

Summary of Linkage Projects Proposals for Funding to Commence in 2009

Queensland

The University of Queensland

LP0989845 Dr KR Anthony; Prof O Hoegh-Guldberg; Dr G Diaz-Pulido; Prof RB Dunbar; Prof JR Koseff; Prof SG Monismith; Dr CM Eakin; Dr D Gledhill; Mr R Beeden

Approved Project Title **Multi-Scale Analysis of the Vulnerability of Coral Reefs to Ocean Acidification**

2009 : \$ 90,000

2010 : \$ 93,000

2011 : \$ 93,000

Primary RFCD 2799 OTHER BIOLOGICAL SCIENCES

APA(I) Award(s): 1

Collaborating/Partner Organisation(s)

National Oceanic and Atmospheric Administration

Stanford University

Great Barrier Reef Marine Park Authority

Administering Organisation The University of Queensland

Project Summary

The Great Barrier Reef (GBR) is one of Australia's biggest icons, and represents more than 10% of the world's coral reefs. It is a World Heritage Area and is home to more than 1 million species. The GBR provides Australia with more than \$6 billion in annual national revenue. To help manage for sustained resilience of the GBR in an era of climate change, Australia needs to understand the major threats, in particular ocean acidification. By producing an innovative framework for assessing acidification risks, the project will help Australia demonstrate continued stewardship of one of the world's richest and most sensitive ecosystems.

LP0989162 Prof DJ Brereton; Prof GA Lawrence; Dr C Pattenden; Dr LA Cheshire

Approved Project Title **Local government, mining companies and the resources boom in regional Australia: meeting the governance challenge**

2009 : \$ 83,000

2010 : \$ 60,000

Primary RFCD 3701 SOCIOLOGY

Collaborating/Partner Organisation(s)

Queensland Resources Council

New South Wales Minerals Council Ltd

Association of Mining Related Councils Inc.

The Local Government Association of Queensland Incorporated

Local Government Association of South Australia

Rio Tinto Limited

BM Alliance Coal Operations Pty Ltd (BMA)

Administering Organisation The University of Queensland

Project Summary

Sustainable regional development and continuing growth of the resources sector are key national priorities. The current resources boom is placing significant pressure on the physical, social and governance infrastructure of mining-intensive regions. Unless these issues can be better managed, new resource projects risk being delayed or deferred and the trend to fly-in fly-out operations will be accelerated, with deleterious consequences for sustainable regional growth. This project will contribute to a more effective response to these challenges by investigating the changing nature of local level governance in mining intensive regions and how these arrangements can be improved.

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LP0989954 Prof RJ Capon

Approved **Towards Next Generation Anthelmintics.**

Project Title

2009 : \$ 135,000

2010 : \$ 145,000

2011 : \$ 150,000

Primary RFCD 2502 INORGANIC CHEMISTRY

APA(I) Award(s): 1

Collaborating/Partner Organisation(s)

ParaCo

Administering Organisation The University of Queensland

Project Summary

The agricultural industry is in urgent need of new, safe and cost effective treatments for parasite infections in commercial livestock (sheep, cattle, goats). The current multi billion dollar agrochemical industry provides only three classes of antiparasitic drug, all of which are >25 yrs old and are largely ineffective due to the widespread resistance. This project will advance the development of a new class of antiparasitic treatment, improving outcomes for Australian farmers by reducing reliance on expensive ineffective agrochemical imports, reducing chemical load on the environment, improving pastures and increasing yields. In short, improved livestock health will lead to more sustainable and productive farming, and a stronger economy.

LP0989676 Prof SP Collin

Approved **Sensory strategies for protecting endangered sawfishes**

Project Title

2009 : \$ 25,000

2010 : \$ 54,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Collaborating/Partner Organisation(s)

Cairns Marine Aquarium Fish Pty Ltd

Administering Organisation The University of Queensland

Project Summary

The Gulf of Carpentaria is the last habitat worldwide containing sustainable populations of sawfish. Easily entangled in nets, the saw has reduced population numbers dramatically in Australia with all species now protected under the Australian Environment Protection and Biodiversity Conservation Act, including the Convention on International Trade in Endangered Species (CITES). This study will provide basic biological information on feeding, prey manipulation and the role of critical senses in the only captive population of sawfishes in Australia. Such knowledge will underpin the development and use of visual, chemical and/or magnetic repellents by fisherman that are still responsible for the loss of large numbers of sawfish as by-catch.

