



UNIVERSITY OF
CANBERRA



INSTITUTE FOR
APPLIED ECOLOGY

2016

ANNUAL REPORT

SCIENCE FOR KNOWLEDGE OF OUR NATURAL WORLD

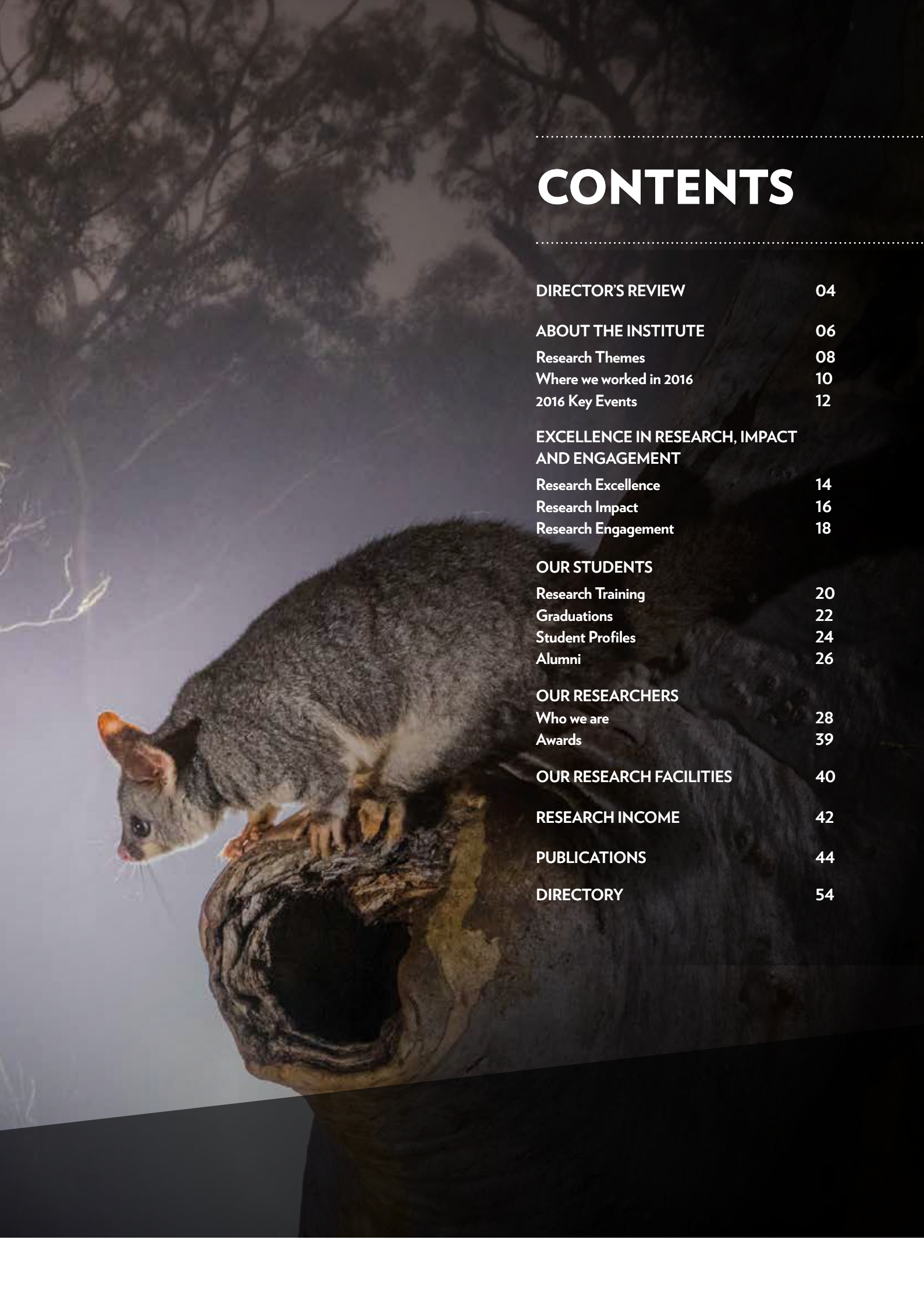


Charles Davies (or Charlie as his friends know him) is an award winning photographer, and University of Canberra alumnus graduating with a Bachelor of Ecology in 2016. He returns regularly to assist on field trips, enjoying the opportunity to learn more about ecology and take photos in remote parts of Australia. His work focuses on Australian wildlife around his home in the Snowy Mountains, NSW, and Charlie has found his studies in ecology a valuable asset in his career as a professional nature photographer.

Front cover image and contents page background image credit: www.charlesdavisphotography.com

ACKNOWLEDGEMENT OF COUNTRY

The University of Canberra acknowledges the Ngunnawal people – the traditional custodians of the land on which the University is situated – and pays respect to the Elders of the Ngunnawal Nation both past and present.



CONTENTS

DIRECTOR'S REVIEW	04
ABOUT THE INSTITUTE	06
Research Themes	08
Where we worked in 2016	10
2016 Key Events	12
EXCELLENCE IN RESEARCH, IMPACT AND ENGAGEMENT	
Research Excellence	14
Research Impact	16
Research Engagement	18
OUR STUDENTS	
Research Training	20
Graduations	22
Student Profiles	24
Alumni	26
OUR RESEARCHERS	
Who we are	28
Awards	39
OUR RESEARCH FACILITIES	40
RESEARCH INCOME	42
PUBLICATIONS	44
DIRECTORY	54

DIRECTOR'S REVIEW

The Institute for Applied Ecology (IAE) had a great 2016, with strong research productivity and a focus on the future. As a now ten year old research institute, it is timely to consider our future direction, and how we will engage with the federal government's Research Innovation and Engagement Agenda. In environmental science there is a particular need for timely, focussed and management-ready advice to government, managers and communities.

Many staff within the Institute have been involved in a 'refresh' of undergraduate science courses offered through our partner Faculty of Education, Science, Technology and Mathematics (ESTEM). Ably led by IAE/ESTEM Associate Professor Dianne Gleeson, joint IAE and ESTEM staff are developing a set of undergraduate offerings that the University of Canberra can be proud of. It is exciting to see this renewal, and IAE research-focussed staff engaging in many ways. A healthy undergraduate science program is a key foundation for a vibrant research institute, and I want to extend my thanks to all staff across IAE and ESTEM who have put their blood, sweat and tears into course redevelopment. I would like to particularly acknowledge ESTEM Dean Geoff Riordan, who has entered into discussions with the IAE in a truly collaborative fashion.

A focus on strategy and growth was a feature of the five year external review of the Institute, carried out in July. An eminent panel comprising Professor Gillian Lewis, Chair (School of Biological Sciences, University of Auckland, NZ), Dr Margaret Byrne (Science and Conservation, Department of Parks and Wildlife, Western Australia), Professor Peter Davies (Centre for Environment, University of Tasmania), Professor David Richardson (Centre of Excellence for Invasion Biology, Stellenbosch University, South Africa), and Professor Lyndon Anderson (Faculty of Arts and Design, University of Canberra) visited the IAE to provide an external perspective on our achievements and challenges. The review was generally positive about the IAE, but identified opportunities for stronger connections into the teaching program, building more profound international connections, and renewing focus on both excellence and engagement.

The review was the catalyst for an assessment of the IAE's achievements, but also some deep thinking on the future for the Institute. We can proudly look back on some highlights; an Excellence in Research in Australia (ERA) '5' in the 2015 assessment; sustained growth in paper productivity and quality; and development of an

exceptional science team. Looking forward there are challenges in proving relevance of our research, building external income, and remaining agile and innovative within a university which is achieving ever higher standards of performance across several research areas. By the time you read this, the *2016-2021 IAE Strategic Plan* will have been finalised. This plan the product of wide consultation, but in particular benefitted from the hard work of a number of IAE staff and students including Jill Bartlett, Andrew O'Reilly-Nugent, Dr Fiona Dyer, Dr Anna MacDonald, Associate Professors Simon Foster and Janine Deakin, and Professor Tariq Ezaz.

The *2016-2021 Strategic Plan* outlines the IAE's strategy for becoming a world-class research centre in environmental science. The strength in the IAE's research capabilities, coupled with strong engagement with industry, the public sector and the community, positions the IAE to become a global leader in applying the very best science to solve environmental problems.

The Plan structures the next five years around a renewed focus on problems, with a reduced emphasis on disciplinary divisions. The inter-disciplinary nature of the IAE, combined with a culture of external engagement, provides the ideal basis for carrying out excellent solutions-focussed environmental science.

The four key objectives of the Plan are:

APPLIED EXCELLENCE

We aspire to be Australia's leading research institute in applied ecology and a 'research partner of choice' in addressing local and global environmental challenges. We will generate knowledge for management solutions, through research, partnership, advice and training. We will adopt a 'problem-based' rather than 'discipline-based' structure and focus.

BROAD ENGAGEMENT

We will broaden and deepen partnerships with industry, policy makers and managers. The IAE will collaborate across academic disciplines to arrive at holistic solutions to environmental issues, and broker the development of research teams and problem-focussed workshops. Key to this will be co-location of staff and students with partners in the private and public sectors to achieve environmental outcomes.

GLOBAL CONNECTIONS

The IAE will be recognised as an important partner and contributor to international applied ecological research. We will take Australia's environmental science to the world and bring the world's environmental science expertise to Australia. We will be highly competitive in recruiting international PhD students, research fellows and academic staff.

BUILDING CAPACITY

We will share knowledge through engagement in training at all levels; partnering in the delivery of undergraduate education, post-graduate training and the provision of research and advice.

If my focus in this year's Director's Review is on the future, then that reflects where the IAE's thoughts need to be. In 2016 we welcomed a new Vice Chancellor to University of Canberra; Professor Deep Saini. Professor Saini is an eminent environmental scientist in his own right, meaning that all three senior managers at the University of Canberra are scientists, and two of them have an environmental focus. This group will challenge the IAE to engage with the University of Canberra's new strategic plan (expected in 2017) and to build the Institute into a broad-based program of science and technology excellence across the University.

Finally, I want to recognise some notable achievements in 2016. The world's pre-eminent flow ecologist, Professor LeRoy Poff has joined IAE in a part time role, while retaining his connection to Colorado State University. We recruited Professor John Hewson, AM, as a thinker-in-residence in the area of sustainability economics, following on from his excellent Krebs Lecture early in the year. Assistant Professor Simon Foster and Associate Professor Tariq Ezaz were promoted to Associate Professor and Professor respectively. There was Category 1 grant success for a number of staff, and the number and quality of papers from the Institute remains fantastic. You will read about those achievements in more detail in the following pages.



Professor Ross Thompson



ABOUT THE INSTITUTE

The Institute for Applied Ecology (IAE) undertakes world class research to improve our understanding of the environment, and enhance decision-making for natural resource management and sustainable development.



*Photo: Associate Professor Janine Deakin
in the Wildlife Genetics laboratory.*

We have a reputation for world class research with an applied focus, and engage with on-ground managers and policy makers to solve environmental problems.

THE IAE:

- Carries out quality research independently and in partnership.
- Provides technical advice to private and public sector partners on environmental issues.
- Brokers the creation of interdisciplinary teams to address major environmental research needs.
- Develops the next generation of environmental scientists through Honours, PhD, and early career training and mentoring programs.

We have specialist expertise in conservation biology, genetics, freshwater ecology, landscape modelling and environmental chemistry. The inter-disciplinary nature of the IAE, combined with a culture of external engagement, provides the ideal basis for carrying out innovative solutions-focussed environmental science.

FUNDAMENTAL RESEARCH & INNOVATION

Ecology, Natural Resource Management, Water Science, Landscape Modelling, Conservation Biology, Ecotoxicology, Genetics & Genomics, Environmental Chemistry

TRANSDISCIPLINARY SCIENCE

ENGAGEMENT

TRAINING

SOLUTIONS

EXCELLENCE IN RESEARCH ASSESSMENT

The University of Canberra was awarded an Excellence in Research in Australia assessment of 5 (being “well above world standard”) in the Environmental Sciences discipline. This is at the two-digit field of research code level, and also in the specific fields of Ecological Applications and Environmental Science and Management. We were also awarded a 4 in genetics (being “above world standard”).



**ENVIRONMENTAL SCIENCE DISCIPLINE
ERA AWARD RANKING**

RESEARCH THEMES



Researchers at the IAE are tracking the evolution of the Tasmanian Devil Facial Tumour Disease and aim to discover what is driving this change. Photo by Rodrigo Hamede.

GENETICS AND GENOMICS

Our genetics and genomics research brings the power of DNA technologies to bear on central questions in ecology and evolution. We engage in detailed examination of epigenetic factors in plants and animals to unveil the mysteries surrounding the interaction of genes and the environment. By combining genetic and genomic analysis with whole organism and field studies we can discover the role genetic processes have in determining basic life histories and characteristics such as sex determination or disease resistance.



Vegetation survey at Whealbah Billabong in the Lower Lachlan River Catchment. Photo by Laura Caffey.

WATER SCIENCE

IAE's water scientists aim to increase our understanding of freshwater systems to better inform management and policy decisions. Our researchers study the fundamental ecology of Australia's freshwater systems, from endangered native freshwater fish to stream metabolic processes. This knowledge is brought to bear on a number of applied problems; particularly the management of environmental flows, effects of pollutants in the environment, impacts of land-use change and understanding climate change. Increasingly our researchers work in partnerships across disciplines, research organisations and agencies to generate integrated solutions to water science challenges.



Postdoctoral researcher Elise Furlan taking water samples for eDNA testing. Photo by Diane Gleeson.

ENVIRONMENTAL DNA

Environmental DNA (eDNA) is increasingly being used in surveys to establish the presence or absence of target species at sampling sites. The IAE have demonstrated the application of eDNA detection methods for a range of invasive aquatic species including redfin perch, and carp. We have also developed a method for the detection of spawning in a threatened species, Macquarie perch, and shown that eDNA can detect the presence of terrestrial vertebrate species at water sources. We are now focussing on the use of eDNA for biomass estimation, which will be of significant importance in determining the impact of carp biocontrol. eDNA is gaining popularity as a detection tool because it can have advantages over traditional survey methods in difficult-to-survey locations, such as aquatic habitats, and for difficult-to-detect taxa, such as rare or cryptic species.

At the IAE we pride ourselves on the interdisciplinary nature of our research.
Our researchers span a broad range of expertise, and regularly collaborate to solve environmental problems.



Student fieldtrip to Willandra, NSW. Photo by Duanne White.



Investigating the occurrence of 'straight head' disease in commercial rice crops induced by arsenic contaminated soil, Letton, NSW. Photo by Hayden Martin.



The endangered grassland earless dragon. (Tymanocryptis pinguicolla). Photo by Anna MacDonald.

CONSERVATION ECOLOGY

Our Conservation Ecology team carries out research that underpins conservation management, providing knowledge and tools to manage threats to Australia's native biodiversity. Our research focusses on how plant and animal communities function; their response to changes brought about by processes such as land transformation, the spread of alien species, and changes to climate, fire and nutrient cycles; and how this understanding can be applied to most effectively manage or mitigate those impacts.

