2013 Student Conference for Ecology and the Environment

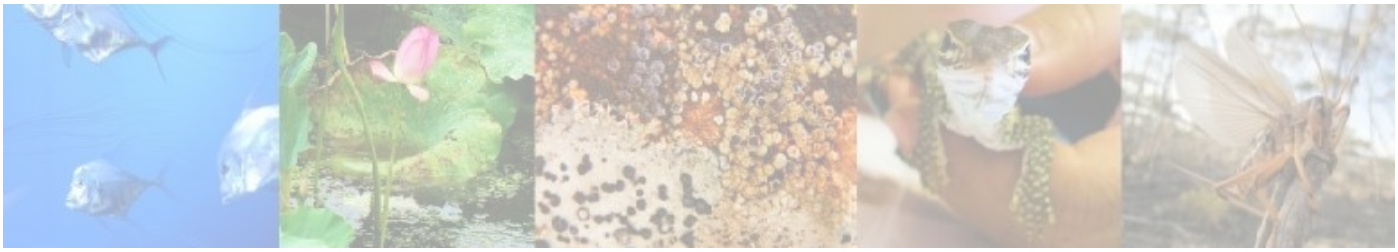
We are very excited to present the conference proceedings for the first ever student run conference on Ecology and the Environment at La Trobe University.

We have been overwhelmed with the response from students and staff in support of this event, and we would like to thank everybody that has made this conference possible: the **Biology, Evolution and Ecology Group at La Trobe (BEEG@L)** and the RFA funding body for **Securing Food, Water & the Environment**; the amazing **students** who have come from universities across Melbourne and volunteered to share their work, be it through talks, presenting their posters or sharing pictures – (without the generous donation of your time we would have no content); and of course, thank you to all of our **attendees**. The turn out in support of this event reaffirms the importance we all place on starting conversations about environmental and ecological issues, and without you we would have no conference.

Sharing research and fostering connections with our contemporaries is an integral part of building the next generation of the scientific community, and we sincerity hope that this event has afforded all those who attended that opportunity.

Sincerely,

Lara Bereza-Malcolm, Nicole Coggan and Jen Wiltshire
(Conference organization team)



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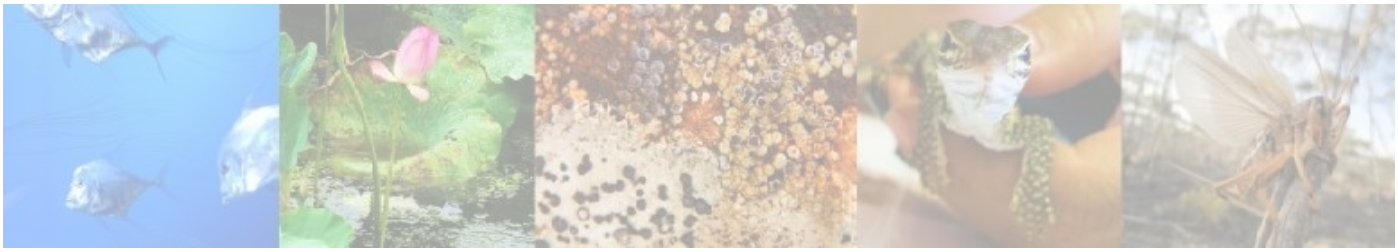


Maddie **WILLCOCK** (Keynote presenter)

School of Geosciences, Monash University

'A super-volcano, thesis and life'

Caldera volcanoes have the potential to radically affect human society and the natural world. Eruptions from big caldera volcanoes and the resulting destructive pyroclastic flows make understanding of these systems paramount. The paucity of large caldera eruptions have left the current knowledge of the dynamic processes of these systems lacking. Studies of calderas and their deposits in the geologic record, provides valuable insights into magma processes, caldera eruption, timing of caldera collapse and transport and depositional processes of voluminous ignimbrites. The 277 – 274 Ma eruption of the Ora ignimbrite, in northern Italy, produced one of the largest caldera eruptions globally, with over 1290 km^3 of magma erupted.

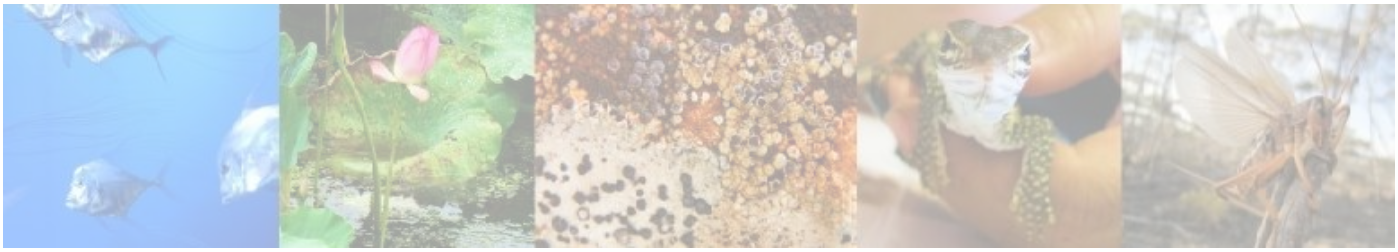
This project was focused in the areas of dynamic caldera eruption, intra-caldera pyroclastic flow transport processes and ignimbrite deposition. Significant lateral differences were discovered between the northern and southern caldera regions, suggestive of two nested calderas, with a complex multi-eruption point eruption and collapse process. These were revealed through differences in pyroclastic flow directions, the preserved eruptive stratigraphy and ignimbrite composition.

The northern Ora caldera, Bolzano, Italy

The broader implications of this research centred on eruption and intra-caldera in-filling processes and in comparison between this and other large-scale ignimbrite forming caldera eruptions globally.

The PhD journey is amazing, at times overwhelming and certainly different for everyone. It can help to know a few tips from others so we don't all have to entirely re-invent the wheel. I hope to provide some insight into my good, not so good and interesting journey and make your experience a bit easier in the process!

In the field



Mackenzie **KWAK**

Undergraduate, La Trobe University

Carnivorous Plants- Competition & Trickery

A study exploring the ecology and effects conspecifics, rival species and insect scavengers and predators have on the members of the carnivorous plant genus *Drosera*.

