Honours Opportunities

Environmental and Conservation Sciences

Project title	Description	Supervisor contact	Start date
Changes in distribution and abundance of pteropods in the SE Indian Ocean	Because of their calcium carbonate shells, pteropods are extremely important sentinel species with respect to extent of ocean acidification. An opportunity exists to compare distribution and abundance of pteropods collected along 110°E during 2019 as part of the Second International Indian Ocean Expedition against published data from the first Expedition on the same meridian in 1963. Interests in zooplankton, biological oceanography and being involved in an international science programme are necessary. This project is available from February 2023.	Professor Lynnath Beckley	This project is available from Feb 2023.
Trophodynamics of mesopelagic fishes in the SE Indian Ocean	Mesopelagic fishes such as lantern fishes are vital components of the pelagic food web but relatively little is known about their feeding. This project will examine the diet of selected lantern fishes along the 110°E transect of the International Indian Ocean Expedition using standard microscopic techniques. The results will then be compared against those obtained by isotopic and genomic techniques (Beckley et al. in prep). Interests in deep sea fishes, zooplankton, biological oceanography and being involved in an international science programme are necessary. This project will be co-supervised by Dr Pilar Olivar of CSIC in Barcelona, Spain and is available from February 2023.	Professor Lynnath Beckley	This project is available from Feb 2023.

Comparison of the influence of oceanographic variables on larval fishes and krill offshore of Ningaloo Reef	A neat data set from concurrent sampling of larval fishes (meroplanktonic), krill (holoplanktonic) and a suite of marine environmental variables has been collected for several transects across the continental shelf offshore of Ningaloo Reef. These data are available to be analysed to test hypotheses about planktonic larval duration and the influence of oceanographic variables. An interest in biological oceanography is essential and the project will be co-supervised by Dr Alicia Sutton of Carijoa Consulting. This project is available from February 2023.	Professor Lynnath Beckley	This project is available from Feb 2023.
Biological oceanography of the Kimberley	A detailed sampling programme in the Kimberley collected a suite of zooplankton samples together with data on various oceanographic variables (Beckley et al. 2019). These samples are available to explore distribution and abundance patterns of various zooplanktonic taxa relative to the gradients of major environmental variables (turbidity, chlorophyll etc) in the dynamic, macro-tidal waters of the Kimberley. An interest in biological oceanography is essential and the project will be co-supervised by Dr Alicia Sutton of Carijoa Consulting. This project is available from February 2023.	Professor Lynnath Beckley	This project is available from Feb 2023.
Role of submerged plants in wetland biodiversity: developing knowledge to underpin wetland restoration	This project follows on from another BSc. Honours project examining whether native and exotic submerged plants support different freshwater invertebrate assemblages in wetlands. That project showed that both native and exotic submerged plants increase invertebrate biodiversity in wetlands. This new project focuses on investigating whether the physical structure that plants provide is their most important role in increasing invertebrate biodiversity. A field experiment will place plastic aquarium plants that mimic the shape of common	Assoc. Professor Belinda Robson	Available February or mid-year start.

	plant species (plant analogues) into local wetlands and observe their colonization by invertebrates. Real plants will also be sampled to identify what species live on the real plants in the same wetland. By comparing the analogues to the natural plants, we will be able to see whether structure alone is driving the positive effect of plants on invertebrate diversity. Mixed plant stands can also be compared, and the diversity and abundance of algal epiphytes can also be examined as they are an important food source. Exotic and native plants can also be compared. This is a field and lab-based experimental project suitable for 1 or 2 students. Co-supervised by Dr Jane Chambers.		
Invertebrates using sediment refuges in rangelands lakes: Lake Woolleen (Gascoyne).	Semi-arid climate zones cover much of Australia, but the freshwater lakes that occur in these regions are very poorly studied, especially episodic lakes in WA. Lake Woolleen is a large temporary lake on Woolleen Station in the Gascoyne region of WA. It is filled by episodic river flows arising from cyclonic rains, meaning that it fills unpredictably (termed an episodic lake). When episodic lakes fill, they often become a focus of biological activity as waterbirds arrive from up to several hundred km to feast and even breed at these lakes. Lake Woolleen is also connected to rivers and so fish and turtles may enter the Lake while it is filled. Episodic lakes are difficult to study because we do not know when they will fill. However, evidence from other semi-arid episodic lakes (e.g. Lake Eyre) suggest that much of the biological activity develops from resting stages of plants and animals in the lake sediments. Little is known of which species are present in the sediments of such lakes, how long resting stages can survive in dry lake sediments	Assoc. Professor Belinda Robson	Available for mid-year start

	nor the spatial distribution of resting stages across large inland lakebeds. This Honours project, in collaboration with the owners of Woolleen Station, would require a student to visit the lake when dry and collect sediment samples from multiple locations across the dry lakebed. These would be brought back to Perth and inundated to stimulate the emergence of animals and germination by aquatic plants. Inundation experiments can manipulate water temperature, oxygenation and duration to identify responses by emerging biota. The diversity and density of species emerging would be quantified and their spatial distribution across the lake described. This project uses field and lab skills and is suitable for 1-2 students. Co-supervised by Dr Edwin Chester		
Urban ecology of dragonflies	South West WA has more than 40 species of dragonflies, including many endemic species. Around half of these species were found in urban wetlands and streams in the past. However, land use intensification and climate change have altered urban habitats, but the impacts on dragonfly breeding are unknown. This project will involve sampling urban wetlands for dragonfly larvae and exuviae to identify which species are breeding and determine habitat correlates for successful breeding in urban wetlands. Students may also explore whether some species are accelerating their development to make use of seasonal wetlands before they dry out. This project will use field and lab skills and is suitable for 1 or 2 students. Co-supervised by Dr Edwin Chester.	Assoc. Professor Belinda Robson	Available for mid-year start.
The contribution of waterfalls to regional	South-western Australia is part of the southern Australian flatlands bioregion. Flat landscapes have fewer waterfalls and fast-flowing riffles in their rivers than do	Assoc. Professor Belinda Robson	Best suited for mid-year start.