ENVIRONMENTAL CHEMISTRY AND ECOTOXICOLOGY

Our environmental chemistry and ecotoxicology researchers have renowned expertise in freshwater and marine chemistry, cycling of nutrients, metals and metalloids through aquatic ecosystems, and ecotoxicology. Of special interest to the group are the transport and fate of elements in the environment, including water, sediment, dust and biota, focussing on element speciation. Our researchers are experienced in the sampling and analysis of a wide range of sample types, and have a well-equipped environmental chemistry and toxicology facility.

WILDLIFE GENETICS

The Wildlife Genetics team at the IAE have a broad range of expertise from traditional population genetics through to eDNA and genomic tools. Applying DNA technologies for biodiversity and conservation outcomes is a prime focus of the team. We combine genomic trace DNA and DNA genotyping to probe the historical phylogeography of Australasian fauna and to solve problems of forensic and ecological importance. End users of this science include conservation management agencies, environmental regulatory authorities, and other research institutions.

WHERE WE WORKED IN 2016





2016 KEY EVENTS



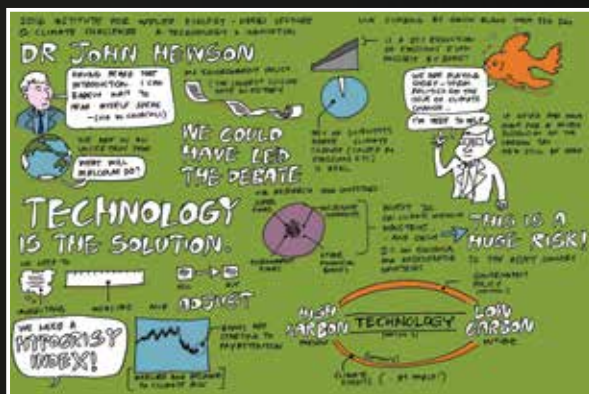
John Hewson delivers the annual Krebs lecture to a packed audience. Photo: Amy Dobos.

The IAE hosted many events throughout the year, ranging from informal weekly seminars spanning a wide range of topics, to large public events with high profile speakers.

KREBS LECTURE

Australian economic expert and former federal Liberal Party and Opposition Leader, Dr John Hewson AM, delivered a lively address on how technology and innovation can answer the climate challenge at the 2016 Krebs Lecture. Dr Hewson said it was a pleasure to speak to the engaged audience at the Ann Harding Conference Centre about an issue he has long been passionate about. He also conversed with many attendees during the cocktail reception at the conclusion of the presentation, and at the networking dinner which followed.

The annual Krebs Lecture is dedicated to IAE Thinker in Residence Professor Charles Krebs for his extraordinary contribution to our understanding and appreciation of our natural world. Gavin Blake created clever illustrations to summarise the lecture, including the one above.



A visual summary of John Hewson's lecture created by Gavin Blake.

RICHARD NORRIS LECTURE

Another highlight of the year was Dr Mike Joy's presentation for the annual Richard Norris Lecture. Dr Joy is a senior lecturer in Ecology and Environment Science at Massey University, and an outspoken advocate for environmental protection in New Zealand. Dr Joy described his perspective of the failure of freshwater management in New Zealand and the relegation of science to a parody played out and then ignored by politicians and vested interests.

The Richard Norris Lecture commemorates the life and scientific contributions of the late Professor Richard Norris, a foundation member of the IAE and an internationally significant researcher in freshwater ecology.



Dr Mike Joy presented at the 2016 Richard Norris Lecture.

EXCELLENCE IN RESEARCH, IMPACT AND ENGAGEMENT

RESEARCH EXCELLENCE

The Commonwealth Governments' National Innovation and Science Agenda is focused on encouraging quality research, as well as encouraging universities, industry and others to work together to derive the greatest benefits for Australia from the outstanding research that our universities produce.

Research Excellence is now assessed in conjunction with Impact and Engagement benefits, showing how universities are translating their research into economic, social, environmental and other impacts.

FEWER HOMES AMONG THE GUM TREES, NEW RESEARCH WARNS

Climate change will not only impact eucalypt distribution in Australia, but phylogenetic diversity (or 'family trees') as well. A startling 596 out of 657 eucalypt species are predicted to lose suitable climate niches by 2085 according to work conducted by Dr Carlos González-Orozco and Dr Bernd Gruber of the IAE, in collaboration with a team of international scientists. Their study demonstrates the importance of considering the relatedness among species to ensure their conservation, and was published in *Nature Climate Change*.

The team combined species distribution modelling with measures of phylogenetic diversity to predict how climate change might affect species diversity in the future. The impact resulting from a +3 degrees celsius climate change scenario, which is in line with current Australian emissions, is the loss of about half of their geographic range for 91% of species. Climate niches are expected to shift south and to higher altitudes for the majority of these species. Areas along Australia's southern, southeast, and southwest coasts will become highly important for the conservation of old and also recently evolved eucalypt lineages, while remote the Kimberley region will increasingly be a refuge for rare, ancient lineages.

"Our study identifies areas that may be crucial in the future for species conservation," explains Dr Bernd Gruber. "These places might not be identified as current hotspots for biodiversity, but they will become vital as our climate warms."

Land managers can use this information to target species and areas for conservation, for example reserving land as National Parks."

The study demonstrates the importance of not simply counting the number of species in biodiversity conservation, but also considering the relatedness among species. Using this approach the scientists were able to identify hotspots that will be important for the future evolution of eucalypts species and in turn also for all species and ecosystems that depend on them.



Dried gumnuts of Eucalyptus kingsmillii by Andrew Thornhill.

GETTING SPECIFIC ON SALTS IN SALINITY STANDARDS

An international team of scientists and economists, including IAE Assistant Professor Ben Kefford and adjunct Associate Professor Brenda Dyack, are calling for tougher global salinity regulations to preserve freshwater ecosystems. Their research was published in the prestigious journal *Science*.

The researchers argue that while salinity standards to protect freshwater life are lacking in most of the world, even where they are enforced they are not sufficient. Dr Kefford maintains that Australia and the United States are good examples of countries where legislation addresses salinity in freshwater to protect biodiversity, however existing standards are not clear enough. These standards are based on total salinity, and don't refer to the ionic composition, i.e. the type of salts contributing to the total salinity concentration.

Ions are as important to salinity as the total salt content, because they can alter the effects of saline water on organisms in those environments. "Waters with the same total amount of salts but different ion composition can have markedly different effects on freshwater life," explains Dr Kefford.

The science of salinisation isn't the only challenge that needs to be addressed to save freshwater ecosystems. Dr Dyack explains there are complex issues in developing salinity standards, and the need to strike a balance between social, environmental and economic outcomes. "Australia is leading the world in this respect. Unlike the rest of the world, we require 'triple bottom line' planning under the Water Act (2007), which governs management in the Murray-Darling Basin."

"However, we can do more. Specific standards that refer to ionic composition will allow more efficient management of water resources, limit the impact on the wider ecosystem, and deliver greater benefits to communities relying on those freshwater supplies. There are a number of approaches that governments could take from our report, including introducing incentives for reducing salinization."

The article suggests ways to make it sensible for enterprises to reduce salinity, including wider introduction of market-based cap and trade schemes; subsidies for technology development and implementation; direct economic incentives to commercialise crops that demand less water; and, fees or charges for those releasing wastewater and run-off that contributes to salinity.

The researchers said that the laws governing how such standards are set need to be flexible and developed with a collaborative approach between science, economic stakeholders and other interested groups.



Salinity affected trees, South Australia.

ANTIMONY IN THE ENVIRONMENT: IS IT A PROBLEM?

Antimony has dramatically increased in the environment since the Industrial Revolution, and there is growing concern about its presence because of chemical similarities with arsenic. Researchers at the IAE are collaborating with the Chinese Academy of Sciences to better understand the potential risks of antimony in Australia and China.

The environmental chemistry of antimony is not yet well understood, including how it cycles through the environment and its' potential to be taken up into the food chain. As such, it is not clear how much of a problem we have yet.

Dr Zengping Ning from the Institute of Geochemistry, Chinese Academy of Sciences, worked at the IAE for much of 2016. Before arriving in Canberra, Dr Ning had read many articles by IAE researchers including Bill Maher, Simon Foster and Frank Krikowa focusing on the speciation of antimony and its' impact on the environment, so he was keen to work with them in person and build a long term cooperative relationship with the group. Dr Ning's primary research focus is on the distribution, bioavailability and accumulation of antimony from mining and smelting in a heavily populated area in southwest China. Specifically, He is focusing on antimony species in the interface between soils and plants.

Researchers at the IAE have developed methods to determine the chemical forms of antimony, and are investigating the uptake and bioaccumulation of antimony in a highly contaminated stream near the Hillgrove antimony-gold mine in NSW.

By working together they will better understand the association of antimony in soils, and the transfer and transform mechanism in the interface between soils and plants.



Professor Bill Maher sampling for antimony.

RESEARCH IMPACT

AUSTRALIA'S WATER REFORM NARRATIVE

Australia's water reform journey started in the 1980's, battling salinity, water security and conflicting water uses. The skills generated during this experience are valuable to both national and international audiences. Professor Jane Doolan was commissioned by the Australian Water Partnership (AWP) to capture thirty years of Australian water reform in several summary reports.

Professor Doolan consulted with a number of public and private sector water experts to build a shared perspective of the key policy and management reforms. Two reports were released in 2016:

1. *Australian Water Reform Journey* — aimed at international water managers, this report describes the evolution of Australian water policy and management over the past thirty years; and
2. *Building Resilience to Drought* — details arrangements made before and during the Millennium Drought, and lessons learned through this critical period of water management.

As the AWP builds partnerships with countries in Asia and the Indo-Pacific regions, these reports are being used to provide a high level overview of Australia's journey, providing lessons and experience that can be useful to other countries as they undertake their own water reform programs.

At a UN/World Bank High-level Panel on Water meeting in New York, Australian Prime Minister Malcolm Turnbull referenced the AWP Australian Water Reform Journey, "We have made very great strides in water management, and we've presented for the panel a paper entitled the Australian Water Reform Journey which outlines our experience. It shows in particular how our governance reforms have helped manage Australia's food bowl, the Murray-Darling Basin," said the Prime Minister.



WHY STEMMING DEFORESTATION IN THE AMAZON ISN'T ENOUGH

Most people would consider policies designed to conserve 80% forest cover in the Amazon to be a success story. However, these forests may lose up to 54% of their potential conservation value from landscape change and within forest disturbance. The IAE's Professor Ralph Mac Nally and a team of international scientists were the first to measure the combined effect of these disturbances in tropical forest landscapes. Their research was published in the prestigious journal, *Nature*.

The researchers looked at a range of landscapes, from largely pristine primary rainforest, through to cleared areas in the Brazilian state of Pará, which includes a quarter of the Brazilian Amazon. Birds, trees, understory plants and dung beetles (which are a 'proxy' for ecosystem processes such as nutrient cycling) were sampled, constituting about 2000 species. The broad range of species considered also makes the study unique because previous work has focused on single taxa.

Disturbance was classified as 'landscape disturbances', which includes subsidiary effects of deforestation such as vegetation fragmentation and edge creation, and 'within-forest disturbances', such as selective logging and wildfires. Professor Mac Nally and other team members analysed the data to measure how severely each area was affected by the multiple disturbance processes. Conservation value should be proportional to forest cover in the absence of landscape or within-forest disturbance, so that the deficit relative to this expected conservation value is a measure of the effect of disturbance (the 'conservation deficit value').

The findings of the study were alarming. Even were land holders complied with the Brazilian *Forest Code*, which mandates that private land holders must maintain 80% of their forest cover or offset the deficit, the forests may only retain 46–61% of their potential conservation value. These deficits are significant because about 53% of Brazil's native vegetation is on private property.

Professor Mac Nally explains that if you don't account for both landscape disturbance and within-forest disturbances, then biodiversity loss will be significantly underestimated, "you don't have to disturb the forest very much to get a substantial loss of biodiversity above the effect of the loss of forest cover in its own right."

Photo: Professor Jane Doolan and Professor Gary Jones (then Chief Executive, AWP) launching the Australian Water Reform Narrative at Stockholm World Water Week 2016. Photo by: AWP.

"I think it's great there is a target to maintain 80 percent forest cover," Mac Nally continued "but we need to remember this means that land owners with more than 80% can still reduce their cover down to 80%. Offsets are often geographically distant from the forest they are intended to replace, and the species that are meant to be protected may not occur in those distant areas. We are looking at ways to improve the Forest Code to benefit both biodiversity conservation and to reduce opportunity costs to the land holder. Win-win solutions are needed to have a better chance of compliance by land holders."



Photo by Luke Parry.

MATING INTO EXTINCTION

An unexpected catch in the waters of the Running River sparked research into the potential extinction of the Running River rainbow fish. In 2015 IAE Dr Peter Unmack and Curator of Fishes at the Museum and Art Gallery of the Northern Territory, Dr Michael Hammer, were sampling for the usually supremely abundant Running River Rainbowfish. But something was wrong – they started finding a few Eastern Rainbowfish as well.

The Running River Rainbowfish is a small, strikingly coloured species that lives exclusively in a 13 km stretch of the Running River, north of Townsville in Queensland. Due to geographic constraints the Running River Rainbowfish have lived in isolation for thousands of years, and have evolved to become physically and genetically distinct from neighbouring rainbowfish species.

However, between 2012 and 2015 Eastern Rainbowfish were introduced to the upper reaches of Running River and began spreading downstream. Unfortunately the Running River Rainbowfish finds this invader particularly attractive, mating with them and genetically diluting their population to produce a hybrid swarm.

Researchers from the IAE captured Running River Rainbowfish at this crucial moment. "It was pure luck that we sampled this population when we did, as a few years later pure wild fish would have been difficult to find. Our research is the first to demonstrate Running River Rainbowfish is a new species which could have gone extinct prior to being formally recognized as a species," says Dr Unmack.

Without formal conservation funding, IAE researchers had to look elsewhere to finance their work, and are collaborating with the Australian New Guinea Fishes Association and Diversity Arrays Technology. They also instigated a crowd funding effort and raised in excess of \$10,000, with over half the donations from amateur aquarium clubs and aquarists from around the world. Crowd funding made possible the genetic testing of 207 wild caught and captive fish, informed captive breeding using wild caught fish at the University of Canberra, and shipped offspring to Townsville for 'grow-out' at James Cook University. Those fish are currently being released into two nearby creeks to provide a home to pure populations and thus ensure their conservation in wild habitats.



Sampling for rainbowfish in Running River.

Photo by Mark Lintermans.

HELPING CHINA ACHIEVE WATER SECURITY

China has set ambitious water security targets, and the IAE's Professor Jane Doolan was asked to provide advice as they develop strategies to achieve them. Nominated by the Australian Water Partnership for her expertise in water planning and management, Professor Doolan was one of just two international experts asked to provide advice on the World Bank funded study.

Professor Doolan met with Chinese officials and World Bank representatives in Beijing to establish the Terms of Reference for the study. Sixteen study components were identified, and Professor Doolan will review and provide advice on them.