Notable points of the study include:

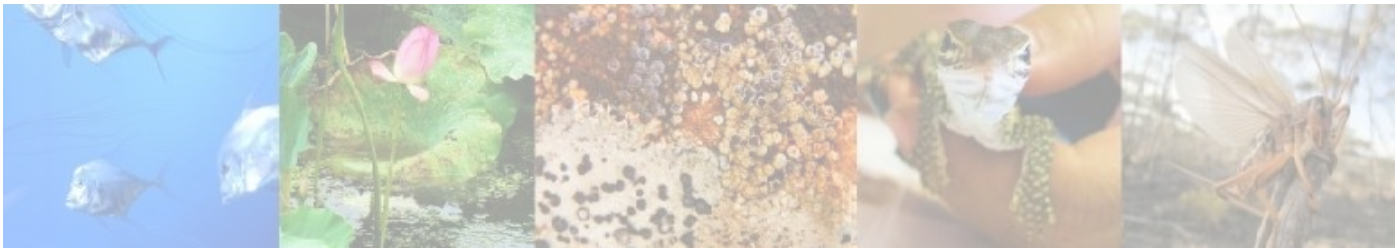
• This is the first study exploring the 'magnet species effect' in carnivorous plants examining the effect that conspecific density has on prey capture rates.

• An examination of the effects insect scavenging has on the level of prey actually left for digestion on Drosera

• A contrast of plant morphology and its implications on prey capture rates

• A contrast of the effect environment has on prey capture rates (swampy grasslands vs dry sclerophyll forests)

• A look at the effect colour plays in prey capture

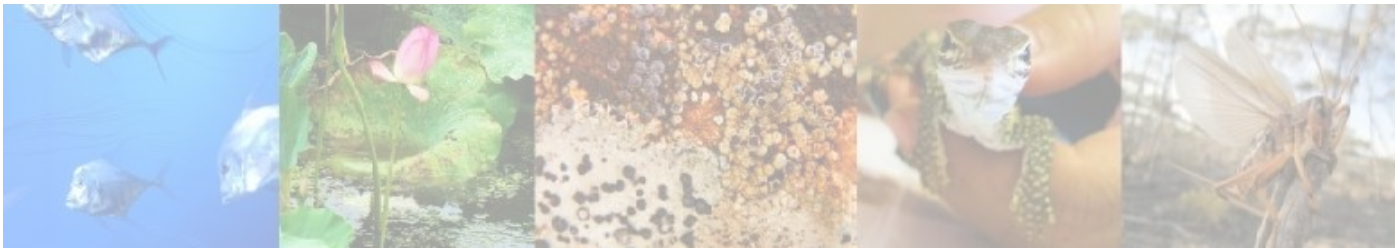


Stephanie **SUTER**

Department of Environmental Management and Ecology, La Trobe University, Albury-Wodonga

Fungal community dynamics and leaf litter decomposition in Australian alpine streams

Aquatic hyphomycetes are major contributors to litter decomposition in streams. Despite this, few studies have been carried out in Australian streams, with only one prior study in Australian alpine streams (Suter et al. 2011). The Australian alpine environment and its flora are unique, with Eucalyptus pauciflora (snow gum) being the only native tree species to occur above 1400m. E. pauciflora have slow breakdown rates, compared to other eucalypt species and deciduous Northern hemisphere species. Given the extreme weather fluctuations and the nature of the litter present within the streams, this study investigated the fungal community at both temporal and seasonal timescales in alpine streams of south-eastern Australia. Sporulation, biomass and DNA-based studies combined showed that the fungal community changed over time and seasonally, with the greatest differences occurring between the two extremes of summer and winter. Synchrotron infrared microspectrocopy also revealed subsequent internal changes to leaf chemistry as decomposition occurred.



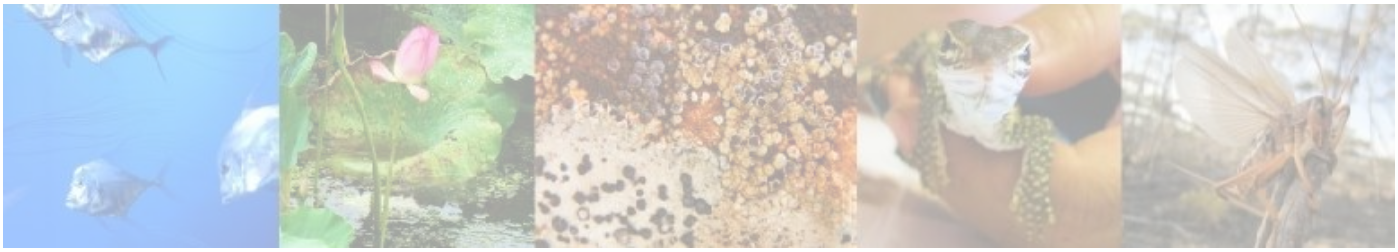
Cesar **GUZMAN**

Department of Agricultural Sciences, La Trobe University

Ecology of microbial succession in the early development of the gastrointestinal system of calves

Microorganisms have a profound influence on the conversion of feed into end products which can impact positively or negatively on the host and their environment. However, there is little knowledge about how they colonise the different areas of the gastrointestinal tract (GIT) in calves and what their interactions are with other groups of microbes.

The aim of this research was to characterize and quantify the succession of microorganisms in the developing rumen of calves at 0 to 20 days. The experiment involved 42 Holstein bull calves, sample collection from the gastrointestinal tract and analysis using molecular techniques. We quantified archaea and cellulolytic bacteria at the species level. We found these microbes one hour after calf was born in different quantities and varying diversity. This knowledge tempts us to think that we could generate solutions to problems like greenhouse gas emission and productivity in calves.



Shanthi **JOSEPH**

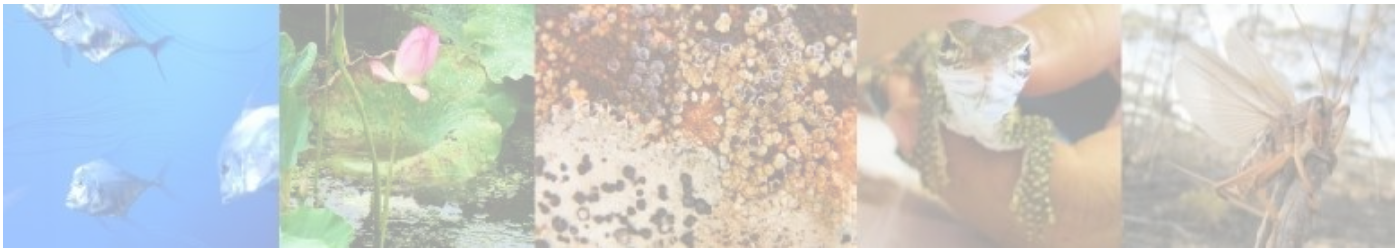
Department of Botany, Swinburne University of Technology

Unlocking the potential uses of Australian native trees

The productive use of saline lands for agroforestry relies primarily on plant species that have salinity tolerance. However, the selection of species also needs to take into consideration other key factors, such as the potential for improving soil fertility or lowering saline water tables, and ideally will incorporate environmental benefits like biodiversity conservation. From a land management perspective, local flora species are preferred to introduced species since they are already acclimatised to local climate and soil conditions, also, their requirements for soil preparation, fertilisers, and watering is minimal.

