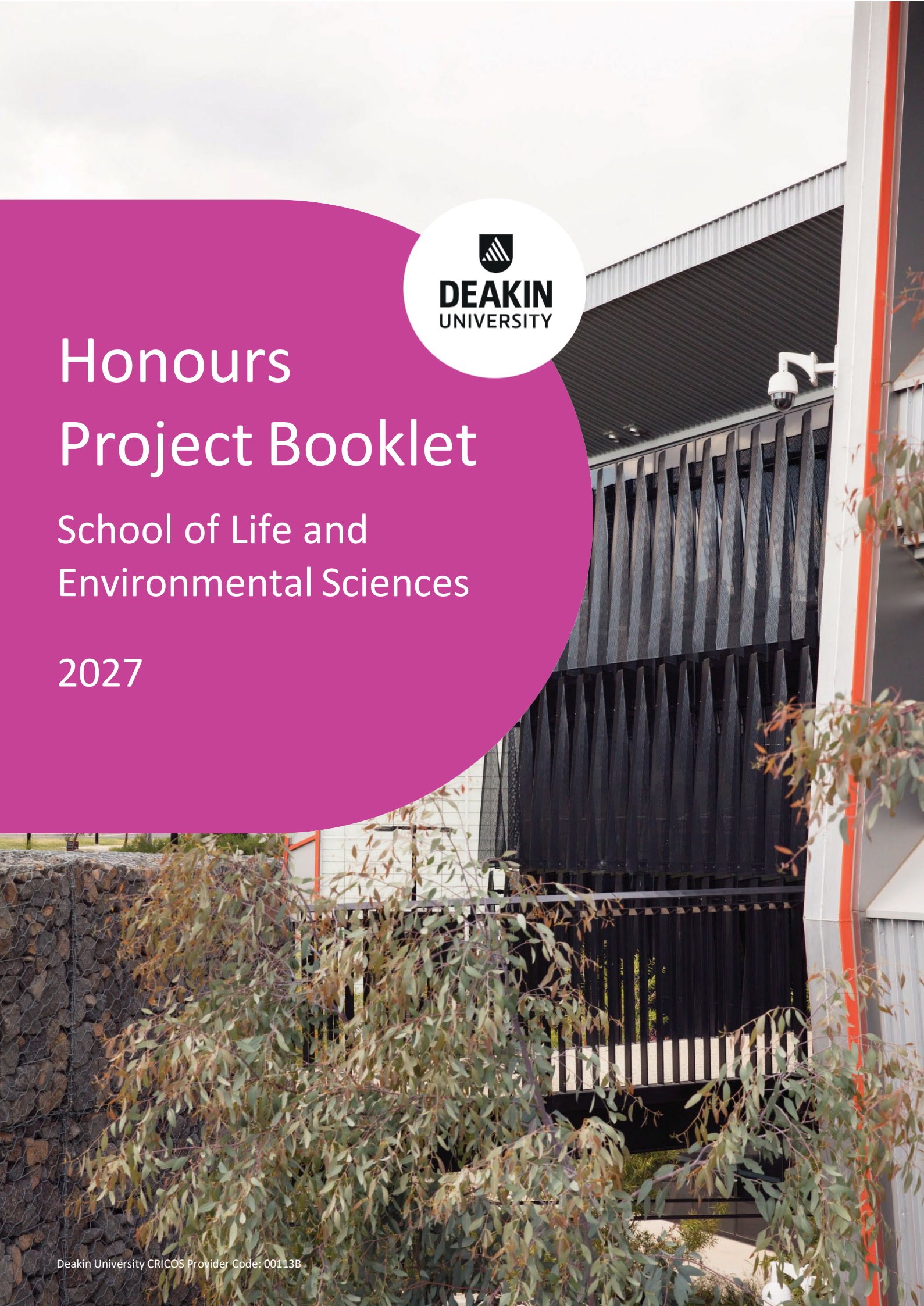


Honours Project Booklet

School of Life and Environmental Sciences

2027

Deakin University CRICOS Provider Code: 00113B

What is Honours?

During Honours, students undertake independent research, under supervision, that forms the majority (75%) of their activity for the year. The research may involve field work, laboratory work and data analysis, depending on the nature of the project. The major assessment component is the written thesis produced at the end of the year. Honours students must present their research via oral presentations. There are also two coursework units (comprising the remaining 25% of activity) which vary according to the Honours program you are enrolled in.

Why do Honours?

An Honours degree provides an important year for further acquisition of scientific skills. In addition to the specialised research training, you obtain during your research project, all Honours students gain further competence in critical thinking and data analysis, information technology, computer software, and scientific communication via oral and written presentations. These skills are recognised by external employers as essential in the workplace. Thus, completion of an Honours year will make you more employable. An Honours degree also exposes you to research of national and international significance, and is the springboard to further study as a postgraduate student undertaking Masters or PhD level research.

How do I get into Honours?

Admission to the Honours program normally requires students to have a Bachelor's degree with an average of at least 65% or greater in their level-3 units. There is an alternative entry pathway with consideration of relevant work experience through an interview process. Furthermore, admission to the Honours program is dependent on a suitable research project and the availability of a supervisor.

Honours structure

There are three Honours courses:

- S400 Bachelor of Science (Honours)
- S401 Bachelor of Forensic Science (Honours)
- S494 Bachelor of Environmental Science (Honours)

All three Honours courses run on a semester structure, with Honours requiring 2 semesters of study. In each semester you will do 4 credit points. Two of these credit points in semester 1 or semester 2 will be for the two stand-alone coursework units. The remaining 6 credit points will be for your research project running across both semesters.

Activities for Semester 1 Honours will commence on **Monday, 1 February 2027,** with thesis submission in early November. Semester 2 Honours commence on **Monday, 21 June 2027,** with thesis submission the following March 2028. You must be available to commence Honours on the specified start dates.

Applications

The first step in securing a place in the program for 2027 is to contact supervisors and discuss projects. Once you have met with a supervisor and agreed on a project, please complete the application form on the website. Application forms must be completed and signed by the nominated Supervisor and attached to your online application via the Deakin applicant portal.

Applications close on **Monday, 11 January 2027** for the Semester 1, 2027 intake and **Monday, 31 May 2027** for the Semester 2, 2027 intake. **Please note that late applications will not be considered.**

Further information can be obtained from your local Honours coordinator (Burwood: Dr Tricia Wevill; Waurn Ponds: Dr Andrew Oxley; Warrnambool: Dr Mary Young) and via the

School Honours website.

Burwood Projects

Dr Carla Archibald

Campus: Burwood or Online
Contact details: c.archibald@deakin.edu.au

Research area description:
How do we keep producing food without losing the wildlife that depends on the same land? It's a genuinely wicked problem, which is exactly what makes it interesting to work on. My research with the Conservation Crossroads Lab, and for my ARC Early Career Industry Fellowship (2026 to 2029) in partnership with WWF-Australia, embeds wildlife conservation into agricultural supply chains, identifying which species are most at risk from climate change and land use change, and designing practical actions that benefit biodiversity, farmers, and industry.

I'm keen to work with students who are, first and foremost, passionate and enthusiastic about nature, but who also have an interest in writing and communicating, familiarity with data analysis and/or statistics (e.g., using Excel, R, Python, or GIS), and the ability to work independently and collaboratively within research and potential industry collaborations. For the project themes listed below, applicants should expect to learn desirable skills for future employment in the conservation or sustainability field.

Specific project themes:

1. **Species vulnerability to climate and agricultural change:** Using habitat suitability and/or land-use modelling to identify which Australian species are most at risk from climate change and land-use change, where climate refugia and conservation hotspots exist, and what to do about it. Spatial analysis (GIS) desk-based analysis opportunities are available in collaboration with industry partners like WWF-Australia or other collaborators working in the private land conservation area (e.g., Land Covenantors Victoria Association).
2. **Conservation actions within agricultural landscapes:** Identifying and evaluating conservation actions tailored to specific species and farming contexts, from habitat features like artificial perches, native intercropping, or shelterbelts, to broader land management practices like organic farming or schemes like Landcare, that support both biodiversity and productive agriculture. This can be desk-based, or ecological fieldwork opportunities are available through existing sustainable vineyard sites with EcoVineyards and BirdLife Australia *Birds on Farms* program.
3. **What makes conservation actions scale?** Using social surveys and/or interviews to understand what drives farmers, land managers, or investors to adopt (or abandon) biodiversity-friendly practices, from native vegetation restoration on farms, to sustainable farm management, to conservation finance, and what this means for which actions are realistically scalable across different agricultural and climate contexts.

Please note that I am always happy to discuss other project ideas that students may have, and there will be opportunities to bring on co-supervisors for additional expertise. For more information, please refer to my Deakin Find and Experts page: https://experts.deakin.edu.au/53873-carla-archibald

Prof Damien Callahan

Campus: Burwood

Contact details: **damien.callahan@deakin.edu.au**
Research area description:

The research conducted by Dr Callahan's laboratory spans environmental chemistry, chemical ecology and advanced analytical chemistry. The analytical methods developed are applied to projects that are focused on improving our understanding of chemicals in the environment and to study the biochemical

mechanisms that support extreme traits in organisms which have potential practical applications, such as, metal hyperaccumulating plants. This is multidisciplinary research and involves analytical chemistry, biochemistry and bioinformatics and has many potential applications. For these reasons the methodology applied in this research area enables a diverse collaborative research portfolio.

Specific projects on offer:

- Pesticide profiling in Australian waterways
- Toxicant analysis in the Gippsland lakes
- Metabolite profiling of metal hyperaccumulating plants
- Halocarbon production by microalgae
- Per and polyfluoroalkyl substances (PFAS) are an emerging pollutant of concern and are used solar panels. This project will determine if roof top solar panels are a source for human PFAS exposure.

Dr Adam Cardilini

Campus: Burwood or Waurn Ponds

Contact details: adam.cardilini@deakin.edu.au Ph: (03) 9244 3083

Research area description:
Animal Ethics, Environmental Values, and Climate Action: My research uses social science methods to investigate how our values, experiences, and interactions with animals and nature shape science, society, and environmental action. Projects typically draw on social science approaches, including surveys, semi-structured interviews, and content analysis. My core research explores: **(1) Animal Ethics & Flourishing**, focusing on expanding moral consideration and addressing animal use in science and education; **(2) Plant-Based & Alt-Protein Systems**, investigating climate-friendly food literacy, cellular agriculture, and ethical food shifts; **(3) Art & Science Engagement**, examining how creative practice fosters deeper connections with animals, nature, and community; and **(4) Climate Action & Social Change**, driving public participation for a safe climate. Feel free to reach out whether you have a specific project in mind or want to explore possibilities.

Specific projects on offer:

- **Community Understanding of the Grey-headed Flying Fox**: Investigate people's thoughts and feelings about Grey-headed Flying Foxes and/or develop educational experiences to promote care and protection of them.
- **Animal Perspective Taking to Promote Ethical Consideration**: Identify, develop, and test methods that encourage animal perspective taking and investigate whether it impacts how people think, feel, and behave toward animals.
- **Animal Use in Science**: Using content analysis of research articles to quantify and describe the use of animals in various domains of science.
- **Animal Use as a Barrer to STEM Participation**: Investigate whether the normalised use of animals in science impacts students study experience, consideration of animals, and pursuit of science careers.
- **The Role of Knowledge in Plant-based Transitions**: Investigate the role of objective knowledge of animal agricultures impact on the environment, animals, and people, and its relationship to transitions to plant-based diets.
- **Local Community Climate Action**: Investigate barriers, motivations, and methods to participation in local community-based climate action.

Dr Belinda Christie

Campus: Burwood and Online

Contact details: b.christie@deakin.edu.au

Research area description:
I specialise in environmental education research; often in formal settings like universities and in informal settings like adult outdoor and community education. I am a 'mixed methods' researcher, frequently combining both quantitative and qualitative social research methods. As an applied social environmental scientist, my research has spanned investigating human–nature relationships, Education for Sustainability, pro-environmental behaviour, sustainability, urban planning, composting and recyling, compassionate conservation, art, mindfulness, spiritual ecology, and inclusive and trauma-informed practice, usually in the context of the field of environmental education research.

Specific projects on offer:
Below is a list of projects currently on offer through *The Interbeing Lab* (our research-praxis community focusing on inclusive and ethical environmental education). It is not an exhaustive list. I'm happy to discuss any environmental education or sustainability education project which aligns with your interests, cultural background, and the skills you wish to develop as a researcher.

Environmental and sustainability education projects:

1. Sustainability professionals: Improving sustainability and environmental professionals wellness, resilience, and compassion, through applied trauma-informed nature-based mindfulness practices.

2. University classrooms: The use of applied trauma-informed mindfulness practices as pedagogy (the practice of teaching) within university classrooms and their capacity to assist Graduate Learning Outcomes for environmental graduates.

3. Outdoor education: Applying contemplative and nature-based mindfulness practice in adult outdoor education programs to improve inclusion, education outcomes, and develop connection with place.

4. Community environment programs: Using trauma-informed applied mindfulness practice and communication in community-based environmental, sustainability, and climate action projects to promote inclusivity for marginalised communities and achieve improved social and environmental outcomes.

5. Sustainable consumer behaviour: The role of applied mindfulness practices in developing compassionate action and kinship through sustainable lifestyle choices and consumption habits (dietary choice, products, clothing, travel, social and mainstream media, investment decisions, etc)

6. Food waste and composting: The effectiveness of applied nature-based mindfulness practices in inclusive composting education and food waste diversion.

