ARC Centre of Excellence for Environmental Decisions

2014 Annual Report

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Centre of Excellence for Environmental Decisions

looking back

222 CEED members

14 Chief Investigators

5 Partner Investigators

12 Senior Researchers

59 Postdoctoral Fellows

113 Postgraduates

4 new Postdoctoral Fellows

22 new postgraduates

168 collaborating organisations

51 International Visitors from 15 Countries

151 peer reviewed publications

33 workshops

488 workshop attendees

99 conference presentations

56 attendees at mentoring programs

27 awards

67 centre commentaries

4 policy submissions

79 government and industry briefings

38 public awareness programs

30 public talks given

12 media releases

138 separate media stories potentially reaching >632,000 people

9 Issues of our magazine, Decision Point, with >100 stories

*Orange-eyed tree frog (*Litoria chloris*).*
Photo: Jeremy Ringma.

Commencing in 2011, the Centre of Excellence for Environmental Decisions (CEED) is an Australian Research Council (ARC) partnership between universities and other research institutions. CEED is one of the world's leading research centres for solving environmental management problems and for evaluating the outcomes of environmental actions.

Further information on the Centre and activities can be found at our website www.ceed.edu.au

Contents

Tasmanian highlands. Photo: Bruce Kendell.

our vision

To be the world's leading research centre for solving environmental management problems and for evaluating the outcomes of environmental actions.

our mission

We will benefit environmental science, policy and management across Australia and around the world by solving complex problems of environmental management and monitoring in a rapidly changing and uncertain world.

Photo: K Connors.

Always on the lookout for birds, Hugh at a workshop this year, Lamington National Park QLD. Photo: Christopher Brown.

A new phase for CEED

Hugh Possingham, Director

CEED's independent mid-term review with Dr Fiona Cameron (ARC) and Professors Michelle Leishman (Macquarie) and Jim Mitchell (Flinders) was a major feature of 2014. Their comments substantiate our claims of excellence based on an innovative research approach, major impacts on environmental policy and management, and our ability to foster the next generation of researchers.

The review team concluded that we have "published collaborative, widely cited papers in high quality journals". This is certainly a hallmark of CEED. At half the size of most ARC Centres of Excellence, CEED continues to publish a large number of papers in the world's top multidisciplinary scientific journals including *Science*, *Nature* and *PNAS*; plus papers in the best journals in our field, such as *Ecology Letters* and *Trends in Ecology and Evolution*. These high profile papers are extremely important to Australia's reputation in environmental science and management.

Workshops continue to be the cornerstone of our highly collaborative research approach. The review panel noted that we have "developed a strongly interdisciplinary research program". Our workshops are a little different. While most people think of workshops as talkfests, we think of them as "workfests". We gather together the best people from overseas and Australia and, over 2-5 days, tackle a substantive problem and actually start solving problems and drafting manuscripts inside the workshops.

Our researchers are determined to make a difference. You will discover in this annual report that 2014 was an especially successful year for CEED contributing to, and having impact on, policy, in particular in the areas of biodiversity offsets, threatened species recovery, meeting carbon and biodiversity outcomes through restoration, and prioritising environmental projects. This success led the review committee to note that CEED has "become a highly respected source of scientific and technical advice to both government and non-government organisations".

CEED has "become a highly respected source of scientific and technical advice to both government and non-government organisations"

All these achievements aside, the review comment of which I was particularly proud was "the Centre had provided a supportive and stimulating environment for the next generation of researchers". The Chief Investigators and staff of CEED, especially Drs Wilson and McDonald-Madden, have worked hard this year to develop and implement mentoring and leadership programs that are unanimously successful. These additional investments of time and resources have added another layer of interaction, beyond workshops, themes and projects, that binds CEED together. This is one of the reasons why our Centre of Excellence is more than the sum of its parts and not merely a collection of disparate projects led by individuals.

2015 is already full of activity. Most of the CEED Chief Investigators have already been successful in being part of a $30 million National Environmental Science Program hub for Threatened Species Recovery research. Thirty other researchers from across the nation join them in this new endeavour that is tightly focussed on research to recover Australia's threatened species. Meanwhile, CEED will maintain its commitment to a broad range of environmental management issues both nationally and internationally.

CEED's research theme leaders are already driving workshops to tackle new problems: the use of animal telemetry data in spatial decision-making, optimal restoration under complex social and economic circumstances, combating wildlife crime, consistently determining the cost of conservation actions, the role of social networks and human values in achieving conservation outcomes, advances in the theory of offsetting, planning linear infrastructure to minimise biodiversity impacts and many more. These new initiatives, coupled with an increased investment in our strategies for communication, engagement and internationalisation, will make 2015 a very busy year.

our research

how our research has made a difference

Meet Dr Maria Beger, a post doctoral research fellow, whose research on coral reef ecology and conservation is guided by Research Theme A: Environmental policy and management evaluation.

Research Themes

Led by dedicated theme leaders with teams composed of senior, mid-career and early career researchers, our research is coordinated and integrated across five themes to achieve the overall objectives of the Centre.

Our researchers are recognised as global leaders in fundamental environmental science, and we place a high priority on the career development of the next generation of conservation researchers. We also collaborate extensively and see interactivity as the key to our success.

Through our research, we benefit environmental science, policy and management across Australia and globally, by tackling the complex problems of environmental management and monitoring in a rapidly changing and uncertain world.

This section outlines CEED's research outputs and achievements for 2014 against the five themes:

Photo: Bruce Kendell

Theme A - Environmental Policy and Management Evaluation

We evaluate the effectiveness of environmental management actions, such as establishing protected areas, habitat and ecosystem restoration at a landscape and marine zoning scale. We attempt to address the needs of environmental policy-makers and managers at all scales across national and international boundaries.

Theme B - Optimal Monitoring

Our work on how to monitor efficiently and effectively in order to transform optimal monitoring into a central pillar of environmental decision-making and prioritisation.

Theme C - Socio/Ecological Analysis and Modelling for Environmental Decision-Making

We build on techniques from a range of disciplines which are used to developing methods to analyse, model and integrate knowledge about socio-economic and ecological processes to improve environmental decision-making.

Theme D - Ecological Theory and Processes

Our researchers tackle strategic, fundamental ecological science questions that are expected to inform environmental decisions. Ecology is the science of the patterns and processes determining species abundance and distribution and interactions between them and the environment.

Theme E - Quantitative Tools and Approaches

Our activities are all quantitative, extending from fundamental research into mathematical approaches to ecological questions, through to training on-the-ground managers to use decision-support tools.

Theme A: Environmental policy and management evaluation

Theme Leader: Associate Professor Salit Kark, The University of Queensland

Theme A focuses on the needs of environmental policy-makers and managers at all scales across national and international boundaries.

During 2014, our research has continued to impact major global environmental policy and develop policy options. CEED researchers have led and participated in several large scale and globally relevant projects with novel policy implications.

At the core of this has been ongoing research on invasive alien species, which are considered to be one of the most detrimental factors affecting the decline of native biodiversity in both terrestrial and marine ecosystems. Work in this area has been undertaken across a range of alien groups, which have had major impacts on native biodiversity, the economy and human well-being.

Research undertaken by Reid Tingley and Darren Southwell has found an "Achilles heel" for the cane toad. Cane toads have reached the Kimberley and there is no sign that their march across Australia will abate. Tingley and Southwell's research has found that whilst cane toads are an extremely adaptive species, their one weakness is water. The research shows that by removing access to enough water sources in the same area, there is a possibility that the last parts of Australia that the toads have not yet reached, may be able to be "walled" off. The result would be a break in the landscape. Reid and colleagues combined information on toad biology, rainfall and the location of water points to show that the scheme has a good chance of working. A barrier of only a few hundred water points in the right location could stop the invasion dead in its tracks, and prevent toads from occupying more than 260,000 km^2 of Western Australia. This is larger than the area of the whole United Kingdom.'

Work on assessing biodiversity indicators undertaken by Ben Collen and Emily Nicholson has provided key information for managers in determining which indicators for biodiversity are the most informative, under which circumstances, and how the growing list of indicators might best serve conservation policy decisions.

Their 'Taking the measure of change' ***Science*** paper (346, 166-167) explored the urgent requirement for a set of agreed metrics of biodiversity. They highlighted that indicators of change must be rigorously tested, and that the gold standard for conservation decision making would test the modelled performance of management alternatives prior to implementation. Such evaluation was mentioned in the selection of indicators of the Convention on Biological Diversity (CBD) 2010 target, with all indicators "identified for immediate testing." Yet, with few exceptions, the indicators remain largely unevaluated in their capacity to report meaningfully on conservation targets and the means of achieving them. This remains a critical task for predictive conservation science if it is to influence conservation progress.

Collaborations between CEED researchers and CSIRO Ecosystem Science has led to the development of an innovative model that integrates global and national scale scenarios with local land use change across agricultural landscapes in Australia. This model is used to predict outcomes of different carbon policy options.

'Carbon farming' by planting trees on cleared agricultural land is currently a hot topic in Australian policy. This has the potential to not only reduce potential emissions from agriculture, but also to actively sequester carbon from the atmosphere. Given the right mix of trees in the

Carbon farming: A forest re-planting covering 18 ha of private land in a pastural district near Goulburn, NSW. The forest provides ecoservices including carbon storage.
Photo: Greenfleet Australia / Flickr, CC.

right places, these plantings could contribute to restoring biodiversity in agricultural landscapes. Further, depending on the type and level of encouragement, carbon farming may offer an important alternative source of revenue on marginal farmland. However, the ability of carbon markets to motivate the supply of carbon sequestration and biodiversity services from agricultural land is uncertain, especially given future changes in environmental, economic, and social attitudes.

An interdisciplinary team of leading researchers and policy developers from CSIRO and ARC CEED, led by Dr Brett Bryan at CSIRO, quantified the potential supply of carbon and biodiversity services from intensive Australian agricultural land from 2013 to 2050. The team explored four 'global outlook' scenarios, which specified alternative emissions pathways, food demand, energy price, and carbon price futures. Using a simplified version of the Land Use Trade-Offs (LUTO) model, economic returns to agriculture, carbon plantings, and environmental plantings were calculated for each year.

The team found that carbon supply curves were similar across global outlooks and sharp increases in carbon sequestration supply occurred at carbon prices exceeding $50 tCO2_1 in 2015 and exceeding $65 tCO2_1 in 2050. Results also showed that a carbon market can motivate supply of substantial carbon sequestration in some scenarios (up to 189 MtCO2 yr-1), but only modest amounts of biodiversity services from agricultural land. These results were sensitive to global drivers, especially the carbon price, and the domestic drivers of adoption hurdle rate and agricultural productivity.

The study identifies potential outcomes of policy aimed at achieving carbon sequestration and biodiversity co-benefits, and clarifies the future uncertainty in these outcomes due to both national and global drivers.

How to save more species

Jane McDonald has continued her work on threatened species management in Australia. Following the 2013 CEED submission to a Senate inquiry on this issue, Ms McDonald co-authored a recently published paper on these recommendations: "Improving policy efficiency and effectiveness to save more species: A case study of the megadiverse country Australia." *Biological Conservation*. This paper has now been circulated throughout the Australian Department of the Environment and received by the Threatened Species Commissioner, Gregory Andrews, who tweeted about it and was using it to develop conservation priorities.

The majestic grey nurse shark is critically endangered on Australia's east coast. With the recommendations given in Jane McDonald's publication, grey nurse sharks and other threatened species could come back from the brink of extinction. Photo: Kelly Hunter / Flickr, CC.

Halting cane toad invasion in WA

blocking their access to vital water sources

Cane toads have reached the Kimberley and there is no sign that their march of conquest is finished. Their remorseless advance across the Top End makes it seem they are invincible, but CEED researchers Reid Tingley and Darren Southwell believe that the species has an Achilles heel.

Cane toads are a tough, fast, adaptive species with glands that can secrete a cocktail of toxins lethal to native species. Their one weakness is water. Cane toads can travel across dry landscapes like few other amphibians, but even they cannot survive more than 10 days without water. In very dry regions, their spread may be halted by taking away any permanent water sources. If access to enough water sources in the same area can be removed (e.g., by fencing natural water bodies, or minimising leaks in cattle tanks), the last parts of Australia that the toads haven't yet reached may be walled off. The result would be a break in the landscape – a moat with no water – that toads can't cross.

Cane toad. Photo: Atlas of Living Australia.

The arid Pilbara region is a perfect place to make this last stand. Only a few hundred kilometres from the edge of the advancing wave of toads is an arid corridor where permanent natural water is almost absent. Artificial water points created for pastoralism, and natural springs, dot the corridor, forming a thin strip of suitable toad habitat along the coast.

CEED researchers published a paper in 2013 proposing such a barrier. Reid Tingley and colleagues combined information on toad biology, rainfall and the location of water points to show that the scheme has a good chance of working. A barrier of only a few hundred water points in the right location could stop the invasion dead in its tracks, and prevent toads from occupying more than 260,000 km^2 of Western Australia. This is larger than the area of the whole United Kingdom.

The modelling suggested that creating a waterless barrier could work, and conservation organisations and state governments were interested in the proposal. However, Reid and Darren wanted to ask pastoralists and people who know this region firsthand what they thought of the idea. After all, it's easy to 'pretend' to manage water points on a computer by simply deleting them! So they travelled the entire length of the corridor and got feedback on the idea from every local they could find.

Mount Augusta in the Pilbara region, Australia. Most water sources here are artifical (e.g. earth dams) and toads could be blocked from accessing them. If so, toads will not be able to survive in the Pilbara, and the invasion will be halted. Photo: Robyn Jay / Flickr, CC.

Their road trip ended in a meeting in Broome to speak with people who know the country and the reality of getting things done. A wide range of stakeholder groups attended, including academics, NGOs, indigenous groups, and employees from several state and federal government departments. The workshop and trip generated considerable positive feedback about the idea, but perhaps the most promising aspect of the discussions was the realisation that a waterless barrier might create numerous opportunities for 'win-win' situations among environmentalists, pastoralists and indigenous communities. For example, this idea could present an opportunity to improve infrastructure and water usage on pastoral stations, while implementing and monitoring a barrier could provide potential employment opportunities for indigenous ranger groups in the area.

The new information gained at the workshop has changed our understanding of how a barrier would work, and where it should go. However, it hasn't changed the main conclusions of the study – that a waterless barrier could stop the toad advance dead in its tracks, creating a toad-free reserve in the west. In the next few years CEED researchers will continue to collaborate with managers in Western Australia and the federal government to work towards implementation.

Toad barrier surrounding an earth dam (bore water is pumped from underground). When toad barriers are secured around dams, toads cannot get to the water to drink or breed. This will make crossing the desert virtually impossible, because aside from these dams there are very few natural water sources. Because earth dams are managed by people, toad barriers will be easy to include in current and future dam management practices.
Photo: Michael Letnic

CEED contribution to the Red Lists

Biodiversity around the world is in decline. Understanding risks to biodiversity is pre-requisite for effective action to slow rates of loss, secure ecosystem services and manage ecosystems. The International Union for Conservation of Nature (IUCN) Red List of Threatened Species is an effective, credible and universally adopted tool for assessing risks to species. Despite a recognised need, until recently there has been no globally accepted method for assessing risks to biodiversity at the ecosystem level.

On May 20th 2014, during the International Union for the Conservation of Nature's (IUCN) 83rd meeting, held at Gland, Switzerland, the categories and criteria for the identification of threatened ecosystems and the creation of Red Lists of Ecosystems were officially adopted.

This marks the end of a process that started in 2007, led by Jon Paul Rodríguez and David Keith (UNSW), with contributions by many, including CEED researchers Michael McCarthy, Emily Nicholson and Tracey Regan.

The criteria are now in the processes of being applied around the world. Research to test their effectiveness and provide recommendations for their application is now underway by CEED researchers.

IUCN building Switzerland. Photo: www.iucn.org .

Two orangutans in trees, central Kalimantan, Indonesia, Borneo. Photo: Daniel Murdiyarso.

Prioritising reforestation efforts in Indonesia

In 2012, Indonesia broke the record for tropical forest clearing. Stories of the haze from burning forest and peatland blanketing South East Asia are common, and awareness of the economic and health hazards that this creates is growing.

Over 63 percent (82.9 million hectares) of Indonesia's Forest Estate is currently deforested or degraded and many iconic species such as orangutans and proboscis monkeys have become endangered as a result. Indonesia faces a challenge to reduce these environmental effects while achieving development goals for oil palm, timber plantations and energy production. These goals are coupled with increasing industry and international demand and are important for securing economic growth for Indonesia.

The Indonesian government has expressed plans to reforest 2.5 million hectares of previously degraded land annually in conjunction with a reduction in carbon emission by 41 percent by 2020. There is a particular focus on reducing emissions from deforestation and forest degradation.

CEED researchers have become involved by lending expertise in clearly defining and solving land use problems with multiple objectives and constraints. CEED PhD student and Indonesian national, Sugeng Budiharta of The University of Queensland and colleagues have tackled the difficult problem of prioritising reforestation efforts, given the goals of sequestering carbon and restoring biodiversity. This research has identified 400,000 hectares of highly degraded lowland forest in East Kalimantan where restoration would be cost-effective.

One of the more interesting findings in this study revealed highly degraded areas should not be converted to other land uses, such as palm oil. The research instead suggests these areas could be the focus of privately funded ecosystem restoration concessions (ERC) thereby contributing to the Indonesian government's reforestation target (currently only 397,000 hectares of ERC licenses have been granted).

This research has been highlighted in both "*The Jakarta Globe*" and "*Mongabay*" (a highly cited environmental science conservation news site for information on tropical forests, conservation, and wildlife).

Reforestation on the ground. Pesalat Reforestation Project in Central Kalimantan, Indonesia. Photo: World Resources Institute / Flickr, CC.

Theme B: Optimal monitoring

Theme Leader: Dr Jonathan Rhodes, The University of Queensland

Theme B researchers work on how to monitor efficiently and effectively in order to transform optimal monitoring into a central pillar of environmental decision-making and prioritisation. Monitoring is crucial for providing information to make environmental decisions. CEED research focuses on identifying monitoring actions and strategies that provide the greatest environmental outcomes for the lowest cost.

An important area of focus for CEED researchers is the monitoring of threatened species to inform their management and recovery planning. Previous CEED work has informed how much to invest in monitoring species declines and which species to monitor. In a paper by Sean Maxwell, with Eve McDonald-Madden, Jonathan Rhodes and Hugh Possingham, we have extended this to put a financial value on learning about species declines through monitoring for recovery planning. The idea is that this will inform the benefits of investing in monitoring versus investing in management; a fundamental question in conservation science. Looking at one of the most important koala populations in Australia we used information analysis to show that the financial cost of gaining new information about the effect forest cover on declines is actually quite small, only around $85,000; only a very small fraction of the cost required to recover the population. The implications is greater benefits are likely to be gained through management than monitoring this aspect of the decline. Importantly, this is the first study to calculate the financial cost of learning about a threatened species before investing in management actions. The method outlined in our study will help expand the use of value of information analysis in threatened species management and monitoring.

