



Research to Reality

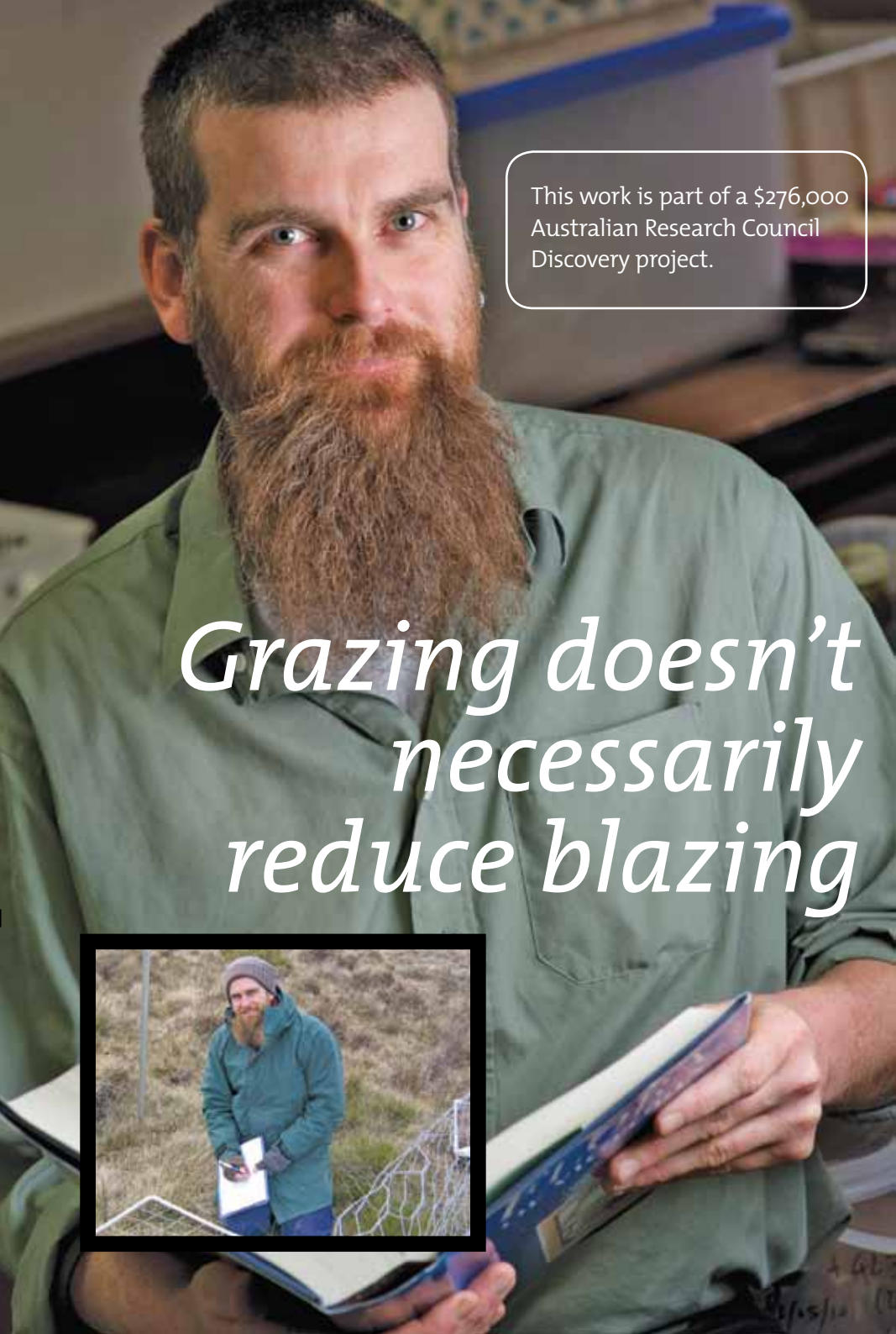
2010 EDITION 6

It is my great pleasure to introduce the sixth edition of *Research to Reality*. This snapshot of research within the University is deeply rooted in the strong links the University has with its local environment. Whether it is developing a greater understanding of our historical context, understanding the impact of our farming practices on wild fires, or understanding our unique animal and natural heritage, all of the research shows a passion and commitment to the development of Tasmania. This edition also emphasises the impact our research can have on our society both in realising unprecedented healthcare cost reductions or in better positioning our new teachers for life in the classroom.

