



Honours & Master's Research Projects

2027

Welcome to your research journey

School of Biological Sciences | Honours and Master's Research Projects

Welcome from the Head of School

Welcome to the School of Biological Sciences Projects and to the beginning of your journey as a junior researcher. Your research project is an opportunity to ask important questions, develop practical and analytical skills, and contribute new knowledge to the biological sciences. We encourage you to be curious, rigorous and open to collaboration, and to make the most of the guidance and expertise available across our School.

Each project is normally coordinated by a member of SBS staff, who provides academic oversight and supports compliance with UWA rules, policies and research requirements, with at least 50 % of the supervision. Your supervisor and project coordinator will guide you through the relevant expectations, milestones and approvals for your work. You should also have a co-supervisor(s) who will be another academic postdoc or an adjunct who is usually a long-term university industry collaborator.

Please explore the list of projects or contact research groups to present your ideas.

Research projects are completed in several stages. These stages are organised through the research units listed below, allowing the project to progress from development and planning through data collection, analysis, presentation and final completion.

SBS research units

The exact sequence and timing of units depend on your course and approved study plan. Students should follow their formal enrolment advice and consult their supervisor or SBS Research Project Coordinators if they are uncertain about any requirement. The research part is 6 units in each degree (Honours and Master) with the total of 36 credit points, below example for typical degrees.

Program	Unit code	Unit title
Honours	BIOL4461	Honours in Biological Sciences Research Project Development
Honours	BIOL4462	Honours in Biological Sciences Research Dissertation Part 1
Honours	BIOL4463	Honours in Biological Sciences Research Dissertation Part 2
Honours	BIOL4464	Honours in Biological Sciences Research Dissertation Part 3
Honours	BIOL4465	Honours in Biological Sciences Research Dissertation Part 4
Honours and Master's	BIOL4466	Research Presentation Skills
Master's	BIOL5561	Master in Biological Sciences Research Dissertation Part 1
Master's	BIOL5562	Master in Biological Sciences Research Dissertation Part 2
Master's	BIOL5563	Master in Biological Sciences Research Dissertation Part 3
Master's	BIOL5564	Master in Biological Sciences Research Dissertation Part 4
Master's	BIOL5565	Master in Biological Sciences Research Dissertation Part 5

Associate Professor Greg Skrzypek
Head of School

Professor Jan Hemmi
Professor Jacqueline Batley
Research Project Coordinators

School of Biological Sciences
The University of Western Australia

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General information

Research projects available in the School of Biological Sciences (SBS)

As biologists, we are passionate about how living organisms – plants and animals – live, work, sense the world around them, communicate, reproduce, and can be managed, conserved and restored in threatened environments, as well as how they provide clues to advance medical science and treatment. We are also committed to the communication of science to the public and external stakeholders. Our researchers tackle grand challenges in the laboratory and at field sites across the globe, studying plants and animals in natural as well as managed environments, including below and on the ground and in the air as well as in fresh and marine waters. We use a wide range of techniques spanning scales from molecular and genetic to individuals as well as to populations and higher order ecosystems.

Want to know more?

Many projects are available across more than one Honours/Master's Stream/Specialisation. All students are strongly encouraged to contact prospective supervisors directly to discuss the project and find out about additional projects not currently listed in this booklet. You can use the first part of the booklet to find research groups that do research in areas you are interested in and then contact those groups. This is highly recommended.

If you want a predefined project, go to part 2. Be aware that projects often change and may already have been taken.

In both cases, please contact the staff member. The projects available are not necessarily limited to those outlined in this booklet.

Part 1: Research groups

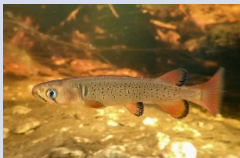
Albany Research Group: Aquatic, terrestrial and cross-cultural ecology and OneHealth



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The Centre for Natural Resource Management in Albany offers a range of postgraduate and honours research projects. Students can undertake both applied and fundamental research across natural, agricultural and urban landscapes, with strong themes in aquatic ecology, terrestrial ecology, cross-cultural research, and ecosystem and human health (One Health). These projects provide an opportunity to contribute to real-world environmental challenges while developing advanced research skills in collaboration with experienced researchers and partners across science, management, and community sectors.

To view supervisors and research project click the hyperlink titles or scan the QR codes (best viewed on laptop)

 Supervision <u>Primary Supervisors</u> Experienced, enthusiastic & research active supervisors 	 <u>Aquatic Ecology</u> Freshwater estuarine & marine ecosystems 	 <u>Terrestrial Ecology</u> Biodiversity, ecology, conservation & restoration 	 <u>Cross Cultural</u> Indigenous knowledge & two-way science 	 <u>One Health</u> Relationships between ecosystem & human health 
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Behavioural ecology research – understanding cognition, cooperation and adaptation to climate change

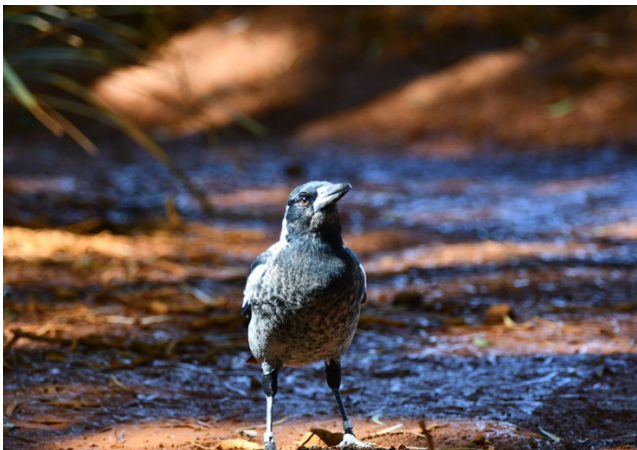
Amanda Ridley, amanda.ridley@uwa.edu.au



My research lab has a behavioural ecology and conservation focus. Students in my lab primarily work on animals in the wild, using long-term marked populations to be able to identify and quantify individual differences in response to environmental and social factors. Student projects typically involve experiments (such as playbacks, presentations and cognitive tests) combined with behavioural observation. My research lab focusses on questions such as causes of intraspecific variation in cognition, cooperative investment and other behaviours and typically uses short-term experiments to test larger evolutionary questions.

Examples of typical research conducted in my lab include: conducting cognitive tests on individuals to determine the relationship between cognition and social interaction, conducting playbacks on individuals to determine how anthropogenic noise affects their ability to forage and communicate with one another effectively, presentation of model predators to determine how heat stress impacts the ability of individuals to detect predators, and presentation of same-sex competitors to determine perceived risk to young versus self, and the cost of parental care behaviours.

I established and run the Western Magpie Research Project, which has been running since 2013, allowing students access to long-term records, an extensive database, and a good sample size of wild birds (>100). However, projects in my lab are not restricted to only magpies, projects on other species (under the lab's broad research themes) are also available. In the last few years, students in my lab have also worked on the following species: orangutans, feral cats, ants, toque macaques, bottlenose dolphins, golden snub-nosed monkeys, and squirrel monkeys. In this booklet, I may have detailed only 1-2 projects. This is because projects become available as previous Master's students finish and their results are known (thus we know what research question can build on previous findings). Therefore please feel free to approach me to ask what projects are currently available.



Conservation and Evolutionary Genetics

Renee Catullo, renee.catullo@uwa.edu.au



What we study: We investigate how Australia's unique biodiversity evolves, adapts, and persists under environmental change. Our research combines taxonomy, genomics, and biogeography to reveal how species form, how genetic diversity is structured across landscapes, and how evolutionary history shapes resilience and vulnerability. By linking fundamental evolutionary insights with applied conservation, we aim to improve understanding and management of Australia's threatened fauna and ecosystems.

Approach: We use an integrative approach combining fieldwork, genomic sequencing, and computational analyses of population structure, phylogeny, and demographic history. Student projects focus on taxonomy, species delimitation, phylogenomic reconstruction, or conservation genetics. Training is available in lab-based molecular methods, morphological assessments, bioinformatics, and spatial modelling.

Scope: Our work spans frogs, small mammals, and invertebrates across tropical, arid, and temperate regions of Australia. Current projects include:

- Taxonomy and phylogenomics of poorly known frog, reptile, mammal, beetle, and spider lineages,
- Genetic diversity and connectivity in fragmented landscapes, and
- Integrating genomic and spatial data to inform conservation planning.



Conservation Genomics in Action: Many projects are co-supervised with government agencies, providing opportunities for students to contribute directly to applied conservation outcomes. These partnerships ensure that our research not only advances evolutionary science but also supports real-world biodiversity management across Australia.

Getting involved: Students interested in Honours or Masters projects are encouraged to contact Renee to discuss current opportunities. Due to the cost and complexity of genomic research, projects are generally based on existing datasets and funded research programs rather than student-designed topics.

However, there may be flexibility to tailor analyses or taxonomic focus within these projects, and students will gain experience in high-impact, collaborative research contributing directly to conservation outcomes.



Due to the short project period and need for existing datasets, honours/masters projects are generally computer based. However, there are regular opportunities for volunteering in the field with PhD students.

Conservation and Restoration Sciences

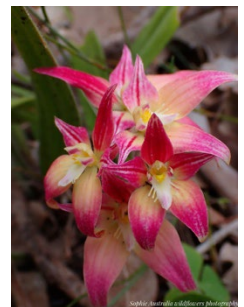


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My research group and I are dedicated to pushing the boundaries of plant conservation, ecological restoration, and seed science to heal landscapes facing unprecedented environmental pressures. From the lab to the bush, we operate at the intersection of fundamental botanical discovery and practical, large-scale application for meaningful ecological outcomes. Our team works tirelessly to safeguard threatened ecosystems, particularly within the fragile biodiversity hotspots of Australia and across global arid zones.

Core Research Themes

- Seed science
In particular complex dormancy patterns that are a common feature of much of Western Australia's unique flora. The research ranges from greenhouses and in-field trials to Scanning Electron Microscopy and AI image processing.
- Ecosystem recovery and restoration
With a focus on ecosystem behaviour after fire, land clearing and mining. Extensive work involving spatial and data science capability to assess the condition, trajectory and future risks in a quantitative manner.
- Rare native species and native orchid conservation
From lab-based microbiological research to in-field programs to return rare species to the wild. Rare native orchids and carnivorous plants are a focus, as well as culturally significant species.
- Integrated spatial science and AI, grounded by botanical knowledge
With experts in these fields working closely together within the group, the complementary knowledge base and expertise are leveraged to deliver exceptional outcomes for our environment.
- Indigenous engagement
Our group is proud to be at the forefront of the [Indigenous Ranger micro-credentialling program](#). Led by the Winjan Aboriginal Corporation, and co-designed with Winjan elders, our group is helping deliver on-country restoration training to indigenous rangers. These micro-credentials are Recognition of Prior Learning, making the first on-country pathway for Indigenous rangers to commence a tertiary degree.



We are based at the [Shenton Field Station](#), in Floreat. With extensive laboratory space and over 40 ha of land and some of the best quality Banksia Woodland in Perth just outside our front door, we can offer students something different, unique and meaningful.

