

Annual Report 2011

ACTING DIRECTOR

I'm delighted to present the 2011 Environment Institute Annual Report for 2011 having taken over as Acting Director of the Institute in January 2012.

I was a member of the Environment Institute's Board for the period of this report and am thrilled to see how the strength of what was developed and initiated during 2011 is flowing through to this year and building on the results documented in this annual report.

2011 marked the third anniversary of the Institute and by the end of 2011 it had achieved, or exceeded, all its 5 Key Performance Indicators and nearly all the stretch targets set for it.

This strong foundational work has provided the backdrop for our leadership group to come together at the start of 2012 and refine future Institute aims and strategy. I'm very much looking forward to presenting the developments, as well as successes, in the collaborative delivery of results as we have refined our priorities this year.

The Institute is collectively composed of a large group of standout environmental research leaders conducting impressive and invigorating, relevant research. I hope you enjoy reading about some of this work from 2011 and I look forward to the further enhancement of our work in 2012.



Professor Bob Hill
Acting Director
The Environment Institute

MANAGEMENT TEAM

Professor Bob Hill, Acting Director of the Environment Institute
Professor Alan Cooper, Director of the Australian Centre for Ancient DNA (ACAD)
Professor Andrew Lowe, Director of the Australian Centre for Evolutionary Biology and Biodiversity (ACEBB)
Professor Barry Brook, Director of Climate Change Research
Professor Bronwyn Gillanders, Director of the Marine Biology Program (MBP)
Professor Corey Bradshaw, Director of Ecological Modelling
Professor Graham (Gus) Nathan, Director of the Centre for Energy Technology (CET)
Associate Professor Justin Brookes, Director of the Water Research Centre (WRC)
Professor Wayne Meyer, Director of the Landscape Futures Program (LFP)
Associate Professor Jennifer Watling, Head of School of Earth and Environmental Sciences
Professor Mike Wilkinson, Head of School of Agriculture, Food and Wine
Simon Divecha, Business Manager of the Environment Institute

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This report has been prepared for the Office of the Deputy Vice-Chancellor and Vice-President (Research), The University of Adelaide.

As of 31 December 2011 the Environment Institute had been in operation for 31 months since its launch on 4 June 2009.

This report has been compiled to address the 5 key performance indicators and directives as agreed upon by the Institute's Board on 5 November 2009.

SUMMARY AND FUTURE DIRECTIONS

The Environment Institute exists to deliver outstanding research across Environmental Sciences. By understanding patterns and processes to derive solutions, we help enable decision-making that can meet today's and future needs.

This focus is an important priority for the University, reflecting the role of our research in society and the current state of the environment as an international priority. This requires us to develop and implement solutions for its health, our wellbeing and to sustain our economy.

To help do this, the Environment Institute puts water and climate scientists together with biodiversity, marine, landscape and genetics work, and more. We are doing this at a time when our capabilities to research and understand the issues we face are growing exponentially.

Our work spans and transcends traditional science. This approach is essential to help meet today's and future needs. For example:

- What does it look like as we act to enhance biodiversity, recognising that human greenhouse emissions mean that the climate is changing?
- How does such an understanding enable us to answer human and environmental water needs?
- How do we effectively put different areas of science and research together to better understand environmental and social systems?
- How does climate change—with all the atmospheric, land, water temperature and sea interactions inherent in understanding this issue—affect ecology, food productivity and the environmental services that underpin our economy?

These are just a few of the questions demanding connected answers.

To help deliver connected answers we have specialists, working side by side, to deliver innovative, pertinent and relevant research including:

- Water
- Marine
- Biodiversity
- Conservation
- Climate change
- Impact assessment
- Landscape transformation
- Climate change resilience and adaptation
- Genetics, ancient DNA and DNA barcoding.

Our research work is detailed throughout this report. Some highlights include:

Biodiversity discovery

For 300 years, species identification meant describing the shape and features of animals and plants – slow and expensive work. DNA barcoding turns this on its head. Short pieces of genetic material can discover new species. On the other hand, such material can tell you which rainforest a piece of wood came from. This helps to identify illegal logging.

This knowledge can be used for sustainable trade, delivering a competitive advantage to the industries, people and companies that manage their resources for their own, and society's, long term advantage.

Ancient genetic clues

Climate change means that we may face rapid changes. Animals and plants may need to adapt to these environmental changes quickly. This poses a significant challenge to us and the biodiversity that supports our food production systems. Ancient genetic material holds some clues to climate change adaptation and resilience. To uncover this, we are looking into *epigenetic* changes, modifications that occur in organisms without altering the underlying DNA sequence, in 30,000 year old bison bones that were discovered in the permafrost at a goldmine in Canada's Yukon.

Comparing the epigenetic fingerprints to those from today's cattle, opens a window into how some animals may be able to adapt to rapid climate change. Understanding such fundamental processes, can generate knowledge to address food and environmental security, enhance resilience and, potentially, better manage some of the impacts of climate change. While there is no substitute for addressing greenhouse gas emissions, putting fundamental research together with predicted future conditions and impacts can deliver important benefits.

Enhancing biodiversity in a changing climate

As Australia acts on carbon emissions, scientific capabilities—focusing on climate change, biodiversity, genetics and landscape transformation – have advanced significantly in recent years. These capabilities address maintaining and improving ecosystems while also designing for the future resilience of such systems as the climate changes.

This science has the potential to assist our biodiversity programs. In particular, it is relevant to assessing complex interactions – what are likely to be the best restoration and enhancement approaches? We need to address cost, climate change resilience and future biodiversity outcomes over expansive landscapes. What project-scale outcomes could we assess today for better future results?

Relevant active research at the Environment Institute includes:

- Optimising biodiversity corridors, beyond simple linkages, for ecosystem resilience
- Monitoring the impact of climate change combined with other human-driven changes on biodiversity
- Understanding and predicting how systems will change to forecast biodiversity responses with climate change
- Quantifying potential extinction threats and enhancing our responses
- Developing logistically feasible and cost-effective ways to prevent biodiversity loss
- Investigating water use and the implications from major revegetation programs.

The future of our land – from aspiration to implementation

Regional adaptation to climate change – addressing agricultural resilience and productivity while, at the same time catering for changing market and society demands—is possible. We can mitigate against climate impacts by adapting what and how we farm, restoring and enhancing biodiversity, and focusing on where we take such actions within specific areas of the landscape.

Demonstrating technical feasibility is, however, only a first step. We also address the implementation challenges – the best ways for individuals, localities and regions to embed such knowledge, so that people and organisations act on it.

Murray River

The Coorong, Lower Lakes and Murray Mouth region is one of Australia's largest wetland systems. Located south-east of Adelaide in South Australia, the region is of international ecological significance and is one of the Murray-Darling Basin Authority's Living Murray Icon sites. The region hosts an economy based on agriculture, fisheries and tourism, and is the traditional country of the Ngarrindjeri nation.

Modifications to the flow regime of the Murray River have resulted in a significant change in the ecological character of the region. Currently consumptive use of water across the Murray-Darling Basin has reduced the average annual stream flow at the Murray Mouth by about 60%. Water use and a regional drought have resulted in siltation of the Murray Mouth channel to the sea and extreme hyper-salt water in the Coorong's South Lagoon.

We helped to gather ecological information and to develop a decision-support framework to assess the effectiveness of interventions aimed at restoring and managing the Coorong and Murray Mouth.

The framework uses ecosystem-level models that allow natural resource managers to



SUMMARY AND FUTURE DIRECTIONS

assess potential consequences of actions and evaluate water benefits, particularly for migratory birds and estuarine fish. The framework has been used to evaluate 20 potential longer-term climate and management scenarios for the Coorong and Murray Mouth region.

Spencer Gulf

The Spencer Gulf region expects to see a rapid expansion in shipping and development within ten years.

We are leading a major marine investigation on the Gulf. This work brings together essential social, economic and biophysical information to understand the Gulf's environment. Our research will help maximise the likelihood that a significant number of major developments, currently being planned or underway, can occur without compromising the region's fisheries and environment.

The Environment Institute's performance measured

2011 saw the Environment Institute achieve all its Key Performance Indicators. The performance over the three years since the institute was established is detailed below. We identify key 2011 highlights and when these achievements are particularly linked to a specific centre, program or laboratory.

KPI 1 The Environment Institute leads national and international research programs

KPI One major new initiative per year for first three years

- We successfully established next generation genetic sequencing at the University in 2011.
- We played a key role in establishing the Goyder Institute for Water Research that funds much of the work being undertaken by this centre.
- We are now developing and have secured industry funds for the first stage of a \$20m to \$50m Spencer Gulf Development Initiative. The majority of program development work occurred in 2011.
- Throughout 2011 we developed a series of proposals that seek to bring together biodiversity conservation with landscape management and ecosystem service thinking.
- In 2011 we developed a major soil carbon proposal for submission to Canberra that will bring together researchers from South Australia, Victoria, ACT, Queensland and Western Australia (with UK input).

Stretch Targets Lead a major funding program in each sector of the Institute by 2013

- The Terrestrial Ecosystem Research Network and Bar Code of Life research are sector leading programs with significant input and delivery through Australian Centre for Evolutionary Biology and Biodiversity (ACEBB). A 2011 highlight was the Barcode of Life conference in Adelaide.
- The initiative we are developing for Spencer Gulf is targeted to bring between \$20 million and \$50 million to the South Australian marine research community.
- The Australian Centre for Ancient DNA (ACAD) is an international leader in ancient DNA research.
- The Global Ecology Laboratory's (GEL) modelling related to climate change, biodiversity and biosecurity has established an international leading reputation for such climate change impact and evidence consideration.
- Water research work, led by the Water Research Centre, is being sought out to assist with water research in China.

Stretch Target International partnership established by 2013

- A series of collaborative international arrangements are in place and are influential in the success of programs and projects highlighted above and following.

KPI 2 The Environment Institute builds new strategic relationships

KPI Several relevant state government agencies have joint appointments with EI by 2010

- Several joint appointments have been made with the Department of Environment, Water and Natural Resources.

KPI One new centre created within the EI by 2009

- We have established the Centre for Energy Technology (CET).
- We have established the Water Research Centre (WRC).
- In the near future, we expect to establish further new centres.

KPI Some base level funding received by 2010

- We have secured corporate funding for the Centre for Energy Technology.
- We have secured a corporate collaboration that is funding the development of a Spencer Gulf Development Initiative.

Stretch Target Significant relationships formed with national government agencies, at least one ASX200 company and international research centres

- Through the Spencer Gulf Development Initiative, ancient DNA genetic history work, ACEBB Gene Bank of Australasia, climate change and biodiversity work, Natural Resource Management and Landscape Futures engagements, we have formed significant relationships with key companies and the Australian Government. This work, by its very nature, is ongoing.

Stretch Target External, base level funding of \$500k pa by 2011

- Untied endowment for base funding was a stretch and difficult to meet despite succeeding with approximately 50% of this target.

Stretch Target Demonstrated influence on the structure of curriculum and operations within the University

- Engagement includes bringing a policy research focus to the University's course on Environmental Issues and the development of the Master of Carbon Management core courses (Business and Resource Management offered by the University of Adelaide's Business School). In addition, nearly all Environment Institute researchers and staff teach at least one subject and/or supervise a significant number of post graduate students – largely at Ph.D level.

KPI 3 Research income growth at an annual compound rate of 15%

Required progress 15% target achieved by 2011 and beyond from 2009

- Achieved - details on grants and statistics are later in this annual report.

Stretch target Double research income by 2013

- We are on track to double the research income associated with Environment Institute scientists by 2013.

KPI 4 Government policy and investment in the private sector is demonstrably influenced

Required Progress Advice sought and preferably State Government policy influenced as a result of EI

- We are routinely consulted by State and Commonwealth Government agencies on a wide range of issues. Arguably our greatest engagement is in the water sector and in the development of natural resource management policies, plus strategic thinking on the impacts of climate change on biodiversity, resilience, pest emergence and refugia.

Required Progress Major new investment in infrastructure by private sector using know how developed by EI by 2011

- Investment based on the CET solar thermal hybrids and algae biofuel programs,



SUMMARY AND FUTURE DIRECTIONS

plus timber source tracking using DNA Barcoding at ACEBB, are leading programs for private sector development.

Stretch Target National and international government policy changed as a result of EI research

- A number of water management policies at state and national level have been impacted by EI research including Murray-Darling Water management and accounting for the use of water by forest plantations.

KPI 5 The Environment Institute increases the recognition of its research

Required Progress Maintain current media profile, recognition of research excellence

- We have excelled in this area with significant quality written media, social media and recognition in the academic community. Statistics are later in this report.
- Environment Institute centre and program directors are sought out as speakers for international conferences. A tangible measure of this impact was the hosting of the Barcode of Life conference in Adelaide - the only time this conference has been held in the Southern Hemisphere.

Stretch Target National and international research awards and significant increase in international media recognition

- Mike Young, Barry Brook, Corey Bradshaw, Andy Lowe have all won national awards.

Management

The Environment Institute Advisory Board in 2011 consisted of:

- Dr Steve Morton, CSIRO Group Executive, Manufacturing, Materials and Minerals (Chair, commenced in June 2011)
- Paul Duldig, Vice-President, Services and Resources, University of Adelaide (Chair until June 2011)
- Professor Bob Hill, Executive Dean of the Faculty of Sciences, University of Adelaide
- Professor Peter Dowd, Executive Dean of the Faculty of Engineering, Computer and Mathematical Sciences, University of Adelaide
- Pauline Gregg, Head of CSR and Public Affairs at St George Bank
- Carl Binning, Vice-President for Sustainability, BHP Billiton
- Professor Mike Young, Executive Director of the Environment Institute

The Board met twice during 2011, in June and December.

Environment Institute Centres and Programs

Biodiversity and Conservation



Australian Centre for Ancient DNA (ACAD)
www.adelaide.edu.au/environment/acad
Director Alan Cooper



Australian Centre for Evolutionary Biology & Biodiversity (ACEBB)
www.adelaide.edu.au/environment/acebb
Director Andrew Lowe

Biodiversity, Conservation and Climate



Global Ecology Laboratory
www.adelaide.edu.au/environment/climate
Directors Barry Brook
& Corey Bradshaw

Energy



Centre for Energy Technology (CET)
www.adelaide.edu.au/environment/energy
Director Graham (Gus) Nathan

Envisioning, Water, Land and Sea Futures



Landscape Futures Program
www.adelaide.edu.au/environment/lfp
Director Wayne Meyer



Marine Biology Program (MBP)
www.adelaide.edu.au/environment/mbp
Director Bronwyn Gillanders



Water Research Centre (WRC)
www.adelaide.edu.au/environment/wrc
Director Justin Brookes



MAJOR RESEARCH PROGRAMS - IN DEVELOPMENT

Note: Only projects attracting more than \$100k in 2011 or \$300k across their lifespan have been included.

Adapted future landscapes: from aspiration to implementation (\$3.5m)

Funding Climate Change Adaptation Research Grant (2012-2013)

Status Pending

Lead Professor Wayne Meyer



The University of Adelaide will work with the Eyre Peninsula and SA Murray-Darling Basin Natural Resources Management Boards to generate new regional plans to integrate changes in climate with environmental management, production and community goals. The results of this research will also inform work under the Clean Energy Future plan to incorporate

An integrated tool for informing pest management: modelling range shifts for an invasive vertebrate in response to climate change (\$575k)

Funding ARC Linkage Projects

Status Pending

Lead Dr Damien Fordham, Assoc. Professor Phillip Cassey, Professor Barry Brook, Mr Gregory Mutze



Invasive species and climate contribute directly to loss of biodiversity and economic productivity. This research project focuses on providing user-orientated tools that enable a strategic approach to European rabbit management and vertebrate pest control in Australia in response to anticipated climate and land-use change.

AusBASE (\$35m)

Funding Commonwealth

Partners Atlas of Living Australia, holders of National Biological Collections (approx. 30), Australian Barcode of Life Network

Status Pending

Lead Professor Andrew Lowe



Professor Andrew Lowe has developed a major funding proposal for a national DNA barcoding program. The proposed program outlines the establishment of the Australia Barcoding and Systematic Encyclopaedia (AusBASE). This national five year program would require an estimated \$35 million in Commonwealth funding that would be distributed across 30 key institutions to liberate information stored in biological collections. This effort would include the digitisation of existing collection information and sub-sampling of collection specimens for DNA analysis. Professor Lowe is working closely with the Atlas of Living Australia and Australian Barcode of Life Network to further develop this proposal.

MAJOR RESEARCH PROGRAMS - IN DEVELOPMENT

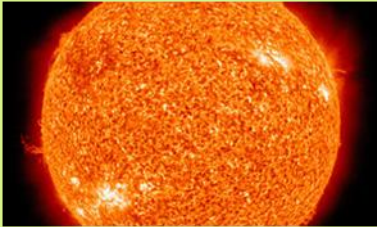
Australian Solar Institute

Funding Australian Solar Institute

Partners Heliotherm and other partners under negotiation

Status An amended bid is set to be resubmitted in round 3

Lead *Professor Graham (Gus) Nathan*



Two bids are under development for the third round, following feedback from the first and second rounds. One of these is for a novel solar-combustion hybrid technology being developed by Centre for Energy Technology, and the other is for solar gasification of coal. Support for the first of these will be strengthened by the recent announcement of a successful ARC Linkage Grant on the same technology. The formal call for the expression of interest was due at the end of June. Funding announcements for the third round of ASI are anticipated in December.

Bad tastes, odours and toxins in our drinking water reservoirs: are benthic cyanobacteria the culprits? (\$465k)

Funding ARC Linkage Projects

Status Pending

Lead *Assoc. Professor Justin Brookes, Professor Andrew Humpage, Assoc. Professor Michael Burch, Assoc. Professor Paul Monis, Professor Tsair-fuh Lin*



Cyanobacteria (blue-green algae) produce toxins and bad tastes that contaminate drinking water sources, cause public concern about water quality. This project will address a critical knowledge gap by investigating species that grow on the sediments of reservoirs, thus providing more comprehensive management solutions to the water industry.

Building resilience into the lower Murray swamps through exploration of experimental land use options (\$555k)

Funding Department For Water - Riverine Recovery package

Partners University of Adelaide Consortium

Status Pending

Lead *Associate Professor Justin Brookes*



A multidisciplinary exploration of land use options for riverine recovery in the lower Murray swamps, including social, spatial and ecological parameters.

MAJOR RESEARCH PROGRAMS - IN DEVELOPMENT

From organo-mineral nanocomposite to Australian basins: an integrated approach to unconventional gas exploration and development (\$750k)

Funding ARC Linkage Projects

Status Pending

Lead *Professor Martin Kennedy, Dr Rosalind King, Professor David Dewhurst, Dr Simon Holford*



Gas production from unconventional shale reservoirs is a potential major energy boom in Australia that will lower carbon emissions over comparable coal and oil use. The geological controls of shale are currently too poorly understood to direct effective exploration. This project will be the largest international effort to develop this knowledge.

Heat transfer in novel solar thermal reactors to process minerals and solar fuels (\$500k)

Funding ARC Discovery Project

Status Pending

Lead *Professor Graham (Gus) Nathan*



The project will develop new design tools for optimising novel solar reactors for the production of solar fuels and for low emission minerals processing. It will enable substantial cost reductions in these technologies and establish a unique and leading program in solar power tower technology within Australia.