LP0989200 A/Prof D Edwards

Approved **Next generation metagenomics**

Project Title

2009 : \$ 133,000

2010 : \$ 133,000

2011 : \$ 133,000

Primary RFCD 2702 GENETICS

APA(I) Award(s): 1

Collaborating/Partner Organisation(s)

Biomatters Ltd

Australian Genome Research Facility Ltd

Administering Organisation The University of Queensland

Project Summary

Applying the latest scientific advances supports society directly through promoting a knowledge based economy, as well as indirectly through securing agricultural productivity, improved biomedical applications and a greater understanding of our changing environment. Establishing these methods places Australia at the forefront of genomics technology with direct applications for Australian biomedical and biotechnology industries. Applying next generation sequencing for metagenomics will provide a detailed understanding of microbial population structures and lead to advances in biomedicine, agriculture and environmental science.

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LP0989499 Prof N Ellis; Prof GA Jull; Dr V Johnston; Prof J Strong; Dr SA Gargett; A/Prof M Battersby; Dr KW Adam

Approved Project Title **Does Self Management Increase The Effectiveness Of Vocational Rehabilitation For Chronic Compensated Disorders?**

2009 : \$ 86,000

2010 : \$ 87,000

2011 : \$ 20,000

Primary RFCD 3212 PUBLIC HEALTH AND HEALTH SERVICES

Collaborating/Partner Organisation(s)

Health Services Australia (HSA) Group

The Workers' Compensation Regulatory Authority (Q-COMP)

Motor Accident Insurance Commission (MAIC)

Administering Organisation The University of Queensland

Project Summary

Workplace injuries result in human suffering and are costly for those injured, employers and the community. For some, the injury results in a chronic disability, a sense of powerlessness, and unemployment. This study will test whether participation in a 'self-management' program improves health and well-being, decreases pain, results in earlier return-to-work and is a more efficient use of resources than usual care in vocational rehabilitation. Self-management programs have been shown to be effective in helping people manage chronic disabling conditions. By adapting the self-management program for this population it is anticipated that the human and financial burden on individuals and society from chronic injuries will be reduced.

LP0989765 Dr B Feng; Dr N Drinnan

Approved Project Title **Minimization of emissions from dimethyl ether (DME) combustion in a diesel engine**

2009 : \$ 110,000

2010 : \$ 100,000

2011 : \$ 100,000

Primary RFCD 2905 MECHANICAL AND INDUSTRIAL ENGINEERING

APA(I) Award(s): 1

Collaborating/Partner Organisation(s)

Ambre Energy Ltd

Administering Organisation The University of Queensland

Project Summary

The project works on the utilization of dimethyl ether, an innovative clean fuel produced from coal or natural gas, as a diesel substitute. The utilization of DME in diesel engines can potentially reduce the emissions by 90%, making it possible to meet the strictest engine standard. In the meantime the engine efficiency can be improved. The outcomes of the project will help accelerate the maturity of the DME market in Australia.

LP0989643 Prof IJ Hayes; Dr CN Cifuentes

Approved Project Title **Software Quality Improvement Through Static Analysis and Annotation**

2009 : \$ 93,000

2010 : \$ 92,000

2011 : \$ 94,000

Primary RFCD 2803 COMPUTER SOFTWARE

APA(I) Award(s): 1

Collaborating/Partner Organisation(s)

Sun Microsystems Australia

Administering Organisation The University of Queensland

Project Summary

Software forms the basis of critical infrastructure that supports industries such as electronic commerce. Flaws in the software can lead to failure of the overall system, or allow the security mechanisms of the software to be by-passed. This project is developing methods to improve the quality of software by finding common flaws that lead to security vulnerabilities or runtime failures. Within Australia, it is estimated that there are approximately 75,000 software developers who make substantial use of C/C++ and who could benefit from the availability of better automatic static analysis tools to improve both the quality of the code they produce and their productivity.