In the weeks since I joined the University I have been constantly amazed and inspired, in equal measure, by the research I have seen. Even though I have only met a small proportion of the researchers here at UTAS I am confident that we will continue to develop our research capability and to innovate for the long-term benefit of the state and nation.

Professor Paddy Nixon
Pro Vice-Chancellor (Research)



A man with a long, full brown beard and a green button-down shirt is looking towards the camera. He is holding a blue book or folder. The background is slightly blurred, showing what appears to be a laboratory or office setting with shelves and equipment.

This work is part of a \$276,000 Australian Research Council Discovery project.

Grazing doesn't necessarily reduce blazing



A UTAS study is challenging the widely-held view that 'grazing reduces blazing' and found that it is not always true. In fact, some vegetation grazing may actually increase the likelihood of fire.

Dr Steve Leonard from the UTAS School of Geography and Environmental Studies said the key to determining the effect of grazing on the occurrence of fire is working out how much of the potential fuel for fires is also food for animals. "The study was carried out at 10 grassland sites across Tasmania. Five of the sites had a 'lawn' structure of closely cropped grass, while the other five sites consisted of 'tussock' grassland," Dr Leonard said. "By fencing off plots at these sites we were able to monitor how much and what components of the vegetation were consumed by grazers – mostly wallabies and wombats, but also sheep at some sites.

"Lawn grasslands support large animal populations and are maintained in a continuously regenerating state by grazing. The vegetation is nutritious and palatable and almost all of it becomes food for grazers. There is rarely enough fuel to sustain fire."

In contrast, tussock sites are dominated by relatively nutrient-poor and unpalatable grasses. Most of the vegetation biomass at these sites is not favoured as food by grazers and therefore remains available as fuel for fires. In addition, at tussock sites the tendency for grazers to target actively growing green shoots, which are the most nutritious portion of the vegetation, leads to higher levels of dead fuel. This means that grazing actually

increases the chance that these sites could burn.

"The 'grazing reduces blazing' argument is based on the idea of 'competition' between herbivores and fire for the same 'food', which is plant biomass," Dr Leonard said. "However, animals require a range of nutrients, such as proteins, in their diets and therefore are much fussier eaters than fire, which only requires carbohydrates."

The authors found that where the vegetation is good to eat, animals eat most of it, leaving little fuel for fires. On the other hand, where the vegetation is mostly not good food it remains available to fuel fires. Put simply, grazing will only reduce blazing if animals can eat a large proportion of the vegetation.

Ongoing research by the group indicates that these findings are relevant beyond grasslands. "In fact the inverse relationship between palatability and flammability that we have demonstrated probably applies to many vegetation types," Dr Leonard said. "Australia's most fire-prone landscapes are dominated by plants with tough, nutrient-poor and toxic leaves, which have evolved to resist being eaten. Grazing or browsing by livestock or native animals is unlikely to reduce the likelihood of fire in these vegetation types."

The research paper by Dr Leonard and co-authors Professor Jamie Kirkpatrick and Dr Jon Marsden-Smedley, *Variation in the effects of vertebrate grazing on fire potential between grassland structural types*, has been published in the *Journal of Applied Ecology*.

Sea-level change at Macquarie Island, 100 years after Mawson

Close to a century after Sir Douglas Mawson made his 1911–14 Australasian Antarctic Expedition (AAE), the data collected by his team are being used to help determine sea and land-level change at Macquarie Island.

The long-term geological evidence would suggest that the island itself might still be rising – but not so, the study has found. The island is clearly subsiding, most probably still in response to an earthquake in 1924. This has exacerbated the local influence of sea-level rise.

In an unexpected twist, a major earthquake located north of the island in 2004 has been shown to affect the entire south-east portion of the Australian continent – shifting the city of Hobart by a massive 6 mm and slightly changing the direction of Tasmania's underlying plate motion.

A team led by Dr Christopher Watson, from the Surveying and Spatial Science Group in the UTAS School of Geography and Environmental Studies, has been comparing Mawson's sea-level observations to modern records. The team has also been using satellite measurements to determine the motion of the land.

"In this case you can't understand the behaviour of the ocean without also knowing what the land is doing," Dr Watson said.

