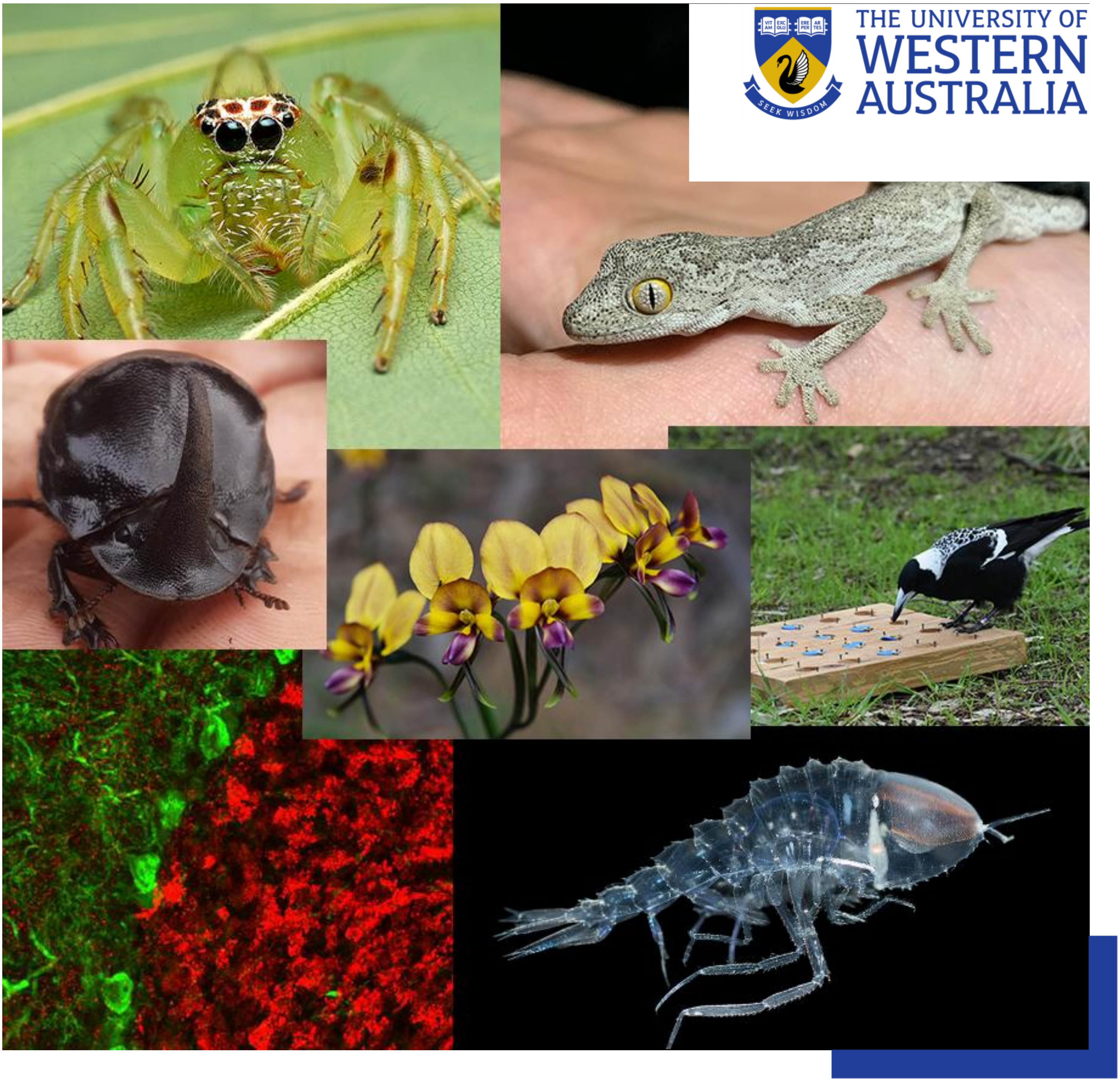


THE UNIVERSITY OF WESTERN AUSTRALIA

Research Projects 2026

School of Biological Sciences

Contents

Researchers

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/Masters 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

Behavioural ecology research – understanding cognition, communication and adaptation to climate change

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

My research lab has a strong behavioural ecology 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 and cognitive tests) combined with behavioural observation. My research lab focusses on large evolutionary questions such as the evolution of cognition, cooperation and complex vocal communication, but typically uses short-term experiments to test these larger evolutionary questions.

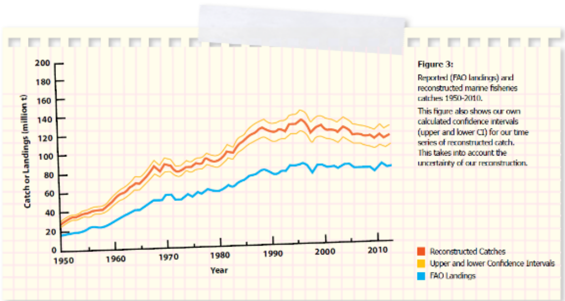
Examples of typical research conducted in my lab include: conducting cognitive tests on individuals to determine the relationship between cognition and social interaction (a test of the social intelligence hypothesis), conducting playbacks on individuals to determine how anthropogenic noise affects their 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 and the cost of parental care behaviours.

The Western Magpie Research Project 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 these broad research themes) are also available.

Sea Around Us – Indian Ocean: Fisheries science & aquatic ecology

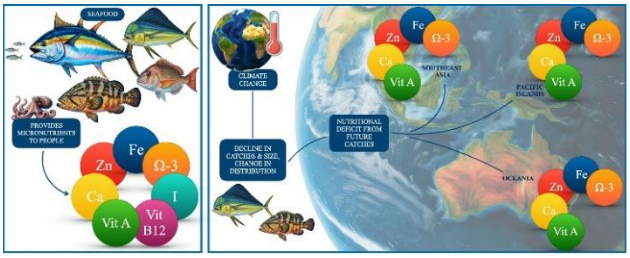
Dirk Zeller, **dirk.zeller@uwa.edu.au**, **www.seaaroundus-io.org**

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 (wanja.nyingi@uwa.edu.au) that focuses on aquatic ecology and aquaculture (www.seaaroundus-io.org/freshwater).



We research fishing impacts on marine ecosystems at large spatial and temporal scales, including reconstructions of historical catches, fishing effort and other fisheries time series, and engage in research on population dynamics, density-dependence in growth, stock assessments, fisheries history, strategic ocean governance, fisheries policy, seafood nutritional profiles and fisheries economics.

The lab also partners regularly with colleagues around the world including collaborations with the Harvard University Aquatic Food Composition Database team, with the Aquatic Resource Trade in Species Database team at the University of Washington, with fisheries historians, with *FishBase* and *SeaLifeBase* on biodiversity (www.fishbase.org, www.sealifebase.org), and with the *Fisheries Economics Research Unit* (UBC, feru.oceans.ubc.ca) on issues in resource economics.



Isotope Ecology

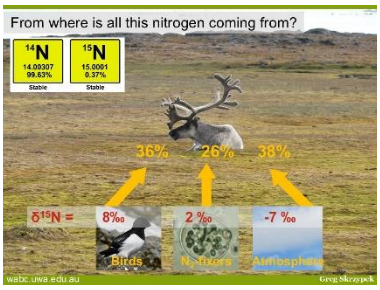
Greg Skrzypek, grzegorz.skrzypek@uwa.edu.au, https://www.wabc.uwa.edu.au/

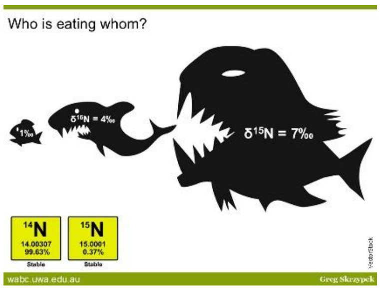
Greg Skrzypek is a scientist who uses stable isotopes (like hydrogen, carbon, nitrogen, oxygen, sulfur, and strontium) to explore how ecosystems work. He investigates things like who eats what, how water and nutrients move, how plants use water and how pollution spreads, especially in places affected by mining, agriculture, and climate change.

His research takes him from deserts to oceans, and he's helped build important environmental baselines for the Pilbara region in WA, one of the world's most significant iron ore mining areas. These baselines help scientists and decision-makers monitor and protect the environment more effectively.

A big part of Greg's work, and what makes it exciting for students, is the hands-on experience in the lab. If you're curious about a mix of ecology, chemistry, and isotope science, and want to learn how science can help solve real-world problems, Greg's work is a great example of where your studies could take you.

Stable isotope ecology Stable isotopes are non-radioactive forms of elements that occur naturally. Because different processes (like photosynthesis, respiration, or digestion) affect isotopes in predictable ways, they act like chemical fingerprints in nature. Stable isotopes could be used to trace ecological processes, e.g.:
1. **Trophic Dynamics** (Who Eats Whom) - carbon and nitrogen isotopes help identify an organism's position in the food web. For example, predators have higher nitrogen-15 levels than herbivores.
2. **Tracking Nutrient Cycles** - isotopes of carbon, nitrogen, and sulfur reveal how nutrients move through soil, water, and organisms. It could help study fertiliser runoff, eutrophication, or nutrient limitations.
3. **Water Sources and Movement** - hydrogen and oxygen isotopes in water can show where plants get their water (rain, groundwater, etc.). This can help to identify ecosystem responses to drought.
5. **Climate Change Impacts** - isotope ratios in tree rings, ice cores, or animal tissues can reflect past climate conditions. For example, the stable isotope composition of the tooth reflects the stable isotope composition of the water drunk by the mammal and therefore the mean air temperature at the time of enamel formation.