Human ancient DNA (~\$600k)

Funding ARC Future Fellowship

Partners American and European laboratories & Australian museums

Status Pending

Leads *Professor Alan Cooper, Doctor Wolfgang Haak*



To build upon the collaborations formed through participation in the Genographic Project, ACAD is looking to increase its capacity for human ancient DNA research through supporting the development of the early-career researcher Doctor Wolfgang Haak. Wolfgang is an expert in ancient human DNA and the evolution of our species. ACAD will look to expand its operation by supporting Wolfgang in his international research collaborations. This is an important step for ancient DNA research in Australia as this field has traditionally been dominated by European and American laboratories. Unique opportunities exist in Australia to examine the history of our Indigenous populations and that of our closest neighbours.

MAJOR RESEARCH PROGRAMS - IN DEVELOPMENT

Identifying NGOs for investment strategies (≈\$5m)

Funding TBA

Status Pending

Lead *Professor Andrew Lowe*



The Australian Centre for Evolutionary Biology and Biodiversity has employed Simon Habel, Director of Conservation Ark at the Zoological Society of South Australia, to conduct a scoping exercise on NGO and industry funding opportunities for biodiversity and ecosystem management. Simon has previously held the position of Vice President Global Support with the World Wildlife Fund. Simon is working closely with members of the Environment Institute to map our research strengths to the needs of NGOs.

Investigation of the coupled dependence of concentrated solar radiation and combustion in a novel solar hybrid technology (\$1m)

Funding ARC Linkage Projects

Status Approved

Lead *Professor Graham (Gus) Nathan*



This project will develop the models necessary for the optimisation of a novel solar-combustion hybrid technology and a novel heat exchanger component. It will deliver a solar thermal technology that lowers the cost of solar energy with immediate potential in off-grid sites, such as in remote mines, in Australia and throughout the world.

Landscapes for Life (\$≈5m)

Funding Various including the Potter Foundation and South Australian Local Government Association

Status Pending

Leads *Professor Wayne Meyer, Professor Andrew Lowe, Professor Barry Brook, Professor Corey Bradshaw, Professor Bronwyn Gillanders, Professor Randy Stringer, Professor Mike Young*



World Heritage Sites bring economic, social and cultural benefits to their communities, along with global prestige, new business opportunities, and potential 'reputation premiums' for local products. There are also outcomes such as increased investment and enhanced local pride, place and identity. Only a handful of the 890 listed World Heritage Sites focus on agricultural landscapes; few of those are 'working agrarian landscapes'. We are building a case to intensively research a mosaic of agrarian landscapes, from the Clare Valley to the Fleurieu Peninsula, which would culminate in an application for World Heritage status.

MAJOR RESEARCH PROGRAMS - IN DEVELOPMENT

Spencer Gulf (\$Negotiations progressing)

Funding \$240k from Fisheries Research and Development Corporation + \$240k from industry

Partners SARDI

Status Pending

Leads *Professor Bronwyn Gillanders, Professor Corey Bradshaw*



Support is being sought by a consortium of industry and research providers to explore development options in Spencer Gulf to maximise the commercial, ecological and cultural potential of the surrounding region. The project seeks to provide pragmatic solutions to support the rapid development of mining ventures in the north. A focus is placed upon minimising the environmental impacts on the Spencer Gulf ecosystem while allowing for the maintenance of fisheries and expansion of aquaculture. This cross institutional program would provide information to decision makers such as where to locate new ports, logically sizing infrastructure, dredging, location of aquaculture zones and management of invasive species and zoning of marine parks.

MAJOR RESEARCH PROGRAMS - IN PROGRESS

Adelaide Airport (\$750k)

Funding Adelaide Airport (2011-2013)

Partners Adelaide Airport

Lead Professor Graham Nathan



The Adelaide Airport aims to become an Australian leader in clean energy use thanks to a new three-year, \$750,000 partnership with the University of Adelaide's Centre for Energy Technology. Members of the Environment Institute will investigate renewable energy generation both on and off site, including wind and solar energy; novel methods to reduce energy from heating, cooling and lighting; alternative approaches for ground transportation; and adapting new technologies to Adelaide Airport's unique facilities and requirements.

ARC Super Science Fellowships (\$557k)

Funding ARC Super Science Fellowships (2011-2014)

Leads Professor Andrew Lowe, Professor Corey Bradshaw, Professor Anton van den Hengel, Professor Barry Brook, Professor Alan Cooper



Two fellowships have been awarded to the Environment Institute to examine environmental DNA barcoding and genomics, and develop methods for rapid visual analysis of ecosystem change and improved climate change modelling approaches. Improving the forecasts of ecosystem shifts must be a key focus of future ecological research if we are to preserve our unique Australian landscapes. The damage modern human societies are inflicting on global environments has led to a great demand for logistically-feasible and cost-effective ways to prevent biodiversity loss, issues that will be addressed by these fellows.

A shipload of consequences: studying the impact of Old World diseases on native South American populations via ancient DNA (\$360k)

Funding ARC Discovery (2010-2012)

Lead Doctor Wolfgang Haak



This pioneering project will give the first real-time picture of the genetic changes induced by epidemics in human populations. This will reveal important new information about the likely impact of future epidemics on the genetic diversity of the immune system in modern human populations. It will be of substantial use in building epidemiological models. By proposing to combine state-of-the-art science with global problems of humanity, we will address Australia's interests in expanding scientific expertise beyond its borders and place Australia at the leading edge of disease impact studies.

MAJOR RESEARCH PROGRAMS - IN PROGRESS

A new flood design methodology for a variable and changing climate (\$342k)

Funding ARC Discovery (2010-2012)

Lead *Professor Martin Lambert*



The extreme temporal and spatial variability of Australia's rainfall affects the quantity and quality of water resources, the productivity of agricultural systems, and aquatic and terrestrial ecosystems. Given the impact of extreme events such as floods and the massive investment in water related infrastructure, evaluation of these risks is an issue of national economic and environmental significance. Monte Carlo simulation techniques will quantify the risks associated with current and future climate change, and the combined risks that come from multiple sources, such as from coastal tides and storm runoffs. This research will provide a new spatial framework for calculating risk as well as tools to evaluate flood risk.

Biodiversity and population genetics of groundwater calcrete ecosystems of central Western Australia (\$500k)

Funding ARC Linkage (2010-2013)

Partners Minara Resources Limited, South Australian Museum, Western Australian Museum

Leads *Professor Andrew Austin, Assoc. Professor Steve Cooper*



This project is documenting a unique subterranean ecosystem of world acclaim that represents a significant component of the biodiversity of the Australian arid zone. It is contributing to the sustainable management of groundwater ecosystems and providing information that can be used to predict and monitor how future water use and climate change may impact on these ecosystems. Results generated will provide the knowledge base required to improve the efficiency and scientific rigour of the environmental review process for major resource projects, leading to economic benefits for the mining and environmental consultancy industries, and to Australia in general.

Capturing Proteus: 65 million years of ecosystem change revealed through evolution of Proteaceae in Australasia (\$330k)

Funding ARC Discovery Grant (2011-2013)

Leads *Doctor Gregory Jordan, Assoc. Professor Timothy Brodribb, Professor Robert Hill*



By assessing past changes in the iconic Australian plant family Proteaceae, this research will show how the Australasian vegetation has responded to 65 million years of profound landscape and climate changes. This knowledge from the past will give important insights into how ecosystems can be expected to change under future climate scenarios.

Detailed understanding of the behaviour of soot in, and emission from, turbulent flames and fires (\$504k)

Funding ARC Discovery (2010-2012)

Lead *Professor Graham (Gus) Nathan*



Combustion processes creating soot have been widely employed for many years. Their great complexity puts them beyond present capacity to understand or reliably model such processes. Within a flame, soot plays an important role in radiant heat transfer, and hence in energy efficiency. Beyond a flame, soot can either be emitted as an unwanted air pollutant or as a desirable source of nano particles, depending on the application. The benefits to society from improved understanding and predictive capability include reduced air pollution; improved health and safety; increased efficiency in the utilisation of both fossil and alternative fuels; the support of the rapidly growing sector employing carbon nano particles; and increased fire safety.

Developing best practice approaches for restoring forest ecosystems that are resilient to climate change (\$405k)

Funding ARC Linkage (2012-2014)

Partners Australian Carbon Biosequestration Initiative Ltd, Greenfleet, Greening Australia (SA) Ltd, SA Water, Trees For Life Inc

Leads *Professor Andrew Lowe, Professor Barry Brook, Professor Corey Bradshaw*



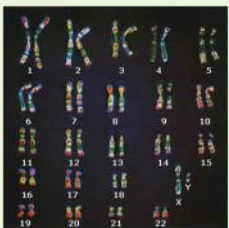
Existing restoration practices for forests tend to rely on ad hoc rules of thumb that lack a firm scientific basis and risk failure due to climate change. This project will model biodiversity, genetic and growth performance data to develop best practice restoration guidelines for forest ecosystems to enable them to become resilient to climate change and maximise biodiversity and carbon capture outcomes.

Development of a diagnostic microarray to detect aneuploidy in single cells (\$240k)

Funding ARC Linkage Grant (2010-2012)

Partners Geneworks, Reproductive Health Science

Leads *Associate Professor Frank Grutzner, Mr Robert King, Doctor Dean Male*



Incorrect chromosome number is one of the most common genetic abnormalities in newborns and in cancer. Accurate diagnosis of chromosomal defects from minimal starting material and single cells is still challenging but has many applications for diagnosing human cancers, in prenatal diagnosis and assisted reproductive technology. This study seeks to develop better ways of amplifying DNA from single cells and more sensitive tests to detect chromosomal imbalance. This research will also provide emergent applications for powerful new sequencing technology for use in both research and product development.

MAJOR RESEARCH PROGRAMS - IN PROGRESS

DNA and the missing: ancient DNA and advanced forensic identification (\$693k)

Funding ARC Future Fellowship (2010 - 2014)

Lead *Dr Jeremy Austin*

Identifying the remains of missing persons, disaster victims and war dead is of major social and cultural importance and has significant implications for national and international justice systems. This project is applying expertise in the analysis of ancient DNA to build capacity within Australia to identify highly degraded human remains. This research will be conducted in Australia's own purpose built Ancient DNA laboratory maintained by ACAD. During 2010, ACAD completed four consulting contracts for the DNA analysis of human remains for interstate and Commonwealth Government clients, private companies and the general public. This area of research holds promise for the generation of a non-traditional funding stream and the Centre is looking to partner with biotech companies to develop tailor-made forensics protocols specific to their DNA sequencing platforms.



Early warning of cyanobacteria blooms in drinking water reservoirs by means of evolutionary algorithms (\$360k)

Funding ARC Linkage (2009-2012)

Partners SA Water & South East Queensland Water

Lead *Associate Professor Friedrich Recknagel*



The estimated economic cost of cyanobacteria blooms to Australia is \$150 million per annum. Early warning of cyanobacteria blooms will allow water managers to conduct preventive and operational controls in reservoirs and water works, and significantly lower the public health risks and costs of monitoring and treatment. Resulting early-warning systems will be novel prototypes for cyanobacteria blooms in drinking water reservoirs based on forecasting models adaptable to environmental and climate change. Model-based scenario analysis will also assist in informed decisions on effects of drought, injection of recycled water and global warming to cyanobacteria growth.

Ecology, physiology and phylogeography: an integrated approach to the study of the invasive marine green macroalga *Caulerpa taxifolia* in Australia (\$524k)

Funding ARC Linkage (2009-2012)

Partners Department of Primary Industries and Resources of South Australia

Lead *Doctor Carlos (Fred) Gurgel*



The green marine macroalga *Caulerpa taxifolia* is one of the world's worst invasive species. In Australia, 'exotic strains' of this alga are a listed pest species. Invasions in NSW and SA have caused environmental harm and managing them has cost \$10 million since 2000. This linkage project will integrate ecology, physiology and genetic analyses to provide data to better respond to this pest, potentially savings millions of dollars per year. We will produce the first empirical evidence of the effects of climate change and ocean acidification on this marine pest, in the context of increasing coastal human populations.

MAJOR RESEARCH PROGRAMS - IN PROGRESS

Environmental genomics: mining, climate change, water, crime and health (\$1.26m)

Funding ARC Linkage (2009-2012)

Partners Australian Federal Police, Institute of Medical & Veterinary Science, Australian Water Corporation Centre, SA Water, Department of Primary Industries and Resources of South Australia, Department for Environment & Heritage (now Department of Environment and Natural Resources), Australian Genome Research Facility, Biomatters Ltd & South Australian Museum

Lead *Professor Alan Cooper*



The new environmental genomics approach will employ high-powered genome sequencing systems to perform some of the first detailed genetic studies of Australian environments. The resulting high-resolution data will comprise a genetic audit, providing essential information for the accurate measurement of climate and environmental change. This method will dramatically improve the speed and power of environmental impact assessments, permitting responsible resource development with major benefits to industry and the economy. It will also create new tools to improve water management and quality, biosecurity, forensics/policing and human health, as reflected by the diverse range of industry partners supporting this project.

Frequency domain micro-reflection processing for pipe condition assessment (\$372k)

Funding ARC Discovery (2010-2012)

Lead *Professor Angus Simpson*



Over the coming years, many millions of dollars will be spent on upgrading deteriorated pipeline infrastructure that is part of water distribution systems all over Australia. Determining the condition of buried pipes is very difficult and expensive. This research will solve that problem. We will develop powerful numerical methods for non-invasive pipe condition assessment. Small controlled transients will be input by a specially designed signal generation device that can determine the condition of the inside of the pipe. These new techniques will be cost-effective, accurate and able to cover very long distances of pipe.

From biodiversity to health: performing the first genetic audits of Australia (\$900k)

Funding ARC Future Fellowship (2009-2013)

Lead *Professor Alan Cooper*



This project is establishing a new technology for the rapid measurement of environmental biodiversity, whether that be in natural resources such as forests, or pathogens in water supplies or hospitals. The method is fast, low- cost and provides much higher resolution than current methods. It will provide some of the first ever comprehensive environmental impact assessments using such techniques, and thus assist responsible resource development with major benefits to industry and the economy. It also provides a common platform for government agencies (including agencies from the South Australian Department of Environment and Natural Resources to the Federal Police). It will create new tools to improve water management, biosecurity, forensics/ policing and human health. The wide reach of the research is reflected in the range of industry partners supporting the project.

MAJOR RESEARCH PROGRAMS - IN PROGRESS

Goyder Institute for Water Research — Environmental Water

Funding South Australian State Government 2010-2014

Partners CSIRO, University of South Australia, Department For Water, Department of Environment and Natural Resources, Flinders University

Lead Associate Professor Justin Brookes



Mike Young, Justin Brookes and Graeme Dandy were key proponents in the formation of the Goyder Institute for Water Research that was formally announced on 27 May 2010. Working closely with the Chief Scientist, CSIRO, DFW, the University of South Australia and Flinders University, the Water Research Centre is preparing a number of research submissions under the guidance of Justin Brookes. The centre plans to apply for funding in the areas of environmental and urban water management.

For more information visit <http://goyderinstitute.org/>.

Integrating molecular and morphological data for generic delimitation and species identification in Lauraceae (\$150k)

Funding: ABRIS postdoctoral fellowship grant (2009-2011)

Leads: DM Crayn, M Rossetto, PH Weston, JG Conran, S Madriñán, H van der Werff, B Hyland, B Gray



Lauraceae is a large plant family of c. 50 genera and 3000 species widely distributed mostly in the tropics and subtropics from lowland to montane regions. Lauraceae is notorious for: a) the difficulty of identifying sterile material; b) existence of numerous species complexes; c) classificatory instability, especially the delimitation of genera (various modern authors recognise 43-52 genera); and d) dissection of widespread species into 'geopolitical endemics'. Molecular approaches can help address each of these problems: a) DNA barcoding accurately and efficiently discriminates Neotropical Lauraceae species that cannot be separated using sterile morphology alone; b) molecular systematics has established the broad phylogenetic framework for Lauraceae and provided a proven methodology (e.g. informative loci) and context for efficiently placing the Australian taxa; and c) population genetics methods rigorously test species boundaries by

Kelp forest ecosystems near and far: putting a new theory explaining dynamic ecological systems to the test (\$895k)

Funding ARC Future Fellowship (2010 - 2014)

Lead Professor Sean Connell



Few, if any, ecological models account for the biological diversity and observed vulnerability of ecosystems at a molecular to whole-ocean scale. This project is investigating kelp forests in ways that integrate previously disparate approaches to the study of ecosystems. This is to prove the value of a novel framework for understanding how broad scale and local phenomena interrelate to maintain the diversity and function of ecosystems, or, alternatively, to provoke their decline, transition or collapse. This new conceptualisation of ecosystem processes will assist managers to assess the consequences of their management decisions, highlighting the effects of external stimuli on normally robust systems.

MAJOR RESEARCH PROGRAMS - IN PROGRESS

Mesozoic Austral biodiversity: research and regional museum applications (\$600k)

Funding ARC Linkage (2010-2012)

Partners Monash Science Centre, South Australian Museum, Flinders University, Queensland Museum, Australian Opal Centre, Australian Age of Dinosaurs at Winton & the Outback Gondwana (Eromanga) Foundation in western Queensland

Lead Associate Professor Michael Lee



The impact of environmental alteration on Australia's biodiversity has poorly understood long-term effects. This project examines the controversial biogeography and evolution of Australia's biodiversity during the Age of Dinosaurs (mid-Cretaceous ~100 MYA) and their adaptational responses to climatic change. Fossils readily capture the public imagination and thus help promote complex scientific concepts in the global media. This project raises awareness about sustainable use of non-renewable fossil resources through public education and ecotourism fieldwork programs. These will help generate local interest and thus protection of sensitive fossil localities by highlighting them as lucrative tourism assets for regional communities.

Multi-model predictions of ecosystem flux under climate change based on novel genetic and image analysis methods (\$556k)

Funding ARC Super Science Fellowships (2011-2014)

Leads Professor Andrew Lowe, Professor Corey Bradshaw, Professor Anton van den Hengel, Professor Barry Brook, Professor Alan Cooper



The loss of biodiversity as a result of human modification to ecosystems is accelerating to human society's own detriment. We will use new genetic and historical photo-point methods to assess the diversity and uniqueness of South Australian biota. In support of the Terrestrial Ecosystem Research Network, these expansive biodiversity assessment databases will be combined with state-of-the-art projection techniques to ascertain the most realistic future of Australia's unique and highly threatened biodiversity. The tools we will develop will help determine the best approaches to managing landscapes for biodiversity maintenance while continuing productive human land uses.

Phylogeography and host specificity of stemborer parasitoids: essential components for the pre-emptive biocontrol of sugarcane pests in Australia (\$621k)

ARC Linkage (2009-2012)

Partners Bureau of Sugar Experiment Stations Limited & South Australian Museum

Lead Professor Andy Austin



Stem-boring insects cause huge economic losses to the sugar industry worldwide but fortunately these pests are largely absent from Australia, in part because quarantine measures have prevented their introduction. However, given their proximity, incursion of foreign stem-borers from Asia pose a serious threat to Australian sugarcane. This study will 1) develop molecular diagnostic tools to select wasp biocontrol agents that are suitable for the control of specific foreign stem-borer pests, and 2) evaluate whether any Australian native wasps have the ability to kill foreign stem-borers.