freshwater biodiversity in a flat landscape	mountainous regions. This can increase the importance of waterfalls for providing fast-flowing habitat. Research in another flat region, western Victoria, showed that waterfalls contained unique species of invertebrates not found elsewhere in rivers. Elsewhere in the world, specialised dragonflies, mayflies and stoneflies have been found living only in waterfalls. Southwestern Australian waterfalls have not yet been studied but may also contain unique species. As our climate dries, waterfalls will be very vulnerable to lower flows and shorter flow periods. They may require special management if they are to retain unique species, but the first step is to determine whether waterfalls do contain species not found elsewhere in the landscape. This project involves fieldwork suited to a single or pair of students. A good level of physical fitness is required for this project, as reaching some waterfalls will require hiking and carrying field equipment. Co-supervised by Dr Edwin Chester.		
Life history, diet and environmental tolerances of freshwater insects	Southwestern Australia is a biodiversity hotspot with a unique evolutionary heritage. Most aquatic insects in the region are endemic (found nowhere else) and relicts of cooler and wetter times (i.e. of Gondwanan origin). Compared to southeastern Australia, SWWA has relatively few species of Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) but a high proportion of endemic species. In contrast, SWWA has quite high diversity and endemism amongst the Odonata (dragonflies, damselflies), Coleoptera (water beetles) and Chironomidae (Diptera). Little is known about the life histories, diet or environmental tolerances of these insects. A few studies show that some species have quite low tolerance of heat, whilst other species have shown surprising adaptations to withstand drying. Yet, knowledge of species life histories is essential for	Assoc. Professor Belinda Robson	This project has a February or mid-year start.

	effective conservation. Many of these taxa will have important roles in the ecology of waterbodies (e.g. as shredders or algal grazers) but we do not know which taxa fulfil these roles nor how they will respond to continuing warming or drying. Within this topic, there are many options for students to choose which insect group they would like to study. Projects will involve field sampling but could also involve laboratory rearing of insect larvae and experiments to examine responses to warming and drying. This project is suitable for 1 or more students and is co-supervised by Dr Edwin Chester.		
Do stream confluences provide a unique form of habitat for stream biota?	Understanding longitudinal changes in assemblages of freshwater plants and animals has a long history in the field of freshwater ecology. River flow dynamics change along a hierarchy of spatial scales along the length of a river and are often associated with changes in biotic assemblages. There are several important morphological elements that can cause a sharp change in the flow dynamics along the length of a stream, including tributary confluences (i.e. point where two streams meet). The aim of this project is to assess the importance of river confluences for structuring invertebrate or benthic algal assemblages in small streams in southern Australia, comparing streams in Victoria and Western Australia. Invertebrates or algae will be sampled above and below tributary confluences in both States. This project involves fieldwork suited to a single or pair of students. A good level of physical fitness is required for this project, as reaching some confluences will require hiking and carrying field equipment. The student(s) may also have the opportunity to travel to Deakin University in Victoria for field and laboratory work for a period of a few weeks. This project is co-supervised by Dr Ty Matthews (Deakin University).	Assoc. Professor Belinda Robson	Best suited for mid-year start.

The role of spiders in controlling mosquitoes emerging from saltmarsh wetlands.	When saltmarsh wetlands are in good condition they are surrounded by fringing trees, including species of Melaleuca, Casuarina and Eucalyptus. This vegetation provides places for web-spinning spiders to build webs and trap flying insects. Anecdotal evidence suggests that where fringing vegetation is removed, more mosquitoes enter nearby residential areas. The aim of this project is to quantify both the density of web-spinning spiders and their diet in saltmarsh wetlands. What vegetation features enhance densities of web-building spiders? This project involves field and lab work and is suited to 1 student. Co-supervised by Dr Edwin Chester.	Assoc. Professor Belinda Robson	This project has a February or mid-year start.
Does the mosquito *Aedes camptorhynchus* rely on autogeneous egg production to stock egg banks in saltmarsh wetlands?	Recent research suggests that the saltmarsh mosquito A. camptorhynchus may lay an egg batch before taking a blood meal, to ensure that each female contributes at least some eggs to the egg bank. This project will involve field sampling in saltmarsh wetlands in the Peel-Harvey wetlands. The student will collect adult female mosquitoes as they oviposit and determine whether they have taken a blood meal. Adult trapping may also be used. This project involves field and lab work and is suited to 1 student. Co-supervised by Dr Edwin Chester.	Assoc. Professor Belinda Robson	This project has a February or mid-year start.
Change in the urban and peri-urban distribution of the freshwater mussel Westralunio carteri: 1988-2023	This project uses data collected on the distribution and population structure (size frequency) of *Westralunio carteri,* Carter's freshwater mussel, by Robson in 1988. Robson visited a wide range of urban and peri-urban waterbodies, measuring the sizes of mussels before returning them to their habitat. This data was never published, but since 1988, many waterbodies have been affected by the drying climate, changing from perennial to seasonal and others have been affected by Perth's accelerating urban development. This mussel is the only mussel native to southwestern Australia and relies on fish for both dispersal and reproduction. In 1988, Robson	Assoc. Professor Belinda Robson	This project has a February or mid-year start.