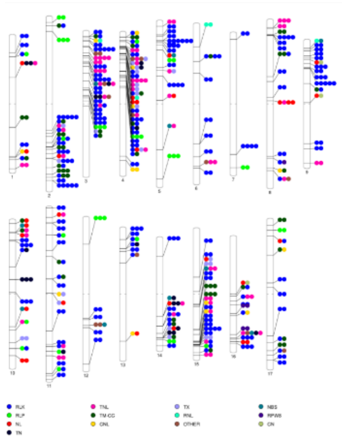


Note: *In my current role, Head of School, I can accept very limited number of students each year*

Plant Genomics

[Jacqui 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 in doubt whether these conventional approaches alone are adequate for addressing the impending challenges and further compounded by erosion of diversity in cultivated species.



Resistance genes: Our group focuses on the identification, prediction and characterisation of novel qualitative and quantitative resistance sources 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 aim to uncover new resistance genes crucial for breeding resilient canola varieties. Furthermore, to ensure durable resistance, we aim to explore the regulatory pathways involved in resistance and track the evolutionary patterns in *Brassica* and its wild relatives. Our work addresses the urgent need for sustainable disease management strategies to protect global canola production and better understand the complex plant-disease responses.

Sterols: Addressing the urgent need for innovative pest control strategies, we delve into modifying plant sterol metabolism to combat insect pests. By genetically engineering canola plants to produce non-utilisable sterols, we aim to impede insect growth 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.



Neuroecology and Behaviour

[Jan Hemmi](), [jan.hemmi@uwa.edu.au]()

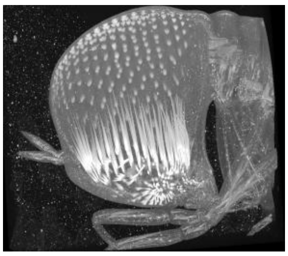
Physiology: Electrical signals from eyes allow us to measure visual performance

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.

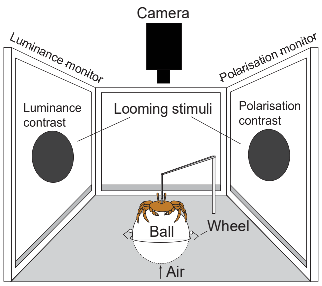
Approach: We take a **comparative** approach to study **behaviour, physiology**, and **anatomy** and our methods include 3D imaging, modelling, and virtual reality.

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.



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.

Colour pattern diversity, behaviour, and environmental change

Dr Jennifer Kelley, Jennifer.kelley@uwa.edu.au

Our research lab explores the incredible diversity of colours and patterns observed in nature and seeks to link this with behaviour. In collaboration with industry, our group also examines how animals respond to environmental change through shifts in their behaviour.

Colouration for camouflage in 3D: Having a 3D body shape is problematic for camouflage because overhead illumination results in the productions of shadows across the body. However, animals may also exploit the relationship between 3D form and shadows to create the illusion of 3D shapes and surfaces. Our research uses computer modelling, photography, and experiments with 2D and 3D printed prey to explore how camouflage works in 3D.

Evolution of leaf mimicry in nocturnal moths: Many species of moth avoid predation by having colouration that gives them a leaf-like appearance. This form of camouflage – known as masquerade - is particularly fascinating because it relies on predators mis-classifying prey as an uninteresting object. We are exploring the evolution of this strategy in moths, revealing the optical mechanisms for producing leaf-like characteristics, and conducting behavioural experiments with birds to determine the cues used for object classification.

Colour and behaviour in peacock spiders: Peacock spiders have striking iridescent colouration and charismatic courtship dances, but very little is known about their behaviour and ecology. Our research addresses this knowledge gap, linking colouration with behaviour and exploring the importance of illumination and signalling geometry for communication behaviours.

Native fishes in altered water flows: Freshwater habitats in the Pilbara region are becoming altered due to the release of groundwater from iron ore mining activities. Our group examines how changes in water flow rate impact key fitness behaviours in native fishes (e.g. western rainbowfish) such as predator avoidance and mate choice.

Filbee-Dexter lab: marine ecology, blue forests and coastal conservation

Karen Filbee-Dexter, karen.dexter@uwa.edu.au

Our research centres on how coastal ecosystems—especially marine forests—respond 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 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.

“Joe’s Lab”: 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 traits 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.

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 the emerging field of offshore wind energy.

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.

Ecological and evolutionary theory and modelling

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 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
- The evolution of resistance to pesticides in weeds, pests, and pathogens
- Plant root systems and nutrient foraging strategies
- The coevolution of inter-species interactions, such as mutualism between plants and microbes, pollinators and plants, coral and algae
- Coral communities and their structural diversity
- Optimising management strategies in biosecurity, biological invasion, crop protection and conservation
- Mine site restoration and revegetation

Honours and Masters 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.

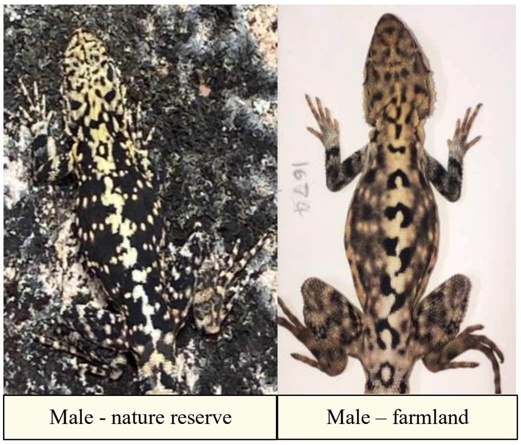
Evolutionary biology in the wild

Natasha LeBas, natasha.lebas@uwa.edu.au

I'm an **evolutionary biologist** interested in **sexual selection** and **conservation biology**. I primarily work on a wild lizard model system, but also lab-based insects (sexual selection) and marsupial conservation (i.e. the loss of antipredator behaviour in havens).

Research: Wild populations are becoming smaller and more isolated; whilst simultaneously having to adapt to a rapidly changing environment and climate. Against this stark dichotomy of adapt or perish, it is imperative that we learn how best to support small, fragmented populations. While lab-based systems exist to guide us, there are few robust natural systems within which we can develop our understanding. The population dynamics of our **wild lizard model system** mimic those of threatened species and allow us to develop this understanding.

Our model system, the ornate dragon (Fig 1), resides on isolated granite outcrop 'islands' within a 'sea' of wheat fields, providing the replication and population variation required to establish the predictors of extinction and adaptation. There are over 3,500 individuals sampled from over 70 wild populations dating back ~28 years. There are opportunities to utilize, and add, to this dataset to examine the relationships between natural and sexual selection and genomic parameters in the wild. It appears that the ornate dragon has also rapidly adapted to anthropogenic change of their habitat (Fig 2 – dorsal colour change in farmland).



Projects: There are multiple opportunities available, possibilities include: 1) determining the key factors that enhance **adaptive potential** in a changing environment, 2) **population variation in sexual selection** and its role in improving genetic health, 3) the evolution of **female ornamentation**, 4) the population consequences of variation in **predator and parasite pressure**, 5) **comparative study** of the Ctenophorus genus. I am happy to hear other suggestions.

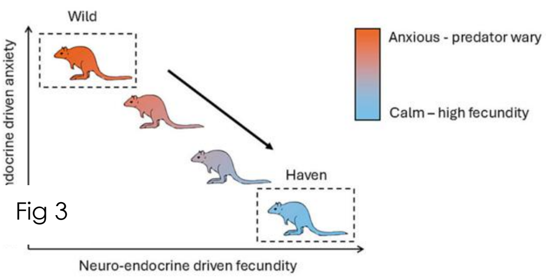


Fig 3

I am also interested in how evolutionary biology can assist broader conservation problems such as the **loss of antipredator behaviour** in havens/islands. There are marsupial projects available which examine the trade-off between fecundity and antipredator behavior (Fig 3) using both genomic datasets and behavioral data / experiments.

Please email me if any of these opportunities are of interest.

Vertebrate conservation and climate change

[Nicki Mitchell](), [nicola.mitchell@uwa.edu.au]()

I am on sabbatical from Jan-July 2026, so not available for supervision until Semester 2 2026

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 climate change. This includes 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. I am particularly interested supervising students with strong interest in physiological ecology or population ecology, and who enjoy 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. Consequently, unless I am supervising a specific project featured in Part 2 of this booklet, considerable lead time may be needed to develop a new project. Research areas suited to 1-1.5 year 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 of terrestrial-breeding (amphibians): Physiological studies examining desiccation tolerance, breeding phenology, 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, with a focus on understanding their sensitivities to fire and climate change (could include invertebrate species).

Thermal ecology, sex determination and climate vulnerability (reptiles): Analyzing impacts of high temperatures on hatching success and sex ratios (primarily sea turtles), often utilizing field data, microclimate modelling, and finite element analysis.

Please email me if you are interested in discussing research opportunities, ideally at least six months before starting your first dissertation unit.

Conserving biodiversity and ecosystem services

Raphael Didham, raphael.didham@uwa.edu.au

INSECTS are the little things that run our world. They are the most diverse of all organisms, with spectacular adaptations in form and function that underpin the central roles they play in the ecosystem functioning.

BUT they are also the least well studied, and most poorly represented in conservation planning.

In my research group we measure and monitor the impact of global environmental change on biodiversity…

- Land-use change
- Agricultural intensification
- Climate change
- Invasive species
- Urbanization

…and benchmark the ecological and applied importance of these impacts for the maintenance of ecosystem functioning, e.g.:

- How does insect pollinator decline affect pollination services by bees and wasps?
- How resilient is ecosystem multifunctionality to species loss in ant assemblages?
- How do we promote more sustainable agriculture by enhancing nutrient cycling services of dung beetles and pest control services provided by natural enemies?

Insects are the perfect group to tackle important ecological questions – they are easy to sample, respond rapidly, and play important functional roles in ecosystems, allowing us to generate meaningful data in a very short space of time.

SKILLS learned here will set you up for a successful career in ecology: how to develop a good testable hypothesis, design robust experiments, handle complex data, carry out statistical analyses in R, communicate findings effectively, and publish your work.

Conservation & 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, and beetle 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.