MAJOR RESEARCH PROGRAMS - IN PROGRESS

Range dynamics and demographics of spatially structured populations under global change (\$393k)

Funding ARC Discovery (2010-2012)

Lead *Doctor Damien Fordham*



Why are particular species present in some locations, but not others? This is a simple, fundamental ecological question yet, surprisingly, our answers on this point remain far from complete. Using an integrated, systems based approach, Damien is determining the interplay between: (1) birth, death and movement rates, (2) species interactions, and (3) the constraints of the physical environment (temperature, rainfall, soil type), which determine the limits of species' ranges. Our models will provide Australian conservation managers with a novel, validated toolbox to explore the trade-offs and synergies that are inherent in trying to adapt to climate change and other stressors on biodiversity.

Reef Rescue Marine Monitoring Program – 'Inshore Seagrass Monitoring' (\$2.6m)

Funding GBRMPA (Reef Rescue) (2006-2014)

Leads Professor Michelle Waycott and Doctor Len McKenzie



The Great Barrier Reef's inshore seagrasses are being monitored as part of the Reef Rescue Marine Monitoring Programme. Information from the program is being used to assess the long-term effectiveness of management actions in reversing decline in water quality of the GBR Marine Park. Since 2005, inshore seagrasses have been monitored across the six Natural Resource Management regions adjacent to the GBR World Heritage Area, south of Cooktown. Inshore seagrasses are currently monitored sub-regionally (habitats) at 30 sites using Seagrass-Watch as the basis. Results from the monitoring report annually on

seagrass status and are incorporated into a report card for the health of the Great Barrier Reef.

Resolving the systematics of stygobitic Amphipoda (Crustacea) using morphology and genetic analyses: The Melitidae and Paramelitidae of central Western Australia (\$368k)

Funding ABRS and the Hermon Slade Foundation (2011-2014)

Leads *Doctor Rachael King, Associate Professor Steve Cooper*



This project will provide a comprehensive taxonomic treatment of poorly known stygobitic amphipod crustaceans, dominant members of a recently discovered and internationally significant underground fauna in the Pilbara, Western Australia. A modern approach incorporating morphology and molecular data will be used to define species boundaries. New genera and 30-50 new species will be described, six genera and 30 species revised, and an illustrated interactive key developed for species identification. The outcome will be information on the biodiversity of a fauna that is critical for environmental assessments and conservation management, from a region where there is considerable resource development and exploration.

MAJOR RESEARCH PROGRAMS - IN PROGRESS

Single molecule sequencing technologies (\$900k)

Funding Bioplatforms Australia, with co-investment from the Environment Institute

Partners Australian Genome Research Facility & Bioplatforms Australia

Status Secured, MOU & Contracts to be finalised in 2011

Leads *Professor Alan Cooper, Professor Mike Young, Professor Steve Donellan*



In collaboration with Bioplatforms Australia and the Australian Genome Research Facility (AGRF), the Environment Institute has secured funding to place Australia's first single molecule sequencer in Adelaide. The machine will be located at the Adelaide node of AGRF, with Environment Institute members having privileged access to the technology during the first 12 months of deployment and guaranteed reductions in service fees and access to the technology thereafter. It is anticipated that this project will be in progress during 2011. A bid for an additional \$330,000 was made to the Science Innovation Panel of the South Australian Department of Further Education, Employment, Science and Technology to support a bioinformatics position for this acquisition. While gaining strong support, State budgetary constraints did not allow for co-investment in this technology in 2011. The Environment Institute continues to explore leveraging opportunities that will flow from our early adoption of this technology.

Species and gene turnover across environmental gradients: a landscape level approach to quantify biodiversity and resilience for climate adaptation (\$420k)

Funding ARC Linkage (2011-2013)

Partners Royal Botanic Gardens & Domain Trust

Lead *Professor Andrew Lowe*



Biodiversity corridor planning in Australia desperately needs to progress beyond the simple linking up of remnant vegetation, based on aerial maps, and start incorporating ecosystem features which will promote climate adaptation. This project will develop a new genomics method to assess ecosystem resilience for use in national biodiversity corridor planning.

Study on the genetic differentiation of remnant populations of *Atriplex* sp. Yeelirrie Station (\$160k)

Funding BHP Billiton

Partner BHP Billiton

Status Secured for 2011

Lead *Professor Andrew Lowe*



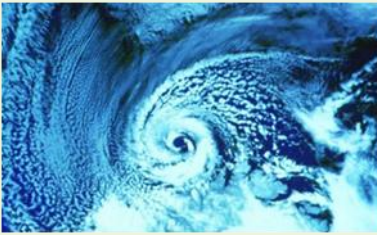
The Yeelirrie Station uranium project is one of the three most advanced uranium mining projects in Western Australia with mining in the area due to commence by 2014. This study will examine the resilience of remnant populations of *Atriplex* species (salt bush) flora using genetic methods. This information will be used in the ongoing management of these endangered species to ensure their existence into the future.

MAJOR RESEARCH PROGRAMS - IN PROGRESS

Systems modelling for synergistic ecological climate dynamics (\$911k)

Funding ARC Future Fellowship (2010-2014)

Lead *Professor Barry Brook*



This modelling program will improve forecasts of the response of biodiversity to future climate change and so improve on-ground conservation management. A systems modelling framework will be developed and tested against real-world data to integrate a wide variety of biological and geophysical inputs and so produce more realistic predictions. The work is aimed at developing more robust and accurate tools for decision-making around natural resources.

TERN - AusPlots (\$3m)

Funding Department of Innovation, Industry, Science and Research - National Collaborative Research Infrastructure Strategy (2010-2012)

Lead *Professor Andrew Lowe*



Andrew Lowe from ACEBB is leading the Australian Rangelands component of the Terrestrial Ecosystem Research Network funded by the National Collaborative Research Infrastructure Strategy. This program will establish 1,000 long term monitoring sites across the Australian rangelands. The Australian rangelands cover 81% of the continent and include some of Australia's most poorly understood ecosystems. The program is providing research infrastructure, standardising monitoring protocols and making baseline measurements to establish a long-term monitoring network with key Natural Resource Management agencies across Australia. The initial field survey will involve cataloguing vegetation species in combination with their structure and cover, along with the collection of voucher specimens of plants and soils across the continent.

TERN Eco-informatics (\$4.5m)

Funding Department of Innovation, Industry, Science and Research - National Collaborative Research Infrastructure Strategy (2010-2012)

Leads *Professor Andrew Lowe, Mr Craig Walker*



The TERN eco-informatics program is building tools for data and information management and discovery covering Australia's flora, fauna and biophysical properties. It is actively acquiring key, significant existing data from natural resource management custodians across the country. Outputs from this TERN facility will be used to assist and support multi-scale plot systems that include super sites, plots and transects spanning all of Australia's ecosystems. Its long term goal is to provide a one-stop-shop for data browsing, display, extraction and analysis.

MAJOR RESEARCH PROGRAMS - IN PROGRESS

TERN Long-term Australian Multi-scale Plot System (\$12m)

Funding Education Infrastructure Fund

Lead *Professor Andrew Lowe*



The TERN Long-term Australian Multi-scale Plot System (LAMPS) Facility will be responsible for coordinating a national network of terrestrial ecosystem monitoring plots and transects at multiple spatial and informational scales. The LAMPS Facility will enable a basis for understanding Australian terrestrial ecosystem community dynamics and interactions with their environment in the face of increasing localised anthropogenic disturbances as well as broad-scale climate change.

Terrestrial biodiversity – Adaptation Research Network (\$1.6m)

Funding NCCARF (2009-2013)

Lead *Professor Steve Williams*



The primary goal of this network is to develop explicit and practical strategies that increase the resilience of terrestrial ecosystems and maximise their adaptive potential under climate change. This will be achieved by collating knowledge, coordinating expertise and synthesising these inputs into recommendations and frameworks that will guide the way forward for Australia to adapt to global climate change.

The evolution and function of sex chromosomes and genes in mammalian reproduction (\$710k)

Funding ARC Australian Research Fellowship (5 years)

Lead *Associate Professor Frank Grützner, Associate Professor Henrik Kaessmann*



Building upon world-class research into the sex chromosomes of the platypus and echidna, this project will ensure the University's position as the global leader in monotreme reproductive biology and genomics. As our most distant relatives, these iconic Australian species provide an understanding of human genes contributing to medical conditions involved in sexual development, infertility and ovarian cancer. An understanding of their unique biology has given, and will continue to give us, insights into the evolution of a diverse range of mammalian lineages.

The evolution of species traits and spread during biological invasions (\$789k)

Funding ARC Future Fellowship (2009-2013)

Lead *Dr Phil Cassey*



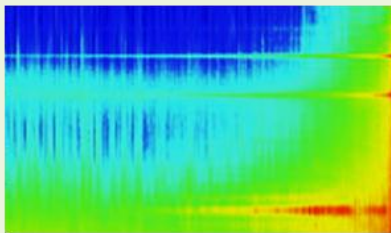
Exotic species pose a dire threat to Australia's biodiversity and natural resources due to the speed at which non-indigenous pests spread and the ecological and environmental damage they are capable of causing. This research focuses on identifying traits associated with the spread of exotic vertebrate species and modelling the reproductive and dispersal parameters among different populations. This approach provides new knowledge and is aiding in the development of innovative solutions for arresting the spread of exotic species. The project includes the validation of current models of spread, represents a major and timely addition to the national research capability on exotic species, and adds substantially to Australia's reputation as a global leader in evolutionary ecology.

MAJOR RESEARCH PROGRAMS - IN PROGRESS

The mechanics of quiet airfoils (\$282k)

Funding ARC discovery Project (2010-2012)

Lead *Assoc. Professor Con Doolan*



Airfoil trailing edge noise affects many technologies, from wind turbines to computer cooling fans, and must be reduced to improve productivity, public health and the environment. This project is developing a new class of quiet airfoil design and an active trailing edge noise control system to help solve this important problem. This research will provide multiple, long-term benefits to Australia that include reduced greenhouse gas emissions, reduced airport noise, new high-technology products for export and improved public health.

The origin and migration of humans using genetic evidence (\$504k)

Funding National Geographic Society: National Geographic Research and Exploration Grant

Partners University of Otago, Institute Pasteur, Universitat Pompeu Fabra, Lebanese American University, University of Witwatersrand, Madurai Kamaraj University, Fudan University, University of Pennsylvania, Universidade Federal de Minas Gerais, LaTrobe University

Leads *Professor Alan Cooper, Doctor Wolfgang Haak*



This landmark study is tracing the migration of human populations from a common African ancestor who lived 50,000 years ago. ACAD has started to publish the results of the Genographic Project with international partners. One finding indicates that the transition from a hunter-gather to a sedentary farming-based lifestyle, known to have originated in the Near East around 11,000 years ago, was spread to Europe through significant levels of migration and interbreeding by our ancient ancestors. For more information visit <http://tiny.cc/farmer-migration>.

Transformational diagnostics (\$835k)

Funding ARC Super Science Fellowship (2011-2014)

Leads *Professor Tanya Monro, Professor Alan Cooper, Professor Lois Salamonsen, Professor Robert Norman, Adjunct Professor Nigel Spooner*



Australia has established world-leading capabilities in optical fibres and surface science that, when brought together, have the potential to transform applications that require non-invasive, real-time and/or portable biological detection tools. We propose a novel and ambitious suite of projects that bring together these capabilities with experts in reproductive health, forensics and explosives to solve pressing problems in each of these areas. This program has the potential to develop new industries in Australia as well as to explore rich science opportunities at the boundaries of these disciplines. One of these fellows will work closely with ACAD to develop novel forensic approaches.

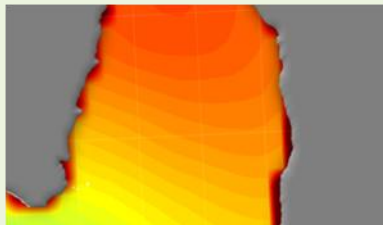
MAJOR RESEARCH PROGRAMS - IN PROGRESS

TREND (\$1.35m)

Funding Premier's Science and Research Fund (2010-2013)

Partners South Australian Research and Development Institute, Department of Environment and Natural Resources

Leads *Professor Andrew Lowe, Professor Corey Bradshaw, Doctor Peter Hayman*



The TRansect for ENvironmental monitoring and Decision-making (TREND) aims to provide an early warning system for ecosystem shifts due to climate change, helping to plug a fundamental gap in our knowledge about how natural and production systems respond to this change. This will lead to improved modelling that will help inform effective management decisions for the future. The program will establish a number of long-term monitoring corridors in South Australia along marked environmental gradients. The science underpinning this program has influenced the direction of the NCRIS-funded Terrestrial Ecosystems Research Network.

Unlocking Early Miocene climate: New Zealand in a warmer world (\$835k)

Funding: Royal Society of New Zealand, Marsden Grant (2009-2011)

Leads: *DE Lee, G Wilson, A Gorman, D Mildenhall, E Kennedy, R DeConto, JG Conran*



We propose to use a remarkably well-preserved high-resolution climate record recently discovered in the biogenically varied sediments of an ancient Otago lake to predict what New Zealand's terrestrial climate and its variability might be like in a warmer world. This deposit formed ~23 million years ago when global climates were much warmer than today. We plan to drill a core through ~200 m of finely layered sediments that preserve a continuous ~200,000-year-long record of temperature, seasonality, rainfall and associated climatic oscillations, including ENSO cycles. From information recorded in the sediment layers and the exquisitely preserved leaf, fish and insect fossils, we will be able to reconstruct the changing climate and ecosystems during the lake's existence. Our detailed data from this site can then be used to constrain global climate models for a warmer Earth, and will give insights into the potential effects of global warming on New Zealand.

Using ancient fish ear bones to overcome the shifting baseline syndrome in freshwater fish populations (\$813k)

Funding ARC Future Fellowship (2011-2015)

Lead *Professor Bronwyn Gillanders*



Professor Bronwyn Gillanders has applied to the Australian Research Council to use chemical tracers in ancient (5,500 BP) through to modern fish ear bones to provide accurate information on changes in fish ecology, examining the anthropogenic and natural population decline of freshwater fish over large time scales. This internationally important research will try to resolve the inaccuracies of using fish ear bones to monitor past ecological states. Outcomes may include knowledge of how fish populations would react to altered fishing pressure and the restoration of environments.

MAJOR RESEARCH PROGRAMS - COMPLETED

A fully integrated process for biodiesel production from microalgae in saline water (\$884k)

Funding Asia Pacific Partnership on Clean Development and Climate — Renewable Energy and Distributed Generation Task Force (2008-2011)

Lead Associate Professor Peter Ashman



This project will demonstrate the technical and economic feasibility of an integrated process for the production of microalgal oils that are suitable as a feedstock for biodiesel production. A preliminary economic feasibility study and assessment of total greenhouse gas emissions (GHG) is being carried out. This is based on the results of small-scale studies and will be followed by a second large-scale phase designed to integrate all the steps at the pilot scale. The larger scale will optimise the process over a long enough period for detailed assessment of the economics and GHG emissions. Participating partners in this project are Australia, China and India.

Climate change, communities and environment: building research capability to identify climate change vulnerability and adaptation options for South Australian landscapes (\$3m)

Funding Premier's Science and Research Fund & Partner organisations (2009-2011)

Partners CSIRO Climate Adaptation Flagship, South Australian Research and Development Institute/Department of Primary Industries and Resources South Australia, Department for Water, Department of Environment and Natural Resources, SA Murray-Darling Basin NRM Board and the Eyre Peninsula NRM Board.

Lead Professor Wayne Meyer



The Climate Change, Communities and Environment (CCCE) project aims to understand the impact of predicted drier, warmer conditions from climate change on the health of communities and environments in South Australia. Bio-physical, economic and social processes are being modelled in pilot projects for the regions of Eyre Peninsula and the SA Murray-Darling Basin to assess effective management options. This project is developing tools to evaluate balances in landscapes between continuing production and maintaining ecosystem services that support production. It has the potential for wide application across Australian landscapes and is an excellent example of a multi institutional approach to a complex landscape scale management issues.

Many Ys in monotremes: multiple sex chromosomes and sex determination in platypus and echidna (\$607k)

Funding ARC Discovery (2006-2011)

Lead Associate Professor Frank Grützner



The unusual biology of marsupials, in particular monotremes (egg laying mammals), and their ancient relationship to humans make them a unique model for understanding the evolution of the mammalian genome. This is reinforced by the discovery of ten sex chromosomes in the platypus which link mammalian and avian sexual assignment. This project is identifying new genes on these ten sex chromosomes to investigate how they determine an individual's sex. The project is helping researchers understand human sexual abnormalities and the evolution of sex genes in a diverse range of mammalian groups.

MAJOR RESEARCH PROGRAMS - COMPLETED

Phylogeography, evolution and taxonomy of humanity's greatest pest, *Rattus rattus*: epidemiological, archaeological and conservation implications (\$398k)

Funding ARC Discovery (2009-2011)

Leads *Professor Steve Donnellan, Professor Alan Cooper*



This project is characterising a major threat to Australian biosecurity and health, while identifying the range of likely disease risks associated with introductions of different 'strains' of black rat. Our researchers are providing critical data for management efforts around the world, especially to strategic partners in neighbouring South-East Asian nations, as well as for conservation efforts within Australia. The data will also provide novel means to track the timing and routes of prehistoric human movements throughout the area. It is establishing strategic research collaborations between researchers in zoological, medical, epidemiological, genetics and conservation fields in a unique multidisciplinary study.

Planning for a transformed future: modelling synergistic climate change and land use impacts on biodiversity (\$647k)

Funding ARC Linkage (2009-2011)

Partners Department for Environment and Heritage, Department of Water (now Department of Environment and Natural Resources), Land and Biodiversity Conservation, City of Onkaparinga & Adelaide and Mount Lofty Ranges NRM Board

Lead *Professor Barry Brook*



Climate change poses a dire threat to Australia's biodiversity and natural resources due to its all-encompassing reach and the speed at which human driven changes are taking place in already heavily modified systems. The proposed research, on modelling the synergistic impacts of anthropogenic threats, will provide new knowledge and innovative solutions for protecting unique ecosystems facing severe environmental challenges this century. The validation of these new methods, which aim to capture ecological responses to global change, will represent a major and timely addition to the national research capability on climate change adaptation, and add to Australia's reputation as a global leader in the field of ecology.

TERN OzFlux (\$250k)

Funding Department of Innovation, Industry, Science and Research - National Collaborative Research Infrastructure Strategy (2010-2011)

Partners James Cook University, University of Sydney, Monash University, Northern Territory University, CSIRO & The University of Waikato, NZ

Leads *Professor Wayne Meyer, Professor David Chittleborough*



OzFlux is establishing a sustainable network and long-term data set from instrumented towers across all Australian ecosystems, measuring key energy parameters suitable for multiple ecosystem science, and modelling applications. The Landscape Futures Program established a supersite in the semi-arid mallee ecosystem north of the River Murray near Chowilla in July 2010. The site is monitoring fluxes in water vapour and carbon dioxide between the atmosphere, upper soil layers and groundwater in a mallee shrub-land community. For more information visit <http://tiny.cc/calperumtower>.