"In a number of areas, China sits where Australia was 30 years ago with regard to water management, but on a much larger scale," says Professor Doolan. "The challenges they face include water scarcity in some areas, and flooding in others. The current irrigation systems are highly inefficient, and water is often severely polluted, especially in cities and around industrial areas. These challenges will be amplified in the face of population growth and climate change."

The 2020 and 2030 targets are extremely ambitious, for example, more than 95% of water zones are required to comply with water quality standards by 2030. Other targets cover total water consumption across China, drinking water quality in cities and rural areas, and water efficiency in irrigation and industries.

Professor Doolan maintains that while every country has a different set of water management issues and challenges, there are a number of areas where our Australian experience could provide some valuable ideas or assistance to Chinese water managers as they develop their implementation programs to meet their targets.

RESEARCH ENGAGEMENT

SAVING CENTRAL AUSTRALIAN WATERHOLES

Researchers at the University of Canberra aim to repair damage to Central Australian waterholes devastated by feral animals and invasive plants. IAE senior research fellow Dr Fiona Dyer and science lecturer Dr Valerie Caron were awarded \$100,000 by the University's Collaborative Indigenous Research Initiative to carry out the research. The project team also includes researchers from Alice Springs and Charles Darwin University, as well as Traditional Owners.

Work has commenced near the community of Santa Teresa (Ltyentye Apurte) on the land of the Arrernte people, about 80 kilometres southeast of Alice Springs in the Northern Territory. The Arrernte people are involved in the project focusing on the nearby Salt Springs waterhole, and the project employs a research assistant from the Santa Teresa community.

Dr Dyer and Dr Caron have visited Salt Springs a number of times to install monitoring equipment including infrared cameras and loggers. They will be monitoring the entire ecosystem around the watering hole, before and after restoration. Researchers expect to see changes in plant and animal life as the waterhole is cleaned up and returned to normal use by Santa Teresa locals and native wildlife. Ultimately the team will install watering points away from the waterhole to attract feral animals to less delicate areas (a separate feral animal control programs will continue independent of the project).

The waterholes are not just important sources of water for communities like Santa Teresa, but they have significant cultural importance as well, either historical or stretching back to the Dreamtime. The results of the study will be translated into Central Australian languages such as Pitjantjatjara and Luritja/Pintubi.

"Returning these waterholes to their pre-feral animal condition is important for local wildlife, but I think that empowering communities to restore these sites themselves is something which builds on their connection to the living land and their own culture and I'm honoured to be able to help towards that goal," says Dr Dyer.



Dean of Aboriginal and Torres Strait Islander Leadership and Strategy, Professor Peter Radoll congratulates Dr Valerie Caron and Dr Fiona Dyer on their grant for the waterhole project. Photo by Marcus Butler.

DIAGNOSING RIVER HEALTH USING INVERTEBRATE TRAITS AND DNA BARCODES

The health of Australian waterways will be closely monitored through a better understanding of the organisms living in them, thanks to an IAE research project led by Assistant Professor in water science, Dr Ben Kefford. The project was awarded funding from the Australian Research Council (ARC) Linkage program, and also includes IAE researchers Dr Sue Nichols and Professor Ralph Mac Nally.

Current river assessment methods are based on aquatic invertebrates and can identify if a river is impaired, but not the cause of decline. Researchers will develop indices that link changes in invertebrate communities to specific environmental stressors. The research will use organism traits, such as lifespan, physiology and stress sensitivity to identify the causes of ecological degradation.

"Information on species' traits will allow us to determine from their presence or absence the long-term health of a waterway," says Dr Kefford. "If we know that certain species can't tolerate low oxygen water, and we no longer find them in what otherwise would be a healthy looking river, we can theorise that oxygen levels have been a problem in the recent past."

The project also draws on current work at the IAE and the University of Melbourne, in which a DNA library barcode system is being built, allowing researchers to rapidly determine which organisms are present in a water sample. This will speed up the testing process as DNA analysis can identify to species level, without the laborious task of identifying every invertebrate under a microscope.

Combining species traits with access to a DNA library barcode system, researchers can provide results on the health and diversity of waterways and their ecosystems much quicker than previous methods.

The methodologies developed through this project will help inform sustainable water resource management, aid in effective use of limited resources to arrest and to reverse environmental decline, and to meet evolving management and policy needs.

Environmental management agencies in all Australian States and Territories will also contribute to the project, including personnel from the Environment Protection Authorities of South Australia and Victoria, and the Queensland Department of Environment and Resource Management as partner investigators.



Dr Sue Nichols kick-sampling for stream invertebrates.

EVALUATING THE OUTCOMES OF ENVIRONMENTAL FLOWS: SCIENCE'S ROLE IN ADAPTIVE MANAGEMENT

The Commonwealth Environmental Waterholder's Long-Term Intervention Monitoring project provides researchers with an opportunity to directly support improvements in the management of Commonwealth Environmental Water. The project involves over 17 research institutions and 22 management agencies in monitoring the outcomes of environmental flows at seven significant sites across the Murray-Darling Basin. The Basin-scale component of the project is led by the IAE's Professor Ben Gawne, and the Lachlan River monitoring is led by Dr Fiona Dyer, with involvement from IAE Professor Ross Thompson and a range of partners.

The project is designed to accurately report on outcomes from the use of Commonwealth environmental water; and to support adaptive management of environmental water. Adaptive management enables a cycle of continuous improvement in management practice. It also acknowledges that our understanding of these systems is incomplete, and that each environmental flow is an opportunity to learn more about how flow can be used to protect and restore environmental values.

The project provides an important opportunity for researchers to work collaboratively with water managers both regionally and at the Basin scale to improve the management of environmental flows. The scale and scope of the project will also provide invaluable new knowledge about flow responses across five years.

"By comparing responses in different years across the seven sites we will get a better understanding of how flow responses differ and the factors that cause this variation," says Professor Gawne. "Similar environmental flows delivered in drought or wet years may deliver very different outcomes, for example. It is already apparent that the data generated will raise as many questions as they answer, and researchers will need to draw on all their experience and knowledge to interpret the results and provide advice to managers."

The report on environmental flows delivered in 2014-15 has been finalised, and the project is currently in the process of completing its second evaluation of environmental flows delivered in 2015-16.

OUR STUDENTS

Our students are highly engaged and an important element of the fabric of the Institute. Events to bring students and research staff together are frequent, including regular social gatherings, weekly in-house skills development workshops, an active Seminar Series, and an annual student retreat. These activities create opportunities for students to test ideas and to analyse and interpret research, mentored by leading academics.

RESEARCH TRAINING

A distinguishing feature of the higher degree research program is the emphasis on work integrated learning. Learning first-hand through real work or work-like experiences is a key element to enhancing employability in the workforce. We are committed to preparing professional and highly employable graduates with the right mix of skills and knowledge.



Rheyda Hinlo: PhD student Industry Placement

Rheyda undertook a one month industry placement at the non-profit Centre for Agriculture and Biosciences International (CABI), Malaysia. With a strong background in invasive species, Rheyda's primary duty was to assist with the preparation of the annual report and literature survey for the project 'Removing Barriers to Invasive Species Management in Southeast Asia.'

In addition to working on CABI based projects, a highlight of Rheyda's internship was the opportunity to present her own work on environmental DNA. Rheyda explained how environmental DNA can aid in CABI's work, and was asked to write a concept proposal with one of the CABI researchers on its potential applications there.

Rheyda enjoyed her time at CABI, in particular working with scientists who are passionate about sharing their expertise to build capacities and solve problems in agriculture and the environment. "I witnessed firsthand the application of science for development. When I graduate I would like to work with a similar non-profit organisation or the government, to manage environmental projects," says Rheyda.

Photo: CABI-SEA Regional Director Dr Wai-Hong Loke presents a token of appreciation to Rheyda on the last day of her internship.





Marcello Blaxell: Honours Student Research Training

Studying at the IAE isn't limited to pure ecology classes, students can also enrol in a range of landscape processes and environmental subjects. Over the summer Marcello took part in a research project in Antarctica which aims to better constrain the past extent of the Antarctic Ice Sheet. This work will help modellers predict how the ice sheet will respond to future climate change. Marcello collected glacial erratics (rocks dropped from the bottom of the ice sheet) from rocky outcrops in the Vestfold Hills. The rocks will be crushed and dated to see when the ice last covered the area.

It was a challenging place to work, and not just because of the cold climate. Marcello learnt firsthand the complexities of running a remote scientific field expedition. "We had to balance competing needs of other projects with our own. Particularly demands on aircraft to visit various field sites. This was made harder when the weather was bad, and we missed going to a priority site due to weather conditions," says Marcello.

Marcello enjoyed being part of the field expedition, and is considering further research when he completes his honours thesis.

Background photo by PhD student, Margarita Medina.

GRADUATIONS

HONOURS GRADUATIONS

Eleven Honours students also received their degrees.

Nathan Clough

Conserving Edgaston's endangered endemic spring fauna through improved understanding of the ecology of the invasive Eastern Gambusia (*G. holbrooki*)

McLean Cobden

Managing charismatic species within natural ecosystems towards ensuring successful ecotourism experiences: A comparison between Australia and South Africa

PhD GRADUATIONS

We are proud that
three of our Higher Degree
Research students who received
their Doctoral awards in 2016.

Adrian Dusting

The ecology and evolution of native
Potamopoyrgus antipodarum in Australia

Primary supervisor: Professor Ross Thompson

Toni Furlonge

Physical and biological changes during the filling
of a temperate upland reservoir following its enlargement

Primary supervisor: Dr Fiona Dyer

Sally Hatton

Bioassessment of freshwater lentic
wetlands using the reference condition approach

Primary supervisor: Dr Fiona Dyer

Cathy Cunningham

The effect of subsidence from long wall
coal mining on the ecology and water quality of streams

Mariyam Fatah

Metal contamination and mercury speciation in fish of the Maldives

Laura Hill

Mortality of Bats and Birds at Boco Rock Wind Farm

**Jollene Reich**

Using trait compositions of benthic macroinvertebrates to distinguish between two types of environmental stress

Nathanael Semmler

Climate and land-use change in the Wang Chhu Basin, west Bhutan: a physical evaluation of landscape response

Gemma Stehlik

Effects of repeat drying and rewetting on nitrogen cycling in a constructed urban wetland

Simon Votto

Investigating Terrestrial Vertebrate Occurrence and Assemblages at Arid Springs and Waterholes Using Camera Trap Data

Maya Kruger-Andrzejewska

Mapping and characterization of a novel Tasmanian devil tumour, Red Velvet

Ryl Parker

Identifying and conserving key habitat requirements of Latham's Snipe (*Gallinago hardwickii*) in SE Australia

Photo by Dr Fiona Dyer.

STUDENT PROFILES

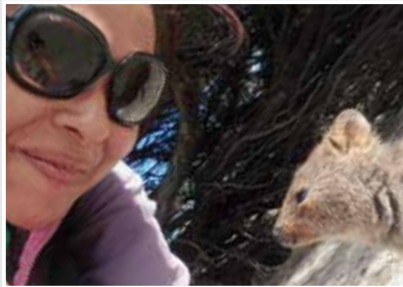


Anthony Davidson: PhD student

Anthony Davidson is the inaugural recipient of the David Choquenot Memorial scholarship. He has a strong background in modelling population dynamics, and will expand on this knowledge using a Bayesian Framework for his PhD studies.

As a New Zealander, Anthony was drawn to the Institute as the David Choquenot Memorial scholarship has strong links with industry (LandCare Research: Manaaki Whenua) and New Zealand ecosystem research. For his thesis, he will investigate the population dynamics of interacting invasive species in New Zealand forests.

Once Anthony finishes his PhD studies he would like to continue with statistical research, ideally applying ecological modelling tools to species of high conservation or economic value. Since joining the IAE, Anthony has enjoyed being part of a small group of dedicated researchers, and has benefited from the opportunity to learn from visiting high profile international ecologists.



Margarita Medina: PhD student

Margarita is from Mexico City, where she completed a Bachelor degree in biology, and a Masters in Biodiversity and Conservation. She then completed a Masters in Biodiversity, Genetics and Evolution in Porto, Portugal.

It was during her undergraduate degree that Margarita became fascinated by marsupials. "My interest was sparked when I found out there were more marsupials than the 'classic' kangaroo and koala. In fact, opossums are native to Latin America, and that there are eight species in my home country of Mexico," said Margarita. "The more I read, the more interested I became. I found out that the migration routes of marsupials were not yet 'solved,' and I thought this would make a good PhD topic."

Margarita is enjoying her research at the IAE, in particular a good working atmosphere, research quality, and the support given to HDR students to attend conferences which helps promote networking with other institutions.

Margarita is considering a number of different career options once she completes her PhD, including applying the tools and software she will develop during her studies to other research projects. Margarita also sees communicating science to students as an important role, and is considering becoming a lecturer.



Jill Bartlett: PhD student

Jill completed an undergraduate degree at the University of Canberra in 2003, and returned to study metal contamination in food webs for her honours thesis in 2007-08. Jill returned again in 2012, this time as a PhD student investigating how energy storage can be used as a biomarker of environmental stress.

"I was drawn to this topic from my interest in ecochemistry and toxicology. I think being able to quantify the effects of stress on an ecosystem is an important tool for ecosystem management," says Jill. "I've established new methods that make measuring energy much faster, and therefore a more viable tool in the future."

Jill finds the IAE a welcoming and exciting place to study, in particular the people and the dynamic energy involved in research. However it's not all academic with Jill. In between her studies Jill worked for local and federal government, including ten years with Defence undertaking environmental risk management, and had three children along the way.

Considering her wide experience in research and public service, Jill sees her future career applying research to real world environmental management decisions.



ALUMNI

Graduates of the IAE's Postgraduate Research Program are part of an inspiring and talented alumni community. Many have used the skills acquired throughout their learning to enhance or expand on their applied environmental skill sets, to become leaders in their fields. Being an Institute alumnus provides lifelong learning, personal and professional development, networking, and volunteer opportunities.

DR ANTHONY CHARITON

Anthony returned to university after a career as a recording engineer, graduating in 2005 with a PhD in environmental chemistry. He then worked at CSIRO in Sydney for more than a decade, with the last five years as leader of the Oceans and Atmosphere Molecular Ecology and Toxicology Team. In January 2016 Anthony took up a lectureship at Macquarie University. Anthony also gave the key note lecture at the IAE's inaugural HDR Student Conference.

Why did you choose the IAE for your PhD studies?

The reason I chose the IAE for my PhD was simple, Professor Bill Maher. During my Honours, Bill and I went to a seminar by a visiting Canadian scientist, Dr Landis Hare which had a great impact on me. Dr Hare's research was elegant and relevant, and was the first time I had seen experimental work which truly captured biogeochemistry, ecotoxicology and community ecology. Bill encouraged me to pursue this line of approach for estuarine benthic communities. Together, we established a network of researchers to assist me with my thesis topic, and to develop the fundamental skills which I still use today.

How would you describe your experience at the IAE?

I cannot overstate the positive impact IAE has had on career. By the time I completed my PhD I had already developed strong skills in ecology, statistics and environmental chemistry. I also established a large network in both government and academic circles, which I still interact with today. Most importantly I gained a critical insight into how to develop and foster a cohesive research team, and how to establish a working environment which is built upon mutual respect and the expertise of various members.