ARISE – Aquatic research for impact, sustainability evidence

Tai Loureiro, tai.loureiro@uwa.edu.au

ARISE is a multidisciplinary group that investigates how aquatic ecosystems support people, how human activities alter these ecosystems, and how this evidence can inform more equitable and sustainable management decisions. We focus on a range of aquatic environments, from estuaries and coastal reefs to offshore systems, and explore the ecosystem services they provide, including food, habitat, blue carbon, coastal protection, and cultural values. Our research combines community and ecosystem ecology, examining concepts such as disturbance and succession, functional traits, species interactions, and biodiversity. This approach enables us to develop frameworks and actionable indicators, often using invertebrate communities as indicators of change. We employ tools such as ocean accounts and ecosystem-based management to achieve our primary goal: to make the human-ocean relationship visible, measurable, and applicable for policy and practice.

Research at ARISE encompasses field ecology, experimental work, data synthesis, and governance analysis, with opportunities for student projects at all levels within these areas. Ecological projects investigate how aquatic communities respond to pressures like artificial light at night, urbanisation, pollution, habitat modification, and climate variability, utilising field surveys, manipulative experiments, long-term datasets, and trait-based or functional approaches. Other projects focus on developing and testing bioindicators and ecosystem service metrics for estuaries, coastal reefs, and offshore systems, linking them to blue carbon, fisheries, biodiversity, and cultural values. On the governance side, students can work on applying ocean accounting to real-world decision problems, such as marine spatial planning, restoration prioritisation, blue economy strategies, or the sustainability and decommissioning of offshore industries.

Across all topics, ARISE encourages projects that explicitly link ecological processes to benefits for people and that generate evidence and tools that managers, communities and industry can apply. Our work has a profound impact on how aquatic ecosystems are monitored, valued, and managed, particularly in dynamic environments. ARISE is committed to conducting rigorous ecological research and employing transparent methodologies that are relevant to those who depend on aquatic systems. We prioritise co-designing projects alongside communities, government agencies, and industry partners, from framing questions to interpreting results, ensuring that the evidence and tools we generate readily translate into practical applications.

ARISE
Aquatic research for impact, sustainability and evidence

Wernberg Lab: temperate reef ecology

Thomas Wernberg, thomas.wernberg@uwa.edu.au, (www.wernberglab.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 the many other types of organisms that live on, in and around seaweed dominated seascapes including corals, reef fishes and invertebrates.

Much of our 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.

Marine social-ecological systems

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.

Behavioural and evolutionary ecology under environmental change

Upama Aich, upama.aich@uwa.edu.au

With Assoc Prof Joseph Tomkins, we investigate how pollutants and life-history state (age, condition) shape behaviour, mate choice, immunity, and reproductive allocation, and how these individual-level processes can scale to population and conservation outcomes. We work at the interface of behavioural ecology, eco-toxicology, and evolution, asking if environmental stressors (e.g. antidepressants, androgenic growth promoters) alter reproductive signalling, choosiness, and fitness. We combine laboratory experiments (fish, insects) with quantitative analyses to generate understanding that inform biodiversity management.

At UWA, I primarily supervise projects on insects (fruit flies, dung beetles), but welcome working with fish. I particularly welcome students who are curious, keen to learn R and quantitative analysis, and interested in linking behaviour to mechanism (hormones, sperm traits, immunity) and to broader ecological change.

The lab projects involve animal work and therefore require risk assessments and, for vertebrates, animal ethics approval. Desk-based projects (e.g. meta-analyses) do not require ethics and can start sooner. Unless I am supervising a specific project featured in Part 2 of this booklet, please allow lead time to co-develop a new project and, where necessary, arrange ethics and logistics. Research areas suited to 1–1.5 year projects are below.

Behavioural eco-toxicology of dung beetles: Experimental tests of how androgenic pollutants affect mate choice, courtship, and reproductive allocation; integration with immune assays and sperm traits to evaluate trade-offs and fitness consequences.

Quantitative synthesis in behavioural ecology: Meta-analyses and systematic reviews addressing questions such as “Does male age shape female mate choice?”, effects of age on signalling/choosiness, and links between age and reproductive investment; multilevel meta-regression, publication-bias tests, and open workflows in R.

Please email me if you are interested in discussing research opportunities; earlier contact helps us align interests, plan methods, and ensure any approvals are in place.

Part 2: Research Projects

Combating the feral cat epidemic using cognition principles

Supervisory team:
Professor Amanda Ridley, amanda.ridley@uwa.edu.au
Dr Lizzie Speechley, lizzie.speechley@uwa.edu.au

Description: Feral cats are one of the most damaging invasive species worldwide. The impediment to most current feral cat management is their aversion to novel objects, such as baits and traps. An enhanced understanding of the factors underpinning this aversion is a crucial to improving current management. In this project, a student would investigate which factors cause neophobia in feral cats. The student would work with captively held feral cats at a Perth DBCA facility, presenting cats with novel objects differing in size, shape, colour to determine which elements cause the most neophobia. A Masters student has already done a project on introducing the same shape of two different sizes to feral cats. Future students will build on these findings, looking at responses to different combinations of size, shape and colour.

Level: Honours, Masters

Feral cat behaviour in captivity vs the wild

Supervisory team:
Professor Amanda Ridley, amanda.ridley@uwa.edu.au
Dr Lizzie Speechley, lizzie.speechley@uwa.edu.au

Description: Feral cats have had an unparalleled negative impact on Australian fauna. However, as they are notoriously neophobic (cautious) we know relatively little about their behaviour. As part of a larger research project, feral cats are being held at a DBCA facility where they are monitored 24/7 by security cameras. This project would require a student to analyse this camera footage to create an ethogram (inventory of behaviours/actions) of cat behaviour. This ethogram will be used to quantify behavioural responses to novel objects (baits/traps), humans and conspecifics. There is also potential to expand this ethogram to include camera trap footage of wild feral cats and compare their behaviour in captivity to the wild. This project will provide valuable insight into the behaviour of an elusive invasive species and reveal how captive conditions may impact behaviour.

Level: Honours, Masters

Problem-solving and cognitive performance in magpies

Supervisory team:
Professor Amanda Ridley, amanda.ridley@uwa.edu.au
Dr Lizzie Speechley, lizzie.speechley@uwa.edu.au

Description: Problem-solving measures behavioural flexibility which is an essential component of an individual's ability to adapt and survive in rapidly changing environments. However, we still do not understand how problem-solving ability relates to an individual's cognition, nor do we understand the cognitive processes underpinning problem-solving ability. This project would require a student to conduct problem-solving tests on individuals to determine whether performance in problem-solving is representative of overall cognitive performance, or whether it is linked to specific cognitive traits. One Masters student has already conducted two simple problem-solving tests on the magpies, confirming they are capable of doing these tasks. Future students would build on these by presenting more difficult problem-solving tasks to determine their limits and its relation to cognition and adaptation to an urban landscape.

Level: Honours, Masters

Magpie reproductive success and population viability

Supervisory team:
Professor Amanda Ridley, amanda.ridley@uwa.edu.au
Dr Lizzie Speechley, lizzie.speechley@uwa.edu.au
Dr Grace Blackburn (University of Central Queensland)

Description: Magpies are one of the most well-known bird species in Australia. However, preliminary data suggests that their population is declining due to high nest mortality during heat waves. The Ridley lab has worked with habituated groups of free-living Western Australian magpies for over 15 years. Consequently, there is a large life-history database on this population, including data on group composition, breeding and social interactions. This desktop project would involve working with the life-history data base to a) determine which factors (environmental, social or individual) effect reproductive success, and b) to conduct a population viability analysis on the magpies to establish their risk of decline in the future. This project provides vital insight into the strength of the magpie population and the impact of environmental events, such as heat waves and droughts, on their viability.

Level: Honours, Masters

Understanding the impact of anthropogenic stressors on urban habitat use and animal behaviour

Supervisory team:
Professor Amanda Ridley, amanda.ridley@uwa.edu.au
Dr Grace Blackburn (University of Central Queensland)

Description: Our previous research has found a considerable effect of anthropogenic stressors on magpie behaviour at the broad level. We are now looking for students interested in projects that will provide more detailed insights into these impacts. Specifically, we are offering projects that will look at use of an animal's territory relative to the differing level of anthropogenic stressors present across the territory, and the importance of microsites as both thermal and auditory refuges. We also are offering projects on the impact of anthropogenic noise prior to alarm calls on the ability to respond to alarm calls, how alarm calls impact social interactions through attentional diversion, and how anthropogenic noise may affect offspring development. All of these projects will involve fieldwork on our established population of ringed magpies in Perth's suburbs.

Level: Honours, Masters

Investigate egg predation by house mice on seabird islands using experimental nests and camera traps

Supervisory team:
Dr Belinda Cannell, belinda.cannell@uwa.edu.au
Dr Erin Clitheroe, erinclitheroe@westcoastbirdresearch.com
Russell Palmer, russell.palmer@dbca.wa.gov.au

Description: There is limited conclusive evidence to determine the direct mechanisms by which house mice and seabird species interact on Western Australian islands. This has contributed to the general perception that house mice have relatively benign impacts on nesting seabird colonies compared to larger Rattus species. Various studies conducted prior to the widespread use of camera traps have implicated house mice in the loss of unattended seabird eggs on islands in Western Australia (e.g., silver gull eggs on Penguin Island). The advent of camera traps now makes it feasible to quantify rates of egg predation by house mice at night by using them at artificial seabird nests baited with non-seabird eggs. These will be deployed on islands both with and without house mice in the Houtman Abrolhos and Shoalwater Islands Marine Park. Camera traps will be set up to record visits by mice and native species, as well as predation events at each experimental nest.

Level: Honours, Masters

Wasted nutrition: the nutritional content of fisheries discards

Supervisory team:
Dirk Zeller, dirk.zeller@uwa.edu.au
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 reason, 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 WA and 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 possibly the 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 is an advantage. Knowledge of basic fisheries science and fish biology is required.

