Apply Now - $1,500 Fellowships for Bachelor students interested in a hands-on research role

Joss Family Fellowship for Future Researchers

September 2024

LA TROBE UNIVERSITY

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Five research projects, under the supervision of Albury-Wodonga Campus researchers, are on offer, covering disciplines such as:

- Business
- Psychology
- Environmental Science, Microbiology, Ecology
- Environment and Genetics
- Biomedical Science
- Australian History, Military History, Gender History, History of Religion

Toward the end of the research period, the Fellows and their supervisors will present their research project at a campus Research Symposium on 25 February 2025.

Details of the fellowships are as follows:

Fellowship	$250 per week (tax-free), $1,500 total
Tenure	Six weeks, weekly hours to be negotiated with supervisor. Supervisors will endeavour to design flexible research schedules that fit with part time work. This is designed to be a taste of research!
Commencement	Commencement and completion dates will be negotiated with the supervising academic staff member. All projects will be completed by 21 February 2025.
Selection	Project supervisors will make the final decision. Only one fellowship will be awarded per student.
Application	Students are required to submit their resume and the fellowship application form.
Eligibility:	Undergraduate students from La Trobe university with a minimum of 180 credit points are eligible to apply, however, preference will be given to students based at the Albury-Wodonga Campus. Designed to provide a taste of research experience to undergraduate students, this program will not be offered to Honours students who will be undertaking research as part of their Honours program.
Submission	Closes 11.59pm on 27 October 2024, by email to hoc.aw@latrobe.edu.au

The Joss Family Fellowship for Future Researchers, Award
The two most outstanding students (as determined by a selection committee including one senior independent researcher) will each receive an additional $2,000 funding to continue involvement in the research project.

La Trobe University thank the generosity of the Joss Family who sponsor this program.

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Project 1: Pooling Resources – Conceptualising Collaborative Approaches to Water Security

Discipline area: Business

Academic Supervisors: Dr Tim Clune

Project Overview:

Sharing water in the Murray Darling Basin (MDB) has been a historic challenge that pre dates Federation (Kildea and Williams, 2010). Sharing of the scarce resources of the MDB to meet the demands of the human population, the environment, cultural and economic outcomes is mediated through the Murray Darling Basin Plan (the Plan), which is overseen by the Australian Government in concert with the Basis States (ie QLD, NSW, Vic, SA and ACT). Although internationally recognised for its management of both political and geographical complexities (Dustin and Rosalind, 2011), more recent discourse relating to the Murray Darling Basin (MDB) has highlighted concerns about future access to water, in particular the loss of water for productive outcomes in regional centres and the loss of jobs and ultimately the decline in rural economies (Sefton et al., 2020).

Despite the overarching framework of the Plan, water extracted for economic benefit or 'consumptive' use is governed by licenced extraction negotiated with relevant Basin State jurisdictions. Further, there is little appetite for the control to revert to the Commonwealth (Wheeler et al., 2023). The licence/entitlements provided by the States provides consumptive users with an option to access or 'right' to a quantum of water from the State share. The 'right' is a form of property that it can be traded (bought, sold, leased etc). A key challenge for water reliant businesses in the current environment is that water can be transferred out of production either through permanent transfer to the environment (buyback) or out of the catchment for use by other users downstream (Zhao et al., 2024).

Agriculture and horticulture in Australia (eg dairy, tobacco, fruit etc) have historically acted to secure its own economic viability through collaborative models such as cooperatives. The cooperatives enhanced the power of individual farmers to take advantage of scale and express that power to both drive down input costs and to secure higher sales outcomes (Peterson and Anderson, 1996). Additionally, we have also seen regional communities express their agency to deliver local banking outcomes in the face of declining interest from recognised banking service providers through the establishment of community focussed services such as local credit unions and more recently local banking facilities in partnership with specialists such as Bendigo Bank (Thomson and Abbott, 2000). In both examples, local solutions have been sought to local issues relying on local resources.

It is in this context that it is of note that there is little evidence that consumptive water users reliant on access to water for economic outcomes in the MDB have acted collaboratively secure their interest. In other jurisdictions such as Arizona and California, issues of access to water reflecting its

sense of property are managed through water banks,[1] independent third party entities that enable the transfer of property in water in times of scarcity such as drought (Ghosh et al., 2014).

Objectives:

The objective of this project is to better understand how water reliant industries such as irrigated agriculture and horticulture could potentially, through their own agency, enhance the sustainability of their sector and the regional communities in which they are situated.