	noted that many waterbodies only had populations of large, old mussels (estimated at ~20y of age) with no smaller or juvenile mussels. Those populations were often those that were inside reservoirs where there were no host fish for larval mussels. It is likely that those populations are now extinct, but no one has checked. Robson also found that the mussel had 2 different growth forms: a long, thin body shape in flowing waters and a shorter, rounder shape in standing waters. The loss of flows and inundation due to climate drying may have favoured the round body form over the longer, thinner form. Similarly, populations in flowing waters may have been more exposed to extirpation than those in standing waters, because running waters have been more dramatically affected by climate change. In this project, the student will visit all the locations sampled by Robson in 1988, plus additional locations where *W. carteri* is now known to be present and collect size-frequency data. As *W. carteri* is now a listed threatened species, all mussels will be returned to their habitat alive. Existing distribution data for potential host fish will be compared with the mussel size frequency data to determine whether reproduction and dispersal may be limited in some populations. The two datasets will be compared and analysed to determine where populations have been lost (and infer why) and where populations have been sustainable (and infer why). This will provide useful knowledge for environmental managers of extant populations of the mussel. This is a field-based project suitable for 1 student. Co-supervised by Dr Stephen Beatty.		
Life history and environmental tolerances of freshwater ostracods.	Ostracods are small bivalve crustaceans living in freshwaters in southwestern Australia. Little is known of	Assoc. Professor Belinda Robson	This project has a February

	their ecology, yet they may have large populations and high diversity. Other studies show that ostracods may be sensitive to salinity and show differing responses to wetland drying. For example, within one common family (Cyprididae) some species may enter dormancy as adults in drying wetlands, reviving quickly once wetlands refill; in other species, adults die but leave behind desiccation-resistant eggs that hatch once wetlands refill. Some species appear to show delays in hatching, but the cues for hatching are not known. Given the likely importance of these animals in aquatic food webs, we need to know more about their ecology and life histories. This project involves field sampling and rearing ostracods in the laboratory under different conditions, to investigate responses to drying, warming and cues for egg hatching.		or mid-year start.
The flora and fauna of wheatbelt gnammas and climate change	Gnammas are rock pools at the top of the granite inselbergs scattered across the WA wheatbelt. These gnammas have been found to contain rare species of aquatic plants and to have a much higher invertebrate biodiversity than gnammas in other parts of Australia and the rest of the world. Because gnammas are rainfed and unconnected to groundwater, they are unaffected by the salinisation that afflicts much of the wheatbelt, so they may be refuges from salinity. Little is known about the interactions between species in Australian gnammas. Although algae are assumed to provide the base of the food web in gnammas, leaf litter has also been found to be important, but quantities of litter vary dramatically between gnammas in different subregions. Food web structure in gnammas is also poorly understood. These	Assoc. Professor Belinda Robson	Best suited for mid-year start.

	projects will investigate the role of algae and leaf litter in gnamma food webs through sampling gnammas with naturally occurring differences in leaf litter abundance and describing invertebrate food webs and through experimental manipulation of leaf litter abundance. This project is only suited to a pair of students, to ensure that you have fieldwork companions, is not suited to drought conditions and is co-supervised by Dr Edwin Chester.		
Understanding the path of seagrass seedling success for Amphibolis antarctica and Amphibolis griffithii.	The viviparous Amphibolis plants develop seedlings on the adult plant. The grappling hook at the base of each seedling enables the seedlings to attach to seagrass, seaweeds, or even hessian, while many of the young plants wash up on beaches around Perth. In this project you will be tracking Amphibolis seedlings in the field from the point of release in the meadow to settlement, as well as study seedling movement characteristics in wave and flume tanks. Knowledge around the pathway, and forces needed to keep the seedlings suspended until they find a suitable receptor site will inform seagrass restoration strategies using seedlings in combination with other seagrass planting methods.	Dr. Jennifer Verduin	Semester 1 2022
Artificial seagrass beds to maximise seagrass recruitment	Seagrasses are so-called soft engineers and provide ecosystem services such as wave and current reduction, water clarity improvement, sediment stabilisation and, in effect, providing coastal protection. This project will study the use of artificial seagrass to slow down waterflow and thus preparing the site in the lee of the artificial meadow to form a more quiescent and suitable recruitment area for seagrass seeds and seedlings settlement and to stimulate further seagrass growth. In	Dr. Jennifer Verduin	Semester 1 2022

	addition to the artificial seagrass, which will be constructed of biodegradable materials, you will be using innovative nano technology to further promote suitable growth conditions.		
Linking aquatic ecosystem health to improved human wellbeing	Time spent in nature has measurable physical and psychological health benefits, providing strong reasons to conserve nature in urban areas. People who regularly spend time in nature experience improved psychological wellbeing (mental restoration and lower stress levels), a reduced risk of cardiovascular diseases, and greater opportunity for socialisation and physical activity. While the health benefits of nature are increasingly understood, it remains unknown if these benefits increase with the ecological quality (i.e., biodiversity and organismal health) of habitats. Natural habitats with high ecological quality may confer greater health benefits, providing a rare win-win conservation opportunity. The overarching aim of this honours project is to pre-test with means of virtual reality environments, if health benefits gained by nature-users increase with levels of ecological quality in blue-spaces (e.g., lakes, rivers, streams, wetlands). This project will use a combination of biological (biodiversity surveys, water quality testing) and psychological tools (virtual reality, survey questions).	Dr Essie Rodgers	February 2024
Pearls of Collaboration: Advancing Akoya Oyster Conditioning for Sustainable Aquaculture in Western Australia	The "Pearls of Collaboration" project is an exciting new opportunity that bridges the realms of academia, government, and industry in Western Australia. Focused on the conditioning of Akoya oysters (Pinctada imbricata), this project aims to harness the full potential of shellfish aquaculture by optimizing key variables including water temperature, day length, and microalgae feed. The student involved will gain valuable insights	Dr Essie Rodgers Dr James Tweedley	February 2024 Full-time only