Dryland vegetation ecology; understanding plant function at the landscape scale

Jake Eckersley, jake.eckersley@uwa.edu.au



My research explores the structure and functioning of Western Australia's dryland vegetation, how it is responding to threatening processes (biological invasion, climate and land use change), and improving the tools we use to observe and describe these shifts. My primary focus is phenology, the study of cyclical plant processes such as leaf emergence, flowering, and litterfall. Plant phenology drives species interactions, terrestrial carbon cycles, and food webs. By understanding how phenology is linked to local microclimates, community composition, and hydrology we can begin to understand the cascading effects of changes in climate and land management on ecosystem functioning.

In partnership with the Health and Biosecurity team at the CSIRO and the DBCA, we are putting this research into practice. We're using insights on the growth dynamics of one of Australia's most damaging weeds to project its spread under future climates, develop improved management plans, and to identify natural enemies from abroad that could be safe and effective biological control agents. As a student with this team, you will have the opportunity to contribute to fundamental science with real conservation outcomes.

My research is field-focused and there are lots of opportunities to gain experience planning and conducting remote ecological fieldwork, skills in plant identification and survey techniques. However, a common goal across this work is to develop ways we can scale measurements made in the field over space and time using remote sensing (phenocam, drone, satellite-based), with potential for projects related to weed detection, tree canopy monitoring, and plant growth observations from space. As part of these projects you will have the opportunity to gain highly sought-after skills in vegetation monitoring, image analysis, deep learning models, and geographic information systems (GIS). If the agents themselves are the bit that get you excited, we have many unresolved questions about plant / agent interactions waiting for the right person to dig into.

If you are interested in any of these themes get in touch! We have a few project proposals ready to go (see the booklet!) but are open to developing research questions around your interests.



Leaf-chewing beetle
Cacoselis sp.

Stem-galling weevil
Philonis inermis

Sap-sucking mirid
Engytatus passionarius



Ecological and evolutionary modelling and theory

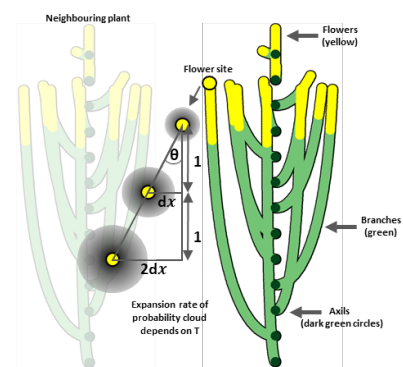
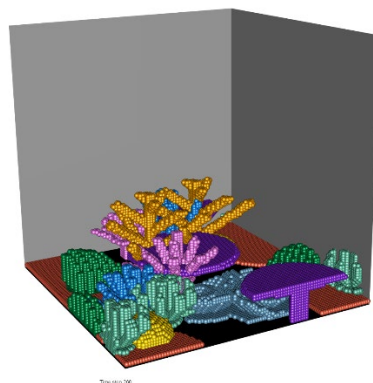
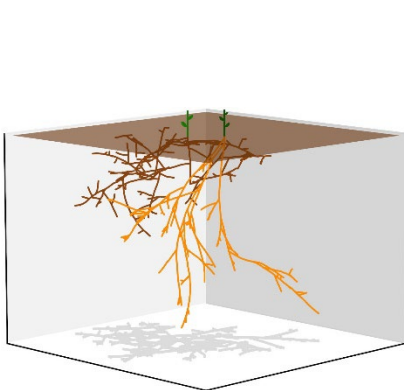
Michael Renton, michael.renton@uwa.edu.au, WhatsApp +61434193425



My group and I use modelling to investigate interesting theoretical questions in ecology and evolution, and address important practical applications in conservation, agriculture, and restoration. We are especially interested in how ecological and evolutionary processes, such as dispersal, interspecies interactions, competition, environmental adaptation and speciation, shape the composition, diversity and resilience of communities and the dynamics of populations. Some key areas of interest include

- Plant communities and the effects of species interactions on diversity, resilience and restoration
- The co-evolution of resistance to pesticides and ecological traits in weeds
- The evolution of resistance to pesticides and fungicides in pests and pathogens
- Plant root systems and the evolution of resource foraging strategies
- The coevolution of inter-species interactions, such as mutualism between plants and fungi, pollinators and plants, coral and algae
- Coral communities and ecology and evolution of their structural diversity
- Optimising management strategies in biosecurity, biological invasion, crop protection and conservation
- Mine site restoration and revegetation

Honours and Master's projects in any of these areas are possible. I'm also happy to discuss other applications and questions if you are interested in other systems or organisms. You don't need to be a skilled coder, but you do need to be interested in theory and in learning to use models. I will also consider being a co-supervisor on other projects to help with complex data analysis.



Ecology and conservation of orchids and ecosystems in WA

Mark Brundrett, mark.brundrett@uwa.edu.au

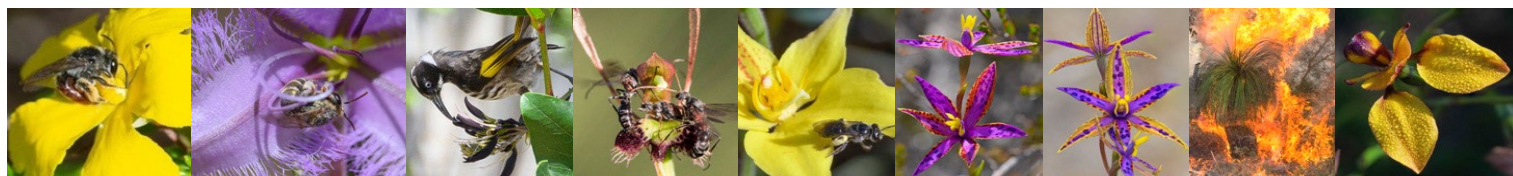


I am an Adjunct Associate Professor at the University of Western Australia and a Research Associate of the West Australian Herbarium. I co-supervise students and have a funding application underway (orchid fungal genomics). My research primarily concerns mycorrhizal associations, ecology, propagation pollination biology, climate and fire effects on orchids and other southwest plants. Other recent research concerns biodiversity patterns of plants and fungi in Western Australia, restoration of banksia woodland and using remote sensing to measure fire impacts (see references below). I work closely with UWA staff and have productive collaborations with scientists based elsewhere, including Daniela Scaccabarozzi (Marie Curie Post-doc Research Fellow, Queen Mary University of London). I am also contributing to a study on the conservation genomics of the *Thelymitra variegata* complex led by Lalita Lalita Simpson and Katharina Nargar (CSIRO, Australian Tropical Herbarium), and National Heritage listing of the Nullarbor Plain. Projects listed below include new research combined with analysis of large existing datasets.

- A. Climate and fire impacts on orchids in urban bushland (1, 2, 9).
- B. Pollination syndrome evolution in WA (3, 4, 5, 8).
- C. Taxonomy of very similar orchids in species complexes (6, with CSIRO).
- D. Impacts of fire, weeds and restoration of banksia woodland (7, 9, with DBCA).
- E. Translocation and monitoring of Critically Endangered orchids (10, with DBCA).
- F. Climate and hydrology impacts on banksia woodland (1, 9).

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Evolutionary Ecology

[Joseph Tomkins](#), joseph.tomkins@uwa.edu.au



I am a behavioural ecologist interested in the evolutionary genetics of fitness related traits. I have a background that spans several different areas of evolutionary ecology.

Threshold trait evolution is a form of phenotypic plasticity where traits are expressed in an all-or-nothing way. This is an extreme form of phenotypic plasticity and is seen in the armaments of many invertebrates with **alternative reproductive tactics** – mites, dung beetles and earwigs are ones I have worked on. I'm interested in the genetics and fitness consequences of adopting different tactics. Not enough is known about frequency dependent selection in these systems and how that impacts their evolution.

The evolution of human twinning, we showed how human twins arise from the release of a single or multiple ova, in relation to an age-dependent cue. This is an adaptation to declining fertility with age as chromosomal abnormalities increase. We also showed how seasonal variation in humans is due to behavioural decisions, not seasonal physiological cycles in fertility. There are projects here related to the global patterns of human twinning and more detailed studies of well-documented populations. The work is desk-based and uses simulations.

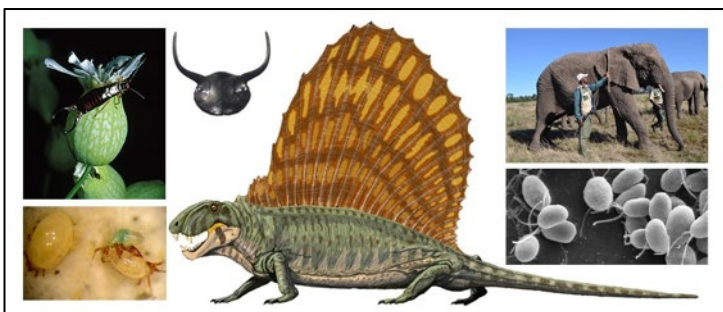
Allometry is the relation between investment in different aspects of an organism's phenotype or life history. There are many aspects of allometry that tie-in to natural and sexual selection, such as the allometry of cooling structures, the allometry of ornaments and of feeding organs like teeth. I have studied allometry mostly in insects, but also elephants and Pteranodon and Dimetrodon.



Sexual selection is a huge subject area, and I am particularly interested in how secondary sexual trait signal genetic quality – this is we think, through **condition dependence**. Recently we have been working on whether male-male competition and female choice convey the same fitness benefits to females, or whether they result in divergent consequences to offspring fitness. We have been recently studying this in *Drosophila melanogaster*, and *Callosobruchus maculatus*.

The evolution of anisogamy is an area of evolutionary biology dominated by theory; however we have evolved size divergent algae, that can be used to represent the very first stage of the evolution of the sexes. This area of research is perfect for someone with good microbiology skills.

Evolution as a tool for sustainability. We use experimental evolution to test ideas about adaptation, conservation and adaptations with sustainable benefits, we have evolved heat and light tolerant algae, increased nitrogen use efficiency and evolved populations to be more desiccation tolerant.



Filbee-Dexter Lab: Marine ecology, blue forests and coastal conservation

[Karen Filbee-Dexter](#), Karen.Dexter@uwa.edu.au, (Wernbergfilbeedexter.org)



Our research centres on how coastal ecosystems-especially marine forests-responds to changing climate and human pressures. Our work spans the drivers and patterns of long-term change in these habitats (such as shifts from kelp forests to sea-urchin barrens or turf-dominated reefs) as well as understanding core ecosystem functions like productivity, detrital export, carbon cycling and nutrient uptake. We use a combination of field, modelling work and aquarium experiments in our research. A major theme in our group research is understanding the carbon cycling potential of kelp and coastal ecosystems – including quantifying long-term storage – and how that capacity is changing under global warming. This work has

recently broadened into studying other valuable ecosystem services provided by kelp forests and their replacement states, such as nutrient cycling, oxygen production, and fisheries and recreational support.