What are you working on at the moment?

My research currently focusses on using environmental genomics to understand how multiple stressors (both natural and anthropogenic) alter the structure and function of aquatic environments.

My other area of focus is in the field of network analysis, where I am trying to understand how environmental stressors, e.g. agricultural run-off onto the Great Barrier Reef, alter the way the constituents of communities interact with each other and operate as a whole.

Academia or industry?

Which is a better choice for you and why?

Academia. Academia suits my values and life style, and gives me an opportunity to develop my own research space based on my vision, and if successful, continue to build upon it. Importantly for me, it gives me the opportunity to teach, something I enjoy very much.

What do you think are the biggest environmental challenges we are currently facing?

Climate change is undoubtedly our biggest challenge. No longer can we just fence off an area, remove the ferals, stop logging and call it a national park. Recent research shows that a large portion of Kakadu National Park, are unlikely to exist by 2070 due to sea-level rise, for example. This not only effects the region's ecology, but also tourism and life styles and the heritage of the traditional owners. Climate change is already shaping our world, and unfortunately, the issue is not being addressed at the scale matching its importance.



DR SUE NICHOLS

27

Sue graduated with a Doctor of Philosophy degree in 2012, and has worked at the IAE both during and after her studies as a lecturer and researcher focusing on freshwater ecology. Sue is currently a Senior Research Fellow with the IAE.

Why did you choose the IAE for your PhD studies?

I have always had an interest in science and the natural environment. My research with the IAE has naturally followed an applied focus, such as the development of invertebrate predictive models for bioassessment, the reference condition and causal analysis for ecological assessment of river condition.

How would you describe your experience at the IAE?

Evolutionary. I started work at the University of Canberra as a research assistant for the late Richard Norris, a world leader in freshwater ecology, while completing my undergraduate studies. Over the years I benefited from mentoring provided by other leaders in the area of freshwater ecology and bioassessment of river health, and gained valuable insight into the area of industry engagement, where science can inform environmental decision making. My experience has equipped me well in my current role as Senior Research Fellow, to design and lead innovative projects that address pressing environmental issues, develop and foster collaborative relationships with other researchers and industry partners, gain research funding, teach and supervise students.

What are you working on at the moment?

I lead the research support services for the Australian River Assessment System (AUSRIVAS), which maintains the user interface to predictive models, model development and training. I work on an Australian-India Strategic Research Fund project investigating biomonitoring of pesticides in rivers and their ecological effects. More recently, my research is on using DNA-based identification for routine aquatic assessment and diagnosing river condition using invertebrate traits and DNA barcodes.

Academia or industry?

Which is a better choice for you and why?

Academia, because I love research and learning. I chose applied science where high quality research can improve understanding of the environment to inform decision-making for natural resource management.

What do you think are the biggest environmental challenges we are currently facing?

Maintaining and managing freshwater is the single largest challenge to protecting human well-being. Protecting the health and functioning of the world's freshwater ecosystems is a key component of both human water security and biodiversity.

Photo Dr. Sue Nichols.

OUR RESEARCHERS

Research undertaken by our staff constitutes the key activity of the Institute, contributing new knowledge that improves understanding of our natural world. Many of our researchers are also closely involved in the delivery of the University's Environmental Science courses, and other research training initiatives.

WHO WE ARE

PROFESSORS



Director / Professor Ross Thompson
BSc(Hons), PhD, University of Otago, New Zealand.

Professor Ross Thompson is a community and ecosystem ecologist with an interest in 'saving the world'. His research seeks to understand the rules that underpin the assembly of complex, diverse and persistent natural communities. While he maintains a passion for fundamental science, his research increasingly concentrates on the ways in which human activities (climate change, pollution, habitat loss, invasions and extinctions) impact on natural systems, and how we can use ecological principles to protect and restore those systems.

Professor Thompson primarily works on freshwaters, with a particular interest in the effects of human activities at large scales on patterns of freshwater biodiversity. His research includes studies of the effects of land use change, the potential for environmental flows to restore natural food webs, and the ways in which changing climates may impact on freshwaters. Professor Thompson leads the Freshwater Research Group at University of Canberra, and also engages widely across disciplines, states and countries to build research teams to address major environmental issues.



Professor Jane Doolan

BSc (Hons), PhD, University of Melbourne.

Professor Jane Doolan is a professorial fellow in natural resource governance, appointed as a shared position between the IAE and the Institute of Governance and Policy Analysis.

Professor Doolan has extensive experience in sustainable water resource management, having provided policy advice on issues such as urban and rural water supply and security, national water reform, and water sector governance. She has driven important initiatives in river health, environmental water allocation and catchment management, and the management of water during drought and climate change. Her career encompasses intergovernmental policy development and negotiations, particularly in relation to the management of the Murray–Darling Basin, and the oversight of major water projects and programs.

A strong focus throughout her career has been the integration of advanced science and governance research into water policy and management – an interest she will continue to pursue from a more academic perspective.

Professor Doolan is also currently the Chair of the Murray–Darling Freshwater Research Centre and a director of Western Water Authority.

Photo by Marcus Butler.

WHO WE ARE

Centenary Professor Richard Duncan

BSc (Hons), PhD, University of Canterbury, New Zealand.

Professor Richard Duncan has broad research interests in ecology and conservation with a focus on biological invasions and extinctions. His recent work examines the ways in which invasive species arrive, establish, spread and impact natural ecosystems. He works with a variety of taxa, including plants, birds and mammals, and uses a variety of approaches to understand the changes associated with biological invasions and to answer both applied and fundamental ecological questions.

Professor Duncan is an Associate Editor for the journals *Diversity and Distributions*, and *Proceedings of the Royal Society London B*, a member of the International Science Advisory Panel for New Zealand's Biological Heritage National Science Challenge, and was awarded the Te Tohu Taiao Award for Ecological Excellence by the New Zealand Ecological Society in 2011.



Professor Tariq Ezaz
BSc (Hons) Zoology, MSc
(Fisheries), University of Dhaka,
Bangladesh. PhD in Aquaculture
Genetics, Institute of Aquaculture,
University of Stirling, Scotland, UK.

Professor Ezaz's research focuses on the evolutionary and comparative genomics of sex determining mechanisms and sex chromosome evolution in non-traditional vertebrate model species, a discipline primarily devoted to basic research aiming to expand the current knowledge base. His areas of research interest include development and application of molecular markers, molecular cytogenetics, epigenetic regulation of sex differentiation, plasticity and adaptation. Professor Ezaz uses diverse taxa, ranging from fish to birds, as well as invertebrates including crustaceans and mollusc to answer his research questions. Professor Ezaz co-authored papers published in high impact journals including Nature, Science, Current Biology and Molecular Biology and Evolution.

Prof Ezaz's contributions to his field of expertise have led to a deeper understanding of the mechanisms and evolution of sex determination and sex chromosome evolution, particularly in reptiles. In recognition of his significant contributions he was awarded prestigious ARC Future Fellowship. He holds a very strong track record in the context of his discipline expectations and led the establishment of an international network of cytogeneticists (chromosomics network) which has members from 18 different countries. Professor Ezaz supervises postgraduate students and also teaches units on Genetics and Genomics and on plants and animals to 2nd and 1st year undergraduates respectively.



**Distinguished Professor
Arthur Georges**
BSc Mathematics, BSc (Hons)
Physiology, PhD Zoology,
University of Queensland.

As the inaugural director of the Institute, Distinguished Professor Arthur Georges has a broad interest in fostering research that underpins decisions on the management of our natural environment. Within this broad context, he has specific research interests in the ecology, evolution and conservation biology of Australia's reptiles and amphibians.

A fundamental interest in these fascinating animals takes him into the field and laboratory to learn more of their biology and to apply what he has learned in solving contemporary problems of their conservation.

Professor Arthur Georges is Chair of the Australian Capital Territory Scientific Committee, and is an Associate Editor of the Journal of Experimental Zoology. He was Dean of the Faculty of Applied Science, and has served as president of the Australasian Wildlife Management Society and the Australian Society of Herpetologists.



Centenary Professor Ralph Mac Nally
DSc, BSc (Hons),
Grad Dip Computer Science, PhD,
The University of Melbourne.

Professor Ralph Mac Nally trained as a community ecologist, and has developed extensive interests in the emerging disciplines of whole-catchment ecology, conservation ecology, landscape ecology and ecological futures. He uses large-scale modelling to treat landscapes as integrated systems of multiple terrestrial and aquatic ecosystems and is focusing now on developing ways to understand how human impacts will affect biodiversity and ecosystems in the coming decades. He has extensive collaborations with researchers in Brazil and western North America apart from his work in south-eastern Australia.

Professor Mac Nally serves on the editorial boards of Diversity and Distributions and the Journal of Applied Ecology. He was a scientific expert for the second Australian bird atlas program and Victoria's strategic document: Land and Biodiversity at a Time of Climate Change. Professor Mac Nally has been an Australian Research Council Discovery Outstanding Researcher.

WHO WE ARE

Professor Stephen Sarre

BAppSci, MSc, University of Canberra. PhD, Australian National University

Professor Stephen Sarre's research interests are broad, but centre on the genetics and genomics of wildlife with an emphasis on endangered and invasive species. He has a particular interest in studying the genetics of populations through the application of DNA markers usually in conjunction with intensive field ecological studies. This combined approach enables a much deeper understanding of the dynamics of natural populations than could be obtained by either approach alone.

Professor Sarre's other main research interest is sex determination of reptiles. He is particularly interested in understanding how the interplay between genetics and temperature ultimately determines sex and how this interplay has evolved among different reptile groups.

Professor Sarre is a Member of the Scientific Advisory Committee for the Invasive Species Council and the Research Committee of the Hermon Slade Foundation.



**COMBINED YEARS
OF EXPERIENCE BY IAE
PROFESSORS**





Professor N LeRoy Poff

**Bachelors of Arts in Biology, Hendrix College, Conway Arkansas, USA.
MEnvSci, Indiana University.
PhD in Biology, Colorado State University, USA.**

N. LeRoy Poff is a stream and river ecologist who holds a Professorial Chair in Riverine Ecology and Environmental Flows at the IAE, and Professorship in the Department of Biology at Colorado State University USA. His research aims to understand how natural and human-caused variation in river flow and water quality shapes the structure and function in freshwater aquatic and riparian ecosystems. His research is theory-based and applications oriented.

Professor Poff is a recognised global leader in the scientific arena of 'environmental flows' and in ecologically sustainable river management. He collaborates with biologists, hydrologists, geomorphologists, engineers and social scientists, and he currently has research projects on hydro-ecology and climate change in the USA, Ecuador, and Australia. He is former president of the international Society for Freshwater Science, an elected Fellow of the American Association for the Advancement of Science, an Aldo Leopold Leadership Fellow, and an elected Fellow of the Ecological Society of America. He is also a Highly Cited Researcher.



Professor Bill Maher

**BAppSc (Hon), MAppSc,
The University of Melbourne.
PhD, University of Southampton,
United Kingdom.**

Professor Bill Maher has a sustained track record of research in the understanding biogeochemical cycling of trace metals, metalloids and nutrients in aquatic ecosystems, development of water quality and sampling guidelines, and development of analytical procedures for measuring trace contaminants in water, sediment and biota. He has a particular interest in understanding the exposure of organisms to contaminate, and how and where they accumulate contaminants (dose) and effects at the subcellular and whole organism level.

Professor Maher has published over 270 papers and has been awarded the RACI Analytical Divisions medal in 2002 and the RACI Environmental Chemistry Divisions medal in 2004. He also co-authored a Handbook of Sediment Quality Assessment that won the Eureka Prize for water research in 2006. Professor Maher received the 2012 IAE Ecology-Senior scientist award.



Professor Ben Gawne

**Biology B.Sc. (Hons) University
of Melbourne, Dept. of Zoology.
Ph.D. Monash University,**

Professor Ben Gawne has broad research interests in the protection and restoration of freshwater ecosystems. His recent work has focussed on wetland and river their responses to flow modification and how this major stress may interact with other stressors (e.g. invasive species) to affect ecosystem condition. Over the last two decades, he has worked closely with water managers in the Murray-Darling Basin to both generate new knowledge, but also to apply knowledge to the management decisions, condition assessments and evaluating the outcomes of management actions. Professor Gawne currently leads two large collaborative, multi-disciplinary projects. The first is the Murray-Darling Basin Environmental Water Knowledge and Research Project. The second is the Commonwealth Environmental Waterholder's Long-Term Intervention Monitoring.

Prior to joining the IAE, Professor Gawne was the Director of the Murray Darling Freshwater Centre, a joint venture research facility that seeks to generate the knowledge required to sustainably manage the water resources of the Murray-Darling Basin. Prior to this, he established the MDFRC's laboratory at Mildura.



Photo by Dr Anna MacDonald.

WHO WE ARE

ASSOCIATE PROFESSORS



Dr Janine Deakin



Dr Paul Downey



Dr Simon Foster



Dr Dianne Gleeson



Dr Bernd Gruber



Dr Jackie Schirmer



Dr Duanne White

ASSISTANT PROFESSORS



Dr Ben Kefford



Dr Jasmyrn Lynch



Dr Fiona Dyer



Mr Mark Lintermans



Dr Sue Nichols

SENIOR RESEARCH FELLOWS

POSTDOCTORAL FELLOWS



Dr Aaron Adamack



Dr Lisa Doucette



Dr Elise Furlan



Dr Hania Lada



Dr Ali Livernois



Dr Anna MacDonald



Dr David Pepper



Dr Tim Reid



Dr Rob Rolls



Dr Peter Unmack



Dr Lizzie Wandrag

THINKERS IN RESIDENCE

We are honoured to have internationally leading scientists as 'Thinkers in Residence' at the IAE. Thinkers spend time each year with us, and contribute oversight and analysis to research undertaken by staff and students. They also provide independent insight into strategic planning, recruitment and other key developments.