	and expertise in shellfish aquaculture, working hands-on with industry professionals at DPIRD's Hillarys Shellfish Hatchery. By measuring critical parameters such as growth rates, metabolism, and spawning success, students will contribute to the development of robust conditioning techniques that can significantly enhance oyster production.		
Climate change projections from the latest CMIP6 models	The Coupled Model Intercomparison Project (CMIP) phase 6 is the latest round of global model projections of future climate change as used by the Intergovernmental Panel on Climate Change (IPCC). A vast family of model simulations exist, from which a number of research questions can be tailored according to the student's interests.	Dr Jatin Kala	Flexible timing
High resolution modelling of extreme weather events affecting southwest Western Australia.	A number of projects can be tailored to better understand different types of extreme weather events to better understand their underlying atmospheric dynamics using high resolution atmospheric model simulations.	Dr Jatin Kala	Flexible timing
Observations and simulations of near surface and subsidence inversions in southwest Western Australia.	Near surface temperature inversions occur typically in the morning after cold cloud-less nights, and this can lead to poor air quality, especially if there were bushfires the day before. Subsidence inversions occur further aloft and can also be conducive to poor air quality. This project will examine the frequency and intensity of these temperature inversion using both observations and models to better understand how these might change in the future.	Dr Jatin Kala	Flexible timing
Regional climate projections for southwest Western Australia	Under the new Climate Science Initiative of Western Australia, new regional climate projections for WA are being produced at 4 km resolution, by dynamically downscaling the latest CMIP6 global climate models. A	Dr Jatin Kala	Flexible timing

	number of projects are possible around changes in temperature and precipitation extremes from these new regional climate projections.		
High value products from saline microalgae.	Freshwater is a finite resource and should not be used solely for human consumption or for agriculture. On the other hand, we need to generate products from marine environment. In this project, the potential of using saline algae as a source of high value product will be assessed. Depending on the interest of the Honours candidate, the project can be designed for: 1. bio-prospecting, 2. mass cultivation and scaling up, 3. harvesting and down-stream processing, 4. process design, 5. techno-economics or 6. Life cycle analyses.	Prof Navid Moheimani	For start from Sem. 2, 2021 onwards.
Milking microalgae for generating hydrocarbon.	There is worldwide interest in developing algal biofuel. One main reason for the lack of success so far in producing a sustainable transport fuel from microalgae is the high cost of biomass processing, especially dewatering and oil extraction. There is also a significant cost involved in the energy content of the nutrient fertilisers required for biomass production. Non-destructive oil extraction or "milking" from algae biomass has the potential to bypass all these hurdles. Using a "milking" strategy means that there would be no need for (a) biomass dewatering, (b) breaking cells for oil extraction and (c) addition of nutrients to the culture,	Prof Navid Moheimani	For start from Sem. 2, 2021 onwards.

	resulting in a significant reduction in energy and fertiliser cost involved in production of biofuel from algae. We make use of the natural tendency of Botryococcus to produce external hydrocarbon in the extracellular matrix. The project can be designed for: a) bioprospecting, b) cultivation or c) c) optimisation of hydrocarbon extraction.		
Light management technologies for increasing algal photobioreactor efficiency.	The ever-increasing demand for food, valuable bio-based compounds and energy has triggered the development of novel and sustainable resources. Microalgae are a promising source of sustainable high-value products. The need for light (suitable intensity and wavelength) and temperature control in microalgal cultures remains the most significant challenge limiting their photosynthetic efficiency and productivity. Appropriate light management has the potential to concurrently maximize photosynthetic productivity and control the temperature of microalgal photobioreactors resulting in a reduction in overall production costs. In this Honours project the candidate will examine suitability of a solar control infrared blocking film (IRF) applied to an algal flat plate photobioreactor to block excessive non-photosynthetic photons and regulate the temperature profile of a selected microalga.	Prof Navid Moheimani	For start from Sem. 2, 2021 onwards.
Algal wastewater treatment.	Due to potential benefits of microalgae production incorporated into waste streams, studies into the use of microalgae culture as a treatment for wastewater have been ongoing for several decades. So far however, results have failed to bring about widespread applications for the industry primarily due to concerns regarding the economic and environmental sustainability associated	Prof Navid Moheimani	For start from Sem. 2, 2021 onwards.

	with pre-treatment or dilution of the waste before growth of microalgae. In this study, the growth of most dominant algal isolates on domestic anaerobic digestate will be assessed. The use of biomass as a source of feed (animal or aquaculture) or bio-fertiliser will also be assessed.		
Spatial ecology and remote sensing.	A variety of project possibilities exist in the fields of spatial ecology or environmental remote sensing, covering topics such as habitat mapping and modelling, spatial planning for ecological connectivity, spatial conservation planning, detection of ecological disturbances and recovery processes, and more.	Dr. Margaret Andrew	Flexible timing.
Environmental policy implementation.	In recent years, MSc students have examined the effectiveness of Australia's implementation of a range of international conventions such as MARPOL, Ramsar Convention and CITES. Projects are available to extend this work to include other international and regional environmental agreements. In addition, the application and implementation of ecologically sustainable development principles within Australian and Western Australian environmental law and decision-making can be studied using a similar framework. Projects of this nature could review the precautionary principle, the use of environmental offsets, etc.	Dr. Oliver Fritsch	Flexible timing.
Public participation and collaboration in managing Swan River.	The participation of citizens, industry, environmental movements and other non-state actors is commonly associated with better environmental policy outputs and a swifter implementation of policies and management plans. Projects are available to analyse the validity of such claims in the context of Swan River. To this end, students will carry out research interviews with policy makers and stakeholders, analyse policy documents and look at a number of other sources. Travel expenses can be covered.	Dr. Oliver Fritsch	Flexible timing.