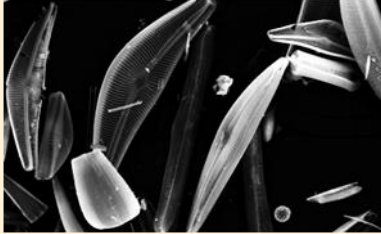
MAJOR RESEARCH PROGRAMS - COMPLETED

The history of North Stradbroke Island's wetlands: defining natural climate variability in south-east Queensland and improving ecosystem management (\$324k)

Funding ARC Linkage Project Grants (2009-2011)

Partners Queensland Department of Natural Resources and Water, Consolidated Rutile Limited

Lead *Doctor John Tibby*



South east Queensland has among the fastest growing populations in Australia. It has also experienced severe drought lasting more than a decade. These combined pressures have led to the expenditure of more than \$9 billion on water resource development. However, it is not known whether the current drought is part of a natural cycle, or, importantly, if it represents the worst extremes in such a cycle. We will determine whether this is the case and, in doing so, contribute to national and international debates about the role of human induced vs natural climate change.

In 2011, members of the Environment Institute published 276 journal articles.

1. Abbot, P., Abe, J., Alcock, J., Gardner, M.G., et al (2011), 'Inclusive fitness theory and eusociality', *Nature*, 471 (7339), pp. e1-e4.
2. Adams, M., Wedderburn, S.D., Unmack, P.J., Hammer, M.P., Johnson, J.B (2011), 'Use of Congeneric Assessment to Reveal the Linked Genetic Histories of Two Threatened Fishes in the Murray-Darling Basin, Australia', *Conservation Biology*, 25 (4), pp. 767-776.
3. Adler, C.J., Haak, W., Donlon, D., Cooper, A. (2011), 'Survival and recovery of DNA from ancient teeth and bones', *Journal of Archaeological Science*, 38 (5), pp. 956-964.
4. Aldridge, K.T., Lamontagne, S., Deegan, B.M., Brookes, J.D. (2011), 'Impact of drought on nutrient concentrations in the Lower Lakes (Murray Darling Basin, Australia)', *Inland Waters*, 1 (3), pp. 159-176.
5. Aplin, K.P., Suzuki, H., Chinen, A.A., Chesser, R.T., ten Have, J., Donnellan, S.C., Austin, J., Frost, A., Gonzalez, J.P., Herbreteau, V., Catzefflis, F., Soubrier, J., Fang, Y.-P., Robins, J., Matisoo-Smith, E., Bastos, A.D.S., Maryanto, I., Sinaga, M.H., Denys, C., van Den Bussche, R.A., Conroy, C., Rowe, K., Cooper, A. (2011), 'Multiple geographic origins of commensalism and complex dispersal history of black rats', *PLoS ONE*, 6 (11), art. no. e26357.
6. Appels, R., Adelson, D.L., Moolhuijzen, P., Webster, H., Barrero, R., Bellgard, M. (2011), 'Genome studies at the PAG 2011 conference', *Functional and Integrative Genomics*, 11 (1), pp. 1-11.
7. Armstrong, K.N., Kerry, L.J. (2011), 'Modelling the prey detection performance of *Rhinonictis aurantia* (Chiroptera: Hipposideridae) in different atmospheric conditions discounts the notional role of relative humidity in adaptive evolution', *Journal of Theoretical Biology*, 278 (1), pp. 44-54.
8. Badets M., Whittington I.D., Lalubin F., Allienne J.-F., Maspimby J.-L., Bentz S., Du Preez L.H., Barton D., Hasegawa H., Tandon V., Imkongwapang R., Ohler A., Combes C. & Verneau O. (2011), 'Correlating early evolution of parasitic platyhelminths to Gondwana breakup'. *Systematic Biology*, 60, pp. 762–781.
9. Balanovsky, O., Dibirova, K., Dybo, A., Mudrak, O., Frolova, S., Pocheshkhova, E., Haber, M., Platt, D., Schurr, T., Haak, W., Kuznetsova, M., Radzhabov, M., Balaganskaya, O., Romanov, A., Zakharova, T., Soria Hernanz, D.F., Zalloua, P., Koshel, S., Ruhlén, M., Renfrew, C., Wells, R.S., Tyler-Smith, C., Balanovska, E. (2011), 'Parallel evolution of genes and languages in the Caucasus region', *Molecular Biology and Evolution*, 28 (10), pp. 2905-2920.
10. Bannister, J.M., Conran, J.G., Lee, D.E., Kaulfuss, U., Mildenhall, D.C. (2011), 'Fossil flowers, fruits and seeds from the Early Miocene Foulden Maar, New Zealand', in 'IBC 2011 XVIII International Botanical Congress, Melbourne Australia, 23-30 July 2011.' (Ed. IBC 2011 Editorial Committee.) (IBC 2011: Melbourne).
11. Bannister, J.M., Jordan, G.J., Carpenter, R.J., Conran, J.G., Lee, D.E. (2011), 'Fossil leaves provide evidence of a diverse swamp forest flora from a Late Oligocene/Early Miocene site in the Gore Lignite Measures', in 'Abstract volume, Geosciences 2011 Conference, Nelson, New Zealand. Geoscience Society of New Zealand Miscellaneous Publication 130A.' (Eds NJ Litchfield, K Clark.) pp. 8. (Geoscience Society of New Zealand: Nelson).
12. Beak, D.G., Kirby, J.K., Hettiarachchi, G.M., Wendling, L.A., McLaughlin, M.J., Khaliwada, R. (2011), 'Cobalt distribution and speciation: Effect of aging, intermittent submergence, in situ rice roots', *Journal of Environmental Quality*, 40 (3), pp. 679-695.
13. Bi, P., Williams, S., Loughnan, M., Lloyd, G., Hansen, A., Kjellstrom, T., Dear, K., Saniotis, A., (2011), 'The effects of extreme heat on human mortality and morbidity in Australia: implications for public health', *Asia-Pacific journal of public health / Asia-Pacific Academic Consortium for Public Health*, 23 (2 Suppl), pp. 27S-36.
14. Bierman, P., Lewis, M., Ostendorf, B., Tanner, J. (2011), 'A review of methods for analysing spatial and temporal patterns in coastal water quality', *Ecological Indicators*, 11 (1), pp. 103-114.
15. Biffin, E., Conran, J., Lowe, A.J. (2011), 'Podocarp Evolution: A Molecular Phylogenetic Perspective', Ch 1 in *Ecology and Ecophysiology of Tropical Conifers*, Smithsonian Contributions to Botany, pp 1-20.
16. Birzer, C.H., Kalt, P.A.M., Nathan, G.J. (2011), 'The Influences of Jet Precession on Large-scale instantaneous turbulent particle clusters', *Int. J. Multiphase Flows*, 37, pp. 394–402.
17. Birzer, C.H., Kalt, P.A.M., Nathan, G.J. (2011), 'A method to provide statistical measures of large-scale instantaneous particle clusters from planar images', *Experiments in Fluids*, 51 (3), pp. 641-656.
18. Blackburn, T.M., Prowse, T.A.A., Lockwood, J.L., Cassey, P. (2011), 'Passerine introductions to New Zealand support a positive effect of propagule pressure on establishment success', *Biodiversity and Conservation*, 20 (10), pp. 2189-2199.
19. Bloomfield, A.L., Elsdon, T.S., Walther, B.D., Gier, E.J., Gillanders, B.M., (2011), 'Temperature and diet affect carbon and nitrogen isotopes of fish muscle: Can amino acid nitrogen isotopes explain effects?', *Journal of Experimental Marine Biology and Ecology*, 399 (1), pp. 48-59.

20. Bradshaw, C.J.A. (2011), 'No place for humans!' *Frontiers in Ecology and the Environment*, Vol 9 No 3, pp. 190-191.
21. Bradshaw, C.J.A., Clements, G.R., Laurance, W.F., Brook, B.W. (2011), 'Better SAFE than sorry', *Frontiers in Ecology and the Environment*, 9 (9), pp. 487-488.
22. Bradshaw, C.J.A., Cooper, A., Turney, C.S.M., Brook, B.W. (2011), 'Robust estimates of extinction time in the geological record', *Quaternary Science Reviews*, 33, pp. 14-19.
23. Bradshaw, C.J.A., Laurance, W.F., Gibson, L., Ehrlich, P.R., Brook, B.W. (2011), 'Homage to an Avant-Garde Conservation Leader', Navjot Sodhi, *Conservation Biology*, 25, pp. 1056-1058.
24. Brawand, D., Soumillon, M., Necsulea, A., Julien, P., Csárdi, G., Harrigan, P., Weier, M., Liechti, A., Aximu-Petri, A., Kircher, M., Albert, F.W., Zeller, U., Khaitovich, P., Grützner, F., Bergmann, S., Nielsen, R., Pääbo, S., Kaessmann, H. (2011), 'The evolution of gene expression levels in mammalian organs', *Nature*, 478 (7369), pp. 343-348.
25. Breed, A.C., Breed, M.F., Meers, J., Field H.E. (2011), 'Evidence of endemic hendra virus infection in flying-foxes (*Pteropus conspicillatus*) - implications for disease risk management', *PLoS One*, 6 (12): e28816.
26. Breed, W.G. & Leigh, C.M. (2011), 'Reproductive biology of an old endemic murid rodent of Australia – the spinifex hopping mouse, *Notomys alexis*: adaptations for life in the arid zone', *Invited Review, Integrative Zoology*, 6, pp. 321-334.
27. Breed, W.G., Tan, S., Leigh, C.M., Aplin, K.P., Hortova K., Moore, H.D.M. (2011), 'The morphology of the squirrel spermatozoon: a highly complex male gamete with a massive acrosome', *Journal of Morphology*, 272, pp. 883-889.
28. Breed, M.F., Ottewell, K.M., Gardner, M.G., Lowe, A.J. (2011), 'Clarifying climate change adaptation responses for scattered trees in modified landscapes', *Journal of Applied Ecology*, 48 (3), pp. 637-641.
29. Bricker, E., Waycott, M., Calladine, A., Zieman, J.C. (2011), 'High connectivity across environmental gradients and implications for phenotypic plasticity in a marine plant', *Marine Ecology Progress Series*, 423, pp. 57-67.
30. Brodie, C.J. (2011), 'Juglandaceae' (version 1), in Kellermann, J. (ed) *Flora of South Australia* 5th ed., State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
31. Brodie, C.J. (2011), 'Passifloraceae' (version 1), in Kellermann, J. (ed) *Flora of South Australia* 5th ed., State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
32. Brook, B.W. (2011), 'Could nuclear fission energy, etc., solve the greenhouse problem?', *The affirmative case*, *Energy Policy*, 42, pp. 4-8.
33. Brook, B.W., Bradshaw, C.J.A. (2011), 'Strange bedfellows? Techno-fixes to solve the big conservation issues in southern Asia', *Biological Conservation*, 151 (1), pp. 7-10.
34. Brook, B.W., Bradshaw, C.J.A., Traill, L.W., Frankham, R. (2011), 'Minimum viable population size: Not magic, but necessary', *Trends in Ecology and Evolution*, 26 (12), pp. 619-620.
35. Brook, B.W. (2011), 'Global climate change: convergence of disciplines', *The Quarterly Review of Biology*, 86, pp. 131-132.
36. Brook, B.W. (2011) 'Climate change in the 21st century', *The Quarterly Review of Biology*, 86, pp. 131-132.
37. Brookes, J.D. and Carey, C.C (2011), 'Resilience to blooms', *Science*, 334, pp. 46-47.
38. Brooks, T.M., Brook, B.W., Koh, L.P., Pereira, H.M., Pimm, S.L., Rosenzweig, M.L., Sodhi, N.S. (2011), 'Extinctions: consider all species', *Nature*, 474, pp. 284.
39. Brown, G.K., Gardner, M.G. (2011), 'Isolation, characterisation and transferability of microsatellites for *Paraserianthes lophantha*, Cape Wattle (Leguminosae: Mimosoideae): A significant weed worldwide', *Muelleria*, 29 (1), pp. 87-92.
40. Bryan, B.A., Crossman, N.D., King, D., Meyer, W.S. (2011), 'Landscape futures analysis: Assessing the impacts of environmental targets under alternative spatial policy options and future scenarios', *Environmental Modelling and Software*, 26 (1) pp 83-91.
41. Bryan, B.A., King, D., Ward, J.R. (2011), 'Modelling and mapping agricultural opportunity costs to guide landscape planning for natural resource management', *Ecological Indicators*, 11 (1), pp. 199-208.
42. Bryan, B.A., Raymond, C.M., Crossman, N.D., King, D (2011), 'Comparing spatially explicit ecological and social values for natural areas to identify effective conservation strategies', *Conservation Biology*, 25 (1), pp. 172-181.
43. Bryant, L.M., Donnellan, S.C., Hurwood, D.A., Fuller, S.J. (2011), 'Phylogenetic relationships and

- divergence date estimates among Australo-Papuan mosaic-tailed rats from the Uromys division (Rodentia: Muridae)', *Zoologica Scripta*, 40 (5), pp. 433-447.
44. Burge, D.O., Erwin, D.M., Islam, M.B., Kellermann, J., Kembel, S.A., Wilken, D.H., Manos, P.S. (2011), 'Diversification of *Ceanothus* (Rhamnaceae) in the California Floristic Province', *International Journal of Plant Sciences*, 172, pp. 1137-1164.
45. Butterly, C.R., McNeill, A.M., Baldock, J.A., Marschner, P. (2011), 'Changes in water content of two agricultural soils does not alter labile P and C pools', *Plant and Soil*, 348 (1-2), pp. 185-201.
46. Butterly, C.R., McNeill, A.M., Baldock, J.A., Marschner, P., (2011), 'Rapid changes in carbon and phosphorus after rewetting of dry soil', *Biology and Fertility of Soils*, 47 (1), pp. 41-50.
47. Carpenter, R.J., Goodwin, M.P., Hill, R.S., Kanold, K. (2011), 'Silcrete plant fossils from Lightning Ridge, New South Wales: New evidence for climate change and monsoon elements in the Australian Cenozoic', *Australian Journal of Botany*, 59 (5), pp. 399-425.
48. Carpenter, R.J., Jordan, G.J., Mildenhall, D.C., Lee, D.E. (2011), 'Leaf fossils of the ancient Tasmanian relict *Microcachrys* (Podocarpaceae) from New Zealand', *American Journal of Botany*, 98 (7), pp. 1164-1172.
49. Cassey, P., Maurer, G., Lovell, P.G., Hanley, D. (2011), 'Conspicuous eggs and colourful hypotheses: testing the role of multiple influences on avian eggshell appearance', *Avian Biology Research*, 4, pp. 179-189.
50. Catalano, S.R., Hutson, K.S., Ratcliff, R.M., Whittington, I.D. (2011), 'The value of host and parasite identification for arripid fish', *Marine and Freshwater Research*, 62 (1), pp. 72-82.
51. Chan QN., Medwell PR., Alwahabi ZT., Dally BB., Nathan GJ., (2011), 'Assessment of Interferences to Nonlinear Two- line Atomic Fluorescence (NTLAF) in Sooty Flames', *Applied Physics B: Lasers and Optics*, 104 (1), pp. 189-198.
52. Chan QN., Medwell PR., Kalt PAM., Alwahabi ZT., Dally BB., Nathan GJ., (2011), 'Simultaneous Imaging of Temperature and Soot Volume Fraction', *Proceedings of the Combustion Institute*, 33 (1), pp. 791-798.
53. Chang, R.L., Richardson, J.C., Banky, G.P., Collier, B.D., Jaksa, M.B., Lindsay, E.D., Maier H.R. (2011), 'Practitioner reflections on engineering education students' engagement with e-learning', *Advances in Engineering Education*, 2(3), 31p.
54. Charlton-Robb, K., Gershwin, L.-a., Thompson, R., Austin, J., Owen, K., McKechnie, S. (2011), 'A new dolphin species, the burrunan dolphin *Tursiops australis* sp. nov., endemic to Southern Australian coastal waters', *PLoS ONE*, 6 (9), e24047.
55. Childers, C.P., Reese, J.T., Sundaram, J.P., Vile, D.C., Dickens, C.M., Childs, K.L., Salih, H., Bennett, A.K., Hagen, D.E., Adelson, D.L., Elisk, C.G., (2011), 'Bovine Genome Database: Integrated tools for genome annotation and discovery', *Nucleic Acids Research*, 39 (SUPPL. 1), pp. D830-D834.
56. Christen, E.W., Shephard, M., Meyer, W., Stone, C. (2011), 'Triple bottom line reporting in the irrigation sector', Chapter 5, pp. 47-56, in *Defining the Social Licence of Farming, Issues, Challenges and New Directions for Agriculture*. Eds. Williams, J. and Martin, P. CSIRO Publishing, Collingwood, Melbourne, Australia 2006.
57. Clarke, K., Lewis, M., Brandle, R., Ostendorf, B. (2011), 'Non-detection errors in a survey of persistent, highly-detectable vegetation species', *Environmental Monitoring and Assessment*, 184 (2), pp. 625-635.
58. Clarke, K., Lewis, M., Ostendorf, B. (2011), 'Additive partitioning of rarefaction curves: Removing the influence of sampling on species-diversity in vegetation surveys', *Ecological Indicators*, 11 (1), pp. 132-139.
59. Clements, G.R., Bradshaw, C.J.A., Brook, B.W., Laurance, W.F. (2011), 'The SAFE index: Using a threshold population target to measure relative species threat', *Frontiers in Ecology and the Environment*, 9 (9), pp. 521-525.
60. Coleman, M.A., Roughan, M., Macdonald, H.S., Connell, S.D., Gillanders, B.M., Kelaher, B.P., Steinberg, P.D. (2011), 'Variation in the strength of continental boundary currents determines continent-wide connectivity in kelp', *Journal of Ecology*, 99 (4), pp. 1026-1032.
61. Collier, C., Uthicke, S., Waycott, M. (2011), 'Thermal tolerance of two seagrass species to current and future sea temperature in the Great Barrier Reef and implications for their distribution', *Limnology and Oceanography*, 56, pp. 2200-2210.
62. Collier, N., Austin, B.J., Bradshaw, C.J.A., McMahon, C.R. (2011), 'Turning Pests into Profits: Introduced Buffalo Provide Multiple Benefits to Indigenous People of Northern Australia', *Human Ecology*, 39 (2), pp. 155-164.
63. Connell, S.D., Russell, B.D., Irving, A.D. (2011), 'Can strong consumer and producer effects be reconciled to better forecast 'catastrophic' phase-shifts in marine ecosystems?', *Journal of Experimental Marine Biology and Ecology*, 400 (1-2), pp. 296-301.