Our group also works on restoration and conservation of kelp forests. This involves understanding the effectiveness of protection, developing and testing new restoration tools such as 'green gravel' and exploring future proof approaches for marine conservation in a warming ocean. We work on temperate reefs and Arctic regions, with several students conducting some research in the Norwegian Arctic. Our 'home ground' is the western Great Southern Reef, a magnificent ecosystem and natural laboratory!

We are an interdisciplinary team with expertise and ongoing projects across marine ecology, conservation science, physical oceanography, conservation ethics, environmental economics, and biogeochemistry. Our research tackles globally relevant questions about how marine ecosystems respond to accelerating climate and biodiversity change. We aim to uncover the mechanisms driving ecosystem shifts, carbon cycling, and resilience in the world's blue forests to help predict how ocean ecosystems will function in a warmer future and guide effective conservation and restoration strategies. Through international collaborations, large-scale field studies, and synthesis of long-term data, we aim to link local ecological change to global environmental challenges- ensuring that coastal ecosystems are recognized and protected.



We are looking for postgraduate students to join our diverse team. Several projects are available. Most projects are likely to involve a combination of database, laboratory/aquarium and/or field work. Some projects will require advanced SCUBA diving qualifications. Some time spent away on field trips and research visits must be anticipated for most projects, especially at the PhD level.

Fisheries and conservation science

Tim Langlois, tim.langlois@uwa.edu.au



I am a marine ecologist focused on understanding the optimal way that both commercial and recreational fisheries can be managed to meet their objectives and maximise the broader benefits of healthy marine ecosystems to society. I have used no-take marine reserves and fisheries closure to better understand ecosystem dynamics and the impacts of fishing. I have demonstrated that these closures can provide important value-adding to fisheries science. I combine tools from spatial ecology, fisheries science, environmental economics, human behaviour science, and Traditional and Local Ecological Knowledge Systems. A core part of my approach involves applying quantitative methods to model a range of marine biodiversity datasets. This includes predictive habitat modelling and the development of novel metrics of marine species population health. I work closely with Traditional Owners, management agencies, policymakers, and other end users to ensure research outcomes are useful, relevant, and grounded in real-world contexts. My research is multidisciplinary across biology, socio-economics, oceanography and statistical theory, but also strongly applied and policy-relevant. I offer students and collaborators the opportunity to work across fieldwork, data analysis, and interdisciplinary research design. There's a strong emphasis on developing quantitative skills, engaging in policy analysis, and collaborating with stakeholders who are shaping the future of marine management.

Intertidal and near-shore ecology – the Prince-Hovey Lab

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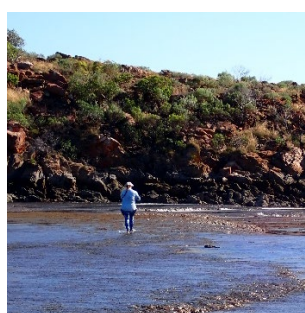


Our lab investigates the ecological processes that shape the distribution and abundance of marine species and communities. Our research spans population, community and spatial ecology, with a particular focus on intertidal and shallow subtidal ecosystems. We are interested in how marine populations and communities vary through space and time, and how they respond to natural disturbance, environmental change and human activities. Our work encompasses a diverse range of organisms, including marine invertebrates, fishes, shorebirds, algae and seagrasses.

Field ecology is central to what we do. We combine long-term monitoring, manipulative experiments, ecological surveys, underwater imagery, habitat mapping and spatial analyses to understand both ecological patterns and the processes that produce them. Our research extends across Western Australia, from temperate estuaries and coastal ecosystems in the south to coral reefs and remote intertidal environments in the north. We work closely with government agencies, including DBCA, DPIRD and DoT, as well as Traditional Owners and Indigenous ranger groups, to support the design, implementation and analysis of scientifically rigorous marine monitoring and research.

Our research interests are not constrained by taxonomy, geography or habitat. Our Master's students study infauna, benthic and pelagic organisms in estuaries and along the coast from Broome to Albany including species from many different phyla. Some of our current research interests and possible projects include:

- **Long-term change in marine communities** – investigating changes in fish and invertebrate assemblages in the Rottnest Island Marine Reserve and other long-term monitoring locations.
- **Population dynamics and reproductive ecology of marine invertebrates** – including the ecology, reproductive biology, connectivity and conservation of the living fossil, the lighthouse snail *Campanile symbolicum*.
- **Indigenous-led and collaborative marine monitoring** – working with Traditional Owners and Indigenous ranger groups to develop and implement monitoring of reef, seagrass and intertidal ecosystems, particularly in the Kimberley.
- **Marine biodiversity associated with human-made structures** – investigating the contribution of artificial reefs and other marine infrastructure to habitat availability, community structure and biodiversity.
- **Benthic habitat mapping for conservation and management** – integrating field surveys, remote sensing, underwater imagery and spatial ecology to map marine habitats and understand patterns of species and habitat distribution.
- **Seagrass recruitment, recovery and restoration** – investigating the ecological and environmental processes that regulate seagrass recruitment and establishment, including seed and seedling supply, dispersal, retention, survival and early growth. Projects may examine the bottlenecks that limit natural recovery following disturbance and explore how this knowledge can be used to improve the design and success of seagrass restoration.



Marine social-ecological systems

Matt Navarro, matthew.navarro@uwa.edu.au



I conduct research at the intersection of human and natural systems to better understand and address the challenges facing our marine environment in the Anthropocene. My work focuses on informing marine management in Australia, including marine conservation, fisheries management, and developments in the Blue Economy.

I combine tools from spatial ecology, fisheries science, environmental economics, human behaviour science, and Traditional and Local Ecological Knowledge Systems. A core part of my approach involves applying quantitative methods to model complex social-ecological phenomena. This includes using behavioural science frameworks, Structural Equation Modelling, and Random Utility Modelling to understand and predict human behaviour in marine contexts. My research is strongly applied and policy relevant. I work closely with management agencies, policymakers, Traditional Owners, and other end users to ensure research outcomes are useful, relevant, and grounded in real-world contexts.

I offer students and collaborators the opportunity to work across fieldwork, data analysis, and interdisciplinary research design. There's a strong emphasis on developing quantitative skills, engaging in policy analysis, and collaborating with stakeholders who are shaping the future of marine management. If you're interested in tackling marine environmental challenges through innovative, applied science, this is an exciting area to be involved in.



Neuroecology and Behaviour

Jan Hemmi, jan.hemmi@uwa.edu.au



Vision can be a tool to predict what animals are interested in and how they interact with other organisms. We focus on understanding what animals see and how they process information on a behavioural and physiological level. This has implications on how we understand animal decisions and interactions. It also helps us understand why eyes and other sensory systems have evolved to the specific forms we see today and what drives this process.



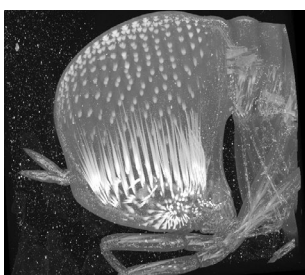
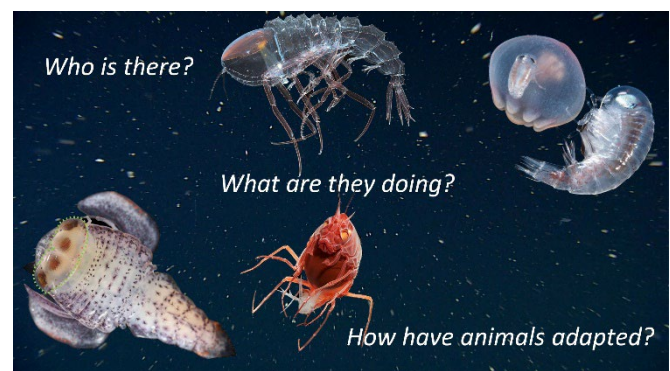
Approach: We take a **comparative** approach to study **behaviour, physiology, and anatomy** and our methods include 3D imaging, modelling, and virtual reality.

Scope: We have applied our tools to monkeys, sharks, fishes, crocodiles, lizards, possums, dunnarts, wallabies, ants, bees, crabs, hyperiid amphipods and more. Our current focus is on tractable systems such as fiddler crabs and deep-sea invertebrates, particularly hyperiids. Hyperiids are a group of deep-sea crustaceans that have the largest eyes relative to body size of any animal and present many opportunities to understand general vision questions and how the deep-sea environment drives the evolution of animal eyes.

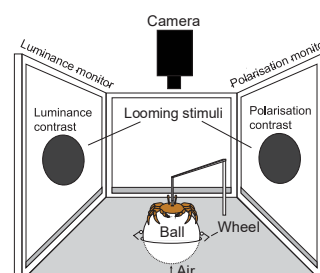
Deep Sea Vision: Our Ocean Shot project "Discovery in the largest frontier: advance imaging and genomics of open ocean animals" aims to accelerate the process of species discovery, classification, and documentation in the deep, open ocean, or midwater, the largest and least explored habitat on earth. Students can contribute to two primary objectives: **1. Expediting species discovery/classification, and 2. Understanding the role of newly discovered species in oceanic processes.** This includes projects on the evolution of visual systems, species descriptions, and functional morphology in the deep sea.

Physiology:

Electrical signals from the eyes allow students to measure visual performance in



Anatomy: 3D micro-CT scan showing the optics (bright structures) of a large-eyed, deep-sea hyperiid allow us to reconstruct and model the vision of this animal.



Behaviour: Virtual environments and active experimentation in the field test how animals respond to stimuli and interact with each other.

Please come and talk to me if you are interested in any of these approaches and topics.

Plant physiological ecology

Erik Veneklaas, erik.veneklaas@uwa.edu.au



Our main interest is in how plants are affected by their environment, particularly climatic and soil conditions, but also how plants affect their environment, for example revegetation effects on hydrology and soil formation, effects of companion/rotational crops, nurse plants. The principal factors of interest are water, mineral nutrients (especially phosphorus) and temperature.

We work in native vegetation, restored vegetation, urban vegetation, and agricultural systems. We also do purely greenhouse- or lab-based research.

Examples of projects where we may be able to accommodate Master's and Honours projects:

- Water use patterns of Pilbara species in the context of ecological restoration
- Vegetation tolerance to hostile iron ore tailings substrates
- Assessing differences in drought and heat tolerance across species distributions
- Identifying native plant species best suited for urban greening
- Growing plants below solar panel arrays
- Optimising vegetation cover for slope stability
- Ecological diversity in plant hydraulics, stomatal regulation, energy balance
- Plant functional traits and community assembly



Plant Genomics

[Jacqueline Batley](#), Jacqueline.batley@uwa.edu.au



Genome sequencing is changing our understanding of biology and evolution, with significant implications for agriculture. The genus *Brassica* consists of a diverse set of agronomically important species, including the world's main vegetable and oilseed crops. However, pathogens and pests have caused substantial yield and economic losses. Plant breeding has largely relied on conventional methods based on phenotypic selection. However, it is doubtful whether these conventional approaches alone are adequate to address the impending challenges, further compounded by the erosion of diversity in cultivated species.