Environmental Defender's Office of Western Australia.	The EDOWA is an important organisation to offer legal support to citizens and environmental movements in Western Australia. With a small number of staff only and limited resources, EDOWA relies on a network of dedicated environmental lawyers who provide voluntarily and for free legal analyses to win environmental cases. This project takes a novel perspective to look at lawyers as environmental activists. The student will interview EDOWA staff to understand better the conditions under which EDOWA operates and then utilises both research interviews and surveys to explore the wider network of professional lawyers supporting EDOWA. Travel expenses can be covered.	Dr. Oliver Fritsch	Flexible timing.
Sustainability in regulatory impact assessment.	This project will analyse the role of environmental protection and sustainability in Commonwealth and state regulatory impact assessments/statements. Attention: RIA/RIS, not environmental impact assessment (EIA). Large-N and computer-assisted analysis of RIA/RIS documents.	Dr. Oliver Fritsch	Flexible timing.
Relationship between EPA and WA government departments.	This project will explore the day-to-day working relationship between the Environmental Protection Authority and government departments in WA. This includes areas such as environmental impact assessment and environmental regulation. Methods: research interviews with EPA/gov staff, document analysis etc. Travel expenses can be covered.	Dr. Oliver Fritsch	Flexible timing.
You are what you eat but how big are your teeth?	This is a suite of projects that link the dietary composition of fish species to their functional morphology. The shape and size of physical features, e.g. mouth, teeth and various fins have been shown to influence the types of food a predator can both catch and consume. While most studies on fish diet compare radically different species (e.g. a herbivore vs a	Dr James Tweedley	Flexible in 2024

	carnivore), in this study we will investigate those species that co-occur and/or have similar morphology or taxonomy. Data are available for a range of groups of fish including • Benthic sharks and rays from Cockburn Sound • Ambush feeding flatfish from Cockburn Sound • Introduced and native gobies • Co-occurring estuarine hardyheads		
Diet of Green Mud Crabs	The Green Mud Crabs are armoured feeding machines. They can reach up to 2.5 kg in weight and have a large claw that can produce 40 kg of force to crush prey and a smaller claw for cutting up their food. Despite their fearsome reputation, and cultural and recreational importance as a food source, little is known about their diet. We are collaborating with staff from DPIRD Fisheries to study the diet of this species in the Kimberley and potentially also from the Pilbara. This project would give prospective students the chance to work with staff from the Department and gain insights and showcase their skills to a potential employer.	Dr James Tweedley	Flexible in 2024
Seagrass as a home for infaunal species.	Seagrasses and other complex habitats are known to support a unique fish assemblage and act as a nursery area. Far fewer studies have, however, investigated the role of seagrasses in supporting invertebrate communities, particularly in estuaries. This study involves sampling vegetated nearby and unvegetated areas of estuaries and comparing the fauna over a number of seasons.	Dr James Tweedley	Flexible.
Invertebrates in the deep: what lives at the bottom	Benthic invertebrates are key components of all aquatic systems and provide oxygenation, nutrient cycling and also act as a food source for higher predators. Despite	Dr James Tweedley	Flexible.

of the Swan-Canning Estuary?	their importance all our knowledge of these species comes from shallow sand banks habitats. We have several projects available involving sampling of shallow and deeper parts of the Swan-Canning Estuary to investigate what lives in these sediments, do they reflect the marinisation of the estuary as the effects of climate change increase and what does this mean for the health and future of these ecosystems. This project would involve collaborations with the Rivers and Estuaries Team at DBCA and the potential for a summer scholarship if the student wants.		
Urbanisation in estuaries: the good, the bad and the hungry.	As human populations increase the shorelines of estuaries often become modified. Some of these involve the loss of habitat (e.g. converting natural beaches to a sea wall), while others potentially add habitat (e.g. jetties and bridges). Using baited underwater cameras, this project will quantify how the fish compositions of contrasting natural and anthropogenic habitats differ and estimating the how this affects opportunist fish (i.e. the foxes of the fish world) and the consumption of carrion.	Dr James Tweedley Dr Alan Cottingham	Flexible.
Biology/ecology of fish and invertebrate species in coastal and estuarine systems.	A number of potential projects are available to build on the long-term history of Murdoch's excellence in ecological research on fish and invertebrates. These studies help identify critical habitats for species, understand productivity of our systems and the resilience of these species to anthropogenic effects, particularly fishing.	Professor Neil Loneragan Dr Peter Coulson Dr James Tweedley	Flexible
Using shell gaping behaviour of Ningaloo Reef Giant Clams to detect environmental perturbations in real time.	Like all coral reefs, Ningaloo is vulnerable to a range of natural and anthropogenic impacts, some of which can cause mass mortality of marine life. Giant clams are the mollusc equivalents of 'charismatic megafauna' and are an excellent flagship taxa to study the effects of environmental perturbations on these communities. This	Dr Alan Cottingham Dr James Tweedley	Flexible in 2024.

	project employs new technology to monitor the behaviour of giant clams at Coral Bay to elucidate the environmental factors that lead to stress in these fragile ecosystems.		
Elucidating the behaviour of bivalves for use as environmental sentinels.	Monitoring the degradation of aquatic environments requires cost-effective approaches. Bivalve molluscs are particularly useful environmental sentinels as they are often sessile or can be contained within a narrow area and respond to stress in a consistent way, i.e. by closing their valves. This study employs innovative technology to monitor the valve activity of several commercially important bivalve species exposed to different environmental and anthropogenic factors, e.g. dissolved oxygen, temperature, salinity and microplastics. This project will provide adequate background for future employment in WA's rapidly growing aquaculture industry.	Dr Alan Cottingham Dr James Tweedley	Flexible in 2024.
Movement and valve behaviour of WA's endemic freshwater mussel.	*Westralunio carteri* (Carter's freshwater mussel) is endemic to south-western Australia and was recently added to Australia's list of threatened species. Like other bivalves, *W. carteri* can close its shell during periods of poor water quality, but differs from marine bivalves in that it is mobile and can also ameliorate stress through moving from those conditions. This study explores the movement patterns and valve behaviour of W. carteri in its natural habitat to establish its physiological thresholds and provide valuable information for the conservation of this vulnerable species	Dr Alan Cottingham Dr Steve Beatty	Flexible in 2024.
Determining the filtration capacity of a 'restored' shellfish reef in WA's most important estuary.	With 85% of shellfish reefs lost, these habitats are among the most threatened marine habitats. Because these reefs provide a range of ecosystem services restoration projects are increasing rapidly throughout the world including in the Swan-Canning Estuary. Although a	Dr Alan Cottingham Dr James Tweedley	Flexible in 2024.