Prof Raylene Cooke

Campus: Burwood

Contact details: raylene.cooke@deakin.edu.au;

Research area description:
Our research team has a focus on raptors and how they utilize different land-use types including urban, agricultural and forested landscapes. Much of the fieldwork is undertaken at night investigating the

movement and behaviour of nocturnal birds (owls and frogmouths) and their prey (possums and gliders) so a willingness to work at night is a must, as is a current driving license.

We are also interested in investigating the impact rodenticides are having on native wildlife.

Specific projects on offer:

1. Assessing the extent of rodenticides in nocturnal birds.
2. Determining the presence of nocturnal birds across Phillip Island using playback.
3. Determining the presence of large forest owls (sooty owls; powerful owls and masked owls) across the Central Highlands using acoustic monitoring.

Dr Bernhard Dichtl

Campus: Burwood

Contact details: bernhard@deakin.edu.au Ph: (03) 9251 7060

Research area description:

In our lab, we are broadly interested in the regulation of gene expression, with a focus on how cells integrate signals from stress, DNA damage, and viral infection to control transcriptional output. Our work examines how transcriptional repression, RNA processing, and post-translational modifications are coordinated to shape gene expression programs under changing cellular conditions. We are particularly interested in how nuclear factors interact to fine-tune the transcriptional machinery in response to physiological and environmental stress, and how these mechanisms contribute to genome stability and cellular homeostasis.

Our research focuses on understanding the molecular pathways that silence gene activity once a response has been initiated. We are exploring how specific nuclear proteins coordinate to suppress transcription at multiple levels, including promoter-proximal pausing, chromatin modification, and the post-translational control of transcription factors and co-regulators. This work aims to define how these layers of regulation ensure that stimulus-responsive genes are inactive under resting conditions and are efficiently downregulated once the cellular response has been resolved. By investigating these pathways, we hope to uncover general principles of gene regulation that apply not only to immune defense, but also to broader contexts such as stress adaptation, DNA repair, and developmental control.

Specific projects on offer:

Biochemistry and Molecular Biology projects:

1. Promoter proximal regulation of gene transcription by termination factors.
2. Biochemical characterisation of factors involved in HIV latency.
3. Regulating the RNA kinase Clp1 in health and disease.

Honey bee research projects:

European Honeybee (*Apis melifera*) and Varroa mite research

Honeybees are vital pollinators supporting biodiversity and billions of dollars in Australian agriculture. Their survival is now threatened by the parasitic mite *Varroa destructor*, which is spreading through Victoria. Varroa weakens colonies, spreads viruses and causes colony collapse. Honours research projects are available to help develop solutions to this urgent and emerging biosecurity challenge.

1. The first project focuses on enhancing honeybee resistance to Varroa infestation through nutritional intervention. Successful Varroa reproduction depends critically on the honeybee fat body, a central metabolic and immune organ. Targeting fat body development therefore represents a promising and underexplored avenue for Varroa management. This project will test

the impact of defined pollen and sugar supplements on fat body development and composition. Students will gain hands on experience in honeybee dissection and apply mass spectrometry-based lipid analysis to understand how nutrition shapes bee physiology and resilience.

2. The second project investigates Oxalic acid, which is one of the most widely used treatments for controlling *Varroa destructor*, yet its mode of action remains poorly understood. This project will investigate the chemical form of oxalic acid that affects mites providing insights to improve treatment efficacy and support sustainable Varroa management.

The projects offer an exciting combination of fundamental biology, applied research, and field experience. The projects are a unique opportunity for students to learn about honeybee biology and hive management while contributing to cutting edge research aimed at safeguarding one of our most important pollinators.
Candidates must not be allergic to bee venom and must be able to regularly travel to apiaries in the Lilydale and Mount Evelyn region. Due to the seasonal nature of honeybee biology, projects can only commence in Semester 2!

Prof Don Driscoll

Campus: Burwood

Contact details: d.driscoll@deakin.edu.au

Research area description:
The Biodiversity Research and Conservation Ecology lab (https://dondriscoll.com/) has a focus on how species use whole landscapes, including animal movement and disturbances like land-clearing and fire. We test ecological theory using applied conservation problems, and work with a range of government and environmental organisations to ensure our research has real-world impact. The BRACE lab draws on cross-disciplinary expertise to help us answer complex ecological questions, including collaboration with social-sciences, engineering and experts in artificial intelligence.

To complete field projects, you will need to gather volunteers, and you will need a current driver's license. Frog projects involve night work.

Specific projects on offer:

1. **CRACK!** (suits February start) Where do small animals hide when it dries out, and what happens when farming practices threaten those hiding places? In this novel project we will collaborate with the Beyond Bolac catchment action group to map threats to cracks and to assess crack use by frogs and other small animals.
2. **Threatened frog declines** (suits February start) *Pseudophryne semimarmorata* is listed as vulnerable in Victoria due to reported declines. In collaboration with Melbourne Water, this project aims to discover how land management influences this autumn-breeding frog and the extent of decline across its range.
3. **Threatened species distributions and monitoring with the Threatened Species Conservancy including:**

   ***3.1 Aprasia parapulchella* (pink-tailed worm-lizard) monitoring protocols using eDNA** (Feb, or mid year start)

   3.2 Breeding requirements of the endangered small ant blue butterfly (Acrodipsas myrmecophila). This project will investigate the habitat requirements for the butterfly's host species, the coconut ant and the conditions under which butterflies colonise ant colonies.

   3.3 Impact of bushfires and climate change on the endangered Otway Black Snail (Victophanta compacta) Survey historical and community collected records to determine changes in distributions and potential drivers of change including potential impacts of the 2014 & 2015 bushfires near Wye River post 2 years of El Nino.

4. **Christmas Island Reptiles.** A new management plan has just been developed that highlights some priority projects to help save extinct-in-the-wild reptiles. You would need to self-fund some of the travel, but if you are up for that, this is a very exciting project with potential to help save a species from extinction. The current project includes applications of new AI-assisted cameras to detect invasive species and monitor extinct-in-the-wild reptiles.
5. **Other ideas that you are prepared to organize and lead and which fit into the scope of the BRACE lab and which you can self-fund or cost very little.**

Dr Christie Lam

Campus: Burwood

Contact details: c.lam@deakin.edu.au

Research area description:
I am an environmental and development anthropologist. My research is multidisciplinary in nature, drawing on Anthropology, Environmental Sciences, and Development Studies perspectives. My particular research interests are the social dimension of natural resources conflicts (protected areas management), climate change adaptation, sustainable farming and food security, and pro-environmental behaviour. I love working with communities closely by listening to their voices and empowering them in the decision-making process through participatory research methods such as ethnography and participatory action research to develop co-designed sustainability policies. I welcome inquiries from students who are interested in understanding environmental sustainability from the social science perspective.

Methodology: Qualitative methods, cross-cultural engagement, systems thinking

Specific project on offer:

- **Regenerative Agriculture Project:** Transforming agriculture is crucial to achieving future sustainability, and regenerative farming practices are increasingly popular as a nature-based solution to mitigate climate change, biodiversity loss, and soil degradation; however, limited evidence about their environmental, social, and economic impacts remains a key barrier to their wider adoption. This project brings together scientists from diverse disciplines, industry partners, and farming communities to evaluate the impacts of regenerative practices on soil health, water quality, animal health, food nutrition, biodiversity, economic viability, and community wellbeing. If you have relevant knowledge and would like to work together, please contact me. The project aims to use rigorous evidence to inform future sustainable agri-food system policies.

- **Cellular Agriculture Project:** Cellular agriculture attempts to create animal products, such as meat and dairy, through technological innovation and without animals. Such technologies promise significant environmental, health, allergy, and animal well-being benefits. Despite the rapidly advancing technology of cellular agriculture, especially the soon-to-be available animal-free dairy products in the Australian market, the potential impacts of the agriculture industry are unknown. The project aims to investigate farmers' attitudes toward animal-free dairy products and their concerns about the fast-growing cellular agriculture. The study's results will help us design future research on sustainable food systems.

Prof Rebecca Lester, Dr Galen Holt, Dr George Cunningham, Dr Emily Armstrong and Dr David Dodemaide

Contact details: rebecca.lester@deakin.edu.au, g.holt@deakin.edu.au, george.cunningham@deakin.edu.au, emily.armstrong@deakin.edu.au, d.dodemaide@deakin.edu.au

Ph: +61 3 522 78254

Research area description:

The Quantitative Aquatic Ecosystem Laboratory (QAEL) undertakes theoretical and applied research in freshwater, estuarine and marine systems. Our current program focuses on ecological and population dynamics in freshwater systems, including the effects of drought, climate change and other human impacts. Our research strength lies in bringing together theoretical and statistical modelling with empirical work in the field and laboratory.

We are not currently offering specific projects. Instead, the themes below reflect the kind of research we've run in the past and give a sense of our lab's focus. We welcome interest in any of these areas, as well as other aquatic ecology projects not listed here, please contact us to discuss what might be possible.

- **Species coexistence mechanisms**
  Field, laboratory or modelling projects investigating the mechanisms that allow caddisfly species to coexist, including how environmental variability influences competition and community structure.
- **Caddisfly habitat and reproductive ecology**
  Field-based investigations into caddisfly egg-laying site selection, habitat limitation, and the factors shaping where and when caddisflies reproduce successfully.
- **Emerging disease dynamics in aquatic insects**
  Field and laboratory projects examining Saprolegnia infection in caddisflies, including its impact on reproduction and how temperature influences the disease's ability to locate and infect hosts.
- **Restoring farm waterways and biodiversity**
  Field-based projects assessing how fencing, revegetation and habitat restoration on farm dams and other waterways affect biodiversity and environmental condition.
- **Stream restoration and rehabilitation**
  Field-based projects evaluating the ecological effects of stream restoration activities, such as willow removal and riparian rehabilitation, on freshwater biodiversity and habitat condition.
- **Drought-resilient grazing systems**
  Small-scale studies exploring whether native plant species can supplement or replace exotic pasture species to help farmers maintain livestock feed during drought.

Dr Roan Plotz

Campus: Burwood and Waurn Ponds

Contact details: r.plotz@deakin.edu.au Ph: (03) 9244 5165

Research area description:

My research is multidisciplinary and spans wildlife behavioural ecology, Indigenous Knowledge, and the human dimensions of conservation. I investigate the escape and communication behaviour of mammals, work with communities to integrate Indigenous Knowledge into climate resilience and understand climate-driven shifts in animal and plant phenology and explore how human–wildlife interactions can inform more effective conservation and management. My research is predominantly field based, with many projects conducted at night

Specific projects on offer:

1. **Escape behaviour in mammals (and potentially reptiles)**: Projects use Flight Initiation Distance (FID) to investigate mammal, bird and reptile responses to human disturbance, including urbanisation, vehicles, artificial light and human presence. Reptile projects require identification experience.
2. **Eavesdropping behaviour in animals:** Explore how birds, reptiles and mammals eavesdrop on communication signals, such as alarm calls and macropod foot-thumping, to understand sociality, anti-predator behaviour, information use and interspecific competition.
3. **Indigenous Knowledge and community climate resilience:** Explore opportunities to integrate Indigenous Knowledge with contemporary science to strengthen climate resilience, environmental decision-making, and biodiversity conservation.

Students interested in these areas are encouraged to get in touch to discuss potential projects that align with their interests and my research expertise.

Dr Ella Plumanns Pouton

Campus: Burwood

Contact details: ella.p@deakin.edu.au

Research area description:

My research primarily focuses on plants and environmental change. This means studying species across their life cycle, from seeds to mature plants, and learning about the fascinating relationships between plants and the web of animals, people, and landscapes that they're part of. I am available to supervise projects related to these topics and generally within the areas of fire ecology, plant ecology, and conservation biology, commencing July. If students have an interest in starting in February, we can also discuss co-supervision opportunities.

Specific projects available:

This suggested list of projects includes examples and is not exhaustive. I welcome discussions with students on other opportunities, to either adapt these ideas, or co-develop new projects within the areas of fire ecology, plant ecology, and conservation biology that students are passionate about.

1. **Working with Dja Dja Wurrung to assess the impact of Galk Galk Dhelkunya (forest gardening) on the health of Djandak (Country).** This will involve learning forest monitoring skills, including taking dendrometer band measurements, assessing tree-to-tree competition, floristic identification, and developing quantitative analysis and written communication skills. Requires an ability to work communicatively and in a culturally competent manner with industry partners.
2. **Assessing the impact of repeated high severity fire on plant persistence and recruitment**. This will involve learning fieldwork skills including floristic identification, identifying basal and epicormic resprouting, and measuring bark thickness and tree diameter, and developing quantitative data analysis and written communication skills. Requires an openness to communicate and work with industry partners.
3. **Assessing the spatial patterns of Australian plant dispersal strategies and their relationship to climate, fire, ecosystem-type, other plant traits, and potentially animal distributions.** This will involve only desktop work. It requires some existing capacity to do basic coding using R, and an interest in developing these into strong R-skills that allow you to work with large datasets and spatial products, in addition to developing quantitative analysis and communication skills.

Dr Nicholas Porch, Prof Heloise Gibb, Dr Nathan Butterworth

Campus: Burwood

Contact details: nporch@deakin.edu.au Ph: (03) 9251 7620

Research area description:

Deakin Bug Lab (Nick Porch - nporch@deakin.edu.au, Prof. Heloise Gibb – h.gibb@deakin.edu.au, Dr. Nathan Butterworth – nathan.b@deakin.edu.au) have ongoing research projects focussing on the poorly known terrestrial invertebrate fauna of SE. Australia (1).

We are discovering hundreds of previously unknown and undescribed species every year in wet forests and rainforests (an Australian Research Council Linkage Project with Zoos Victoria, DEECA, Australian Museum and South Australian Museum) and in montane environments (a Hermon Slade Foundation project).