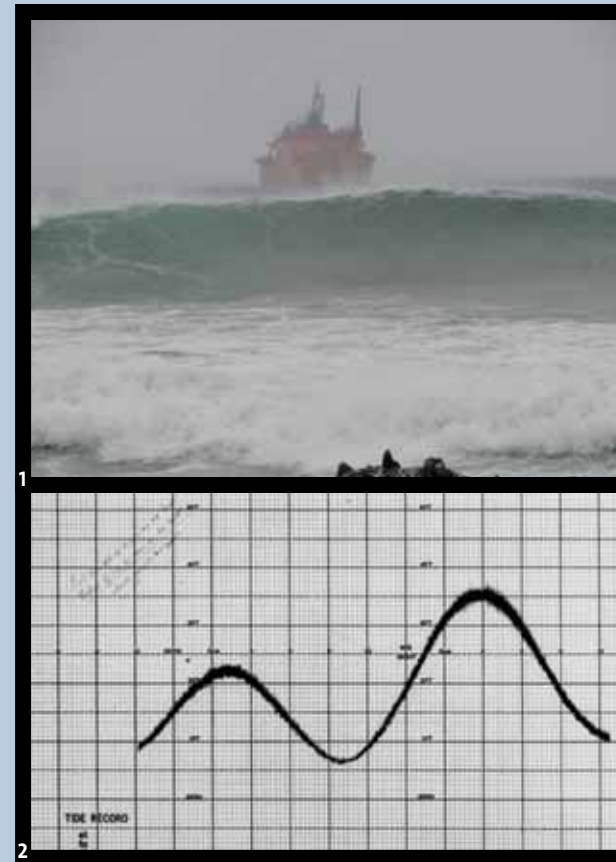
"In the northern hemisphere, historic sea-level gauges are dotted around the coast. The situation is far more problematic in and around the Southern Ocean. Macquarie Island is a lone data point within a massive void of information.

"That's one of the reasons why Mawson's records are such a treasure trove of information."

Mawson's rare and historic records indicate that relative to land, the sea level at Macquarie Island is rising by 4.8 mm per year. When subsidence of the island is taken into consideration, sea level has risen at the 2 mm per year level.

Interestingly, these data have helped understand the properties of the Earth's interior and allowed the modelling of deformation induced by large earthquakes. It seems that the Australian plate is not as rigid as perhaps first thought.

The research led by Dr Watson and co-authors was recently published by the *Geophysical Journal International* in a paper titled *Twentieth century constraints on sea level change and earthquake deformation at Macquarie Island*.



This work is part of a five-year, multi-institution \$1.16m Australian Research Council Discovery Project (DP0877381).

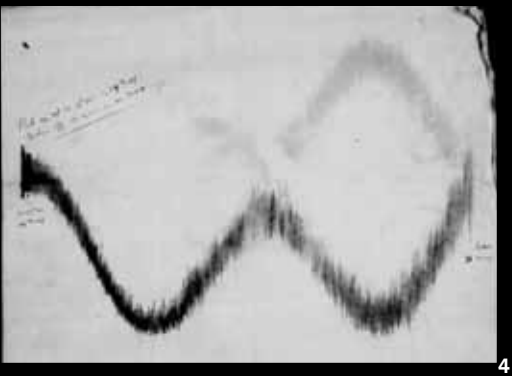
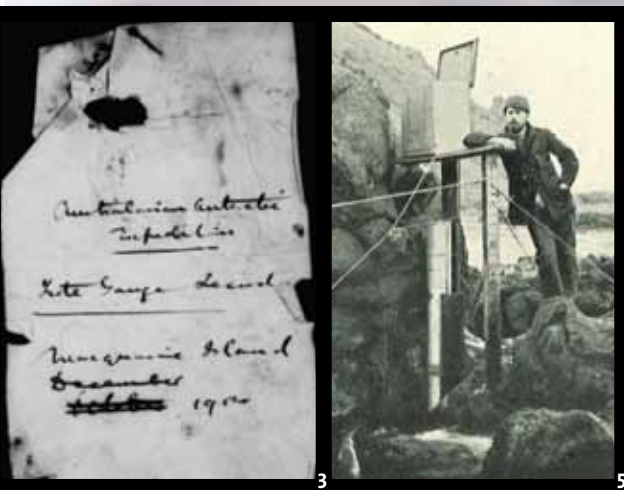
Team leader Dr Christopher Watson explained that in this case, you can't understand the behaviour of the ocean without also knowing what the land is doing.