	single mussel can filter nine litres of water per hour, the filtration capacity of a reef largely depends on a large range of abiotic and biotic factors. This study aims to elucidate the factors that influence filtration and estimate the filtration capacity of the reef under a range of different scenarios.		
Ecology for conservation.	A variety of research project possibilities exist in the field of plant community ecology and its application to ecological restoration. With my help, students are encouraged to develop projects to address real-world problems. Students can work collaboratively with industry partners including Rangelands Natural Resource Management, Alcoa of Australia or Kings Park Science. Students will be invited to participate in the activities of the Terrestrial Ecology Research Group. Please contact Associate Professor Rachel Standish to register your interest.	A. Prof Rachel Standish	Flexible start date.
Urban ecology.	NatureLink Perth seeks to integrate nature into the city by linking remnant bushlands and wetlands, improving the biodiversity of greenspaces and supporting urban forests. A number of urban greening projects may be available.	Dr Jane Chambers	Flexible start date.
Nature/People interactions: Determining opportunity for people to interact with wildlife across Perth	This survey will ask people which native plant and animal species (a select group) they have seen in their suburb. Supported by data on access to green space/natural areas and from Atlas of Living Australia, this project will seek to determine how people's interaction with wildlife is influenced by where they live in the Perth Peel region. This information will be used to prioritise the creation of wildlife habitat, naturelinks and engagement programs spatially across Perth.	Dr Jane Chambers Dr Michael Hughes	Flexible start date.

Turtle conservation.	Climate change is increasing temperatures in southwestern Australia, the home of the southwestern snake-necked turtle (Chelodina oblonga). This project investigates how land cover and use around a wetland affect temperature of the soil and surrounds. Increasing temperatures are a problem for nesting females and hatchlings returning from the nest as well as hatching success but may be mitigated with appropriate habitat restoration. This project will make direct management recommendations as to the effect and potential solutions to urban warming.	Dr Jane Chambers Dr Steve Beatty Anthony Santoro	Mid year start part time recommended.
Restoring submerged aquatic plants to the Canning River weir pool	After 2017 aquatic macrophytes were lost to the Canning River Weir pool with significant ecological impact to the ecosystem. This occurred at the time of the new weir installation and change in water regime but also when cichlids (exotic fish) were established in the area. This project will seek to identify the cause of the aquatic plant loss and seek potential solutions to rectify it. This project may lead to a PhD on the topic.	Dr Jane Chambers Dr Steve Beatty	Mid year start part time recommended.
Seagrass restoration.	A series of projects will examine opportunities to improve the succession ecology, and survival and stability of seagrass transplants. The overall aim of these projects is to develop new techniques for effective large-scale seagrass restoration for both temperate and tropical locations. There are various project options under this project umbrella: - Surveys to identify meadows of pioneering species in the Perth region, to act as suitable recipient sites for the study. A variety of habitats	A. Prof. Mike Van Keulen	Flexible start date.

	will be selected to cover a range of physical conditions. - Studies of seed banks of colonising species will be studied to examine potential for recolonization after disturbance or loss. - Seedlings and sprigs of climax seagrass species will be transplanted into existing meadows of pioneering species; minor/colonising species have been anecdotally observed to aid survival of seagrass transplants and these species will be targeted for this study. - Results will be measured by regular monitoring of experimental plots for survival, growth and physiological stress, and return of ecosystem function. Experimental treatments will cover a range of suitable planting densities and will be compared to control plots. The impact of introducing transplants into existing pioneer species meadows will be measured by regular monitoring.		
Coral restoration	Projects are available to explore opportunities for restoration of corals and coral reefs. A range of approaches is possible; details will depend on students' personal interests and funding for field and laboratory work. Field study locations can include Coral Bay/Ningaloo Reef and Bali, depending on funding availability.	A. Prof. Mike van Keulen	Flexible start date.
Changes in community composition of seagrass epiphytes in response to eutrophication.	This project will examine the effects of nutrient enrichment on community composition of epiphytes growing on seagrasses in the Perth metropolitan region. The objectives of this project are:	A. Prof. Mike Van Keulen Prof. Navid Moheimani	Flexible start date.

	- Artificial seagrass units will be deployed within seagrass meadows to examine epiphyte community composition under natural conditions. - Additional artificial seagrass units will be set up in aquaria at the Algae R&D Centre using seawater collected from coastal seagrass meadows. Some of the lab treatments will receive nutrient enrichment, and some will be controls. - Results will be measured by regular monitoring of epiphyte communities on the artificial seagrass units. Cultured epiphyte communities will be compared to those placed in the marine environment, and to actual seagrass epiphyte populations. Experimental treatments will cover a range of nutrient enrichment levels and will be sampled during 2-3 seasons. - A focus of the study will be the relative proportion of calcareous (climax) epiphyte species vs. filamentous (nuisance/opportunistic) species. - A supplementary/parallel study could be response of epiphyte communities to changes in pH.		
Biology and cultivation of Asparagopsis tetrasporophytes	There is considerable interest in the viability of a red alga, Asparagopsis sp., as a supplement to reduce methane emissions in livestock. Thereis an Honours opportunity to explore the biology and cultivation of the tetrasporophyte growth stage of Asparagopsis for eventual commercial cultivation.	A. Prof. Mike Van Keulen	Availability is flexible throughout 2021-2023
Alexandrium harmful algal bloom and associated challenges	Harmful algal blooms, or HABs, occur when colonies of algae grow out of control and produce toxic or harmful effects on people, fish, shellfish, marine mammals and birds. The human illnesses caused by HABs, though rare, can be debilitating or even fatal. This project will be	Prof Navid Moheimani	Availability is flexible throughout 2021-2023.