David Lindenmayer has led long-term monitoring research in Victorian wet forests. Many new insights have been derived from this work. As an example, together with Professor Michael McCarthy at the University of Melbourne Node of CEED, detailed empirical analyses has revealed a non-linear relationship between logging history and fire severity. Stands of ash forests 7-40 years post-logging are significantly more likely to burn at high severity than immediately post-logged forests and long uncut forests. This work was published in the journal *Conservation Letters* and has significant implications for forest management and biodiversity conservation in wood production forests, not only in Australia but also in similar fire-prone ecosystems subject to high-severity conflagrations.

CEED research on koala conservation is transforming the way we understand and think about prioritising actions for species declining due to multiple threatening processes. A challenge for the conservation of koalas is that they are widely distributed, and the threats causing declines in different places can be quite different. So there is no 'one size fits all' strategy for successful koala conservation and recovery. Research led by Jonathan Rhodes, is developing new tools for prioritising recovery actions at particular locations while accounting for variation in threats across broad spatial extents. A critical part of this work has been utilising citizen science data to map how threats vary across New South Wales and then incorporating this into prioritisation tools. This is giving us new insights into how we should allocate resources for koalas across their range and what actions to do where.

research on koala conservation is transforming the way we understand and think about prioritising actions for species declining due to multiple threatening processes

At a finer scale, Tal Polak, with Jonathan Rhodes and Hugh Possingham, has developed new methods for optimising how we mitigate the effects of roads on wildlife and has applied this to koalas in southeast Queensland. This innovative work represents the first time that decision theory has been applied to the problem of mitigating the effect of roads on wildlife. Tal's work is now being expanded to account for multiple species and CEED researchers are now working on developing new tools for road planning that link with existing conservation planning software such as Marxan.

Eucalyptus regnans. *Sherwood Forest Victoria*
Photo: Wikipedia CC.

Imperfect detection and literary allusions

Species are often hard to detect in ecological surveys. They might hide from searchers – think of a frog hidden high in a tree. Or seeds of a plant might be present, yet the adult plants themselves might be absent until the seeds germinate. Or for migratory species, individuals might only be present at a site for a short period. How can we be sure that a species is truly, and permanently, absent?

CEED works extensively in the area of imperfect detection because the consequences are profound. Threatened species can remain undetected for years, even being listed as extinct when they in fact persist. These seemingly "extinct" species are sometimes rediscovered, with the moniker of "Lazarus species" alluding to them coming back from the dead. To help estimate the chances of such happy surprises, CEED published a new method to infer the probability that a species is extant given a set of sighting records (Lee et al. 2014).

Some species that are wrongly thought to be extinct might suffer if management to help them were to cease. If this misapprehension and premature cessation of management were to cause their extinction, then they will lose their chance of becoming Lazarus species, and instead run the risk of becoming "Romeo species". Yet we don't want to manage a species indefinitely. For example, we would be unwise to manage in the hope that the dodo was still extant.

Our previous research addressed the balance between the risk of curtailing management too early and managing for a threatened species that is extinct. We have now applied these ideas to invasive species management, but with the risks reversed. In the past, invasive species have been seemingly eradicated and control efforts wound back, only for them to rebound and cause further harm. We might call them "Voldemort species".

Tracy Rout developed this idea of deciding when to declare successful eradication, and applied it to control of foxes on Phillip Island, Victoria (Rout et al. 2014). Foxes threaten little penguins and other island fauna, and managers are attempting to eradicate them. In addition to developing the decision theory for declaring eradication, this specific application has helped the island's managers make substantial further investments in fox control.

Imperfect detection is also relevant at landscape scales, with CEED demonstrating significant understanding of the distributions of species (Lahoz-Monfort et al. 2014). This paper even has its own movie: http://tinyurl.com/sdm-det.

We have also further developed methods to allocate surveillance effort across landscapes (Guillera-Arroita et al., 2014), over time (Moore et al. 2014), and when integrated with other management options (Rout et al. 2014b), building on our previous research. Application and further development of this research has contributed to a body of work on managing invasive willows and hawkweeds in the Victorian alps. Led by our collaborators Joslin Moore, Nick Williams and Roger Cousens, and involving CEED researchers Cindy Hauser and Kate Giljohann, these two projects were awarded the Nancy Millis Science in Parks Award in 2014 (http://parkweb.vic.gov.au/about-us/science-award).

When can you declare invasive foxes eradicated from Philip Island? Photo: Phillip Island Nature Parks.

CEED research, to manage invasive plants within the Victorian Alps environment, was recognised with the award of the Nancy Millis Science in Parks award this year. Photo: Victorian alps, by Mick Stanic / Flickr, CC.

Campbell Island. Photo; Liana Joseph.

Theme C: Socio/ecological analysis and modelling for environmental decision-making

Theme Leader: Associate Professor Sarah Bekessey, RMIT University

This theme recognises that environmental management is, by definition, a social and political process, so responses to environmental problems must focus at least in part on human behaviour and social preferences.

Our researchers build on techniques from a range of disciplines, and develop methods to analyse, model and integrate knowledge about socio-economic and ecological processes to improve environmental decision-making.

Maina Mbui and colleagues have developed a methodology addressing the gap in integrating climate projections and social-ecological vulnerability analyses at scales that matter, affecting local-scale adaptation planning and action. The research shows that it is possible to capture social information and integrate this with climate and ecological modeling in ways that are best suited to address the impacts of climate-mediated environmental changes currently underway across different scales. The Wildlife Conservation Society (WCS) is currently rolling out this methodology to villages in Papua New Guinea as part of their adaptation planning.

David Lindenmayer led a major study of the factors influencing patterns of species co-occurrence associated with long-term landscape transformation in landscapes subject to plantation expansion. The work uncovered new mechanisms linked with patterns of functional diversity and temporal changes of assemblage transformation and landscape transformation. Key studies focused on birds, mammals, reptiles and butterflies. Results were reported in a series of papers on spatio-temporal changes in species diversity, functional diversity and patterns of intra-guild co-occurrence published in *Diversity and Distributions, Journal of Applied Ecology, Ecography, Conservation Biology, Animal Conservation,* and *Biological Conservation*.

Research undertaken by Ascelin Gordon into Market Based Instruments focussing on offsetting provides the first example of the quantitative use of "backcasting" in a conservation context, applying this to NSW and federal offset policies implemented to manage the growth of Sydney into a critically endangered woodland community. Further work explicitly explores issues around baselines and counterfactuals in evaluating the performance of offset policies quantitatively demonstrates the fundamental importance of this issue.

environmental management is, by definition, a social and political process - our research must therefore focus on human behaviour and social preferences within environmental problems

The work undertaken on offset research has led to an invitation to Dr Gordon to be part of the review panel for the "Draft Framework for Biodiversity Assessment for Assessing and Offsetting State Significant Development and State Significant Infrastructure". This important policy document will have significant impacts as it determines the offset requirements of large development and infrastructure projects. Several recommendations have been made for how the policy could be improved to deliver more robust offsets. Submissions were also made to the Senate Environment and Communications References Committee Inquiry into Environmental Offsets.

A novel finding from research undertaken by

Michael Wysong into feral cat and dingoes has been the discovery of habitat segregation between these predators in the central semi-arid region of Western Australia. Understanding this habitat segregation will enable managers to better target feral cat control. His fieldwork has included the capture and GPS collaring of 16 dingoes and 20 feral cats – this represents the largest dataset for concurrently collared dingoes and feral cats in all of Western Australia.

Understanding the mechanisms for change in environmental attitudes and behaviours is key to ensuring conservation in human dominated landscapes. A new collaboration between CEED researcher Georgia Garrard (pictured below) and researchers at Victoria University, looking at the influence of environmental education and engagement on environmental attitudes and behaviour, led to a community event centred on a critically endangered urban grassland and attended by more than 150 people. This event was led by primary school students, presenting on what they had learnt and experienced about the grassland to the broader community.

*Georgia Garrard looking for endangered plant species. Inset - Blue pincushion or native cornflower (*Brunonia australis*) is a perennial herb that grows widely across Australia. It is found in woodlands, open forest and sand plains. Although sometimes difficult to establish, as a very ornamental species, there is good potential for the public to protect and grow this species. Photos: Georgia Garrard.*

Modelling restoration in agricultural landscapes

Landowner decisions about conservation initiatives are influenced by their values, beliefs and social norms. Understanding what drives landowner decision-making and how these decisions impact biodiversity on privately owned land can better inform natural resource management.

In a recent *Biological Conservation* paper "Modelling the benefits of habitat restoration in socio-ecological systems", Sacha Jellinek and colleagues demonstrate how Bayesian Networks can be used to integrate ecological and social data with expert opinion to model the cost-effectiveness of revegetation (for biodiversity) in agricultural landscapes. They demonstrate their approach with a case-study in the grassy woodlands of south-eastern Australia. In this study, cost-effectiveness was defined as the improvement in native reptile and beetle species richness achieved per dollar spent on a restoration action.

Socio-ecological models predict that weed control, the planting of trees and shrubs, the addition of litter and timber, and the addition of rocks are likely to be the most cost-effective actions for improving reptile and beetle species richness. The cost-effectiveness of restoration is lower in remnant and revegetated areas than in cleared areas because of the higher marginal benefits arising from acting in degraded habitats. This result is contingent on landowners having favourable attitudes. Under the best-case landowner demographic scenarios the greatest biodiversity benefits are seen when cleared areas are restored. They found that current restoration investment practices may not be increasing faunal species richness in agricultural landscapes in the most cost-effective way, and that new restoration actions may be necessary.

Integrated socio-ecological models support transparent and cost-effective conservation investment decisions. Application of these models highlights the importance of collecting both social and ecological data when attempting to understand and manage socio-ecological systems.

A skink using log habitat in Thornton, a rural town in Victoria, Australia. Photo: Guido / Flickr, CC.

First-of-its-kind coral community survey database

Together with partners from the Wildlife Conservation Society, Maina Mbui has been part of a team which has led the efforts to compile the first-of-its-kind database of coral community surveys from the Indo-Pacific.

This database provides the first regional snapshot of contemporary coral communities and was developed in a collaborative effort between 90 scientists from government, non-profit and academic sectors.

The database includes over 2500 sites in 50 countries comprising 35,000 coral observations of 397 scleractinian coral species and 93 genera.

This Indo-Pacific coral database will be used to field test a suite of global climate variables and anthropogenic stress models in order to evaluate their predictive ability for coral reefs. The team has establish regional relationships between climate variables and coral community metrics to assess areas vulnerable to climate change vs. climate refuges that may be more resilient to future-ocean warming. In addition, one of the novel metrics being developed is the first test of coral functional diversity – a metric that links coral abundance and species trait information for better predictive responses to climate change. Key contributors met with a leader in functional diversity (David Mouillot, University of Montpellier) at a working group in France in August 2014 to advance these ideas. Importantly, this endeavour has enabled the Indo-Pacific coral community to work together on a collaborative effort to understand and manage for the impacts of climate change and identify relevant climate adaptation options.

Green sea turtle resting on the coral reef in the Indo-Pacific region. Photo: Megan Evans.

Theme D: Ecological theory and processes

Theme Leader: Associate Professor Peter Vesk, The University of Melbourne

Theme D focuses on the ecology of novel ecosystems, fragmented landscapes, and disturbances by looking at various patterns and processes for determining species abundance, distribution and interactions between them and the environment. This theme focuses on four main research directions:

(i) population ecology;

(ii) species traits;

(iii) multi-species interactions; and

(iv) ecosystem resilience and effective ecosystem interventions.

The theme's research provides a critical understanding for managers and policy makers who are involved in the decision-making process.

A major piece of research undertaken by Rachel Standish has produced key findings on how forests around the world are affected by climate change. Around the globe, forests are found to be already undergoing strong changes due to human influence. Degradation of woods due to man-made climate change cannot be ruled out for the future. To understand and improve the resilience of forests, a combination of approaches from small-scale field experiments to large-scale computer simulations can help, according to the studies. Taking a risk perspective, scientists caution that global warming puts additional pressure on some of the most valuable ecosystems on Earth.

In Finland and Australia, scientists performed field experiments on regrowth of forests. A joint Dutch-Finnish team examined how boreal peat bogs can shift to forests and concluded that shrubs can pave the way for greener tree dominated landscapes in the far northern hemisphere. The Australian team studied the timing of seeding and the use of seedlings in restoring sites. Dr Standish's research has shown that adapted restoration practices could help alleviate the negative effects of climate change on reforestation efforts.

how forests around the world are affected by climate change...

Research by Keren Raiter and colleagues on the impacts of mining development in the Great Western Woodlands in Western Australia has led to the development of a framework for identifying a full range of likely impacts, beyond the obvious direct effects of the mine itself. There are many types of ecological impacts that slip 'under the radar' of conventional impact evaluations and undermine the potential for successful impact mitigation (including offsets). These 'enigmatic' impacts include those that are small but act cumulatively; those outside of the area directly considered in the evaluation; those not detectable with normal methods; those facilitated, but not directly caused, by development; and synergistic impact interactions.

Ultimately, it is reasonable to expect a fair accounting process whereby the beneficiaries of development are responsible for the full environmental costs of those developments, including costs that are currently borne by the broader society and future generations. A range of approaches includes no-development and restricted access zones, addressing historical impacts, improving professional and ethical practice and decision-making processes, and adopting environmental insurance schemes.

The research has been presented to a range of stakeholders including government agencies such as the WA Department of Environment and Conservation, mining companies and consultants to both government and the mining industry.

Peat forest in Finland. Photo: Miika Silfverberg / Flickr, CC

Theme D continued

These discussions have led to approaches from mining companies to discuss ways of integrating the research findings into their environmental mitigation and offset activities.

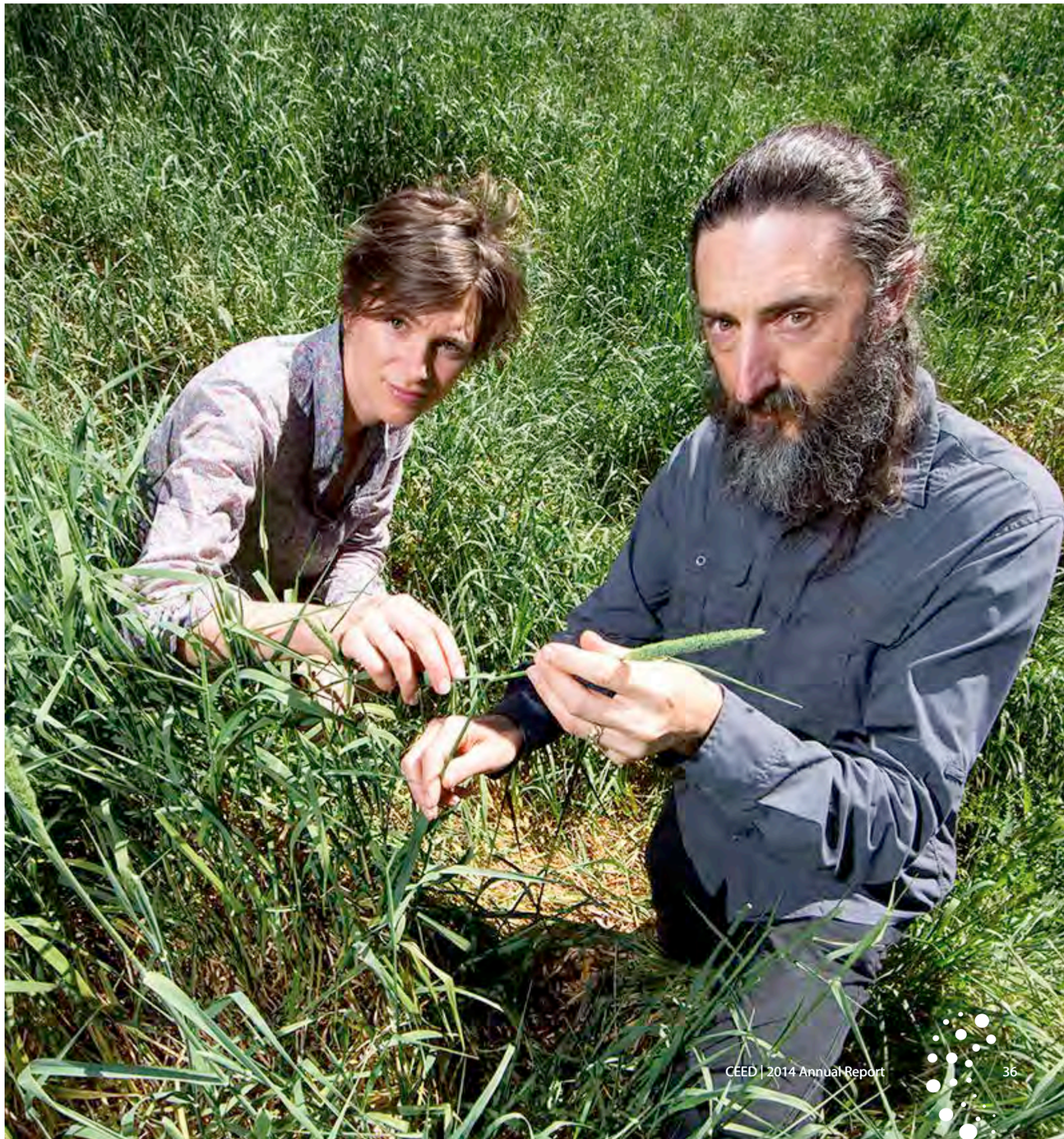
Furthermore, discussions have been undertaken with the Mineral Policy Institute, which is working on mining legacy issues with the Ngadju people, who have recently been granted Native Title for a large portion of the Great Western Woodlands. The Mineral Policy Institute has a focus on empowering communities to protect their rights and respond to mining issues in ways that reduce their negative impacts.

From an on-ground management perspective, the research will also help to inform predator management strategies, and it has already received great interest from the Kalgoorlie regional office of Department of Parks and Wildlife which is interested in incorporating the outcomes of field investigations into their on-ground management practices.

Research led by Don Driscoll highlights that new pasture plants have a high risk of becoming invasive weeds. Globally, over 90 percent of plants developed for pasture are regarded as weeds, and one third are classed as weeds in the country in which they are sold. The study looked at data on pasture species promoted by 17 agribusinesses and government agriculture agencies on six continents, and found that 91 percent of the plants were classified as potentially invasive weeds — often in the same country in which they were developed and marketed. Only one of the 17 agribusinesses had a formal process for identifying possible weeds.

The research suggests solutions for this problem, including making the organisation that promotes the pasture species financially liable for controlling it if it becomes invasive. Featured as a Research Highlight in *Nature*, the paper generated considered media interest and has led to additional published pieces in *The Conversation, ESA Hot Topics* and *Nature*. Correspondence with various government agencies and weed organisations is ongoing, and the work has also been presented in two government policy submissions.

FACING PAGE: Jane Catford with Don Driscoll in a dense sward of canary grass. This species is a known invasive plant but new varieties are still being developed for pasture. Photo: Stuart Hay.