Level: Honours, Masters, PhD

Bait in wild-capture fisheries: an overlooked impact

Supervisory team:
Dirk Zeller, dirk.zeller@uwa.edu.au

Description: A number of fishing gears such as long-lines, traps, and many recreational gears rely on bait to catch fish. The scale of bait use in wild fisheries remains largely un-assessed. Thus, the conservation implications of bait as an input to wild fisheries are unknown, particularly given that many species used for bait are crucial ecosystem prey species. This project will empirically model bait use in wild fisheries by collating data on global fishing effort and bait consumption by fishing gear. The spatio-temporal distribution of bait procurement and bait consumption by fisheries will be analyzed, particularly in light of geopolitical considerations such as the UN Sustainable Development Goals. Good skills with Excel, good R-programming skills, comfortable with statistical approaches, good literature skills, willingness to read extensively and ability to digest a wide diversity of source materials, and an ability to think critically and "outside the box".

Level: Honours, Masters, PhD

Fisheries in Indian Ocean Rim countries

Supervisory team:
Dirk Zeller, dirk.zeller@uwa.edu.au

Description: Science and policy for Indian Ocean fisheries are heavily skewed towards industrial tuna fisheries, yet most Indian Ocean countries gain domestic food security, and economic benefits from domestic fisheries within their national or local high seas waters. These fisheries are under-represented in science at the national and regional level. Students engage in country-level or ocean-basin scale fisheries science using big-data approaches. These projects are of interest to students that are excited by data mining and historical ecology or wish to be challenged by big-data approaches in an interdisciplinary setting. Projects can be fisheries centric, or focus on nutritional or socio-economic aspects. Good skills with Excel, R-programming skills an advantage, comfortable with statistical approaches, good literature skills, and an ability to think critically and "outside the box".

Level: Masters, PhD

Australia's freshwater fisheries

Supervisory team:
Dirk Zeller, dirk.zeller@uwa.edu.au
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 frshwater 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 will create a nation-wide baseline of available data and knowledge, and identify and fill major data gaps. Good interpersonal and collaborative skills. Excel and R-programming skills, comfortable with statistical approaches, and ability to think critically and "outside the box".

Level: PhD

WA fisheries: population dynamics and stock evaluations

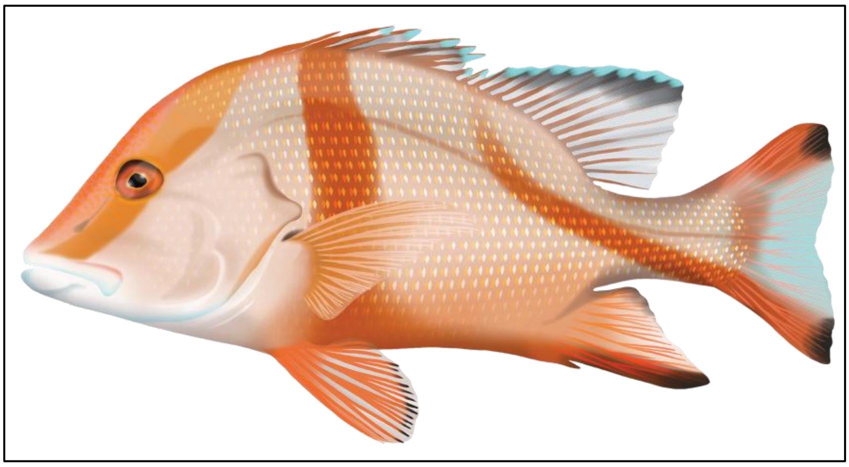
Supervisory team:
Dirk Zeller, dirk.zeller@uwa.edu.au
expert co-supervisors from DPIRD

Description: Suitable projects on WA fisheries related biology, ecology, population dynamices, growth, 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 analyses, stock assessments, population dynamics, and information and analyses of utlity 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.

Level: Honours, Masters, PhD

Comparative genomics of Lutjanid snappers

Supervisory team:
Dr Emma de Jong, emma.dejong@uwa.edu.au
Dr Shannon Corrigan, shannon.corrigan@uwa.edu.au
Dr Philipp Bayer, pbayer@minderoo.org



Description: Snappers (family Lutjanidae) are ecologically and commercially important reef fishes, but genomic resources for this group are scarce. This project will generate high-quality reference genomes for over 20 species using long-read sequencing and chromosomal scaffolding, creating the largest genomic dataset for the family to date. Comparative analyses will focus on immune gene families to reveal how species adapt to disease and environmental stress. The project will contribute new tools for fisheries and aquaculture management and is ideal for students interested in genomics, bioinformatics, and molecular evolution.

Level: Honours, Masters

Comparing active and passive eDNA collection methods in deep-sea environments

Supervisory team:
Dr Georgia Nester, georgia.nester@uwa.edu.au
Dr Shannon Corrigan, shannon.corrigan@uwa.edu.au
Prof Alan Jamieson, alan.j.jamieson@uwa.edu.au

Description: Different sampling methods can strongly influence which species are detected in eDNA surveys. This project compares active (Niskin water samples) and passive (sponge or filter-based) eDNA collection approaches using data from multiple deep-sea expeditions. The student will analyse biodiversity richness, taxonomic coverage, and community composition across methods to inform best-practice standards for deep-sea monitoring. This project is ideal for someone interested in marine ecology, molecular biology, and lab to bioinformatic workflows.

Level: Honours, Masters

Integrating eDNA and under water visual survey data to assess biodiversity

Supervisory team:
Dr Georgia Nester, georgia.nester@uwa.edu.au
Dr Shannon Corrigan, shannon.corrigan@uwa.edu.au
Prof Alan Jamieson, alan.j.jamieson@uwa.edu.au
Dr Todd Bond, todd.bond@uwa.edu.au

Description: How well does eDNA reflect what we see on camera? This project combines eDNA detections with deep-sea lander video footage from regions such as Christmas Island and the Gascoyne to cross-validate species observations. By exploring overlaps and discrepancies, the study will reveal where each method excels and identify potential range extensions for deep-sea fauna. The project is suited to a student interested in both molecular and conventional approaches to biodiversity monitoring and will provide training in data integration and marine ecological interpretation.

Level: Honours, Masters

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

Supervisory team:
A/Professor Greg Skrzypek, grzegorz.skrzypek@uwa.edu.au
Professor Pauline Grierson, pauline.grierson@uwa.edu.au
A/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 $\delta^{13}C$ and $\delta^{15}N$ 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, Masters

Molecular crosstalk between biotic and abiotic stress pathways in *Brassica*

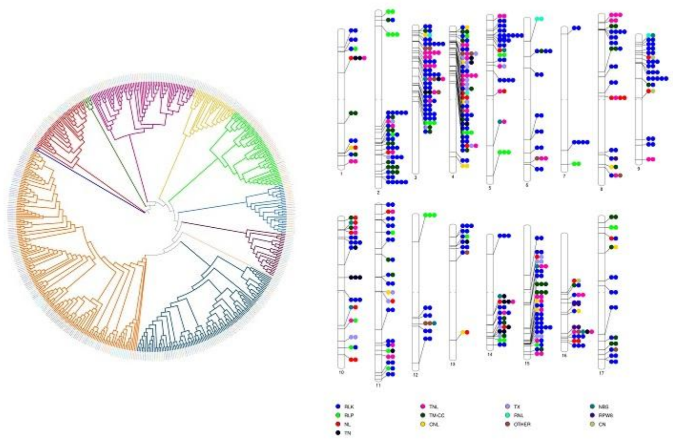
Supervisory team:
Prof Jacqui Batley, jacqueline.batley@uwa.edu.au
Dr Aria Dolatabadian, aria.dolatabadian@uwa.edu.au

Description: This project will investigate how *Brassica* species respond to the combined effects of biotic stress from *Leptosphaeria maculans* (blackleg disease) and abiotic stresses, including salt, drought, heat, and UV. The student will design and conduct controlled experiments to expose plants to single and combined stresses, followed by the assessment of physiological, biochemical, and molecular responses. Techniques may include gene expression analysis, enzyme activity assays, and stress-marker measurements. The student will gain hands-on experience in plant stress physiology, molecular biology, and data analysis. They will also learn to integrate results to understand stress crosstalk and how environmental factors influence disease progression. This work will contribute to strategies for improving stress resilience in *Brassica* crops.

Level: Honours, Masters, PhD

In silico and molecular characterisation of resistance gene analogs in *Brassica*

Supervisory team:
Prof Jacqui Batley, jacqueline.batley@uwa.edu.au
Dr Aria Dolatabadian, aria.dolatabadian@uwa.edu.au



Description: This project focuses on the identification and characterisation of resistance gene analogs (RGAs) in *Brassica* and other major crops using both molecular and in silico approaches. The student will perform computational analyses to mine genomic databases for potential RGAs, followed by laboratory validation using PCR, sequencing, and expression profiling. They will learn to integrate bioinformatics and molecular biology techniques to study plant immunity and disease resistance. Through this project, the student will gain hands-on experience in genome analysis, primer design, gene amplification, and functional characterisation. The work will contribute to understanding the diversity and potential utility of RGAs for crop improvement and disease management.

Level: Honours, Masters, PhD

Molecular characterisation of *Brassica napus* resistance genes

Supervisory team:
Prof Jacqui Batley, jacqueline.batley@uwa.edu.au
Dr Rajesh Natarajan, rajesh.natarajan@uwa.edu.au

Description: *Brassica napus* (canola) is a globally important oilseed crop that suffers significant yield losses from the fungal pathogen *Leptosphaeria maculans*, the causal agent of blackleg disease. This project aims to identify and validate *B. napus* resistance (*R*) genes that recognize and restrict this pathogen, providing a foundation for developing durable resistance in canola. Candidate *R* genes will be cloned and expressed in *Arabidopsis thaliana* lines to assess their capacity to restore resistance following pathogen challenge. The project will involve molecular cloning, plant transformation, and functional assays to elucidate the molecular mechanisms underlying *R* gene-mediated defense. Through this research, the candidate will gain advanced skills in plant molecular genetics, functional genomics, and plant–pathogen interaction studies, contributing to improved understanding and management of blackleg disease in canola.