	focused mostly on the algal species *Alexandrium minutum,* which has been found in the Swan-Canning estuary. *Alexandrium* produce toxins that can be concentrated by filter feeding shellfish. Consumption of shellfish containing high levels of these toxins can result in PSP. In the worst-case scenario, this can cause muscular paralysis and death due to respiratory failure. Various Honours projects on algal cultivation, examination of the biology and life history of *Alexandrium,* as well as removal process can be defined. Students would work alongside industry partners and an industry-funded PhD student.		
Determining parental contribution to cultured fish stocks	Yellowtail kingfish is an important cultured fish species in Australia. To supply the local growout industry, fish are naturally spawned in a hatchery in Fremantle. Spawning occurs in broodstock groups (several male and female fish), meaning that parental contribution to the next generation is not precisely known. This limits the efficiency of genetic improvement programs. This project will use an experimental approach to investigate this problem, by creating artificial pools of parental DNA (mixed in different ratios), and genetically comparing these pools with offspring DNA. The project is a collaboration between Murdoch University, the Department of Primary Industries and Regional Development and partners from the aquaculture industry. It would suit a student with interests in molecular biology and population genetics, and a desire to use these skills to help the rapidly growing aquaculture industry in Australia.	Alan Lymbery (a.lymbery@murdoch.edu.au) or Gavin Partridge (Gavin.Partridge@dpird.wa.gov.au)	Available 2021 Semester 1 or Semester 2 start.
Monitoring tools for wary dingoes	Understanding how many dingoes are present in an area is an important piece of information necessary to guide their management. Many studies use passive infrared camera traps to monitor population numbers, assuming	Trish Fleming	Flexible start

	that estimates obtained through these cameras are robust and representative of actual numbers. However it is clear that dingoes avoid cameras – some stare into the lens, while others walk around the sensor field and therefore avoid triggering the camera. This project will address a simple question – can we alter camera trap position to increase the likelihood of 'trapping' camera-wary dingoes?		
What do schoolie ravens eat, and where do they go when term is over?	Australian ravens are problematic for many Perth schoolyards. They are super-smart animals that know how to undo backpack zips, open lunchboxes, and access bins. Their populations flourish around schools as they exploit discarded (or badly protected) play lunches and refuse. But what happens when term is over and students leave for holidays? Anecdotal stories suggest that these bullying birds head out into the neighbourhood where they cause havoc among small bird and reptile populations. This project will use a range of methods to find out what the birds are doing: following ravens using trackers, watching their exploitation of resources within schoolyards, and analysing their diet.	Trish Fleming	Flexible start
Identifying optimal lures for feral cats	Feral cats can be difficult to monitor and control due to neophobia and trap avoidance behaviour, resulting in low detection rates and variable success of control measures. We will test a novel, long-life (up to 1 year) lure system to increase trap captures and reduce neophobic behaviour of cats and develop a smart camera to identify cats.	Trish Fleming	Flexible start
Quenda are fussy about their fungi.	A recent study lead by Murdoch University found that 80% of fungi identified in quenda scats were unclassified on global genetic databases. This indicates that they have never been genetically described before, representing a huge gap in knowledge. This project will compare fungi consumed by quenda with a broader sample collected	Trish Fleming and Shane Tobe	Flexible start

	form the environment to test the hypothesis that quenda are fussy eaters.		
Biodiversity of salt lakes	Salt lakes represent one of the most important inland environments in Australia, yet they are poorly studied. They contain unique and diverse communities of invertebrate. Our research group is studying these invertebrates with the goal of generating base-line information that can be used to help manage salt-lake environments, which are under threat from a range of anthropogenic stressors. We are using molecular tools to review the existing taxonomy of groups, and find new species. We are alsodocumenting the distribution and environmental tolerances of species, and studying their population structures, genetic diversity and evolutionary histories and in the process testing ecological and evolutionary theories. Join the fun – honours projects on brine shrimp, *Coxiella* gastropods, giant ostracods, small ostracods, cladocerans and other salt-lake taxa are available. Background information - https://www.publish.csiro.au/MF/MF21088	Jennifer Chaplin jchaplin@murdoch.edu.au	Flexible start
Animal Conservation and Population Biology	Many of our Australian native species are found nowhere else in the world, and yet are threatened with extinction. The success of conservation measures depends on having a good understanding of species biology and ecology, but for many species this is lacking. Possible honours projects exist in the study of terrestrial vertebrates, particularly on our native mammals. These studies would	Kate Bryant	Flexible

	examine aspects of population biology and species ecology, including projects collaborating with industry to improve the scientific methods for monitoring these species.		
Urban owls in Australia's Southwest	The urban landscape presents multiple challenges for birds and other biodiversity to survive and flourish. Owls play an important ecological role in managing lower order species and pests. Despite being an iconic and much-loved taxonomic group, a review of the presence and abundance of owls in the Southwest of Australia has not been undertaken for more than two decades. This project will draw on desk-top and/or field-collected data to build a picture of the distribution and abundance of owls in the Greater Perth region and how different urban attributes might predict their population trends.	Dr Rochelle Steven	From July 2022
Farm cats in Greater Albany	Cats on farms can present a management conundrum to conservation practitioners and farmers alike. For the South Coast of Western Australia, this is particularly poignant, with multiple highly threatened bird and mammal species at imminent risk of extinction due to habitat loss and degradation and predation by feral cats. This multidisciplinary project will explore the barriers and obstacles to effective cat management (or control) on farms in the Greater Albany region with a view to improving conservation-focused practices across the land management sector. This is a collaborative project working with Oyster Harbour Catchment Group and will require a certain amount of travel, if they student is based in Perth	Dr Rochelle Steven	July 2022-December 2023 – start asap