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LP0989211 Prof PA Lindsay; Prof RG Dromey; Dr RK Porteous; Dr VL Wheway

Approved Project Title **A New Approach to Air Traffic Management to Deliver Significantly Reduced Environmental Impact and System-wide Efficiencies**

2009 : \$ 156,000

2010 : \$ 145,000

2011 : \$ 89,000

Primary RFCD 2801 INFORMATION SYSTEMS

APA(I) Award(s): 1

Collaborating/Partner Organisation(s)

Airservices Australia

The Boeing Company - Phantom Works

Qantas Airways Limited

Administering Organisation The University of Queensland

Project Summary

Aviation is often cited as a major contributor to harmful emissions in the upper atmosphere. The primary outcome of this project is the development of tools that will enable aviation industry stakeholders to optimise the deployment of 4-Dimensional User Preferred Trajectories across Australian airspace. It is expected that this will result in significant environmental benefit, through reductions in fuel burn for each flight, and increases in system effectiveness. The project will enable better analysis of Australian aviation environmental effect, whilst at the same time allowing the aviation industry to continue to contribute to Australia's sustainable economic growth.

LP0989161 Dr MM Mayfield; A/Prof CJ Bradshaw; A/Prof MJ Lawes; Dr DJ Chittleborough; Dr PD Erskine; Dr T Gardner; Dr MR Menendez Martinez

Approved Project Title **Identifying cost-effective reforestation approaches for biodiversity conservation and carbon sequestration in the Australian wet tropics**

2009 : \$ 132,000

2010 : \$ 130,000

2011 : \$ 23,000

2012 : \$ 65,000

2013 : \$ 75,000

Primary RFCD 2707 ECOLOGY AND EVOLUTION

Collaborating/Partner Organisation(s)

Biome5 Pty Ltd

Greening Australia

Terrain NRM Pty Ltd

Stanwell Corp Ltd

Administering Organisation The University of Queensland

Project Summary

There is great potential for rainforest reforestation to help in the protection of Australia's tropical flora and fauna. Little is known, however, about how to reforest pasture to rainforest for the purpose of maximising the recovery of native biodiversity. We propose a unique experimental study of rainforest reforestation practices with biodiversity conservation as a primary goal. Reforestation is currently an unlikely option for most landholders in Australia's tropics given the lack of data on the economic benefits obtainable from such efforts. Our study examines the profits obtainable through the carbon market for each reforestation approach with the goal of increasing the feasibility of rainforest reforestation in North Queensland.

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LP0989701 A/Prof J Meers; A/Prof PR Young; Dr DP Higgins

Approved Project Title **Retroviral invasion of the koala genome: prevalence, transmission and role in immunosuppressive disease**

2009 : \$ 80,000

2010 : \$ 80,000

2011 : \$ 80,000

Primary RFCD 3005 VETERINARY SCIENCES

APA(I) Award(s): 2

Collaborating/Partner Organisation(s)

Australia Zoo Wildlife Warriors Worldwide Ltd.

Australia Zoo

Queensland Parks and Wildlife Service

Administering Organisation The University of Queensland

Project Summary

Koalas are a national symbol yet many of their populations are in decline as a result of habitat loss and disease. Lymphoid cancers and opportunistic infections are significant diseases in both captive and wild koala populations. We previously demonstrated that the recently identified koala retrovirus is associated with lymphoid cancer in koalas. This project will determine the distribution of the virus in Australia, the mechanism of its spread and its effect on the immune function of koalas. This research will provide a foundation for better management of captive koalas and for conservation of wild koalas.