Burning questions for endangered black cockatoos

The gregarious Carnaby's cockatoo (*Calyptorhynchus latirostris*) is such a common sight in Perth that it is easy to forget they are endangered and that the urban and agricultural expansion of south-western Australia has removed the bulk of their habitat. How we manage their remaining habitat will have important consequences for the species' survival.

South-western Australia is a global biodiversity hotspot that has undergone extensive habitat loss from agricultural and urban development. Less than 30 percent of the original vegetation now remains. As a consequence of this habitat loss, the endemic Carnaby's cockatoo has experienced widespread loss of nesting and feeding habitat and is considered endangered under the IUCN Red List, and Australian federal and state legislation.

Leonie Valentine and colleagues have been studying the Carnaby's cockatoo and how their remaining habitat around Perth is managed. Fire management practices influence the availability of food for the cockatoos, particularly seeds produced by Banksia species.

To understand how fire influences food availability in the banksia woodlands, in a recent paper (Valentine et al 2014) we 1) examined how time since fire influences plant and cone densities of the two dominant native woodland food species, *Banksia attenuata* and *Banksia menziesii*; 2) estimated the number of Carnaby's cockatoos that would be supported in different post-fire aged banksia woodlands, and 3) estimated the number of Carnaby's cockatoo that could be supported with the current distribution of post-fire banksia woodland habitat.

Food resources are influenced by time since fire and may be manipulated by altering burning patterns. The research predicted that higher numbers of Carnaby's cockatoos would be supported in vegetation aged between 14–30 years since fire, peaking in vegetation aged 20–25 years. The current distribution of post-fire aged vegetation within this area (>60 percent burnt within the last 7 years) is predicted to support only 25–35percent of the estimated number of birds reliant on the area. Importantly, this would involve retaining greater areas of woodland burned with less frequency. Current fire management is focused, understandably, on human and asset protection as a priority for prescribed burning. If management of landscapes for improved persistence of threatened species is also considered important, then complex trade-offs may have to be considered. The research has proven useful for decisions relating to offsets and as input to population viability modelling.

Male and female Carnaby's cockatoos feeding together. Photo: Ron and Beth / Flickr, CC.

Tiger quolls. Photo: Flickr, CC.

Theme E: Quantitative tools and approaches

Theme Leader: Dr Michael Bode, The University of Melbourne

Theme E focuses on quantitative tools and approaches, extending from fundamental research into mathematical approaches to ecological questions, through to training on-the-ground managers to use decision-support tools. Key elements include a focus on detectability modelling, the IUCN's threatened ecosystems Red List, the project prioritisation protocol scheme and Marxan. In 2014, the team delivered cutting edge quantitative tools, collaborated with managers and undertake training workshops bringing stakeholders together around a shared problem.

Close collaboration between Peter Lane, a statistical scientist, and CEED researchers David Lindenmayer, Martin Westgate and Philip Barton, has resulted in an exciting new method for the analysis of networks of species interactions: Network Association Analysis (NAA).

The method empirically resolves the strengths of interactions between sets of species in an assemblage and the direction (positive versus negative) of inter-species associations. The NAA approach was demonstrated using data gathered over 12 years in the temperate woodlands of south-eastern Australia and that work showed theree are suites of species that have strong negative associations with other species in these environments. Conversely, some species showed strong positive associations with other species and which hence may be useful surrogates of co-occurring species occurrence in woodland ecosystems. The NAA approach is now being applied to a wider range of ecological systems and problems. The software methodology is now widely available in Open Access form.

Research has continued on prioritising government actions and 2014 demonstrated progress in this area. Research undertaken by Joseph Bennett on using species distribution models in conservation provided clear guidance on how to account for spatial autocorrelation in species distribution models, and how multi-scale models are necessary for guiding conservation. Further work on invasive species in fragmented grasslands showed that several key assumptions regarding the role of competition in structuring mixed native/exotic communities are false, whilst research on optimising environmental assessment showed the best way of balancing sample size and taxonomic effort in environmental assessment. Dr Bennett's work on balancing phylogenetic goals and species goals in conservation prioritisation, showing that there does not have to be a trade-off in species-based and phylogenetic goals, has led to NSW now exploring phylogenetic distinctiveness in its PPP equation.

Martina Di Fonzo has been working with Dr Terry Walshe and several staff from Parks Australia to develop an Excel-based tool for prioritising management actions for threatened species conservation across Australia's six Commonwealth National Parks. This easy-to-use Excel tool is a user-friendly method for prioritizing management actions under limited budgets, which could be applied to any situation. The tool has been well-received, with park managers keen to put it to use in order to maximise the expected extant years of threatened species within their parks. It is hoped park managers will use this tool to make better decisions regarding which management actions to fund under a limited budget.

When to put all your bilbies in the same basket

Australia's shy endangered marsupials will have a far better chance of surviving deadly predation by feral cats and foxes if they are kept in several protected areas instead of a single large area, scientists say. Fences are a key strategy in the conservation of threatened native species, particularly in Australia and New Zealand. Australia has more than 37 large conservation fences, enclosing 27 species of bird, marsupial and reptile in more than 35,000 hectares of predator-free habitat. On the Australian mainland, many of these species can no longer be found outside chain-link and electrified wire.

To save the greater bilby, for example, a predator-proof fence was built in Queensland's Currawinya National Park, enclosing 25 square kilometres. State governments and conservation non-governmental organisations (NGOs) such as the Australian Wildlife Conservancy are all planning to extend the use of fenced reserves to protect other endangered terrestrial wildlife.

But what do you do if your fence is too successful? Although these species have been driven to the brink of extinction by cat and fox predation, they are perfectly adapted to the Australian environment.

Once they're protected behind a fence, their numbers can increase dramatically. Where do you put all the excess animals?

*Bilby (*Macrotis lagotis*). Photo: Bernard Dupont, / Flickr, CC*

After a while then, all managers face the same dilemma: do they expand existing successful fence projects, which would be easier and cheaper to manage, or do they set up new fenced areas somewhere else?

Kate Helmstedt, a CEED PhD student who now works at the University of California, Berkeley, showed this year that extra funds should almost always be used to build new, separate fenced areas. This is in stark contrast to the current practice, which is to use money to expand the existing fences in a series of renovations. Separate fences split the risk of catastrophes: protecting our highly vulnerable animals against feral cats, dogs and foxes, diseases, or catastrophes such as fires and floods.

Helmstedt's new method gives clear advice. If the managers can find a suitable location that's within 60km of their existing project, they should build a second fenced area. Fences that are more than 60 km apart cost too much money to manage over the long term. If no suitable locations exist closer than 60 km, then managers should enlarge their existing fence.

How effective is shorebird disturbance enforcement?

Shorebirds at Roebuck Bay, WA. Photo: Rob Clemens

Kiran Dhanjal-Adams collaborated with Marine Parks, measuring the effectiveness of shorebird disturbance enforcement. Results have been written up and recommendations made and implemented for more cost-effective management options. By measuring enforcement effectiveness, Kiran and the team have provided Marine Parks with a portfolio of cost-effective sites for management, providing greater information supporting decisions on where to manage.

Fire at sea!

Fire ants invade Ashmore Reef Marine Reserve

Island ecosystems contain a disproportionately large amount of the world's biodiversity, and consequently, a significant amount of conservation effort is directed towards them. One of the greatest threats to these ecosystems is the presence of invasive species, and island eradications of invasive species are now commonplace. However, there is currently a lack of mathematical modelling used in planning these eradications.

Christopher Baker, a PhD researcher at The University of Melbourne, has developed a mathematical framework for assessing and optimising resource allocation throughout an eradication project. Working with colleagues from Monash University, Rohan Clarke and Jarrod Hodgson, and the School of Mathematics and Statistics at the University of Melbourne, Elena Tartaglia, the framework has been applied to the proposed tropical fire ant (*Solenopsis geminata*) eradication at Ashmore Reef Commonwealth Marine Reserve in the Timor Sea. This work forms an important part of an eradication plan currently being considered by the Australian Government.

The framework incorporates two dependant models, a population model and a detection model, and recommendations from this work span the eradication project.

As with any invasive species control project, there are multiple methods; in this case there were two bait options: toxin and insect growth regulator (IGR). IGRs were initially the favoured option, but the population model showed that without the use of toxin, the probability of eradication would be zero. Following the baiting phase of the project, eradication needs to be confirmed. The detection model is able to estimate the probability of eradication, taking into account the baiting schedule, population dynamics and search effort. This model was also able to show that the use of detector dogs is likely to be a more cost-effective way to search for ants than using only the more traditional lure-detection method.

This framework has broad applicability to invasive species management projects and is an important example of how to use modelling to help plan these high-profile conservation projects.

Fire ants are now living on West Island, part of the Ashmore Reef Marine Reserve, Timor Sea. Photo: Jarrod Hodgson.

Bringing researchers together

The bringing together of scientists from across disciplines and from across the globe, plays a key part in the integration and synthesis of CEED research in order to achieve the most effective outcomes and the most up-to-date science on the challenges we face.

In 2014 CEED undertook 32 of these high-level, integrative workshops, bringing together 493 scientists, managers and practitioners from around the world. These opportunities to bring together the bright minds to work on these challenges are considered to be one of the success stories by both CEED researchers and the participants.

CEED Planning Meeting. Photo: David Salt.

Leadership training program. Photo: Colleen Corrigan.

The opportunity to share progress, challenges and possible solutions is considered to be extremely valuable, and leads to ongoing collaborations between conservation practitioners and scientists nationally and internationally.

During this year, some of the key outputs and outcomes from these workshops have included:

- Bringing together lead scientists from around the world across disciplines to tackle some of the challenges and big issues on conservation science and environmental decisions
- A large number of peer reviewed journal publications
- Continued collaborations across research, policy and management
- Development of guidelines explaining where to start and how to implement adaptive management in reintroductions and ex-situ programmes.
- Broad agreement on a general framework that sets out the keys elements required to set decision thresholds, that would fit within the monitoring, evaluation and adaptive management frameworks already in place within agencies.

Our workshop at Lamington National Park, 'Reconciling the triple bottom line of social equity, economic return, and environmental benefits in conservation'. Photo: Christopher Brown.

Workshops

bringing government, science, community and non-government organisation experts together to develop better ways to solve environmental problems

Facing west – coral reefs of Western Australia workshop developed an outline for further analyses and figures to discuss how observed patterns relate to thermal stress events by defining goals for the coral reef conservation targets on large spatial scales and optimal ways of critically informing current marine park management.

Dr Maina Mbui (1st on the left) & attendees at Facing West.

Context matters – the case for integrating socio-economics into urban ecosystem services looked at an actionable approach for a conceptual foundation on how to incorporate socio-economics into urban ecosystem services specifically aiming to enhance the effectiveness of city planners and management efforts to bring ecosystem services to a city's residential zones.

Developing robust and defensible decision thresholds for management actions led discussions that revealed decision thresholds can take many different forms and looking at ways to overcome operational barriers by developing an approach that could be more widely used across a number of contexts.

Reid Tingley and colleagues travelled across the Kimberley and gave the workshop 'Halting the spread of cane toads in WA'.

Halting the spread of cane toad in Western Australia considered the use of waterless firebreaks to halt their spread and identified a need to refine the maps of water bodies while reviewing the modelling for future management actions of this process, including a cost-effective component for planning.

The role of multi-country collaboration in conservation in the Western Indian Ocean region examined spatial options when maintaining fish biomass at a level where yields are high, that would also prevent the undermining of ecosystem exploitation for conservation practitioners.

Adaptive management for species conservation along the captive-wild spectrum workshop functioned to clarify the importance of conserving adaptive management as part of the broader structured decision making (SDM) framework and commenced work on producing a set of guidelines for its implementation.

Integrating human response to climate change into conservation planning. During this workshop held at UQ in September a large panel of national and international attendees have discussed of the importance of a holistic approach to climate change adaptation and assessed different ways of integrating the human response to climate change into conservation planning.

Dr Ramona Maggini (seated, 2nd from right) and attendees at the Integrating human response to climate change into conservation planning.

Managing invasive birds wisely addressed challenges among species interactions in the avian invasion process, impacts and the efficiency of control measures with a specific focus on bird invasions on islands and their potential implications relating to managing alien invasive birds on islands.

Professor Salit Kark (second from left) and her research group organised the Managing Invasive Birds Wisely workshop in Canberra.

2014 workshops

WORKSHOP NAME	Event date 2014	Venue location	Attendees
Biodiversity metrics and game theory	5 - 6 February	University of Queensland	9
CEED workshop on SNAP proposal	7 February	University of Queensland	5
Urban Ecology - progressing collaborative projects	10 - 12 February	University of Queensland	5
Quantifying and detecting declines in wild populations	10 - 12 February	University of Queensland	11
Marine conservation planning in a changing world	17 - 19 February	Stradbroke Island	16
Role of urban context in ecosystem services	24 - 25 March	University of Queensland	7
Trade-offs between the (Co-)benefits of carbon farming	31 March - 2 April	CSIRO Boggo Road	17
Adaptive management for species conservation along with the captive-wild spectrum	1 - 4 April	University of Melbourne	10
Socio-economics and recreational services in Brisbane's parks	14 - 15 April	University of Queensland	6
Species distributon modelling training course	28 April - 2 May	University of Mebourne	38
Halting the spread of invasive cane toads in Western Australia	15 May	Broome Western Australia	23
Integrating climate adaptation plan into spatial planning of coral reef biodiversity conservation in Western Australia	15 May	University of Western Australia	20
Western indian ocean continental and island states cross-boundary collaboration in conservation planning	19 - 20 May	University of Queensland	7
Managing invasive alien birds wisely: addressing the challenges	4 - 6 June	The Australian National University	14
Marxan Introduction and Marxan Train the Trainer Course	23 - 25 June	University of Queensland	20
Managing Networks for Biodiversity and Ecosystem Service Benefits	26 - 27 June	Paris, France	9
SNAP Working Group	22 - 24 July	University of Queensland	5
Managing invasive species wisely - Part 2 writing workshop, invasions in islands and lags	23 - 25 July	Stradbroke Island	2
CEED Workshop on Bridging Scales and Complexities for Conservation	5 - 8 August	Monterey, United States	16
Urban Ecology - progressing collaborative projects (workshop 2)	14 - 15 August	RMIT University	3
Applying complexity theory and systems thinking to improve the effectiveness of evaluations for conservation	26 - 29 August	Imperial College London	12
Integrating human responses to climate change into conservation planning	8 - 10 September	University of Queensland	16
Reconciling the triple bottom line of social equity, economic return, and environmental benefits in conservation	22 - 24 September	University of Queensland	9
Strategies to support both biodiversity and production in agricultural landscapes	3 - 4 November	Brisbane, Australia	46
CEED Environmental Leadership Training Program 2014-2015	3 - 7 November	University of Queensland	37
Conservation and Management priortisation for threatened and invasive species on Australian islands and mainland islands	6 - 7 November	University of Queensland	8
Marxan Introduction and Marxan Train the Trainer Course	17 - 19 November	University of Queensland	9
Horizon Scanning Workshop with Parks Australia	25 November	Canberra	25
Metrics for biodiversity accounting and policy	26 - 28 November	University of Queensland	12
The Psychology of Communicating Environmental Science Effectively	27 November	University of Queensland	61
Joint CEED and Tansley working group meeting	9-11 December	Imperial College	11
What factors influence high-level environmental decisions?	10 December	Melbourne	9

our legacy

the lasting legacy of our knowledge and practice

Marshall Islands. Photo: Maria Beger

Photo: Jeremy Ringma.

Leadership Program (2014-15 cohort)

Payal Bal	Megan Evans	Hannah Pearson
Martina Di Fonzo	Claire Foster	Stephanie Pulsford
Ramona Maggini	Luke Kelly	Gerry Ryan
Morena Mills	Matthew Mitchell	Jeremy Simmonds
Nathalie Butt	Sam Nicol	Tanja Straka

Leadership trainees and trainers. Photo: Colleen Corrigan.

Cultivating our next generation of environmental leaders

Support of early career researchers is a cornerstone of CEED.

During 2014, early career researchers were supported through four key initiatives: (i) integrated research workshops; (ii) early career research travel grants; (iii) leadership program; and (iv) PhD scholarship top-ups.

CEED's highly interactive **Centre Workshops** provide a unique form of mentoring and integration across the various nodes. They have been very successful at building cohesion – in 2014 32 workshops were held with more than half driven by early career researchers.

The **early career research travel grants** provide opportunities for ECRs to build their networks nationally and internationally and to work with some of the leading researchers in environmental decisions. It also provides opportunities for international early career researchers to visit Australia and work with CEED researchers at the nodes. During the year, 17 early career researchers benefitted from this scheme (14 national and 3 international). Since its inception, 54 Australian-based and 29 international early career researchers have used the opportunities to develop networks, hone skills and finesse their research agendas.

The **PhD scholarship top-ups** under CEED have provided the Centre with a cohesive group of the next generation of environmental decision scientists and managers. The top-up scheme is a cornerstone of building our legacy. During the year, 14 students benefitted from this scheme. These PhD students contribute substantially to CEED's research program and are another major legacy, providing quantitative ecologists to many academic, government and industry sectors.

Lastly, the introduction of the new **Leadership Program** met with success during its first year in 2014. The program concept was generated at the 2013 CEED Biannual Conference at the University of Queensland. A small group of participants with a keen interest in the principles and practice of leadership formed a focus group to explore the topic in depth, discussing personal experiences and brainstorming ideas about how this important area could be examined further in the CEED network. Thus the seed for this enterprise was first planted by CEED. Since most leadership programs are located in Europe and the US, or run through private sector companies, creating an opportunity for CEED students and staff in this hemisphere was deemed important.

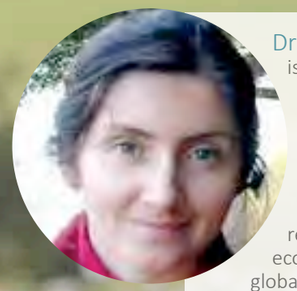
The program was designed in its pilot year (2014-2015) and comprised a 14-person cohort including PhD students in their second year and postdocs representing almost all CEED nodes. This audience was selected because the timing of training would benefit their career options shortly after completion of the program. The CEED program aims to maintain a balance between the theories and practice of environmental leadership development, and flexibility for participants already committed to their studies. The first cohort began their program with a week of intensive leadership training in November 2014. The week saw participants being mentored and trained by external experts as well as senior researchers from across the nodes. During the week participants covered topics including: media training; facilitation training; career strategy mentoring; skills transfer; discussing ideas with invited experts.

The program will entail additional gatherings of the cohort, focused skill training events, and cohort-designed activities that foster team leadership development as well as personalised action plans for self-assessment and growth. Special guest speakers for the week-long event included: Dr Peter Cosier, Wentworth Group; Dr Simon Ferrier, CSIRO; Dr Nick Heath, WWF; Professor Paul Meredith, The University of Queensland; Dr Sally Troy, Australian Federal Government (Department of Agriculture, Fisheries and Forestry); Professor Helene Marsh, James Cook University; Professor Mike Young, Adelaide University; Kent Redford (WCS) and Dr James Watson (WCS), and; Senator Larissa Waters, Greens Senator.