64. Conn, B.J. (2011), 'Xyridaceae' (version 1), in Kellermann, J. (ed.) Flora of South Australia, 5 th ed. State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
65. Conran, J.G. (2011) 'Book review: Essay on the geography of plants', Systematic Biology, 60, pp. 562.
66. Conran, J.G. & Marchant, N.G. (2011), 'Droseraceae' (version 1), in Kellermann, J. (ed.) Flora of South Australia, 5th ed., State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
67. Conran, J.G., Bannister, J.M., Lee, D.E. (2011), 'An update of fossil data on the evolution of monocots, with emphasis on the Southern Hemisphere', in 'IBC 2011 XVIII International Botanical Congress, Melbourne Australia, 23-30 July 2011.' (Ed. IBC 2011 Editorial Committee.) (IBC 2011: Melbourne).
68. Conran, J.G., Lee, D.E., Bannister, J.M., Mildenhall, D.C. (2011), 'Vegetation diversity in southern New Zealand at the Oligocene–Miocene boundary: floristic and paleoecological characterization of the Foulden Maar paleoforest', in 'Abstract volume, Geosciences 2011 Conference, Nelson, New Zealand. Geoscience Society of New Zealand Miscellaneous Publication 130A.' (Eds NJ Litchfield, K Clark.) pp. 27. (Geoscience Society of New Zealand: Nelson).
69. Conran, J.G., Maciunas, E., Maciunas, K.J. (2011), 'Serapias lingua L. (tongue orchid) naturalised in the Adelaide Hills, South Australia - caveat cultivator?', The Orchadian, 16, pp. 556-561.
70. Conran, J.G., Marchant, N.G. (2011), 'Droseraceae' (version 1), in Kellermann, J. (ed.) Flora of South Australia (ed. 5), pp. 1-13, State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
71. Cooke, D.A. (2011) 'Centrolepidaceae' (version 1), in Kellermann, J. (ed.) Flora of South Australia, 5th ed., State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
72. Cooper, S.J.B., Harvey, M.S., Saint, K.M., Main, B.Y., (2011), 'Deep phylogeographic structuring of populations of the trapdoor spider Moggridgea tingle (Migidae) from southwestern Australia: Evidence or long-term refugia within refugia', Molecular Ecology, 20 (15), pp. 3219-3236.
73. Corkhill, E., Tibby, J., Garcia, A., Zawadski, A. (2011), 'Unexpected post-settlement freshening and increase in charophytes in Bombah Broadwater (Myall Lakes, New South Wales, Australia)', Journal of Paleolimnology, 46(4), pp. 637-647.
74. Cornelis, G., Ryan, B., McLaughlin, M.J., Kirby, J.K., Beak, D., Chittleborough, D. (2011), 'Solubility and batch retention of CeO₂ nanoparticles in soils', Environmental Science and Technology, 45 (7), pp. 2777-2782.
75. Costion, C., Ford, A., Cross, H., Crayn, D., Harrington, M., Lowe, A. (2011), 'Plant DNA barcodes can accurately estimate species richness in poorly known floras', PLoS ONE, 6 (11), art. no. e26841.
76. Cowan, D.A., Pointing, S.B., Stevens, M.I., Craig Cary, S., Stomeo, F., Tuffin, I.M., (2011), 'Distribution and abiotic influences on hypolithic microbial communities in an Antarctic Dry Valley', Polar Biology, 34 (2), pp. 307-311.
77. Crossman, N.D., Bryan, B.A., Cooke, D.A. (2011), 'An invasive plant and climate change threat index for weed risk management: Integrating habitat distribution pattern and dispersal process', Ecological Indicators, 11 (1), pp. 183-198.
78. Crossman, N.D., Bryan, B.A., King, D. (2011), 'Contribution of site assessment toward prioritising investment in natural capital', Environmental Modelling and Software, 26 (1), pp. 30-37.
79. Crossman, N.D., Bryan, B.A., Summers, D.M. (2011), 'Carbon Payments and Low-Cost Conservation', Conservation Biology, 25 (4), pp. 835-845.
80. Davison, J., Ho, S.Y.W., Bray, S.C., Korsten, M., Tammelleht, E., Hindrikson, M., Østbye, K., Østbye, E., Lauritzen, S.- E., Austin, J., Cooper, A., Saarma, U., (2011), 'Late-Quaternary biogeographic scenarios for the brown bear (*Ursus arctos*), a wild mammal model species', Quaternary Science Reviews, 30 (3-4), pp. 418-430.
81. De Little, S.C., Williamson, G.J., Bowman, D.M., Whelan, P.I., Brook, B.W., Bradshaw, C.J. (2011), 'Experimental comparison of aerial larvicides and habitat modification for controlling disease-carrying *Aedes vigilax* mosquitoes', Pest Management Science, DOI: 10.1002/ps.2317.
82. de Livera, J., McLaughlin, M.J., Hettiarachchi, G.M., Kirby, J.K., Beak, D.G. (2011), 'Cadmium solubility in paddy soils: Effects of soil oxidation, metal sulfides and competitive ions', Science of the Total Environment, 409 (8), pp. 1489-1497.
83. de Silva, A., Ukuwela, K.D.B., Sivaruban, A., Sanders, K.L. (2011), 'Preliminary observations on the reproductive biology of six species of Sri Lankan sea snakes (Elapidae: Hydrophiinae)', Salamandra, 47 (4), pp. 193-198.
84. Deveney, M.R. & Whittington, I.D. (2011), 'Revision of *Dioncopsudobenedenia* Yamaguti, 1965 including the description of *D. ancoralis* sp. n. (Monogenea: Capsalidae) from Pacific acanthuroid teleosts', Folia Parasitologica, 58, pp. 257-272.

85. Dick J., Haynes D., Tibby J., Garcia A. and Gell P. (2011), 'A history of aquatic plants in the Coorong, a Ramsar-listed coastal wetland', South Australia, *Journal of Paleolimnology*, 46 (4) pp. 623-635.
86. Dimasi, D.P., Hewitt, A.W., Kagame, K., Ruvama, S., Tindyebwa, L., Llamas, B., Kirk, K.A., Mitchell, P., Burdon, K.P., Craig, J.E. (2011), 'Ethnic and mouse strain differences in central corneal thickness and association with pigmentation phenotype', *PLoS ONE*, 6 (8), art. no. e22103.
87. Disspain, M., Wallis, L.A., Gillanders, B.M. (2011), 'Developing baseline data to understand environmental change: a geochemical study of archaeological otoliths from the Coorong, South Australia', *Journal of Archaeological Science*, 38 (8), pp. 1842-1857.
88. Doughty, P., Kealley, L., Donnellan, S.C. (2011), 'Revision of the Pygmy Spiny-tailed Skinks (*Egernia depressa* species- group) from Western Australia, with descriptions of three new species', *Records of the Western Australian Museum* 26, pp. 115-137.
89. Dudaniec, R.Y., Schlotfeldt, B.E., Bertozzi, T., Donnellan, S.C., Kleindorfer, S. (2011), 'Genetic and morphological divergence in island and mainland birds: Informing conservation priorities', *Biological Conservation*, 144 (12), pp. 2902- 2912.
90. Dunstan, A., Bradshaw, C.J.A., Marshall, J. (2011), 'Nautilus at risk - estimating population size and demography of *Nautilus pompilius*', *PLoS ONE*, 6 (2), art. no. e16716.
91. Eichler, H., Jeanes, J.A., Walsh, N.G. (2011), 'Ranunculaceae' (version 1), in Kellermann, J. (ed.) *Flora of South Australia*, 5th ed., State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
92. Einoder, L.D., Page, B., Goldsworthy, S.D., De Little, S.C., Bradshaw, C.J.A. (2011), 'Exploitation of distant Antarctic waters and close neritic waters by short-tailed shearwaters breeding in South Australia', *Austral Ecology*, 36 (4), pp. 461-475.
93. Eldridge, M.D.B., Potter, S., Cooper S.J.B. (2011), 'Biogeographic barriers in north-western Australia: an overview and standardisation of nomenclature', *Perspective paper, Australian Journal of Zoology*, 59, pp. 270-272.
94. Faast, R., Facelli, J.M., Austin, A.D., (2011), 'Seed viability in declining populations of *Caladenia rigida* (Orchidaceae): Are small populations doomed?', *Plant Biology*, 13 (SUPPL. 1), pp. 86-95.
95. Ferguson, G.J., Ward, T.M., Gillanders, B.M. (2011), 'Otolith shape and elemental composition: Complementary tools for stock discrimination of mullet (*Argyrosomus japonicus*) in southern Australia', *Fisheries Research*, 110 (1), pp. 75-83.
96. Field, I.C., Meekan, M.G., Speed, C.W., White, W., Bradshaw, C.J.A. (2011), 'Quantifying movement patterns for shark conservation at remote coral atolls in the Indian Ocean', *Coral Reefs*, 30 (1), pp. 61-71.
97. Fordham, D.A., Wigley, T.M.L., Watts, M.J., Brook, B.W. (2011), 'Multi-model climate projections for biodiversity risk assessments', *Ecological Applications*, 21, pp. 3317-3331.
98. Gabriel, S.I., Stevens, M.I., Mathias, M.d.L., Searle, J.B. (2011), 'Of Mice and 'Convicts': Origin of the Australian House Mouse, *Mus musculus*', *PLoS ONE* 6 (12): e28622. doi:10.1371/journal.pone.0028622.
99. Gardner, M.G., Fitch, A.J., Bertozzi, T., Lowe, A.J. (2011), 'Rise of the machines - recommendations for ecologists when using next generation sequencing for microsatellite development', *Molecular Ecology Resources*, 11 (6), pp. 1093 -1101.
100. Giam, X., Sodhi, N.S., Brook, B.W., Tan, H.T.W., Bradshaw, C.J.A. (2011), 'Relative need for conservation assessments of vascular plant species among ecoregions', *Journal of Biogeography*, 38 (1), pp. 55-68.
101. Gibbs, M.S., Maier, H.R., Dandy, G.C. (2011), 'Relationship between problem characteristics and the optimal number of genetic algorithm generations', *Engineering Optimization*, 43 (4), pp. 349-376.
102. Gibson, L., Lee, T.M., Koh, L.P., Brook, B.W., Gardner, T.A., Barlow, J., Peres, C.A., Bradshaw, C.J.A., Laurance, W.F., Lovejoy, T.E., Sodhi, N.S. (2011), 'Primary forests are irreplaceable for sustaining tropical biodiversity', *Nature*, 478, pp. 378-381.
103. Gillian, B.K. & Gardner, M.G. (2011), 'Isolation, characterisation and transferability of microsatellites for *Paraserianthes lophantha*, Cape Wattle (Leguminosae: Mimosoideae): a significant weed worldwide', *Muelleria*, 29 (1), pp. 87-92.
104. Goodman, A.M., Ganf, G.G., Maier, H.R., Dandy, G.C. (2011), 'The effect of inundation and salinity on the germination of seed banks from wetlands in South Australia', *Aquatic Botany*, 94 (2), 102-106.
105. Greenslade, P., Stevens, M.I., Torricelli, G., D'Haese, C.A. (2011), 'An ancient Antarctic endemic genus restored: Morphological and molecular support for *Gomphiocephalus hodgsoni* (Collembola: Hypogastruridae)', *Systematic Entomology*, 36 (2), pp. 223-240.
106. Guzik, M.T., Austin, A.D., Cooper, S.J.B., Harvey, M.S., Humphreys, W.F., Bradford, T., Eberhard, S.M., King, R.A., Leys, R., Muirhead, K.A., Tomlinson, M. (2011), 'Is the Australian subterranean fauna uniquely diverse?', *Invertebrate Systematics*, 24, pp. 407-418.

107. Guzik, M.T., Cooper, S.J.B., Humphreys, W.F., Ong, S., Kawakami, T., Austin, A.D. (2011), 'Evidence for population fragmentation within a subterranean aquatic habitat in the Western Australian desert', *Heredity*, 104, pp. 215-230.
108. Hancock, J.M., McNeill, A.M., McDonald, G.K., Holloway, R.E. (2011), 'Fate of fertiliser N applied to wheat on a coarse textured highly calcareous soil under simulated semi-arid conditions', *Plant and Soil*, 348 (1-2), pp. 139-153.
109. Hardy C.M., Adams, M., Jerry D.R., Court L.N., Morgan M.J., Hartley D.M. (2011), 'DNA barcoding to support conservation: species identification, genetic structure and biogeography of fishes in the Murray Darling River Basin, Australia'. *Marine and Freshwater Research* 62, pp. 1-15.
110. Harris, J.B.C., Sekercioglu, C.H., Sodhi, N.S., Fordham, D.A., Paton, D.C., Brook, B.W. (2011), 'The tropical frontier in avian climate impact research', *Ibis*, 153 (4), pp. 877-882.
111. Hasbullah H., Marschner, P., McNeill, A., (2011), 'Legume residue influence arbuscular mycorrhizal colonisation and P uptake by wheat', *Biology and Fertility of Soils*, 47 (6), pp. 701-707.
112. Haynes, D., Skinner, R., Tibby, J., Cann, J., Fluin J. (2011), 'Diatom and foraminifera relationships to water quality in The Coorong, South Australia, and the development of a diatom-based salinity transfer function', *Journal of Paleolimnology*, 46(4), pp. 543-560.
113. Henderson, W., Bomford, M., Cassey, P. (2011), 'Managing the risk of exotic vertebrate incursions in Australia', *Wildlife Research*, 38 (6), pp. 501-508.
114. Higgins, A.J., Bryan, B.A., Overton, I.C., Holland, K., Lester, R.E., King, D., Nolan, M., Connor, J.D. (2011), 'Integrated modelling of cost-effective siting and operation of flow-control infrastructure for river ecosystem conservation', *Water Resources Research*, 47 (5), art. no. W05519.
115. Ho, S.Y.W., Lanfear, R., Bromham, L., Phillips, M.J., Soubrier, J., Rodrigo, A.G., Cooper, A. (2011), 'Time-dependent rates of molecular evolution', *Molecular Ecology*, 20 (15), pp. 3087-3101.
116. Ho, L., Grasset, C., Hoefel, D., Dixon, M.B., Leusch, F., Newcombe, G., Saint, C., Brookes, J.D. (2011), 'Assessing granular media filtration for the removal of chemical contaminants from wastewater', *Water Research*, 45, 3461-3472.
117. Hunt, K.V., Steer, M.A., Gillanders, B.M. (2011), 'Validating age in southern calamary (*Sepioteuthis australis*) over seasonal and life history extremes', *Journal of the Marine Biological Association of the United Kingdom*, 91 (4), pp. 857-863.
118. Hutchinson, M.N., Hutchinson, R.G., (2011), 'Karyotypes of *Moloch* and *Chelosania* (Squamata: Acrodonta)', *Journal of Herpetology*, 45 (2), pp. 216-218.
119. Hutson, K.S., Brock, E.L., Steer, M.A. (2011), 'Spatial variation in parasite abundance: Evidence of geographical population structuring in southern garfish *Hyporhamphus melanochir*', *Journal of Fish Biology*, 78 (1), pp. 166-182.
120. Igic, B., Braganza, K., Hyland, M.M., Silyn-Roberts, H., Cassey, P., Grim, T., Rutila, J., Csaba, M., Hauber, M.E. (2011), 'Alternative mechanisms of increased eggshell hardness of avian brood parasites relative to host species', *Journal of the Royal Society Interface*, 8 (64), pp. 1654-1664.
121. Irving, A.D., Connell, S.D., Russell, B.D. (2011), 'Restoring coastal plants to improve global carbon storage: Reaping what we sow', *PLoS ONE*, 6 (3), art. no. e18311.
122. Izzo, C., Hamer, D.J., Bertozzi, T., Donnellan, S.C., Gillanders, B.M. (2011), 'Telomere length and age in pinnipeds: The endangered Australian sea lion as a case study', *Marine Mammal Science*, 27 (4), pp. 841-851.
123. Jackway, R.J., Pukala, T.L., Donnellan, S.C., Sherman, P.J., Tyler, M.J., Bowie, J.H., (2011), 'Skin peptide and cDNA profiling of Australian anurans: Genus and species identification and evolutionary trends', *Peptides*, 32 (1), pp. 161-172.
124. Jennings, J.T., Austin, A.D. (2011), 'Novel use of a micro-computed tomography scanner to trace larvae of wood boring insects', *Australian Journal of Entomology*, 50 (2), pp. 160-163.
125. Jessop, J.P., Conran, J.G. (2011), 'Commelinaceae' (version 1), in Kellerman, J. (ed.) *Flora of South Australia*, 5th ed, pp. 1-4, (State Herbarium of South Australia: Adelaide), www.flora.sa.gov.au/ed5.
126. Jessop, J.P., Toelken, H.R., Kellermann, J. (2011), 'Glossary' (version 1), in Kellermann, J. (ed.) *Flora of South Australia*, 5th ed, State Herbarium of South Australia, Adelaide, Adelaide, www.flora.sa.gov.au/ed5.
127. Johnson, C.N., Brook, B.W. (2011), 'Reconstructing the dynamics of ancient human populations from radiocarbon dates: 10 000 years of population growth in Australia', *Proceedings of the Royal Society B: Biological Sciences*, 278 (1725), pp. 3748-3754.
128. Johnson, R.W. (2011), 'Convulvulaceae' (version 1), in Kellermann, J. (ed.) *Flora of South Australia*, 5th ed., State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
129. Jones, W.A., Jones, D.T., Bannister, J.M., Lee, D.E., Conran, J.G., Mildenhall, D.C. (2011), 'A Late