We seek honours students to work on aspects of these projects and don't expect any previous invertebrate experience – just an open mind to what most of biodiversity looks like. Projects may be supervised/co-supervised by Prof. Heloise Gibb and/or Dr. Nathan Butterworth.

Further, Nick is always looking for students interested in the palaeoecology of past environments and using fossils to reconstruct the history of human impact on insect biodiversity (2), and Nathan is interested in beach fauna and sexual selection (3).

Specific projects on offer:

1. Discovery and Conservation of Australian Terrestrial Invertebrate Diversity (Porch, Gibb, Butterworth): A wide range of potential projects are available that directly or indirectly relate to the projects described above. This includes projects focussing of **patterns of endemism in SE Australia** in selected invertebrate taxa using molecular or morphological approaches, the **association between alpine plant species and obligate plant-feeding insects** and developing **understanding of highly endemic regional faunas**. Other projects could focus on **urban ecology** or **invertebrate translocation** to restore ecosystems. Some projects would be laboratory based whereas other may involve significant periods of fieldwork.

2. Palaeoecology of Human Impact on Island Biodiversity (Porch): Are you interested in islands, extinction, biological invasions, biogeography, palaeoecology or fossils? Projects in this area are laboratory-based investigations into the nature of the recent fossil record of plants and insects on Indo-Pacific oceanic islands. Projects could, for example, explore this **history of human impact on biodiversity** using samples from the Cook Islands or contribute to the growing recognition of catastrophic insect extinction by **describing extinct beetles from Rodrigues in the Indian Ocean**.

3. Sex on the Beach: Biodiversity, Endemism, and Sexual Selection on Victoria's beaches (Butterworth): Are you interested in coastal biodiversity or sexual selection? Coastal beaches support surprisingly rich but understudied invertebrate communities, particularly flies (Diptera: Chloropidae and Muscidae) and talitrid amphipods (beach hoppers), which gather in dense numbers along the beach and around wrack and show striking mating behaviours and sexually selected traits. Projects could explore **diversity and endemism of flies or talitrid amphipods** across different stretches of coastline, using morphological or molecular approaches; **mating behaviour and sexual selection in beach flies**, including field observation of courtship and competition; **how coastal geography shapes both species diversity and mating systems**; or **impacts of coastal development** or beach management practices on these invertebrate communities.

If these areas or similar types of questions in an Australian context interest you, please send Nick an email and arrange a meeting with our friendly lab. Alternatively, come visit us in the Deakin Bug Lab (Building BA: BA1.30), meet our group and see our lab

Dr Anthony Rendall

Campus: Burwood and Waurn Ponds

Contact details: a.rendall@deakin.edu.au

Research area description: My research spans the fields of invasive species ecology, island ecosystems, trophic dynamics, threatened species conservation and landscape ecology. I am always happy to speak with students about research that interests them or can discuss projects within my fields of research.

Prof Matthew Symonds

Campus: Burwood

Contact details: matthew.symonds@deakin.edu.au Ph: (03) 9251 7437

Research area description:

In our group we work on the evolution of behaviour, morphology and physiology between closely related species of animals. Much of our research involves combing ecological and evolutionary information to answer questions about how and why traits have evolved, identifying the factors that shape evolution of the trait – with particularly interest in effects of climate and other environmental variation. I offer a mixture of field-. museum-, lab- and desk-based Honours projects – predominantly on birds, and insects. In additional to the projects below I'm open to suggestions! Feel free to contact me to ask me more about these. If you want to get the best idea of the breadth of my research interests and projects, look no further than the publications page on my website (www.symondslab.wordpress.com/publications/).

Specific projects on offer:

1. The interaction between morphological, behavioural and physiological adaptations across populations in different climates
2. The link between escape responses and bird and mammal distribution and extinction risk
3. Predictors of anti-predator responses in threatened bird species
4. Variation in the control of heat loss in birds, and its consequences for bird body shape
5. The evolution of sexual differences in body shape
6. Drivers of diversity in ant cuticular hydrocarbons
7. Gender differences in publication output in the ecological sciences (this project is suited for a more science-policy, data-based student).

Dr Angel A.J. Torriero

Campus: Burwood

Contact details: angel.torriero@deakin.edu.au Ph: (03) 9244 6897

Research area description:

My research group operates at the dynamic intersection of electrochemistry and molecular biology. Our diverse and pioneering projects involve electrosynthesis, electrochemical biosensors and immunosensors, and the interaction of pharmacologically active molecules with cell membranes. Our work aims to develop innovative solutions to current scientific challenges, making a tangible impact on health and technology.

Specific projects on offer:

1. **Development of Electrochemical Calibration-Free Biosensors for Early Disease Detection:** This project focuses on designing and fabricating novel biosensors capable of detecting biomarkers for various diseases at early stages. Students will learn electrochemistry, bioconjugation, and data

analysis techniques, providing a comprehensive skill set for careers in medical diagnostics and research.

2. **Electrosynthesis of Pharmacologically Active Molecules:** This project aims to develop new methods for synthesising pharmacologically active compounds using electrochemical techniques. The work involves collaboration with leading pharmaceutical researchers and offers hands-on experience in synthesising, purifying, and characterising new molecules.
3. **Interaction of Drugs with Cell Membranes:** Understanding how drugs interact with cell membranes is crucial for developing more effective therapies. This project combines electrochemical techniques with molecular biology to study these interactions at a detailed level, offering insights into drug design and delivery.
4. **Immunosensors for Point-of-Care Testing:** This project involves developing immunosensors for rapid and accurate point-of-care testing. Students will engage in multidisciplinary research, integrating immunology with advanced sensor technology to create devices that could revolutionise patient care.

Why Join Our Team? Our lab offers a unique opportunity to work at the forefront of scientific research with state-of-the-art facilities and a collaborative environment. Students will gain valuable experience and mentorship, preparing them for successful careers in academia, industry, or further research. We seek passionate, dedicated students eager to learn and contribute to cutting-edge research.

Assoc Prof Susanna Venn

Campus: Burwood

Contact details: susanna.venn@deakin.edu.au

Research area description:
Alpine plant ecology projects: I'm interested in testing ecological theory in the mountains and looking at ways in which alpine plant communities are coping with environmental change. This could involve focusing on community (re) assembly patterns, how snow drives community composition, ecological function or ecological processes in the mountains, treeline dynamics, vegetation responses to heat and frost, regeneration strategies of alpine plants, and experimental manipulations in the field / lab. Have a look through my webpage for some of the topics that I'm interested in, I'm happy to discuss ideas for honours projects that overlap with any of these topics – or possibly other plant ecology projects in extreme environments. I also co-supervise honours projects with other ecologists in the School.

https://susannavenn.wordpress.com
https://www.extremeplantecology.com/

Specific projects on offer:

1. Phenology and the timing of life history events in alpine plants (Desktop, GIS, herbarium records and some fieldwork)
2. Interactions between high light, freezing resistance and photosynthesis (labwork and some fieldwork)
3. Opportunities for growth and development of alpine plants under snow (fieldwork and labwork)
4. Alpine seed germination (labwork, possibly some fieldwork)
5. Evaluating the success of Alpine Resort revegetation projects (Fieldwork)
6. Using plant functional traits to understand changes in plant community composition and interactions with snow melt timing (GIS mapping, Desktop study)

Dr Mark Warne

Campus: Burwood

Contact details: **mark.warne@deakin.edu.au** Ph: (03) 9251 7622

Research area description:
My research interests are in the fields of micropalaeontology and palaeo-oceanography. My research focuses on marine crustaceans (Ostracoda) and their use in tracking ocean current evolution and past environmental change.

Specific projects on offer:

Project 1. Late Pliocene marine micro-crustacean migrants into SE Australia: Timing, diversity and mechanisms of dispersal.
This project will involve investigations into the sudden appearance of distinctive micro-crustaceans within SE Australian shallow marine realms approximately 3.6 million years ago - which was a period notable for warm global climates. These invertebrates are now a dominant component of shallow marine microfaunas in SE Australia, and understanding their origins and colonization success will shed light on the influence of climate change on marine biogeography.

Project 2. Marine Ostracoda from the shores of Hobson's Bay, Victoria: Biodiversity in an industrial marine precinct.
The distribution of present-day marine ostracod faunas (microscopic crustaceans) along the shores of Hobson's Bay (north end of Port Phillip Bay) will be used to identify sites of maximum biodiversity within this industrial maritime precinct.

Dr Liz Weldon

Campus: Burwood

Contact details: l.weldon@deakin.edu.au Ph: (03) 9251 7191

Research area description:
Research supervision capabilities in palaeontology, earth science, palaeobiogeography, palaeoecology, palaeoenvironmental analysis, and geoconservation.

Major themes:

1. **Geoconservation:**
   - Develop regionally and culturally appropriate quantitative methodology to assess geosites and geoheritage for geoconservation.
   - This research is suitable for both Honours and Master of Sustainability students.
2. **Marine invertebrate response to climate change and mass extinction events:**
   - Taxonomic studies and quantitative analysis of marine macro-invertebrate fossils used as bridging taxa for Gondwana-Euroamerican correlation in the Permian.
   - Understand the drivers of diversity, origination, extinction and distribution in response to palaeoenvironmental change.
3. **Terrestrial megafauna:**
   - Quantitative morphological studies of extinct and extant macropods and emus.
   - Spatial and temporal distribution patterns of wombats.
4. **Vertebrate and invertebrate palaeontology:**
   - Various projects available in conjunction with the Melbourne Museum.

Assoc Prof Desley Whisson

Campus: Burwood

Contact details: dwhisson@deakin.edu.au Ph: (03) 9251 7302

Research area description:
My research aims to understand the spatial ecology (home range, movements, distribution) of terrestrial wildlife and impacts of climate and landscape change and stochastic processes on species' distributions. I am particularly interested in forest ecosystems and arboreal species (koalas and gliders) but also have a

strong interest in rodents including the threatened Broad-toothed Rat.

I am open to developing a mutually-interesting project with you. Some potential projects are listed below.

Specific projects available:

1. **Squirrel gliders** in modified landscapes – Possible projects may examine activity, movements, use of artificial hollows, and habitat use.
2. **Yellow-bellied gliders** – This project will map distributional shifts in Victoria's yellow-bellied gliders by using historical records and targeted acoustic surveys.
3. **Koalas** –This project will use passive acoustic monitoring (and possibly drone surveys) to better understand the distribution of koalas in regions where their populations occur at low densities (e.g., Ballarat, Strathbogies).
4. **Broad-toothed Rats**: Surviving fire – This project aims to understand the response of Broad-toothed Rats to fire by assessing populations (scat searches and trapping) across a range of fire histories in the Victorian Alps.

Assoc Prof John White

Campus: Burwood

Contact details: john.white@deakin.edu.au

Research area description:

John leads a long-term research project in the Grampians National Park (Gariwerd) investigating the impact of fire and shifts in climate on small mammal communities.

This research offers a great opportunity to do lots of fieldwork, get valuable project management skills and build your professional resume skills enormously. A driver's license (all projects) and a commitment to being in the Grampians for up to 8 weeks is essential. The Grampians was hit by a set of massive wildfires over the 24/25 summer, and this is an opportunity to now track the impact of the fires and the recovery process.

John also has research focusing on wildlife management and increasingly also the impact of rodenticides on wildlife.

Specific projects on offer:

1. Small mammal responses to fire and climate in the Grampians landscape. Join this project which has been documenting small mammal responses at 36 small mammal monitoring sites since 2008. This project offers heaps of field work, extensive experience in fire ecology, and great links to local management agencies. See Hindcasting the response of mammals to fire and climate; Boom and busts of small mammals in the Grampians for context about this amazing project.
2. Potential camera trapping project in the Grampians. Investigating the role of wet landscape features in fire recovery.
3. Assessing the extent of rodenticides (rat poisons) in wildlife.

Prof Mike Weston

Campus: Burwood

Contact details: mweston@deakin.edu.au Ph: (03) 9251 7433

Research area description:

Conservation, human-wildlife interactions, solutions.

Specific projects/programmes available:

1. Flight Initiation Distances of world's mammals – investigating mammalian behavioural responses to disturbance/ environmental change/ urbanisation/ other threats. This is an exciting, new, large-scale research, and there is scope for multiple projects. We have some research topic ideas already, but bringing your own ideas is encouraged. Co-supervised by Dr Kaori Yokochi, Dr Anthony Rendall, Dr Roan Plotz and Dr Matt Symonds. Specific projects include:
    a. The relationship between cover, activity, Giving Up Densities and Flight-initiation Distance.
    b. The possibility of major expeditions to locations where Flight-initiation Distances have not yet been recorded. This includes arid and semi-arid Australia, and also overseas, depending on financial and permits.
2. Flight Initiation Distances of world's reptiles. Students with experience in reptile identification are required to conduct some of the first ever studies of escape behaviour in Australia's reptiles using Flight-Initiation Distance. Co-supervised by Dr Kaori Yokochi, Dr Anthony Rendall, Dr Roan Plotz and Dr Matt Symonds.
3. Flight Initiation Distances of world's birds. Antipredator behaviour is a key life history trait and underpins the key threatening process known as "disturbance". A range of projects are available, including exploring discrimination between different types of "stimuli", factors which mediate risk taking (e.g., prevailing predator environment), and the nature and form of escape. Specific projects include:
    a. Penguin behaviour and escape under different spotlight colours.
    b. Escape and defence in Masked Lapwing across a rural-urban gradient in southern Australia.
4. Shorebird conservation, especially supporting the conservation management of resident shorebirds under pressure from human use of habitats and other stressors e.g. invasive predators. Projects include Red-capped Plover conservation and management, but other species are also possible. Project themes include:
    a. Building upon a 2007 study at Cheetham Wetlands about unauthorised entries into the off-limits site. Substantial housing development has occurred in the area, so comparison with previous data will infer changes associated with urbanisation. This may extend to multiple shorebird sites off limits to the public.
    b. Contaminants/pollutants in shorebird faeces and carcasses. This project will require laboratory analysis and field work.
    c. Reintroduction of a locally extinct shorebird (Bush Stone Curlew) to Victoria. A range of projects exist to support critical information gaps in the reintroduction of this species, including elucidating breeding habitat, success, threats and solutions.
5. The function of head-bobbing in shorebirds. Head-bobbing is a distinct behaviour recorded from many (possibly all) shorebirds, and is variously interpreted as alarm, signalling to predators, etc. This project will combine field observations with a systematic literature review/expert elicitation to understand the occurrence and context of head-bobbing.