Resistance genes: Our group focuses on identifying, predicting and characterising novel qualitative and quantitative resistance sources, including from wild relatives and introgression lines, against blackleg, other disease-causing pathogens (i.e. *Alternaria*, clubroot, downy mildew) and viruses (i.e. Turnip mosaic virus) in *Brassica* germplasm. Using genomics, transcriptomics and bioinformatics tools, we mine resistance gene analogs across crop genomes, predict seedling resistance from expression data, and develop diagnostic assays to quantify pathogen biomass. We also track the evolutionary patterns of resistance genes across *Brassica* and the wider Brassicaceae family and decode how immune receptors recognise pathogen effectors. Our work addresses the urgent need for sustainable disease management strategies to protect global canola production and better understand complex plant-disease responses.

Sterols and Trichomes: To address the urgent need for innovative pest control strategies, we examine modifications to plant sterol metabolism and trichome development to combat insect pests. By genetically engineering canola plants to produce non-utilisable sterols and knocking out trichome-regulating genes such as TRY, we aim to impede insect growth, feeding and reproduction while preserving plant health. Our innovative approach, utilising CRISPR technology and novel sterol biosynthetic genes, holds promise for revolutionising pest control strategies and safeguarding global crop yields.

At the Batley Lab, we are driven by a passion for scientific discovery and a commitment to addressing pressing challenges in agriculture. Join us in our quest to unlock the potential of genetics and genomics for a more resilient and sustainable future in farming.

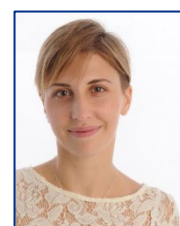
Sea Around Us – Indian Ocean

Dirk Zeller, www.seaaroundus-io.org, dirk.zeller@uwa.edu.au

My lab investigates, documents and communicates the impact of fishing on the marine & aquatic ecosystems of the world, with a major focus on the Indian and Pacific Ocean regions. Our research has major impacts on how we view global and ocean-basin scale fisheries and the ecosystems in which they are embedded. We also collaborate closely on fisheries science, stock assessments and population dynamics with colleagues at Western Australia Fisheries (DPIRD), and have established a freshwater hub under the leadership of Dr Wanja Nyingi that focuses on aquatic ecology and aquaculture.

We research fishing impacts on marine ecosystems and society at large spatial and temporal scales. This may include historical catches, fishing effort, high seas fisheries dynamics and other fisheries time series, and research on population dynamics and stock assessments. Dr Vania Andreoli is leading research on seafood nutritional profiles and fisheries economics including subsidies and supply chain dynamics.

The lab also partners regularly with colleagues around the world including collaborations with the Fisheries Economics Research Unit at the University of British Columbia on issues in resource economics, with the Harvard University Aquatic Food Composition Database team, and with the Aquatic Resource Trade in Species Database team at the University of Washington.

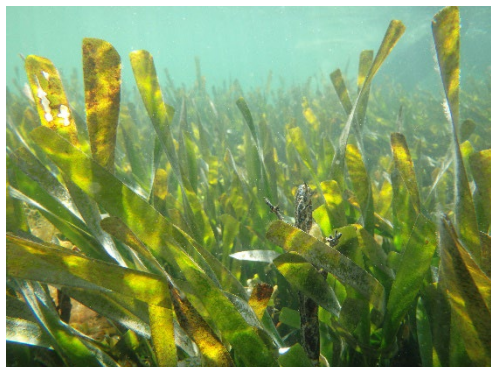


Seagrass Ecology

Maria Jung, maria.jung@uwa.edu.au, www.seagrassresearch.net



Our work focuses on seagrasses, true flowering plants that have returned to the water. These coastal blue-carbon ecosystems are critically important, protecting coastlines, providing food and refuge for marine life, and storing CO₂ over long timescales. However, seagrasses are declining globally, with significant consequences for the health and functioning of a range of marine environments.



Our research spans contrasting coastal environments, from urban-influenced Derbal Nara (Cockburn Sound) to the pristine World Heritage Area of Gathaagudu (Shark Bay). We investigate how climate change and human pressures, such as dredging and eutrophication, affect seagrasses across different biogeographic regions, including tropical and temperate species, life-history strategies, and life stages from seeds and seedlings to juveniles and adults.

To understand seagrass responses from different perspectives, we use a multidisciplinary approach spanning scales from whole meadows to individual cells. Our work combines field monitoring and morphological and physiological measurements with genetics, metabolomics, stable isotopes, microsensor measurements and GIS mapping. This allows us to build a more holistic picture of seagrass health, performance and resilience.

We also work closely with Traditional Owners, recognising the value of integrating Traditional Knowledge with Western scientific approaches. Our research involves collaborations with government agencies, community-led seagrass restoration projects, NGOs such as OzFish, and tourism operators. Our research is closely connected to conservation and management, with findings informing seagrass monitoring, restoration and environmental management.

Student opportunities

We are looking for Honours and Master's students interested in understanding how seagrasses respond to past, present and future environmental stressors. Students can contribute to ongoing research projects while developing their own research questions and gaining experience across field, controlled tank, laboratory and analytical approaches, depending on their project.

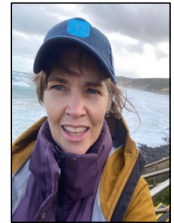


We encourage students to think creatively, ask critical questions and develop their own ideas. SCUBA diving experience at rescue-diver level, or a willingness to obtain this qualification, is desirable for projects involving underwater fieldwork.



Vertebrate Conservation and Climate Change

Nicki Mitchell, nicola.mitchell@uwa.edu.au



My lab group's research takes many directions, but we consistently focus on threatened vertebrate species and how they could be proactively managed to improve their capacity to persist through anthropogenic change. This includes more controversial forms of species translocation such as assisted colonisation, and emerging methods such as targeted gene flow. We often use mechanistic modelling to explore impacts of climate change, and to design management interventions before putting them into practice in field trials.

I am a herpetologist, so I mostly supervise projects on amphibians and reptiles (including sea turtles) but I also supervise mammal projects in collaboration with mammal experts. I particularly enjoy supervising students with strong interest in physiological ecology or population ecology, and who have proficiency in coding and mathematics.

Many projects I supervise involve fieldwork, and almost all projects, aside from those using desktop analysis, will require approval from an animal ethics committee and external funding. Consequently, unless I am offering a project featured in Part 2 of this booklet, about 6-12 months lead time would be needed to develop a new project. Research areas suited to dissertation projects are below.



Conservation interventions and risk management: Assessing the feasibility and outcomes of fauna translocations and assisted colonization, including the use of population viability analysis.

Ecophysiology and reproductive ecology of terrestrial-breeding amphibians: Physiological studies examining desiccation tolerance, breeding phenology, acoustic behaviours and reproductive traits in terrestrial-breeding frogs, often relating these mechanisms directly to conservation actions in drying climates.



Biodiversity of peatland ecosystems:

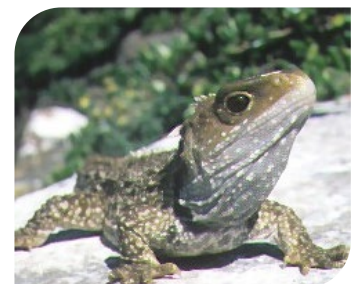
Ecological, genetic and distribution studies of potentially threatened taxa occurring in *Empodisma* peatlands in southwestern Australia, with a focus on understanding their sensitivities to fire, changed hydrology and climate change (could include invertebrates).

Thermal ecology, sex determination and climate vulnerability of reptiles:

Analysing impacts of high temperatures on hatching success and sex ratios (primarily sea turtles), often utilizing field data, microclimate modelling. Experimental projects on thermal ecology of reptiles could also be in scope.



Population modelling and conservation decisions: Using demographic and genetic data to project population trends and risk of extinction, exploring impacts of synergistic threats and potential intervention scenarios.



Please email me if you are interested in discussing research opportunities at least six months before intending to start your dissertation project. Also note I work half-time for UWA's Oceans Institute, so I have more limited availability to supervise research than other academics in the School of Biological Sciences.

Wernberg Lab: Temperate reef ecology

[Thomas Wernberg](#), Thomas.Wernberg@uwa.edu.au, (Wernbergfilbeedexter.org)



We are a group of passionate marine ecologists with a predilection for kelp forests and subtidal seaweeds. Our focus is broadly the ecology of shallow subtidal ecosystems, and we work mostly on large habitat-forming seaweeds because of their ecological importance as foundation species in many communities. While we are phycophiles, we are also broadly interested in many other types of organisms that live on, in and around seaweed dominated seascapes including coral, reef fishes and invertebrates.

Much of our effort is focused on uncovering impacts of climate change, marine heatwaves and other human impacts such as coastal darkening and understanding associated threats to ecosystem functioning and ecosystem services. Increasingly, we are also focused on solutions to mitigate past damage and prevent future loss (e.g., restoration).

Our approach bridges genomics, physiology, ecology and biogeography, combining surveys of distribution and interactions with laboratory and field experiments, to tease apart the local through global processes of change and drivers of ecological patterns. We work all over the world and Australia but our 'home ground' is the western Great Southern Reef, a magnificent ecosystem and natural laboratory extraordinaire!



We are looking for postgraduate students to join our diverse team. Several projects are available to study temperate reef ecology in Australia and globally. Most projects are likely to involve a combination of database, laboratory/aquarium and/or field work. Many projects, but not all, will require advanced scuba diving qualifications. Some time spent away on field trips and research visits must be anticipated for most projects, especially at the PhD level.



Part 2: Research projects

Repeatability of interindividual cognitive performance outcomes in Green Head Ants.

Supervisory team:

Prof Amanda Ridley, amanda.ridley@uwa.edu.au

Dr Sam Lymbery, samuel.lymbery@uwa.edu.au

E/Prof Leigh Simmons, leigh.simmons@uwa.edu.au

Kimberley Wong, kimberley.wong@research.uwa.edu.au

Description: Studies on cognition in terrestrial invertebrates remain widely underrepresented in the existing literature in non-human animal cognitive ability. Embedded within the Ridley lab, we are interested in exploring variation in cognition in ants, specifically using *Rhytidoponera metallica* as a study species. Our preliminary results show intraspecific variation in cognitive ability at the individual level across colonies of *R. metallica* sampled across the Perth metropolitan area. This project will require a student to explore whether cognitive performance is conserved across individuals undergoing repeated associative learning trials as a measure for cognitive ability and will be in direct support of an ongoing PhD project within the lab. Students will be required to independently conduct learning trials, manage data collection, and statistical analyses and so good data management skills in excel and a solid understanding of R are ideal.

Level: Honours or Master's

Assessing the effectiveness of revegetation projects

Supervisory team:

Dr Barbara Cook, Barbara.cook@uwa.edu.au

Dr Paul Close, Paul.close@uwa.edu.au



Description: There has been significant investment in the revegetation of cleared land aimed at increasing the extent of native vegetation in Australia. Although the degree to which this service has been delivered is well reported, a lack of follow-up to determine the effectiveness of these plantings makes it difficult to (i) quantify success, (ii) identify failure and ways to improve the implementation of plantings to rectify this, and (iii) apply what has been learnt from individual sites to other areas. In this research, you will evaluate the response of selected taxa such as mammals, birds or invertebrates to restored vegetation patches of differing ages, type and size in southwestern Australia.