Professor Charles Krebs

**BSc Wildlife Management (University of Minnesota),
MA Zoology, PhD Zoology
(University of British Columbia)**



Professor Jenny Graves

**BSc (Hons), MSc Genetics (Adelaide University),
PhD (Berkeley University of California)**



Professor Philip (Sam) Lake

**B.Sc. (Australian National University)
PhD (University of Southampton)**



Dr John Hewson AM

**B.Ec (University of Sydney)
MSc (University of Saskatchewan)
MSc (John Hopkins University)
PhD Economics (John Hopkins University)**



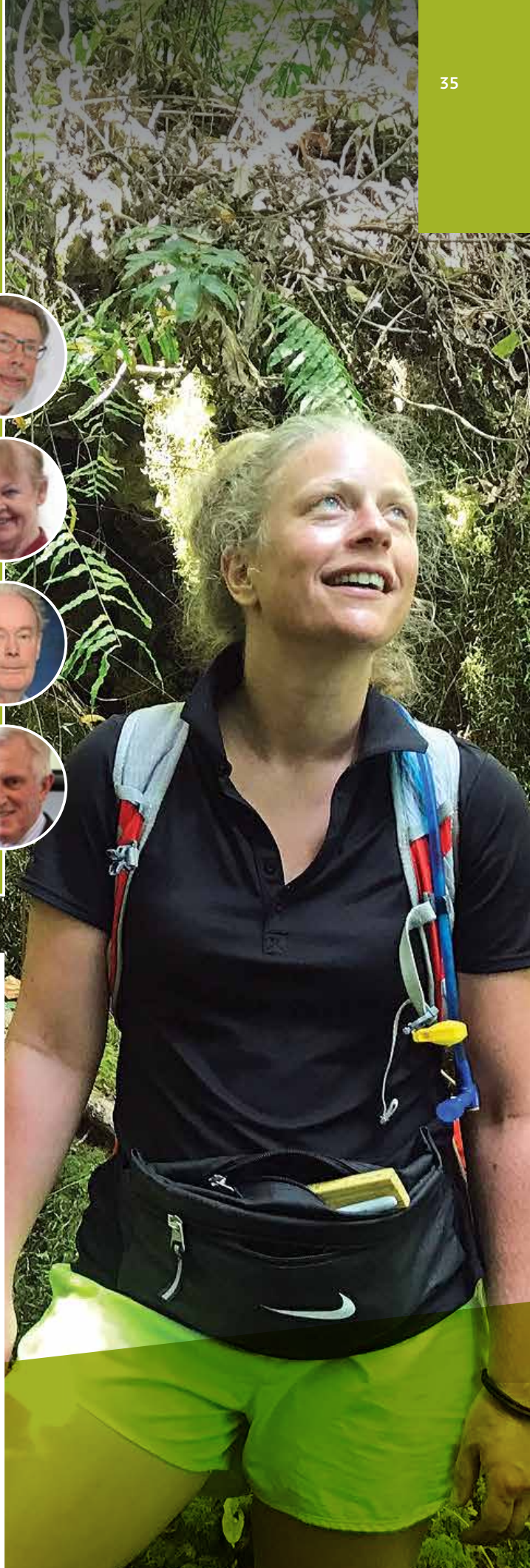
LIZZIE WANDRAG

**Post-Doctoral Researcher BSc (Hons) Ecology,
Stirling University. MSc Ecology, Aberdeen University.
PhD Ecology, Lincoln University**

Dr Wandrag is a community ecologist interested in understanding the processes that determine plant community composition. She has worked in various systems around the world, from coordinating biodiversity surveys in the Maasai Highlands of Tanzania, to investigating the role of vertebrate seed dispersers in forest ecosystems on the island of Guam.

Dr Wandrag now holds a post-doctoral position at the IAE, with her grassland field site conveniently located on campus. The aim of her research with the IAE is to develop a general framework to understand how exotic plant species can establish and become invasive in native ecosystems, specifically grasslands. This information can help identify which exotic species are most likely to negatively impact native ecosystems.

The expertise of other IAE researchers in the areas of community ecology, plant invasion and quantitative ecology and the small collegial department initially attracted Dr Wandrag to the IAE. While Dr Wandrag has experience in private industry and non-government organisations, she hopes to continue her career in research once her position with the IAE concludes.



WHO WE ARE

EMERITUS AND ADJUNCT STAFF

Our Emeritus and Honorary staff play an extremely important role in the life of the Institute. Drawn from leaders in academia, government and industry, they contribute to our research, act as advocates for our work, and provide access to networks spanning the globe. Many take an active interest in our students and provide valuable advice and mentoring.

The Institute currently has two Emeritus Professors, both of whom had long and distinguished careers with the University of Canberra.



Dr Robert Kearney
Emeritus Professor in Fisheries Management



Dr Jim Hone
Emeritus Professor in Wildlife Management

ADJUNCT PROFESSORS

Thirty - seven Honorary Staff held adjunct appointments in the Institute in 2016. They provide a diverse set of skills to the IAE ranging from university academics, economists, CEO's and land managers, to media artists focused on environmental and indigenous knowledge.

Dr Peter Bridgewater	<i>Terrestrial and marine biodiversity governance, novel ecosystems, landscape ecology, science policy interfaces</i>
Dr Sue Briggs	<i>Ecosystem management, conservation biology, environmental impact assessment, conservation and environmental policy</i>
Dr Brian Green	<i>Animal energetics</i>
Dr Gary Jones	<i>Freshwater science (ecology and chemistry) and management</i>
Dr Rod Kennett	<i>Environmental research and management in indigenous and private sectors</i>
Dr Andrzej Killian	<i>Genetics, research in next generation sequencing and application in agriculture and plant science</i>
Dr Peter O'Brien	<i>Science-policy interface, research leadership, multi-disciplinary research</i>
Dr Tony Peacock	<i>Invasive animals and R&D with large research organisations</i>
Dr Glen Saunders	<i>Vertebrate ecology and pest animal management</i>

ADJUNCT ASSOCIATE PROFESSORS

Mr James Barrett	<i>Wildlife management programs, management of freshwater fish, vertebrate pest management</i>
Dr Anthony Chariton	<i>Aquatic ecology, ecogenomics, ecotoxicology, biometry</i>
Dr Brian Cooke	<i>Conservation of native fauna and flora, population dynamics of native and introduced fauna</i>
Dr Brenda Dyack	<i>Ecological economics</i>
Dr Dianne Jolley	<i>Environmental chemistry and toxicology</i>
Dr Rod Kennett	<i>Environmental research and management in indigenous and private sectors</i>
Ms Alice Kenney	<i>Wildlife ecology and data management</i>
Dr Peter Kinnell	<i>Land and environment</i>
Dr Ikuo Miura	<i>Sex determination in amphibians</i>
Mr Gerry Olsen	<i>Raptors and predation</i>
Dr Will Osborne	<i>Conservation biology, herpetology, invertebrate conservation</i>
Dr Brad Sherman	<i>Environment fluid dynamics, reservoir water quality, aquatic greenhouse gas emissions</i>

PROFESSIONAL ASSOCIATES

Dr Shuvo (Khandoker) Bakar	<i>Statistics</i>
Dr Tracey Benson	<i>Media arts focussed on environmental and indigenous knowledge</i>
Dr Alistair (Vincent) Drake	<i>Insect migration and use of radar</i>
Dr Marion Hoehn	<i>Ecology, evolutionary biology, genetics</i>
Dr Julien Lepetit	<i>Water sensitive urban design, green infrastructure</i>
Dr Denis O'Meally	<i>Bioinformatics</i>
Dr Sue Powell	<i>Environmental flows, hydrology, aquatic ecology, spatial analysis</i>
Mr Greg Raisin	<i>Wetland ecology, water quality, science to policy interface</i>
Dr Anett Richter	<i>Conservation biology of invertebrates, biodiversity research, golden sun moth expert</i>
Dr Jane Roberts	<i>Plants and vegetation of riverine systems, their ecology and responses to water change, rehabilitation of these systems</i>
Dr Bill Sea	<i>Applied ecology and plant ecology</i>

WHO WE ARE



Adjunct Professor Peter Bridgewater

Professor Peter Bridgewater has had an impressive career in the science-policy interface, with current research interests including the links between cultural and biological diversity; marine and coastal biodiversity; and the role of novel ecosystems in the biosphere.

Professor Bridgewater joined the IAE in early 2016 and is strongly engaged with the Institute, being found on-campus most days. During 2016 he represented the IAE at a number of international events, including as a panel speaker at the Meeting of the Conference of the Parties of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, attending the decennial meeting on UNESCO Biosphere reserves, participating in the IPBES-UNESCO international workshop on relational values in biodiversity and ecosystem services, and participating as member in the IPBES Task force on Indigenous and Local Knowledge.



Adjunct Associate Professor Rod Kennett

Associate Professor Rod Kennett is currently a Senior Research Fellow at the Australian Institute for Aboriginal and Torres Strait Islander Studies. There he leads land and water research programs that bring science, livelihood development and indigenous issues together at national and international scales.

Associate Professor Kennett was appointed as an Honorary Staff Member in 2014, and has since contributed new ideas and valuable skills to the development of several research initiatives in the Institute, and has strengthened our contribution to Indigenous issues. In 2016 the Institute recruited its first indigenous research assistant, and enrolled its first indigenous PhD candidate.

Photo by PhD student, Maya Kruger-Andrzejewska.

Adjunct Professor Sue Briggs

On accepting her appointment as an Adjunct Professor in 2011, Dr Sue Briggs, in a short note for the Ecological Society of Australia, wrote "I aim to help expand the horizons of post-graduate students, and help them understand policy worlds."

Professor Briggs offers a range of expertise to our staff and students, with several decades of experience working on waterbirds, wetlands, woodland conditions and birds, cropping and grazing management, soil and eco-hydrology, wildlife management, and incentive schemes and policy instruments for biodiversity conservation and management.

Professor Briggs is a student supervisor, and actively contributes to teaching and curriculum development for undergraduate programs. She is passionate about developing the next generation of ecologists and conservation managers.

WHO ARE WE	MALE	FEMALE
Academics (34)	20	14
HDR students (45)	19	26
Honours students (13)	4	9
Emeritus & Adjuncts (37)	28	9
Research Support Staff (22)	11	11

AWARDS

THE IAE ARE PROUD OF OUR STAFF AND STUDENTS FOR THE FOLLOWING AWARDS

Institute for Applied Ecology	Vice Chancellor's Excellence Award for Research
Jonas Bylemans	Invasive Animals CRC Chief Executive's Award for Student Achievement
Elise Furlan	Institute for Applied Ecology Award for Excellence in Research by an Early Career Researcher
Teresa González de Chávez Capilla	Institute for Applied Ecology Award Scientific Breakthrough by an HDR Student
Sue Nichols	Institute for Applied Ecology Richard Norris Award for turning external engagement into grant success
Jackie O'Sullivan	University of Canberra Eric Best Memorial Medal
Anne Taylor	Australasian Society of Environmental Toxicology and Chemistry Early Career Medal 2016

OUR RESEARCH FACILITIES

The Institute invests heavily in new and upgraded research facilities and scientific infrastructure for the benefit of our researchers and students. Some of our facilities are outlined below.

FRESHWATER ECOLOGY LABORATORY

The Freshwater Ecology Laboratory has the capacity for the analysis of macro invertebrate and fish samples, algae and stable isotope samples, as well as a range of habitat characterisation parameters.

The Laboratory contains a range of Leica microscopes, micro balances mutiprobe meters and data loggers as well as instruments for measuring water quality, algal biomass and chlorophyll concentration.

ECOCHEMISTRY LABORATORY

The Ecochemistry Laboratory is a highly specialized laboratory undertaking analysis of chemical species in biological tissues, waters and sediments from aquatic ecosystems.

The Laboratory is the only facility in Australia able to undertake chemical speciation analysis in water, sediments, soil, animal and plant tissues.

WILDLIFE GENETICS LABORATORY

The Wildlife Genetics Laboratory allows researchers to undertake high quality DNA research through the use of separate pre- and post- PCR space equipped for DNA sequencing, genotyping, cloning, and state-of-the-art cytogenetic work.

EPIGENOMICS LABORATORY

The Epigenomics Laboratory complements the high quality research undertaken in the Wildlife Genetics Laboratory. It is equipped to perform epigenetic and epigenomic studies, from the level of entire genomes or chromosomes down to individual genes, on model and non-model species for biomedical and ecological research projects.

The facility consists of dedicated laboratories for cell culture, molecular cytogenetics and fluorescence microscopy, as well as a large main laboratory with 16 individual work spaces and communal equipment benches.



COSMOGENICS FACILITY

The Cosmogenics Facility is a purpose built facility equipped with a robotic Vulcan 84 automated sample preparation system that enables acid digestion of solid and liquid samples.

The Cosmogenics Facility enables research into cosmogenic nuclide dating of geological samples, general analysis of environmental soil and sediments, fatty acid analysis of fish and macroinvertebrates, and complements the Ecochemistry Laboratory.

GLASSHOUSE

The Glasshouse has recently been upgraded to a state-of-the-art auto grow facility with an 'on the go' mobile platform and comprehensive climate controls that enable researchers to cultivate their research in a measurable environment. The Glasshouse facility also contains an in-built alarm system that sends alerts if there are any deviations to set climate measures. The Glasshouse compound also contains an outdoor experimental system of freshwater tanks that allows our researchers to examine the natural environment under controlled conditions.

GEOGRAPHIC INFORMATION SYSTEM AND ECOLOGICAL MODELLING LABORATORY

The Geographic Information System and Ecological Modelling Laboratory is a highly specialised IT Laboratory equipped with high-end computers comprising of ARCGIS and other modelling software. This assists our researchers through parallel computations to manipulate, simulate and model their research with ability to facilitate the production of maps.

TRACE DNA LABORATORY

The Trace DNA Laboratory is isolated from all other DNA work related buildings to enable researchers to undertake DNA work used for genetic analysis of samples where DNA quantity is low and the potential for contamination significant.

RESEARCH VEHICLES/VESSELS

The Institute maintains a fleet of fully equipped four wheel drive vehicles, boats, remote controlled electrofishing vessel and trailers to support our researchers throughout their time in the field during research collection periods. The Institute has recently rejuvenated its vehicle fleet, acquiring two brand new fit for purpose vehicles. These vehicles and trailers have the ability to go fully off road and reach remote areas.