Acacia forests, woodlands, open woodlands and shrublands cover 20% of the total native vegetation in Australia and many *Acacia* species show high potential for agroforestry uses. However, there is limited data for most Australian species (not just *Acacia*) regarding salinity tolerance potentials or distinguishing the upper and lower limits of tolerance. Here, we present a novel approach for preliminary identification of salt tolerance in *Acacia* species with potential for agroforestry in salinity affected areas. The method is based on molecular phylogenetic analysis of species related to four identified salt tolerant *Acacia* candidate species currently utilised in the Kamarooka land reclamation project north of Bendigo, Victoria. Nucleotide sequences were generated for ITS and ETS marker regions then combined with an extensive, published dataset of *Acacia* species. This methodology, followed by appropriate laboratory testing for ecophysiological traits, has been used to identify new native *Acacia* species suited to agroforestry in salinity-affected regions.

L-R: Prof. Mrinal Bhave, Ms. Shanthi Joseph, Dr. Daniel Murphy. Photography Courtesy of Eamon Gallagher (Hardie Grant Media, Melbourne) for Venture Magazine, Swinburne University of Technology.



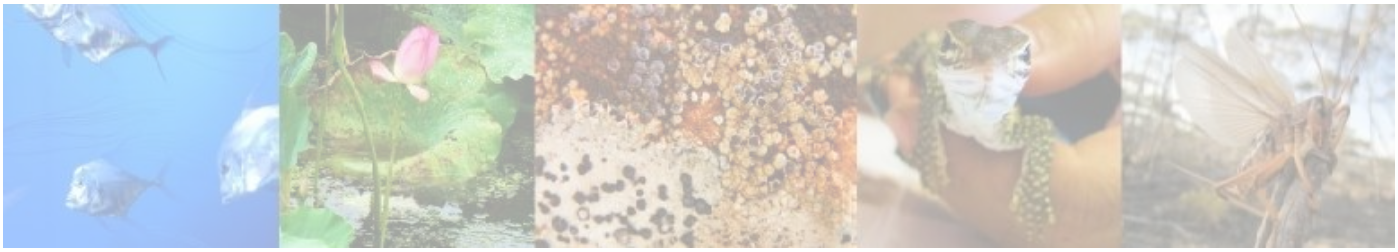
Kylie **Soanes**

School of Botany, University of Melbourne

From use to effectiveness: how well do crossing structures mitigate the impacts of roads on wildlife?

Millions of dollars are spent on wildlife crossing structures to mitigate the negative impacts of roads on animal populations. However their success is largely unknown due to a lack of research on population impacts. We use before-after-control-impact (BACI) population monitoring to evaluate the effectiveness of crossing structures for the squirrel glider (*Petaurus norfolcensis*), a threatened arboreal mammal, along a highway in south-east Australia. Remote-sensing cameras, personal integrated transponder (PIT) scanners and BACI radio-tracking were used to determine the impacts of crossing structures on squirrel glider movement. Mark-recapture surveys were conducted BACI to determine how survival rates and gene flow changed over time.

We found that installing crossing structures increased squirrel glider movement across the highway while unmitigated sites remained a barrier to movement. Multiple individuals of both sexes and all age classes were detected using crossing structures, suggesting that some level of functional connectivity is provided. Genetic analysis revealed that this movement also resulted in gene flow. However, when compared to non-freeway (control) sites, the impact of the highway on movement was only partially mitigated. Analysis of mark-recapture data is currently underway, and will reveal if survival rates have improved as a result of mitigation. This research will be used to determine if these structures are successful, or if additional management actions are required to preserve squirrel glider populations.



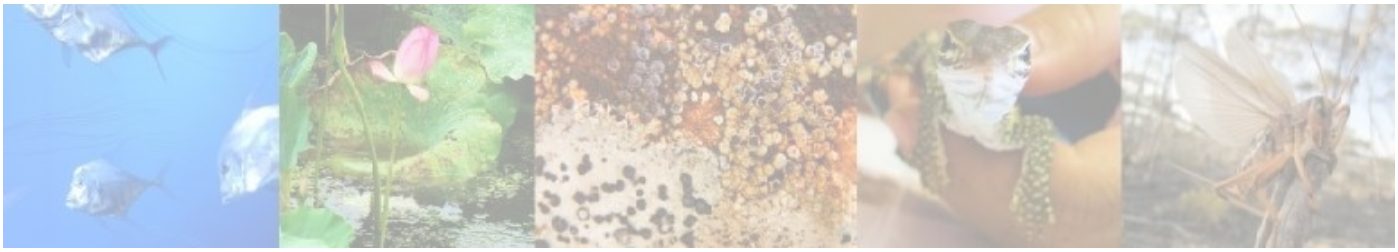
Luke S. **O'Loughlin**

Department of Botany, La Trobe University

The secondary invasion of rainforest on Christmas Island

Biological invasions are a significant threat to all ecosystems and considerable research effort is focussed on determining the mechanisms of invasion success. Increasingly, positive interactions between alien species have shown to increase impacts and potentially facilitate other exotic species to enter the system. This phenomenon of secondary invasion is a key aspect of the invasional meltdown hypothesis but is rarely the focus of research and is poorly expressed in the ecological literature. We define secondary invasion as the scenario whereby the invasion success of one exotic species is contingent on the presence and influence of another exotic species. On Christmas Island, mutualism between invasive yellow crazy ants (YCA) and honeydew-secreting scale insects has led to population explosions of both, dramatically altering the rainforest understory by causing the local extinction of omnivorous red crabs. We tested the hypothesis that by deleting red crabs, the ant-scale mutualism facilitates the secondary invasion of rainforest by a variety of non-native landsnails. The focus of this project is three-fold; i) to document the pattern of non-native landsnail invasion in relation to YCA supercolony formation, ii) experimentally determine the mechanism of invasion success, and ii) establish whether these exotic landsnail species are also causing impacts. Preliminary findings support the hypothesis that the exotic landsnail fauna is promoted by YCA supercolony formation with significantly higher numbers present in impacted forest ($F=3.13$, $p=0.06$). We have also found that the most conspicuous of these exotics, the Giant African Landsnail, is having very little impact, and may replace to some extent the role played by native decomposers (land crabs) in this system. This ongoing project aims to highlight secondary invasion as an important phenomenon in refining our understanding of the determinants of invasion success.