People and nature – multiple project opportunities	My research expertise covers multiple facets of the relationship between people and the non-human environment. Connections and interactions may be positive or negative for both people and other species. I lead research projects that explore the drivers and predictors of these interactions and seek to develop strategies and mechanisms that promote better co-existence between all species at varying spatial scales. Research projects might explore questions related to nature based tourism and recreation, public participation in conservation, resolving human-wildlife conflicts, promoting conservation on private land, managing protected areas for maximum biodiversity benefit, and many other aspects of multidisciplinary conservation. If you are interested in this area of research, please contact me to discuss specific project options that will suit your own interests and analytical strengths.	Dr Rochelle Steven	From July 2022
Ecological characteristics that make fire-fighting waterpoints effective refuges for biodiversity	Freshwater and riparian ecosystems are the most biologically diverse in the world per unit area but are also disproportionately threatened by climate change. The most severe effect of climate change is the loss of permanent pools that provide essential refuges for the survival of species during the dry season. We have recently found that fire-fighting waterpoints can mimic natural refuge pools to maintain biodiversity. However, the utilization of waterpoints for conservation is currently hindered by an inadequate understanding of the characteristics that make them effective as biodiversity refuges. Therefore, this project aims to identify the ecological characteristics that make fire-fighting waterpoints effective biodiversity refuges. Projects can be designed to focus on any of the flora and fauna that	Stephen Beatty Alan Lymbery Belinda Robson Trish Fleming Joe Fontaine Callum Donohue	From Feb 2023

	are dependent on natural refuge pools for survival, including fishes, frogs, macroinvertebrates, and terrestrial flora and fauna (including feral animals). This large-scale project is fully funded and includes the scope to design field and/or laboratory-based studies and is suitable for up to 6 students.	
How to court a jumping spider using chemicals	Did you know that the largest living land animal, the Asian elephant (*Elephas maximus*) shares the same sex pheromone as 140 species of moth? Although it is unlikely that elephants and moths will choose the incorrect mate, this sharing of sex pheromones demonstrates the ubiquity of pheromones across the animal kingdom. This project will investigate the sex pheromones used by the jumping spider *Menemerus nigli*. Jumping spiders are known for complex courtship displays with both visual, vibratory, and chemical components. The jumping spider *Menemerus nigli* is considered non-indigenous to Australia and results from this study will be used to determine the feasibility of isolating chemicals for use as a lure in traps.	Associate Professor Melissa Thomas (HBI) (Melissa.Thomas@murdoch.edu.au) plus One staff member from ECS Preferable mid-year start
Aliens among us - biosecurity matters Multiple project opportunities	Rats on Gough island that attack adult albatross and dive into water to prey on crabs. Possums in New Zealand that forego their plant-based diet for native bird eggs. Fire ants in Australia who have the potential to wipe out entire native ecosystems. These invasive species, and many more, are causing significant environmental and economic harm and their numbers are accelerating as the world becomes increasingly connected. Invasive alien species are considered one of the five direct drivers causing a global decline in nature and without significant transformation to support a global sustainable pathway, it's only going to get worse. We are using a	Associate Professor Melissa Thomas (HBI) (Melissa.Thomas@murdoch.edu.au) plus One staff member from ECS Flexible start

	multidisciplinary approach (evolutionary, ecology, chemical, computer science, social science) to develop innovative solutions that will help staunch the flow of invasive species from moving around the globe. If you are interested in this area of research, please contact me to discuss project options that will suit your own interests and strengths.		
Population Genomics of Little Penguins	Little Penguins in Western Australia face a range of threats. Elucidating the amount of genetic diversity and connectivity (= exchange of individuals among colonies) is central to understanding the resilience of this species to these threats. This study will therefore use population genomic data to provide high resolution estimates of the amount of genetic diversity and extent of gene flow among colonies of the Little Penguin in Western Australia.	Jennifer Chaplin and Belinda Cannell jchaplin@murdoch.edu.au	Flexible start
Novel Food Ingredient from Microalgae: A Sustainable Approach to Enhancing Nutrition and Taste	Microalgae have emerged as a promising source of sustainable and nutritious food ingredients, including proteins and sweeteners. Sweet proteins derived from microalgae are a relatively new and exciting development in the world of natural sweeteners. These proteins offer the potential to replace traditional sugars and artificial sweeteners in various food and beverage products while providing sweetness without the associated calories or negative health effects. This research project aims to explore the identification development of a novel food ingredient derived from microalgae to enhance the nutritional and sensory properties of food products while promoting environmental sustainability. This project will involve	Dr Ashiwin Vadiveloo **(**Ashiwin.Vadiveloo@murdoch.edu.au**)** Prof Navid Moheimani	

	the isolation, characterization optimization of microalgal strains for the production of novel food ingredients. The nutritional profile, stability and sensory evaluation of the novel ingredient, including protein content, amino acid composition, and potential bioactive compounds from the targeted microalgae will also be assessed as part of this work.	
Utilizing Wastewater-Grown Microalgae as a Sustainable Biofertilizers for Enhanced Crop Productivity	Wastewater-grown microalgae as biofertilizers offer a sustainable and environmentally friendly approach to nutrient recycling, wastewater treatment, and agricultural improvement. This research project aims to investigate the feasibility and effectiveness of wastewater-grown microalgae as biofertilizers for common food crops such as tomato and lettuce. This project will involve growth trials to assess the effectiveness of microalgae-based biofertilizers on different crops, comparing them with conventional fertilizers. Moreover, it will also investigate the impact of wastewater grown algal biofertilizer on nutrient release, water quality and soil heath.	Dr Ashiwin Vadiveloo **(**Ashiwin.Vadiveloo@murdoch.edu.au**)** Prof Navid Moheimani