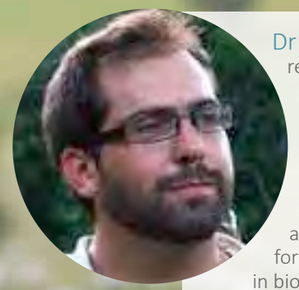
Tall poppies

the next generation, making a difference

Our early career researchers are already producing results and being invited to participate in national and international forums as experts in their fields. Below are some of the highlights from our next generation.

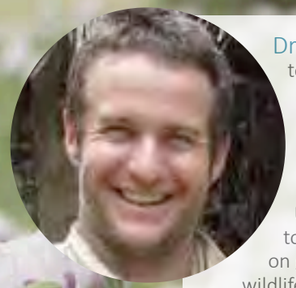


Dr Maria Martinez Harms is a co-author of a handbook chapter for the Group on Earth and Biodiversity Observations Network (GEO BON) that is currently in review process. This chapter addresses basic requirements for monitoring ecosystem services at the global scale. She has also been a contributing author for the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services IPBES thematic assessment on pollinators and pollination. This chapter reviews possible responses to the risks and opportunities associated with pollinators and pollination.



Dr Oscar Venter has recently joined an expert panel for the newly created Quick Response Biodiversity Fund to provide real-time assessments of land acquisition proposals. The panel's goal is to rapidly and fairly evaluate proposals for potential land purchases in biologically important areas of the developing world. The panel offers a unique opportunity to apply scientific knowledge and approaches to directly influence and improve the disbursement of funds for acquisition of conservation land globally.

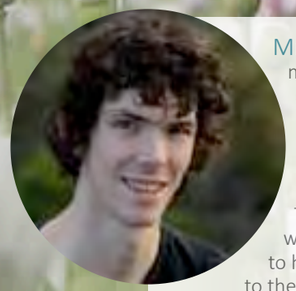
Dr Georgia Garrard has been involved in a collaboration looking at the influence of environmental education and engagement on environmental attitudes and behaviour. This led to a community event centred around a critically endangered urban grassland, attended by more than 150 people.



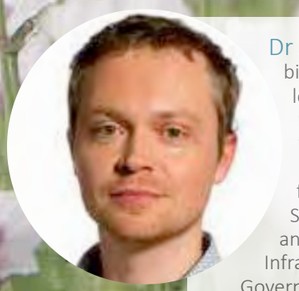
Dr Duan Biggs continues to take an active role in international conservation policy discussions on combatting the illegal trade in wildlife. He was invited by the IUCN Sustainable Use and Livelihood's Group to synthesise their session on governance and the illegal wildlife trade at the World Parks Congress in Sydney in November 2014. This has been followed with numerous requests for his expertise, and in 2015 he will serve as the scientific coordinator and planning committee member for a high level symposium on 'Beyond Enforcement: Communities, governance, incentives and sustainable use in combating wildlife crime'. This symposium will be held in South Africa and promises to be influential in the debate on how to better manage the threat of the illegal wildlife trade.

Duan was also an invited presenter at the IUCN World Parks Congress 2014.

Dr Jose Lahoz-Monfort and colleagues' work on vegetation and kangaroo management is now being used to set the guidelines for an adaptive management approach to be adopted by Parks Victoria at Wyperfeld National Park.



Mr Chris Baker has made major inroads into developing models to help improve the plan for the eradication of tropical fire ants from Ashmore Reef. The eradication plan, which was altered due to his work, was submitted to the Department of the Environment during the year.



Dr Ascelin Gordon's biodiversity offset research led to him being invited to undertake a review of the "Draft Framework for Biodiversity Assessment for Assessing and Offsetting State Significant Development and State Significant Infrastructure" for the NSW Government. This is important policy that will have significant impacts as it determines the offset requirements of large development and infrastructure projects. He has made several recommendations for how the policy could be improved to deliver more robust offsets.

Photo: Morguefile CC.

Student members

NAME			Thesis title	Supervisors
Anna Backstrom	RMIT	PhD	Benefits of the novel ecosystem concept for environmental management in highly modified systems	Sarah Bekessey, Georgia Garrard
Christopher Baker	UM	PhD	Optimising invasive species management	Michael Bode, Michael McCarthy, Steve Carnie
Payal Bal	UQ	PhD	Biodiversity indices for monitoring and managing ecosystems	Jonathan Rhodes, Eve McDonald-Madden, Ayesha Tulloch
Sana Bau	UM	Phd	Reconciling value judgements and evidence-based decision making theory in conservation	Michael McCarthy, Terry Walshe
John Baumgartner	UM	Phd	Robust prediction and decision strategies for managing extinction risk under climate change	Brendan Wintle, Tracey Regan
Laurence Berry	ANU	PhD	The ecology of fire refuges in the Mountain Ash Forests of the Victoria Central Highlands	David Lindenmayer, Don Driscoll, Sam Banks
Tom Bird	UM	Phd	Novel methods to account for individual heterogeneity in capture-recapture studies	
Sugeng Budiharta	UQ	PhD	Systematic planning for the rehabilitation of degraded tropical forests: Scenarios for optimum allocation of REDD + in Indonesia	Kerrie Wilson, Hugh Possingham, Peter Erskine and Erik Meijaard
Hernán Caceres Escobar	UQ	PhD	Prioritisation of action for invasive alien mammals in Australia	Salit Kark
James Camac	UM	PhD	Climate change and trajectories of vegetation change in an alpine heathland	Peter Vesk
Abbey Camaclang	UQ	PhD	Critical habitat definition and identification for threatened and endangered species	Hugh Possingham, Tara Martin, Martine Maron
Stefano Canessa	UM	Phd	Using decision theory to improve the management of reintroductions in conservation biology	Kirsten Parris
Xyomara Carretero-Pinzón	UQ	PhD	Fragmentation effects of primate community in a fragmented area at Colombian Llanos	Jonathan Rhodes, Thomas Defler, Clive McAlpine
Kate Cranney	UM	Masters	Monitoring monitoring: refining Ecological Outcomes Monitoring within Bush Heritage Australia reserves.	Brendan Wintle, David Duncan, Libby Rumpff
Hugh Davies	UM	Phd	Managing fire to preserve northern Australia's declining small mammals	Brett Murphy, Michael McCarthy
Katrina Davis	UWA	PhD	Improving management of marine resources in Chile	David Pannell, Steve Schilizzi, Marit Kragt
Kiran Dhanjal-Adams	UQ	PhD	Conserving migratory birds	Richard Fuller, Karen Mustin, Hugh Possingham

NAME			Thesis title	Supervisors
Aaron Dodd	UM	Phd	Strategies for Optimal Investment in Post Border Plant Biosecurity	Mark Burgman, Michael McCarthy, Nigel Ainsworth
Naomi Evans	UQ	PhD	Managing trade-offs in human-wildlife conflict and conservation value: a case study of Fraser Island dingoes	Gregory Bazter, Jonathan Rhodes, Yvonne Buckley, Hazel Parry
Dini Fardila	UM	PhD	Relating landscape metrics to ecological processes for spatial planning and management of birds in fragmented habitat	Michael McCarthy, Luke Kelly
Michelle Freeman	UM	PhD	From little things big things grow- How do trees succeed in Australian savannas?	Brett Murphy, Peter Vesk, Garry Cook, Anna Richards
Veronica Gama	UQ	PhD	Are migratory birds more threatened than non-migrants?	Hugh Possingham, Richard Fuller, Morena Mills, Milton Ribeiro
Eduardo Gallo Cajiao	UQ	PhD	How effective is the international regime for the conservation of migratory shorebirds in the East Asian Australasian flyway	Richard Fuller, Salit Kark
Katherine Giljohann	UM	PhD	Optimal fire management for biodiversity conservation in fire-prone landscapes	Tracey Regan, Michael McCarthy, Luke Kelly
Elise Gould	UM	Masters	Making do with what you've got: optimally allocating grassland management resources	Peter Vesk, Libby Rumpff
Kate Grarock	ANU	PhD	Introductions, spread, impact and control of the common Myna (*Actidotheres tristies)*	David Lindenmayer, Chris Tidemann, Jeff Wood
Angela Guerrero-Gonzalez	UQ	PhD	Accounting for the links between social and ecological systems for effective nature conservation.	Kerrie Wilson, Ryan McAllister, Jonathan Corcoran
Valerie Hagger	UQ	PhD	The costs and success of revegetation and the potential for achieving multiple outcomes for carbon and biodiversity	Kerrie Wilson, John Dwyer, Hugh Possingham
Chris Hallam	UM	PhD	Investigating biodiversity metrics across multiple scales and disciplines	Brendan Wintle, Emily Nicholson
Yi Han	UQ	PhD	Modelling the effects of invasive species eradication on other interacting species in an ecosystem context.	Eve McDonald-Madden, Yvonne Buckley, Justine Shaw, Hugh Possingham
Jeffrey Hanson	UQ	PhD	The relationship between niche breadth and geographic range size and using niche theory to inform conservation practices	Richard Fuller, Jonathan Rhodes
Mat Hardy	RMIT	PhD	The use of decision theoretic approaches to improve private land conservation	Sarah Bekessy, Ascelin Gordon, James Fitzsimons

student members continued

NAME			Thesis title	Supervisors
Brett Howland	ANU	PhD	Kangaroo grazing effects of biodiversity	David Lindenmayer, Adrian Manning, Ascelin Gordon
Decky Indrawan Junaedi	UM	Phd	Examining traits - abundance relationship: using trait as an approach toward risk assessment and invasion ecology studies in the tropical natural forest ecosystem	Mark Burgman, Michael McCarthy, Jane Catford
Kendal Jones	UQ	PhD	Planning for the impacts of land uses on coral reef fisheries under different climate scenarios	James Watson, Carissa Klein, Hugh Possingham
Geoffrey Kay	ANU	PhD	Use of agri-environment schemes for conservation of reptile fauna in a critically endangered ecosystem	David Lindenmayer, Don Driscoll, Saul Cunningham, Wade Blanchard
Claire Keely	UM	Phd	Conservation genetics of the growling grass frog in an urbanising landscape	Kirsten Parris, Geoff Heard
Christine Kershaw	UWA	PhD	Integrating decision support tools into NRM	David Pannell, Allan Curtis, Sally Marsh
Alex Kusmanoff	RMIT	PhD	How message framing influences environmental decision	Sarah Bekessy, Ascelin Gordon, Fiona Fidler
Bill La Marca	UM	Masters	Modelling Species Distributions and Conservation Priorities for Small Mammals on the Tiwi Islands	Brendan Wintle, Emily Nicholson, Brett Murphy, Tracey Regan
Elizabeth Law	UQ	PhD	Trading carbon, biodiversity, and livelihoods. A landscape scale analysis of ecosystems services and trade-offs in land-use policy	Kerrie Wilson, Brett Bryan, Thilak Mallawarrach, Paul Dargusch
Juliana Lazzari	ANU	PhD	Malee reptiles, fire adn habitat fragmentation	Don Driscoll, David Lindenmayer, Geoff Cary, David Keith
Greg Lefoe	UM	Masters	A Structured Decision Making approach to invasive plant management	Libby Rumpff
Darren Le Roux	ANU	PhD	Maintaining and perpetuating resources associated with mature trees for wildlife in modified landscapes	Philip Gibbons, Karen Ikin, David Lindenmayer, Adrian Manning
Hsien-Yung Lin	UQ	PhD	Designing reserves system that connect freshwater and marine system: diadromous fish conservation in Australian coastal areas	Hugh Possingham, Chris Brown, Simon Linke, Richard Fuller
Azusa Makino	UQ	PhD	Conservation planning for coral reefs threatened by runoff and climate change	Hugh Possingham
Liz Martin	UM	Masters	Borrowed Information: predicting rare species distributions with multispecies models	Michael McCarthy, Gergia Garrard, William Morris
Maria Martinez-Harms	UQ	PhD	Conservation planning for Ecosystem services in the system of natural protected areas of Chile.	Kerrie Wilson, Brett Bryan, Jonathan Rhodes, Hugh Possingham
Fleur Maseyk	UQ	PhD	Managing natural capital stocks for the provision of ecosystem services	Hugh Possingham, Alec Mackay, Yvonne Buckley, Marit Kragt
Sean Maxwell	UQ	PhD	Edological, social and economic factors for conservation decision making: what should we learn about and when	James Watson, Jonathan Rhodes, Eve McDonald-Madden
Jane McDonald	UQ	PhD	Accounting for Biodiversity and Ecosystems - Putting a number on nature to build environmental accounts	Hugh Possingham, Kerrie Wilson, Philip Gibbons, David Pannell
Jennifer McGowan	UQ	PhD	Benchmarking reef health of spatial conversation	Hugh Possingham, Carissa Klein, Maria Beger
Kimberley Millers	UM	PhD	Searching for the stars: assessing the monitoring and management of the invasive seastar, Asterias amurensis in Victoria (Australia)	Michael McCarthy, Jan Carey
William Morris	UM	PhD	The value of information for vegetation management.	Peter Vesk, Hugh Possingham, Michael Runge
Courtney Morgans	UQ	PhD	Population level modeling of orangutans in East Kalimantan and the evaluation of strategies for their protection	Kerrie Wilson
Laura Mumaw	RMIT	PhD	Biodiversity decision making and stewardship in urban neighbourhoods	Sarah Bekessy, Cecily Maller
Will Neal	UM	PhD	Assessing the value of phylogenetic data for conservation planning	Peter Vesk, Heini Kujala and laura Pollock
Wendy Neilan	ANU	PhD	Birds and bats in a temperate production landscape	David Lindenmayer, Philip Barton, Clive McAlpine
Estibaliz Palma	UM	PhD	Plant invasion ecology: seeking for generalization through species traits	Jane Catford, Peter Vesk
Hannah Pearson	UM	PhD	Of woodlands and birds: how terminology effects our inferences	Michael McCarthy, Libby Rumpff, Cindy Hauser, Georgia Garrard
Michaela Plein	UM	PhD	Assessing and managing interacting species at risk of coextinction	Peter Vesk, Melinda Moir, Michael Bode, Michael McCarthy
Tal Polak	UQ	PhD	Conservation decision science	Hugh Possingham
Stephanie Pulsford	ANU	PhD	Improving connectivity of poor dispersing reptiles, frogs and invertebrates in south-east Australian grazing landscapes.	Don Driscoll, David Lindenmayer, Alessio Mortelliti
Alina Pung	UM	Masters	Trade offs in fire management between people and avian biodiversity.	Michael McCarthy, LUke Kelly
Keren Raiter	UWA	PhD	Mitigating mining's enigmatic ecological impacts in Australia's Great Western Woodlands	Richard Hobbs, Hugh Possingham, Suzanne Prober, Leonie Valentine

student members continued

NAME			Thesis title	Supervisors
Laura Rayner	ANU	PhD	The status and conservation of woodland birds in the Australasian Capital Territory	Adrian Manning, Philip Gibbons, David Lindenmayer
Jeremy Ringma	UQ	PhD	Improving the outcomes of multi-species translocations in Australian mammals	Richard Fuller, Anne Goldizen, Diana Fisher, David Roshier
Finlay Roberts	UM	Masters	Multiple objectives of fire management	Brett Murphy, Libby Rumpff
Andrew Rogers	UQ	PhD	Avian community response to invasion by non native species	Salit Kark, Berndt Van Rensburg
Lucy Rose	UM	Phd	Prioritisation tools for wetland management and biodiversity conservation	Mark Burgman, Brendan Wintle, Yung Chee, Kay Morris
Rebecca Runting	UQ	PhD	Managing synergies and trade-offs among natural capital assets and ecosystem services under global change	Jonathan Rhodes, Brett Bryan, Hugh Possingham
Gerard Ryan	UM	PhD	Birds in the Sky, Fish in the Sea, Money in the Bank: Quantitative Methods for More Effective Conservation	Michael McCarthy, Emily Nicholson
Kylie Sloanes	UM	PhD	Evaluating the success of road-crossing mitigation for arboreal mammals: how does monitoring effort influence the detection of population-level effects?	Rodney van der Ree, Peter Vesk, Michael McCarthy
Adam Smart	UM		Optimal detection of an aquatic invader using environmental DNA	Michael McCarthy, Reif Tingley
Brigette Sommer	UQ	PhD	Dynamics of marginal coral communities along the eastern Australian coastline, and their potential to act as refugia during climate change.	John Pandolfi, Maria Beger, Russell Babcock, Peter Harrison
Darren Southwell	UM	PhD	Optimal management of populations across space and time	Michael McCarthy, Brendan Wintle, Eve McDonald-Madden
Tom Stephens	UM	Masters	Rules of thumb for optimal management of metapopulations	Michael McCarthy
Zoe Steven	UM	Masters	Can feedback improve the accuracy of visual estimates of cover abundance	Peter Vesk, David Duncan
Tanja Straka	UM	PhD	The shared habitat - Wetlands for wildlife and people in cities	Brendan Wintle, Rodney van der Ree, Dave Kendall, Lindy Lumsden
Andres Surarez Castro	UQ	PhD	Species richness and functional trait diversity under a land use intensification context: developing ecological indicators of ecosystem's service delivery capacity	Jonathan Rhodes, Martine Maron, Matthew Mitchell
Freya Thomas	UM	PhD	The generation and generalisation of plant functional traits in fire-prone communities	Peter Vesk
Vivitskaia Tulloch	UQ	PhD	Managing threats to land and sea ecosystems to balance multiple objectives	Hugh Possingham, Chris Brown, Carissa Klein, Eva Plaganyi
Els Van Burm	UM	PhD	Optimal monitoring for environmental manageme	Michael McCarthy, Gurutzeta Guillera-Arroita, Brendan Wintle
Rosanna van Hespen	UM		Designing a camera trap arrangement to monitor fox abundance in the mallee	Brendan Wintle, Libby rumpff, Cindy Hauser, Jos
Ruben Venegas Li	UQ	PhD	Effectiveness of trans boundary collaboration in systematic and spatial marine conservation planning and prioritisation in the Coral Triangle and at global scales	Salit Kark
Casey Visintin	UM	PhD	Wildlife Collisions with Linear Infrastructure: Modelling, Management and Mitigation	Michael McCarthy
Saras Windecker	UM	PhD	Applying the response and effect trait framework to wetland restoration ecology	Peter Vesk, Jane Catford
John Weiss	UM	PhD	Do locusts seek greener pastures? An evaulation of MODIS Vegetation Indices for predicting locust presence and abundance.	Michael McCarthy, Kim Lowell
Matt West	UM	PhD	Evaluating the response of frogs to multiple threats.	Michael McCarthy
Michael Wysong	UWA	PhD	Understanding the mechanisms between feral cat and wild dog interaction in the arid rangelands of Western Australia	Richard Hobbs, Leonie Valentine, Neil Burrows, Euan Ritchie
Ding Li Yong	ANU	PhD	Influences of space, time and conservation contexts on the application of taxonomic surregates	David Lindemayer, Philip Barton, Saul Cunningham

Engaging with others

Seabirds. Photo: K Gillow.