Methods:

This project will examine two potential models for retaining and securing access to water for the purposes of economic consumption. Given the limited timeframe the project will consider a 'cooperative' model and a 'water bank' as case studies. The desktop research project will draw on publicly available datasets to explore opportunities and constraints of establishing a water cooperative and a water bank to underpin irrigation production and regional economy. The project will focus on two catchments in the MDB experiencing pressure from losses from the consumptive pool due historical sales, a changing climate and the potential for future buyback in fulfilment of the current iteration of the MDB Plan. The project will consider a Northern and Southern Basin study area. Example catchments include the lower Murrumbidgee, the Broken-Goulburn, the lower Murray (Southern Basin) and the Barwon Darling, the Namoi (Northern Basin).

Key datasets include:

- Catchment water accounts – historic flows, extractions etc
- Economic statistics – regional production, agricultural sector activity
- Farm information – number of farms, are (ha), irrigation/dryland
- Catchment water market information – trades, sales etc
- Catchment climate risk forecasts
- Statutory Guidance - Water Licensing Regulation

The key datasets would be considered in conjunction with relevant literature supporting the structures surrounding these models.

Output

The key output form this work would be a report describing conceptual models that support a more constructive approach to discussions about securing access to diminishing water resources in irrigation landscapes. A key aspiration of this project is the development of a paper that can inspire a more comprehensive assessment of these opportunities in the Australian context as a basis for enhanced economic resilience of regional communities and regional economies reliant on irrigated agriculture.

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[1] For the purposes of this work it is important to separate these 'property transfers' from physical water banks that may be constructed using process such as aquifer recharge (Gonzalez et al., 2020, Clune and Crase, 2017, Page et al., 2023).

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Project 2: Access to Best-Practice Eating Disorder Treatment and Support in North-East Victoria

Discipline area: Psychology

Academic Supervisors: Professor Leah Brennan and Associate Professor Anita Raspovic

Project Overview:

Empirically supported eating disorder interventions are available (National Eating Disorders Collaboration [NEDC], 2020), demonstrating remission in 65-70% of participants (e.g., Fairburn, et.al., 2015). However, only 19-36% of individuals with eating disorders receive treatment (Hart et al., 2011), and of those only 35-40% receive evidence-based treatment (Mond et al., 2007). Further, those that do receive treatment do so an average of 5-15 years after onset (Hamilton et al., 2022). Efforts are required to bridge these gaps by improving access to effective, efficient, affordable and translatable interventions.

The situation is even more dire in rural and remote Australia where access to eating disorder intervention is even more limited (Butterfly, 2018). LTU-AW is located in the North-East Region of the Murray Primary Health Network (MPHN). The lack of services in this region was highlighted in the Butterfly Foundation's "Pushing Past Postcodes" initiative. The current study will target provision of services to this region.

Objectives:

The Joss Family Fellowship recipient will work across projects which aim to

1. Map local eating disorder service, gaps in service and referral pathways
2. Evaluate a novel approach to providing evidence-based eating disorder services in rural Victoria

Methods:

We will use a range of methodologies including

1. Systematic collection of data related to local eating disorder services, gaps and referral pathways
2. Quantitative and qualitative evaluation of outcomes of an evidence-based eating disorder services in rural Victoria

Project 3: Research Capacity of Australian Mid and Senior Career Eating Disorder Researchers

Discipline area: Psychology

Academic Supervisors: Professor Leah Brennan and Associate Professor Anita Raspovic

Project Overview:

Eating disorders (EDs) are characterised by severe and persistent disturbances in eating behaviours affecting physical, psychological and/or social functioning (Guarda, 2023). It is estimated that more than one million Australians (4-5% of the population) an eating disorder (InsideOut Institute, 2021). EDs are costly with a wide range of health and economic impacts. The prevalence and impacts of eating disorder may be improved by optimising the integration of evidence from research, clinical expertise, and individual patient values (Peterson et al., 2016). In order to reduce the prevalence, duration and impact of EDs, researchers need to have the capacity to develop and translate ED research (Peterson et al., 2016).

Research capacity refers to the skills, resources, and essential infrastructure needed to effectively engage in research activities (Matus et al., 2018). The key barriers to research engagement and capacity include time and funding. There are also barriers specific to career stages yet research examining this is limited (Cidlinská & Zilincikova, 2022). Early Career Researchers (<5yrs post PHD) have been the subject of most research attention with results indicating that this group is at higher risk of burnout, research disengagement and poor mental health outcomes (van der Weijden et al., 2016)(Vekkaila et al., 2018).