Luke O'Loughlin is a PhD Candidate working on the facilitation of secondary invaders by primary invaders in rainforest on Christmas Island. His main research interests are in novel species interactions and the determinants of invasion success (@OLoughlinLS)

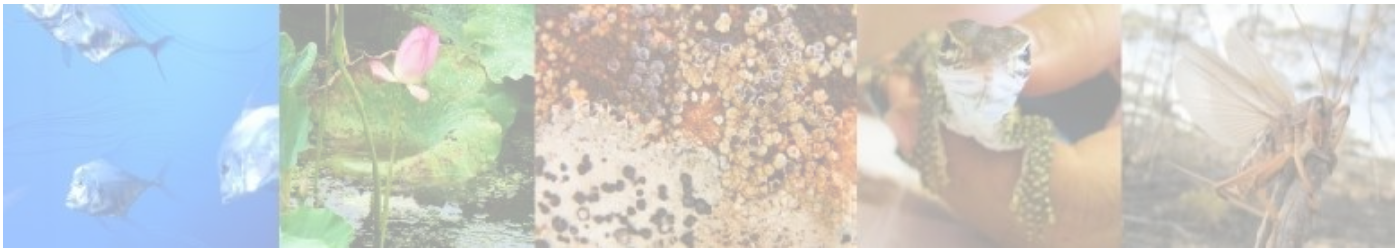


John **PATYKOWSKI**

School of Life and Environmental Science, Deakin University

The effect of fire on rare plants and their role in ecosystem function

The response of rare plants to fire and their role in ecosystem recovery is poorly understood. Following disturbance, changes in the abundance of rare species may have profound consequences for the recovery and stability of ecosystem functions. Rare species may support unique plant functional trait combinations, and provide functional insurance against the loss of common species. Thus, this project aims to determine the influence of fire on rare species dynamics and plant functional trait dynamics within three Victorian ecosystems of varying biotic and abiotic characteristics. Further, the roles of rare species (singularly and collectively) in nutrient cycling, and maintaining carbon pools and fluxes, will be examined within these systems.



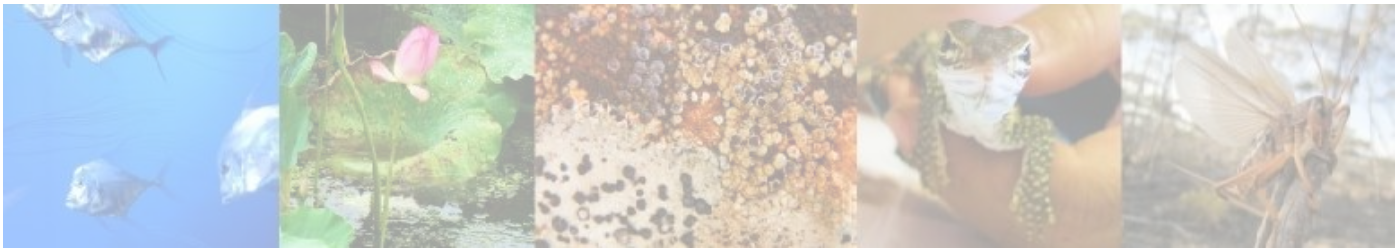
Blake **ALLAN**

School of Life and Environmental Science, Deakin University

Tracking on the cheap

Brush tail possum with tracking collar

In wildlife research, our ability to track sufficient numbers of individuals is always limited by cost, which restricts inference of species-habitat relationships. I will describe the modification and use of some relatively new and inexpensive off-the-shelf accelerometers, magnetometers and GPS, to provide detailed and accurate information on the movement patterns of individuals (mountain brushtail possums, *Trichosurus cunninghami*), including how movement varies through time, and how individuals interact with each other and the environment. I will demonstrate some methods in which the data can be analysed, and suggest some future directions for the technology



Natasha **ROBINSON**

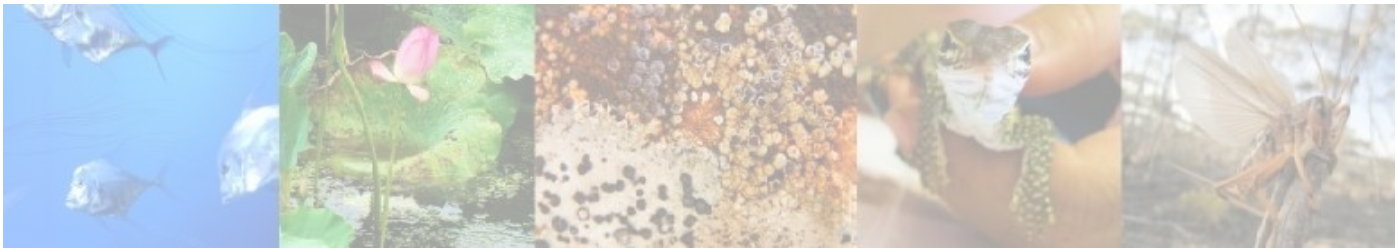
Department of Zoology, La Trobe University

Faunal refuges in fire-prone landscapes: does planned fire moderate the impact of mega-fire on bird assemblages?

Unburnt patches within fire boundaries are considered to act as faunal refuges. However, their role in facilitating post-fire survival of fauna has rarely been examined. This study aimed to determine the relative importance of fire history and severity in predicting the persistence of birds in burnt landscapes, within the context of a 'mega-fire'.

Sites ranged in severity from unburnt to crown burnt. Fire history prior to the mega-fire was defined as recently burnt (<3 years) and long unburnt (>20 years). Our results revealed declining species richness and abundance with increasing fire severity. However, the magnitude of this effect was dependent on fire history. Unburnt patches created due to recent fire were important avian refuges, harbouring more species than more severely burnt habitat; but were not equal to unburnt patches of older vegetation.

Such insights can inform decision-making in the use of planned fire to achieve ecologically positive outcomes for birds.



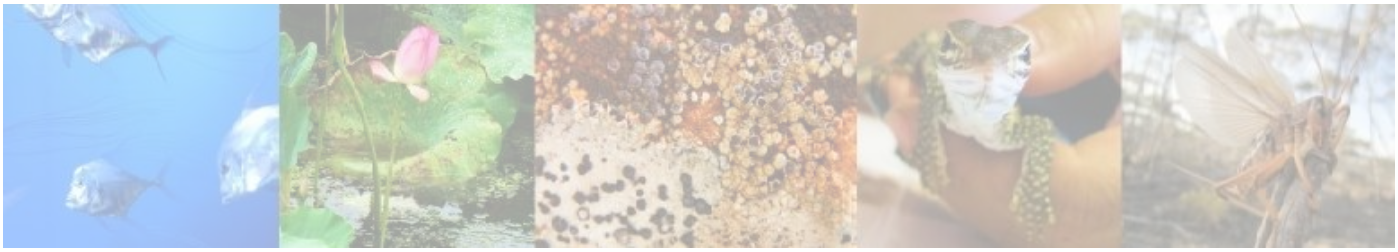
Nicola **KHAN**

Department of Zoology, La Trobe University

Sex, Stress and Conservation

When under stress, energy is re-directed from non-essential physiological processes toward survival. There is an urgent need to understand how animals cope with the increasing frequency of stress events associated with rapid global change. Understanding why eggs fail to hatch, and the potential effects of stress on offspring sex ratio and fitness, is crucial for a number of factions ranging from commercial poultry to captive breeding programmes for endangered species conservation.