Almost all projects involve co-supervisors. These projects a current driver's licence and capacity to conduct field work is required. Some projects require field work at night. Please email CV to start a discussion regarding any of these projects.

Dr Kaori Yokochi

Campus: Burwood

Contact details: k.yokochi@deakin.edu.au

Research area description: Urban Ecology of wildlife, mainly focussing on native mammals but open to any taxa. I'm interested in how urbanisation and infrastructure impacts wildlife and exploring potential solutions. My current and past research includes impacts of light pollution on insectivorous bat communities, use of existing drainage culverts by wildlife to cross roads, impacts of rodenticides on wildlife, impacts of anthropogenic factors on birds and mammals' escape behaviours, wildlife education on teachers using microbats as an ambassador and using arts to connect the public to their local biodiversity.

Some projects ideas/available:

1. **Bats**
   - Microbats as ambassadors – investigating how we can use inconspicuous, not-so-charismatic (not my personal view!) microbats to increase awareness of local biodiversity in the public.
   - Scopes for some ecological and social science projects with the Grey Headed Flying Foxes, especially involving the Geelong camp.
2. **Road x coastal squeeze: Use of existing infrastructure as crossing structure by wildlife in Otways** – ability to conduct fieldwork in Otways for a few days at a time is required. Experience in camera trapping is highly desirable. Co-supervised by Dr Marissa Parrott (Zoos Vic), Dr Jemma Cripps (ARI) and Dr Barbara Wilson.
3. **Flight Initiation Distance of world's mammals** – investigating mammals' behavioural response to disturbance/ environmental change/ urbanisation/ other threats. Nocturnal fieldwork is required. Co-supervised by A/Prof Mike Weston, Dr Anthony Rendall, Dr Roan Plotz and/or Prof. Matt Symonds.
   - Spotlight brightness and escape in Australian mammals - indexing escape behaviour when mammals with different light sensitivities are exposed to different spotlight brightness and intensities.
   - Bringing your own ideas is also encouraged.
4. **Acoustic surveys of nocturnal birds** to investigate their distributions and important habitat characteristics in Yarra/ Dandenong ranges. Co-supervised by A/Prof John White and Prof Raylene Cooke.
5. **Investigating the abundance of possums and gliders in different land-use types** – then potentially linking the information to powerful owl habitat and defoliation rate of vegetation. Willingness to conduct nocturnal fieldwork is essential. Co-supervised by A/Prof John White and Prof Raylene Cooke.

   Other projects become available throughout the year, so please get in touch to discuss what is available. **A current driver's licence, high level of organisational skills and ability to work independently are required for all projects.** Please contact me via email with your CV attached.

Assoc Prof Angela Ziebell

Campus: Burwood

Contact details: a.ziebell@deakin.edu.au Ph: (03) 9244 6340

Research area description: My education research centres around understanding student learning in Science in transferable skills areas like employability, tolerance of uncertainty and cultural intelligence (through Indigenous Science).

Specific projects available:

1. Careers: Preparation at university for future employment, transition to employment and the first 3-5 years out in the workforce are all crucial times for young scientists. I want to make sure we understand how to prepare you best. I am following students into the workforce to understand how their learning at university impacts their career experiences and decisions later. This includes looking at whether different groups of students have different experiences and understanding them to best support current students.
2. Indigenous Science: As an important reconciliation step many universities (especially Deakin) are introducing Indigenous contexts, perspectives, and content into the curriculum. It important to ensure that this is done well and to understand the experience of all students who are learning about this

material. I am using quantitative and qualitative techniques to study the experience of student undertaking a whole unit of Indigenous Science learning.

3. In class experience: Feelings of belonging, student motivation, tolerance of uncertainty and many other aspects of being a student influence learning. I look at these points for science students to understand how we can support students better. Thing includes looking at different student groups and not assuming that there is one student experience.

Waurn Ponds Projects

Dr Jacqui Adcock

Campus: Waurn Ponds

Contact details: jadcock@deakin.edu.au Ph: (03) 5227 2096

Research area description:

My research focusses on lipid chemistry and lipid analysis – developing new chromatographic methods for the analysis of various oils and fats and applying them to investigate the chemistry of lipids relevant to health and the food industry. Lipids (oils and fats) are a diverse group of molecules, with a range of important roles including cell membrane structure, energy storage, intracellular signalling, and antioxidant activity. They are present in many foods and are a vital part of a healthy diet. Analysis of lipids can be challenging, in part because of the difficulty in studying such amphiphilic molecules that can vary markedly in polarity and often lack chromophores or other chemical features amenable to current detection methods. In my work, I aim to increase our understanding of lipids and lipid oxidation through the development of improved analytical methods relevant to industry.

Projects will employ a range of analytical methods including: HPLC, GC-FID, GC-MS, UV-vis spectrometry, EPR spectroscopy, titrations and colorimetric reactions.

Specific projects on offer:

1. Investigating the contamination of fish products with synthetic antioxidants
2. Degradation of pet foods and pet food ingredients (industry collaboration)
3. Investigation and analysis of lipid oxidation processes in food systems (industry collaboration)
4. Effectiveness of antioxidants in preventing lipid oxidation (industry collaboration)
5. Enzymatic synthesis and analysis of lipid mediators – important anti-inflammatory biomolecules

Dr Anne Aulsebrook

Campus: Waurn Ponds

Contact details: a.aulsebrook@deakin.edu.au

Research area description:

I am interested in how animals, particularly birds, respond to changing and extreme environments. A major focus of my research is the influence of urbanisation on the timing of activity and sleep behaviour. Honours projects that I offer include field-based research with wild birds, lab-based research with captive birds, and desk-based research (using existing or public datasets). I am also open to chatting about other ideas you might have!

Specific projects on offer:

1. **Incubation "shiftwork" in urban and rural peregrine falcons** (desk-based project using nest-cam data, co-supervised by Dr Alex McQueen and Prof Kate Buchanan)**.** Peregrine falcon pairs take turns incubating their eggs in "shifts". This project will involve using public data collected from nest-cams to explore whether the timing of these shifts is influenced by artificial light at night.
2. **Identifying sleep in Australian magpies** (desk-based project using existing video, activity and sleep data; co-supervised by A/Prof John Lesku at La Trobe University). It is not always easy to tell when

an animal is sleeping without recording brain activity, which can be a major limitation in sleep research. This project will involve using existing data to determine how behaviour relates to brain-based sleep states in Australian magpies. There are also datasets available from other species, if a student is interested!

3. **Identifying zebra finch behaviour using miniature data loggers and machine learning** (lab-based project with captive zebra finches, co-supervised by Dr Hui Yu and Prof Kate Buchanan). For this project, a student will film captive zebra finches wearing data logger "backpacks" that collect accelerometry data. They will then (with our support) develop a machine learning model to identify specific behaviours (e.g. flying, foraging) from accelerometry.
4. **Impacts of human disturbance on wild Australian magpies** (field-based project, co-supervised by Prof Kate Buchanan and Prof Raoul Mulder at The University of Melbourne). This project will involve observation of wild birds at various locations around Greater Geelong. Depending on the focus of the project, there may also be opportunities to capture wild birds and/or test their cognitive performance.

Assoc Prof Philip Barton

Campus: Waurn Ponds

Contact details: p.barton@deakin.edu.au Ph: (03) 5227 8191

Research area description:
I lead the Insects in Ecosystems Lab at Deakin University Waurn Ponds campus. In our lab we have a number of field, lab, or desk-based projects available across ecology, entomology, and forensic topics. All our research is done in close collaboration with other researchers and industry partners.

Specific projects on offer:

1. **Pollinators or pests? Understanding insect biodiversity in *Acacia* orchards.** This project would suit someone interested in conducting field and lab work to survey and identify insects in *Acacia* orchards.
2. **Insects in riparian food webs.** A lab-based project to sort and identify insect biodiversity in riparian ecosystems, and investigate relationships between insects, spiders, bats and birds.
3. **Do vineyard management practices benefit insects?** This project would suit someone interested in field work to understand insect biodiversity in vineyards.
4. **Forensic ecology of animal remains.** A range of projects are available to students interested in investigating the links between insects, soils, and plants during the decomposition of animal remains.

Dr Victoria (Tori) Berezowski

Campus: Waurn Ponds

Contact details: **tori.b@deakin.edu.au** Ph: (03) 5227 3561

Research area description:
Tori's research area combines aspects of forensic anthropology, geophysical sciences, and criminology. Her research mainly focuses on a multidisciplinary approach to search for and detect clandestine graves (such as those associated with homicide cases). More specifically, Tori works with geophysical techniques and remote sensing methods, as well as a focus on criminological theory and human behaviour to increase our chances of locating clandestine graves. Other research interests include: the application of 3D techniques to crime scene documentation, and human identification (in a forensic anthropological capacity). Students interested in forensic science and/or criminology are encouraged to contact Tori for potential honours projects. Some areas of interest include grave detection, body deposition sites, and biological fluid persistence. Projects may be in collaboration with other Deakin staff members.

For more information or to discuss potential project ideas, please feel free to reach out via email.

Prof Kate Buchanan

Campus: Waurn Ponds

Contact details: kate.buchanan@deakin.edu.au Ph: 0429 398 460

Project or research area description:

I am interested in why animals do what they do. I use birds to look at basic animal behaviour and the physiological mechanisms that control behaviour, with a strong emphasis on development. My group have current projects looking at the sensory abilities of unhatched embryos and how this may alter birds behaviour after they hatch and the effects within and across generations. These alterations include adaptive changes where early life programs adult physiology and behaviour optimally for the environments in which birds live. These changes may also be maladaptive, for example the impacts of sound and light pollution on developing avian embryos. All projects will need to be planned around animal ethics requirements and seasonal timings. In most cases the student must be based in Geelong and available to interact with the research group.

Specific projects on offer:

1. What controls the annual cycle of arid adapted birds? Unlike seasonally breeding birds, arid adapted birds can switch quickly from one physiological state to another when conditions change and food suddenly becomes available, after a long period of absence. Using captive populations of zebra finches the student will quantify how the perception of food availability in captivity alters the daily and annual cycle of activity, seasonal moult and breeding. This project could include involve bird observation, capture and handling on campus, analysis of existing feather samples, blood samples and monitoring of breeding activity or videos, dependent on student interest and availability.
2. Can unhatched birds communicate with each other? We know that chicken embryos move, hear and vocalise before hatching and that precocial species such as chickens use such signals to synchronise the hatching of their clutch. The student will ask do diurnal light and temperature cycles affect the development, timing of avian hatching, rate of growth, condition and behaviour in chickens? Building on recent work in our research group the student will have the opportunity to test whether embryos use environmental cycles to time their development and hatching. A variety of project design options exist including the opportunity to design your own experiment testing communication between chicken embryos. This project will be conducted in collaboration with Turosi Food Solutions and has relevance to improving production efficiency and welfare in chicken meat production.
3. What role does daylight timing play in determining bird behaviour? We have a current project making use of online citizen science data to examine the role of circadian rhythms in determining bird behaviour. The student will use publicly available web cam footage to look at daily patterns of feeding, movement, hatching timing and posthatch begging behaviour. This project can be run remotely, for an independent student who can proactively manage their own work pattern.

Dr Tim Connell

Campus: Waurn Ponds

Contact details: t.connell@deakin.edu.au

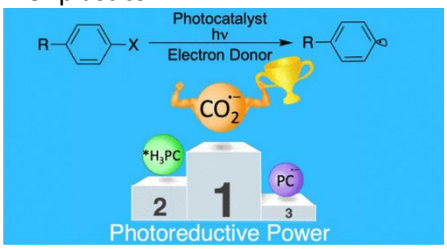
Research area description:

My research explores the synthesis and application of photoactive metal complexes. These compounds

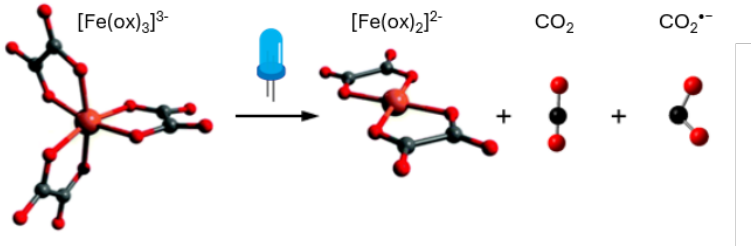
exhibit favourable photophysical properties compared to organic dyes that may be controlled by manipulating the ligands bound to the central metal atom. The fundamental study of luminescent metal complexes is relevant across varied applications, including:light-emitting diodes, chemical sensing, generating solar fuels and bioimaging. A key theme of my research is photoredox catalysis, the artificial equivalent of photosynthesis in plants. Molecular photocatalysts convert visible light into chemical energy and the last 15 years have witnessed rapid growth of this methodology to achieve sustainable high-value chemical synthesis.