Less research has focused on more experienced researchers. The research sector is led by Senior-Career Researchers (>10yrs post PhD) and Mid-Career Researchers (6-10yrs post PhD) thus knowledge of the facilitators and barriers of their research capacity is essential for improving research capacity across the sector.

Objectives:

This study has two key aims:

1. to investigate the current barriers and challenges in building research capacity for mid-career and senior eating disorder researchers in Australia, and
2. to identify the supports and facilitators in building research capacity for mid-career and senior eating disorder researchers in Australia.

Methods:

This study will use a qualitative methodology. The student involved will (under the supervision of the research team):

1. conduct qualitative interviews
2. check interview transcriptions
3. code data and generate theme
4. assist with manuscript preparation
5. assist with dissemination of findings

Project 4: Microbial impacts on legacy mercury and arsenic contamination in Victorian rivers

Discipline area: Environmental Science, Microbiology, Ecology

Academic Supervisor: Dr Caitlin Gionfriddo

Project Overview:

Recent events, such as floods, fires and the COVID-19 pandemic, have demonstrated time and time again that the needs of many people who do not speak English are often overlooked in emergency communications. This is a challenge in multicultural communities around the world.[2] Even when information is provided in diverse languages, it is typically only provided in a small number of languages, the translated information is often delivered later than the English information, with poor checks on quality, and in formats that often fail to reach the community members who need that information.

This multidisciplinary project is a first step towards understanding the obstacles, challenges and opportunities for effective emergency communications in diverse languages, which will then inform the development of robust solutions. The project will begin by working with stakeholders to develop a case study of emergency communications in Albury Wodonga, selected because it is an example of a particularly complex communication situation – it is an Anglo-dominant context, with numerous small-scale language communities, that crosses borders. Our aim is to then use this case study to better understand the opportunities and obstacles to emergency communication in multiple languages, so that we can later design a solution that can be applied to other languages in other urban and regional locations in Australia and internationally.

Objectives:

1. To work with local communities and stakeholders to map emergency communications in Albury Wodonga
2. To identify the challenges, obstacles and opportunities that impact emergency communications in multiple languages

Methods:

Analysis of reports, guidelines and media accounts, interviews and focus groups with community members,

[2] E.g. Baba et al 2022; Bang 2021; Cole et al 2019; Healey et al 2022; Henry et al 2018; Kosiyaporn et al 2022; Lee et al 2016; Scott and Errett 2018; WHO 2017

Project 5: PeatSense: Improving peatland condition monitoring and management

Discipline area: Environment and Genetics

Academic Supervisors: Associate Professor Ewen Silvester, Dr Aleicia Holland and Dr Michael Shackleton

Project Overview:

PeatSense is a new project funded by the National Environmental Science Program (NESP) that aims to improve our understanding and management of alpine peatlands. Peatlands in the Australian Alps are listed as endangered under the EPBC Act and are key habitat for a range of endangered and vulnerable species. These ecosystems are impacted by a range of threats including fire, feral ungulates, weed invasion, and climate change, all having adverse effects on immediate habitat quality as well as downstream aquatic ecosystems. However, their remoteness and fragmented distribution makes ongoing condition assessment challenging. The PeatSense project aims to develop tools for the assessment of peatland condition historically and into the future. To do this, we will integrate satellite remote sensed data with on-ground hydrological and floristic data, validated using higher resolution satellite and hyperspectral drone imaging to generate condition time series across broad regional areas. The proposed Joss Family Fellowship for Future Researchers project will focus on undertaking floral surveys during drone and satellite fly over times. These data will help inform models of peatland condition.

Objectives:

1. Identify and quantify plant species within quadrats during satellite and drone fly overs.
2. Assess floral communities in alpine peatland ecosystems

Methods:

1. Establish quadrats (30 x 30 m) that represent landsat, and sentinel on-ground pixel areas
2. Within quadrats, establish smaller 30 x 30 cm quadrats
3. Identify all plant species within 30 x 30 cm quadrats and estimate their percent cover extent

Project 6: Phenology of alpine invertebrates

Discipline area: Environment and Genetics

Academic Supervisors: Dr Michael Shackleton, Dr Aleicia Holland and Associate Professor Ewen Silvester

Project Overview:

The Australian Alps are predicted to be one of the ecosystems most at risk from climate change. Alpine invertebrates are important components of food webs. However, as they are ectothermic, they are particularly influenced by temperature in terms of their seasonal abundance (phenology), growth and development. Long term monitoring sites within three catchments of the Bogong high Plains have been recently established to better understand the influence of temperature on alpine invertebrates and the potential impact of climate change on this fauna. The Joss Family Fellowship for Future Researchers project will use the samples collected as part of the long-term monitoring to investigate the seasonal abundance of a particular group of organisms (to be decided by the successful applicant)