Level: Honours, Masters, PhD

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

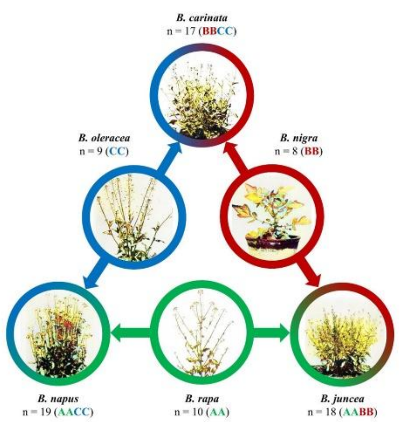
Supervisory team:
Dr Junrey Amas, junrey.amas@uwa.edu.au
Prof Jacqui Batley, jacqueline.batley@uwa.edu.au

Description: Diseases such as blackleg, Alternaria leaf blight, white leaf spot, downy mildew, 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 delve into these underexplored genetic resources to discover novel resistance genes (R genes) that can be used for breeding and gene evolution studies. Genetic and genomic analyses will be conducted to identify potential R 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. The discovery of these novel genes will broaden the array of genetic strategies available to combat plant diseases effectively.

Level: Honours, Masters, PhD

Comparative genomics of disease resistance in *Brassica*

Supervisory team:
Prof Jacqui Batley, jacqueline.batley@uwa.edu.au
Dr Shu Mohd Saad, shu.mohdsaad@uwa.edu.au

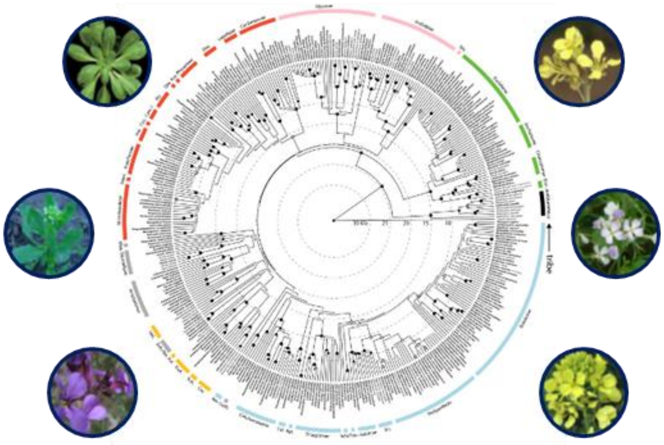


Description: Clubroot, Sclerotinia, Downy mildew, blackleg, Alternaria, light leaf spot, white rust, Verticillium wilt, Fusarium wilt and black rot caused by various pathogens are diseases affecting oilseed and vegetable *Brassica* yield worldwide. While traditional management practices like fungicides and crop rotations are effective at reducing and controlling disease prevalence, none will eliminate the disease threat completely. Mining and identifying causal resistance (*R*) genes, and breeding for disease resistant varieties are essential for substantially accelerating crop improvement to meet the exponential global demand for *Brassica*. This project aims to populate a *Brassica* QTL atlas using multiple reference genome approach to capture all candidate *R* genes linked to these fungal diseases. The student will perform comparative genome analysis, identify inter- and intraspecies syntenic regions and re-annotate candidate loci, and validate selected candidates using PCR amplification and sequencing.

Level: Honours, Masters, PhD

Understanding the evolution of disease resistance genes in canola

Supervisory team:
Prof Jacqui Batley, jacqueline.batley@uwa.edu.au
Dr William Thomas, william.thomas@uwa.edu.au

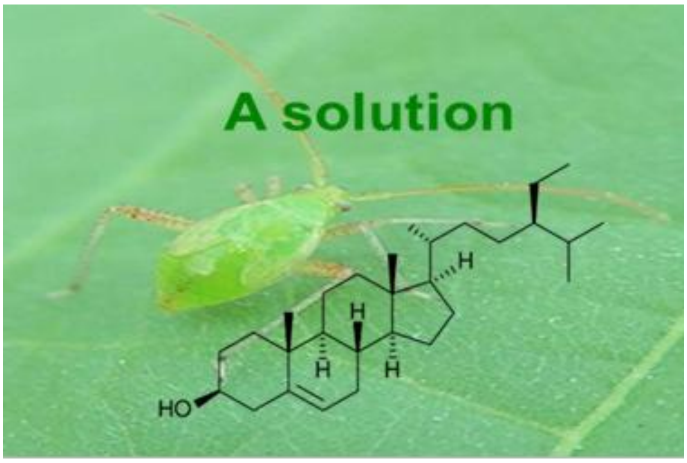


Description: Genetic resistance is the most cost-effective and sustainable approach to combat disease in major crops, including canola. The genes that confer this resistance (*R* genes) are under intense selection and are thought to evolve dynamically, yet little is known about their evolution in canola. This project aims to identity and understand the evolutionary patterns of *R* genes in canola and its wild relatives in the Brassicaceae family. It will involve tracking the evolutionary events of specific *R* genes, as well as exploring the genome-wide diversity of *R* gene analogs across different Brassicaceae genomes. The project will mainly be data-based, and the student will gain experience in a range of analyses 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, Masters, PhD

A novel biotechnological approach to protect crop from insect plants

Supervisory team:
Prof Jacqui Batley, jacqueline.batley@uwa.edu.au
Dr Jing Li, jing.li@uwa.edu.au

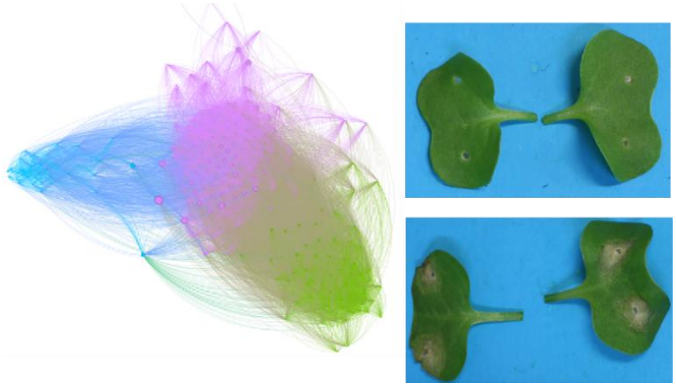


Description: New approaches are required to control insect pests which cause enormous global crop losses. Phytophagous insects are incapable of synthesizing cholesterol. Cholesterol is a precursor of the molting hormone. Insects rely on converting host phytosterols to cholesterol. There are stringent structural demands on phytosterols used as substrates, therefore some phytosterols cannot be utilized by insects. This critical pest–host interaction provides a unique opportunity to develop innovative pest control strategies. The project aims to develop a novel technology which is achieved by modifying plants to produce non-utilizable sterols. The plants with modified sterols will be unable to support insect growth & reproduction but will nevertheless function normally in plants. 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, Masters, PhD

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

Supervisory team:
Prof Jacqui 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 are predictive of 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. Candidate genes identified through these analyses can then be screened at both the seedling and adult plant stages to evaluate their roles in disease defence. The candidate will gain valuable experience in plant molecular genetics, machine learning approaches for transcriptomic prediction as well as 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, Masters, PhD

Targeted knockout of the TRY locus in *Brassica* species

Supervisory team:
Prof Jacqui Batley, jacqueline.batley@uwa.edu.au
Dr Thomas Bergmann, thomas.bergmann@uwa.edu.au

Description: Trichomes are hairy-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 a multitude of biotic threats, such as herbivorous insects. Canola (*B. napus*) is a major oilseed crop worldwide but lacks an adequate layer of trichomes. 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 pest and pathogen attacks. Genetic studies among *Brassica* species identified *TRY* as major candidate gene for trichome formation, but it has yet to be functionally validated. This project aims at unravelling the functional role of *TRY* in *Brassica* species to improve insect resistance in canola. The project includes comparative genomics, CRISPR/Cas-mediated knockout approaches, as well as reverse-genetics approaches to characterize the *TRY* gene and to evaluate its potential for breeding improved canola varieties. The student will conduct bioinformatic analyses, wet lab tasks and perform targeted crossing of plants in the glasshouse.

Level: Honours, Masters

Linking behaviour with colouration in peacock spiders

Supervisory team:
Dr Jennifer Kelley, Jennifer.kelley@uwa.edu.au
Dr Anna-Lee Jessop, Annie.Jessop@murdoch.edu.au
Jonah Walker, jmw258@cam.ac.uk

Description: Peacock spiders are tiny (3-5 mm) but well known for their elaborate colouration and for their striking courtship dances, involving yoga-like poses. Despite their popularity with photography enthusiasts, surprisingly little is known about the behaviour and ecology of peacock spiders. This is a critical knowledge gap because these spiders tend to have highly restricted ranges and thus are at risk of extinction from threats such as bushfires and urban developments. This project will investigate the functions of colouration in peacock spiders and the importance of the light environment and signalling geometry for communication behaviours.

Level: Honours, Masters

Export of blue carbon from kelp forests to deep marine sinks

Supervisory team:
Dr Karen Filbee-Dexter, karen.dexter@uwa.edu.au
Dr. Mirjam van Der Mheen, mirjam.vandermheen@uwa.edu.au
Dr. Albert Pessarrodona, albert.pessarrodona@uwa.edu.au

Description: The ocean plays a vital role in the global carbon cycle and acts as a key buffer against climate change. Although the coastal ocean covers only a small percentage of the global ocean surface, it is one of the most productive regions and plays an important role in the ocean carbon cycle. It contributes to carbon sequestration through the uptake of atmospheric CO_2 and export of both inorganic and organic carbon into the deep sea. This project will quantify different components of coastal ocean carbon export and can be approached from different angles: 1) quantifying physical export mechanisms; 2) quantifying atmospheric CO_2 uptake and export of dissolved inorganic carbon; 3) quantifying export of organic carbon from different sources.