In this experiment, small doses of CORT were repeatedly administered to mothers during egg formation. This study aimed to determine not only whether maternal stress affects offspring sex ratio and sex-specific mortality of young, but also whether clutch size, overall fertility rates, hatching success, and fertile hatchability were affected. Elevated circulating CORT around the time of egg production negatively affected hatching success and survivorship, but not offspring sex ratio.



Nicole **COGGAN**

Department of Zoology, La Trobe University, Bundoora

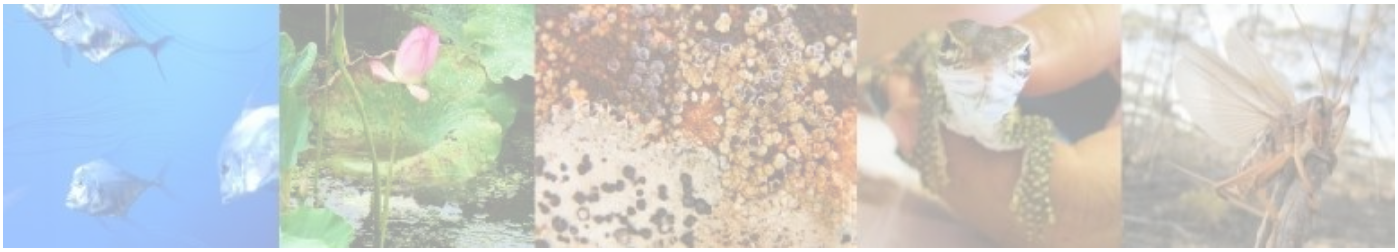
Restoration of ecosystem engineers affects habitat use by a key detritivore

Regional extinctions of Australian mammals in the 21st century have outpaced global averages of species declines. Reintroducing regionally extinct species to their former habitats is regarded as a viable solution against extinction. We addressed a key assumption of threatened species conservation, wherein interactions between locally extinct and persisting species are expected to recover automatically as a result of reintroductions.

We uncovered important information regarding historic interactions between regionally extinct fossorial marsupials and ground-dwelling invertebrates that can inform planning for the sustainability of habitats chosen for conservation. Termites' use of buried resources was significantly altered by reintroduced marsupial activity: A smaller proportion of resources buried within reach of marsupial foraging pits were consumed by termites when we tested the effect of soil disturbance intensity caused by reintroduced marsupials. Proportionally more termites were also lost from buried resources over time when we tested the response of termites to direct resource disturbance. Climatic restrictions on resource availability and the attraction of predatory ant species to disturbed resources had minor influences on the strength of termites' reactions to resource manipulation.

Our research suggests that small-scale patterns of habitat use by termites changed after marsupials were reintroduced, and highlights the importance of understanding the contexts of biotic and abiotic interactions between species and their habitats in species restoration.

Nicole Coggan is a PhD candidate supervised by Drs. Heloise Gibb and Matt Hayward. Her research focuses on the impacts of marsupial extinction and reintroduction on insect biodiversity and ecosystem processes. Nicole's primary research interests include ecology and entomology.



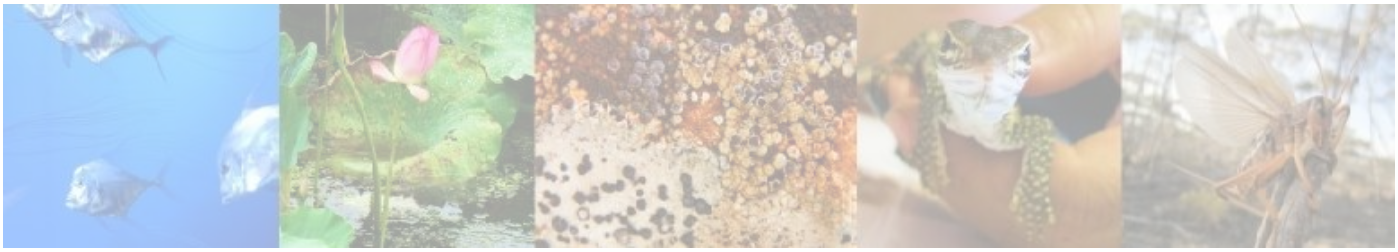
Ali **JALALI**

School of Life and Environmental Science, Deakin University

LiDAR remote sensing for coastal habitat mapping

Maintaining sustainability is one of the main goals of marine resource managers. In this regard, coastal regions are of crucial significance supporting variety of commercially important species. However, understanding the geographical extent of species suitable habitats relevant to the scale of resource exploitation remains a challenge. The recent advent of bathymetric LiDAR systems provides an opportunity to fill knowledge gaps in coastal habitat mapping and provide new opportunities for ecosystem-based marine resource management.

In our case study, species distribution modeling (SDM) approach using seafloor topographic variables generated by remotely sensed airborne LiDAR bathymetry and the localities of spatially explicit fishing effort data were used to gain an understanding of the geographic footprint of the blacklip abalone (*Haliotis rubra*) fishery in Victoria.



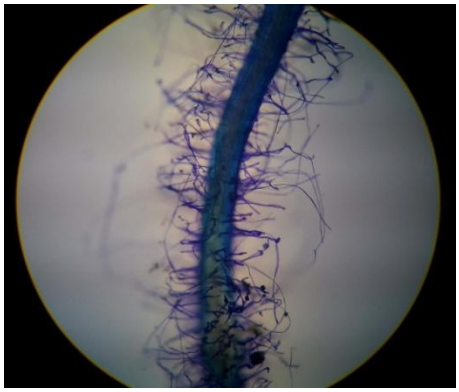
Jen **Wiltshire**

Department of Microbiology, La Trobe University

Getting to the root of the problem: saving the environment from the ground up

Heavy metals that contaminate soils as a result of anthropological activities are capable of leeching into water supplies, poisoning both plants and animals and changing the indigenous microbial populations. As such, developing methods for their efficient removal from the soil is paramount. Phytoremediation utilizes plants that hyper-accumulate heavy metals in their aerial tissues as a cost effective, environmentally friendly method for restoring heavy metal contaminated sites. My research is focused on the rhizosphere of heavy metal hyper-accumulating plants and incorporates ecological, chemical and biochemical approaches.