1. Macquarie Island has produced one of very few historical sea level records across the void of the Southern Ocean - simply measuring sea level at a place like Macquarie Island is an achievement in itself.
Photo by Angela Bender

2 & 4. Tide records from Douglas Mawson's 1911-14 Australasian Antarctic Expedition.
Photo courtesy of the Mitchell Library, State Library of New South Wales.

3. Close to a century after Sir Douglas Mawson made his Australasian Antarctic Expedition, the data collected by his team are being used to help determine sea and land-level change at Macquarie Island.
Photo courtesy of the Mitchell Library, State Library of New South Wales.

5. The original AAE tide gauge located in Garden Cove, Macquarie Island.
Photo published in A.T. Doodson's, *Tidal Observations (Part 2)*, Australian Government Printers, 1939.



Our biggest family history:

Founders & Survivors

The secret lives of our convict ancestors are going to be revealed in a major new research project.

Founders and Survivors: Australian Life Courses in Historical Context is a national collaboration between demographers, historians, epidemiologists and genealogists.

By examining birth, death and marriage records and other historical sources, the project will produce the means of analysing the health and welfare of Australians over the past 200 years.

Associate Professor Hamish Maxwell-Stewart, from the UTAS School of History and Classics, said the project aims to reconstruct life courses in historical context, reconstituting people's fertility, household formation, health, survival time and social and geographical mobility.

"It will create an historical sample of convict and assisted migrants and their descendants and build an account of how their lives helped to shape Australian civil society," Assoc. Prof. Maxwell-Stewart said.

"It will be our biggest 'family history'."

By linking information about transported convicts to birth, death and marriage records for 19th century Tasmania, the project can create one of the richest pre-20th century sources of information for a population that can be followed from cradle to grave.

"We will use this to study the effect that punishment, nutrition and other environmental circumstances had on life expectancy and we can do this not just for the convicts but for their children as well," Assoc. Prof. Maxwell-Stewart said.



While convict experience was varied – it changed in severity over time and impacted on individuals in different ways according to their age, gender and skills – the record groups allow these variations to be traced in detail.

“We have to date captured 1,000,000 lines of data relating to people who lived in 19th century Tasmania.

“We are also using over 70,000 digital images that have already been made available through the Tasmanian Archives and Heritage Office website,” Assoc. Prof. Maxwell-Stewart said.

“In other words, the recorded experience of convicts who underwent harsh punishment compared to those who laboured as assigned servants, or in other relatively benign regimes, is a natural experiment of the effects of severe stress on an historical population that had identifiable living descendants.”

This project is supported by an \$800,000 Australian Research Council Grant-Discovery Projects.

Associate Professor Hamish Maxwell-Stewart and Professor Alison Venn in Birdcage Walk, the tunnel beneath Hobart's Penitentiary Chapel Historic Site, where convicts used to walk from the jail house to the court room.



This project, titled *Spatial and temporal variation in declining eastern quoll (Dasyurus viverrinus) populations in Tasmania*, is supported by funding from the Holsworth Wildlife Research Endowment, Wildlife Preservation Society of Australia, Royal Zoological Society of New South Wales and the M.A. Ingram Trust. In-kind support has also been provided by the Save The Tasmanian Devil Program.



Spotlight on the eastern quoll

Across Tasmania, eastern quoll (*Dasyurus viverrinus*) populations appear to have declined by around 50 per cent over the past decade, annual spotlighting data have suggested.

Bronwyn Fancourt, an honours student from the UTAS School of Zoology, said this trend is particularly distressing because the eastern quoll is considered to be extinct on mainland Australia.

“It was once widespread through south-eastern Australia,” Ms Fancourt said. “But today, Tasmania is the last refuge for this carnivorous marsupial. So it’s particularly important to obtain further scientific data to confirm the status of the species.”

But while the spotlighting surveys (conducted by the Department of Primary Industries, Parks, Water and Environment) indicate an overall decline, there are some areas of the State where they appear to be maintaining consistent numbers.

To test the spotlighting trends, Ms Fancourt has been undertaking a ‘trap and release’ monitoring program at three sites across Tasmania (Cradoc, Buckland and

Cradle Mountain). The results from these regular trips will help confirm and quantify any possible changes in numbers at these sites. This research will also provide an opportunity to assess the general health and condition of the captured animals: such as checking for signs of injury or disease, collecting blood and scat samples, and recording the number of pouch young.