The project can incorporate numerical modelling, field, and laboratory components as desired.

Level: Masters, PhD

Spatial mapping and modelling of marine forest functions in Western Australia

Supervisory team:
Dr Karen Filbee-Dexter, karen.dexter@uwa.edu.au
Prof Thomas Wernberg, thomas.wernberg@uwa.edu.au
Lianna Gendall, lianna.gendall@uwa.edu.au

Description: We're looking for students interested in using spatial mapping and/or modelling to explore how climate change is reshaping functions of Western Australia's iconic seaweed and kelp ecosystems. These habitats play a vital role in coastal biodiversity, carbon and nutrient cycling, and ecosystem resilience, yet are increasingly threatened by warming oceans and marine heatwaves. Developing accurate spatial maps and predictive models of their distributions and critical functions is essential for understanding future reef services, identifying climate refuges, potential areas for restoration and building baselines for long-term monitoring and management. Projects may focus on habitat mapping, environmental modelling, or predicting future shifts in seaweed distributions and/or functions under conservation scenarios. Students with skills or interest in R, QGIS, or ArcGIS are especially encouraged to get involved.

Level: Masters, PhD

Impacts of climate change on temperate reefs

Supervisory team:
Dr Karen Filbee-Dexter, karen.dexter@uwa.edu.au
Prof Thomas Wernberg, thomas.wernberg@uwa.edu.au
Dr. Albert Pessarrodona, albert.pessarrodona@uwa.edu.au

Description: Kelp forests cover over a quarter of the world's coastlines and are one of the ocean's most diverse and productive ecosystems. Despite this, kelp forests are experiencing unprecedented rates of decline across many regions, and public and political awareness of the scale and significance of this issue remains low. Using the natural gradient in sea temperature along the Western Australian coastline, this project aims to understand how climate change is transforming the biodiversity, structure and functioning of kelp forests and temperate reefs. Communities of interest include habitat formers (e.g. kelp and other seaweeds, corals), invertebrates or fishes. Interested candidates can develop these topics using a suite of different tools and approaches, including field surveys (SCUBA), experimental manipulations or laboratory assays (e.g., aquaria). A background in marine science and ecology is essential. Depending on the student's interests, components of the project may involve collaboration with international partners working on kelp forest systems across the North Atlantic.

Level: Masters, PhD

Future proof conservation approaches for marine ecosystems

Supervisory team:
Dr Karen Filbee-Dexter, karen.dexter@uwa.edu.au
Prof Anna Smajdor, anna.smajdor@ifikk.uio.no

Description. Human-driven impacts on our oceans are intensifying and there is urgent need for novel solutions to combat habitat loss and promote resilience in marine ecosystems. Warming temperatures, intensifying extreme events, and ecological tipping points are pushing natural systems into entirely new states, where traditional goals of "restoration" to historical baselines are no longer feasible. As species and ecosystems cross thresholds of tolerance, conservation must evolve to address not just the protection of what remains, but the creation of ecological resilience in an unfamiliar future. This project explores how synthetic biology, and specifically synthetic DNA (synDNA), could transform conservation in this new era. Synthetic biology enables the redesign of genetic pathways, conferring resilience to stressors or even constructing novel organisms capable of performing critical ecological roles once lost to extinction. This research will critically investigate the scientific, ethical, and governance dimensions of synDNA applications for ecosystem recovery—asking whether we can, and should, use engineered life to restore function in collapsing marine systems. This is an interdisciplinary project, and some experience in biology and philosophy is preferred.

Level: Masters, PhD.

Understanding Recreational Fisher Preference for Black Bream Management: A Choice Experiment Approach

Supervisory team:
Dr Matt Navarro (UWA), matthew.navarro@uwa.edu.au
Dr Alex Hesp (DPIRD), sybrand.hesp@dpird.wa.gov.au
Dr Charlotte Aston (UWA), charlotte.aston@uwa.edu.au
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 more large 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, Masters

Historic changes in recreational fishing (1900-2010) from Western Australian

Supervisory team:
Dr Matt Navarro (UWA), matthew.navarro@uwa.edu.au
Dr Joe Christensen (UWA), joseph.christensen@uwa.edu.au

Description: Fisheries management often struggles due to limited historical data. This project taps into an innovative and largely untapped resource: historic newspaper fishing reports. These archives offer a unique window into past coastal fisheries and provide valuable baseline information that can help us better understand shifts in fish populations.

This project will analyze 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, Masters

Exploring spatial values in three proposed Western Australian marine parks

Supervisory team:
Dr Matt Navarro (UWA), matthew.navarro@uwa.edu.au
Dr Nicole Hamre (DBCA), nicole.hamre@dbca.wa.gov.au
Brooke Gibbons (UWA), 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, Masters

Understanding and Promoting Sustainable Behaviour in Recreational Fishing Using Environmental Psychology

Supervisory team:
Dr Matt Navarro (UWA), matthew.navarro@uwa.edu.au

Description: Promoting voluntary behaviour in recreational fishing is key to effective fisheries and conservation management. This includes decisions to follow regulations, adopt best-practice handling, and retain the first fish caught.

This project applies environmental psychology to explore how attitudes, subjective norms, and perceived behavioural control influence sustainable fishing choices—and how managers can leverage these insights to encourage better practices.

The research involves designing and conducting a field survey, combined with Structural Equation Modelling, to quantitatively identify behavioural drivers and inform management recommendations.

Level: Honours, Masters

Plant-mediated CH_4 emission in paddy rice

Supervisory team:
Ole Pedersen, ole.pedersen@uwa.edu.au
Juan Jiménez, juan.jimenezserna@bio.ku.dk

Description: Explore how rice roots influence methane (CH_4) release from flooded soils! The project investigates how plant traits such as root porosity, aerenchyma, and barriers to gas diffusion control CH_4 transport. You will measure CH_4 fluxes using state-of-the-art gas analyzers (Li-COR and laser-based systems) and characterize root anatomy and physiology using microscopy and micro-sensor techniques. The student will gain hands-on experience in greenhouse experiments, advanced gas measurements, data processing, and trait analysis thereby linking plant structure and ecosystem greenhouse-gas dynamics.

Level: Honours, Masters

Salinity tolerance of paddy rice

Supervisory team:
Ole Pedersen, ole.pedersen@uwa.edu.au
Juan Jiménez, juan.jimenezserna@bio.ku.dk

Description: Investigate how rice plants respond to salt stress and identify traits linked to salinity tolerance. The project involves growing contrasting rice genotypes under controlled salinity levels and measuring key physiological and anatomical traits such as ion accumulation, root porosity, and membrane integrity. You will use advanced equipment for chlorophyll fluorescence, ion analysis, and root imaging. The student will gain hands-on experience in experimental design, stress physiology, and data interpretation thereby linking plant function to tolerance mechanisms in saline environments.

Level: Honours, Masters, PhD

Using eDNA data to inform expanded protections for the Bremer Sub-Basin and South Coast Marine Estate

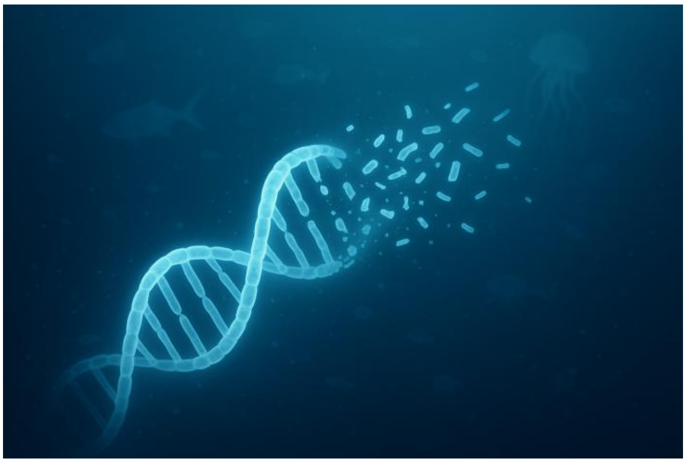
Supervisory team:
Dr Shannon Corrigan, shannon.corrigan@uwa.edu.au
Dr Rebecca Wellard, rwellard@minderoo.org
Dr Philipp Bayer, pbayer@minderoo.org

Description: This project will explore the use of eDNA sampling as a complementary tool for baselining pelagic megafauna that use Bremer Marine Park and neighbouring regions. The focus will be on using these data to infer whether activity hotspots extend beyond existing marine park boundaries. The candidate will 1) explore existing eDNA data from the region for signatures of hotspots of pelagic megafauna activity 2) generate new eDNA data from existing sample sets, targeting species/fauna of interest 3) collaborate with leading cetacean specialists to integrate eDNA based observation data with more than 20 years of visual survey data from the region 4) identify priorities for future eDNA sampling effort and 5) interpret findings in the context of spatial protections for pelagic megafauna and guide recommendations for marine spatial planning.

Level: Honours, Masters

Characterisation of marine eDNA fragments and fragment distribution

Supervisory team:
Dr Shannon Corrigan, shannon.corrigan@uwa.edu.au
Dr Katrina West, katrina.west@csiro.au
Dr Georgia Nester, georgia.nester@uwa.edu.au



Description: This project will compare 'traditional' eDNA extraction methods (e.g. spin column, salting out, phenol-chloroform) with adaptations of ultra-high molecular weight DNA extraction methods that were developed for Whole Genome Sequencing (WGS) using long-read approaches. The hypothesis is that additional fragmentation of long molecules occurs during extraction and this contributes to the narrative that 'eDNA are short, degraded fragments'. The idea will be to characterise 'undisturbed' fragment length distributions that are typical of marine eDNA samples using a combination of more gentle extraction methods and long-read shotgun sequencing. Identification of eukaryotic and prokaryotic portions of the fragment distribution may be explored as will the use of gel-based size selection as a method for target enrichment.