Level: Honours, Master's or PhD

Assessing the performance of open-source pattern recognition software for numbat photo ID

Supervisory team:

Dr Barbara Cook, Barbara.cook@uwa.edu.au

Dr Peter Speldewinde, Peter.speldewinde@uwa.edu.au



Description: Images of numbats captured using remote, wildlife cameras can be individually identified based on stripes patterns and other features. This study will test the performance of up to three freely available pattern recognition software program for the recognition of numbats to individual level. Potential programs to be tested include Wild-ID, Wildbook, I³S Pattern/Spot, Stripespotter, Discovery, Hotspotter and ExtractCompare.

Level: Honours or Master's

Optimizing the use of AI models for processing images from wildlife camera traps

Supervisory team:

Dr Barbara Cook, Barbara.cook@uwa.edu.au

Dr Peter Speldewinde, Peter.speldewinde@uwa.edu.au



Description: To be able to cost-effectively monitor biodiversity at the scale needed in Australia, automation of processes will become essential. Despite the existence of some 'stand out' examples of using automated processes such as the monitoring of fauna in fire damaged landscapes in eastern Australia using remote cameras, adoption across other parts of Australia of automated workflows for camera trapping has been poor. Many regions lack adequate training image data sets to ensure that AI models are accurate, and potential users vary in terms of their access to technology. Following targeted collection of training image data sets, this project will test the performance of selected AI models for detection of terrestrial fauna in southwestern Australia.

Level: Honours or Master's

Stock watering (troughs/ dams) refuges

Supervisory team:

Dr Barbara Cook, Barbara.cook@uwa.edu.au

Dr Paul Close, Paul.close@uwa.edu.au



Description: Many waterways and wetlands in the Wheatbelt of Western Australia have become salinized due to past land clearing, leading to the loss of many freshwater species. Freshwater troughs and dams used for livestock are 'islands' of suitable habitat surrounded by inhospitable environments and are likely to be the only refuges remaining for obligate freshwater species. This project will investigate the distribution of aquatic invertebrates in stock watering troughs and dams in the light of habitat size and degree of isolation.

Level: Honours or Master's

Wasted nutrition: the nutritional content of fisheries discards

Supervisory team:

Prof Dirk Zeller, dirk.zeller@uwa.edu.au

Dr Vania Andreoli, vania.andreoli@uwa.edu.au

Description: Discarding, the practice of throwing overboard unwanted catch that is too small, damaged, or not retained for other reasons, is a widespread phenomenon in fisheries. This has major impacts on sustainability and can also be extremely wasteful from a nutritional point of view. The nutritional profile of discards in the wider Indian Ocean is currently unknown, and this project aims to remedy this by estimating the nutritional “wastage” due to discarding in selected fisheries and the wider Indian Ocean. As part of the Sea Around Us - Indian Ocean collaboration with the Harvard University T.H. Chan School of Public Health, the student will engage in nutritional aspect of fisheries science using big-data analysis. Statistical skill requirements are minor, but a willingness to learn and adapt if needed. R programming skills and knowledge of fisheries science and fish biology is required.

Level: Master's

WA fisheries: population dynamics and stock evaluations

Supervisory team:

Prof Dirk Zeller, dirk.zeller@uwa.edu.au

Dr Vania Andreoli, vania.andreoli@uwa.edu.au

Expert co-supervisors from DPIRD

Description: Suitable projects on WA fisheries as related to biology, ecology, population dynamics, stock evaluation, and assessments for fishes as well as invertebrates will be developed in close cooperation with DPIRD expert staff. These types of projects could be interesting for students that are excited by applied data work and advanced analyses, stock assessments, population dynamics, and information and analyses of utility to sustainable management of WA's living aquatic resources. Good skills with Excel and R programming, comfortable with and keen on statistical approaches, good interpersonal and collaborative skills are required.

Level: Master's

Australia's freshwater fisheries

Supervisory team:

Prof Dirk Zeller, dirk.zeller@uwa.edu.au

Dr Wanja Nyingi, wanja.nyingi@uwa.edu.au

Description: Much emphasis in Australian scientific and management circles is focused on marine fisheries. Yet Australia's freshwater and estuarine environments provide a distinct fisheries science challenge. Some commercial fisheries exist, yet the majority of freshwater fishing activities are either recreational or traditional in nature. This makes the scientific and socio-economic understanding of freshwater fisheries a unique challenge in Australia. This research builds on a successful freshwater fisheries science project in 2020 for Kenya and will link into current global research collaboration efforts to derive comprehensive global freshwater fisheries data systems. This project aims to create a nationwide baseline of available data and knowledge and identify and fill major data gaps. Good interpersonal and collaborative skills. R programming skills, comfortable with statistical approaches, and ability to think critically and “outside the box” is required.

Level: Master's

Understanding seed trait variation in *Agonis flexuosa* (WA peppermint)

Supervisory team:

Dr Emma Dalziell, Kings Park Science (DBCA), emma.dalziell@uwa.edu.au

Dr David Merritt, Kings Park Science (DBCA), david.merritt@dbca.wa.gov.au

Ms Lauren Murfit, lauren.murfit@research.uwa.edu.au

Prof Jacqui Batley, jacqueline.batley@uwa.edu.au



Description: *Agonis flexuosa* (peppermint) is an iconic south-west Western Australian plant increasingly threatened by habitat fragmentation, Phytophthora dieback, climate change and the potential spread of myrtle rust. Seed banking provides an important safeguard, but effective *ex situ* conservation depends on understanding germination characteristics to support propagation and use, and on utilising stored seeds to generate knowledge of species biology. Currently, little is known about how seed traits, including germination responses to temperature and water stress, vary among populations of *Agonis flexuosa* across the south-west. This project will investigate: (1) variation in seed traits and germination requirements among populations, and (2) relationships between seed traits, climate and geography. Using collections from across the species' natural distribution, you will characterise seed traits and link them to environmental variables to inform best-practice seed banking, restoration and conservation of this keystone species.

Level: Honours or Master's

Enhancing soil-like function in iron ore tailings using microalgal biomass

Supervisory team:

Prof Erik Veneklaas, erik.veneklaas@uwa.edu.au

Dr Luke Omoarelojie, luke.omoarelojie@uwa.edu.au



Description: Iron ore tailings and mining-derived waste rocks and overburden often have physicochemical and biological constraints, including low carbon and nitrogen availability, that restrict microbial activity, nutrient cycling, soil development, and the establishment of native vegetation. As part of a broader rehabilitation program investigating the revegetation of salt-affected tailings storage facilities through the reconstruction of suitable growth media using mining-derived wastes and overburden, this project will examine the potential of microalgal biostimulant as a source of labile carbon and nitrogen. This will involve isolating and culturing suitable microalgae, developing biostimulant formulations from the resulting biomass, and evaluating their effects on soil biological function and the growth and establishment of salt-tolerant native chenopods and grasses occurring in the Fortescue Marsh region.

Level: Honours or Master's

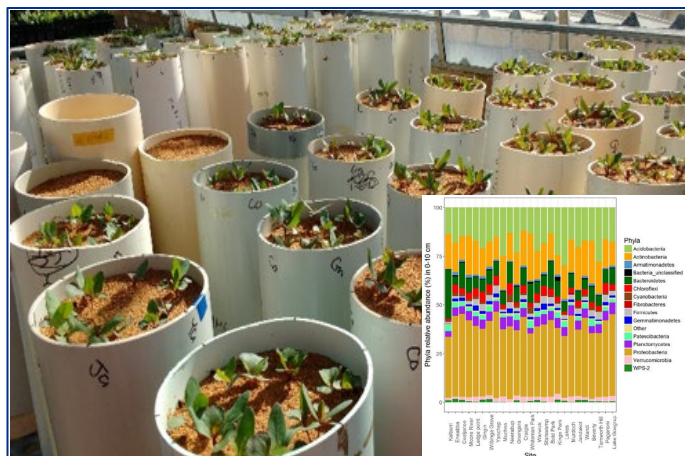
Ecophysiology and microbiome of a tree species in restored vegetation after sand mining

Supervisory team:

Prof Erik Veneklaas, erik.veneklaas@uwa.edu.au

Prof Martin Breed (Flinders University)

Adj Prof Siegfried Kraus (Kings Park Science)



Description: Restored vegetation after sand mining on the Swan Coastal Plain will be subject to an increasingly warmer and drier climate. It may therefore be beneficial to source seed from provenances that have historically had a warmer and drier climate. Field trials that test this hypothesis, however, have shown that substrate has a much greater influence on the successful establishment of key species such as *Eucalyptus tottiana* and *Banksia attenuata*. The soil microbiome represents a poorly known factor in plant performance. Substrates, microbiomes and plants interact in complex ways. This Honours or Master's project aims to quantify the influence of three substrate types (topsoil, overburden and tailings) under well-watered and drought-stressed conditions on the growth and physiology of a key species of the Banksia woodland. Measurements will include photosynthesis, water relations, nutrition and rhizosphere chemistry. The microbiome will be studied in parallel by a student from Flinders University.

Level: Honours or Master's

How prevalent are agricultural food sources in black cockatoo diet?

Supervisory team:

Assoc Prof Greg Skrzypek, grzegorz.skrzypek@uwa.edu.au

Adj Prof Peter Mawson, peter.mawson@uwa.edu.au

Prof Amanda Ridley, amanda.ridley@uwa.edu.au



Description: Western Australia's black cockatoo species are iconic but declining as land-use change reduces and fragments their natural feeding habitat. At the same time, observations suggest that agricultural crops, especially canola, may provide an important dietary subsidy for adults and growing nestlings. How much do cockatoos use agricultural food sources? This project will use stable carbon and nitrogen isotope analysis to investigate the contribution of agricultural and native food sources to cockatoo diets. Samples of nestlings' feathers will be collected from nine long-term observation sites spanning ~900 km in a north-south transect, creating an opportunity to examine geographic variation in resource use across contrasting landscapes. The project suits a motivated ecology, zoology or conservation biology student interested in bird ecology who enjoys combining ecological questions with careful laboratory work and quantitative data interpretation.

Level: Honours or Master's

Plant community distributions on a semiarid flood plain as a response to flood depth and frequency

Supervisory team:

Assoc Prof Greg Skrzypek grzegorz.skrzypek@uwa.edu.au

Prof Pauline Grierson pauline.grierson@uwa.edu.au

Prof Huade Guan huade.guan@flinders.edu.au



Description: This project is located in the Pilbara and focuses on native bush and riparian communities. It would involve some fieldwork and botanical surveys along transects, analysing drone pictures to assess plant distribution and analysing leaves for $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ to understand water stress. The main research question is how topography, soil type, and water depth shape the zonation of plant communities with respect to water use efficiency.