Engaging with policy-makers, decision-leaders and communities

CEED has a proven track record in delivering environmental policy and management outcomes, and our researchers work with a diversity of end-user groups from local government and regional bodies to non-government organisations and civil society. Key to this success has been the communication and engagement platforms which underpin the research.

Public engagement:

Our engagement with the public includes the participation at and organisation of public events:

- Conferences
- Public lectures
- Workshops
- Community events
- Book launches

Media:

Information, tools and knowledge produced by CEED researchers for key stakeholders and audiences is regularly disseminated through various platforms including:

- CEED website (www.ceed.edu.au).
- *Decision Point* magazine (www.decision-point.com.au).
- CEED produces a weekly newsletter called Dbytes that goes to researchers, policy makers and managers
- Social media platforms: Facebook, YouTube and Twitter.
- News media (internal and external, national and regional).

Policy submissions:

Several policy submissions and recommendations have been made throughout the year including:

- The Centre Director, Hugh Possingham has been involved in the **NSW Biodiversity Legislation** which has provided extensive recommendations to the Minister for Environment in NSW. This involved many meetings over 6 months in late 2014.
- Production of the report Maron M., Gordon A. (2014) Peer Review of the **Draft Framework for Biodiversity Assessment for Assessing and Offsetting State Significant Development and State Significant Infrastructure** in New South Wales. Report to the NSW Office of Environment and Heritage, Sydney. 36 pages.
- Submission to the **House of Representatives Standing Committee on the Environment Inquiry** into streamlining environmental regulation: Hardy M., Kusmanoff A., Gordon A., Mumaw L., Backstrom A., Cooke B., Garrard G., Ives C., Meiklejohn D., Oke C., Torabi N., Bekessy S. (2014) Submission to the House Standing Committee on the Environment Inquiry into streamlining environmental regulation, 'green tape', and one stop shops. 9 pages.
- Submission to the **Senate Environment and Communications References Committee Inquiry into Environmental Offsets**: Gordon A., Hardy M., Mata L., Garrard G., Kusmanoff A., Bekessy S. (2014) Submission to the Senate Environment and Communications References Committee Inquiry into Environmental Offsets. 5 pages. Available at http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Environmental_Offsets/Submissions (submission number 34).

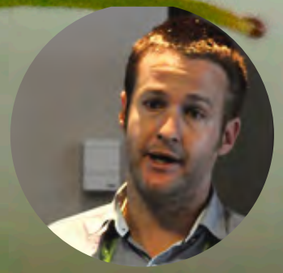
Researchers and managers share views on the natural and economic values of box-gum grassy woodlands in NSW. Photo: David Salt.

Our voices

tune in to our community

Prof David Lindenmayer talks with Richard Fidler about his life and work as an ecologist. Conversations with Richard Fidler on ABC Local Radio. Broadcast 18 March 2014. Photo: ABC Local

Assoc Prof James Watson speaks with the Wildlife Conservation Society in a video about how just a fraction of the global military budget could be enough to effectively manage the world's conservation reserves.



Dr Duan Biggs presenting at the IUCN World Parks Congress 2014, a major international conference with over 5000 delegates. Photo: IISD Reporting Services 2014

Dr Georgia Garrard organised a community event centred around a critically endangered urban grassland attended by more than 150 people.

Dr Amy Whitehead shares her life as a researcher at Antarctica in the video 'Antarctica: no ordinary place, no ordinary assignment'. Produced by Air New Zealand & National Geographic, broadcast 12 March 2014.

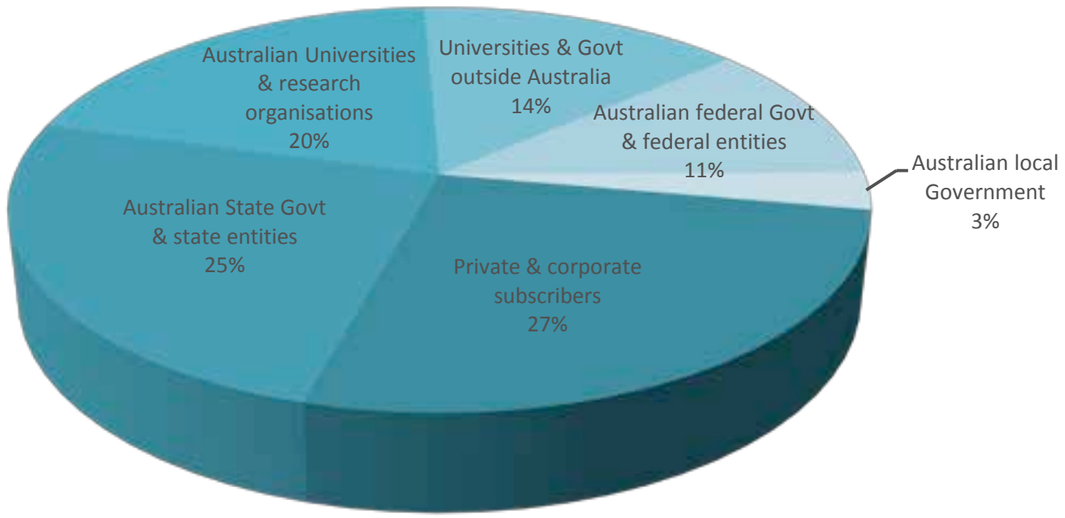
Photo: Jeremy Ringma.

Decision Point

our free monthly magazine

Nine issues of our Decision Point magazine were distributed to over 5,800 readers during 2014. As well as being available as a .pdf file, Decision Point's web site is now set up as a blog, improving reader's ability to

- share
- comment and discuss
- read on the go (mobile, tablet, laptop)
- download PDF
- follow on Facebook



Decision Point subscribers divided by affiliation category

"*Decision Point* would have to be the most relevant and insightful publication I receive. The coverage of issues is excellent, the content innovative and the research findings are incredibly useful in my everyday work. Thanks ... for a great resource and keep it up"

- Kirsti, Sth Rivers CMA

"What would we do without our regular dose of challenging articles from *Decision Point*? I love it."

- Judy, Community Solutions

" ... really enjoy reading *Decision Point*; good information, relevant pitch, stimulating debate and provocative essays (should be more of it)"

- Peter

"I want to pass on how much myself and the team enjoy reading *Decision Point*.

We find it not only useful as applied information to get on-ground outcomes (environmental rehabilitation and restoration projects) but also feel inspired by the dedicated research occurring that keeps knowledge up to date."

- Environmental practitioners, 2014

making news

media releases

Beating poachers – with mathematics

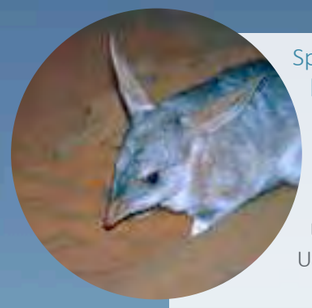
25/02/2014

Talent: Richard Fuller, UQ; James Watson, UQ

European newts invade Australia

30/06/2014

Talent: Reid Tingley, UoM; Andrew Woolnough, external



Split reserves increase bilby's survival chance

13/10/2014

Talent: Michael Bode, UoM; Kate Helmstedt, UQ

Nations "failing to save earth's wildlife"

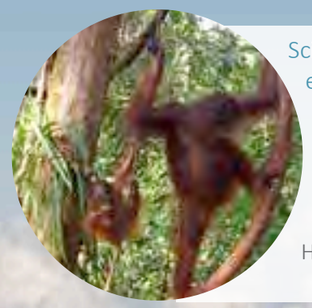
12/11/2014

Talent: Oscar Venter, UQ; James Watson, UQ

Private land "can help save Australia's imperilled wildlife"

31/03/2014

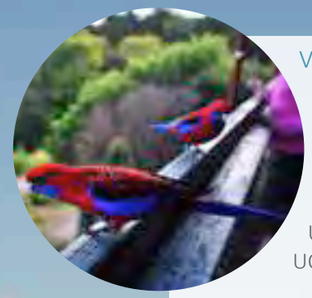
Talent: Laura Rayner, ANU; David Lindenmayer, ANU; Sacha Jellinek, UM; Brendan Wintle, UoM



Scientists urge greater efforts to protect orangutan forests

17/07/2014

Talent: Hugh Possingham, UQ; Howard Wilson, UQ



Visitors "can help save our national parks"

11/11/2014

Talent: Duan Biggs, UQ; Hugh Possingham, UQ

Killing off alien invaders - with maths

25/11/2014

Talent: Michael McCarthy, UoM

Governments adopt 'triage' for threatened species

21/05/2014

Talent: Hugh Possingham, UQ; Michael McCarthy, UM

Let's hear it for citizen scientists!

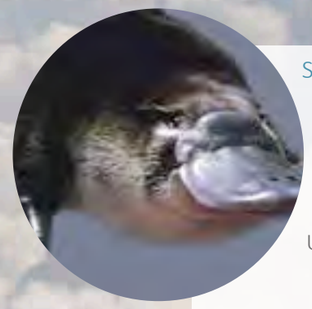
01/09/2014

Talent: Richard Fuller, UQ; Ayesha Tulloch, UQ; Hugh Possingham, UQ

Plant library takes on the global weeds menace

12/11/2014

Talent: Roberto Salguero-Gómez, UQ



Scientists race to save 'books' in the burning 'library of life'

29/12/2014

Talent: Joseph Bennett, UQ

MARXAN
conservation solutions

The demand for Marxan as the world's premier conservation planning tool continues with managers and practitioners in more than 167 countries utilizing Marxan as the planning tool in supporting decisions to a range of conservation planning problems, both terrestrial and marine.

To-date, Marxan and related software has been downloaded 10,168 times between July 2011 and December 2014. This is up from 7,558 downloads recorded one year ago.

The number of countries using the tool is up from 141 countries twelve months ago to 167. Australia is still the top country in the list. Mexico entered the top 10 and Japan dropped from the top 10. Interestingly, downloads in Iran significantly increased in 2014.

supporting decision making in terrestrial, aquatic and marine environments

A total of 4,828 unique users have downloaded Marxan and related software during this period. Currently, there are 4,232 unique users who are subscribed to the Marxan email list which represent the group of active and engaged Marxan users.

In November 2013, Marxan became easier to access with the introduction of the 'cloudified' Marxan.net system, which enables users to run their Marxan analysis online with R Studio Server. In early 2014 this system was further improved by enabling users to use the new method of cloudified Marxan on Marxan.net as opposed to the traditional method of users downloading Marxan and using it on their own computers.

Australian museum Eureka Prizes

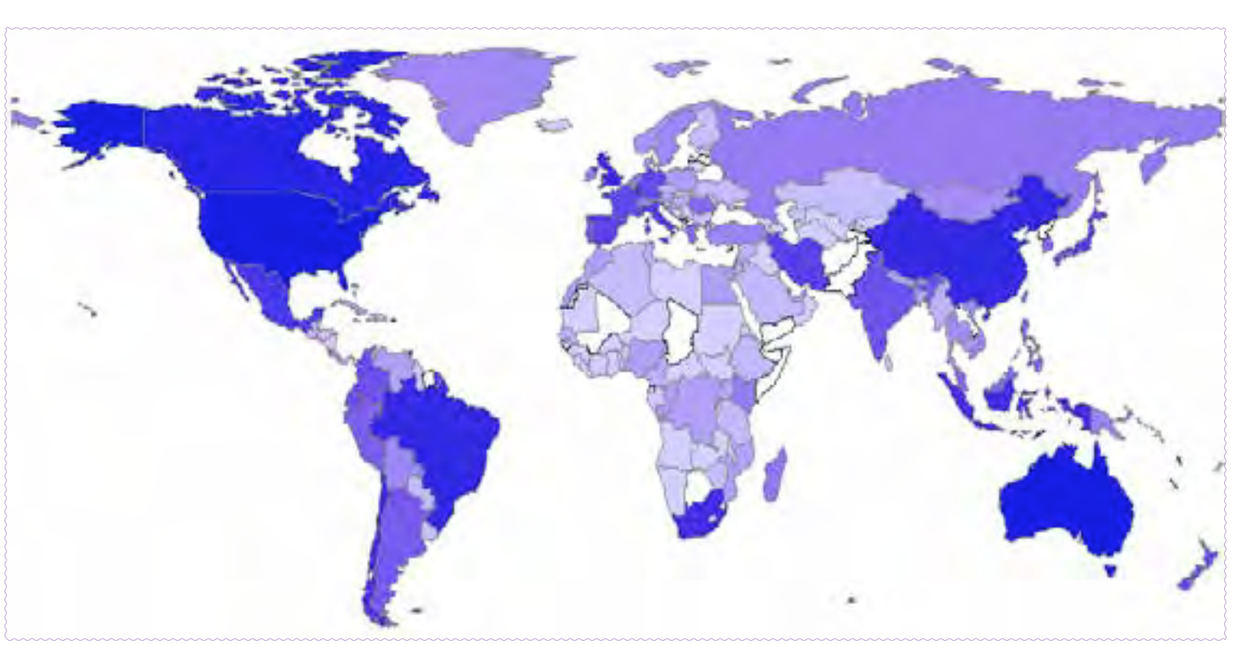
Winner 2009

WWF

Used by the World Wildlife Fund 'Roadmap to Recovery' program to redesign the world's marine parks

The Nature Conservancy

Used by The Nature Conservancy for most of their conservation planning



Global frequency of Marxan software downloads (light to dark, with dark being highest frequency). Figure: Matthew Watts.

Most widely used conservation planning tool

Used by over 7000 professionals in over 150 countries.
Taught in universities.
Used by biologists, industries and resource managers alike.

Marxan put to practice

With ongoing support from CEED, Marxan continues to be used around the world to achieve conservation goals, including:

Protection for Lemurs

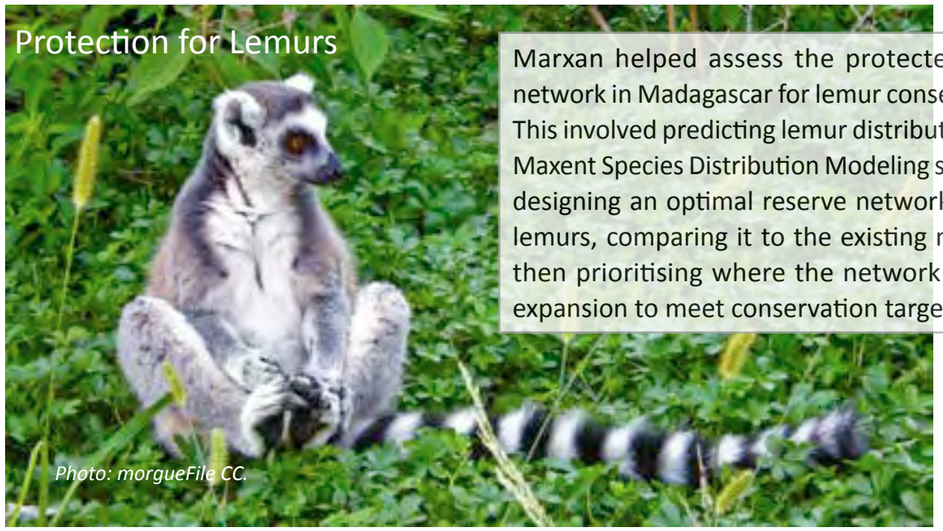


Photo: morgueFile CC.

Marxan helped assess the protected areas network in Madagascar for lemur conservation. This involved predicting lemur distribution with Maxent Species Distribution Modeling software, designing an optimal reserve network for the lemurs, comparing it to the existing network, then prioritising where the network needed expansion to meet conservation targets.

Rezoning the reef

Photo: morgueFile CC.

Marxan was redeveloped in order to assist managers in rezoning of the Great Barrier Reef, Australia. *Great Barrier Reef Marine Planning Authority*.

Achieving balance

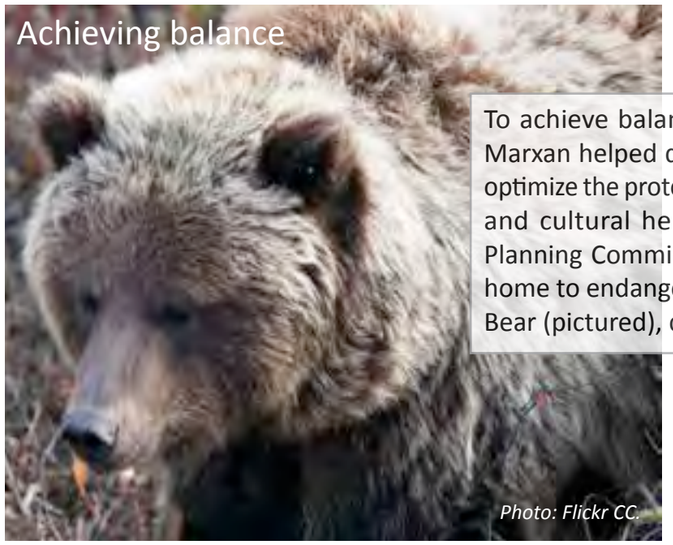


Photo: Flickr CC.

To achieve balance in management priorities, Marxan helped devise a a management plan to optimize the protection of environment, resources and cultural heritage in the Peel Watershed Planning Commission, Yukon Territory, Canada, home to endangered species such as the Grizzly Bear (pictured), caribou, and more.

National Park Extension

Photo: morgueFile CC.

Marxan helped in assessing the expansion of the Mt Zebra National Park, Sth Africa, resulting in a massive reserve for zebra, elephants, buffalo, big cats and many more animals. It also helped to connect MZNP to other parks, forming a corridor for wildlife and protecting native grassland habitats.

Pacific Island Conservation

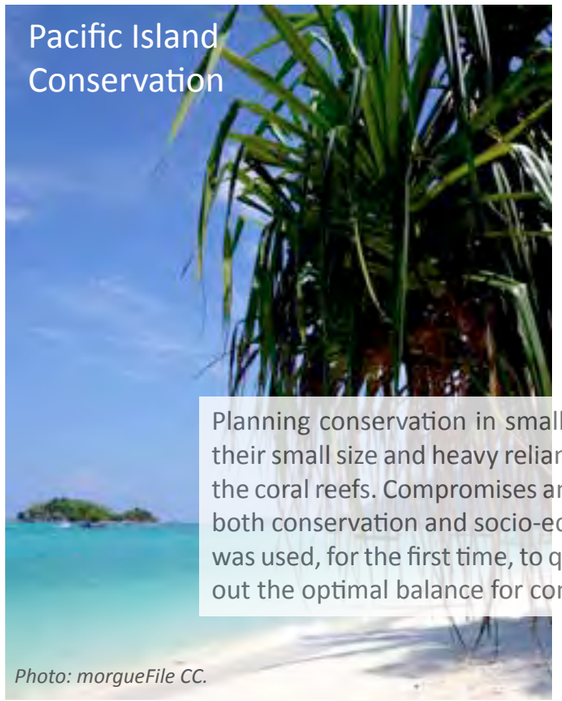


Photo: morgueFile CC.