Level: Honours, Masters

Patterns of genome evolution and diversification across fishes

Supervisory team:
Dr Shannon Corrigan, shannon.corrigan@uwa.edu.au
Dr Philipp Bayer, pbayer@minderoo.org
Dr Emma de Jong, emma.dejong@uwa.edu.au

Description: Ray-finned fishes (Actinopterygii) represent nearly half of all vertebrates, yet large gaps remain in genomic data across this diverse group. This project will leverage genome assemblies generated by OceanOmics Centre to uncover patterns of genome evolution and adaptation. The project will identify gene families under expansion, contraction, or selection, and explore how these changes relate to ecological traits and diversification. Ideal for candidates interested in evolutionary genomics and bioinformatics, this project provides hands-on experience with genome assembly, annotation, and large-scale comparative analyses.

Level: Honours, Masters

Exploring temporal changes in biodiversity patterns at the Houtman Abrolhos Islands using four years of environmental DNA data

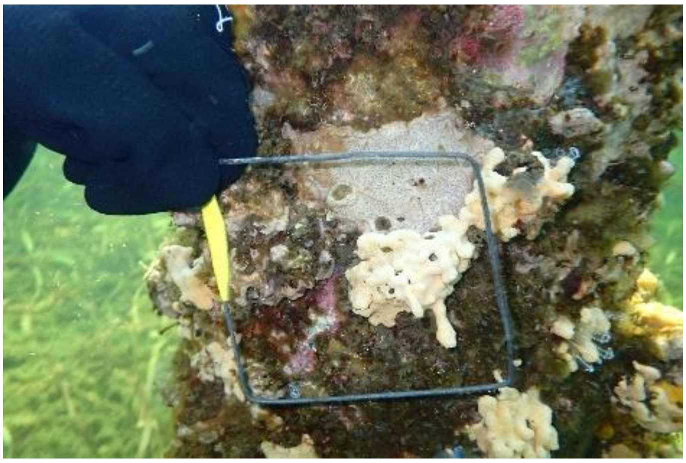
Supervisory team:
Dr Shannon Corrigan, shannon.corrigan@uwa.edu.au
Dr Eric Raes, eraes@minderoo.org
Dr Philipp Bayer, pbayer@minderoo.org
Dr Emma de Jong, emma.dejong@uwa.edu.au

Description: The Houtman Abrolhos Islands are one of Western Australia's most unique and biodiverse marine areas. These islands are particularly vulnerable to climate change, with warming waters posing a major threat to biodiversity and ecosystem stability. OceanOmics has collected eDNA samples from the three Abrolhos island groups over a four-year period and generated metabarcoding data targeting marine vertebrates. This project will analyse the existing eDNA data to map baseline biodiversity but also examine how biodiversity changes over time and relate these changes to any significant environmental events, including the presence or absence of important indicator species.

Level: Honours, Masters

Benthos Barometers: Aquatic assemblages as sentinels of change

Supervisory team:
Tai Loureiro, tai.loureiro@uwa.edu.au



Description: Aquatic communities provide early indicators of environmental changes before these are visible in conventional water-quality metrics. This project utilises benthic assemblages as "aquatic sentinels" to monitor changes in estuaries and coastal systems, such as the Swan-Canning system in Western Australia. We explore how community composition and succession patterns shift with factors like salinity, nutrients, urbanisation, and human pressures. Student projects may include field deployments (e.g., settlement plates), habitat surveys, lab identification, and data analysis. These initiatives aim to compare urban and less-modified sites, examine seasonal recruitment, and develop bioindicator indices based on species and traits. Collectively, these efforts enhance our understanding of how everyday pressures impact aquatic ecosystems and support monitoring and conservation efforts.

Level: Honours, Masters, PhD

Breaking the Dark: Light pollution impacts on coastal systems

Supervisory team:
Tai Loureiro, tai.loureiro@uwa.edu.au

Description: Coastal species have adapted to natural day-night and lunar cycles, timing behaviours like foraging and refuge use to changes in light. However, urbanisation along shorelines is increasing artificial light at night (ALAN) along beaches, estuaries, and seawalls. Research on this topic is limited, particularly in Western Australia, with most studies focusing on rocky shores in the Northern Hemisphere. This project aims to explore how ALAN affects the structure and activity of coastal invertebrate communities and the implications for ecosystem functioning and services, including habitat provision and nutrient cycling. Research will be conducted along the WA coastline, comparing lit and unlit sites, with student projects that may involve nighttime surveys, settlement-plate assays under different light conditions, or mesocosm experiments.

Level: Honours, Masters, PhD

TANGLESS: Mapping ghost gear hazards and wildlife risk

Supervisory team:
Tai Loureiro, tai.loureiro@uwa.edu.au

Description: Lost fishing gear and marine debris pose "ghost fishing" hazards for wildlife along the WA coastline. This project maps the locations and timing of hazardous gear using ghost-gear records and oceanographic data to assess wildlife risk. By analyzing large datasets, we identify high-risk hotspots, seasons, and coastline segments. Student projects are primarily desktop- and data-focused, and may include building and cleaning integrated databases, scoring the hazard of different gear types from photos and notes, modelling hotspots and drivers of strandings, and translating the results into clear maps, indicators and guidance that can be used by government, NGOs and community groups working on ghost-gear prevention and response.

Level: Masters, PhD

Environmental Safeguards in Offshore Decommissioning

Supervisory team:
Tai Loureiro, tai.loureiro@uwa.edu.au

Description: As Australia faces more complex decisions about decommissioning offshore oil and gas platforms, the implications for benthic habitats and Sea Country are significant. Public consultations highlight concerns about seabed disturbance, long-term monitoring, and waste management, though alignment with existing laws remains unclear. This project aims to enhance ocean governance by mapping public concerns from submissions, connecting them to relevant Commonwealth and Western Australia legislation, and integrating ecological data on affected habitats and species. Student projects will involve desk research, GIS mapping of environmental sensitivities, analysis of decommissioning frameworks, and evaluation of monitoring standards. Qualitative methods may include interviews with regulators and stakeholders to gauge transparency and community responses.

Level: Masters, PhD

Impacts of climate change on temperate reefs

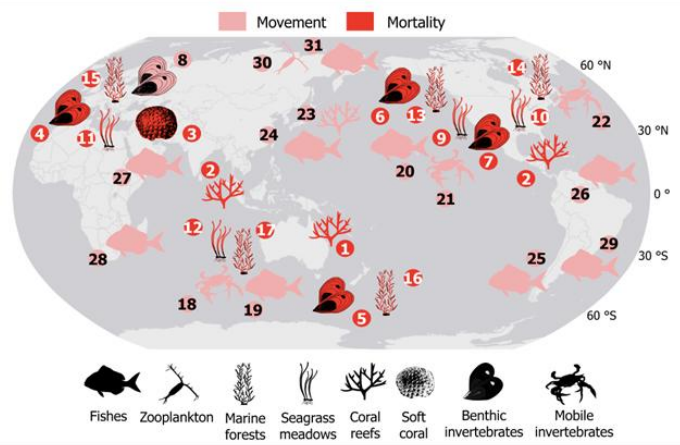
Supervisory team:
Prof Thomas Wernberg, thomas.wernberg@uwa.edu.au
Dr. Albert Pessarrodona, albert.pessarrodona@uwa.edu.au
Dr Karen Filbee-Dexter, karen.dexter@uwa.edu.au

Description: Kelp forests cover >25% of the world's coastlines and are one of the ocean's most diverse and productive ecosystems. Unfortunately, kelp forests are in decline in many regions, and public and political awareness of the scale and significance of this problem is low. Using the natural gradient in sea temperature along the Western Australian coastline, this project aims to understand how climate change is transforming the biodiversity, structure and functioning of kelp forests and temperate reefs. Communities of interest include habitat formers (e.g. kelp and other seaweeds, corals), invertebrates or fishes. Interested candidates can develop these topics using different tools and approaches, including field surveys (SCUBA), experimental manipulations or laboratory assays (e.g., aquaria). A background in marine science and ecology is essential. Components of the project may involve collaboration with international partners.

Level: Honours, Masters, PhD

Impacts of marine heatwaves on species, populations and ecosystems

Supervisory team:
Prof Thomas Wernberg, thomas.wernberg@uwa.edu.au
Dr. Shinae Montie, shinae.montie@uwa.edu.au

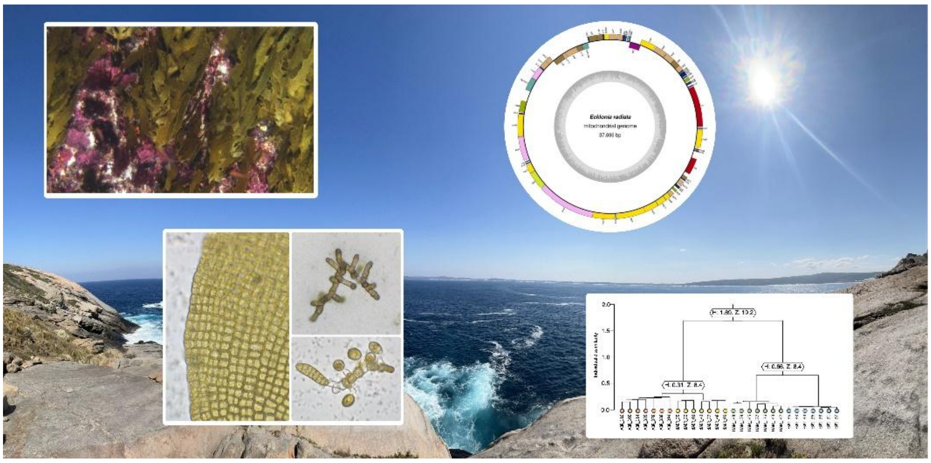


Description: Marine heatwaves (MHWs) are acute thermal anomalies and among the most severe manifestations of anthropogenic climate change. MHWs are driving widespread and often abrupt shifts in community structure, productivity, and ecosystem function. This project will examine how both intrinsic properties of heatwaves (e.g. duration, maximum and cumulative intensity) and extrinsic context (e.g. species' range position, proximity to thermal tolerance limits) influence the magnitude and variability of biological impacts across taxa and habitats. The project will build on meta-analyses of a global database of marine heatwave impacts, spanning six decades, all major biogeographical realms, and diverse taxonomic groups. The project may also integrate field surveys (SCUBA) or aquarium experiments to complement the meta-analyses. A background in marine science and ecology is essential.