Objectives:

1. Collect samples from the long-term invertebrate monitoring malaise traps
2. Identify invertebrate species and quantify their seasonal abundance
3. Assess seasonal abundances of species and infer responses to temperature and/or day length
4. Estimate seasonal biomass from dry weights of focal taxa

Methods:

1. Collect samples from malaise traps already established in the Bogong High Plains.
2. Work with samples previously collected from the malaise traps.
3. Identify and extract from the samples all members of a focal taxon.
4. Enumerate the abundance of the taxon within samples
5. Assess at what time of the year the taxon is abundant in the landscape
6. Measure the dry weight of focal taxon and calculate the biomass of that taxon over a season.

Project 7: Utilising super-resolution microscopy to investigate chromatin dynamics in male germ cells

Discipline area: Biomedical Science

Academic Supervisors: Dr Cathryn Hogarth

Project Overview:

Spermatogenesis refers to the complex morphogenesis of undifferentiated spermatogonia into spermatozoa. The role of the spermatogonial population is to either self-renew to maintain the germ line or expand in number through mitotic divisions. Spermatogonia can be divided into two different subpopulations: 1) undifferentiated (spermatogonial stem cells [SSCs] and transit amplifying progenitor cells) and 2) differentiating (A1, A2, A3, A4, intermediate, and B cells). To date, the only way to accurately differentiate one spermatogonial subtype from another has been to utilize transmission electron microscopy to assess subtle differences in chromatin structure. In addition, the colocalization of various germ cell proteins and histone modifications with either euchromatin or heterochromatin in the nucleus has only been achieved using conventional wide-field fluorescent microscopy techniques. The development of super resolution imaging now allows for a more in-depth analysis of the chromatin dynamics and epigenetic changes that take place within the different spermatogonial subpopulations.

Objectives:

1. Determine whether super-resolution imaging can be utilized as tool to differentiate between different subpopulations of spermatogonia.
2. Investigate the subnuclear localization of STRA8, a key nuclear protein involved in the differentiation of spermatogonia and transition into meiosis.
3. Assess the dynamics of histone modifications within the different subpopulations of differentiating spermatogonia.

Methods:

This project is a cross-campus collaboration. The successful completion of all three aims will rely on the use of various cell biology techniques including fixation and sectioning, immunohistochemistry and immunofluorescence, performed under the supervision of Dr Hogarth at the Albury-Wodonga campus. This project will also rely heavily on the use of the single molecule super-resolution microscope and sample imaging will take place under the supervision of Dr Whelan in Bendigo.

Project 8: Investigating retinoic acid action on epididymal function

Discipline area: Biomedical Science

Academic Supervisors: Associate Professor Ewen Silvester, Dr Aleicia Holland and Dr Michael Shackleton

Project Overview:

The epididymis is a long and very tightly coiled tube that connects the testis to the vas deferens. While transiting through the epididymis, sperm acquire motility and the ability to fertilize an egg. As a result, proper epididymal function is essential for normal male fertility. While the importance of retinoic acid (RA), the active metabolite of vitamin A, has been well studied in the testis, far less is known regarding its function within the epididymis. Previous studies have shown that at least one of the receptors for RA, RARα, is expressed at very high levels within two different regions of the epididymis (Kim et al, *Biol Reprod*, 1996) and genetic elimination of RAR function within the epididymis leads to severe inflammation and infertility (Costa et al, Biol Reprod, 1997; Jauregui et al, Development, 2018). These results suggest that RA plays an important regulatory role in controlling the immune response within the epididymis. An improved understanding of the downstream effects of RAR signaling within the epididymis will provide new insights into possible treatments for epididymitis, a painful disorder in humans that results in excessive inflammation within the epididymis and can lead to infertility.

Objectives:

Assess the changes in inflammation in epididymal cells in response to RAR antagonism.

Methods:

Treatment of immortalized epididymal cells, and primary epididymal cells with antagonists of RA signalling, RNA extraction, quantitative RT-PCR analysis for effect on the expression of genes associated with inflammation. Epididymidies from genetically modified mice will also be analysed by immunohistochemistry and ELIZA for expression of inflammatory cytokines.