Specific projects on offer:

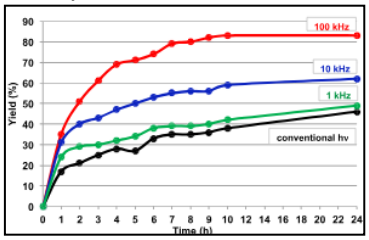
1. **Unlocking light limits in photocatalysis.** Photocatalysts convert photons into chemical energy but do so inefficiently, losing energy and limiting the chemical reactivity This project aims to decouple the redox requirements from the catalyst and use molecular additives (such as oxalate, $C_2O_4^{2-}$) to facilitate reactions that require greater energy to occur, even surpassing the original photon absorbed. Harnessing these powerful intermediates will be applied to demanding reactions, such as the chemical recycling of consumer plastics.



2. **Replacing precious metal photocatalysts.** Many of the best performing catalysts are based on precious metals such as ruthenium and iridium, which are amongst the rarest elements on Earth. This project investigates replacing the bimolecular chemistry of these catalysts with the unique unimolecular photochemistry of earth abundant iron complexes capable of generating highly reactive organic radical species (e.g. carbon dioxide radical, $CO_2^{\bullet-}$).



3. **Chain propagation reactions and pulsed light.** Most photoredox reactions are inefficient and suffer from poor quantum yields (ϕ, moles of product per moles of incident light). This project aims to develop reactions capable of photochemical chain propagation, where ϕ >> 100% and the radical intermediates sustain the reaction without requiring additional photons. This approach also allows investigation of controlled light delivery (*e.g.* intensity, Watts, and pulse rate, kHz) which, despite being the intrinsic reagent in photocatalysis, is seldom considered beyond photon energy.



Dr Antoine Dujon

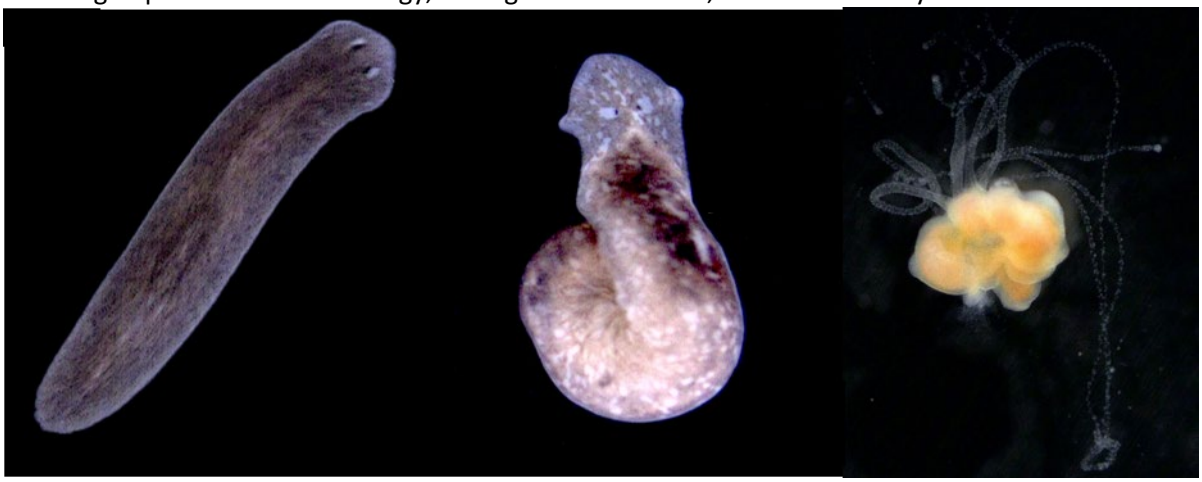
Campus: Waurn Ponds

Contact details: a.dujon@deakin.edu.au Ph: (03) 9244 5711

Co-supervisor: Prof Beata Ujvari

Research area description:

This research examines how human induced environmental changes cause cancer in wildlife and the resulting impacts on animal biology, ecological interactions, and overall ecosystem function.



Specific projects on offer:

1. Investigate how pollution exposure affects tumour development and progression in Australian freshwater Hydra and planaria, and the resulting consequences for life-history traits. This project will examine how exposure to human-produced chemicals influences tumour formation and progression in Hydra, a freshwater cnidarian related to jellyfish, and planaria, freshwater flatworms. By maintaining and monitoring tumour-prone populations of Hydra and planaria under controlled laboratory conditions, the project will assess how chemical exposure and tumour development affect key life-history traits, including asexual reproduction and survival.

2. Investigate how pollution affects the behaviour of freshwater Hydra and planaria. This project will repeatedly measure the behaviour of individual animals over time to determine how consistent their behavioural traits are and whether exposure to pollutants alters these patterns. The study will help reveal whether pollution affects not only average behaviour, but also individual behavioural consistency and variability. It will also investigate how fast they recover from exposure to pollution.

3. Investigate the effects of DNA damage on the metabolism of freshwater planaria. This project aims to quantify the energetic cost of DNA repair by measuring changes in oxygen consumption following experimentally induced DNA damage. By comparing metabolic rates before and after exposure, the project will assess whether activation of DNA repair mechanisms results in a measurable increase in energetic expenditure.

4. Model the effects of cancer on predator-prey interactions and ecosystem functioning. Using established modelling tools, this fully computer-based project (using the R statistical software) will investigate how individuals with tumours affect ecosystem functioning and species coexistence. The study aims to quantify the cancer prevalence threshold in wild populations that causes significant ecosystem damage.

5. Investigate whether Hydra and planaria are suitable model organisms for studying histone deacetylase (HDAC) inhibitors. HDAC inhibitors are molecules that affect how genes are regulated and can also be designed to fluoresce, allowing researchers to track where they accumulate in living animals. In this project, the student will expose freshwater Hydra and planaria to fluorescent HDAC inhibitors and examine how well the compounds are taken up, where they localise within the animals, and whether they produce any visible biological effects. The aim is to determine whether these simple invertebrate models could be useful for testing and visualising HDAC-targeting molecules in vivo.

6. A project along the lines of those described above. If you are interested in one of these ideas, or have an idea of your own, feel free to contact me and we can discuss what would be possible to develop into a project.

Prof Paul Francis

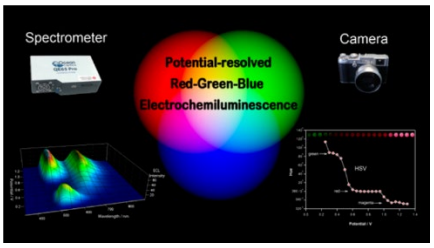
Campus: Waurn Ponds

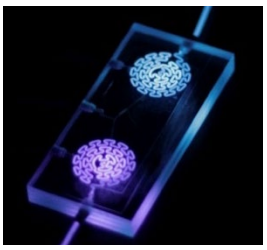
Contact details: paul.francis@deakin.edu.au Ph: (03) 5227 1294

Research area description:

The capacity to effectively diagnose disease in the human body and identify dangerous pollutants in our environment is fundamentally limited by the speed, selectivity, accuracy and sensitivity that we can measure molecules. We create new analytical approaches based on chemical reactions that produce light, for clinical diagnostic, environmental and forensic science applications.

Our projects involve spectroscopy, analytical chemistry, electrochemistry, inorganic chemistry and/or synthetic chemistry, and are generally of interest to students that enjoyed aspects of **SLE316 Analytical Chemistry and the Environment** and/or **SLE361 Inorganic Chemistry** in their undergraduate course.





Specific projects on offer:

1. **Exploiting 'Redox-Mediators' to Reach New Limits of Detection**. Electrochemiluminescence (ECL) is a widely use detection platform for clinical diagnostics, with over 2 billion assays performed each year. If you have had a blood test, it is likely that some of the analytes were measured using ECL detection systems. Our research group has created a new approach to enhance this mode of detection by orders of magnitude. This project aims to provide unprecedented sensitivity in ECL detection.

2. **Earth-Abundant Metal Complexes for More Sustainable Chemistry**. Complexes of precious metals such as ruthenium, iridium and platinum are widely used in technologies such as solar cells, light-emitting devices, photocatalysis, bioimaging, and chemical detection systems. This project explores luminescent complexes of widely available first-row transition metals such as iron, manganese and chromium, as cost-effective and sustainable alternatives for these important technologies.

3. **Multi-Colour Electrochemiluminescence for Rapid Detection in Portable Devices**. Molecules that emit different coloured light can be selectively switched-on or switched-off by applying different electrochemical potentials. This provides opportunities to simultaneously measure multiple different analytes for time-critical analytical applications, such as point-of-case and at-scene detection with portable analytical devices.

Prof Michelle Harvey

Campus: Waurn Ponds

Contact details: michelle.harvey@deakin.edu.au

Research area description:

Research in the areas of entomology, decomposition and forensic biology. This includes: general entomology projects both forensic and non-forensic, blowfly biology, attraction of insects, growth studies on rate of development for estimating postmortem interval, flystrike by maggots on sheep, bacterial relationships with insects, entomotoxicology, decomposition and factors affecting rate of

decay. Forensic projects can also focus on factors affecting field-based decomposition of remains, scavenging of remains, insect succession, effect of substances in/on remains on the development of insects and rate of decay, burial studies, vegetation and aquatic studies.

Specific projects on offer:

Projects are designed in discussion to best suit your interests, desired skill set for your future plans, and my own expertise. Ideas include the following, but I encourage you to approach me directly with any suggestions. Novelty is great – send me an email to chat!

Entomotoxicology: how does the presence of a specific substance on/in remains affect fly attraction, oviposition, successional order, and development/survival of offspring? Can be solely laboratory based or combine an additional field element. Generally co-supervised with Prof Xavier Conlan.

Entomology: anything and everything insects. Field and/or lab-based.

Blowfly competitive effects: How does the presence of one species affect another? Primary blowflies may be affected by the arrival of secondary species such as the hairy maggot blowfly. How do predatory secondary species affect developmental rates, fitness and survival of our early colonisers? Implications for PMI estimation, as well as agriculture.

Refrigeration and insects: How does exposure to cold temperatures (such as morgue refrigeration) affect insect biology, and the subsequent estimation of postmortem interval?

Decomposition: How do various factors affect rate and pattern of decomposition, insect succession, rate of biomass loss and estimation of postmortem interval? Think clothing, sun/shade, water, concealment, vegetation, scavenging, substance application (bleach, perfume, suncream, fly spray etc). Field based, with laboratory components.

Dr Brendan Holland

Campus: Waurn Ponds

Contact details: b.holland@deakin.edu.au Ph: +61 3 9244 5853

Research area description:

Dr Holland is a researcher in Analytical Chemistry and Green Chemistry. Dr Holland's research aligns with the Deakin BioFactory, working with industry partners to develop solutions for handling food waste, agricultural waste, and marine by-products. Our work aims to reduce waste going to landfill by develop new approaches to transform and process organic waste and transforming under-utilised marine biomass into bioproducts.

Specific projects on offer:

Primary supervisor: Prof Colin Barrow

Opportunities include converting organic waste to ingredients for aquafeed, cosmetics, and fertilizers. Projects will provide opportunities to gain hands-on experience in analytical chemistry, green chemistry and/or bioprocessing. Contact me for further details and opportunities to tailor a project to your own goals.

Prof Marcel Klaassen

Campus: Waurn Ponds

Contact details: marcel.klaassen@deakin.edu.au

Research area description:

I have a broad research interest including theoretical, experimental, and observational ecological and eco- physiological studies on numerous animal, plant, and microbe taxa. Currently, my focus is primarily on the population dynamics, migration, and disease ecology of birds, notably ducks and

long-distance migratory shorebirds. To get a good impression of my (latest) research and what type of research you could do with me during your Honours, please have a look at my publication record at https://scholar.google.com.au/citations?user=OrKqLoAAAAAJ&hl=en. When you are working with me you are guaranteed of (1) regular field work catching, banding, sampling shorebirds and ducks, (2) the possibility to acquire some great analytical skills, and (3) good data sets providing the potential to write a stellar honours' thesis and possibly even a publication. We will jointly decide on your Honours project based on your interests and ambitions, my expertise, and the possibilities that my study systems offer.

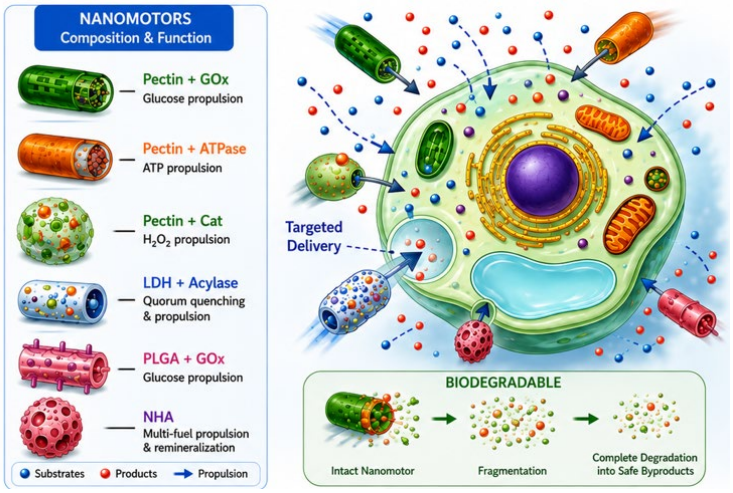
Dr Motilal Mathesh

Campus: Waurn Ponds

Contact details: **m.matheshshanmugam@deakin.edu.au** Ph: (03) 5227 2014

Research area description:

Fabricate biodegradable nanomotors capable of autonomous motion using naturally occurring fuels and investigate their potential for targeted drug delivery, biosensing, plant health, and sustainable agricultural applications.