Planning conservation in small Pacific Islands is unique due to their small size and heavy reliance on fishing and resources from the coral reefs. Compromises and tradeoffs must be expected for both conservation and socio-economic & fishing needs. Marxan was used, for the first time, to quantify these tradeoffs, and work out the optimal balance for conservation in the Pacific.

our publications

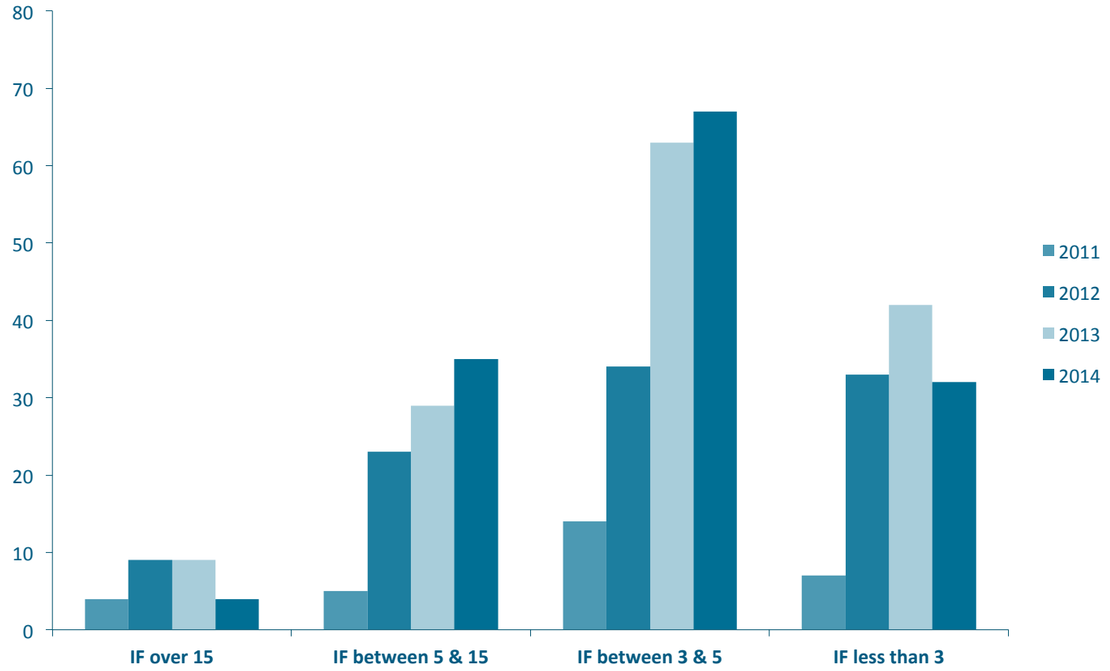
Predator proof fence, Currawinya.
Photo: Tim Holmes.

publications

Many of CEED's research findings have been published in a wide range of international scientific journals, books, conference papers and other forums - ensuring the latest findings are communicated to the scientific community, managers, practitioners, students, governments and other interested stakeholders around the world.

CEED researchers continue to be prolific publishers in major international journals. This year researchers have published 151 journal articles with 40 of these publications having an Impact Factor (IF) greater than 5. Thirty six percent of CEED papers involved an Early Career Researcher (ECR) with a total of 20 percent of all 2014 journal articles being led by an ECR. This demonstrates the quality of the Centre's publication record and continuing commitment to the next generation of researchers.

Another measure of the impact of our journal articles is the citations for each publication. Whilst citation data can be slow to accumulate, given the delay in publications becoming available, CEED publications have been cited 338 times during the past year. Twenty five (17 percent) of CEED publications had five or more citations by February 2015, with 4 of them having between 12 and 18 citations. This clearly demonstrates that CEED journal publications are important in furthering the work of the broader scientific community.



Citizen science - demonstrated to help research. Photo: Ayesha Tulloch.

2014 publications

	REFEREED JOURNAL ARTICLES	Impact factor at 2013	Citations at 2015
1	Adams VM, ET Game and M Bode (2014) Synthesis and review: delivering on conservation promises: the challenges of managing and measuring conservation outcomes. *Environmental Research Letters* 9(8)	4.09	0
2	Adams-Hosking C, CA McAlpine, JR Rhodes, PT Moss and H Grantham (2014) Prioritizing regions to conserve a specialist folivore: considering probability of occurrence, food resources, and climate change. *Conservation Letters* (Online)	5.42	0
3	Auerbach NA, AIT Tulloch,HP Possingham (2014) Informed actions: Where to cost-effectively manage multiple threats to species to maximize return on investment. *Ecological Applications* 24(6):1357-1373	4.126	2
4	Banks SC and DB Lindenmayer (2014) Inbreeding avoidance, patch isolation and matrix permeability influence dispersal and settlement choices by male agile antechinus in a fragmented landscape. *Journal of Animal Ecology* 83(2):515-524	4.726	3
5	Barnes M, JK Szabo, WK Morris and HP Possingham (2014) Evaluating protected area effectiveness using bird lists in the Australian Wet Tropics. *Diversity and Distributions* 21(4):368-378	5.469	1
6	Barton PS, K Ikin, AL Smith, C MacGregor and DB Lindenmayer (2014) Vegetation structure moderates the effect of fire on bird assemblages in a heterogeneous landscape. *Landscape Ecology* 29(4):703-714	3.574	3
7	Bates AE, TJ Bird, RD Stuart-Smith, T Wernberg, JM Sunday, NS Barrett, GJ Edgar, S Frusher, AJ Hobday, GT Pecl, DA Smale and M McCarthy (2015) Distinguishing geographical range shifts from artefacts of detectability and sampling effort. *Diversity and Distributions* 21(1):13-22	5.469	0
8	Beger M, KA Selkoe, E Treml, PH Barber, S von der Heyden, ED Crandall, RJ Toonen and C Riginos (2014) Evolving coral reef conservation with genetic information. *Bulletin of Marine Science* 90(1):159-185	0	13
9	Beger M, B Sommer, PL Harrison, SDA Smith and JM Pandolfi (2014) Conserving potential coral reef refuges at high latitudes. *Diversity and Distributions* 20(3):245-257	5.469	7
10	Beher J (2014) Pasture Characteristics in Three Different Ecotypes at Khovd Aimag, Western Mongolia. *PLoS One* 9(7)	3.534	0
11	Bennett J, G Elliott, B Mellish, LN Joseph, AIT Tulloch, WJM Probert, MMI Di Fonzo, JM Monks, HP Possingham and R Maloney (2014) Balancing phylogenetic diversity and species numbers in conservation prioritization, using a case study of threatened species in New Zealand. *Biological Conservation* 174:47-54	4.036	5
12	Bennett JR, DR Sisson, JP Smol, BF Cummimg, HP Possingham and YM Buckley (2014) Optimizing taxonomic resolution and sampling effort to design cost-effective ecological models for environmental assessment. *Journal of Applied Ecology* 51(6):1722-1732	4.754	0
13	Biggs D, L Swemmer, G Phillips, J Stevens, S Freitag and R Grant (2014) The development of a tourism research framework by South African National Parks to inform management. *African Protected Area Conservation and Science* 56(2)	0	0
14	Blyton MDJ, DB Lindenmayer and SC Banks (2014) Maternal lineages best explain the associations of a semisocial marsupial. *Behavioral Ecology* 25(5):1212-1222	3.157	0
15	Borer ET, EW Seabloom, DS Gruner, WS Harpole, H Hillebrand, EM Lind, PB Adler, J Alberti, Y Buckley et al. (2014) Herbivores and nutrients control grassland plant diversity via light limitation. *Nature* 508(7497):517	42.351	9
16	Brown CJ, MI Saunders, HP Possingham and AJ Richardson (2014) Interactions between global and local stressors of ecosystems determine management effectiveness in cumulative impact mapping. *Diversity and Distributions* 20(5):538-546	5.469	5
17	Bryan BA, M Nolan, TD Harwood, JD Connor, J Navarro-Garcia, D King, DM Summers, D Newth, Y Cai, N Grigg, I Harman, ND Crossman, MJ Grundy, JJ Finnigan, D Ferrier, KJ Williams, KA Wilson, EA Law and S Hatfield-Dodds (2014) Supply of carbon sequestration and biodiversity services from Australia's agricultural land under global change. Global Environmental Change-Human And Policy Dimensions 28:166-181	6	4
18	Buckley YM and Y Han (2014) Managing the side effects of invasion control. *Science* 344(6187):975-976	31.477	0
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27	Catford JA, WK Morris, PA Vesk, CJ Gippel and BJ Downes (2014) Species and environmental characteristics point to flow regulation and drought as drivers of riparian plant invasion. *Diversity and Distributions* 20(9):1084-1096	5.469	2
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35	Cook CN, G Wardell-Johnson, RW Carter and M Hockings (2014) How accurate is the local ecological knowledge of protected area practitioners? *Ecology And Society* 19(2)	2.669	2
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47	Foster CN, PS Barton and DB Lindenmayer (2014) Effects of large native herbivores on other animals. *Journal of Applied Ecology* 51(4):929-938	4.754	4
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52	Goldman R, E Bitona, E Brokovich, S Kark and N Levin (2014) Oil spill contamination probability in the southeastern Levantine basin. *Sciencedirect* 91(1)	0	0
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55	Grechi I, I Chades, YM Buckley MH Friedel, AC Grice, HP Possingham, RD van Klinken and TG Martin (2014) A decision framework for management of conflicting production and biodiversity goals for a commercially valuable invasive species. *Agricultural Systems* 125:1-11	2.453	5
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67	Ikin K, PS Barton, IA Stirnemann, JR Stein, D Michael, M Crane, S Okada and DB Lindenmayer (2014) Multi-scale associations between vegetation cover and woodland bird communities across a large agricultural region. *PLoS One* 9(5)	3.534	2
68	Ives C and D Kendal (2014) The role of social values in the management of ecological systems. *Journal of Environmental Management* 144:67-72	3.188	5
69	Iwamura T, RA Fuller and HP Possingham (2014) Optimal Management of a Multispecies Shorebird Flyway under Sea-Level Rise. *Conservation Biology* 28(6):1710-1720	4.32	4
70	Jellinek S, KM Parris, MA McCarthy, BA Wintle and DA Driscoll (2014) Reptiles in restored agricultural landscapes: the value of linear strips, patches and habitat condition. *Animal Conservation* 17(6):544-554	2.524	0
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73	Kearney MR, A Shamakhy, R Tingley, DJ Karoly, AA Hoffmann, PR Briggs and WP Porter (2014) Microclimate modelling at macro scales: a test of a general microclimate model integrated with gridded continental-scale soil and weather data. Methods In *Ecology and Evolution* 5(3):273-286	5.322	9
74	Keith DA, M Mahony, H Hines, J Elith, TJ Regan, JB Baumgartner, D Hunter, GA Heard,NJ Mitchell, KM Parris, T Penman, Ben Scheele, CC Simpson, R Tingley, CR Tracy, M West and HR Akcakaya (2014) Detecting Extinction Risk from Climate Change by IUCN Red List Criteria. *Conservation Biology* 28(3):810-819	4.32	0
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77	Lahoz-Monfort JJ, G Guillera-Arroita and BA Wintle (2014) Imperfect detection impacts the performance of species distribution models. *Global Ecology And Biogeography* 23(4):504-515	7.242	18
78	Law EA, BA Bryan, E Meijaard, T Mallawaarachchi, MJ Struebig and KA Wilson (2014) Ecosystem services from a degraded peatland of Central Kalimantan: implications for policy, planning, and management. *Ecological Applications* 25(1)	4.126	1
79	Law EA, BA Bryan, N Torabi, SA Bekessy, CA McAlpine and KA Wilson (2014) Measurement matters in managing landscape carbon. *Sciencedirect* (Online)	0	0
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82	Lindenmayer DB, PS Barton, PW Lane, MJ Westgate, L McBurney, D Blair, P Gibbons and GE Likens (2014) An empirical assessment and comparison of species-based and habitat-based surrogates: A case study of forest vertebrates and large old trees. *PLoS One* 9(2)	3.534	8
83	Lindenmayer DB, PW Lane, MJ Westgate, M Crane, D Michael, S Okada and PS Barton (2014) An Empirical Assessment of the Focal Species Hypothesis. *Conservation Biology* 28(6):1594-1603	4.32	3
84	Lindenmayer DB, W Blanchard, L McBurney, D Blair, SC Banks, DA Driscoll, AL Smith and AM Gill (2014) Complex responses of birds to landscape-level fire extent, fire severity and environmental drivers. *Diversity and Distributions* 20:467-477	5.469	4

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86	Mac Nally R, CA McAlpine, HP Possingham and M Maron (2014) The control of rank-abundance distributions by a competitive despotic species. *Oecologia* 176(3):849-857	3.248	0
87	MacDonald JA, J Carwardine, LN Joseph, CJ Klein, TM Rout, JEM Watson, ST Garnett, MA McCarthy and HP Possingham (2014) Improving policy efficiency and effectiveness to save more species: A case study of the megadiverse country Australia. *Biological Conservation* 182:102-108	4.036	
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91	Mantyka-Pringle CS, TG Martin, DB Moffatt, JR Rhodes and S Linke (2014) Understanding and predicting the combined effects of climate change and land-use change on freshwater macroinvertebrates and fish. *Journal of Applied Ecology* 51:572-581	4.754	1
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93	Maxwell SL, JR Rhodes, MC Runge, HP Possingham, CF Ng and E McDonald-Madden (2014) How much is new information worth? Evaluating the financial benefit of resolving management uncertainty. *Journal of Applied Ecology* 52(1):12-20	4.754	
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95	Mccarthy MA, AL Moore, J Krauss, JW Morgan and CF Clements (2014) Linking Indices for Biodiversity Monitoring to Extinction Risk Theory. *Conservation Biology* 28(6):1575-1583	4.32	2
96	McDougall AS, JR Bennett, J Firn, EW Seabloom, et al (2014) Anthropogenic-based regional-scale factors most consistently explain plot-level exotic diversity in grasslands. *Global Ecology And Biogeography* 23(7):802-810	7.242	2
97	Melville J, K Smith, R Hobson, S Hunjan and L Shoo (2014) The Role of Integrative Taxonomy in the Conservation Management of Cryptic Species: The Taxonomic Status of Endangered Earless Dragons (Agamidae: Tympanocryptis) in the Grasslands of Queensland, Australia. *PLoS One* 9(7)	3.534	0

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99	Mikusinski G, HP Possingham and M Blicharska (2014) Biodiversity priority areas and religions-a global analysis of spatial overlap. *Oryx* 48(1):17-22	1.914	4
100	Mills M, JG Alvarez-Romera, K Vance-Borland, P Cohen, RL Pressey, AM Guerrero and H Ernston (2014) Linking regional planning and local action: Towards using social network analysis in systematic conservation planning. *Biological Conservation* 169:6-13	4.036	5
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106	Mortelliti A, G Sozio, DA Driscoll, L Bani, L Boitani and DB Lindenmayer (2014) Population and individual-scale responses to patch size, isolation and quality in the hazel dormouse. *Ecosphere* 5(9)	2.595	0
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108	Muir AM, PA Vesk and G Hepworth (2014) Reproductive trajectories over decadal time-spans after fire for eight obligate-seeder shrub species in south-eastern Australia. *Australian Journal of Botany* 62(5):369-378	0.903	0
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118	Pollock LJ, R Tingley, WK Morris, N Golding, RB O'Hara, KM Parris, PA Vesk and MA McCarthy (2014) Understanding co-occurrence by modelling species simultaneously with a Joint Species DistributionModel (JSDM). *Methods in Ecology and Evolution* 5(5):397-406	5.322	3
119	Polyakov M, DJ Pannell, R Pandit, S Tapsuwan and G Park (2014) Capitalized Amenity Value of Native Vegetation in a Multifunctional Rural Landscape. *American Journal of Agricultural Economics* 97(1):299-314	1.363	3
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124	Reyes-Ponce R, SM Clegg, SB Carvalho, E McDonald-Madden and HP Possingham (2014) Geographical surrogates of genetic variation for selecting island populations for conservation. *Diversity and Distributions* 20(6):640-651	5.469	2
125	Rhodes JR, D Lunney, J Callaghan and CA McAlpine (2014) A Few Large Roads or Many Small Ones? How to Accommodate Growth in Vehicle Numbers to Minimise Impacts on Wildlife. *PLoS One* DOI: 10.1371/journal.pone.0091093	3.534	1
126	Robinson LM, AJ Hobjay, AJ Richardson and HP Possingham (2014) Trailing edges projected to move faster than leading edges for large pelagic fish habitats under climate change. *Sciencedirect* 113:225-234	0	3
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128	Romera AJ, GJ Doole and EN Khaembah (2014) Value of chicory crops to pasture-based dairy farms in the Waikato region of New Zealand. *Journal of Agricultural Biological and Environmental Statistics* 153(1):124-137	0.783	0
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130	Runge CA, TG Martin, HP Possingham, SG Willis and RA Fuller (2014) Conserving mobile species. *Frontiers In Ecology And The Environment* 12(7):395-402	8.412	3
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134	Scheele BC, DA Hunter, LF Grogan, L Berger, JE Kolby, MS Mcfadden, G Marantelli, LF Skerratt and DA Driscoll (2014) Interventions for Reducing Extinction Risk in Chytridiomycosis-Threatened Amphibians. *Conservation Biology* 28(5):1195-1205	4.32	1
135	Shtilerman E, CJ Thompson, L Stone, M Bode and M Burgman (2014) A novel method for estimating the number of species within a region. *Proceedings of The Royal Society B-Biological Sciences* 281(1779)	5.292	2
136	Smith AL, CM Bull, MG Gardner and DA Driscoll (2014) Life history influences how fire affects genetic diversity in two lizard species. *Molecular Ecology* 23(10):2428-2441	5.84	0
137	Sommer B, PL Harrison, M Beger and JM Pandolfi (2014) Trait-mediated environmental filtering drives assembly at biogeographic transition zones. *Ecology* 95(4):1000-1009	5	6
138	Standish R, R Hobbs et al (2014) Resilience in ecology: Abstraction, distraction, or where the action is? *Biological Conservation* 177:43-51	4.036	2
139	Sweaney N, DB Lindenmayer and DA Driscoll (2014) Is the matrix important to butterflies in fragmented landscapes? *Journal of Insect Conservation* 18(3):283-294	1.789	1
140	Taylor C, MA McCarthy and DB Lindenmayer (2014) Nonlinear effects of stand age on fire severity. *Conservation Letters* 7(4):355-370	5.42	5
141	Tingley R, AR Weeks, AS Smart, AR van Rooyen, AP Woolnough and MA McCarthy (2014) European newts establish in Australia, marking the arrival of a new amphibian order. *Biological Invasions* 17:31-37	2.716	0
142	Tingley R, M Vallinoto, F Sequeria and MR Kearney (2014) Realized niche shift during a global biological invasion. *Proceedings of The National Academy of Sciences of The United States of America* 111(28):10233-10238	9.809	3

2014 publications continued

	REFEREED JOURNAL ARTICLES	Impact factor at 2013	Citations at 2015
143	Tingley R, RA Hitchmough and DG Chapple (2014) Analyses of extinction risk are an important part of the conservation process - Reply to Monks. *Biological Conservation* 168:224-225	4.036	0
144	Trueman M, RJ Standish and RJ Hobbs (2014) Identifying management options for modified vegetation: Application of the novel ecosystems framework to a case study in the Galapagos Islands. *Biological Conservation* 172:37-48	4.036	3
145	Tulloch AIT, VJD Tulloch, MC Evans and M Mills (2014) The Value of Using Feasibility Models in Systematic Conservation Planning to Predict Landholder Management Uptake. *Conservation Biology* 28(6):1462-1473	4.32	1
146	Valentine LE, R Fisher, BA Wilson, T Sonneman, WD Stock, PA Fleming and RJ Hobbs (2014) Time since fire influences food resources for an endangered species, Carnaby's cockatoo, in a fire-prone landscape. *Biological Conservation* 175:1-9	4.036	0
147	Villasenor NR, DA Driscoll, MAH Escobar, P Gibbons and DB Lindenmayer (2014) Urbanization impacts on mammals across urban-rorest edges and a predictive model of edge effects. *PLoS One* 9(5)e97036	3.534	1
148	von der Heyden S, M Beger, RJ Toonen, L van Herwerden, MA Juinio-Menez, R Ravago-Gotanco, C Fauvelot and G Bernardi (2014) The application of genetics to marine management and conservation: examples from the Indo-Pacific. *Bulletin of Marine Science* 90(1):123-158	0	8
149	Weeks R, C Klein, et al (2014) Developing Marine Protected Area Networks in the Coral Triangle: Good Practices for Expanding the Coral Triangle Marine Protected Area System. Coastal Management 42(2):183-205	1.013	5
150	Wilson HB, E Meijaard, O Venter, M Ancrenaz and HP Possingham (2014) Conservation Strategies for Orangutans: Reintroduction versus Habitat Preservation and the Benefits of Sustainably Logged Forest. *PLoS One* DOI: 10.1371/journal.pone.0102174	3.534	0
	REPORT	Impact factor at 2013	Citations at 2015
151	Carwardine J, S Nicol, S Van Leeuwen, B Walters, J Firn, A Reeson, TG Martin and I Chades (2014) Priority Threat Management For Pilbara Species of Conservation Significance. Report	NA	2

Detecting species in urban areas. Photo: Georgia Garrard.

collaborating

working with others to achieve impact

Green sea turtle, Heron Island.
Photo: Alex Possingham.