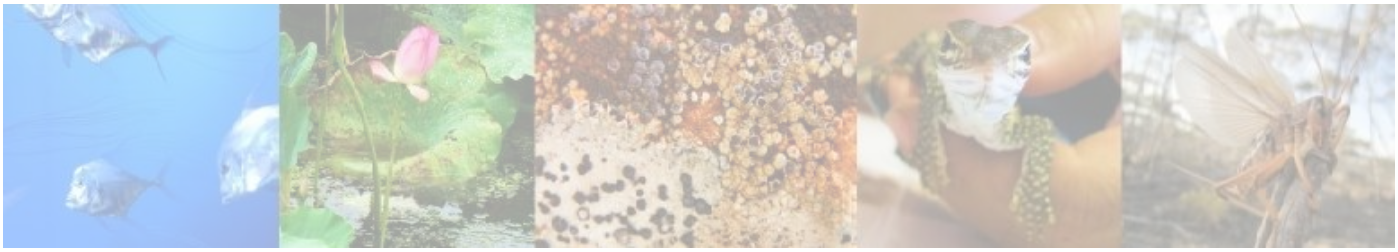
The plant rhizosphere, the area surrounding plant roots, is an essential area for nutrient uptake and soil interactions. Following the hypothesis that rhizosphere microbes influence the ability of a plant to hyper-accumulate heavy metals, I am investigating the community structure and microbial interactions within the rhizosphere of these unique plants to determine the key drivers of these communities: be they the plant, the pollutant or some other factor.



Detail of root from cadmium hyper-accumulating plant: the root surface and the protruding root hairs are hot spots for plant-microbe interactions that can influence heavy metal uptake from the environment.

Additionally, using isolates from the rhizosphere of an Australian native heavy metal hyper-accumulator, I will be testing for microbial functions of interest, such as plant growth promotion or the production of meal chelating compounds, in an attempt to elucidate which microbial processes have the greatest impact on the efficiency of metal extraction by the plants.

By elucidating how these microbial communities are formed and which microbial functions influence heavy metal uptake, I hope to uncover new ways to optimize phytoremediation.

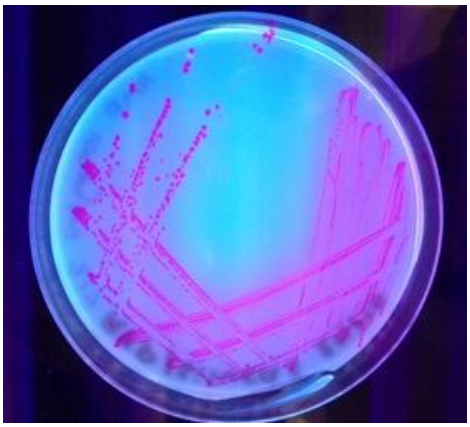


Lara **BEREZA-MALCOLM**

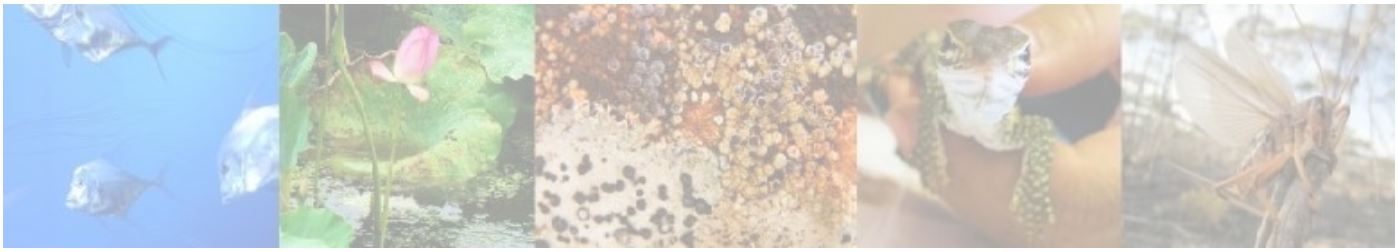
Department of Microbiology, La Trobe University

Synthetic biology - Engineering bacteria to act as environmental sentinels

There is an increasing global need for novel, innovative methods and technologies which can be used to combat environmental problems facing future generations. These problems are not limited to global warming, loss of useable crop land, need of sustainable water and food supplies. These problems lead back to the contamination by the human population of water-ways, soils and air-pollution. The ability to sense fluctuations in our environment is essential if we want to quickly combat them. One means in which we have the potential to detect either chemicals, or bacteria of interest is via an emerging area known as synthetic biology. My research involves the use of synthetic biology to design a novel microbial biosensor for detection of contaminants in the environment.



Fluorescent microbes: Fluorescence can be used as a visual output in the detection of environmental contaminants



Rakhshan **RHOOI**

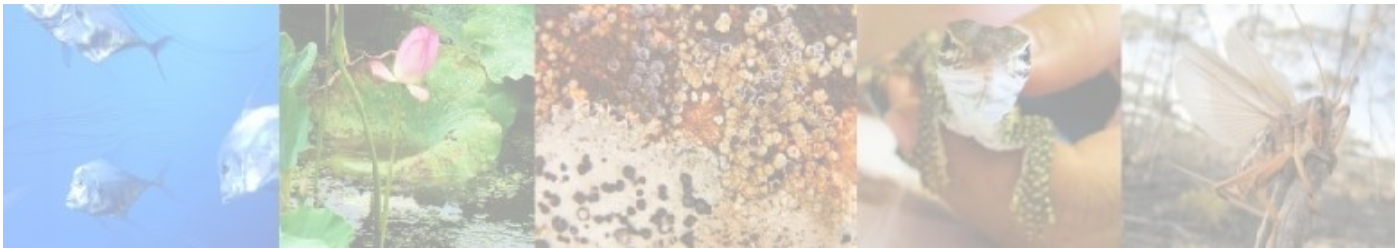
Department of Agricultural Sciences, La Trobe University

Farm dams- Water storage structure; water barriers to hydrological flows or evaporation ponds

In western Victoria, Australia over the last four decades, increasing climatic uncertainty and high annual and seasonal rainfall variability resulted in a shift in landuse practices. From early 1950s to 1980s there was a continuous increase in sheep and cattle population as a result of mechanization and improved pasture management techniques. In turn, the development of small water storage structures like farm dams has increased tremendously. The drought of 1982-83 resulted in a sharp decline in sheep and cattle population. After the drought, the livestock population regained the increasing trend till the prolong drought of early 2000. During this entire period, the farm dam development continued the rising trend though at a very slow rate following 1993. Though large farm dams must be registered with the catchment management authorities, a comprehensive historical record of small farm dam development was not available.