Specific projects on offer:

- Fabricating and understanding 2D Nanomotors
- Active Nanomotor-Based Drug Delivery for Cancer Treatment
- Biodegradable Nanomotors for Agricultural Delivery
- Evaluating Biodegradable Nanomotors Using Zebrafish Models

Dr Mikayla Milanovic

Campus: Waurn Ponds

Contact details: mikayla.milanovic@deakin.edu.au Ph: (03) 5227 3774

Research area description:

My research interests lie in forensic chemistry and the manufacture and trafficking of illicit drugs. Under my supervision, honours students will develop synthetic, organic chemistry skills, and become proficient in analytical techniques—with a particular focus on forensically relevant methods—for the characterisation of new chemical species. Through my projects, students will have the opportunity to liaise with Victoria Police Forensic Services Department. My projects will be of interest to students that enjoyed **SLE313 Forensic Analysis and Interpretation** and/or **SLE318 Synthetic and Medicinal Chemistry**

in their undergraduate course.

Co-supervisor: Assoc Prof Fred Pfeffer fred.pfeffer@deakin.edu.au

Assoc Prof Fred Pfeffer

Campus: Waurn Ponds

Contact details: fred.pfeffer@deakin.edu.au Ph: (03) 5227 1439

Research area description:

My research interests range include supramolecular, organic, forensic and medicinal chemistry with a key focus on understanding molecular level interactions and interconversions. This fundamental knowledge is relevant to a number of fields including (i) the development of new materials—including porous materials and catalysts (ii) recognition and sensing (iii) imaging of biomolecular systems and (iv) medicinal chemistry.

One key theme in my research is the use of large conformationally **preorganised molecular frameworks** to assemble larger architectures (including covalent frameworks, covalent cages, coordination polymers and metal organic frameworks) that can selectively interact with other species. [eg. *Chem. Eur J.*, **2016**, p 10791, *Chem. Sci.*, **2026**, p 6939 and *Chem. Commun.* **2026**, p 10211].

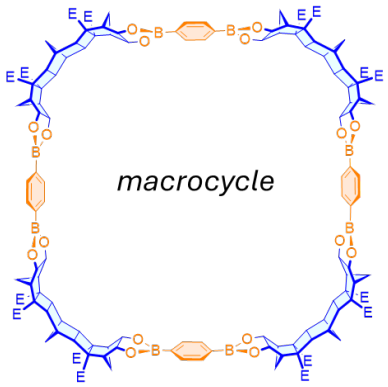
A second theme is the development of high yielding methodology to access a broad range of **naphthalimide based fluorophores** [eg. *Chem. Commun.*, **2020**, p 6866, *Dyes Pigments*, **2022**, p 131921, *Dyes Pigments*, **2023**, p 111382]. These fluorescent molecules have been customised for cellular imaging and has received ARC funding.

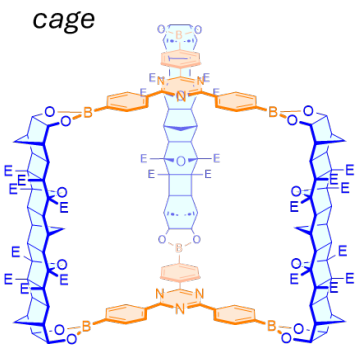
Students gain valuable "hands on" organic chemistry skills, and also become proficient in the characterisation of new chemical entities (in particular the use of NMR spectroscopy, mass spectrometry and even X-ray crystallography). For naphthalimide based research the photophysical properties are also evaluated. All projects involve collaboration, including at Deakin (eg Tim Connell, Mikayla Milanovic) and with other research groups in Australia and/or overseas.

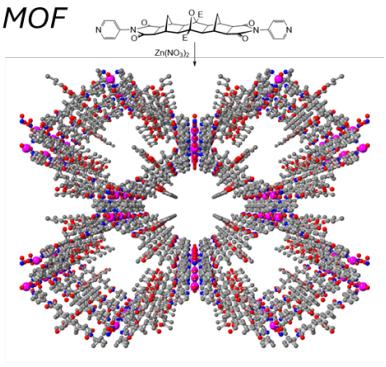
Specific projects on offer:

1. **Constructing large molecular architectures (with ANU, UoM, UNSW and Australian Synchrotron)**

   We have established an efficient route for the synthesis of large architectures using boronic esters formed from norbornane bis-diols. These structures are unique to our research group and are remarkably stable. Projects are available to investigate applications of such materials as catalysts, gas storage materials and hosts for other species (including forensically relevant materials).







   Similarly, coordination polymers and metal organic frameworks (MOFs) have been developed based on carefully functionalised fused norbornane frameworks. These extended porous structures also have applications as gas storage materials as well as catalysis. Projects are

available to construct new ligands to construct novel architectures and investigate their properties.

Use of the Australian Synchrotron may be required for crystallographic characterisation.

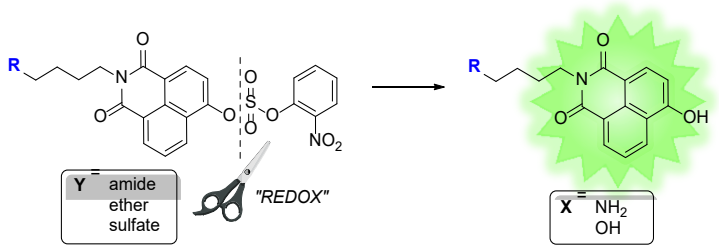
2. **Forensic Organic Chemistry (with Victoria Police Forensic Services Department and DSTG)**

Projects will be available involving the masking synthetic opiods (fentanyl/nitazine).

A recent trend in the illicit trafficking of controlled substances involves chemical masking. The masked compounds are not easily identified by common detection protocols. These projects involve constructing masked precursors and/or model compounds (we use a fentanyl mimic to explore the chemistry) and understanding how readily masking can be reversed and whether the masked compounds would evade common detection systems. All results are shared with relevant agencies.

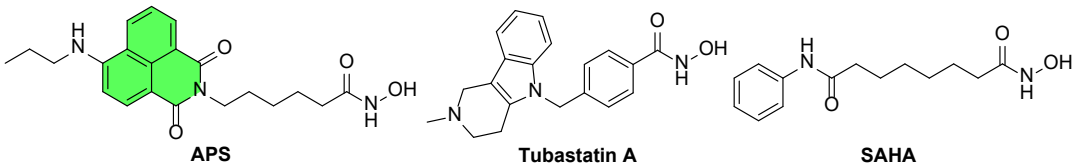
3. **Functionalised naphthalimides for fluorescent imaging. (With Adelaide University)**

In this project custom functionalisation of "switch-on" naphthalimide fluorophores will be pursued. A number of functional groups – capable of responding to biochemical "triggers" that indicate a disease state (eg a changing REDOX environment is a characteristic of some cancer types) will be incorporated and the of the probe evaluated in cells by collaborators at Adelaide University.



4. **A new model for evaluating HDAC activity. (With Dr Antoine Dujon)**

The inhibition of Histone Deacetylase (HDAC) enzymes is now an established approach for the treatment of cancer. The identification of new HDACi typically requires extensive enzymatic/cell-based screening as well as validation in mouse models. In this project the use of a Hydra species as an alternate to mouse models will be investigated for preliminary screening (of known compounds and a number of highly fluorescent scriptaid analogues eg **APS**) to identify active molecules.



Dr Aaron Schultz

Campus: Waurn Ponds

Contact details: aaron.schultz@deakin.edu.au

Research area description:

The Environmental and Human Toxicology lab uses a 'One Health' approach to understand the toxicity risks of pollutants (microplastics, nanomaterials, agrichemicals, etc) to environmental and human health. This includes research that: (1) assesses pollutant levels in freshwater and marine environments, (2) studies toxicity risks and mechanisms of toxicity using zebrafish embryos, planaria, and other aquatic species as models and (3) assesses toxicity risks and mechanisms of toxicity using human cell lines as models.

Specific projects on offer:

Project 1 – Environmental toxicology: Investigating the presence and toxicity risk of contaminants of emerging concern (micro/nano-plastics, nanomaterials and/or agrichemicals) to freshwater and marine ecosystems. Please see two articles published by our group in this area: https://doi.org/10.1016/j.impact.2022.100387 or https://doi.org/10.1039/D1EN00659B

Associate Supervisors: Prof Beata Ujvari (beata.ujvari@deakin.edu.au), A/Prof Damien Callahan (damien.callahan@deakin.edu.au), and/or Dr Antoine Dujon (a.dujon@deakin.edu.au).

Project 2: The role of the plastisphere in microplastic modification and toxicity.

Associate Supervisors: Dr Andrew Oxley (andrew.oxley@deakin.edu.au), A/Prof. Luis Afonso (luis.afonso@deakin.edu.au) and A/Prof Alessandra Sutti (alessandra.sutti@deakin.edu.au).

Project 3: Use of BioNanoGels as carriers for antimicrobial therapeutics. This project will investigate optimal drug loading and release from the BioNanoGels under various simulated peri-wound chronic infection conditions.

Associate Supervisors: **A/Prof Richard Williams (richard.williams@deakin.edu.au), and Dr Ayushi Priyam (a.priyam@deakin.edu.au).**

Prof Cenk Suphioglu

Campus: Waurn Ponds

Contact details: **cenk.suphioglu@deakin.edu.au** Ph: (03) 5227 2886

Research area description:

I head the NeuroAllergy Research Laboratory (NARL) and Deakin AirWATCH pollen counting and forecasting facilities, located on both Burwood and Waurn Ponds campuses. My research group is comprised of placement, Honours and PhD students, as well as postdoctoral fellows, with a network of collaborative research scientists within Deakin, as well as interstate and overseas. My research group predominantly work on translational and fundamental research in the areas of Type I Hypersensitivity diseases (i.e. fast allergic reactions such as pollen and food allergies, including thunderstorm asthma), as well as neurodegenerative diseases (i.e. Alzheimer's and Parkinsons diseases). The list of specific projects below is not exhaustive and provides sample of projects that can be tailored with the successful Honours candidates.

Specific projects available:

1. **Biological brain implants for the treatment of neurological diseases.** Together with my postdoctoral fellow Dr Ruwini Cooray and Neurogen Global, this project examines the construction and testing of stem-cell-derived microtissue brain implants for the future treatment of neurological diseases, such as Alzheimer's disease.
2. **From laboratory to bedside: investigating novel inhibitors of the allergic reaction.** This project characterizes our novel inhibitor peptide therapeutic candidates via in vitro human cell lines and a range of immunoassays to assess their potential as allergy therapeutics.
3. **Importance of food allergens in the trigger of neuroinflammation.** This project aims to investigate the possible link between allergens and their potential cause of neuroinflammation (the "allergy-neuro" link), using our well-established human neuronal cell lines.
4. **Possible link between pollen allergens and lung cancer.** This project investigates how severe pollen allergy in the lower airways may trigger lung cancer, utilizing human lung cell lines in vitro, to identify novel biomarkers.
5. **From laboratory to bedside: investigating novel inhibitors of BACE1 for Alzheimer's disease treatment.** This project builds on our previous work on BACE1 peptide inhibitors and will use a range of biochemical assays for their in vitro testing and molecular refinement.
6. **Nothing to be sneezed at: dissecting the environmental and biological factors of thunderstorm asthma.** This project examines the importance of grass pollen and fungal spore allergens, together with hallmark environmental factors, in the trigger of thunderstorm asthma at the cellular level, utilizing human cell culture models and a range of biochemical analyses.
7. **Itchy eyes: importance of airborne pollen and fungal spores in ocular allergy.** Together with colleagues from Deakin Optometry and UNSW, this project evaluates the importance of pollen and fungal spore allergens on the ocular surface, to identify novel diagnostic markers for ocular allergy.

Dr Bianca Szkuta

Campus: Waurn Ponds

Contact details: b.szkuta@deakin.edu.au Ph: (03) 5227 3132

Research area description:

DNA analysis is recognised in law courts as being underpinned by robust science. This means that rather than asking "whose DNA is it?" the judiciary in criminal cases now focus on "how did the DNA get there?". To answer this, the variables that affect the rate of human DNA transfer, how long DNA remains in the environment, how much DNA exists in the environment at any given time, and how biological material relevant to a crime is best recovered, analysed, interpreted and reported, need to be explored. To that end, our group performs research that will equip forensic science practitioners with the data they require to provide the courts and investigators with the most accurate interpretation of evidence particular to a given case. This research spans multiple fields including human genetics, biochemistry, biomedicine, surface chemistry and statistics. To understand the reseach that we do, further reading has been provided below. Please reach out to discuss ideas for projects if this interests you.

R.A.H. van Oorschot, et al. (2019), DNA transfer in forensic science: A review, Forensic Science International: Genetics 38, 140-166.

R.A.H. van Oorschot, et al. (2021), DNA transfer in forensic science: recent progress towards meeting challenges, Genes 12(11), 1766.

Prof Beata Ujvari

Campus: Waurn Ponds

Contact details: beata.ujvari@deakin.edu.au Ph: via Teams

Research area description:

Our research focuses on evolutionary ecology, host–microbe interactions, and eco-immunology, with the aim to understand how the interaction between organisms and their environment effect on organismal fitness.

Specific projects on offer

1. **Characterization of the Oncogenic Potential of Two Transmissible Cancers in the Tasmanian Devil (DFT1 and DFT2)**

   Supervisors: Prof Beata Ujvari and PhD student Florence Pirard

   The project aims to investigate and compare the oncogenic properties of two independently emerged transmissible cancers, DFT1 and DFT2, in the Tasmanian devil (*Sarcophilus harrisii*). While both cancers are clonally transmissible, they display distinct patterns of dissemination, suggesting potential differences in their tumorigenic behaviours and biological mechanisms.