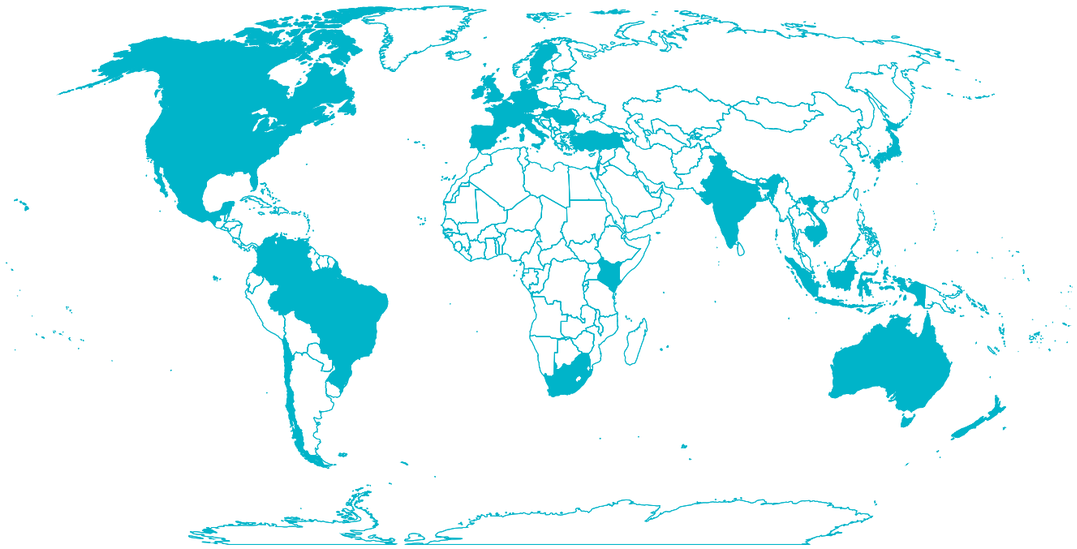
Collaborations across the globe

CEED recognises the importance of collaborating with a wide range of partners and stakeholders in order to achieve its objectives and ensure the research outputs are taken up into various forums to make an impact on how governments, agencies, civil society and communities make decisions regarding their environment and resources.

CEED researchers have developed and enhanced international research linkages. The international Principal Investigators on these projects come from Europe, USA, Africa and the Middle East, and we have collaborations and associations with researchers in other parts of the world including Asia, South America and the Pacific region.

This network provides excellent opportunities for disseminating CEED's scientific breakthroughs to researchers throughout the world. We also conduct collaborative research with international NGOs like Conservation International, Wildlife conservation society adn The Nature Conservancy which provides additional avenues for developing and enhancing international linkages.

During 2014, the Centre attracted a large number of collaborators and partners to work together on achieving key outcomes. These collaborations covered a range of research themes and topics, and involved both international and national expertise, and have been instrumental in raising the profile of CEED and its research on a global scale.



World map showing our collaborator's locations. Map created using Map of World with Countries - Outline by FreeVectorMaps.com

Hsien-Yung Lin, our PhD student, focuses his research on the conservation and management of fish, specifically those which migrate between salt and fresh water.

CEED collaborators

Aarhus University, Denmark

Academy of Sciences of the Czech Republic, Czech Republic

AgResearch, New Zealand

AgResearch Ruakura Research Centre, New Zealand

Annapolis, MD, USA

Australian Antarctic Division, Australia

Australian Bureau of Statistics, Australia

Australian Institute for Marine Science, Australia

Biosecurity South Australian Government, Australia

Birdlife Australia, Australia

BirdLife International Cambodia Programme, Cambodia

Bush Heritage , Australia

Cadiz University, Spain

Cambridge University, UK

Center for International Forestry Research (CIFOR), Indonesia

Center for Large Landscape Conservation, USA

Center for Ocean Solutions, Stanford University, USA

Center on the Biodemography of Aging, University of Southern Denmark, Denmark

Central Tablelands LLS, Australia

Centro de Ecología Instituto Venezolano de Investigaciones Científicas, Venezuela

Charles University in Prague, Czech Republic

City of Melbourne, Australia

CNRS, France

Colombian Primatological Association , Colombia

Conservation Council, Australia

Conservation International, USA

Crawford School of Public Policy, ANU, Australia

CSIRO, Australia

Czech Republic Academy of Science, Czechoslovakia

Deakin University, Australia

Department of Conservation, New Zealand

Department of Parks and Wildlife, WA, Australia

Department of Environment and Primary Industires (DPI), Victoria, Australia

Department of Agriculture and Food, WA, Australia

Department of Primary Industries, Parks, Water and Environment (DPIPWE), Tasmanian Government, Australia

Duke University, USA

Durham University, UK

Earthwatch, Brazil

Ecological Horizons, University of Adelaide, Australia

Edith Cowan University, WA, Australia

Environmental Heritage Protection, Australia

Exeter University, UK

Fundacion Proyecto Titi , XX

Gary Groucher and Associates, Australia

Global Mammal Assessment, Sapienza Universita di Roma, Rome, Italy

Gondwana Link Ltd, WA, Australia

Greenfleet Australia

Griffith University, Australia

Hebrew University of Jerusalem, Israel

Hungarian Natural History Museum, Hungary

Institut de Recherche pour le Développement, France

Institute of Ecology and Biodiversity, Chile

Istanbul University Fisheries Faculty, Turkey

IUCN, Switzerland

IVIC Venezuela, Venezuela

James Cook University, Australia

Kids Teaching Kids, Australia

Lake Cowal Conservation Centre, Australia

Landcare Research, New Zealand

Leibniz Instute of Agriculture Development in Transition Economies Halle (Saale) , Germany

Leuphana University Lueneburg, Germany

Lincoln University, New Zealand

Liverpool John Moores University, UK

Lulea University of Technology, Sweden

Macquarie University, Australia

Max Planck Institute for Demographic Research, Germany

Melbourne Water, Australia

Mineral Policy Institute, Australia

Monash University

Montpellier Supagro, France

Natural Capital Group, Stanford, USA

Natural Decisions Pty Ltd, Australia

Naturalis Biodiversity Center, Leiden, Netherlands

New Zealand Forest Research Institute, New Zealand

Norman Wettenhall Foundation, Australia

NSW Office of Environment and Heritage, Australia

Oregon State University, USA

Parks Australia, Australia

Penn State University, USA

People and Nature Consulting International, Indonesia

Pew Charitable Trust, Australia

Pontificia Universidad Cat'olica de Chile, Chile

Princeton University, USA

Provita, Venezuela

Queensland Government, Australia

Radboud University Nijmegen, The Netherlands

Royal University of Phnom Penh, Cambodia

Rutgers University, USA

Sabah Wildlife Department, Indonesia

Sao Paulo University, Brazil

Sapientia Hungarian University of Transylvania, Romania

Sherbrooke University, Canada

Smithsonian Environmental Research Center, USA

Southern Denmark University , Denmark

Stellenbosch University, South Africa

Stockholm Resilience Centre, Sweden

Sussex University, UK

Sustainability Victoria, Australia

The Biodiversity Consultancy, UK

The European Commission

The Institute of Zoology at the Zoological Society of London, UK

The National Centre for Scientific Research, France

The National Oceanographic & Limnological Research Israel

The Nature Conservancy, Australia

The Orangutan Project, Indonesia

Tiwi Land Council, Australia

Tohoku University, Japan

CEED researcher Phil Gibbons (on the right) talking about biodiversity offsets out in the field with local government conservation managers. Photo: David Salt.

CEED collaborators continued

Trust for Nature, Australia
UC Berkley, USA
Umea University, Sweden
UNEP-GRASP, Kenya
Universidad Nacional Autónoma de México, Mexico
Universidade Federal do Amapá, Brazil
University Brunei Darussalam, Brunei Darussalam
University College London, UK
University de Aveiro, Portugal
University of Alberta, Canada
University of Amsterdam, Netherlands
University of British Colombia, Canada
University of California, Davis, USA
University of Cambridge, UK
University of Canberra, Australia
University of Canterbury, New Zealand
University of Chile, Chile
University of Copenhagen, Denmark
University of Delhi, India
University of Edinburgh, UK
University of Exeter, UK
University of Guelph, Canada
University of Illinois, USA
University of Kent, UK
University of Milano Bicocca, Italy
University of Minnesota, USA
University of Montpellier, France
University of New South Wales, Australia
University of Newcastle, Australia
University of North Carolina Wilmington, USA
University of Plymouth, UK
University of Rome “La Sapienza”, Italy
University of Salento, Italy
University of Santa Clara, USA
University of Santa Cruz, Brazil
University of Stirling, UK
University of South Australia, Australia
University of Sydney, Australia
University of Tartu, Estonia
University of Tasmania, Australia
University of Technology, Sydney
University of Tennessee, USA
University of the Witwatersrand, South Africa
University of Tokyo, Japan
University of Victoria, Canada
University of Waikato, New Zealand
University of Washington, USA
University of Wollongong, Australia
US Geological Survey, USA
Utah State University, USA
Victoria University, Australia
Virginia Tech, USA
Vrije Universiteit Amsterdam, Netherlands
Wageningen University, Netherlands
Waikato University, New Zealand
Wentworth Group of Concerned Scientists, Australia
Wildlife Conservation Society, Kenya
Wildlife Conservation Society Cambodia Program, Cambodia
World Agroforestry Centre, Indonesia
WWF - Greater Mekong, Vietnam
WWF Cambodia, Cambodia
Yarra City Council, Australia
Zoological Society of London, UK
Zurich University, Switzerland

International visitors

CEED nodes played host to a wide range of leading scientists and early career researchers and practitioners from various international research institutes, NGOs, and governmental organisations. These interactions have advanced and strengthened CEED researchers' collaborations and close ties to leading conservation, decision science and environmental science research groups around the globe.

Visitor Name	Institution	Country
Munemitsu Akasaka	Tokyo University of Agriculture and Technology	Japan
Julian Alston	University California, Davis	USA
Thais Parreira do Amaral	Science Without Borders Program	Brazil
Colette Blyth	University of Aberdeen	Scotland
Madeleine Bottrill	Conservation International	USA
Aram Calhoun	Ecology and Environmental Sciences Program, University of Maine	USA
Paul Caplat	Lund University	Sweden
Renato Augusto Damasceno	Science Without Borders Program	Brazil
Emily Darling	University of North Carolina	USA
Laura Dee	University of California	USA
Julien Destres	AgroParisTech (engineering school)	France
Hong Du	Nanjing University, China	China
Jose Fedriani	UFZ	Germany
Sylvaine Giakoumi	Hellenic Centre for Marine Research	Greece
Ronny Groenteman	Landcare Research	New Zealand
Adelina Gschwandtner	University of Kent	UK
Eric Higgs	University of Victoria	Canada
Malcolm J Hunter	Senator George J Mitchell Center for Sustainability Solutions, University of Maine	USA
Andrea Kaim	University of Leipzig	Germany
Isabela Kerber	Science Without Borders Program	Brazil
Sylvain Laplace	AgroParisTech	France
Monique Lima	Science Without Borders Program	Brazil
Adriana Allek Litaiff	Science Without Borders Program	Brazil
Natalie Lobartolo	IUCN	Spain
Norman Mason	Landcare Research	New Zealand
Aurore Mauread	Agrocampus Ouest	France

Visitor Name	Institution	Country
Virginia Matzek	Santa Clara University	USA
Tim R. McClanahan	Wildlife Conservation Society	Kenya
James McNamara	Imperial College	UK
Anna Metaxas	Dalhousie University, Department of Oceanography	Canada
Ana Nuno	Imperial College	UK
Marta Pascual	Basque Centre for Climate Change	Spain
Mario Pereira	Universidade Federal De Santa Catarina	Brazil
Stephane Radureau	AgroParisTech	France
Johannes Refisch	UNEP-GRASP	
Ariandna de Souza Assis	Science Without Borders Program	Brazil
Nicoli Eiras Silva	Science Without Borders Program	Brazil
Gerald Singh	University of British Columbia	Canada
Tim Seastedt	University of Colorado	USA
Bob Smith	Durrell Institute of Conservation Ecology (DICE)	UK
Gary Tabor	Center for Large Landscape Conservation	USA
Riin Tamme	Uni of Tartu	Estonia
Joao Teixeira	State University of Santa Cruz	Brazil
Lizzie Telford	University of Aberdeen	Scotland
Tiago Toma	Departamento de Ecologia, Universidade Federal do Rio Grande do Sul	Brazil
Stephen C. Trombulak	Middlebury College	USA
Luis-Bernardo Valzquez	Urban Ecosystems Group. Department of Agriculture, Society and Environmental	Mexico
Camille Voisin	Agrocampus Ouest	France
Jessica Walsh	University of Cambridge	UK
John Weins	Oregon State University	USA
Marit Wilkerson	University of California, Davis	USA

Edd Hammill, adjunct from University of Sydney researching the overlap around the world of biodiversity hotspots and areas of military & civil conflict.

Adjunct researchers

Name	From	Country
Ameer Abdulla	IUCN Global Marine Programme	Spain
Nicola Abram	University of Kent	United Kingdom
Daniel Beaver	Unixtec Pty Ltd	Australia
Michael Bode	Univesrity of Melbourne , adjunct at University of Queensland	Australia
Madeleine Bottrill	Conservation International	USA
Holly Bryant	Wildlife Queensland	Australia
Mike Craig	Senior Research Fellow, Murdoch University	Australia
Richard Cuthbert	Wildlife Conservation Society	Papua New Guinea
Zena Dinesen	Department of Agriculture, Fisheries and Forestry	Australia
Lucinda Douglass	Centre for Conservation Geography	Australia
Renata Ferrari	University of Sydney	Australia
Sylvaine Giakoumi	Hellenic Centre for Marine Research	Greece
Mathew Gilfedder	CSIRO Land and Water	Australia
Edd Hammill	University of Technology Sydney	Australia
Stephen Harris	Department of Primary Industries, Parks, Water and Environment	Australia
Liana Joseph	Queensland State Government	Australia
Reinaldo Lourival, FF	Universidade Federal de Mato Grosso do Sul	Brazil
Paul Marshall	Australia-Caribean Coral Reef Collaboration	Australia
Tara Martin	CSIRO Ecosystem Science, adjunct at University of Queensland	Australia
Michael Mascia	World Wildlife Fund	USA
Erik Meijaard	People & Nature Consulting International	Indonesia
Suzanne Pillans	Department of Agriculture, Fisheries and Forestry	Australia
Johanna Polsenberg	Wildlife Conservation Society	Gabon, Congo and Equatorial Guinea
Christopher Raymond	Enviroconnect Pty Ltd	Australia
Tracy Rout	University of Melbourne Postdoc, adjunct at University of Queensland	Australia
Romola Stewart	Department of Parks and Wildlife	Australia
Gary Tabor	Centre for Large Landscape Conservation	USA
James Watson	Wildlife Conservation Society adjunct at the University of Queensland	Australia
Howard Wilson	Consultant adjunct at University of Queensland	Australia
Charlie Zammit	Zammit Consulting	Australia

our governance

Photo: Flickr CC.

Governance stucture

The Australian Research Council Centre of Excellence for Environmental Decisions (CEED) officially commenced its operations in July 2011, with a $11.9 million grant from the ARC for a seven-year period from 2011 to 2017. CEED is a partnership between five Australian and two international Universities, the CSIRO and the US Geological Survey.

The Centre is administered by The University of Queensland (UQ) with four other nodes at The University of Melbourne, The Australian National University (ANU), RMIT University and The University of Western Australia (UWA). The Director of the Centre is Professor Hugh Possingham.

The Centre has two over sighting bodies as part of its governance structure: (i) Centre Advisory Board, and (ii) International Scientific Advisory Panel. The Centre is managed by the Centre Executive and Node Directors.

Centre Advisory Board

The CEED management is supported by a Centre Advisory Board comprising Australian's with outstanding track records of leadership across a wide range of disciplines and research areas. The Advisory Board provides strategic advice to the centre management and node directors with a particular focus on issues of governance, communication, impact, outreach and research management. The Centre Advisory Board met once during the year in Brisbane on the 8 September 2014.

The key areas of focus in the meeting were i) the Centre's mid-term review; ii) the legacy of the Centre in establishing an international alliance for biodiversity conservation decisions and evaluation; and iii) the development of a leadership program to establish a strong cohort of early career researchers whose experience spans communication and management related skills to complement their research skills.