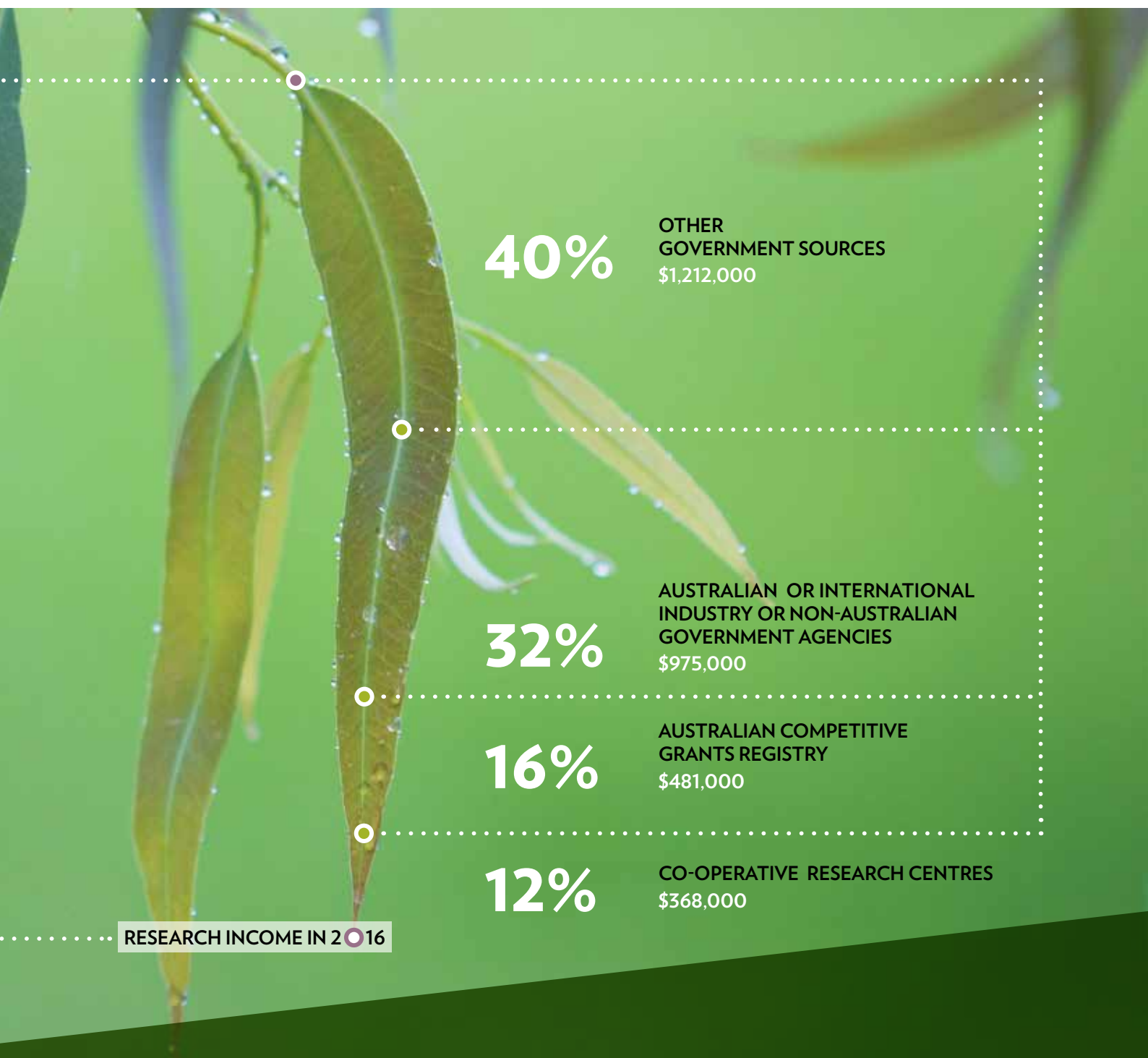


*Undergraduate field trip to Willandra, NSW.
Photo by Associate Professor, Duanne White.*

RESEARCH INCOME

A close-up photograph of green leaves with water droplets, serving as a background for the text. The leaves are elongated and have prominent veins. The water droplets are small and clear, reflecting light. The overall color palette is various shades of green.

In 2016 the IAE received \$3,036,000 of research income from industry groups, philanthropic societies, federal, state and international governments.



PUBLICATIONS

2016 HERDC PUBLICATIONS

Researchers at the IAE publish in a range of journals, books, and conferences. This section provides a summary of our Higher Education Research Data Collection (HERDC) publications. Authors who are IAE staff and students are shown in UPPER CASE.

PUBLICATION TYPE	NUMBER
B1	3
C1	119
E1	2
TOTAL	124

B (BOOK CHAPTERS)

Adriaansen, Chris; Woodman, James; Deveson, Edward; DRAKE, Vincent (2016) The Australian Plague Locust—Risk and Response. *Biological and Environmental Hazards, Risks, and Disasters, 1st Edition*. In Shroder, John; Sivanpillai, Ramesh (Eds) ISBN 9780123948472.

Maher, W. A., Taylor, A. M., Batley, G. E. and Simpson, S. L. (2016). (CH 5) Bioaccumulation. *Sediment Quality Assessment: A practical guide 2nd ed*. In Simpson, S. L. and Batley, G. E. Clayton South, VIC, Australia, CSIRO: 123-156. ISBN 9781486303847.

Taylor, A. M. and Maher, W. A. (2016). (CH 6) Biomarkers. *Sediment Quality Assessment: A Practical Guide 2nd ed*. In Simpson, S. L. and Batley, G. E. Clayton South, VIC, Australia, CSIRO: 157-194. ISBN 9781486303847.

C1 (REFEREED JOURNAL)

Allen, Gerald; UNMACK, Peter; Hadiaty, Renny (2016) The goldiei group of rainbowfishes (Melanotaeniidae) from the Birds Neck region of New Guinea (Papua and West Papua Provinces, Indonesia) with descriptions of five new species and recognition of *Melanotaenia dumasi* Weber., *Aqua*, 22(1), 1-32.

Barlow, Jos; Lennox, Gareth; Ferreira, Joice; Berenguer, Erika; Lees, Alexander; MAC NALLY, Ralph; Thomson, James; Ferra, Silvio; Lazada, Julio; Oliveira, Victor; Parry, Luke; de Castro Solar, R; Vieira, Ima; Aragao, Luiz; Begotti, Rodrigo; Braga, Rodrigo; Cardoso, Thiago; Junior, Raimundo; Junior, Carlos; Moura, Nargila; Nunes, Samia; Siqueira, Joao; Pardini, Renata; Silveira, Juliana; Vaz-de-Mello, Fernando; Veiga, Ruan; Venturieri, Adriano; Gardner, Toby (2016) Anthropogenic disturbance in tropical forests can double biodiversity loss from deforestation, *Nature*, 535, 144-147.

Barlow, N; Bentley, M; Spada, G; Evans, D; Hansom, J; Brader, M; WHITE, Duanne; Zander, A; Berg, S (2016) Testing models of ice cap extent, South Georgia, sub-Antarctic, *Quaternary Science Reviews*, 154, 157-168.

Berg, S; WHITE, Duanne; Bennike, O; Fulop, R-H; Fink, D; Wagner, B; Melles, M (2016) Unglaciaded areas in East Antarctica during the Last Glacial (Marine Isotope Stage 3) – New evidence from Rauer Group, *Quaternary Science Reviews*, 153, 1-10.

BOYLE, Maria; SCHWANZ, Lisa; HONE, Jim; GEORGES, Arthur (2016) Dispersal and climate warming determine range shift in model reptile populations, *Ecological Modelling*, 328, 34-43.

BRIDGEWATER, Peter (2016) The Anthropocene biosphere: do threatened species, Red Lists, and protected areas have a future role in nature conservation? *Biodiversity and Conservation*, 25, 603-607.

BRIDGEWATER, Peter (2016) The Man and Biosphere programme of UNESCO: rambunctious child of the sixties, but was the promise fulfilled? *Current Opinion in Environmental Sustainability*, 19, 1-6.

BRIDGEWATER, Peter; Arico, Salvatore (2016) Turbo-charging the Ecohydrology paradigm for the Anthropocene, *Ecohydrology and Hydrobiology*, 16(2), 74-82.

Bufford, J; Hulme, P; Sikes, B; Cooper, J; Johnston, P; DUNCAN, Richard (2016) Taxonomic similarity, more than contact opportunity, explains novel plant-pathogen associations between native and alien taxa, *New Phytologist*, 212(3), 657-667.

BYLEMANS, Jonas; FURLAN, Elise; Pearce, Luke; Daly, Trevor; GLEESON, Dianne (2016) Improving the containment of a freshwater invader using environmental DNA (eDNA) based monitoring, *Biological Invasions*, 18(10), 3081-3089.

BYLEMANS, Jonas; Maes, Gregory; Diopere, Eveline; Cariani, Alessia; Senn, Helen; Taylor, Martin; Bargelloni, Luca; Bonaldo, Alessio; Carvalho, Gary; Guarniero, Ilaria; Komen, Hans; Martinsohn, Jann; Nielsen, Einar; Tinti, Fausto; Volckaert, Filip; Ogden, Rob (2016) Evaluating genetic traceability methods for captive-bred marine fish and their applications in fisheries management and wildlife forensics, *Aquaculture Environment Interactions*, 8, 131-145.

Canedo-Arguelles, M; Sala, M; Peixoto, G; Prat, N; Faria, M; Soares, A; Barata, C; KEFFORD, Ben (2016) Can salinity trigger cascade effects on streams? A mesocosm approach, *Science of the Total Environment*, 540, 3-10.

Canedo-Arguelles, Miguel; Hawkins, Charles; KEFFORD, Ben; Schafer, R; DYACK, Brenda; Brucet, Sandra; Buchwalter, David B; Dunlop, Jason; Fror, Oliver; Lazorchak, James M.; Coring, Eckhard;

Fernandez, H. R.; Goodfellow, W; Achem, Ana Lucia Gonzalez; Hatfield-Dodds, Steve; Karimov, Bakhtiyor K; Mensah, P; Olson, J.R; Piscart, Christophe; Prat, Narcis; Ponsa, S; Schulz, Claus-Jurgen; Timpano, Anthony J (2016) Saving freshwater from salts : Ion-specific standards are needed to protect biodiversity, *Science*, 351(6276), 914-916.

Carlson, Emma; MACDONALD, Anna; ADAMACK, Aaron; McGrath, Timothy; DOUCETTE, Lisa; Osborne, William; GRUBER, Bernd; SARRE, Stephen (2016) How many conservation units are there for the endangered grassland earless dragons? *Conservation Genetics*, 17(4), 761-774.

Ceola, S; Montanari, A; Krueger, T, DYER, Fiona; Kreibich, H; Westerberg, I; Carr, G; Cudennec, C; Elshorbagy, A; Savenije, H; Van der Zaag, P; Rosbjerg, D; Aksoy, H; Viola, F; Petrucci, G; MacLeod, K; Croke, B; Ganora, D; Hermans, L; Polo, M; Xu, Z; Borga, M; Helmschrot, J; Toth, E; Ranzi, R; Castellarin, A; Hurford, A; Brilly, M; Viglione, A; Bloschi, G; Sivapalan, M; Domeneghetti, A; Marinelli, A; Baldassarre, G (2016) Adaptation of water resources systems to changing society and environment: a statement by the International Association of Hydrological Sciences, *Hydrological Sciences Journal*, 61(16), 2803-2817.

CHAVEZ-CAPILLA, Teresa; Beshai, Mona; MAHER, Bill; KELLY, Tamsin; FOSTER, Simon (2016) Bioaccessibility and degradation of naturally occurring arsenic species from food in the human gastrointestinal tract, *Food Chemistry*, 212, 189-197.

Clarke, Stewart; LYNCH, Jasmyn (2016) Palaeoecology to inform wetland conservation and management: some experiences and prospects, *Marine and Freshwater Research*, 67, 695-706.

PUBLICATIONS

Cole, T; Hammer, M; UNMACK, Peter; Teske, P; Brauer, C; Adam, M; Beheregaray, L (2016) Range-wide fragmentation in a threatened fish associated with post-European settlement modification in the Murray–Darling Basin, Australia, *Conservation Genetics*, 17(6), 1377–1391.

Connell, Sean; Nimmo, Dale; Ghedini, Giulia; MAC NALLY, Ralph; Bennet, Andrew F (2016) Ecological Resistance – Why Mechanisms Matter: A Reply to Sundstrom et al, *Trends in Ecology & Evolution*, 31(6), 413–414.

Cracknell, Matthew; COWOOD, Alison (2016) Construction and analysis of Hydrogeological Landscape units using Self-Organising Maps, *Soil Research*, 54, 328–345.

Dafforn, Katherine; Johnston, Emma; Ferguson, Alastair; Humphrey, Chris; Monk, Wendy; NICHOLS, Sue; Simpson, Stuart; Tulbure, Mirela; Baird, Donald (2016) Big data opportunities and challenges for assessing multiple stressors across scales in aquatic ecosystems, *Marine and Freshwater Research*, 67(4), 393–413.

Davis, Aaron M.; UNMACK, Peter; Vari, Richard P; Betancur-R, Ricardo (2016) Herbivory promotes dental disparification and macroevolutionary dynamics in grunters (teleostei: Terapontidae), a freshwater adaptive radiation, *The American Naturalist*, 187(3), 320–333.

DEAKIN, Janine; EDWARDS, Melanie; Patel, Hardip; Meally, Denis; Lian, Jinmin; Rachael, STENHOUSE; RYAN, Sam; LIVERNOIS, Ali; AZAD, Bhumika; HOLLELEY, Clare; Li, Qiye; GEORGES, Arthur (2016) Anchoring genome sequence to chromosomes of the central bearded dragon (*Pogona vitticeps*) enables reconstruction of ancestral squamate macrochromosomes and identifies sequence content of the Z chromosome, *BMC Genomics*, 17, 447–461.

DEAKIN, Janine; KRUGER-ANDRZEJEWSKA, Maya (2016) Marsupials as models for understanding the role of chromosome rearrangements in evolution and disease, *Chromosoma*, 125(4), 633–644.

Dennis, Lachlan; BROADHURST, Ben; LINTERMANS, Mark (2016) An accurate tool for ageing Two-spined Blackfish for use in determining timing of spawning in upland streams in the Brindabella ranges, ACT, Australia, *Ecological Management and Restoration*, 17(1), 70–80.

DRAKE, Vincent. (2016) Distinguishing target classes in observations from vertically pointing entomological radars, *International Journal of Remote Sensing*, 37(16), 3811–3835.

Duncan, Elliott; MAHER, Bill; Jagtap, Rajani; FOSTER, Simon; KRIKOWA, Frank; Sullivan, Cathryn; Roper, Margaret (2016) Inorganic Arsenic Concentrations in Wheat Chaff Exceed Those in Wheat Grain, *Water, Air, and Soil Pollution*, 227(6), article 212.

DUNCAN, Richard (2016) How propagule size and environmental suitability jointly determine establishment success: a test using dung beetle introductions, *Biological Invasions*, 18(4), 985–996.

Ellwood, Michael; SCHNEIDER, Larissa; POTTS, Jaimie; Batley, Graeme; Floyd, John; MAHER, Bill (2016) Volatile selenium fluxes from selenium-contaminated sediments in an Australian coastal lake, *Environmental Chemistry*, 13(1), 68–75.

Famelli, Shirley; GEORGES, Arthur; Souza, Franco; Bertoluci, Jaime (2016) Movement patterns and activity of the Brazilian snake-necked turtle *Hydromedusa maximiliani* (Testudines: Chelidae) in southeastern Brazil, *Amphibia Reptilia*, 37(2), 215–228.

FERRANTO, Bruno; Roe, J; GEORGES, Arthur (2016) Urban hazards: spatial ecology and survivorship of a turtle in an expanding suburban environment, *Urban Ecosystems*, 19(1), 415–428.

FERRONATO, Bruno; Marques, T; Neliton, L; Martinelli, L; Verdade, L; Camargo, P; Roe, J; GEORGES, Arthur (2016) Isotopic niche in the eastern long-necked turtle, *Chelodina longicollis* (Testudines: Chelidae), along a natural-urban gradient in southeastern Australia, *Herpetological Journal*, 26, 297–304.

FITZSIMMONS, Nancy; Featherstone, Philippa; Tucker, Anton (2016) Comparative dietary ecology of turtles (*Chelodina burrungandjii* and *Emydura victoriae*) across the Kimberley Plateau, Western Australia, prior to the arrival of cane toads, *Marine and Freshwater Research*, 67(11), 1611-1624.

FOSTER, Simon; MAHER, Bill (2016) Arsenobetaine and thio-arsenic species in marine macroalgae and herbivorous animals: Accumulated through trophic transfer or produced in situ? *Journal of Environmental Sciences*, 49, 131-139.

FURLAN, Elise; GLEESON, Dianne (2016) Environmental DNA detection of redfin perch, *Perca fluviatilis*, *Conservation Genetics Resources*, 8(2), 115-118.