   The aims of this project are:

- To characterize cancer hallmarks such as cell proliferation, migration, and possibly invasion, through in vitro assays;
- To analyse gene expression profiles related to key oncogenic signalling pathways using qPCR;
- To perform histological and immunohistochemical analyses on tumour samples to assess tissue architecture and protein expression relevant to tumour progression.

   Through these approaches, the project aims to shed light on the biological basis underlying the different dissemination patterns of DFT1 and DFT2, potentially improving our understanding of cancer evolution and transmissibility in a natural host.

2. **Father's Curse or Gift? The Effect of Mitochondrial Recombination on Mussel Fitness**

   Supervisors: Prof Beata Ujvari and Dr Georgina Bramwell

   In most species, including humans, mitochondrial DNA (mtDNA) is inherited maternally. However, in >100 bivalve species (including mussels), an alternative mode of mtDNA transmission occurs, called doubly uniparental inheritance (DUI). Under DUI, two distinct sex-associated mitochondrial lineages (F-type in eggs and M-type in sperm) are transmitted during reproduction. While the F-type is retained in all offspring, the M-type is (1) selectively eliminated in female descendants and (2) dominant in male gonad tissue and spermatozoa. When both F and M mtDNAs are present in sperm, they can recombine to form a new 'masculinized' sequence, which contains an M-type control region (that regulates mtDNA replication) and F-type protein coding sequences. Consequently, male mussels produce sperm that either contain the evolutionarily older "pure" male mtDNA (M-type) or a recombined mtDNA (M^f-type), which exhibit different physiological and biochemical properties and possibly divergent energy balances and demands. The aims of this project are to determine:

   Q1: Is mitochondrial DNA (mtDNA) recombination present in all members of the Australian *Mytilus* spp. complex?

   Q2: What are the characteristics and impacts of mitotypes on mitochondrial function and sperm behaviour under different environmental conditions?

   Q3: How do mitotypes affect sperm competition, gamete-level mate choice and fitness?

3. **>Do bivalve transmissible cancers exist in Australia?**

   Supervisors: Prof Beata Ujvari and Dr Georgina Bramwell

   Bivalve Transmissible Neoplasia (BTN) is an emerging infectious disease that can decimate wild and farmed bivalve populations. Although it has so far only been reported in species on the Northern hemisphere and the Americas, due to extensive shipping activities across oceans and the mussels' propensity for hull fouling, it is highly likely that BTN have already arrived or will arrive to Oceania in

the coming years. We are in the process to generate evidence for the presence of BTN in Australian bivalve populations. By using haemocytology, histology and molecular analyses, we recently provided supporting evidence of BTN's presence in Victorian waters. While our previous study strongly suggests the presence of BTN in Australian waters, further investigations that use additional diagnostics techniques and markers are needed to confirm whether the new cancer lineages are a threat to Australian blue mussels. We aim to generate supportive molecular evidence for the presence of BTN in Australian waters and investigate how BTN spreads between mussels and its impact on mussel' fitness.

Prof Wenrong Yang

Campus: Waurn Ponds

Contact details: wenrong.yang@deakin.edu.au Ph: (03) 5227 2932

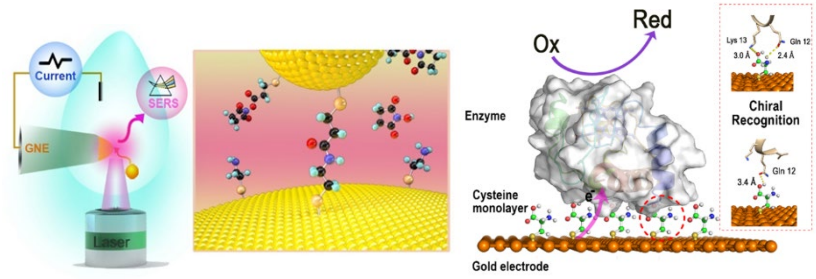
Research area description:

Our research focuses on nanobiotechnology, surface and interface engineering, electrochemistry, and biosensing. We engineer surfaces at the molecular level using self-assembled monolayers, biomolecules, and functional nanomaterials to develop innovative technologies for biosensing, bioelectronics, diagnostics, and biomedical applications. The research group typically comprises approximately 10 researchers, including postdoctoral researchers, PhD and MSc students, Honours students, and visiting researchers. We foster a collaborative, inclusive, and supportive research environment in which team members work on complementary and interconnected projects. Junior researchers receive close guidance and mentoring from postdoctoral researchers, senior PhD students, and Dr. Wenrong Yang, while also being encouraged to develop independence and their own research expertise.

Our multidisciplinary research involves a broad range of techniques spanning surface chemistry, nanomaterial synthesis and characterisation, electrochemistry, biosensing, spectroscopy, microscopy, and biomolecular analysis. Researchers therefore develop a broad interdisciplinary skill set while typically establishing deeper expertise in one or two specialised techniques relevant to their individual projects.

Selected Recent Publications

1) Liu J. *et.al. Acc. Chem. Res*. 2021, 53 (3), 644-653
2) Zhang Y. *et. al. ACS Nano*., 2016, 10, 5096–5103.
3) Mathesh M. *et. al. ACS Catal*. 2016, 6, 7, 4760–4768
4) Liu Z. *et. al. ACS Nano* 2019, 13, 2, 1394–1402
5) Kong N. *et. al . J. Am. Chem. Soc.* 2021, 143, 26, 9781–9790
6) Ramakrishna, TRB *et. al. Langmuir* 2020, 36 (45), 13575-13582
7) Wang J. *et.al. J. Electroanal Chem.*, 2021, 895, 115419
8) Thakkar S. *et.al.*, *Water Research,* 2021, 188, 116538
9) Zhang S., Kong N. *et.al. Chemical Society Reviews,* 2024, 53 (8), 3656-3686
10) Fernando D. *et.al. Langmuir* 2025, 41 (37), 25360-25369
11) Oskoei V. et.al. *Chemistry of Materials* 2025, *37* (18), 7206-7213



Specific projects on offer:

1. Electrochemical detection of small molecules.
2. Nanoparticle based biosensors for ultrasensitive detection.
3. The immobilisation of biocatalyst on surfaces (with Dr. Motilal Mathesh and Professor Colin Barrow, Deakin University)
4. Nanostructured surfaces for understanding fundamental catalytic processes (with Professor Ian Chen, Deakin University).
5. Electrochemical engineering of interfacial chemical reactions at the single-molecule level (with Dr. Fred Pfeffer and Dr. Xavier Conlan, Deakin University and Dr Jin He, Florida International University, USA).

Warrnambool Projects

Dr Patricia Corbett

Campus: Warrnambool

Contact details: p.corbett@deakin.edu.au

Research area description: Contamination of the marine environment including metals, persistent organic pollutants and microplastics are a global issue. The Deakin Marine Ecotoxicology Research group explores key ecosystem components response to anthropogenic environmental stressors. Research includes investigating evidence of bioaccumulation, impacts and mechanisms of effect as well as the development of animal health indices.

Prof Graeme Hays

Campus: Warrnambool

Contact details: **g.hays@deakin.edu.au** Ph: (03) 5563 3311

Research area description: We lead sea turtle satellite tracking projects around the world, using tags to explore migration routes, key areas for conservation, diving performance and sea turtle navigation and orientation. We collaborate with researchers tracking others marine megafauna including marine mammals, birds and fish. As recognition of the importance of this work, the Australian Academy of Science selected our work published in the journal *Science* (https://doi.org/10.1126/science.adl0239), published as part of the international Megamove programme that I coordinate with 8 others (Megamove.org), as the best research published in Australia in 2025 *"… to accelerate scientific solutions for planetary health and drive action on climate change and ecological crises …*". As Australia's best research, this work has been put forward by the Australian Academy of Science as Australia's entry in the 2026 Frontiers Planet Prize (US$1 million prize). Our work has helped underpin what has been described as the greatest conservation success humanity has ever achieved: the general global recovery of sea turtle populations. Honours projects will develop this world-leading conservation research further, using ongoing state-of-the-art tag deployments to define key areas for conservation for sea turtles and other marine megafauna. Excellent computational and numerical skills are needed.

Prof Daniel Ierodiaconou

Campus: Warrnambool

Contact details: Dr Daniel Ierodiaconou **daniel.ierodiaconou@deakin.edu.au**

Specific projects available

1. **Seabed geomorphology classification of the Bass Strait coast**

   Supervisors: Professor Dr Daniel Ierodiaconou (Deakin University), Dr Rachel Nanson (Geoscience Australia), Dr Marta Ribó (Auckland University of Technology), Prof. David Kennedy (University of Melbourne)

   Maps of seabed geomorphology provide fundamental information to support the

sustainable management and planning of marine and coastal areas, and the use of standardised geomorphic terminology ensures the consistency between mapping regions and practitioners. The International Seabed Geomorphology Mapping Working Group (ISGM-WG) recently released a seabed geomorphology classification system designed for application to bathymetry and subsurface seabed datasets. We have a potential project to apply this classification system to characterise and classify the variety of fine-scale features that are observed in several high-resolution bathymetry datasets collected by the Deakin Marine Mapping group from the Bass Strait coast.

This project will apply a suite of semi-automated geographic information system (GIS) tools to map and characterise the geometric attributes of the seabed, using the different multibeam datasets and the ISGM-WG approach. The aim of this research is to characterize the geomorphology of the seabed and to better understand the distribution and diversity of key seabed habitats in the Bass Strait coast.

We invite students with a keen interest in GIS mapping, seabed geomorphology and habitats, to get in touch with our team to discuss this research opportunity.

2. **Quantifying the anchoring footprint on the Victorian coast**

   Supervisors: Professor Dr Daniel Ierodiaconou (Deakin University), Marta Ribó (Auckland University of Technology), Dr Sally Watson (NIWA)

   Anchor use in port regions has significantly changed the structure of the seafloor, with downstream impacts on benthic habitats and ecosystem functions. Sediment mixing and overturn by anchoring is comparable to benthic trawling, a well-known driver of seafloor habitat destruction. Recent research has shown that high-tonnage ship anchors excavate the seabed by up to 80 cm and the associated impacts are preserved for at least 4 years. This research suggests anchoring could be more detrimental than trawling, occurring more frequently, with deeper seabed penetration and concentrated in shallow seas and coastal embayments.

   This project will use high-resolution bathymetry data to identify the morphological signatures and characterise the anchoring footprint within the anchorage regions throughout the Victorian coast. Determining the physical footprint will be coupled with the ship tracking data (i.e., AIS Automatic Identification System data) where possible, to quantify the area and volume of sediment disturbance by anchoring practices, and link physical footprints on the seafloor to anchoring by specific vessels. This project will help to determine the extent of the physical impact of anchoring on the seafloor throughout the Victorian coast.

3. **A comparison of eDNA and BRUV derived measures of spatial fish diversity**

   This project aims to compare environmental DNA (eDNA) and Baited Remote Underwater Video (BRUV) methods for assessing spatial patterns of fish diversity in Bass Strait, with the goal of informing offshore decommissioning decisions. Co-located eDNA sampling and BRUV deployments across natural and infrastructure-associated habitats to evaluate species detection capabilities and community composition. eDNA samples will be analysed using metabarcoding, while BRUV footage will be annotated for visually identifiable taxa. Species distribution models will be developed using random forest algorithms to compare the spatial resolution and predictive performance of each method. By integrating these approaches, the project will generate a comprehensive assessment of fish assemblages across the region and provide an evidence-based framework for evaluating the ecological value of offshore structures, supporting more informed and ecologically responsible decommissioning in temperate Australian waters.

Professor Dr Daniel Ierodiaconou (Deakin University), Dr Ronen Galaiduk (AIMS), Dr Sasha Whitmarsh (Deakin University), Dr Ali Jalali (Deakin University), Dr Dianne Maclean (AIMS)

4. **A comparison of fish communities surveyed by ROV, BRUVs and eDNA in south-east Australia**
This project will compare fish communities surveyed using Remotely Operated Vehicles (ROVs), Baited Remote Underwater Video (BRUVs), and environmental DNA (eDNA) to evaluate the strengths and complementarity of each method for biodiversity assessment in south-east Australia. Surveys will be conducted across a variety of temperate reef and soft sediment habitats, including sites associated with offshore infrastructure, to assess differences in species detection, community composition, and habitat associations. ROVs will provide detailed visual data on species presence and behaviour across transects, BRUVs will capture mobile and bait-attracted taxa, and eDNA will detect a broad range of species through metabarcoding of water samples. The project will analyse how each method reflects fish community structure relative to habitat features such as depth, substrate type, and structural complexity. Findings will inform best-practice monitoring strategies for marine biodiversity and support evidence-based decision-making for the management and decommissioning of offshore assets in temperate Australian waters. **Professor Dr Daniel Ierodiaconou (Deakin University), Dr Sasha Whitmarsh (Deakin University), Dr Dianne Maclean (AIMS)**

Dr Jacquomo (Jac) Monk

Campus: Warrnambool
Contact details: j.monk@deakin.edu.au Ph: (03) 5563 3124

Research area description:

The Shelf Ecology Research Group is focused on understanding temperate mesophotic ecosystems, the largely unexplored seafloor environments that connect shallow coastal reefs with the deep ocean. We combine marine ecology, conservation informatics and decision science with emerging technologies, including underwater imaging, artificial intelligence and statistical modelling, to understand how these ecosystems function, respond to environmental change and can be effectively conserved. Through our leadership of Squidle+, we work with government agencies and research partners to transform large-scale marine observations into accessible knowledge that supports evidence-based conservation and management. Students are encouraged to develop projects that align with their interests, with opportunities to contribute to innovative field-based and computational research while engaging with a broader network of researchers, agencies and conservation organisations.