Level: Honours or Master's

Evolutionary dynamics of RGA gene families in major crop genomes

Supervisory team:

Prof Jacqueline Batley, jacqueline.batley@uwa.edu.au

Dr Aria Dolatabadian, aria.dolatabadian@uwa.edu.au

Description: This project focuses on identifying and characterising resistance gene analogs (RGAs) across 50 genomes spanning diverse plant families, from woody perennial trees to annual and biennial crops. The student will use bioinformatics tools such as RGAugury, NLR-Annotator and OrthoFinder outputs to mine these genomes for RGAs, then build orthology and phylogenetic trees to compare gene family evolution across species. They will learn to integrate comparative genomics and phylogenetics to study the diversity and evolution of plant immune receptor genes. Through this project, the student will gain hands-on experience in genome mining, orthogroup analysis, and phylogenetic tree construction. The work will contribute to understanding how disease-resistance genes have evolved across crops, informing future breeding and crop improvement strategies.

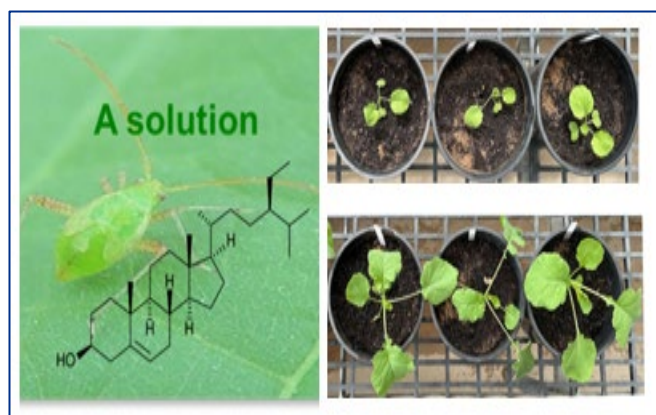
Level: Honours, Master's or PhD

A novel biotechnological approach to protect crops from insect pests

Supervisory team:

Prof Jacqueline Batley, jacqueline.batley@uwa.edu.au

Dr Jing Li, jing.li@uwa.edu.au



Description: New approaches are required to control insect pests which cause enormous global crop losses. Phytophagous insects are incapable of synthesising cholesterol. Cholesterol is a precursor of the moulting hormone. Insects rely on converting host phytosterols to cholesterol. There are stringent structural demands on phytosterols used as substrates; therefore, some phytosterols cannot be utilised by insects. This critical pest–host interaction provides a unique opportunity to develop innovative pest control strategies. The project aims to develop novel technology by modifying plants to produce non-utilisable sterols. Plants with modified sterols will be unable to support insect growth & reproduction but will nevertheless function normally. The specific aims are to modify canola plant sterols by overexpression/knock-out (using CRISPR technology) of novel sterol biosynthetic genes, or by exploiting novel sterol profiles in canola sterol mutant lines.

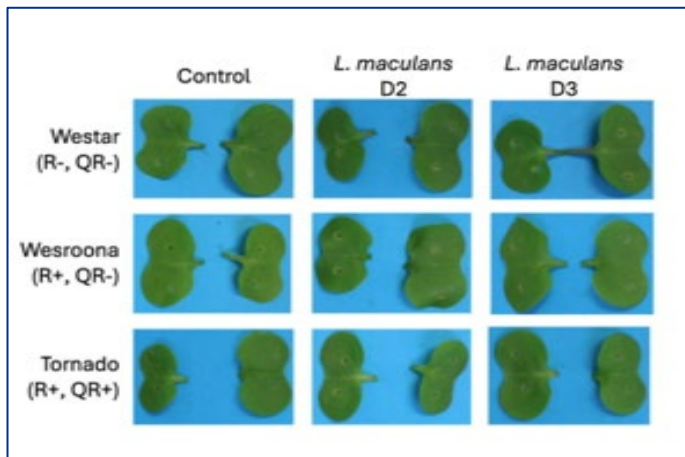
Level: Honours, Master's or PhD

Seedlings to adults: Predicting quantitative resistance genes in *Brassica napus*

Supervisory team:

Prof Jacqueline Batley, jacqueline.batley@uwa.edu.au

Dr Sarah Lock, sarah.lock@uwa.edu.au



Description: Quantitative resistance (QR) provides broad-spectrum and durable protection against plant pathogens, yet the genetic basis of QR in *Brassica napus* remains poorly understood. This project aims to predict disease resistance at the seedling stage using both transcriptomic and genomic data. By applying various techniques, including elastic net regression models, the candidate will identify genes whose expression patterns predict resistance in adult plants. Further analyses will include differential gene expression and the construction of gene co-expression and gene regulatory networks to reveal pathways and regulatory modules associated with QR. The candidate will gain valuable experience in plant molecular genetics, machine learning approaches for transcriptomic prediction, and other bioinformatic analysis techniques. The findings will provide new insights into the molecular basis of QR and contribute to breeding strategies for more resilient *B. napus* varieties.

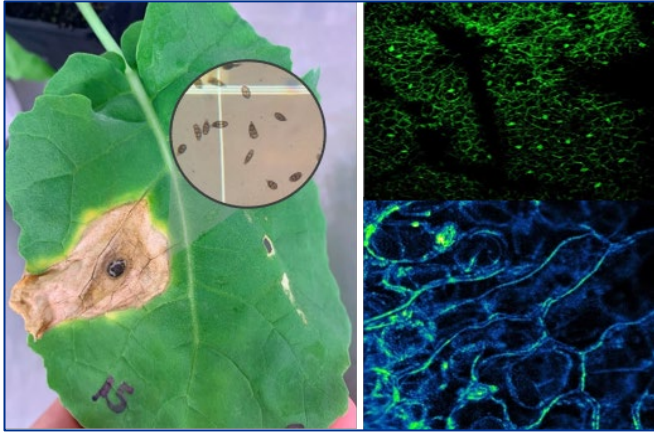
Level: Honours, Master's or PhD

Exploring novel sources of disease resistance for *Brassica* crop breeding

Supervisory team:

Prof Jacqueline Batley, jacqueline.batley@uwa.edu.au

Dr Junrey Amas, junrey.amas@uwa.edu.au



Description: Diseases such as blackleg, *Alternaria* leaf blight and turnip mosaic virus (TuMV) present significant threats to *Brassica* crop production. Previous investigations have identified crop wild relatives, *Brassica carinata*, synthetic *B. napus* and various introgression lines (ILs) as promising sources of novel resistance against these diseases. This project aims to explore these underexplored genetic resources to identify novel resistance (R) and susceptibility (S) genes for breeding and evolution studies. Genetic and genomic analyses will identify potential R and S gene candidates, from which molecular markers can be developed. Subsequently, these candidate genes will undergo functional characterisation using biotechnological tools such as genetic transformation and gene editing. Discovering these novel genes will broaden the array of genetic strategies available to combat plant diseases effectively.

Level: Honours, Master's or PhD

Understanding the evolution of disease resistance genes across the Brassicaceae family

Supervisory team:

Prof Jacqueline Batley, jacqueline.batley@uwa.edu.au

Dr William Thomas, william.thomas@uwa.edu.au



Description: The Brassicaceae is a diverse plant family containing many economically important crops but also hosts numerous devastating pathogens. Genetic resistance is the most cost-effective and sustainable approach to disease management. R genes are under strong selection and evolve rapidly, but their evolution across the Brassicaceae remains poorly understood. This project aims to identify and understand the evolutionary patterns of R genes across Brassicaceae. It will track the evolutionary events of specific R genes and explore the genome-wide diversity of R gene analogs across different Brassicaceae genomes. The project will be mainly data-based, and the student will gain experience in comparative genomics, phylogenetics, and evolutionary genomics. The findings from this project will deepen our understanding of how functional R genes evolve and inform the identification and management of novel R genes.

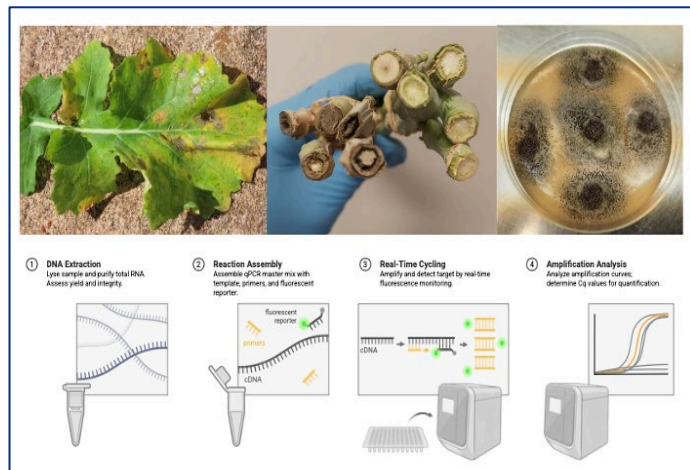
Level: Honours, Master's or PhD

Development of a qPCR assay to quantify *Leptosphaeria maculans* biomass in infected canola

Supervisory team:

Prof Jacqueline Batley - jacqueline.batley@uwa.edu.au

Dr Rajesh Natarajan - rajesh.natarajan@uwa.edu.au



Description: *Leptosphaeria maculans*, the causal agent of blackleg disease, is one of the most important fungal pathogens affecting *Brassica napus* (canola). Understanding how effectively the pathogen colonises and moves through canola plants with different combinations of resistance genes is important for improving durable blackleg resistance. This project aims to develop and validate a quantitative PCR assay for measuring *L. maculans* fungal biomass in infected canola tissues. Assay specificity, amplification efficiency and reproducibility will be evaluated using different *L. maculans* isolates before applying the method to infected leaf and stem samples collected from canola resistance experiments. Through this project, the candidate will gain practical experience in plant-pathogen interactions, DNA extraction and quantification, qPCR assay design and optimisation, molecular diagnostics, fungal disease biology and quantitative data analysis.

Level: Honours or Master's

A Molecular whodunit: Following genetic clues to decode effector recognition specificity in plant immune receptors

Supervisory team:

Prof Jacqueline Batley - jacqueline.batley@uwa.edu.au

Dr Shu Mohd Saad - shu.mohdsaad@uwa.edu.au



Description: How do plant immune receptors evolve to recognise different pathogens? While the blackleg resistance in canola has traditionally been viewed as a simple gene-for-gene interaction, discoveries in the last ten years have revealed unexpected complexity in how plants detect pathogens. Surprisingly, closely related receptors can recognise different pathogen effectors, while more distantly related receptors may recognise the same target. Using ethyl methane sulfonate (EMS) mutants, molecular biology techniques and comparative sequence analysis, students will follow the genetic clues to identify the molecular determinants of effector recognition. The findings will improve our understanding of how plant immune receptors diversify and adapt to evolving pathogen threats.