During the year, Professor Pauline Ladiges from the University of Melbourne indicated she would not be renewing her appointment beyond 2014. Dr Margaret Byrne, Director Science and Conservation in the Department of Parks and Wildlife, WA and Mr David Shelmerdine from the Myer Foundation have agreed to three-year terms as incoming Board members.

Advisory board membership	
Prof Stephen Walker (Chair)	Dean of Science, The University of Queensland
Prof Andrew Cockburn, FAA	The Australian National University
Prof Pauline Ladiges, FAA *	The University of Melbourne
Prof Alistar Robertson	PVC (Research), The University of Western Australia
Prof Charlie Zammit	Commonwealth Dept of the Environment (retired)
Dr Margaret Byrne^	Department of Parks and Wildlife, WA
Mr David Shelmerdine^	Myer Foundation

*retired member, late 2014
^ new members, late 2014

Professor David Lindenmayer (CEED Node Director) and Federal Environment Minister Greg Hunt, at a book launch in March. Photo: Australian National University.

International Scientific Advisory panel (ISAP)

The function of the International Scientific Advisory Panel is to ensure CEED remains at the forefront of international research in its field. The ISAP is particularly important for helping the centre enhance its international linkages and show international disciplinary leadership. The ISAP has five members, all of whom are world leaders in pure and applied ecological research.

Advisory board membership	
Prof Antoine Guisan	The University of Lausanne
Prof Peter Kareiva, FNAS	Chief Scientist & Director, the Nature Conservancy
Prof Claire Kremen	The University of California, Berkeley
Prof Bill Murdoch FNAS	The University of California, Santa Barbara
Prof Bill Sutherland	Miriam Rothschild Professor of Conservation Biology, Cambridge University

Centre Executive and Node Directors

An Executive and Node Directors lead CEED from the various partner institutes across Australia.

Management	
Prof Hugh Possingham (Director)	The University of Queensland
Prof Michael McCarthy (Deputy Director)	The University of Melbourne
Dr Alvin van Niekerk (Chief Operations Officer) until April 2014	The University of Queensland
Ms Karen Gillow (Acting Chief Operations Officer) April 2014 – October 2014	The University of Queensland
Ms Melanie King (Chief Operations Officer) October 2014	The University of Queensland

Node Directors	
Prof David Lindenmayer	The Australian National University
Prof David Pannell	The University of Western Australia
Dr Jonathan Rhodes & Dr Kerrie Wilson, (joint)	The University of Queensland
Dr Brendan Wintle	The University of Melbourne
Assoc Prof Sarah Bekessy	RMIT University

ARC Centre of Excellence Review 2014

The 2014 review of the Centre took place at The University of Queensland on 15 July 2014.

The Review Panel comprised Dr Fiona Cameron (Chair), ARC Executive Director for Biological Sciences and Biotechnology; Professor Jim Mitchell, Flinders University; and Professor Michelle Leishman, Macquarie University.

The Review Panel found that since its establishment in 2011, the Centre has made excellent advances in several areas. It has:

- developed a Project Prioritisation Protocol for governments and environmental nongovernment organisations to prioritise biodiversity conservation projects;
- developed a strongly interdisciplinary research program;
- become a highly respected source of scientific and technical advice to both government and non-government organisations;
- published collaborative, widely cited papers in high quality journals; and
- the Panel considered that the Centre had provided a supportive and stimulating environment for the next generation of researchers.

Overall, the Review Panel believes that the Centre has made excellent progress to date. The Review Panel recommended that ARC funding for the CEED be continued at the current level until the end of currently scheduled funding in 2017.

The Centre is currently undertaking measures based on the recommendations of the review with an expected completion date of June 2015.

Australian Government

Australian Research Council

our people

University of Queensland node, led by Hugh Possingham (back row, 6th from the right).

Dr Brendan Wintle, Chief Investigator at the University of Melbourne node. Photo: Sarah Bekessy.

Our members

Collaborating Organisations	Abbreviation
The University of Queensland	UQ
The University of Melbourne	UM
The University of Western Australia	UWA
RMIT University	RMIT
The Australian National University	ANU

Partner Organisations	Abbreviation
Imperial College, London	Imperial
Trinity College Dublin, Ireland	TCD
CSIRO Ecosystem Sciences	CSIRO
The Hebrew University of Jerusalem, Israel	HUJI
United States Geological Survey	USGS

Director	
Prof Hugh Possingham	UQ

Deputy Director	
Prof Michael McCarthy	UM

Executive	
Prof David Lindenmayer	ANU
Prof Michael McCarthy	UM
Prof David Pannell	UWA
Prof Hugh Possingham	UQ
Dr Kerrie Wilson	UQ
Dr Brendan Wintle	UM

Theme Leaders	
Assoc Prof Salit Kark (Theme A)	UQ
Dr Jonathan Rhodes (Theme B)	UQ
Assoc Prof Sarah Bekessey (Theme C)	RMIT
Assoc Prof Peter Vesk (Theme D)	UM
Dr Michael Bode (Theme E)	UM

Chief Investigators	
Assoc Prof Sarah Bekessey	RMIT
Dr Michael Bode	UM
Prof Richard Hobbs	UWA
Assoc Prof Salit Kark	UQ
Prof David Lindenmayer	ANU
Prof Michael McCarthy	UM
Dr Eve McDonald-Madden	UQ
Prof David Pannell	UWA
Prof Hugh Possingham	UQ
Dr Jonathan Rhodes	UQ
Dr Anthony Richardson	UQ
Assoc Prof Peter Vesk	UM
Dr Kerrie Wilson	UQ
Dr Brendan Wintle	UM

Partner Investigators	
Prof Yvonne Buckley	TCD
Assoc Prof Noam Levin	HUJI
Dr Tara Martin	CSIRO
Dr E.J. Milner-Gulland	Imperial
Dr James D (Jim) Nichols	USGS

our members continued

Senior Researchers

Dr Joe Bull	Imperial
Dr Morteza Chalak	UWA
Dr Graeme Doole	UWA
Assoc Prof Don Driscoll	ANU
Dr Fiona Gibson	UWA
Dr Sayed Iftekhar	UWA
A/Prof Scott Jeffrey	UWA
Dr Marit Kragt	UWA
Dr Joslin Moore	UM
Dr Maksym Polyakov	UWA
Dr Rachel Standish	UWA
Dr James Watson	UQ

Postdoctoral Fellows

Dr Sam Banks	ANU
Dr Philip Barton	ANU
Dr Maria Beger	UQ
Dr Joseph Bennett	UQ
Dr Hawthorne Beyer	UQ
Dr Duan Biggs	UQ
Dr Lucie Bland	UM
Dr Nathalie Butt	UQ
Dr Jane Catford	UM
Dr Morteza Chalak	UWA
Dr Shaun Coutts	UQ
Dr Martina Di Fonzo	UQ
Dr David Duncan	UM
Dr Georgia Garrard	RMIT
Dr Fiona Gibson	UWA
Dr Ascelin Gordon	RMIT
Dr Gurutzeta Guillera-Arroita	UM
Dr Cindy Hauser	UM
Dr Geoff Heard	UM
Dr Kelly Hunt de Bie	UM
Dr Gwen Iacona	UQ
Dr Karen Ikin	ANU
Dr Christopher Ives	RMIT
Dr Chris Jones	UM
Dr Luke Kelly	UM
Dr Carissa Klein	UQ
Dr Marit Kragt	UWA
Dr Heini Kujala	UM
Dr Jose Lahoz-Monfort	UM
Dr Pia Lentini	UM
Dr Ramona Maggini	UQ
Dr Maina Mbui	UQ
Dr Luis Mata	RMIT
Dr Melinda Moir	UWA
Dr Karen Mustin	UQ
Prof Maksym Polyakov	UWA
Dr Alana Moore	UM
Dr Alessio Mortelli	ANU
Dr Brett Murphy	UM
Dr Emily Nicholson	UM
Dr Jodi Price	UWA
Dr Tracey Regan	UM
Dr Anna Renwick	UQ
Dr Tracy Rout	UM
Dr Libby Rumpff	UM
Dr Rob Salguero-Gomez	UQ
Dr Chloe Sato	ANU
Dr Danielle Shanahan	UQ
Dr Justine Shaw	UQ
Dr Luke Shoo	UQ
Dr Annabel Smith	ANU
Dr Rachel Standish	UWA
Dr Reid Tingley	UM
Dr Ayesha Tulloch	UQ
Dr Leonie Valentine	UWA
Dr Jessie Wells	UQ
Dr Martin Westgate	ANU

Weebill. Photo: Dean Ingwersen.

Banksia. Photo: Trevor Ward.

our members continued

Dr Howard Wilson	UQ
Dr Amy Whitehead	UM

PhD Students

Nancy Auerbach	UQ
Anna Backstrom	RMIT
Christopher Baker	UM
Payal Bal	UQ
Sana Bau	UM
John Baumgartner	UM
Laurence Berry	ANU
Sharna Bourke	UQ
Sugeng Budiharta	UQ
Tom Bird	UM
Hernan Caceres Escobar	UQ
James Camac	UM
Abbey Camaclang	UQ
Stefano Canessa	UM
Xyomara Carretero-Pinzón	UQ
Debbie Chamberlain	UQ
Diego Correa Gomez	UQ
Hugh Davis	UM
Katrina Davis	UWA
Brendan Dillon	UQ
Kiran Dhanjal-Adams	UQ
Aaron Dodd	UM
Naomi Evans	UQ
Dini Fardila	UM
Michelle Freeman	UM
Eduardo Gallo Cajiao	UQ
Veronica Gama	UQ
Katherine Giljohann	UM
Kate Grarock	ANU
Angela Guerrero	UQ
Valerie Hagger	UQ
Chris Hallam	UM
Yi Han	UQ
Jeffrey Hanson	UQ
Mat Hardy	RMIT
Kate Helmstedt	UQ
Brett Howland	ANU
Decky Indrawan Junaedi	UM
Geoffrey Kay	ANU
Claire Keely	UM
Christine Kershaw	UWA
Caitlin Kuempel	UQ
Alex Kusmanoff	RMIT
Elizabeth Law	UQ
Juliana Lazzari	ANU
Darren Le Roux	ANU
Hsien-Yung Lin	UQ
Ding Li Yong	ANU
Azusa Makino	UQ
Crystal Mantiyka-Pringle	UQ
Maria Martinez-Harms	UQ
Fleur Maseyk	UQ
Sean Maxwell	UQ
Tessa Mazor	UQ
Sarah McCall	UM
Liz Martin	UM
Kimberley Millers	UM
William Morris	UM
Estibaliz Palma	UM
Hannah Pearson	UM
Michaela Plein	UM
Jane McDonald	UQ
Jennifer McGowan	UQ
David Meiklejohn	RMIT
Courtney Morgans	UQ
Laura Mumaw	RMIT
Wendy Neilan	ANU
Tal Polak	UQ

Xyomara Carretero-Pinzón, one of our PhD students. Photo: Sara Bennett

our members continued

Stephanie Pulsford	ANU
Keren Raiter	UWA
Laura Rayner	ANU
Jeremy Ringma	UQ
Andrew Rogers	UQ
Cristina Romero De Diego	UQ
Lucy Rose	UM
Rebecca Runting	UQ
Gerard Ryan	UM
Ben Scheele	ANU
Kylie Soanes	UM
Brigette Sommer	UQ
Darren Southwell	UM
Andres Surarez Castro	UQ
Tanja Straka	UM
Freya Thomas	UM
Nooshin Torabi	RMIT
Vivitskaia Tulloch	UQ
Els Van Burm	UM
Ruben Venegas Li	UQ
Nelida Villasenor	ANU
Casey Visintin	UM
John Weiss	UM
Matt West	UM
Nicholas Wolff	UQ
Michael Wysong	ANU
Ding Li Yong	ANU

Masters Students

David Blair	ANU
Madeline Brenker	UM
Kate Cranney	UM
Elise Gould	UM
Bill La Marca	UM
Greg Lefoe	UM
Liz Martin	UM
Sachiko Okada	ANU
Alina Pung	UM
Finley Roberts	UM
Adam Smart	UM
Tom Stephens	UM
Zoe Steven	UM
Rosanna van Hespen	UM

Honours Students

Carla Archibald	UQ
Alexander Johnson	UQ
Bona Hartota	UM
Laurel Osborne	UQ
Hannah Wauchope	UQ

Operations

Melanie King, COO	UQ
Dolla Boutros	UM
Pauline Byron	UM
Heather Christensen	UQ
Carol Fawcett	UQ
Heather Gordon	UWA
Melisa Lewins	UQ
Caroline Mitchell	UWA
Claire Shepherd	ANU

Science Communications

Jane Campbell	UQ
Karen Gillow	UQ
David Salt	ANU

our performance

Humpback whale. Photo: Michael Dawes, Flickr CC.

award winners

Jane Catford

2014 Australian Society for Limnology Early Career Excellence Award

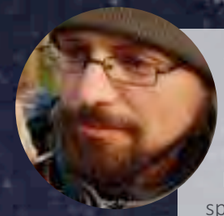
Graeme Doole

Finalist in the Robson Medal for best agricultural research by an early career researcher at UWA

Gurutzeta Guillera-Arroita

Early Career Researcher Grant from University of Melbourne

2nd prize, EDG video competition (with J. Lahoz-Monfort)



Jose Lahoz-Monfort

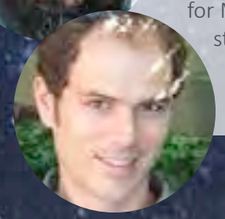
2nd prize at the EDG Video Competition ("Now you see it, now you don't! Imperfect detection and species distributions") (with G Guillera-Arroita)

Rebecca Runting

2014 Wentworth Group Science Program Scholarship

Don Driscoll and Sam Banks

Strategic communications and public affairs award for Most Unusual media story (Cannibal Horses)



Reid Tingley

ECR Grant: Optimal monitoring of freshwater biodiversity using environmental

DNA – Faculty of Science, The University of Melbourne

Eve McDonald-Madden

DECRA

European Union Erasmus Mundas Fellowship

Elected to the editorial board of Conservation Biology

Kiran Dhanjal-Adams

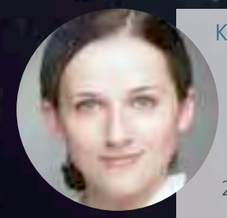
BirdLife Australia's Stuart Leslie Bird Conference Award

Kate Giljohann

Nancy Millis Science in Parks Award

Cindy Hauser

Nancy Millis Science in Parks Award



Katrina Davis

Graduate Research & Scholarship Office, University of Western Australia, Travel Award, 2014

Postgraduate Student's Association, University of Western Australia, Conference Travel Award, 2014

Eduardo Gallo-Cajiao

Special mention for the talk "Characterisation and analysis of the international conservation regime for migratory shorebirds in the East Asian-Australasian Flyway" at the Australasian Shorebird Conference, 20th-21st September 2014. Darwin, NT.

Morteza Chalak

GRDC External Competitive Grant for Special International Workshop on Invasive Species

Sayed Iftekhar

Research Collaboration Award from UWA

UWA Research Collaboration Award, 2014

Marit Kragt

Faculty of Science UWA

2013 Excellence in Honours Research Supervision Award

Australian Agricultural and Resource Economic Society (AARES) (with A. Rogers, F. Gibson, D. Pannell, M. Burton and L. Petersen)

2013 Quality of Research Communication Award

Kerrie Wilson

SCOPUS Young Researcher Award

Life and Biological Sciences

HG Andrewartha Medal, Royal Society of South Australia

Shortlisted for the Australian Academy of Science Nancy Millis Award and for the Prime Minister's Frank Fenner Life Scientist Prize

Photo: Jeremy Ringma.

performance measures

RESEARCH FINDINGS	2014 Target	Outcome
Number of research outputs - peer reviewed publications		
Number of journal publications	80	151
Number of papers with IF in top 25% of ecology journals	50 %	69 %
Number of invited talks/papers/keynote lectures given at major international meetings		
Number of invitations to deliver plenary talks at international conferences	8	5
Number of presentations not covered above	30	94
Number of commentaries about Centre-related achievements	5	67
RESEARCH TRAINING AND PROFESSIONAL EDUCATION	2014 Target	Outcome
Number of attended professional training courses for staff and students	20	45
Number of Centre attendees at all professional training courses	60	92
Number of mentoring programs	1	4
Number of students mentored	50	56
Number of new postgraduate students working on core Centre research and supervised by Centre staff	7	
PhD: 3-4 years		6
Masters by Research: 2 years		2
Number of new postdoctoral researchers recruited to work on core Centre research	6	8
Number of new Honours students working on core Centre research and supervised by Centre staff	10	2
Number of postgraduate completions and completion times, by students working on core Centre research and supervised by Centre staff (PhD & Masters)	7	9
Number of Early Career Researchers (within five years of completing PhD) working on core Centre research	15	16

INTERNATIONAL, NATIONAL AND REGIONAL LINKS AND NETWORKS	2014 Target	Outcome
Number of international visitors and visiting fellows (for more than 10 days)	10	15
Number of international visitors and visiting fellows (for less than 10 days)	20	35
Number of visits to overseas laboratories and facilities (for 10 days or more)	15	23
Number of visits to overseas laboratories and facilities (for 10 days or less)	30	36
Number of national and international workshops held and organised by the Centre	10	30
END-USER LINKS	2014 Target	Outcome
Number of government, industry and business community briefings	20	79
Number and nature of public awareness programs	10	27
Number of public talks given by Centre staff	80	30
Number of website hits	50,000	100,488
Number of organisations collaborating with, or involved in, CEED-related research	3	168
NATIONAL BENEFIT	2014 Target	Outcome
Number of briefings to government, business and interest groups		79
Number of cross-nodal publications		51
Number of cross-institutional publications		118
Number of submissions to government on policy matters		4
CENTRE-SPECIFIC INDICATORS	2014 Target	Outcome
Number of issues of internally produced magazine	10	9
Number of media releases	10	12
Number of media outputs	100	163
Memberships of national and international boards and committees	20	22

Green tree frog (Litoria caerulea). *Photo: Jeremy Ringma.*

financial

Income	2013 $	2014 $
ARC Centre Grant	1,862,205	1,918,480
Host Institutions cash support	834,361	833,849
Commonwealth Government other grants	2,618,444	596,224
ARC Fellowships	11,812,306	11,905,960
ARC Discovery	3,428,339	3,428,339
ARC Linkages	4,239,141	2,600,532
Other	587,971	1,124,358
Total Income	$25,291,767	$22,407,742

Expenditure	2013 $	2014 $
Salaries	1,743,991	1,359,263.07
Equipment	6,193	32,924.09
Travel	360,062	283,509.78
Research maintenance and consumables	17,017	8,534
Scholarships	130,036	248,105.81
Public outreach and administrations	16,269	120,720.91
Total Expenditure	$2,273,568	$2,063,240

ARC CENTRE OF EXCELLENCE
FOR ENVIRONMENTAL DECISIONS

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