Specific projects available:

Project 1: Developing structural complexity indicators for long-term monitoring of benthic ecosystems

This project will analyse long-term monitoring datasets to quantify changes in benthic communities and develop indicators of ecosystem condition and recovery. Structural complexity is an important driver of reef biodiversity but is often overlooked by traditional cover-based metrics. The student will refine an existing Structural Complexity Index, test alternative growth-form weightings using independent Marine Park datasets, and evaluate whether structural complexity metrics improve detection of ecological change through time. The project is suited to students interested in mesophotic reef ecology, biodiversity indicators, quantitative analysis and ecological monitoring.

Project 2: Assessing the Robustness of Habitat Metrics to Automated Object Delineation Uncertainty in Marine Imagery

This project will investigate how uncertainty in automated delineation of benthic organisms influences estimates of habitat structure from underwater imagery. The student will assess how organism characteristics, including morphology, size and visual complexity, influence segmentation performance and the reliability of derived landscape ecology metrics such as patch size, edge

density, fragmentation and diversity. Outcomes will identify which metrics are robust to delineation uncertainty and improve confidence in automated approaches for large-scale marine imagery analysis. The project is suited to students interested in marine ecology, artificial intelligence, image analysis, spatial statistics and R programming.

Project 3: Optimising Marine Monitoring Through Information Theory

This project will investigate how information theory can improve the design and interpretation of marine ecological monitoring programs. The student will use existing underwater imagery and environmental datasets to quantify ecological information, uncertainty and complexity across habitats and spatial scales. The project will evaluate whether information-based approaches can identify optimal sampling strategies, improve biodiversity assessments and support more efficient conservation decision-making. The project is suited to students interested in marine conservation, ecological theory, spatial analysis and quantitative methods.

Dr Mary Young

Campus: Warrnambool

Contact details: mary.young@deakin.edu.au Ph: (03) 5563 3097

Research area description:

My research focuses on applied seascape ecology, using spatial modelling and seabed mapping to understand and manage marine ecosystems under environmental change, supporting sustainable ocean planning and conservation.

Specific project on offer:

1. Mapping urchin barrens using multi-frequency sonar and underwater imagery
2. Climate change impacts on marine species and communities
3. Marine protected area performance in a changing climate focusing on the Victorian MPA network
4. Impact of sponge morphology as habitat for fish communities
5. Open to discussions of other projects related to understanding broad-scale patterns in marine species, communities, or ecosystems.

Queenscliff Projects

Prof Timothy Clark

Campus: Queenscliff

Contact details: t.clark@deakin.edu.au Ph: (03) 9244 6035

Research area description:

Timothy Clark's lab uses eco-physiological approaches to understand the impacts of climate change on aquatic animals. Current projects use experimental manipulations of temperature and oxygen to understand how future environments may impact the growth and metabolism of fish. Specific areas of interest are:

1. What roles do oxygen uptake (at the gills) and oxygen use (at the body's tissues) play in regulating the observed "shrinking" of fishes with climate warming?
2. How do inter-individual differences in behaviour and metabolism determine which fish grow faster than other individuals of the same species?

Prof David Francis

Campus: Queenscliff

Contact details: d.francis@deakin.edu.au
Supervisors: Professor David Francis, Dr Thomas Mock, Dr Thiru Somasundaram, Dr Matthew Jago
Discipline areas: Aquaculture, Animal Nutrition, Marine Science, Biotechnology, Food Security, Circular Economy

Research Group: Nutrition and Seafood Laboratory
Aquaculture is one of the fastest growing food production sectors globally and will play a critical role in meeting the nutritional demands of our growing population. However, improving animal health and productivity while reducing reliance on finite resources will require innovative solutions. Nutrition is central to this challenge, providing one of the greatest opportunities to transform the efficiency, sustainability and quality of seafood production.
The Nutrition and Seafood Laboratory at Deakin University investigates how innovative feeds and nutritional strategies can improve aquaculture outcomes. Working closely with industry partners, including aquaculture producers, feed manufacturers and biotechnology companies, our research explores novel feed ingredients, functional additives, energy metabolism, animal health, seafood quality and circular bioeconomy solutions. Honours students joining the laboratory will become part of a collaborative research team contributing to nationally and internationally funded projects addressing real-world challenges facing the aquaculture industry. Projects are tailored to student interests and may investigate sustainable feed ingredients, nutritional physiology, feed formulation, product quality, or the biological mechanisms underpinning improved animal performance.
Students will gain hands-on experience using Deakin's state-of-the-art Aquaculture and Feed Innovation (AquaFI) facility, where experimental diets are designed, manufactured and evaluated using commercial-relevant technologies. Depending on the project, student may develop skills in aquaculture husbandry, controlled feeding trials involving finfish or shellfish, nutritional analysis, biochemical techniques, chromatography, mass spectrometry, molecular biology and data analysis. Students will also develop valuable skills in experimental design, scientific communication, research management and interpretation of complex biological datasets while working alongside experienced researchers, postgraduate students and industry collaborators.
This project is ideally suited to students with interests in aquaculture, marine science, animal biology, nutrition, biotechnology, food science or environmental science who are seeking research experience with direct industry relevance. Graduates will develop a highly transferable skillset valued across research organisations, biotechnology companies, food production industries and environmental sectors. High performing Honours students may have opportunities to continue into PhD research within the Nutrition and Seafood Laboratory.

Assoc Prof Prue Francis

Campus: Queenscliff

Contact details: prue.francis@deakin.edu.au Ph:(03) 5563 3026
Research area description:
Improving ocean literacy in Australia: Australia's coastal and marine habitats are threatened by climate change and rapid and unsustainable development. One step to ensure we are sustaining healthy marine systems is to raise awareness of the ocean and create an ocean literate society. Our research group is exploring ways to improve ocean literacy in Australia by trialing innovative solutions. We work with many marine organizations in this field and Honours projects can be tailored to work with our current collaborators. This project will be based at Queenscliff Marine Science Centre and can be focused on marine education, marine social science and science communication.

Dr Ty Matthews

Campus: Queenscliff

Contact details: ty.matthews@deakin.edu.au Ph:(03) 5563 3516

Research area description:

I am an aquatic ecologist based at Queenscliff who works in marine, estuarine and freshwater ecosystems. I am particularly interested in how varying flow regimes and surface water availability influences aquatic plant and animal assemblages. Part of my work involves assessing ecological restoration efforts and examining the potential biodiversity value of human-made water infrastructure. Other broad project areas of interest include the ecology of estuarine fish and invertebrates and also sandy beach ecology.

I collaborate with a range of researchers from both Queenscliff, and the Waurn Ponds Campus so please feel free to discuss project ideas with me. I also work closely with a long-term collaborator (Dion Iervasi, Austral Research and Consulting) on a range of joint freshwater and estuarine projects that are often linked with industry (e.g. VFA, CMAs and water authorities). This provides additional opportunities and networking for Honours students that are interested in working with me.

Students working with me who have chosen a marine project will be predominantly based at Queenscliff as part of the Deakin Marine Research and Innovation Centre (DMRIC). Those working on freshwater projects are likely to be based on the Waurn Ponds campus.

Dr Kathy Overton

Campus: Queenscliff

Contact details: k.overton@deakin.edu.au

Research area description: I conduct applied ecological research to recover critically endangered native shellfish reef throughout Victoria. My research explores how we can improve restoration outcomes and success, especially using aquaculture.

Specific projects on offer:

1. Understanding effects of seawater temperature and local adaptation on native flat oyster larval development (July start date only)
2. Testing the thermal and physiological performance of native flat oysters (*Ostrea angasi*) (February or July start date)
3. Quantifying epibenthic biodiversity of remnant and restored native flat oyster reefs (February or July start date)
4. Happy to discuss other projects related to using aquaculture-produced stock for marine restoration, or research on shellfish.

Prof Craig Sherman

Campus: Queenscliff

Contact details: craig.sherman@deakin.edu.au

Specific projects on offer:

1. **Developing the tools for seagrass restoration.**
   Start date: February or July
   As key ecosystem engineers, seagrasses provide a range of important ecosystem services including nutrient cycling, carbon sequestration, coastal protection, and providing a structurally complex habitat to a variety of vertebrate and invertebrate species. Given these important roles, there has

been increasing concern about the rapid decline seagrass populations are now experiencing globally. Several potential projects are available that offers students the opportunity to develop skills and training in undertaking ecological restoration research. Depending on specific project aims, students may undertake field-based trials, mesocosm experiments, habitat mapping, GIS analysis and genetics.

2. **Determining the chemical basis of detection of an invasive predator by scallops.**
   Associate or External Supervisors and their contact details: Xavier Conlan (Deakin University)
   Start date: February or July
   The introduction of non-native species provides an excellent opportunity to study rapid evolutionary change. This is because invasive species have to adapt to a range of novel conditions, while native species often have to evolve novel responses to invasive predators. The Northern Pacific sea star is ranked as one of the top ten most potentially damaging invasive species. It is a ferocious marine predator of marine bivalves and other invertebrates and can have a devastating effect on the biodiversity of native marine communities. Recent work has demonstrated that native scallops in populations exposed to the Northern Pacific sea star show predator avoidance behaviours, while populations with no exposure to this invasive predator show no anti-predator behaviours. This project will explore the chemical basis of this anti-predator behavior and identify the key chemical species involved in predator detection. Students will undertake fieldwork to collect samples and laboratory analysis including a multidimensional approach to detection chemistry with the aid of Mass spectrometry, 2D-HPLC and chemiluminescence detection.

Dr Samantha Sherman

Campus: Queenscliff

Contact details: ssherman@deakin.edu.au

Research area description:
Dr. Sherman's work focuses on shark and ray movement, ecology, and management in fisheries and international policy. Her lab also passionately works on Australian fisheries management and improving methods for sampling and analysing marine research.

CSIRO Australian Centre for Disease Preparedness Project

Dr Matthew McKenzie

Location: CSIRO Australian Centre for Disease Preparedness, Geelong, Victoria 3220

Contact details: m.mckenzie@deakin.edu.au Ph: (03) 5227 3015
Supervisors: Dr Sarah Edwards and Prof Glenn Marsh, CSIRO Australian Centre for Disease Preparedness, Geelong

Specific projects on offer:

Serological landscape of Australian flying foxes to Pararubulaviruses
This research project will characterise the serological landscape of Australian flying foxes (Pteropus spp) with respect to pararubulaviruses using Phage Immuno-Precipitation Sequencing (PhIPseq). Flying foxes are known reservoirs for a variety of paramyxoviruses, including henipaviruses and pararubulaviruses, some of which pose zoonotic risks. The study will utilise a pararubulavirus-focused PhIPseq library to screen sera collected from flying fox populations across diverse geographic regions and time points in Australia. This high-throughput serological platform will detect antibodies to a comprehensive panel of viral peptides, offering insights into historical exposure and immune recognition patterns.
Results from this PhIPseq analysis can then be validated using complementary traditional serological assays such as ELISA, Luminex microsphere-based tests and live-virus neutralisation assays. This will allow the student to learn traditional virological and serological skills, such as culturing of viruses in mammalian cell culture, titration of viruses, micro-neutralisation assays, ELISA and Luminex.

IFM Institute for Frontier Materials

Assoc Prof Angela Ziebell

Contact details: a.ziebell@deakin.edu.au Ph: (03) 9244 6340
Supervisors: Assoc Prof Nolene Byrne and Dr Faezeh Makhlooghi
Research area description:

The Institute for Frontier Materials redesigns materials to make safer and more environmentally friendly energy production and storage materials e.g. fuel cells and batteries. This is a joint project.

Specific projects available:

1. **Improving Na-ion batteries with A/Prof Nolene Byrne**: Energy storage devices are a critical component in the transition to net zero. The limitations associated with Lithium-ion batteries (LIB) such as the supply volatility of key materials and the inherent safety issues due to an inability to completely discharge a LIB can all be overcome by Na-ion batteries. However, Na-ion battery performance needs to improve. A key to this improvement is better performing carbon anodes. Unlike current LIBs which require highly structure graphite as the anode, Na-ion batteries perform best with carbon anodes which are non-graphitizable known as hard carbons. Hard carbon can be derived from several precursors included biomass and more recently waste biomass. Preliminary results from our research group have shown that excellent anode materials can be produced from waste textiles, and that the performance is directly linked to the conversion parameters used to create the carbon. This project aims to provide a better understanding on the role the conversion parameters play on anode performance.

2. **Bio-derived Proton-Conducting Membranes for Fuel Cell Applications with Dr Faezeh Makhlooghi Azad**
   Fuel cells are promising clean-energy technologies that convert hydrogen directly into electricity, producing water as the main by-product. However, their performance depends strongly on the membrane, which must transport protons efficiently while remaining chemically and mechanically stable. Many current proton-conducting membranes rely on fluorinated polymers and highly acidic conditions, creating challenges related to cost, safety, and environmental sustainability.
   This project will investigate bio-derived molecules, particularly histidine and potentially chitosan, as functional components in proton-conducting polymer membranes. Histidine contains an imidazole group that can both donate and accept protons, while chitosan provides renewable amine- and hydroxyl-rich functionality. These groups may form hydrogen-bonded networks that support proton transport and improve interactions within the polymer matrix.
   The student will prepare composite membranes containing selected concentrations of the bio-derived component and investigate their proton conductivity, water uptake, thermal stability, morphology, and mechanical properties. Spectroscopic techniques will be used to examine hydrogen bonding and interactions between the biological molecules and the polymer matrix. The most promising membrane may then be assessed under conditions relevant to fuel-cell operation.