- Miocene high diversity Nothofagus-dominated forest from a lacustrine setting within the Dunedin Volcanic Group, southern New Zealand', in 'Abstract volume, Geosciences 2011 Conference, Nelson, New Zealand. Geoscience Society of New Zealand Miscellaneous Publication 130A.' (Eds NJ Litchfield, K Clark.) pp. 55-56 (Geoscience Society of New Zealand: Nelson).
130. Jordan, G.J., Carpenter, R.J., Bannister, J.M., Lee, D.E., Mildenhall, D.C., Hill, R.S. (2011), 'High conifer diversity in Oligo-Miocene New Zealand', *Australian Systematic Botany*, 24 (2), pp. 121-136.
 131. Kahraman, A., Celep, F., Doğan, M., Guerin, G.R., Bagherpour, S. (2011), 'Mericalp morphology and its systematic implications for the genus *L.* section *Hymenosphaea* Benth (Lamiaceae) in Turkey', *Plant Systematics and Evolution*, 292 (1-2), pp. 33-39.
 132. Kamruzzaman, M., Beecham, S., Metcalfe, A.V. (2011), 'Non-stationarity in rainfall and temperature in the Murray Darling Basin', *Hydrological Processes*, 25 (10), pp. 1659-1675.
 133. Karanovic, T. & Cooper, S.J.B. (2011), 'Third genus of parastenocarid copepods from Australia supported by molecular evidence (Harpacticoida: Parastenocarididae)', *Studies on Freshwater Copepoda: a Volume in Honour of Bernard Dussart, Crustaceana Monographs 16* (Eds. Defaye D., von Vaupel Klein J.C. & Wyngaard G.) pp 283-326, Brill, Leiden.
 134. Karanovic, T. & Cooper, S.J.B. (2011), 'Molecular and morphological evidence for short range endemism in the *Kinnecaris solitaria* complex (Copepoda, Parastenocarididae), with descriptions of seven new species', *Zootaxa* 3026, pp.1-64.
 135. Kawakami, T., Butlin, R.K., Cooper S.J.B. (2011), 'Chromosomal speciation revisited: modes of diversification in Australian morabine grasshoppers (*Vandiemena*, *viatica* species group)' (Review) *Insects*, 2, pp. 49-61.
 136. Kearns, G.C., Whittington, I.D., Evans-Gowing, R. (2011), 'Spermatophores in *Dermopristis cairae* (Monogenea, Microbothriidae)', *Acta Parasitologica* 56, pp. 371-376.
 137. Kellermann, J. (2011), (ed) *Flora of South Australia*, 5th ed., State Herbarium of South Australia, Adelaide. www.flora.sa.gov.au/ed5.
 138. Kellermann, J. (2011). 'Introduction: How to use this flora' (version 1), in Kellermann, J. (ed.) *Flora of South Australia*, 5th ed., State Herbarium of South Australia, Adelaide.
 139. Kellermann, J. (2011), 'Berberidaceae' (version 1), in Kellermann, J. (ed.) *Flora of South Australia*, 5th ed., State Herbarium of South Australia, Adelaide. www.flora.sa.gov.au/ed5.
 140. Kellermann, J. (2011), 'Gunneraceae' (version 1), in Kellermann, J. (ed.) *Flora of South Australia*, 5th ed., State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
 141. Kemper, C.M., Cooper, S.J.B., Medlin, G.C., Adams, M., Stemmer, D., Saint, K.M., Austin, J.J. (2011), 'Cryptic grey-bellied dunnart (*Sminthopsis griseoventer*) discovered in South Australia: genetic, morphological and subfossil analyses and the value of collecting voucher material', *Australian Journal of Zoology*, 59, pp. 127-144.
 142. Keppel, G., Prentis, P., Biffin, E., Hodgskiss, P., Tuisese, S., Tuiwawa, M.V., Lowe, A.J. (2011), 'Diversification history and hybridisation of *Dacrydium* (Podocarpaceae) in remote Oceania', *Australian Journal of Botany*, 59 (3), pp. 262-273.
 143. Kilpatrick, A.D., Warren-Smith, S.C., Read, J.L., Lewis, M.M., Ostendorf, B. (2011), 'Cross-fence comparisons: Theory for spatially comprehensive, controlled variable assessment of treatment effects in managed landscapes', *Ecological Informatics*, 6 (2), pp. 170-176.
 144. King, R.A. & Leys, R. (2011), 'The Australian freshwater amphipods *Austrochiltonia australis* and *Austrochiltonia subtenuis* (Amphipoda: Talitroidea; Chiltoniidae) confirmed and two new cryptic Tasmanian species revealed using a combined molecular and morphological approach', *Invertebrate systematics*, 25 (3), pp. 171-196.
 145. Krampe, J. (2011), 'Full scale evaluation of diffuser ageing with clean water oxygen transfer tests', *Water Sci. Technol.*, 64 (3), pp 700-707.
 146. Krogmann, L. & Austin, A.D. (2011), 'Systematic revision of the spider wasp genus *Sphictostethus* Kohl (Hymenoptera: Pompilidae: Pepsinae) in Australia with description of nine new species', *Stuttgarter Beiträge zur Naturkunde A* 4, pp. 105-128.
 147. Kwei, C.K., Lewis, D., King, K., Donohue, W., Neilan, B.A. (2011), 'Molecular classification of commercial *Spirulina* strains and identification of their sulfolipid biosynthesis genes', *Journal of Microbiology and Biotechnology*, 21 (4), pp. 359-365.
 148. Lancaster, M.L., Taylor, A.C., Cooper, S.J.B., Carthew, S.M. (2011), 'Limited ecological connectivity of an arboreal marsupial across a forest/plantation landscape despite apparent resilience to fragmentation', *Molecular Ecology*, 20 (11), pp. 2258-2271.
 149. Lari, M., Rizzi, E., Mona, S., Corti, G., Catalano, G., Chen, K., Vernesi, C., Larson, G., Boscatto, P., De

- Bellis, G., Cooper, A., Caramelli, D., Bertorelle, G. (2011), 'The complete mitochondrial genome of an 11,450-year-old aurochs (*Bos primigenius*) from Central Italy', *BMC Evolutionary Biology*, 11 (1), doi:10.1186/1471-2148-11-32.
150. Lawley, E.F., Lewis, M.M., Ostendorf, B. (2011), 'Environmental zonation across the Australian arid region based on long-term vegetation dynamics', *Journal of Arid Environments*, 75 (6), 576-585.
151. Lee, D.E., Bannister, J.M., Conran, J.G., Mildenhall, D.C. (2011), 'Cenozoic paleofloras of the Southern Hemisphere: analyzing ancient floras using modern techniques', in 'IBC 2011 XVIII International Botanical Congress, Melbourne Australia, 23-30 July 2011.' (Ed. IBC 2011 Editorial Committee.) (IBC 2011: Melbourne).
152. Lee, D.E., Conran, J.G., Kaulfuss, U., Lutz, H., Jordan, G.J., Bannister, J.M., Mildenhall, D.C., Hill, R.S., Carpenter R.J. (2011), 'Eocene vegetation of New Zealand and Australia: high latitude "tropics" in the Southern Hemisphere', in 'The World at the time of Messel: puzzles in palaeobiology, palaeoenvironment and the history of early primates. 22nd International Senckenberg Conference. Frankfurt am Main (Germany), 15th-19th November 2011'. (Eds T Lehmann, V Mosbrugger, S Schaal) (Senckenberg Research Institute and Natural History Museum: Frankfurt, Germany).
153. Lee, M.S.Y. (2011), 'Macroevolutionary consequences of "spatial sorting"', *PNAS*, 108, E347.
154. Lee, M.S.Y., Jago, J.B., García-Bellido, D.C., Edgecombe, G.D., Gehling, J.G., Paterson, J.R., (2011), 'Modern optics in exceptionally preserved eyes of Early Cambrian arthropods from Australia', *Nature*, 474, pp. 631-634.
155. Lee, M.S.Y. & Paterson, J. (2011), 'Rapid evolution? The eyes have it', *Australasian Science*, 32 (10), pp. 28-30.
156. Lee, M.S.Y. & Skinner, A. (2011), 'Testing fossil calibrations for vertebrate evolutionary trees', *Zoologica Scripta*, 40, pp. 538-543.
157. Lee M.S.Y. & Worthy, T. (2011), 'Likelihood reinstates *Archaeopteryx* as a primitive bird', *Biology Letters* (Advance Online: 10.1098/rsbl.2011.0884).
158. Li, B., Zhang, H., Ma, Y., McLaughlin, M.J. (2011), 'Influences of soil properties and leaching on nickel toxicity to barley root elongation', *Ecotoxicology and Environmental Safety*, 74 (3), pp. 459-466.
159. Ling, K.-H., Brautigan, P.J., Hahn, C.N., Daish, T., Rayner, J.R., Cheah, P., Raison, J.M., Piltz, S., Mann, J.R., Mattiske, D.M., Thomas, P.Q., Adelson, D.L., Scott, H.S. (2011) 'Deep sequencing analysis of the developing mouse brain reveals a novel microRNA', *BMC Genomics*, 12, art. no. 176.
160. Lippold, S., Knapp, M., Kuznetsova, T., Leonard, J.A., Benecke, N., Ludwig, A., Rasmussen, M., Cooper, A., Weinstock, J., Willerslev, E., Shapiro, B., Hofreiter, M. (2011), 'Discovery of lost diversity of paternal horse lineages using ancient DNA', *Nature Communications*, 2 (450), DOI: 10.1038/ncomms1447.
161. Lorenzen, E.D., Nogués-Bravo, D., Orlando, L., Weinstock, J., Binladen, J., Marske, K.A., Ugan, A., Borregaard, M.K., Gilbert, M.T.P., Nielsen, R., Ho, S.Y.W., Goebel, T., Graf, K.E., Byers, D., Stenderup, J.T., Rasmussen, M., Campos, P.F., Leonard, J.A., Koepfli, K.-P., Froese, D., Zazula, G., Stafford Jr., T.W., Aaris-Sørensen, K., Batra, P., Haywood, A.M., Singarayer, J.S., Valdes, P.J., Boeskorov, G., Burns, J.A., Davydov, S.P., Haile, J., Jenkins, D.L., Kosintsev, P., Kuznetsova, T., Lai, X., Martin, L.D., McDonald, H.G., Mol, D., Meldgaard, M., Munch, K., Stephan, E., Sablin, M., Sommer, R.S., Sipko, T., Scott, E., Suchard, M.A., Tikhonov, A., Willerslev, R., Wayne, R.K., Cooper, A., Hofreiter, M., Sher, A., Shapiro, B., Rahbek, C., Willerslev, E. (2011), 'Species-specific responses of Late Quaternary megafauna to climate and humans', *Nature*, 479 (7373), pp. 359-364.
162. Lowe A.J., Cross H.B. (2011), 'The application of DNA to timber tracking and origin verification', *Journal of the International Association of Wood Anatomists*, 32 (2), pp. 251-262.
163. Lowrie, A., Conran, J.G. (2011), 'An overview of the Australian *Levenhookia* (Stylidiaceae) complex, including a new species (*L. murfetii*) and observations on the triggering methods employed for pollination and outcrossing', *Journal of the International Triggerplant Society*, 1 (2), pp. 4-29.
164. Lyle, G. & Ostendorf, B. (2011), 'A high resolution broad scale spatial indicator of grain growing profitability for natural resource planning', *Ecological Indicators*, 11 (1), pp. 209-218.
165. Maciunas, E., Conran, J.G., Bannister, J.M., Paull, R., Lee, D.E. (2011), 'Miocene *Astelia* (Asparagales: Asteliaceae) macrofossils from southern New Zealand', *Australian Systematic Botany*, 24 (1), pp. 19-31.
166. Macqueen, P., Goldizen, A.W., Austin, J.J., Seddon, J.M. (2011), 'Phylogeography of the pademelons (Marsupialia: Macropodidae: Thylogale) in New Guinea reflects both geological and climatic events during the Plio-Pleistocene', *Journal of Biogeography*, 38 (9), pp. 1732-1747.
167. Maier H.R. (2011), 'Using mobile phones to engage students in engineering lectures', in S. Grainger and C. Kestell (Eds.) *Engineering Education: An Australian Perspective*, Multi-Science Publishing, Essex, UK, pp.

- 239-250.
168. Mariakakis, I., Bischoff, P., Krampe, J., Meyer, C., Steinmetz, H. (2011), 'Effect of organic loading rate and solids retention time on microbial population during bio-hydrogen production by dark fermentation in large lab-scale', *International Journal of Hydrogen Energy*, 36 (17), pp. 10690-10700.
 169. Maurer, G. & Cassey, P. (2011), 'Evaluation of a glossmeter for studying the surface appearance of avian eggs', *Journal of Ornithology*, 152 (1) pp. 209-212.
 170. Maurer, G., Portugal, S.J., Boomer, I., Cassey, P. (2011), 'Avian embryonic development does not change the stable isotope composition of the calcite eggshell', *Reproduction, Fertility and Development*, 23 (2), pp. 339-345.
 171. Maurer, G., Portugal, S.J., Cassey, P. (2011), 'Review: An embryo's eye view of avian eggshell pigmentation', *Journal of Avian Biology*, 42 (6), 494-504.
 172. Maurer, G., Portugal, S.J., Mikšik, I., Cassey, P. (2011), 'Speckles of cryptic black-headed gull eggs show no mechanical or conductance structural function', *Journal of Zoology*, 285 (3), pp. 194-204.
 173. May R.J., Dandy G.C., Maier H.R. (2011), 'Review of input variable selection methods for artificial neural networks', in K. Suzuki (ed.) *Artificial Neural Networks - Methodological Advances and Biomedical Applications*, InTech, Rijeka, Croatia.
 174. McBeath, T.M., McLaughlin, M.J., Noack, S.R. (2011), 'Wheat grain yield response to and translocation of foliar-applied phosphorus', *Crop and Pasture Science*, 62 (1), pp. 58-65.
 175. McGaughan, A., Stevens, M.I., Hogg, I.D., Carapelli, A. (2011), 'Extreme glacial legacies: a synthesis of the Antarctic springtail phylogeographic record', *Insects*, 2 (2), 62-82.
 176. McLoughlin, S., Carpenter, R.J., Pott, C. (2011), '*Ptilophyllum muelleri* (Ettingsh.) comb. nov. from the Oligocene of Australia: Last of the Bennettitales?', *International Journal of Plant Sciences*, 172 (4), pp. 574-585.
 177. McMahon, C.R., Brook, B.W., Bowman, D.M.J.S., Williamson, G.J., Bradshaw, C.J.A. (2011), 'Fertility partially drives the relative success of two introduced bovines (*Bubalus bubalis* and *Bos javanicus*) in the Australian tropics', *Wildlife Research*, 38 (5), pp. 386-395.
 178. McPherson, H., Murray, L. (2011), '*Elaeocarpaceae*' (version 1), in Kellermann, J. (ed.) *Flora of South Australia*, 5th ed, State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
 179. Medwell, P.R., Nathan, G.J., Chan, Q.N., Alwahabi, Z.T., Dally B.B. (2011), 'The influence of high intensity radiation on soot within a laminar flame under conditions of relevance to concentrated solar energy', *Comb. Flame*, DOI: 10.1016/j.combustflame.2011.01.006.
 180. Mellick, R., Lowe, A., Rossetto, M. (2011), 'Consequences of long- and short-term fragmentation on the genetic diversity and differentiation of a late successional rainforest conifer', *Australian Journal of Botany*, 59 (4), pp. 351-362.
 181. Mellin, C., Delean, S., Caley, J., Edgar, G., Meekan, M., Pitcher, R., Przeslawski, R., Williams, A., Bradshaw, C. (2011), 'Effectiveness of biological surrogates for predicting patterns of marine biodiversity: A global meta-analysis', *PLoS ONE*, 6 (6), art. no. e20141.
 182. Metcalfe, A.V., Nordin, B.E.C. (2011), 'Calcium, vitamin D, and risk: A reanalysis too far?', *BMJ*, 342, d3538.
 183. Miller, P., Fitch, A.J., Gardner, M.G., Hutson, K.S., Mair, G.C. (2011), 'Genetic population structure of Yellowtail Kingfish (*Seriola lalandi*) in temperate Australasian waters inferred from microsatellite markers and mitochondrial DNA', *Aquaculture*, 319 (3-4), pp. 328-336.
 184. Murphy, J.C., Mumpuni, Sanders, K.L. (2011), 'First molecular evidence for the phylogenetic placement of the enigmatic snake genus *Brachyorrhos* (Serpentes: Caenophidia)', *Molecular Phylogenetics and Evolution*, 61 (3), pp. 953-957.
 185. Murphy, S.A., Joseph, L., Burbidge, A.H., Austin, J. (2011), 'A cryptic and critically endangered species revealed by mitochondrial DNA analyses: The Western Ground Parrot', *Conservation Genetics*, 12 (2), art no 450.
 186. Navarro, C., Cavers, S., Lowe, A.J. (2011), 'Seed sourcing recommendations for forest restoration: tree isolation impacts progeny performance of cedar and mahogany in the neotropics', Ch 3 in *Restoring degraded landscapes with native species in Latin America* (eds Montagnini, F, Finney, C). Nova Science Publishers, New York, USA, pp 51-61.
 187. Newland, C., Field, I.C., Cherel, Y., Guinet, C., Bradshaw, C.J.A., McMahon, C.R., Hindell, M.A. (2011), 'Diet of juvenile southern elephant seals reappraised by stable isotopes in whiskers', *Marine Ecology Progress Series*, 424, pp. 247-258.
 188. Nicholson, M., Biegler, T., Brook, B.W. (2011), 'How carbon pricing changes the relative competitiveness of

- low-carbon baseload generating technologies', *Energy*, 36 (1), pp. 305-313.
189. Ninnies, C.E., Waas, J.R., Ling, N., Nakagawa, S., Banks, J.C., Bell, D.G., Bright, A., Carey, P.W., Chandler, J., Hudson, Q.J., Ingram, J.R., Lyall, K., Morgan, D.K.J., Stevens, M.I., Wallace, J., Möstl, E., (2011), 'Environmental influences on Adelie penguin breeding schedules, endocrinology, and chick survival', *General and Comparative Endocrinology*, 173 (1), pp. 139-147.
190. Nitschke, M., Tucker, G.R., Hansen, A.L., Williams, S., Zhang, Y., Bi, P. (2011), 'Impact of two recent extreme heat episodes on morbidity and mortality in Adelaide, South Australia: A case-series analysis', *Environmental Health: A Global Access Science Source*, 10 (1), art. no. 42.
191. Noack, S.R., McBeath, T.M., McLaughlin, M.J. (2011), 'Erratum: Potential for foliar phosphorus fertilisation of dryland cereal crops: A review (*Crop and Pasture Science* 61:8 (659-669))', *Crop and Pasture Science*, 62 (5), p. 444.
192. Nordin, B.E.C., Lewis, J.R., Daly, R.M., Horowitz, J., Metcalfe, A., Lange, K., Prince, R.L. (2011), 'The calcium scare - what would Austin Bradford Hill have thought?', *Osteoporosis International*, pp. 1-5.
193. Oliver, I.W., Grant, C.D., Murray, R.S. (2011), 'Assessing effects of aerobic and anaerobic conditions on phosphorus sorption and retention capacity of water treatment residuals', *Journal of Environmental Management*, 92 (3), pp. 960-966.
194. Ostendorf, B. (2011). 'Overview: Spatial information and indicators for sustainable management of natural resources', *Ecological Indicators*, 11 (1), pp. 97-102.
195. Ottewell, K.M., Bickerton, D., Lowe, A.J. (2011), 'Can a seed bank provide demographic and genetic rescue in a declining population of the endangered shrub *Acacia pinguifolia*?', *Conservation Genetics*, 12 (3), pp. 669-678.
196. Palmer, J., Lally, T.R. (2011), 'Amaranthaceae' (version 1), in Kellermann, J. (ed.) *Flora of South Australia*, 5th ed. State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
197. Paplinska, J.Z., Taggart, D.A., Corrigan, T., Eldridge, M.D.B., Austin, J.J. (2011), 'Using DNA from museum specimens to preserve the integrity of evolutionarily significant unit boundaries in threatened species', *Biological Conservation*, 144 (1), pp. 290-297.
198. Partington, D., Brunner, P., Simmons, C.T., Therrien, R., Werner, A.D., Dandy, G.C., Maier, H.R. (2011), 'A hydraulic mixing-cell method to quantify the groundwater component of streamflow within spatially distributed fully integrated surface water-groundwater flow models', *Environmental Modelling and Software*, 26 (7), pp. 886-898.
199. Paterson, J.R., Garcia-Bellido, D.C., Lee, M.S.Y., Brock, G.A., Jago, J.B., Edgecombe, G.D. (2011), 'Acute vision in the giant Cambrian predator *Anomalocaris* and the origin of compound eyes', *Nature*, 480, pp. 237-240.
200. Pavey, C.R., Nano, C.E.M., Cooper, S.J.B., Cole, J.R., McDonald, P.J. (2011), 'Habitat use, population dynamics and species identification of *Mulgara*, *Dasycerus blythi* and *D. cristicauda*, in a zone of sympatry in central Australia', *Australian Journal of Zoology*, 59, pp. 156-169.
201. Payne, N.L., Gillanders, B.M., Semmens, J. (2011), 'Breeding durations as estimators of adult sex ratios and population size', *Oecologia*, 165 (2), pp. 341-347.
202. Payne, N.L., Gillanders, B.M., Seymour, R.S., Webber, D.M., Snelling, E.P., Semmens, J.M. (2011), 'Accelerometry estimates field metabolic rate in giant Australian cuttlefish *Sepia apama* during breeding', *Journal of Animal Ecology*, 80 (2), pp. 422-430.
203. Pettit, C.J., Raymond, C.M., Bryan, B.A., Lewis, H. (2011), 'Identifying strengths and weaknesses of landscape visualisation for effective communication of future alternatives', *Landscape and Urban Planning*, 100 (3), pp. 231-241.
204. Peyrard, N., Sabbadin, R., Spring, D., Brook, B., Mac Nally, R. (2011), 'Model-based adaptive spatial sampling for occurrence map construction', *Statistics and Computing*, DOI 10.1007/s11222-011-9287-3.
205. Polačiková, L., Hauber, M.E., Procházka, P., Cassey, P., Honza, M., Grim, T. (2011), 'A sum of its individual parts? Relative contributions of different eggshell regions to intraclutch variation in birds', *Journal of Avian Biology*, 42 (4), pp. 370-373.
206. Portugal, S.J., Butler, P.J., Green, J.A., Cassey, P. (2011), 'Indications of phenotypic plasticity in moulting birds: Captive geese reveal adaptive changes in mineralisation of their long bones during wing moult', *Journal of Ornithology*, 152 (4), pp. 1055-1061.
207. Prowse, T.A.A., Brook, B.W. (2011), 'Climate change, variability and conservation impacts in Australia', *Pacific Conservation Biology*, 17 (3), pp. 168-178.
208. Recknagel, F. (2011), 'Ecological informatics: A discipline in the making', *Ecological Informatics*, 6 (1), pp. 1-3.
209. Rowan, T.S.C., Maier, H.R., Connor, J., Dandy, G.C., (2011), 'An integrated dynamic modeling framework