Using the medium-resolution Landsat data from 1973-2004 in conjunction with a high resolution Google earth image and aerial photographs, the historical development of these water bodies in western Victoria was extracted. Over a period of 32 years, there was 283% increase in farm dam numbers. Initially, the annual rate of increase was high (5-7% per annum), but reduced to 0.2% following 1993. The serious drought of 1982-1983 caused a substantial rise in the rate of farm dam numbers. However, after 1993 the rate of dam construction slowed, due to the fact that most suitable dam sites had already been utilized, and even the major drought of 1997-2010 did not result in an increase in dam construction. The trend in development of farm dams was compared with the changing climate, shift in landuse and stream flow regimes. It has been reported that since 1990 there has been a shift from dryland pastures to dryland cropping, with a concomitant decrease in demand for watering points. Up to 1979, the increase in sheep population was in line with the increasing numbers of farm dams, but the drought of the early 1980s resulted in a decline of sheep and cattle population even though there was sharp increase in farm dams following this drought.

The previous studies on stream flow modelling to assess the impact of land use change on the magnitude of runoff indicated that there were substantial decreases in stream flow in the 1970s–1980s. This flow reduction is in line with the increasing density of farm dams in the study area reflecting that more surface flows were intercepted by these dams resulting in declining stream flows.



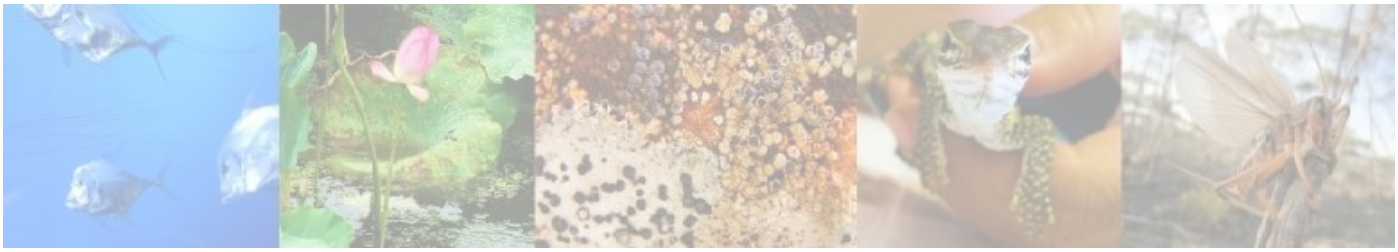
The **POSTERS**

Anaerobic whole cell biosensors - Lara **BEREZA-MALCOLM**

Poster Abstract

The early detection of specific compounds is essential in successfully combating environmental pollutants and potential biological threats, as well as monitoring human health and ecosystem functions. Microbes offer the potential to act as biosensors but often lack specificity and sensitivity. Synthetic biology is currently offering the potential to create modular designed biosensors of increased specificity and sensitivity capable of operating across a range of microbes and environmental conditions. Whilst previous biosensor experiments in aerobic microbes has been successful (i.e. arsenic and mercury detectors), the potential for biosensors utilizing anaerobic and soil associated microorganisms has not yet been fully explored. Anaerobic bacteria have previously been shown to be naturally efficient in bioremediation and biodegradation efforts. Thus focusing synthetic biology techniques on anaerobic bacteria has the potential to expand the range of whole cell biosensors available. Initial experiments have utilized standard Biobricks™ to determine the potential of current technology and assembly techniques. These initial experiments allow the selection of "user-friendly" designed parts and their potential to be determined for novel biosensor development in a range of microorganisms. While initial biosensor design will be conducted in *E. coli*, these sensor systems will be moved into other chassis including anaerobic microorganisms (including species from *Shewanella* and *Geobacter* genera) and rhizosphere-associated microbes (Pseudomonas species).

Once standard sensory systems have been developed across a range of microorganisms, novel sensory components will be designed for the detection of specific heavy metals, microorganisms and other molecules of interest. Detection of a target will be lined to specific outputs, such as biodegradation, which will be a capability integrated into the sensory pathway. This project aims to develop flexible biosensor modules for use across anaerobic and soil associated microorganisms and further develop synthetic biology capacities in Australia.



The **POSTERS**

Microbial fuel cells - Tom **BARTON**

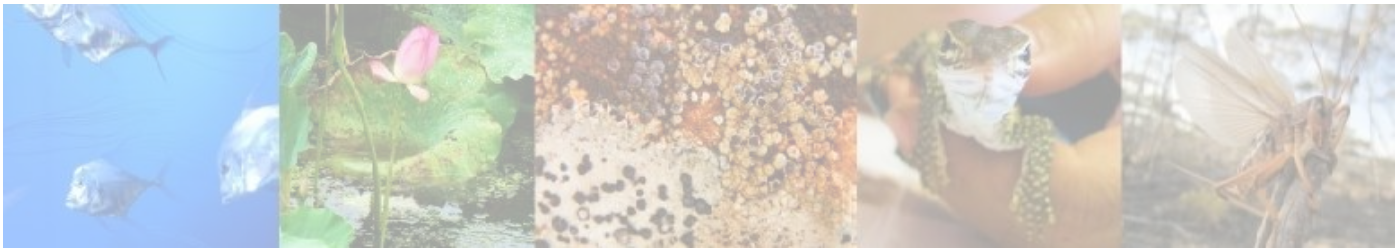
Poster Abstract

A microbial fuel cell is a bio-electrochemical system that harnesses the electrical energy produced by a few special species of microorganisms. These microbes generate electricity by breaking down organic matter found in virtually all soils. Designing a system that is powered by and measures the output of the fuel cells is a brilliant way to demonstrate this long-term power source. The system sends out additional data from a range of sensors, such as temperature, pressure and light levels to a PC via wireless communication.

Understanding gut dysfunction in autism spectrum disorders – Oonagh **BODIN**

Poster Abstract

Gastrointestinal dysfunction is seen in up to 90% of children diagnosed with ASD however the mechanisms behind why this occurs are still unclear. Each individuals' microbial community varies greatly however it is clear that an imbalance in the "normal" microbiota can lead to and increases susceptibility to disease. A missense mutation in the Nlgn3 gene has been identified in patients with ASD causing a disruption in synaptic function. Using a mouse model expressing this mutation we will be studying the overall community composition of the gut microbiome and its functional adaptations over time.