FURLAN, Elise; GLEESON, Dianne; Hardy, Christopher; DUNCAN, Richard (2016) A framework for estimating the sensitivity of eDNA surveys, *Molecular Ecology Resources*, 16(3), 641-654.

GONZALEZ-OROZCO, Carlos; Pollock, L; Thornhill, A; Mishler, B; Knerr, N; Laffan, S; Miller, J; Rosauer, D; Faith, D; Nipperess, D; Kujala, H; Linke, S; Butt, N; Kulheim, C; Crisp, M; GRUBER, Bernd (2016) Phylogenetic approaches reveal biodiversity threats under climate change, *Nature Climate Change*, 6(12), 1110-1114.

GRAVES, Jennifer (2016) Did sex chromosome turnover promote divergence of the major mammal groups?: De novo sex chromosomes and drastic rearrangements may have posed reproductive barriers between monotremes, marsupials and placental mammals, *BioEssays*, 38(8), 734-743.

GRIMM, Annegret; GRUBER, Bernd; HOEHN, Marion; Enders, Katrin; Henle, Klaus (2016) A model-derived short-term estimation method of effective size for small populations with overlapping generations, *Methods in Ecology and Evolution*, 7, 734-743.

HINLO, Rheyda; FURLAN, Elise; Sutor, Lara; GLEESON, Dianne (2016) Environmental DNA monitoring and management of invasive fish: comparison of eDNA and fyke netting, *Management of Biological Invasions*, 8(1), 89-100.

Hirayama, K; Taufik, E; Kikuchi, Megumi; Nakamura, T; Fukuda, K; Saito, T; Newgrain, Keith; GREEN, Brian; Messer, M; Urashima, T (2016) Chemical characterization of milk oligosaccharides of the common wombat (*Vombatus ursinus*), *Animal Science Journal*, 87(9), 1167-1177.

HOLLELEY, Clare; SARRE, Stephen; O'MEALLY, Denis; GEORGES, Arthur (2016) Sex Reversal in Reptiles: Reproductive Oddity or Powerful Driver of Evolutionary Change? *Sexual Development*, 10, 279-287.

Horner, G; Cunningham, S; Thomson, J; Baker, P; MAC NALLY, Ralph; Moreno-Mateos, D (2016) Recruitment of a keystone tree species must concurrently manage flooding and browsing, *Journal of Applied Ecology*, 53(3), 944-952.

Hug, Katrin; MAHER, Bill; FOSTER, Simon; KRIKOWA, Frank; MOREAU, John (2016) Experimental evaluation of sampling, storage and analytical protocols for measuring arsenic speciation in sulphidic hot spring waters, *Microchemical Journal*, 130, 162-167.

INGLES, Emory; DEAKIN, Janine (2016) Telomeres, species differences, and unusual telomeres in vertebrates: presenting challenges and opportunities to understanding telomere dynamics, *AIMS Genetics*, 3(1), 1-24.

Jagtap, Rajani; MAHER, Bill (2016) Determination of selenium species in biota with an emphasis on animal tissues by HPLC-ICP-MS, *Microchemical Journal*, 124, 422-529.

PUBLICATIONS

Jagtap, Rajani; MAHER, William; KRIKOWA, Frank; Ellwood, Michael; FOSTER, Simon (2016) Measurement of selenomethionine and selenocysteine in fish tissues using HPLC-ICP-MS, *Microchemical Journal*, 128, 248-257.

Jakku, Emma; Thorburn, Peter; Marshall, Nadine; Dowd, Anne-Maree; Howden, Mark; Mendham, E.; MOON, Katie; Brandon, C. (2016) Learning the hard way: a case study of an attempt at agricultural transformation in response to climate change, *Climatic Change*, 137(3-4), 557-574.

Jensen, Michael P; Bell, Ian; Limpus, Colin; Hamann, M; Ambar, Stephen; Whap, Terrence; David, Charles; FITZSIMMONS, Nancy (2016) Spatial and temporal genetic variation among size classes of green turtles (*Chelonia mydas*) provides information on oceanic dispersal and population dynamics, *Marine Ecology: Progress Series*, 543, 241-256.

KATH, Jarrod; HARRISON, Evan; KEFFORD, Ben; MOORE, Leah; Wood, Paul; Schafer, Ralf; DYER, Fiona (2016) Looking beneath the surface: using hydrogeology and traits to explain flow variability effects on stream macroinvertebrate, *Ecohydrology*, 9(8), 1480-1495.

KATH, Jarrod; Le Brocq, Andrew; Maron, Martine (2016) Using a Bayesian network model to assess ecological responses to hydrological factor interactions, *Ecohydrology*, 9(1), 11-20.

KEFFORD, Ben; Buchwalter, David B; Canedo-Arguelles, Miguel; DAVIS, Jenny; Duncan, Richard (2016) Salinized rivers: Degraded systems or new habitats for salt-tolerant faunas? *Biology Letters*, 12(3), article 1072.

KINNELL, Peter (2016) A review of the design and operation of runoff and soil loss plots, *Catena*, 145, 257-265.

KINNELL, Peter (2016) Comparison between the USLE, the USLE-M and replicate plots to model rainfall erosion on bare fallow areas, *Catena*, 145, 39-46.

Koehn, John; NICOL, Simon (2016) Comparative movements of four large fish species in a lowland river, *Journal of Fish Biology*, 88(4), 1350-1368.

Krull, Cheryl; Stanley, Margaret; Burns, Bruce; CHOQUENOT, David; Etherington, Thomas (2016) Reducing wildlife damage with cost-effective management programmes, *Plos One*, 11(1), article e0146765.

Laffan, Shawn; Rosauer, Dan; Di Virgilio, Giovanni; Miller, Joseph; GONZALEZ-OROZCO, Carlos; Knerr, Nunzio; Thornhill, Andrew; Mishler, Brent (2016) Range-weighted metrics of species and phylogenetic turnover can better resolve biogeographic transition zones, *Methods in Ecology and Evolution*, 7(5), 580-588.

Lamber, M; Skelly, D; EZAZ, Tariq (2016) Sex-linked markers in the North American green frog (*Rana clamitans*) developed using DArTseq provide early insight into sex chromosome evolution, *BMC Genomics*, 17(1), article 844.

Leal, Cecilia; Pompeu, Paulo; Gardner, Toby; Leitao, Rafael; Hughes, Robert; Kaufmann, Phil; Zuanon, Jansen; de Paula, Felipe; Ferraz, Silvio; Thomson, James; MAC NALLY, Ralph; Ferreira, Joice; Barlow, Jos (2016) Multi-scale assessment of human-induced changes to Amazonian instream habitats, *Landscape Ecology*, 31(8), 1725-1745.

Leroy, B; Peatman, T; Usu, T; Calliot, S; Moore, Brad; Williams, Ashley; NICOL, Simon (2016) Interactions between artisanal and industrial tuna fisheries: Insights from a decade of tagging experiments, *Marine Policy*, 65, 11-19.

Li, Hong; HOLLELEY, Clare; Elphick, Melanie; GEORGES, Arthur; Shine, Richard (2016) The behavioural consequences of sex reversal in dragons, *Proceedings of the Royal Society B: Biological Sciences*, 283(1832), 1-7.

Lieschke, Jason; Lyon, Jarod P.; Moloney, P.; NICOL, Simon (2016) Spatial partitioning in the use of structural woody habitat supports the cohabitation of two cod species in a large lowland river, *Marine and Freshwater Research*, 67, 1835-1843.

LINTERMANS, Mark (2016) Finding the needle in the haystack: Comparing sampling methods for detecting an endangered freshwater fish, *Marine and Freshwater Research*, 67(11), 1740-1749.

LIVERNOS, Ali; HARDY, Kris; DOMASCHENZ, Renae; Papanicolaou, Alexie; GEORGES, Arthur; SARRE, Stephen; RAO, Sudha; EZAZ, Tariq; DEAKIN, Janine (2016) Identification of interleukin genes in *Pogona vitticeps* using a de novo transcriptome assembly from RNA-seq data, *Immunogenetics*, 68(9), 719-731.

LYNCH, Jasmyn; Kalumanga, Elikana; Ospina, Guillermo (2016) Socio-ecological aspects of sustaining Ramsar wetlands in three biodiverse developing countries, *Marine and Freshwater Research*, 67, 850-868.

Mackintosh, Teresa J.; DAVIS, Jenny; THOMPSON, Ross (2016) Impacts of multiple stressors on ecosystem function: Leaf decomposition in constructed urban wetlands, *Environmental Pollution*, 208, 221-232.

Mackintosh, Teresa J.; DAVIS, Jenny; THOMPSON, Ross (2016) Tracing metals through urban wetland food webs, *Ecological Engineering*, 94, 200-213.

MAHER, Bill; DUNCAN, Elliott; Dilly, Geoffrey; FOSTER, Simon; KRIKOWA, Frank; Lombi, E.; Scheckel, Kirk; Girguis, Peter (2016) Arsenic concentrations and species in three hydrothermal vent worms, *Ridgeia piscesae*, *Paralvinella sulficola* and *Paralvinella palmiformis*, *Deep-Sea Research Part I: Oceanographic Research Papers*, 116, 41-48.

MAHER, Bill; KRIKOWA, Frank; FOSTER, Simon (2016) Decomposition of six common selenium species found in animal tissues using microwave digestion with nitric acid and ICP-MS, *Microchemical Journal*, 126, 92-95.

MAHER, Bill; Maher, N.; TAYLOR, Anne; KRIKOWA, Frank; Ubrihien, Rodney; Mikac, Katarina (2016) The use of the marine gastropod, *Cellana tramoserica*, as a biomonitor of metal contamination in near shore environments, *Environmental Monitoring and Assessment*, 188(7), article 391.

MARASINGHE WADIGE, Chamani; TAYLOR, Anne; KRIKOWA, Frank; MAHER, Bill (2016) Sediment Metal Concentration Survey Along the Mine-Affected Molonglo River, NSW, Australia, *Archives of Environmental Contamination and Toxicology*, 70(3), 572-582.

MATSUBARA, Kazumi; MEALLY, D.; AZAD, Bhumika; GEORGES, Arthur; SARRE, Stephen; GRAVES, Jennifer; Matsuda, Yoichi; EZAZ, Tariq (2016) Amplification of microsatellite repeat motifs is associated with the evolutionary differentiation and heterochromatinization of sex chromosomes in Sauropsida, *Chromosoma*, 125(1), 111-123.

McAlpine, C.; Catterall, C.; MAC NALLY, Ralph; Lindenmayer, D.; Ried, J.L.; Holl, K.; Bennett, A.; Runtig, R.; Wilson, K.; Seabrook, L.; Cunningham, S.; Moilanen, A.; Maron, M.; Shoo, L.; Lunt, I.; Vesk, P.; Rumpff, L.; Martin, T.; Thomson, J.; Possingham, H (2016) Integrating plant- and animal-based perspectives for more effective restoration of biodiversity, *Frontiers in Ecology and the Environment*, 14(1), 37-45.

McGinn, Kevin; Putten, Van; DUNCAN, Richard; Shelby, Natasha; Weser, Carolin; Hulme, P. E. (2016) *Trifolium* species associate with a similar richness of soil-borne mutualists in their introduced and native ranges, *Journal of Biogeography*, 43(5), 944-954.

PUBLICATIONS

McInerney, Paul; Rees, Gavin; GAWNE, Ben; Suter, Phillip J (2016) Implications of riparian willow invasion to instream community structure and function: a synthesis using causal criteria analysis, *Biological Invasions*, 18(8), 2377-2390.

McInerney, Paul; Rees, Gavin; GAWNE, Ben; Suter, Phillip J (2016) Invasive willows drive instream community structure, *Freshwater Biology*, 61(9), 1379-1391.

Mina-Vargas, A; McKeown, P; Flanagan, N; Debouck, D; KILIAN, Andrzej; Hodgkinson, T; Spillane, C (2016) Origin of year-long bean (*Phaseolus dumosus* Macfady, Fabaceae) from reticulated hybridization events between multiple *Phaseolus* species, *Annals of Botany*, 118(5), 957-969.

MIURA, Ikuo; Ohtani, Hiromi; Ogata, M; EZAZ, Tariq (2016) Evolutionary Changes in Sensitivity to Hormonally Induced Gonadal Sex Reversal in a Frog Species, *Sexual Development*, 10(2), 79-90.

MOON, Katie; Adams, Vanessa M. (2016) Using quantitative influence diagrams to map natural resource managers' mental models of invasive species management, *Land Use Policy*, 50, 341-351.

MOON, Katie; Brewer, Tom; Januchowski-Hartley, Stephanie; Adams, Vanessa M.; Blackman, Deborah (2016) A guideline to improve qualitative social science publishing in ecology and conservation journals, *Ecology & Society*, 21(3), article 17.

Moran, Nicholas; K, Mossop; THOMPSON, Ross; Wong, Bob (2016) Boldness in extreme environments: temperament divergence in a desert-dwelling fish, *Animal Behaviour*, 122, 125-133.

Morgan, DL; Beatty, S; Close, P; Allen, M; UNMACK, Peter; Hammer, M; Adams, Marc (2016) Resolving the taxonomy, range and ecology of biogeographically isolated and critically endangered populations of an Australian freshwater galaxiid, *Galaxias truttaceus*, *Pacific Conservation Biology*, 22(4), 350-359.

Morgan-Richards, Mary; HINLO, Rheyda; Smuts-Kennedy, Chris; Innes, John; Ji, Weihong; Barry, Manuela; Brunton, Dianne; Hitchmough, Rod (2016) Identification of a Rare Gecko from North Island New Zealand, and Genetic Assessment of Its Probable Origin: A Novel Mainland Conservation Priority? *Journal of Herpetology*, 50(1), 77-86.

Moura, Nargila; Lees, Alexander; Aleixo, Alexandre; Barlow, Jos; Berenguer, Erika; Ferreira, Joice; MAC NALLY, Ralph; THOMSON, Jim; Gardner, Toby (2016) Idiosyncratic responses of Amazonian birds to primary forest disturbance, *Oecologia*, 180(3), 903-916.

Munoz-Ramirez, Carlos; Habit, Evelyn; UNMACK, Peter; Johnson, Jerald; Victoriano, Pedro (2016) Low Genetic Diversity in *Diplomystes camposensis*, an endemic and endangered catfish from South Chile, *Zoological Studies*, 55(16), article 16. "

Mutze, Greg; COOKE, Brian; Jennings, Scott (2016) Density-dependent grazing impacts of introduced European rabbits and sympatric kangaroos on Australian native pastures, *Biological Invasions*, 18(8), 2365-2376.

Mutze, Greg; COOKE, Brian; Jennings, Scott (2016) Estimating density-dependent impacts of European rabbits on Australian tree and shrub populations, *Australian Journal of Botany*, 64(2), 142-152.

Paterson, Iain; Mangan, Rosie; Downie, Douglas; Coetzee, Julie; Hill, Martin; Burke, Ashley; DOWNEY, Paul; Henry, Thomas; Compton, Stephen (2016) Two in one: cryptic species discovered in biological control agent populations using molecular data and crossbreeding experiments, *Ecology and Evolution*, 6(17), 6139-6150.