- for investigating the impact of climate change and variability on irrigated agriculture', *Water Resources Research*, 47 (7), art. no. W07520.
210. Rowell, D.M., Lim, S.L., Grützner, F. (2011), 'Chromosome analysis in invertebrates and vertebrates', *Methods in Molecular Biology*, 722, pp. 13-35.
211. Russell, B.D., Passarelli, C.A., Connell, S.D. (2011), 'Forecasted CO₂ modifies the influence of light in shaping subtidal habitat', *Journal of Phycology*, 47 (4), pp. 744-752.
212. Ruykys, L., Ward, M.J., Taggart, D.A., Breed, W.G. (2011), 'Preliminary spatial behaviour of waru (*Petrogale lateralis* MacDonnell Ranges race) in the Anangu Pitjantjatjara Yankunytjatjara Lands', *South Australia, Australian Mammalogy*, 33, pp. 181-188.
213. Samaš, P., Hauber, M.E., Cassey, P., Grim, T. (2011), 'Repeatability of foreign egg rejection: Testing the assumptions of co-evolutionary theory', *Ethology*, 117 (7), pp. 606-619.
214. Schmidt, D.J., Bond, N.R., Adams, M., Hughes, J.M. (2011), 'Cytonuclear evidence for hybridogenetic reproduction in natural populations of the Australian carp gudgeon (*Hypseleotris Eleotridae*)', *Molecular Ecology*, 20, pp. 3367-3380.
215. Schwarz, M.P., Tierney, S.M., Rehan, S.M., Chenoweth, L.B., Cooper, S.J.B. (2011), 'The evolution of eusociality in allodapine bees: Workers began by waiting', *Biology Letters*, 7 (2), pp. 277-280.
216. Setia, R., Lewis, M., Marschner, P., Raja Segaran, R., Summers, D., Chittleborough, D. (2011), 'Severity of salinity accurately detected and classified on a paddock scale with high resolution multispectral satellite imagery', *Land Degradation and Development*, DOI: 10.1002/ldr.1134.
217. Setia, R., Marschner, P., Baldock, J., Chittleborough, D., Smith, P., Smith, J. (2011), 'Salinity effects on carbon mineralization in soils of varying texture', *Soil Biology and Biochemistry*, Vol 43 No 9, pp. 1908-1916.
218. Setia, R., Marschner, P., Baldock, J., Chittleborough, D., Verma, V. (2011), 'Relationships between carbon dioxide emission and soil properties in salt-affected landscapes', *Soil Biology and Biochemistry*, 43 (3), 667-674.
219. Setia, R., Smith, P., Marschner, P., Baldock, J., Chittleborough, D., Smith, J. (2011), 'Introducing a decomposition rate modifier in the Rothamsted carbon model to predict soil organic carbon stocks in saline soils', *Environmental Science and Technology*, 45 (15), pp. 6396-6403.
220. Sgrò, C.M., Lowe, A.J., Hoffmann, A.A. (2011), 'Building evolutionary resilience for conserving biodiversity under climate change', *Evolutionary Applications*, 4 (2), pp. 326-337.
221. Short, F.T., Polidoro, B., Livingstone, S.R., Carpenter, K.E., Bandeira, S., Bujang, J.S., Calumpong, H.P., Carruthers, T.J.B., Coles, R.G., Dennison, W.C., Erftemeijer, P.L.A., Fortes, M.D., Freeman, A.S., Jagtap, T.G., Kamal, A.H.M., Kendrick, G.A., Kenworthy, W.J., La Nafie, Y.A., Nasution, I.M., Orth, R.J., Prathep, A., Sanciangco, J.C., van Tussenbroek, B., Vergara, S. G., Waycott, M., Zieman, J. C. (2011), 'Extinction risk assessment for the world's seagrass species', *Biological Conservation*, 144, pp. 1961-1971.
222. Simpson, A. & Elhay, S. (2011), 'Jacobian matrix for solving water distribution system equations with the Darcy-Weisbach head-loss model', *Journal of Hydraulic Engineering*, 137 (6), pp. 696-700.
223. Sirisena, U., Donnon, M.J., Macfarlane, T.D., Conran, J.G. (2011), 'Generic relationships within Asparagaceae: Lomandroideae inferred from non-coding chloroplast DNA and morphology'. in 'IBC 2011 XVIII International Botanical Congress, Melbourne Australia, 23-30 July 2011.' (Ed. IBC 2011 Editorial Committee.) (IBC 2011: Melbourne).
224. Skinner, A., Hugall, A.F., Hutchinson, M.N. (2011), 'Lygosomine phylogeny and the origins of Australian scincid lizards', *Journal of Biogeography*, 38 (6), pp. 1044-1058.
225. Skinner, A.J., Wallace, A.K., Lambert, M.F. (2011), 'A null-buoyancy thermal flow meter with potential application to the measurement of the hydraulic conductivity of soils', *IEEE Sensors Journal*, 11 (1), pp. 71-77.
226. Sleeman, J.C., Meekan, M.G., Stewart, B.S., Wilson, S.G., Polovina, J.J., Stevens, J.D., Boggs, G.S., Bradshaw, C.J.A. (2011), 'Corrigendum to "To go or not to go with the flow: Environmental influences on whale shark movement patterns" [J. Exp. Mar. Biol. Ecol. 390 (2010) 84-98]', *Journal of Experimental Marine Biology and Ecology*, Vol. 396, No. 2 page 255.
227. Smith, A.L., Gardner, M.G., Bull, C.M., Driscoll, D.A. (2011), 'Primers for novel microsatellite markers in "fire-specialist" lizards (*Amphibolurus norrisi*, *Ctenotus atlas* and *Nephurus stellatus*) and their performance across multiple populations', *Conservation Genetics Resources*, 3, pp. 345-350.
228. Sparks, T.H., Butchart, S.H.M., Balmford, A., Bennun, L., Stanwell-Smith, D., Walpole, M., Bates, N.R., Bomhard, B., Buchanan, G.M., Chenery, A.M., Collen, B., Csirke, J., Diaz, R.J., Dulvy, N.K., Fitzgerald, C., Kapos, V., Mayaux, P., Tierney, M., Waycott, M., Wood, L., Green, R.E. (2011), 'Linked indicator sets for addressing biodiversity loss', *Oryx*, 45, pp. 411-419.
229. Speed, C.W., Meekan, M.G., Field, I.C., McMahon, C.R., Stevens, J.D., McGregor, F., Huveneers, C., Berger, Y., Bradshaw, C.J.A. (2011), 'Spatial and temporal movement patterns of a multi-species coastal reef shark aggregation', *Marine Ecology Progress Series*, 429, pp. 261-275.
230. Spokes, T.M., Weber, J.Z. (2011), 'Picrodendraceae' (version 1), in Kellermann, J. (ed.) *Flora of South Australia*, 5th ed, State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
231. Stevens, M.I., Porco, D., D'Haese, C.A., Deharveng, L. (2011), 'Comment on "Taxonomy and the DNA barcoding enterprise" by Ebach', *Zootaxa*, (2838), pp. 85-88.

2011 PUBLICATION LIST

232. Stevens, N.B., Austin, A.D., Jennings, J.T. (2011), 'Diversity, distribution and taxonomy of the Australian agathidine genera *Camptothipsis* Enderlein, *Lytopylus* Foerster and *Therophilus* Wesmael (Hymenoptera: Braconidae: Agathidinae)', *Zootaxa*, (2887), pp. 1-49.
233. Summers, D., Lewis, M., Ostendorf, B., Chittleborough, D. (2011), 'Unmixing of soil types and estimation of soil exposure with simulated hyperspectral imagery', *International Journal of Remote Sensing*, 32 (21), pp. 6507-6526.
234. Summers, D., Lewis, M., Ostendorf, B., Chittleborough, D. (2011), 'Visible near-infrared reflectance spectroscopy as a predictive indicator of soil properties', *Ecological Indicators*, 11 (1), pp. 123-131.
235. Sweatman, H., Delean, S., Syms, C. (2011), 'Assessing loss of coral cover on Australia's Great Barrier Reef over two decades, with implications for longer-term trends', *Coral Reefs*, 30 (2), pp. 521-531.
236. Tanner, J.E. (2011), 'Utilisation of the Invasive Alga *Caulerpa taxifolia* as Habitat by Faunal Assemblages in the Port River-Barker Inlet Estuary, South Australia', *Estuaries and Coasts*, 34 (4), pp. 831-838.
237. Taylor, G.S., Jennings, J.T., Purcell, M.F., Austin, A.D. (2011), 'A new genus and ten new species of jumping plant lice (Hemiptera: Triozidae) from *Allocasuarina* (Casuarinaceae) in Australia', *Zootaxa*, 3009, pp. 1-45.
238. Thitipramote, N., Suwanjarat, J., Leigh, C., Breed, W.G. (2011), 'Intra-individual variability in sperm morphology of a murine rodent from South-East Asia', *Acta Zoologica*, 92, pp. 201-205.
239. Thompson, I.R., Wilson, P.J. (2011), 'Fabaceae (Leguminosae) (partly)' (version 1), in Kellermann, J. (ed.) *Flora of South Australia*, 5th ed., State Herbarium of South Australia, Adelaide, www.flora.sa.gov.au/ed5.
240. Thums, M., Bradshaw, C.J.A., Hindell, M.A., (2011), 'In situ measures of foraging success and prey encounter reveal marine habitat-dependent search strategies', *Ecology*, 92 (6), pp. 1258-1270.
241. Tibby, J. & Taffs, K. (2011), 'Palaeolimnology in eastern and southern Australian estuaries', *Journal of Paleolimnology*, 46 (4), pp. 503-510.
242. Tillett, B.J., Meekan, M.G., Parry, D., Munksgaard, N., Field, I.C., Thorburn, D., Bradshaw, C.J.A. (2011), 'Decoding fingerprints: elemental composition of vertebrae correlate to age-related habitat use in two morphologically similar sharks', *Marine Ecology Progress Series*, 434, pp. 133-142.
243. Tillett, B.J., Meekan, M.G., Field, I.C., Hua, Q., Bradshaw, C.J.A. (2011), 'Similar life history traits in bull (*Carcharhinus leucas*) and pig-eye (*C. amboinensis*) sharks', *Marine and Freshwater Research*, 62, pp. 850-860.
244. Traill, L.W., Brook, B.W. (2011), 'An aggregative response of the tropical Australian magpie goose (*Anseranas semipalmata*) to seasonal floodplains', *Journal of Tropical Ecology*, 27 (2), pp. 171-180.
245. Turner, D., Lewis, M., Ostendorf, B. (2011), 'Spatial indicators of fire risk in the arid and semi-arid zone of Australia', *Ecological Indicators*, 11 (1), pp. 149-167.
246. Unmack, P.J., Hammer, M., Adams, M., Dowling, T.E. (2011), 'A phylogenetic analysis of pygmy perches (Teleostei: Percichthyidae) with an assessment of the major historical influences on aquatic biogeography in southern Australia', *Systematic Biology*, 60, pp. 797-812.
247. Van Tussenbroek, B.I., Santos, M.G.B., Wong, R., van Dijk, J.K., Waycott, M. (2011), 'A guide to the seagrasses of the tropical western Atlantic', *Universidad Nacional Autonoma de Mexico, Instituto de Ciencias del Mary Limnologia*.
248. Vidale, P., Piras, F.M., Nergadze, S.G., Bertoni, L., Verini-Supplizi, A., Adelson, D., Guerin, G., Giulotto, E., (2011), 'Chromosomal assignment of six genes (*eif4g3*, *hsp90*, *rbbp6*, *il8*, *tert*, and *terc*) in four species of the genus *equus*', *Animal Biotechnology*, 22 (3), pp. 119-123.
249. Vítkovský, J.P., Lee, P.J., Zecchin, A.C., Simpson, A.R., Lambert, M.F. (2011), 'Head- and flow-based formulations for frequency domain analysis of fluid transients in arbitrary pipe networks', *Journal of Hydraulic Engineering*, 137 (5), pp. 556- 568.
250. Vörös, J., Price, L., Donnellan, S.C. (2011), 'On the occurrence of the chytrid fungus *Batrachochytrium dendrobatidis* on the endemic frog species *Litoria raniformis* in South Australia', *Herpetological Reviews*, 42, pp. 220-223.
251. Wahizatul, A.A. & Jennings, J.T. (2011), 'Impact of exotic willow roots (*Salix* spp.) as habitat for aquatic invertebrate communities in South Australian stream', *Asian Journal of Biological Sciences*, 4, pp. 428-444.
252. Walsh, N.G., Kellermann, J. (2011), 'Papaveraceae' (version 1), in Kellermann, J. (ed.) *Flora of South Australia*, 5th ed., State Herbarium of South Australia, Adelaide. www.flora.sa.gov.au/ed5.
253. Wanger, T.C., Wielgoss, A.C., Motzke, I., Clough, Y., Brook, B.W., Sodhi, N.S., Tschamntke, T. (2011), 'Endemic predators, invasive prey and native diversity', *Proceedings of the Royal Society B: Biological Sciences*, 278, (1706), pp. 690-694.
254. Watts, M.J., Li, Y., Russell, B.D., Mellin, C., Connell, S.D., Fordham, D.A. (2011), 'A novel method for mapping reefs and subtidal rocky habitats using artificial neural networks', *Ecological Modelling*, 222 (15), pp. 2606-2614.
255. Waycott, M., McKenzie, L.J., Mellors, J.E., Ellison, J.C., Sheaves, M.T., Collier, C., Schwarz, A-M., Webb, A., Johnson, J.E., Payri, C.E. (2011), 'Chapter 6 Vulnerability of mangroves, seagrasses and intertidal flats', in JD Bell et al. (eds) *Vulnerability of Tropical Pacific Fisheries and Aquaculture to Climate Change*, Secretariat of the Pacific Community, Noumea, New Caledonia, pp. 297-368.
256. Webala, P.W., Craig, M.D., Law, B.S., Armstrong, K.N., Wayne, A.F., Bradley, J.S. (2011), 'Bat habitat use in logged jarrah eucalypt forests of south-western Australia', *Journal of Applied Ecology*, 48 (2), pp. 398-406.

257. Wechalekar, H., Setchell, B.P., Peirce, E., Leigh, C., Breed, W.G. (2011), 'Are male germ cells of the arid zone hopping mouse (*Notomys alexis*) sensitive to high environmental temperatures?', *Australian Journal of Zoology*, 59 (4), pp. 249-256
258. Weeks, A.R., Sgro, C.M., Young, A.G., Frankham, R., Mitchell, N.J., Miller, K.A., Byrne, M., Coates, D.J., Eldridge, M.D.B., Sunnucks, P., Breed, M.F., James, E.A., Hoffmann, A.A. (2011), 'Assessing the benefits and risks of translocations in changing environments: a genetic perspective', *Evolutionary Applications*, 4, pp. 709-725.
259. Wernberg, T., Russell, B.D., Moore, P.J., Ling, S.D., Smale, D.A., Campbell, A., Coleman, M.A., Steinberg, P.D., Kendrick, G.A., Connell, S.D. (2011), 'Impacts of climate change in a global hotspot for temperate marine biodiversity and ocean warming', *Journal of Experimental Marine Biology and Ecology*, 400 (1-2), pp. 7-16.
260. Wernberg, T., Russell, B.D., Thomsen, M.S., Gurgel, C.F.D., Bradshaw, C.J.A., Poloczanska, E.S., Connell, S.D. (2011), 'Seaweed communities in retreat from ocean warming', *Current Biology*, 21 (21), pp. 1828-1832.
261. White, D., & Lewis, M.M. (2011), 'A new approach to monitoring spatial distribution and dynamics of wetlands and associated flows of Australian Great Artesian Basin springs using QuickBird satellite imagery', *Journal of Hydrology* 408, pp.140-152.
262. Whittington, I.D. & Deveney, M.R. (2011), 'New *Benedenia* species (Monogenea: Capsalidae) from *Diagramma labiosum* (Perciformes: Haemulidae) from the Great Barrier Reef, Australia, oncomiracidial descriptions and a report of egg attachment to the host', *Journal of Parasitology*, 97, pp. 1026-1034.
263. Whittington, I.D. & Kearn, G.C. (2011), 'A new species of *Dermopristis* Kearn, Whittington & Evans-Gowing, 2010 (Monogenea: Microbothriidae), with observations on associations between the gut diverticula and reproductive system and on the presence of denticles in the nasal fossae of the host *Glaucostegus typus* (Bennett) (Elasmobranchii: Rhinobatidae)', *Systematic Parasitology*, 80, pp. 41-51.
264. Whittington, I.D. & Kearn, G.C. 2011, 'Hatching strategies in monogenean (platyhelminth) parasites that facilitate host infection', *Integrative & Comparative Biology*, 51, pp. 91-99.
265. Whyte, J.M., Plumridge, A., Metcalfe, A.V. (2011), 'Comparison of predictions of rainfall-runoff models for changes in rainfall in the Murray-Darling Basin', *Hydrology and Earth System Sciences Discussions*, 8 (1), pp. 917-955.
266. Wilson, R.P., McMahon, C.R., Quintana, F., Frere, E., Scolaro, A., Hays, G.C., Bradshaw, C.J.A. (2011), 'N-dimensional animal energetic niches clarify behavioural options in a variable marine environment', *Journal of Experimental Biology*, 214 (4), pp. 646-656.
267. Wood, J.R., Wilmshurst, J.M., Worthy, T.H., Cooper, A. (2011), 'Sporormiella as a proxy for non-mammalian herbivores in island ecosystems', *Quaternary Science Reviews*, 30, (7-8), pp. 915-920.
268. Woodcock, S.H., Gillanders, B.M., Munro, A.R., McGovern, F., Crook, D.A., Sanger, A.C. (2011), 'Using enriched stable isotopes of barium and magnesium to batch mark otoliths of larval golden perch (*Macquaria ambigua*, Richardson)', *Ecology of Freshwater Fish*, 20 (1), pp. 157-165.
269. Wu, W., Maier, H. R., Simpson, A. R. (2011), 'Surplus power factor as a resilience measure for assessing hydraulic reliability in water transmission system optimization', *Journal of Water Resources Planning and Management*, 137 (6), pp. 542-546.
270. Yang, G-J., Zhou, X-N., Sun, L-P., Wu, F., Zhong, B., Qiu, D-C., Utzinger, J., Bradshaw, C.J.A. (2011), 'Compensatory density feedback of *Oncomelania hupensis* populations in two different environmental settings in China', *Parasites and Vectors*, 4, pp. 133.
271. Yang, H., Unkovich, M., McNeill, A., Wang, X. (2011), 'Symbiotic N₂ fixation and nitrate utilisation in irrigated lucerne (*Medicago sativa*) systems', *Biology and Fertility of Soils*, 47 (4), pp. 377-385.
272. Yongabi, K.A., Lewis, D.M., Harris, P.L. (2011), 'Application of phytodisinfectants in water purification in rural Cameroon', *African Journal of Microbiology Research*, 5 (6), pp. 628-635.
273. Yuan, Y., Shen, T.-J., Gupta, P., Ho, N.T., Simplaceanu, V., Tam, T.C.S., Hofreiter, M., Cooper, A., Campbell, K.L., Ho, C. (2011), 'A biochemical-biophysical study of hemoglobins from woolly mammoth, asian elephant, and humans', *Biochemistry*, 50 (34), pp. 7350-7360.
274. Zenger, A., Lefroy, T., Bryan, B. (2011), 'Science to improve regional environmental investment decisions', *Environmental Modelling and Software*, 26 (1), p. 1.
275. Zhao, Z.Q., Davies, K., Alexander, B., Riley, I.T. (2011), '*Litylenchus coprosma* gen. n., sp. n. (Tylenchida: Anguinata), from leaves of *Coprosma repens* (Rubiaceae) in New Zealand', *Nematology*, 13 (1), pp. 29-44.
276. Zheng, F., Simpson, A. R., Zecchin, A. C. (2011), 'A combined NLP-differential evolution algorithm approach for the optimization of looped water distribution systems', *Water Resources Research*, 47 (8), W08531.