Level: Honours or Master's

Targeted Knockout of the TRY locus in *Brassica* species to improve insect resistance in canola

Supervisory team:

Prof Jacqueline Batley - jacqueline.batley@uwa.edu.au

Dr Thomas Bergmann - thomas.bergmann@uwa.edu.au



Description: Trichomes are hair-like, outgrowing structures from the epidermis of plant cells. They appear in various forms with different features and form a protective layer on the plant surface against many biotic threats, such as herbivorous insects. Canola (*Brassica napus*) is a major oilseed crop worldwide but lacks an adequate trichome layer. Identifying new trichome sources and genes involved in trichome formation in Brassica species is of great interest to breeders seeking to improve plant defence against pests and pathogens. Genetic studies identified TRY as a major candidate gene for trichome formation, but it has yet to be functionally validated. This project aims to unravel the functional role of TRY in Brassica species to improve insect resistance in canola. The project includes comparative genomics, CRISPR/Cas-mediated knockout approaches, and reverse genetics approaches. The student will conduct bioinformatic analyses, wet lab tasks, and targeted plant crosses in the glasshouse.

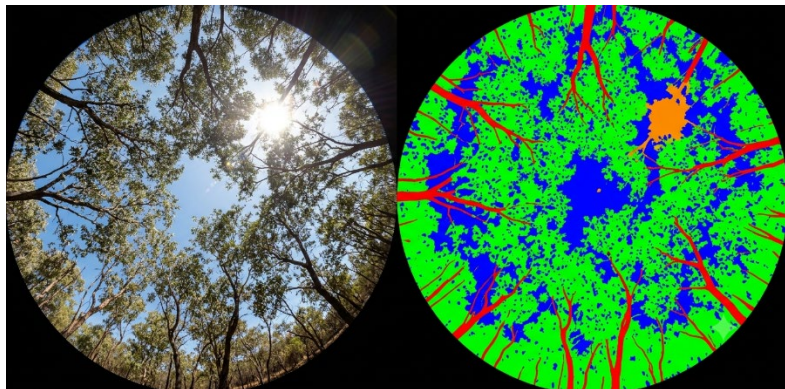
Level: Honours or Master's

Look - a flower! Using deep learning for automated plant part detection in canopy photographs to improve phenological monitoring

Supervisory team:

Dr Jake Eckersley, jake.eckersley@uwa.edu.au

Dr Caitlin Moore, caitlin.moore@uwa.edu.au



Description: Canopy photography is widely used to track leaf emergence, flowering, and senescence; key drivers of terrestrial carbon cycles and food webs. Long-term canopy monitoring datasets are crucial to understand how the timing of these important phenological processes are shifting in response to climate change. However, the techniques used to analyse these images are laborious and imprecise, limiting our ability to detect meaningful shifts in tree function. Using data from an Australia-wide tree monitoring network, you will test how emerging image processing tools can be used to separate plant parts in canopy imagery. This work will help improve ecosystem change detection and allow you to examine what those changes mean for ecosystem function. During the project, you will gain highly sought after skills in remote sensing, vegetation monitoring, and deep learning-based image analysis.

Level: Honours, Master's or PhD

Bouncing back; drought avoidance and disturbance response strategies of an invasive passionfruit (*Passiflora foetida*)

Dr Jake Eckersley, jake.eckersley@uwa.edu.au

Dr Michelle Rafter, michelle.rafter@csiro.au

Assoc Prof Michael Renton, michael.renton@uwa.edu.au



Description: Invasive species pose a major threat to the biodiversity, structure and functioning of native ecosystems. *Passiflora foetida* (stinking passionflower) is a climbing passionfruit species native to the neotropics (yes you can eat it, yes it tastes good) that is highly invasive in northern Australia's tropics and is spreading throughout the Kimberley, Pilbara and Gascoyne regions. A key reason for its invasion success is the ability to re-sprout quickly following droughts and fire, allowing it to overtop native species. However, the mechanisms that allow this rapid response are poorly understood. Using a glasshouse trial, paired with field observations of root structure, this project is aimed at characterising the below ground processes, such as carbohydrate storage, root formation, and groundwater use that allow the species to persist through long drought cycles. By improving understanding of *P. foetida* biology you will help inform a larger project aimed at improving management and mitigating risks to native biodiversity.

Level: Honours or Master's

Geographical variation in the ecology and morphology of gastropod molluscs

Supervisory team:

Dr Jane Prince, jane.prince@uwa.edu.au

Dr Matilda Murley, matilda.murley@uwa.edu.au

Dr Renae Hovey, renae.hovey@uwa.edu.au



Description: Some species of molluscs have an extensive distribution along the western coast of Western Australia spanning from the Kimberley to the Capes crossing recognised biogeographic regions. Each species could be the topic of a research project. These projects aim to investigate the morphological and ecological characteristics of these species at various points along the coast, looking for natural transitions. Tissue samples will be collected for DNA analysis either in these projects or at a later stage. Students need a C-class driving licence (4WD qualifications desirable), familiarity with multivariate statistics and the use of other specialist software. This project will require one extended trip to the Kimberley and Pilbara in June and numerous trips closer to home in spring/summer.

Level: Honours or Master's

The effect of sampling method on the interpretation of field surveys

Supervisory team:

Dr Jane Prince, jane.prince@uwa.edu.au

Dr Matilda Murley, matilda.murley@uwa.edu.au

Dr Renae Hovey, renae.hovey@uwa.edu.au



Description: Quadrat sampling to determine the assemblage structure of intertidal invertebrates is a time-consuming process that requires considerable expertise. This makes it unsuitable for citizen science projects where participants may be unskilled or have limited time. This project will firstly re-examine data collected with indigenous rangers in the Kimberley to see how different methods of scoring the invertebrates in the quadrats affects the outcome and interpretation of the analysis. The second phase will involve field trials of different methods to gauge efficiency. Students need a C-class driving licence, familiarity with multivariate statistics and the use of other specialist software. Must be comfortable with computers and statistics and willing to "play" with data.

Level: Honours or Master's

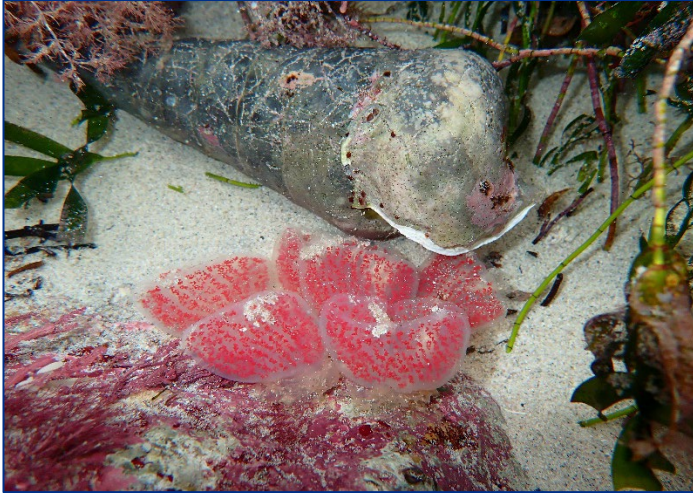
Ecology and conservation of the relict gastropod *Campanile symbolicum*

Supervisory team:

Dr Jane Prince, jane.prince@uwa.edu.au

Dr Ines Leal, ines.leal@dbca.wa.gov.au

Dr Renae Hovey, renae.hovey@uwa.edu.au



Description: The lighthouse snail, *Campanile symbolicum*, is one of Western Australia's most distinctive marine gastropods. It is the only living representative of the once diverse and widespread family Campanilidae and is now endemic to southwestern Australia, where it occurs in patchily distributed populations in shallow coastal habitats. Surprisingly little is known about its biology, ecology or vulnerability to environmental change. Our work has investigated population connectivity, growth and seasonal spatial ecology and has recently confirmed that *C. symbolicum* has direct development. Questions remain as to its current distribution, the connectivity of local populations and the ability of individuals to disperse. How will geographically isolated populations respond to warming oceans, coastal development and habitat change? This project involves considerable field work. Students need a C-class driving licence and to be confident snorkellers ideally with scuba qualifications.

Level: Honour, Master's or PhD

Population Genomics of an Introduced Dung Beetle

Supervisory team:

Assoc Prof Jason Kennington, jason.kennington@uwa.edu.au

E/Prof Leigh Simmons, leigh.simmons@uwa.edu.au

Assoc Prof Theo Evans, theo.evans@uwa.edu.au

Description:

The dung beetle *Onthophagus taurus* was deliberately introduced to Australia in the 1970s as part of a biological control program to improve cattle-dung breakdown and limit dung-breeding flies. It is now widely distributed across several states, including Western Australia, South Australia, Victoria, New South Wales and Tasmania. This project will analyse existing genomic data from *O. taurus* populations collected across Australia and from natural populations in southern Europe and North Africa. The aim is to compare population genetic structure between the introduced Australian populations and native populations to understand how introduction and subsequent spread have shaped genetic variation in an introduced species. It will also provide broader insights into the importance of genetic variation to the success of reintroduction and biological control programs.

Level: Honours or Master's

Orchid Conservation

Supervisory team:

Prof Kingsley Dixon, kingsley.dixon@uwa.edu.au



Description: An exciting project is offered to undertake research into native orchid propagation and conservation science. The study involves understanding how mycorrhiza can influence orchid seed germination and plant growth by examining variation in sources of fungi and how they can alter with the age of cultures. The program will give you skills in bushland restoration concepts, conservation of threatened species and a broad overview of how to develop effective conservation science for native species. The project has funding and capacity to support an enthusiastic person who has an interest in native orchids and/or native plant conservation

Level: Honours or Master's

Conservation of a rare and endangered species: *Eremophila praecox*

Supervisory team:

Prof Kingsley Dixon, kingsley.dixon@uwa.edu.au

Dr Bruno Fogliani, bruno.fogliani@uwa.edu.au

Dr Tristan Campbell, tristan.campbell@uwa.edu.au



Description: *Eremophila praecox*, a member of the Scrophulariaceae family, is classified as a "Priority Two" species by the Western Australian Government's Department of Biodiversity, Conservation and Attractions (DBCA). This classification means the species is currently known from only one or a few collections, a number of individuals, or locations, which may be threatened. This proposed internship is part of a larger research program dedicated to this species. Specifically, the project aims to investigate its biological and ecological requirements, as well as optimize its propagation methods, to enhance its long-term management and conservation. Join us and be part of this exciting project!

Level: Honours or Master's

Exploring seed dormancy breaking and seedling resilience to abiotic factors

Supervisory team:

Dr Bruno Fogliani, bruno.fogliani@uwa.edu.au

Prof Kingsley Dixon, kingsley.dixon@uwa.edu.au



Description: The flora of Western Australia is renowned for its exceptional diversity, with many species enduring significant stress throughout their development. Seed germination and seedling establishment represent critical stages, both in the wild and during ecological restoration efforts. Consequently, plants have evolved specific adaptations within their seeds. Understanding these adaptations not only clarifies species ecology but also provides vital information to optimize their use in revegetation.

Accordingly, this study will investigate the seeds of several native Western Australian species to determine how to break their dormancy and to understand their responses to fire-regulated environmental cues. Additionally, seed priming trials will be conducted to evaluate whether this technique enhances seedling resilience to abiotic stresses such as moisture and temperature.