“Ideally, I’d like to identify what may be contributing to any possible decline,” Ms Fancourt said. “Experience tells us that the sooner you identify the cause of a mammal’s decline, the greater the chance of turning it around. If we wait another five or so years to see what happens, it may be too late to help the species.”

The eastern quoll is one of only three remaining large carnivorous marsupials in Tasmania (Tasmanian devils and spotted-tailed quolls are the other two). A fourth species, the thylacine, was listed as extinct last century.

Pharmaceutical software saves millions and increases life years

Research was funded by the Department of Health and Ageing as part of the fourth Community Pharmacy Agreement.

Australians can expect 50,000 additional quality of life years and healthcare cost savings of \$900m over the next five years, following a major UTAS pharmaceutical research project.

A new software solution for Australia's community pharmacists has been developed over 10 years by the School of Pharmacy's Unit for Medication Outcomes Research and Education (UMORE). This work has culminated in the Australian Government investing \$97m to roll out the software that assists community pharmacists perform and record clinical interventions.

Head of School and Chief Investigator Professor Gregory Peterson said the new software would achieve improved safety and effectiveness of medication use in the community. Prof. Peterson said the shift in service ethos would have the potential to improve patient care by increasing the use of pharmacists' expertise as part of an integrated health team. "Clinical interventions occur when a pharmacist detects a medication-related problem

such as an error or adverse event arising from the use of certain prescription medications," Prof. Peterson said.

"A pharmacist's intervention can improve patient care through improved medication use and prevent hospitalisations caused by adverse medical events, potentially reducing pressure on hospital beds and saving the government about \$900m in healthcare costs."

Prof. Peterson said that over the next five years community pharmacies will be provided with access to training, ongoing support and the software based on the work developed and trialled by UMORE.

The adoption of the UTAS research follows evaluation by clinical and economic experts of software installed in 185 pharmacies and used by more than 500 pharmacists in Tasmania, Victoria and New South Wales.

The UTAS project was in partnership with the University of New South Wales, University of Sydney, Monash University and Curtin University.



Learning curve



The experiences and needs of novice teachers entering the profession are the focus of a new research project at UTAS. The project is titled *Incorporating Newcomers into a Community of Practice: Investigating Issues of School Culture, Socialisation and Professional Expertise for Beginning Teachers*.

The research focuses on the perceptions and experiences of beginning teachers as they graduate from teacher education and take up their first full-time teaching position in a school.

The project is being undertaken by Dr Karen Swabey and Associate Professor Geraldine Castleton from the UTAS Faculty of Education. The researchers said the project arises from state, national and international concerns about rising attrition rates from teaching and the ability of teacher education courses to properly prepare teachers for successful entry into the teaching profession.

Dr Swabey said the project is using a qualitative methodology and longitudinal design, asking teaching students

and beginner teachers about their educational needs, concerns and experiences.

"The research will generate data capable of providing significant new insights into the social, cultural and professional knowledge-related challenges that beginning teachers anticipate, encounter and feel variously prepared for," she said.

Dr Swabey said the study would aim to identify issues (social, cultural and professional) that frame beginner teachers' experiences at the point of interaction between their education program and their entry into the world of teaching.

"We hope to determine the effectiveness and extent to which these issues are addressed in the Bachelor of Human Movement (BHM) pre-service teacher education program offered at UTAS," she said. Dr Swabey said the study's findings would also have applicability beyond the BHM and further research into other programs offered in the Faculty of Education is required.

"This study will assist in reducing attrition, enhancing retention and uncovering the complexities of transition from student teacher to beginning teacher. It also aims to address preparedness of beginning teachers for the teaching profession," she said.

"Institutions around the country and even the world will hopefully benefit from the research findings."

This project was supported by an \$8,000 Institutional Research Grant.

OUR GRADUATES HAVE WHAT IT TAKES.

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The University of Tasmania needs to attract researchers with the talent, passion and desire to excel in graduate research. We are now offering Elite Research Scholarships to outstanding applicants, and any business or individual interested in supporting our growing international reputation for research excellence is invited to contribute to the program by providing \$7,500 per annum as a silent or identified sponsor. Valued at \$30,000 tax-free per annum, Elite Research Scholarships are offered in specific project areas to help keep the research passion alight. **If you're keen to tick the final two boxes, contact the Dean of Graduate Research on (03) 6226 7127.**

Graduate research at  **UTAS**

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