used to develop wastewater management process guides for governments, NGOs, private sector stakeholders, and donors focused on designing and implementing wastewater management strategies that can meet public health and ecosystem health goals.



A wastewater outfall discharging into the ocean, Cienfuegos, Cuba. Photo: Amelia Wenger

Taiwan publishes first national bird report

The Taiwan Wild Bird Federation and the Taiwan Endemic Species Research Institute, where CBCS PhD candidate **Da-Li Lin** is an Assistant Research Fellow, officially announce the publication of the State of Taiwan's Birds 2020. Government, academia and civil society came together to create this first-of-its-kind report, an important milestone in Taiwan's bird conservation work. It is the first comprehensive assessment of the conservation status of Taiwan's birds, integrating data collected through long-term citizen science projects and scientific studies. It also provides in-depth analysis of overall species population trends, the status of specific bird groups, current threats, and conservation strategies and actions. Read the full text [here](#), news articles [here](#) and [here](#), and the full press release [here](#).



The endemic *Babirusa celebensis* in Sulawesi, Indonesia, where ASF is likely to be spreading. Photo: Wikicommons

New virus threatens Babirusas

African Swine Fever (ASF) is highly infectious and causes near-100% fatality in pigs. Since 2019, ASF has caused the death of more than one million domestic pigs in Asia and unprecedented economic impacts on the global pork industry. A new paper led by CBCS's **Dr Matthew Lusk** shows how ASF has spread to wild pigs and now threatens 11 endemic species, including the famous Babirusas. While pandemics remain at the forefront of national agendas, governments must monitor and control ASF. Read more [here](#).

Language diversity under-represented in IPBES assessments

A new *One Earth* paper has found that despite the involvement of linguistically diverse experts in IPBES assessments, references cited were predominantly in English and comments from Anglophone reviewers were over-represented in those reports. This indicates that the IPBES assessment outputs are disproportionately filtered through English-language literature and Anglophone experts. The paper was led by Abigail Lynch from US Geological Survey and co-authored by CBCS's **Dr Tatsuya Amano**. Read the paper [here](#).

Fond farewells

Madeline Davey joins the Centre for Conservation Geography

In late 2020, I was offered a job as a spatial analyst/conservation planner within the **Centre for Conservation Geography**, based in Byron Bay. We are a research group that provides technical support for conservation decision-making across the world in all ecosystems. I am beyond grateful for all the support from CBCS in getting me here, from interview preparation to skill development and mentoring. I hope to still see you all at future CBCS events.

Rachel Oh heads off to Leipzig

I have accepted a post-doctoral position at **iDiv/UFZ**, a national research centre located in Leipzig, Germany. I will work with Professor Aletta Bonn and her Ecosystem Services team, and will be continuing my research on nature/biodiversity and health and wellbeing for the next three years. It has been such a pleasure to be a part of the CBCS team – thank you for everything, and keep in touch: r.oh@uq.edu.au!



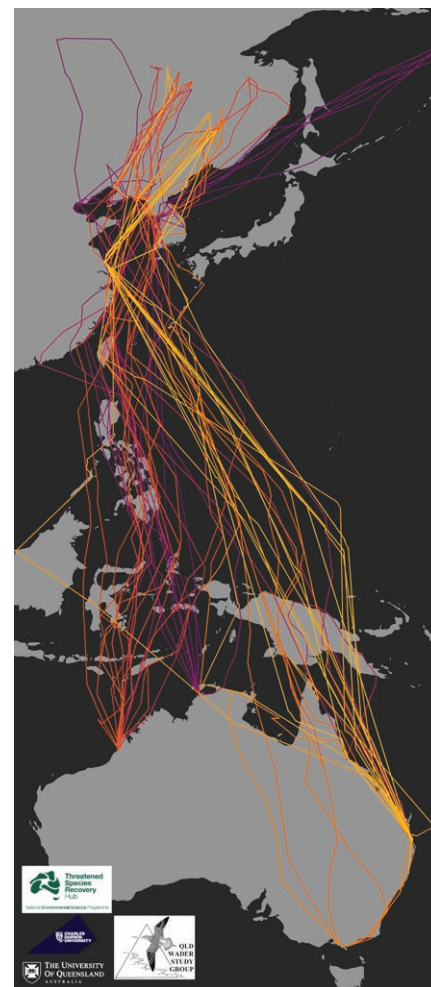


PROFILE

Dr Brad Woodworth

CBCS NSERC* Postdoctoral Research Fellow

*Natural Sciences and Engineering Research Council of Canada



Above Migration routes of the Endangered far eastern curlew. Map: Brad Woodworth

Bottom left Brad releasing a far eastern curlew at Manly, Moreton Bay. Photo: Micha Jackson

Helping migratory species on their way

“My research career was born from a passion for fly-fishing and a childhood of crawling around backwoods trout streams with my Dad in Atlantic Canada. When an opportunity emerged to take a summer field job in a pristine river valley east of Gros Morne National Park in Newfoundland, I had to say yes. I was semi-interested in the birdy job description, but mostly I was lured in by a river chock full of Atlantic salmon! Little did I know that the vibrant reds, yellows, oranges and blues of North America’s songbirds would hook me into a decade plus of migratory bird research.

A passion for migratory shorebirds

Nowadays my research focuses on a group of birds whose beauty might be described as more subtle. Migratory shorebirds, like the far eastern curlew (pictured), are long-legged, long-billed and brown, very much the colour of the mudflats they inhabit. You might have noticed them while walking Australia’s beaches and esplanades. But it is equally or more likely that you missed them.

Far eastern curlews, like many migratory species,

My research focuses on understanding the year-round drivers of population dynamics and trends in migratory species.

travel thousands of kilometres between breeding and non-breeding grounds each year. In many cases, migrations involve multi-day, non-stop flights across open ocean. When they get a chance to make landfall, they do so at stopover sites, which serve as critical links in the chain of habitats between breeding and non-breeding ranges. Breaking any link in the chain can spell disaster for populations of the birds. Using individual-borne tracking devices, population monitoring and demographic data, my research focuses on understanding the year-round drivers of population dynamics and trends in migratory species. By pinpointing where and when species are most sensitive to environmental variability and threats across their annual cycle, we can identify weak points in the chain, and focus conservation action on areas of highest vulnerability.



Journeys in citizen science

When I made the trans-hemispheric migration to Australia, my eyes were quickly opened to the tremendous contributions of citizen science to research and conservation. Given the wide geographic ranges of migratory species, it is

essential that each stop along the flyway does its part to keep the chain intact, and environmental NGOs in Australia certainly do their part. The Queensland Wader Study Group, for one, has been dedicated to shorebird monitoring and conservation for nearly three decades and counting. Without groups like these and their armies of volunteers, much of the basic ecological knowledge that underpins conservation and management would be missing. Helping to facilitate flow of this valuable information and data into conservation planning and decision-making through marine park zoning plans, Ramsar wetland descriptions and EPBC decisions, to name a few, is a very rewarding part of my work.

While migratory shorebirds might blend into their muddy habitats, it is critical that they remain in plain view of environmental decision-makers. By encouraging information-sharing and ecological understanding across the full annual cycle, I hope to help sustain these species and their incredible journeys into the future.