LP0989217 Prof AV Nguyen; Dr Z Xu; Dr L Huang

Approved Project Title **Tailoring nano-crystal suspensions for extended ion supply to hydrophobic and hydrophilic leaf surfaces**

2009 : \$ 187,000

2010 : \$ 170,000

2011 : \$ 153,000

Primary RFCD 2906 CHEMICAL ENGINEERING

APA(I) Award(s): 3

Collaborating/Partner Organisation(s)

Agrichem - Liquid Fertiliser Pty Ltd

Administering Organisation The University of Queensland

Project Summary

Nutrient deficiency undermines the potential of billions of people and many nations. The requirement is to rapidly increase micro-nutrient delivery to support intensive and fortified crop production. This proposal seeks to develop a controlled ion release system through the use of tailored suspensions of nano-crystal nutrient materials for delivery to plants through the leaves. This will increase yields from arable land, reduce water requirements and fertiliser applications, fortifying foods for better nutrition leading to improved human health and wellbeing. It leverages and applies recent significant advances in surface science and nanotechnology to gain improved outcomes in agriculture.

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LP0989159 Dr K Rabaey; Dr Y Mu; Dr RA Rozendal; Dr DJ Batstone; Prof J Keller; Dr JF Mueller; Mr YP Poussade; Dr BL Tan

Approved Project Title **Electrochemical treatment of problematic water recycle waste streams**

2009 : \$ 100,000

2010 : \$ 100,000

2011 : \$ 100,000

Primary RFCD 2911 ENVIRONMENTAL ENGINEERING

APA(I) Award(s): 1

Collaborating/Partner Organisation(s)

Veolia Water Australia

Magneto Special Anodes

Queensland Health Forensic and Scientific Services

Administering Organisation The University of Queensland

Project Summary

Supply of potable water to Australia's major urban areas is a major challenge to growth and quality of life. Indirect potable reuse via membranes can address this issue, as it offers an inexpensive and sustainable water supply, as well as leveraging new water sources. However, the potential impact of the generated reject concentrates on aquatic and human health is potentially of large concern. Our project helps address this, by making reject treatment economically and environmentally much more sustainable, and thereby future-proofing the technology. In addition, it develops technology that can be used worldwide to treat other recalcitrant streams (e.g., hospital, tannery, pulp and paper), is highly scalable, and is low in operating cost.

LP0989824 Dr S Reid; Prof LK Nielsen

Approved Project Title **In-Vitro Production of Baculovirus Biopesticides - A Systems Biology Approach**

2009 : \$ 250,000

2010 : \$ 250,000

2011 : \$ 250,000

Primary RFCD 2703 MICROBIOLOGY

APA(I) Award(s): 2

Collaborating/Partner Organisation(s)

Agrichem

Administering Organisation The University of Queensland

Project Summary

This project has the potential to develop an in-vitro production process that can produce large quantities of Baculoviruses at costs comparable to selective chemicals. This could transform agriculture allowing farmers to choose an insect control option that is both safe and efficacious to use as well as economically and environmentally superior to chemicals, and less controversial than transgenic plants. This outcome would enhance Australia's reputation in the animal cell technology field (related technology is used to produce protein pharmaceutical products), and will earn significant export dollars through licensing out of the technology or through large scale manufacturing and export of the product itself.

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LP0989607 Prof AK Whittaker; Dr I Blakey; Dr KS Jack; Prof J Drennan; Dr TR Younkin

Approved Project Title **Advanced Lithographic Solutions using Block Copolymers: Integrating Self Assembly and Lithography**

2009 : \$ 320,000
2010 : \$ 320,000
2011 : \$ 360,000

Primary RFCD 2501 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)

APA(I) Award(s): 1

Collaborating/Partner Organisation(s)
Intel Corporation - Components Research

Administering Organisation The University of Queensland

Project Summary

The semiconductor industry is one of the largest world-wide, with annual revenue of \$220B and employing over 1.5M people around the world. This project provides a unique opportunity for development within Australia of significant expertise in the field of self assembly in photolithography. Plastics with tailored properties will be made and used to develop novel processes to reduce the defectivity in integrated circuit manufacture. The ultimate benefit will be faster and more energy efficient microprocessors. A major outcome of this project will be establishment of Australia as a world-leader in this rapidly expanding field. Furthermore, the technology can be applied broadly to many other applications such as high density data storage.