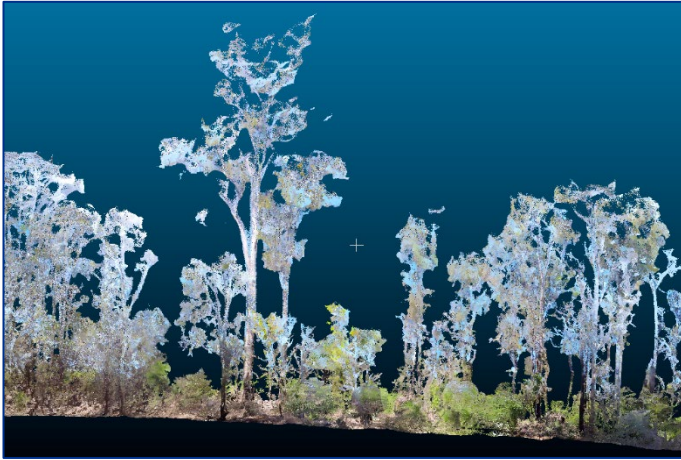
Level: Honours or Master's

Hyper-detailed imaging of vegetation community structures

Supervisory team:

Dr Tristan Campbell, tristan.campbell@uwa.edu.au

Prof Kingsley Dixon, kingsley.dixon@uwa.edu.au



Description: How does the structure of forests and woodlands of WA recover from disturbances such as fire or clearing? How does this affect their future resilience? And what factors influence this? For this project, we will use a hand-held LiDAR scanner to create detailed 3D models of vegetation structures across a series of vegetation types and disturbance histories. This method produces far greater structural detail than traditional survey methods and will provide significant insights into the recovery process. Projects within this can focus on ecological, programming or AI aspects of the research. Experience with programming (python preferred) and GIS are a strong advantage.

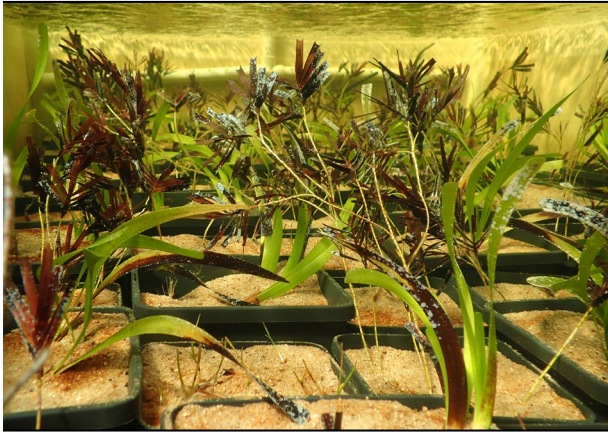
Level: Honours or Master's

Effects of climate change on seagrass morphology and nutrient budget

Supervisory team:

Dr Maria Jung, maria.jung@uwa.edu.au

Dr Renae Hovey, renae.hovey@uwa.edu.au



Description: Seagrasses are critical ecosystem engineers yet are declining globally. In 2011, a marine heatwave (MHW) combined with light deprivation from flash flooding caused large-scale seagrass loss in Gathaagudu (Shark Bay). As extreme climatic events are expected to become more frequent and intense, understanding how seagrasses with different life-history traits respond is increasingly important. This project will investigate the effects of MHW, low light, and their combination under a +1.5 °C ocean warming scenario on temperate and tropical seagrasses from Gathaagudu. The student will analyse changes in seagrass morphology and carbon and nitrogen content to assess nutrient budgets, and gain experience with wet-lab techniques and statistical analysis of a multifactorial experiment. Good interpersonal skills, curiosity, and a willingness to think critically and ask questions are essential. Familiarity with Excel and RStudio is desirable.

Level: Honours or Master's

Recreational fisher preferences for Black Bream management

Supervisory team:

Dr Matt Navarro, matthew.navarro@uwa.edu.au

Dr Alex Hesp (DPIRD), sybrand.hesp@dpird.wa.gov.au

Dr Charlotte Aston, charlotte.aston@uwa.edu.au

Dr Dan Yeoh (DPIRD), daniel.yeoh@dpird.wa.gov.au



Description: Black bream is an iconic recreationally fished species in Southwest WA estuaries, but slower growth over the last 20 years has raised concerns about fish becoming too small to allow for prized trophy sized catches or even retention. However, as a mainly catch-and-release fishery, is small size really a problem for fishers if catch rates remain high? Or would fishers prefer larger trophy fish, even with lower catch rates? This project uses face-to-face surveys in metropolitan and Southwest WA to understand black bream fisher's preferences for management outcomes. Using a choice experiment framework, these surveys will capture and quantify perceived value around different management objectives (e.g., bigger fish vs. higher catch) and integrate this with fisheries stock assessment methods. Outcomes will directly help guide future management of this species to better align with recreational fishing objectives.

Level: Honours or Master's

Resetting baselines in fisheries using novel data sources

Supervisory team:

Dr Matt Navarro, matthew.navarro@uwa.edu.au

Dr Joe Christensen, joseph.christensen@uwa.edu.au



Description: Fisheries management often struggle due to limited historical data. This project taps into an innovative and largely untapped resource: historic dive and angler club fishing reports. These archives offer a unique window into past coastal fisheries and provide valuable baseline information that can help us understand shifts in fish populations better. This project will analyse changes in fish species composition, fish sizes, and public attitudes towards fisheries management over time. By uncovering these patterns, the project aims to shed light on how historical conditions have shaped today's fish populations. This research not only offers a fascinating opportunity to work with historical ecological data but also contributes directly to improving sustainable fisheries management. Students will gain experience in data analysis, historical research, and interpreting long-term ecological change.

Level: Honours or Master's

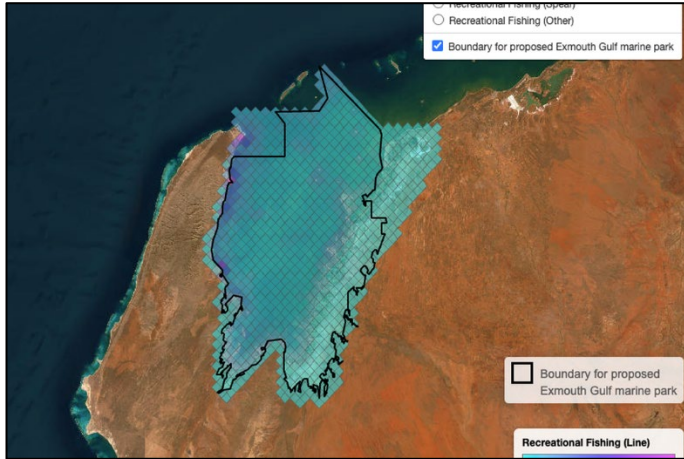
Exploring spatial values in three proposed Western Australian marine parks

Supervisory team:

Dr Matt Navarro, matthew.navarro@uwa.edu.au

Dr Nicole Hamre, nicole.hamre@dbca.wa.gov.au

Brooke Gibbons, brooke.gibbons@uwa.edu.au



Description: Understanding how people use and value coastal spaces is critical to ensure that marine conservation aligns with local values. This project will use data collected by UWA researchers across three marine park planning processes to understand patterns in marine values including identifying areas where values are co-located and exploring how human values are shaped by biological features (e.g., habitat and presence of megafauna). This project presents an opportunity for someone to inform current marine park planning processes, stretch their spatial modelling expertise, and make use of an already existing data set to get a head start on their way to a published output.

Level: Honours or Master's

Understanding feral pig activity and habitat use in the Walpole Wilderness Area

Supervisory team:

Prof Nicki Mitchell, Nicola.mitchell@uwa.edu.au

Dr Emily Hoffmann, emily.hoffmann@uwa.edu.au



Description: Peatlands are important ecosystems that store large amounts of carbon and support unique biodiversity. *Empodisma* peatlands in southwestern Australia are a Threatened Ecological Community and provide habitat for range-restricted species such as the Endangered sunset frog. Feral pigs are a growing threat, with their rooting and foraging disturbing peat and vegetation and increasing susceptibility to drying, erosion and fire. This project is part of the major initiative [PEAT Southwest](#) where camera traps have been deployed since October 2025 to investigate feral pig activity and habitat use across peatlands. The project involves analyzing the camera-trap dataset to study seasonal activity patterns and variation in activity with time since fire. Pig detections can potentially be related to spatial data on soil and biodiversity attributes, and project findings will help identify where and when pig control should be prioritised, particularly to support threatened species and protect soil carbon.

Level: Honours or Master's (Sem 2 start only)

Ancient spiders, modern threats: Conservation priorities in the Pilbara

Supervisory team:

Dr Renee Catullo, renee.catullo@uwa.edu.au

Dr Jeremy Wilson (WA Museum), jeremy.wilson@museum.wa.gov.au



Description: The Pilbara is one of Australia's most ancient and biologically distinctive landscapes. Mygalomorph spiders, including trapdoor spiders and their relatives, are especially valuable for understanding this history because they generally disperse poorly and remain closely associated with particular habitats. As a result, many evolutionary lineages are highly localised and are of conservation significance in a region undergoing extensive resource development.

Using existing genetic, museum and spatial data, this project will map evolutionary diversity across Pilbara mygalomorph spiders. It will identify hotspots of geographically restricted lineages, assess how well these hotspots are represented within conservation areas, and identify gaps in conservation planning. This desktop-based project will develop skills in phylogenetics, spatial analysis, species distribution modelling and R.

Level: Honours or Master's

Monitoring highly targeted mesophotic fish populations: optimising stereo-video monitoring of large offshore no-take marine reserves

Supervisory team:

Dr Tim Langlois, tim.langlois@uwa.edu.au

Brooke Gibbons, brooke.gibbons@uwa.edu.au



Description: Large offshore no-take marine reserves have recently been created around Australia and New Zealand. This project will involve field work to collect baited remote stereo-video samples within no-take areas within the Ningaloo and South-west Capes region. Existing data sets will be provided from New Zealand. This project will use novel methods of power analysis to design optimal future monitoring plans to detect differences in highly targeted mesophotic grouper populations (e.g. hāpuku *Polyprion oxygeneios*) that may occur after the cessation of fishing. The student will develop skills in field work and novel statistical analyses applicable to marine park monitoring design.

Level: Honours, Master's or PhD

Monitoring recruitment habitats of the western rock lobster

Supervisory team:

Dr Tim Langlois, tim.langlois@uwa.edu.au

Dr Simon de Lestang (DPIRD,) simon.delestang@dpird.wa.gov.au



Description: What are the habitat requirements of juvenile western rock lobster? The western rock lobster fishery is the highest value single species fishery in Australia, worth over \$500 Million per annum. An important metric used by fisheries scientists to monitor the health of this resource is the abundance of post-larvae (puerulus) that recruit along the coast of WA. We have a project to evaluate patterns in settlement, recruitment and habitat change that occurred after the 2010/2011 marine heatwave. This project will include a large amount of time on the water using novel methods to survey shallow water habitats where juvenile lobsters are found.

Level: Honours, Master's or PhD



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