Project 9: Microbiome of flathead in Port Phillip Bay

Discipline area: Environment and Genetics

Academic Supervisors: Dr Aleicia Holland, Associate Professor Ewen Silvester, Dr Caitlin Gionfriddo and Dr Michael Shackleton

Project Overview:

Fish microbiomes play an important role in the function and health of fishes, with changes in microbiota linked to changes in growth, reproduction, and vulnerability of the host fish to diseases and pollutants. Microbiota in skin mucous and in gill arches form the first line of defence in protecting fish from disease and pollutants and respond rapidly to events even before changes to growth, reproduction, survival are shown. Fish populations within Port Phillip Bay are declining and under threat from natural and anthropogenic pressures. Currently however, little is known about the microbiome of native Australian fish and studies are needed to understand the contribution of each factor in determining microbiomes in and on different fish species and possible ecological implications. The microbiome of fish may represent an important non-invasive management tool in assessing "health" of fishes. It is therefore important to firstly determine what microbes live in and on fish but also how this changes in response stressors such as pollutants. This project aims to determine what lives in and on fish. The proposed Joss Family Fellowship for Future Researchers project will focus on working with recreational fishers to collect samples and test whether microbiome can be used as a screening tool to assess the health of fish.

Objectives:

1. Determine microbiome associated with skin and gills of Australian native fish.
2. Develop tools to work with recreational fishers to aid in surveying wild fish.

Methods:

1. Collect swab samples from fish such as flathead.
2. Extract DNA.
3. Develop sampling packs for recreational fishers and aid in holding fishing competitions.

Project 10: Improving recruitment of endangered turtles

Discipline area: Ecology and Conservation Biology

Academic Supervisors: Associate Professor James Van Dyke and Dr Ligia Pizzatto do Prado

Project Overview:

Freshwater turtles are declining around the world, and in Australia 44% of all freshwater species are listed as threatened or endangered (Van Dyke et al 2018 *Aus J Zoology*). A common trend across these species is that juvenile turtles appear to be disappearing. Foxes eat 95-100% of turtle nests, so one possibility is that no eggs are surviving to hatch (Spencer et al 2017, *Conservation Biology*). However, turtles that hatch are also extremely vulnerable to predation by other predators, including native fish. My lab is running a number of projects to measure the survival rates of juvenile turtles in a range of habitats. We aim to determine what kinds of habitats increase their survival rates, what kinds of habitats they prefer, and what predators attack them in the water. At the same time, we are testing innovative ways of protecting nests from foxes, so that we can have hatchlings to study. A key project we are running this summer is to determine where females choose to nest, so that we can more effectively protect turtle nests.

Objectives:

1. Measure hatchling survival rates and habitat selection in wetlands in north-eastern Victoria
2. Identify habitat requirements and cues for nesting by adult female turtles

Methods:

1. Radiotelemetry of adult and hatchling turtles
2. Microhabitat assessment in both aquatic and terrestrial systems
3. Capture-mark-recapture analyses

Project 11:	Love in the Aftermath of War: A history of romance in a regional 'garrison' town
Discipline area:	Australian History, Military History, Gender History, History of Religion
Academic Supervisors:	Associate Professor Jennifer Jones

Project Overview:

This project will investigate the long-term impacts of Albury and Wodonga's status as 'garrison' towns through the lens of romance between local citizens and transient enlisted personnel. The project will focus upon a newly donated archive of 600 love letters (circa 1944-1947) the Burkitt-Kerr Letters, which provide significant insight into the WWII home front experience in Albury-Wodonga, from the perspective of long-term local residents and transient enlisted personnel. These border towns were of strategic importance to the military and the presence of the military was of significance for the local community, especially for local families who incorporated transient soldiers into their ranks through romance and marriage. Soldier-civilian romance and settlement in the early post-war period therefor provides a unique and as yet un-examined lens through which to understand the Army's ongoing status as a major stakeholder in the Albury-Wodonga district and other regional settings across Australia. The project will provide deeper understanding of the local impact of the armed forces and give opportunity to communicate the shared past to residents and current service personal, enhancing understanding of the local importance of the armed forces, boosting engagement with history and support for the local GLAM sector. The project can also contribute the military education of military members by shaping understanding of to the Army's impact on garrison communities.

Objectives:

The project will provide deeper understanding of the local impact of the armed forces and give opportunity to communicate the shared past to residents and current service personal, enhancing understanding of the local importance of the armed forces, boosting engagement with history. The project can also contribute the military education of military members by shaping understanding of to the Army's impact on garrison communities.

Methods:

1. Completing an inventory of archival materials including letter number, date, author, recipient and paragraph topic in each letter
2. Identifying key events and themes that emerge from the letters
3. Liaising with industry partners
4. Preparing a literature review