Level: Honours, Masters, PhD

Molecular and physiological basis for resilience in temperate seaweed forests

Supervisory team:
Prof Thomas Wernberg, thomas.wernberg@uwa.edu.au
Dr Antoine Minne, antoine.minne@uwa.edu.au

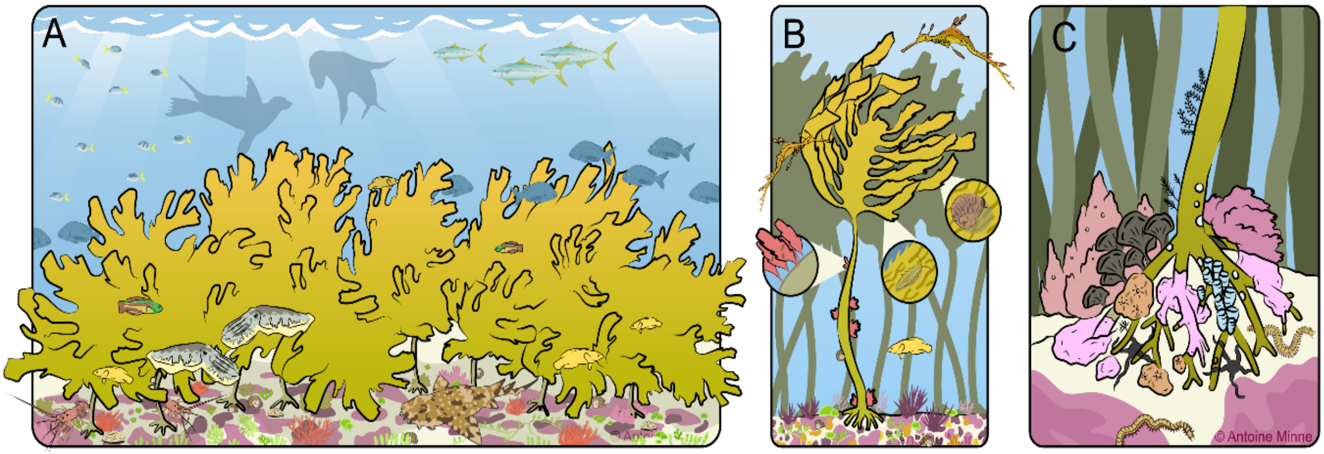


Description: This project will uncover the physiological and molecular mechanisms that underpin how temperate seaweeds respond and adapt to ocean warming and other stressors. The project will identify adapted and maladapted genotypes and populations, to understand how these differences translate into long-term population resilience. The project will also study plastic responses to temperature, light and nutrient regimes to assess how early-life exposure influences later stress tolerance. Working with field collected specimens as well as laboratory reared cultures of early life stages, the project will combine controlled laboratory and aquarium experiments with molecular analyses spanning genomic to transcriptomic tools to link physiological performance with underlying molecular mechanisms. Quantitative skills and motivation for experimental and molecular work are required. Experience with marine ecology is advantageous but not essential.

Level: Honours, Masters, PhD

Biodiversity associated with kelp forests and vulnerability to disturbances

Supervisory team:
Prof Thomas Wernberg, thomas.wernberg@uwa.edu.au
Dr. Shinae Montie, shinae.montie@uwa.edu.au
Dr Karen Filbee-Dexter, karen.dexter@uwa.edu.au



Description: Biodiversity loss and ecological change are accelerating in temperate marine ecosystems as climate change and human pressures reshape coastal habitats. Kelp forests, which form the structural foundation of these ecosystems, support diverse and complex assemblages of invertebrates, fishes, and algae. This project will investigate how biodiversity and community composition shift as kelp forests transition to replacement states and identify the ecological processes that underpin resilience or collapse. The research will combine analyses of existing datasets with new biodiversity data collected through complementary approaches, including field surveys, underwater imagery, and molecular methods such as eDNA. The project may involve collaboration with international partners working on kelp forest systems across the North Atlantic. A background in marine science or ecology is essential.

Level: Honours, Masters, PhD

Impacts of multiple stressors on kelp forests and temperate species

Supervisory team:
Prof Thomas Wernberg, thomas.wernberg@uwa.edu.au
Dr Karen Filbee-Dexter, karen.dexter@uwa.edu.au

Description: While climate change has been a major driving force underpinning the decline of temperate species in many places, humans also affect the environment in many other ways. Because of the potential interactions between multiple stressors, it is important to understand their ecological and evolutionary consequences. This project will investigate the impacts of combined stressors on temperate species and examine the trade-offs involved in adapting to different pressures. Controlled experiments will be used to test how temperate species respond to variation in light (coastal darkening), nutrients and temperature (marine heatwaves), and whether adaptation to one factor influences capacity to respond to other factors. The project can be field- (SCUBA) or laboratory/aquarium-based and may involve different types of marine organisms and communities. A background in marine science and ecology is essential.

Level: Honours, Masters, PhD

Monitoring recruitment habitats of the western rock lobster

Supervisory team:
Dr Tim Langlois (UWA), tim.langlois@uwa.edu.au
Dr Simon de Lestang (DPIRD,) simon.delestang@dpird.wa.gov.au

Source: Daphne Oh

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 surveys shallow water habitats where juvenile lobster are found.

Level: Honours, Masters

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

Supervisory team:
Dr Tim Langlois (UWA), tim.langlois@uwa.edu.au
Brooke Gibbons (UWA), brooke.gibbons@uwa.edu.au

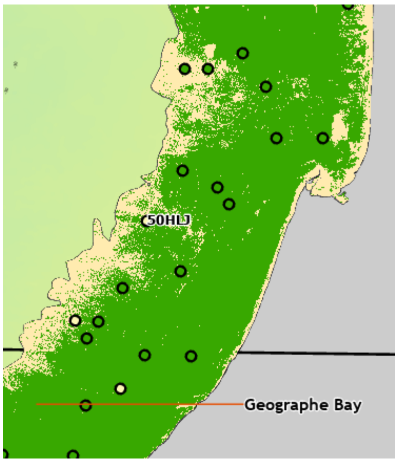
Source: Tim Langlois

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, Masters

Exploring satellite remote sensing to distinguish macroalgal and seagrass assemblages through habitat mapping

Supervisory team:
Dr Tim Langlois (UWA), tim.langlois@uwa.edu.au
Dr Sharyn Hickey (UWA), sharyn.hickey@uwa.edu.au



Description: This project evaluates Landsat 8/9 and Sentinel-2 imagery for marine habitat mapping. Objectives: (1) develop spectral/texture indices and water-column–corrected reflectance to separate seagrass from macroalgae; (2) compare classifiers (e.g. Random Forest) across sensors and seasons; (3) quantify accuracy and transferability. Ground truthing from drop cameras and UAVs will supports stratified accuracy assessment (confusion matrices; kappa). Outputs: best-practice workflow, sensor/season recommendations, and 5–10 m habitat maps with uncertainty layers for management-ready seafloor mapping.

Level: Honours, Masters

How do growth promoting hormones in cattle affect dung-feeding insects?

Supervisory team:
Dr Upama Aich, upama.aich@uwa.edu.au
Assoc Prof Joseph Tomkins, joseph.tomkins@uwa.edu.au

Description: Chemicals released into our environment can have long lasting effects that often extend beyond the target use. In Australia, potent and long-lasting chemicals are used to boost the growth of cattle to produce beef. These growth promoting chemicals have been shown to negatively impact aquatic vertebrates, but nothing is known of their effects on the life-history and fitness of the numerous species of highly beneficial dung feeding insects that are exposed to significant concentrations of these chemicals in dung. This project will use the introduced dung beetle *Onthophagus taurus* as a model system for understanding the fitness consequences of growth promoting residues on insects & is ideal for someone with an interest in understanding anthropogenic disturbances on natural selection, and sexual selection. It will involve working with dung beetles in UWA CT rooms, driving to farms, & liaising with farm workers.

Level: Honours, Masters, PhD

Does male age affect female mate choice? A meta-analysis

Supervisory team:
Dr Upama Aich, upama.aich@uwa.edu.au
Assoc Prof Joseph Tomkins, joseph.tomkins@uwa.edu.au

Description: Should females prefer older or younger males as mates? Females are expected to choose males that provide direct benefits (e.g., good genes, parental care, resources) or indirect benefits (e.g., genetic quality enhancing offspring fitness). Male survival to old age might indicate the presence of fitness-enhancing genes that increase offspring fitness. However, many correlational studies show that mating with older males can lower female fecundity and even reduce offspring fitness due to epigenetic or germline mutation effects. Studies report mixed results on whether females prefer older, younger, or prime-aged males. This desk-based project involves a meta-analysis quantifying how male age influences female preference in non-human animals, and tests why results vary among studies. Student will learn about systematic review methods; effect-size calculation; multilevel/meta-regression in R.

Level: Honours, Masters, PhD

Prof Jacqueline Batley, Research Project Coordinator
School of Biological Sciences
T +61 8 6488 5929 **E** jacqueline.batley@uwa.edu.au
M084, Perth WA 6009 Australia
uwa.edu.au

Prof Jan Hemmi, Research Project Coordinator
School of Biological Sciences
T +61 8 6488 3117 **E** jan.hemmi@uwa.edu.au
M092, Perth WA 6009 Australia
uwa.edu.au