POFF, N; Schmidt, John (2016) How dams can go with the flow, *Science*, 353(6304), 1099-1100.

Povilanskas, R; Armaitiene, A; DYACK, B; Jurkus, E (2016) Islands of prescription and islands of negotiation, *Journal of Destination Marketing and Management*, 5(3), 260-274.

Rab, P; Yano, C; Jegede, O; Lavoue, S; Bertolloo, L; EZAZ, Tariq; Majtanova, Z; Oliveira, E; Cioffi, M (2016) Karyotype and Mapping of Repetitive DNAs in the African Butterfly Fish *Pantodon buchholzi*, the Sole Species of the Family Pantodontidae, *Cytogenetic and Genome Research*, 149(4), 312-320.

Raman, Rosy; Diffey, Simon; Carling, Jason; KILIAN, Andrzej; Luckett, David; Raman, Harsh; Cowley, R (2016) Quantitative genetic analysis of grain yield in an Australian Brassica napus doubled-haploid population, *Crop and Pasture Science*, 67(3-4), 298-307.

Razeng, Emma; Moran-Ordóñez, Alejandra; Brim-Box, Jayne; THOMPSON, Ross; DAVIS, Jenny; Sunnucks, Paul (2016) A potential role for overland dispersal in shaping aquatic invertebrate communities in arid regions, *Freshwater Biology*, 16(5), 745-757.

Richmond, Erinn; Rosi-Marshall, Emma; Lee, Sylvia; THOMPSON, Ross; Grace, Michael (2016) Antidepressants in stream ecosystems: Influence of selective serotonin reuptake inhibitors (SSRIs) on algal production and insect emergence, *Freshwater Science*, 35(3), 845-855.

ROLLS, Robert; Heino, Jani; CHESSMAN, Bruce (2016) Unravelling the joint effects of flow regime, climatic variability and dispersal mode on beta diversity of riverine communities, *Freshwater Biology*, 61(8), 1350-1364.

Roques, Alain; Auger-Rozenberg, Marie; Blackburn, Tim; Garnas, Jeffrey; Pysek, Petr; Rabitsch, Wolfgang; Richardson, David; Wingfield, Michael; Liebhold, Andrew; DUNCAN, Richard (2016) Temporal and interspecific variation in rates of spread for insect species invading Europe during the last 200 years, *Biological Invasions*, 18(4), 907-920.

Sasaki, Minami; Hammer, Michael; UNMACK, Peter; Adams, Mark; Beheregaray, Luciano (2016) Population genetics of a widely distributed small freshwater fish with varying conservation concerns: the southern purple-spotted gudgeon, *Mogurnda adspersa*, *Conservation Genetics*, 17(4), 875-889.

Sauer, Felix; Bundschuh, Mirco; Zubrod, Jochen; Schafer, Ralf; Thompson, Kristie; KEFFORD, Ben (2016) Effects of salinity on leaf breakdown: Dryland salinity versus salinity from a coalmine, *Aquatic Toxicology*, 177, 425-432.

Schmeller, D.; BRIDGEWATER, Peter (2016) The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES): progress and next steps, *Biodiversity and Conservation*, 25, 801-805.

Schneider, Larissa; Haberle, Simon; MAHER, Bill; KRIKOWA, Frank; Zawadzki, Atun; Heijnis, H (2016) History of human impact on Lake Kutubu, Papua New Guinea: The geochemical signatures of oil and gas mining activities in sediments, *Chemosphere*, 148, 369-379.

SCHNEIDER, Larissa; MAHER, Bill; Floyd, John; POTTS, Jaimie; Batley, Graeme; GRUBER, Bernd (2016) Transport and fate of metal contamination in estuaries: Using a model network to predict the contributions of physical and chemical factors, *Chemosphere*, 153, 227-236.

SCHWANZ, Lisa; Robert, Kylie A. (2016) Costs of Rearing the Wrong Sex: Cross-Fostering to Manipulate Offspring Sex in Tammar Wallabies, *PLoS One*, 11(2), article e0146011.

Shelby, Natasha; DUNCAN, Richard; Putten Van Putten, Wim; McGinn, Kevin; Weser, Carolin; Hulme, Philip; Austin, Amy (2016) Plant mutualisms with rhizosphere microbiota in introduced versus native ranges, *Journal of Ecology*, 104(5), 1259-1270.

PUBLICATIONS

Sluiter, Ian; Schweitzer, Andrew; MAC NALLY, Ralph (2016) Spinifex-mallee revegetation: Implications for restoration after mineral-sands mining in the Murray-Darling Basin, *Australian Journal of Botany*, 64(6), 547-554.

Sowersby, Will; THOMPSON, Ross; Wong, Bobbm (2016) Invasive predator influences habitat preferences in a freshwater fish, *Environmental Biology of Fishes*, 99(2-3), 1887-193.

Stoklosa, J; Huang, Y; FURLAN, Elise; Hwang, W (2016) On quadratic logistic regression models when predictor variables are subject to measurement error, *Computational Statistics & Data Analysis*, 95, 109-121.

Sun, B; Li, T; Mu, Y; McGlashan, J; GEORGES, Arthur; Shine, R; Du, W-G (2016) Thyroid hormone modulates offspring sex ratio in a turtle with temperature-dependent sex determination, Royal Society of London. Proceedings B. *Biological Sciences*, 283(1841), article 20161206.

TAYLOR, Anne; MAHER, Bill (2016) Developing a sentinel mollusc species for toxicity assessment: Metal exposure, dose and response - laboratory v. field exposures and resident organisms, *Environmental Chemistry*, 13(3), 434-446.

Thomson, Scott; GEORGES, Arthur (2016) A new species of freshwater turtle of the genus *Elseya* (Testudinata: Pleurodira: Chelidae) from the Northern Territory of Australia, *Zootaxa*, 4061(1), 18-28.

Trost, Susan; OLSEN, Gerald (2016) Common Mynas attack Common Brushtail Possums and nesting Southern Boobook, and diet of the nesting Boobooks, *Australian Field Ornithology*, 33, 22-24.

Urashima, T; Yamamoto, Tomoko; Hirayama, K; Fukuda, K; Nakamura, T; Saito, T; Newgrain, Keith; Merchant, J; GREEN, Brian; Messer, M (2016) Chemical characterization of milk oligosaccharides of the tiger quoll (*Dasyurus maculatus*), a marsupial, *Glycoconjugate Journal*, 33(5), 797-807.

VENABLES, Sam; Daniel, Runa; SARRE, Stephen; Soedarsono, Nurtami; Sudoyo, Herawati; Suryadi, Helena; van Oorschot, Roland; Walsh, Simon; Widodo, Putut; MCNEVIN, Dennis (2016) Allele frequency data for 15 autosomal STR loci in eight Indonesian subpopulations, *Forensic Science International: Genetics*, 20, 45-52.

Warry, F; Reich, P; Cook, Perran; MAC NALLY, Ralph; THOMSON, James; Woodland, R (2016) Nitrogen loads influence trophic organization of estuarine fish assemblages, *Functional Ecology*, 30(10), 1723-1733.

Warry, Fiona; Reich, Paul; Woodland, Ryan; Thomson, James; MAC NALLY, Ralph; Cook, Perran (2016) Nitrogen stable isotope values of large-bodied consumers reflect urbanization of coastal catchments, *Marine Ecology: Progress Series*, 542, 25-37.

Wells, Konstans; Cassey, Phillip; Sinclair, Ron; Mutze, Greg; Peacock, David; Lacy, Robert; COOKE, Brian; Hara, Robert; Brook, Barry; Fordham, Damien (2016) Targeting Season and Age for Optimizing Control of Invasive Rabbits, *The Journal of Wildlife Management*, 80(6), 990-999.

Wells, Konstans; O'Hara, Robert; COOKE, Brian; Mutze, Greg; Prowse, Thomas; Fordham, Damien (2016) Environmental effects and individual body condition drive seasonal fecundity of rabbits: identifying acute and lagged processes, *Oecologia*, 181(3), 853-864.

Windley, Hannah; Barron, Mandy; Holland, Penelope; Starrs, Danswell; RUSCOE, Wendy; Foley, William (2016) Foliar nutritional quality explains patchy browsing damage caused by an invasive mammal, *PLoS One*, 11(5), article e0155216.

Wood, Rebecca; Mitrovic, Simon; Lim, Richard; KEFFORD, Ben (2016) How benthic diatoms within natural communities respond to eight common herbicides with different modes of action, *Science of the Total Environment*, 557-558, 636-643.

Woodward, Guy; Bonada, Nuria; Brown, Lee; Death, Russell; Durance, Isabelle; Gray, Clare; Hladyz, Sally; Ledger, Mark E.; Milner, Alexander; Ormerod, Stephen; THOMPSON, Ross; Pawar, Samraat (2016) The effects of climatic fluctuations and extreme events on running water ecosystems, *Philosophical Transactions of the Royal Society B: Biological Sciences*, 371(1694), article 20150274.

E1 (REFEREED CONFERENCE PAPERS)

DYER, Fiona; SANGSTON, David; TSCHIERSCHEKE, Alica; WRIGHT, Daniel; ROSS-MAGEE, Pat; COUCH, Alan; LINTERMANS, Mark (2016) Water Quality and Murray Cod: Temperature and Dissolved Oxygen in Pools of the Upper Murrumbidgee River, *11th International Symposium on Ecohydraulics 2016*.

MCQUEEN, Ken (2016) Landscape evolution of the Clarence River catchment: Weird rivers and wild ideas, *Fourth Australian Regolith Geoscientists Association Conference*, 55-59.

DIRECTORY

EXECUTIVE MANAGEMENT

Director

Professor Ross Thompson

E: Ross.Thompson@canberra.edu.au

Deputy Director

Associate Professor Janine Deakin

E: Janine.Deakin@canberra.edu.au

Distinguished Professor Arthur Georges

E: Arthur.Georges@canberra.edu.au

Professor Richard Duncan

E: Richard.Duncan@canberra.edu.au

Dr Fiona Dyer

E: Fiona.Dyer@canberra.edu.au

Associate Professor Dianne Gleeson

E: Dianne.Gleeson@canberra.edu.au

Professor William Maher

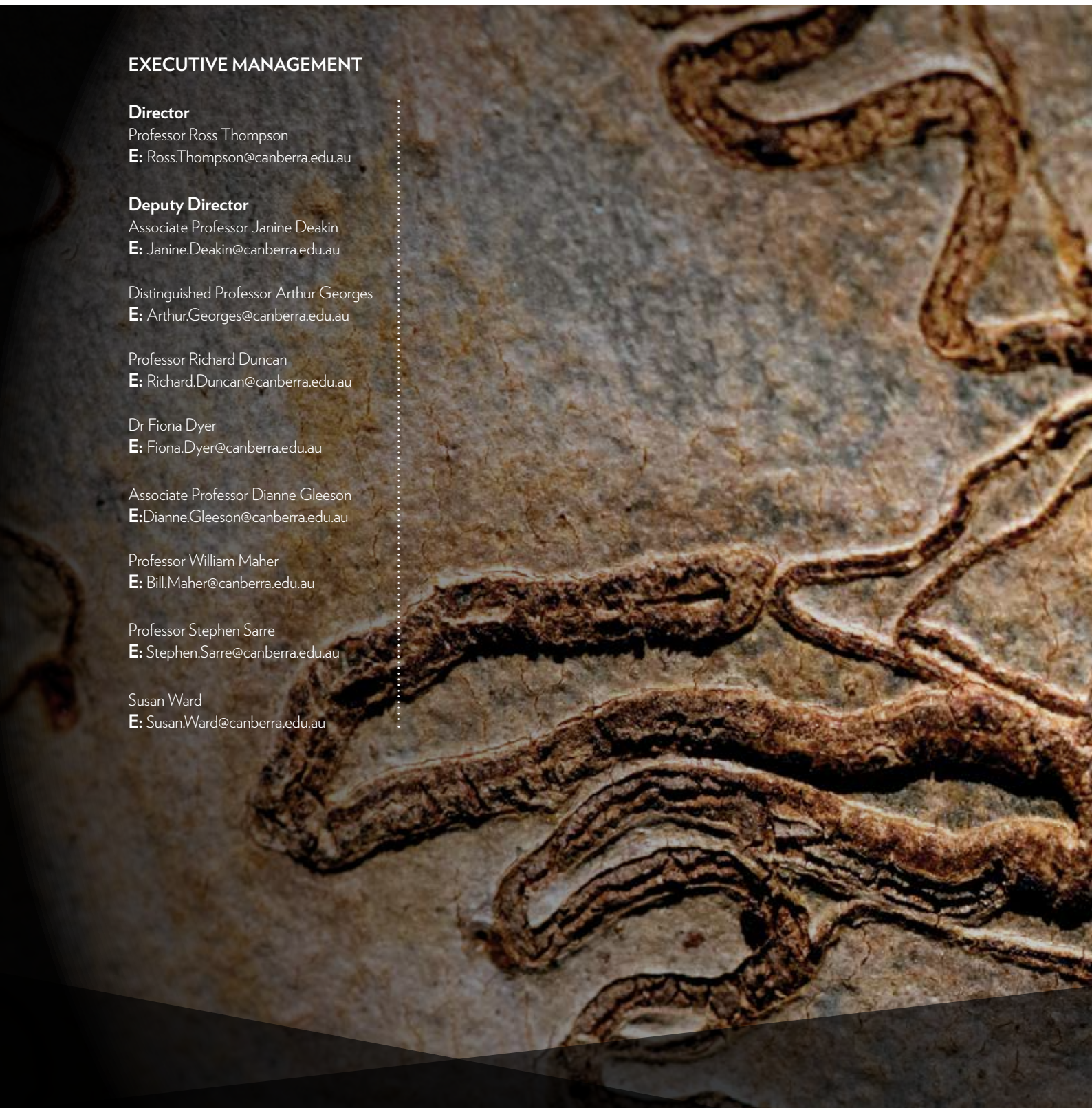
E: Bill.Maher@canberra.edu.au

Professor Stephen Sarre

E: Stephen.Sarre@canberra.edu.au

Susan Ward

E: Susan.Ward@canberra.edu.au







**UNIVERSITY OF
CANBERRA**



**INSTITUTE FOR
APPLIED ECOLOGY**

Institute for Applied Ecology

Building 3, Level C, Room 1

University of Canberra, ACT, 2601

T: +61 2 6201 2795

E: iaeadmin@canberra.edu.au

W: www.appliedecology.edu.au

CANBERRA.EDU.AU/IAE

Printed May 2017. Information in this report was correct at time of printing. Up-to-date information is available on the University's website at canberra.edu.au

This publication is printed on ecoStar 100% Recycled. ecoStar is an environmentally responsible paper made Carbon neutral. ecoStar is manufactured from 100% post-consumer recycled paper in a process chlorine free environment under the ISO 14001 environmental management system. • 100% Recycled post-consumer • ISO 14001 • Made Process Chlorine Free (PCF) • Made Carbon Neutral

Design and typesetting by:
University of Canberra Marketing Services Studio

Australian Government Higher Education
(CRICOS) Provider; #00212K, UCR0114.



#IAEUC