LP0989735 Prof DJ Williams; Dr DM Pedroso; Prof D Sheng; Dr DJ Stolberg; Mr PR Wright

Approved Project Title **Effectiveness of deep natural clay, compacted clay and geomembranes in limiting seepage from coal seam gas production water evaporation ponds**

2009 : \$ 62,000
2010 : \$ 62,000
2011 : \$ 62,000

Primary RFCD 2908 CIVIL ENGINEERING

APA(I) Award(s): 2

Collaborating/Partner Organisation(s)
Queensland Gas Company

Administering Organisation The University of Queensland

Project Summary

Australia's coal seam gas reserves exceed those of the Moomba and Bass Strait gas fields combined. Queensland's coal seam gas production already accounts for more than 50% of the state's natural gas supply, and continues to grow rapidly. The production of coal seam gas will escalate in coming years, particularly to provide a clean fuel for electricity generation and feed stock for liquefied natural gas to supply rapidly growing markets in Asia. As gas production increases, so too does the generation of saline water. This research will ensure that the evaporation of the saline water does not impact the underlying Great Artesian Basin, so that coal seam gas production may continue and grow.

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LP0989662 Dr AL Wright; Prof PW Liesch; Prof ML Hayward; Dr SA Middleton

Approved Project Title **Institutional logics in organisations: The interplay between managerial and professional logics in hospitals**

2009 : \$ 100,000

2010 : \$ 100,000

2011 : \$ 100,000

2012 : \$ 12,000

Primary RFCD 3502 BUSINESS AND MANAGEMENT

APDI Dr SA Middleton

Collaborating/Partner Organisation(s)

Queensland Health

Royal Brisbane and Womens Hospital

Administering Organisation The University of Queensland

Project Summary

In community surveys, health is consistently regarded as the most important issue by Australian voters. Healthcare is particularly relevant in Queensland, where unprecedented population growth has increased waiting lists. Difficulties in recruiting and retaining qualified staff in Queensland's public hospitals are well-publicised. This research examines how organisational practices within hospitals contribute to these challenges in delivering quality healthcare. Improved work practices, staff retention and hospital performance will result from a better understanding of the interaction of managerial and professional logics in decision making and problem solving in the day-to-day practice of public healthcare.

LP0989717 Dr X Yao; Prof GM Lu; Dr L Wang

Approved Project Title **An integrated system for high-efficiency hydrogen assisted electricity generation from solar energy**

2009 : \$ 175,000

2010 : \$ 150,000

2011 : \$ 150,000

Primary RFCD 2911 ENVIRONMENTAL ENGINEERING

APA(I) Award(s): 1

Collaborating/Partner Organisation(s)

Control Technologies International

Administering Organisation The University of Queensland

Project Summary

Energy security and climate change have intensified the search for renewable energy technologies that will reduce the carbon footprint of our economies. This project will lead to a technology platform, enabling hydrogen production and electricity generation by a clean way, which is high potential in solar-abundance Australia. Its success will definitely benefit Australia both economically and environmentally. It will speed up the utilisation of solar energy and help Australia reduce greenhouse emissions. It would also lead to advanced technologies that can be commercialised and exported overseas, thus positioning Australia at the forefront of renewable energy development.

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LP0989723 Prof J Zhu; Dr S Rosenberg

Approved Project Title **Development of a novel technology for DSP separation and soda recovery in alumina refineries**

2009 : \$ 90,000

2010 : \$ 75,000

2011 : \$ 75,000

Primary RFCD 2911 ENVIRONMENTAL ENGINEERING

APA(I) Award(s): 1

Collaborating/Partner Organisation(s)

BHP Billiton Bauxite and Alumina Technology

Administering Organisation The University of Queensland

Project Summary

The successful completion of this project will provide economic and environmental benefits to the Australian alumina industry. For example, this project will provide an effective and economical method for separation of DSP (desilication product) from red mud (thus reducing the pollution by the long-term alkalinity) as well as a new solution to soda recovery. The technology developed will be able to be used as an example to the waste management and recovery of other Australian mineral, energy and chemical industries. The modelling and mechanism studies will also contribute to materials separation and processing.