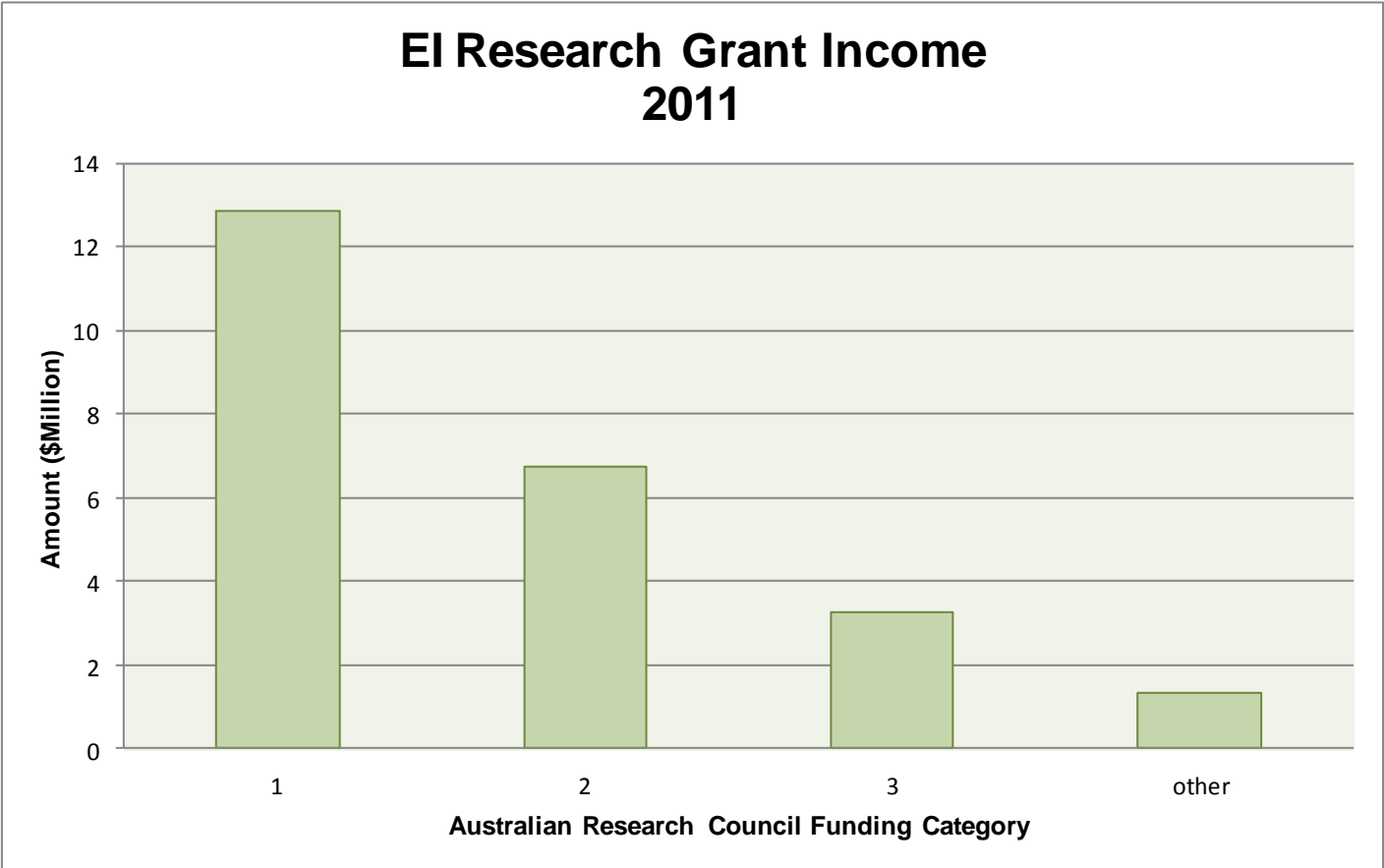
(Please note: Publications list compiled using Scopus and Orbit)

RESEARCH INCOME

The research income across the Environment Institute has continued to grow strongly driven by significant success through competitive grants. Income has also increased with the Institute's research profile attracting established researchers to work at the university and bringing established grant funding with them.

Figure 1 shows cross Environment Institute research grant income for projects that were funded (single or multi year) during 2011.

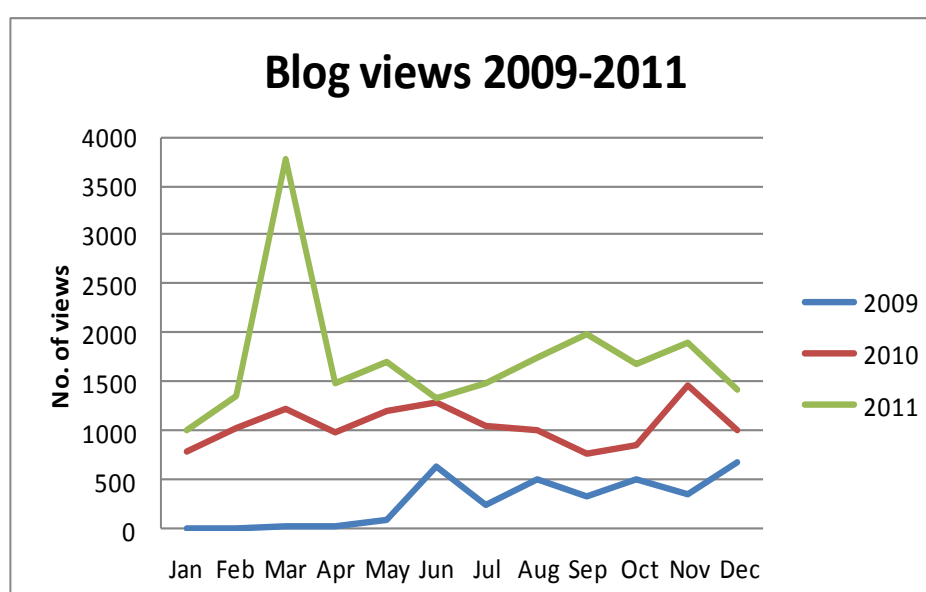
Figure 1



The Environment Institute has a large presence in social media with a blog that has attracted over 36,000 views, a Twitter account with over 1400 followers and a Facebook page with over 270 likes. Through these mechanisms the institute is able to promote our researchers and the impact the research being done has on Australia and the world.

In 2011 the Environment Institute blog had 20,873 views, an increase of 8,238 views from the previous year.

The Environment Institute encourages our researchers to get involved. In 2011 we encouraged our members to share their research with the world, by contributing as a guest blogger on the Environment Institute Blog. This initiative invited postgraduate students, postdoctoral fellows, research associates and academic staff to tell us about their research and let us share their exciting work with the public and the scientific community. One of our most successful guest posts (and most popular post overall to date), was written in March 2011 by Dr John Jennings and titled 'Cricket Plague – Should we be jumping for cover?' To date this post has attracted 2657 views (1268 views more than the next most viewed post), and had 12 comments from the general public.



Both Barry Brook and Corey Bradshaw continue to use social media to promote their research and have developed a popular audience.

Barry Brook's blog Brave New Climate (www.bravenewclimate.com) had 2.29 million views in 2011, with an accumulated total of 3.47 million (Aug 2008 – Dec 2011). Brave New Climate had received over 50,000 comments by the end of 2011 and 1750 subscriptions. In addition to his blog, Barry has 2723 followers on Twitter that he interacts with daily.

Corey Bradshaw's blog Conservation Bytes (www.conservationbytes.com) had 200,000 views, 400 subscribers and 1200 comments at the end of 2011, with an accumulated total number of views of 400,000 (Jul 2008 – Dec 2011). Corey Bradshaw has also developed a large following on Twitter with 1339 followers to date.

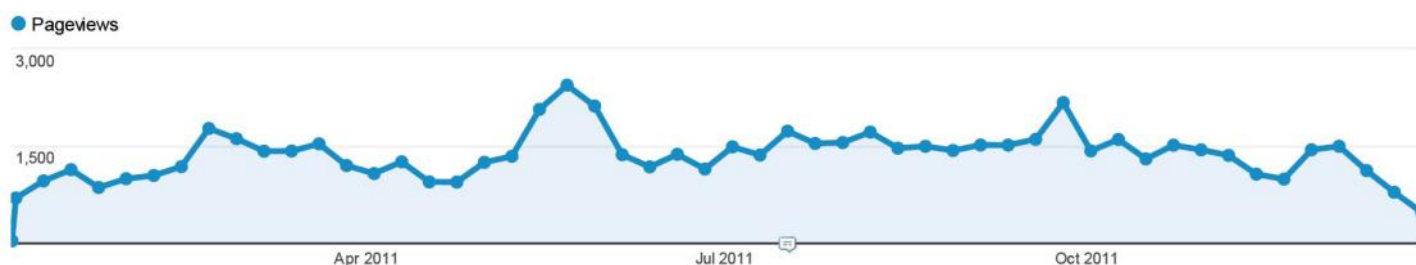
WEBSITE

The content on the Environment Institute website in 2011 has continued to be updated and built upon to maintain a high level of public engagement, including a focus on podcast and video materials for our audience.

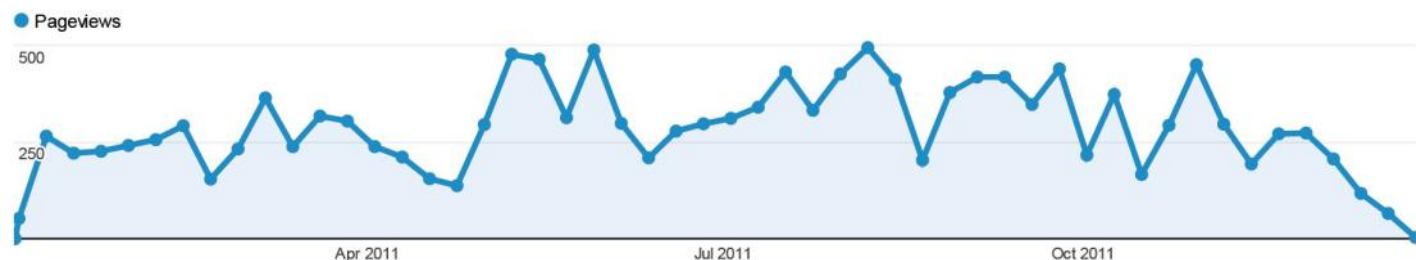
In 2011, the Environment Institute website received 85,851 page views from both internal and external computers. Of this, 62,545 were unique page views (coming from a different IP address).

The graphs below show the weekly page views for external and internal audiences over 2011. The results show that the Institute has a very large number of page views from people on computers outside of the University system, with 70,959 page views externally.

Weekly page views—external



Weekly page views—internal



In 2011 the Environment Institute were involved in 34 events, some of which were collaborations with government departments and other external organisations. This included bringing over Australian and international researchers to present public talks, participate in workshops and round table discussions with our members and invited guests, and encouraging research collaborations between our researchers and visiting academics.

A significant event of interest was the Fourth International Barcode of Life (IBOL) Conference, which was held at the University of Adelaide from 28 November to 3 December 2011. The Environment Institute's Australian Centre for Evolutionary Biology and Biodiversity (ACEBB) were the main organisers of this conference, which attracted over 460 delegates from more than 50 Australian institutions and 61 countries and showcased 294 talks and 168 posters. The conference attracted unprecedented press coverage and provided a focal point for media attention to barcoding. Media reports of the conference reached 34 countries in 15 languages, with coverage by major wire services in the United States, Latin America, Europe and Asia, over 300 publications, and many radio and television interviews.

A full report of this conference is available at www.adelaide.edu.au/environment/acebb/events/2011/cbol/

The Environment Institute also collaborated with the Leaders Institute of South Australia and co-hosted a special public event together in 2011. The event, facilitated by Annabel Crabb, included a high-profile panel discussing the complex and 'wicked' problem of climate change and leadership.

The panellists debating 'Leadership in a Changing Climate' were:

- Senator Penny Wong, Minister for Finance and Deregulation
- Andrew Stock, Director, Executive Projects, Origin Energy Ltd
- David Klingberg, AO-Chairman, Centrex Metals
- Right Hon. Stephen Yarwood, Lord Mayor of Adelaide
- Prof. Mike Young, Former Executive Director, University of Adelaide's Environment Institute
- David Knox, Chief Executive Officer and Managing Director, Santos Limited



Attendees at the opening plenary talk of the IBOL Conference

EVENTS

Complete list of Environment Institute events held in 2011

Month Held	Name of event	Speaker's name	Approx. Audience	Link to content
Feb	DNA Barcode of Life	David Schindel	55	http://tinyurl.com/6p4thgt
Feb	Terrestrial Biodiversity Roadshow	Multiple speakers	N/A	http://tinyurl.com/7zqlgry
Feb	Post Graduate Forum: Adelaide Next-Generation Sequencing Special Interest Group Meeting	Alan Cooper Andreas Schreiber	8	http://tinyurl.com/7ciw25h
Apr	The evolutionary genetic causes and consequences of sociality in insects	Michael Goodisman	50	http://tinyurl.com/3uzk5ms
Apr	Global patterns in microbial biogeography	Steven Pointing	45	http://tinyurl.com/3uzk5ms
Apr	Water Wednesday - Improving community and industry engagement in natural resources management	Ann Shaw-Rungie David Paton Ruchira Talukdar	N/A	http://tinyurl.com/bs7bc0y
May	Mammalian biodiversity dynamics: Inferences from adaptive radiations and species' responses over historical time	Kevin Rowe	50	http://tinyurl.com/3uzk5ms
May	The role of the invasion pathway in exotic bird introductions	Phillip Cassey	40	http://tinyurl.com/3uzk5ms
May	The hidden and bizarre lives of octopuses: revealing cryptic diversity, behaviours and biology	Mark Norman	55	http://tinyurl.com/3uzk5ms
May	Four in 40: Climate change and forward predictions for management	Graham Green Mark Thyer Brad Udall John Tibby	72	http://tinyurl.com/3keyks8
May	Postgraduate Forum: Young Water Professionals Workshop - Water Quality and Disaster Management	N/A	7	http://tinyurl.com/6yjqsh
May	Climate whiplash: What happens AFTER global warming?	Curt Stager	60	http://tinyurl.com/690aazh
May	Mitigating Climate Change – How and why economists have changed their minds	Stephen Howes	150	http://tinyurl.com/3fgrpez
June	Application of next generation sequencing in animal and plant research	Bruce Li	50	http://tinyurl.com/3uzk5ms
June	Making a 'machine' for projecting and monitoring population persistence	Paul Sunnucks	45	http://tinyurl.com/3uzk5ms
June	Coupling physical, sedimentological and biogeochemical processes in a stratified lake	Iliia Ostrovosky	25	http://tinyurl.com/7kvm635
June	Responding to climate change in our national interest	Ross Garnaut	830	http://tinyurl.com/3z3ak6a

Date Held	Name of event	Speaker's name	Audience	Link to content
July	Ancient Seafood on Kangaroo Island: Documenting the Rise of Animals Over Half a Billion Years Ago	John Paterson	40	http://tinyurl.com/3uzk5ms
July	Water Wednesday—Desalination: Future directions for Australia's world class facilities	Nikolay Voutchkov David Furukawa	70	http://tinyurl.com/83ehyg3
July	Postgraduate Forum: Kangaroo Island Tree Planting Festival	N/A	10	http://tinyurl.com/6va36v7
Aug	Four in 40: The Changing Water Scene	Rob Daly Todd Wallace Mike Burch Thorsten Mosisch Fiona Paton	60	http://tinyurl.com/7h47svx
Sept	Evolution of echolocation and its use as a biodiversity monitoring tool	Kate Jones	40	http://tinyurl.com/3uzk5ms
Sept	Leadership and Climate Change Forum	Senator Penny Wong David Klingberg Andrew Stock Stephen Yarwood Mike Young David Knox	500	http://tinyurl.com/3ebqjyt
Sept	Four in 40: What science do we need to inform decision making?	Jim Barratt Seth Westra Chrissie Bloss Matt Gibbs	N/A	http://tinyurl.com/6v6es27
Sept	Four in 40: Emerging Water Quality Issues	Sean Connell Bayden Russell Milena Fernandes David Lewis Sandy Dickson	60	http://tinyurl.com/7h9st9r
Sept	Postgraduate Forum: 2nd National Postgraduate Training Workshop in Systematics	N/A	10	http://tinyurl.com/3hsldvu
Oct	Earth Station at WOMAD	Multiple Speakers	4000+	http://tinyurl.com/768xha8
Oct	New approaches to resolving deep phylogenetic questions in animal evolution	Gonzalo Giribet	50	http://tinyurl.com/3uzk5ms
Oct	A review of Phylogeography and the Integration between Biologists and Earth Scientists.	Luciano Beheregaray	40	http://tinyurl.com/3uzk5ms
Oct	Today's opportunity in energy efficiency	Jim Poss	26	http://tinyurl.com/7dsucdn
Nov	Ancient Proteins: Going beyond bulk collagen isotope analysis using Liquid Chromatography Isotope Ratio Mass Spectrometry	Colin Smith	45	http://tinyurl.com/7cjt7oo
Dec	Fourth International Barcode of Life Conference	Multiple speakers	400+	http://tinyurl.com/7x96evr

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