The **POSTERS**

Stress Response and Duration: Sex Differences in the Zebra Finch - Nicola **KHAN**

Poster Abstract

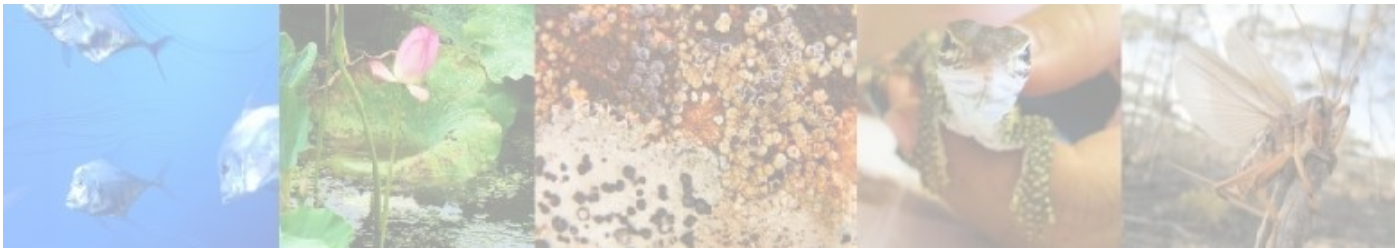
Stress hormones (in birds, corticosterone- CORT) are often used to determine the consequences of environmental change. Often, it is assumed that CORT levels will be similar between sexes; however, recent studies have reported sex differences in CORT concentrations. As Zebra finches are used in laboratory studies worldwide, potential sex-specific differences in hormone metabolism are highly relevant. This study shows that female zebra finches have a significantly higher baseline CORT than males, and identifies different blood profiles between the sexes. This highlights the need for further investigations into potential sex differences in hormone metabolism, and possible cumulative effects of stress.

The role of acoustic and olfactory signals in courtship and mate selection of *Aacanthocnema dobsoni* - Umar **LUBANGA**

Poster Abstract

This study investigates signals utilised by *Aacanthocnema dobsoni* (Hemiptera: Triozidae) for courtship and mate recognition. Y-tube olfactometer bioassays results show no significant differences in male and female responses to offered odorants produced by conspecifics. Gas chromatography-mass spectrometry analyses indicate quantitative and qualitative gender based difference in cuticular hydrocarbons profiles. Vibratory recordings using a laser vibrometer reveal acoustic duets between males and females. Males call first and females respond.

These results indicate that *A. dobsoni* may not rely on odours for long range mate location but rather vibratory signals. Vibratory signals may be complemented at close range by cuticular hydrocarbon cues.

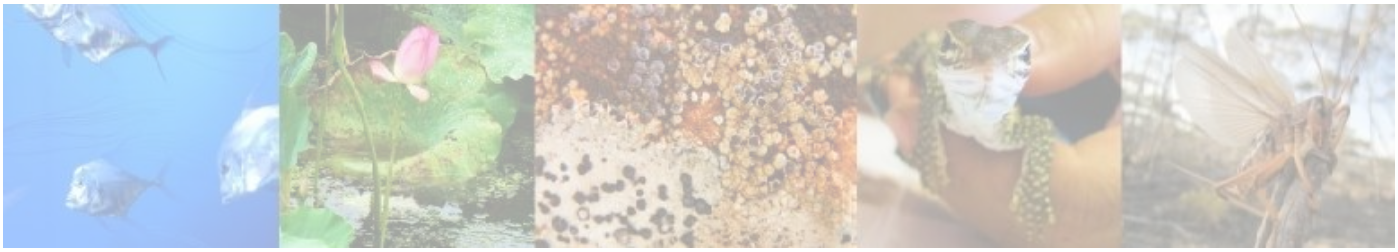


The **POSTERS**

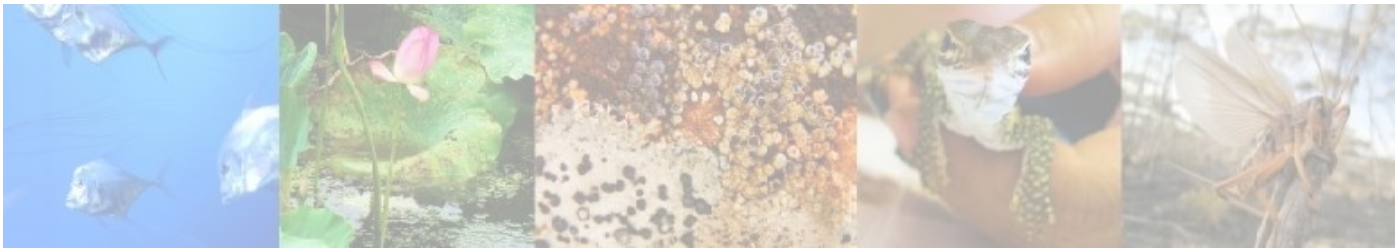
Physiological ecology and dispersal of *Pomaderris vacciniifolia* - John **PATYKOWSKI**

Poster Abstract

Aspects of the physiological ecology and dispersal traits of Pomaderris vacciniifolia—a vulnerable Victorian endemic shrub—were examined to identify their influence on the decline of populations. The response of seed germination to disturbance (wildfire and canopy openings) was investigated, as was the unaided dispersal capability of seeds from parent plants. A significant increase in germination rate was observed following 100 deg. C heat treatment to seeds while smoke exposure and light intensity had little influence. The findings indicate a likely positive post-fire germination response. Unaided seed dispersal is limited, which explains in part the species' apparent reduction in area of occupancy. These findings contribute to a broader research project examining the ecology of this species and development of management prescriptions for its conservation.



The **PHOTOS**



The **PHOTOS**

'Sea Eagle in Defence' by Rob **BARKER**

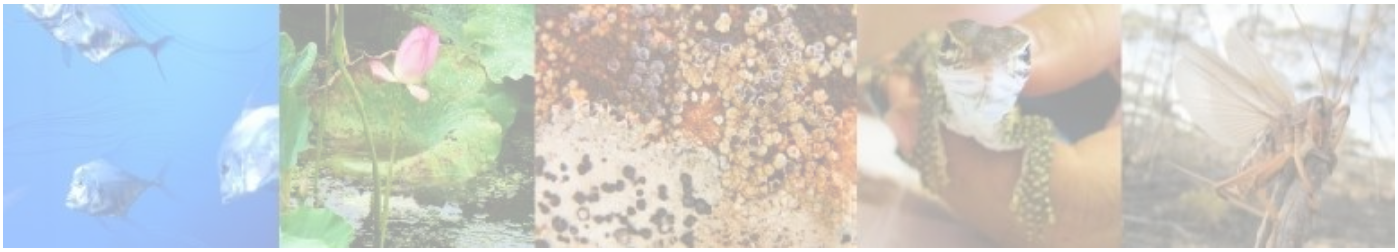
The White-bellied Sea-Eagle (*Haliaeetus leucogaster)* is a large raptor that has long, broad wings and a short, wedge-shaped tail. It measures 75–85 cm in length, and has a wingspan of 180–220 cm. It is generally seen singly or in pairs, though it may occasionally congregate around sites where food is abundant.

'Sundew with victim' by Lara **BEREZA-MALCOLM**

Sundew (*Drosera sp*.) with its morning meal of insect in the foothills of Marysville. Both the botanical name (*drosos* = "dew, dewdrops") and the English common name (sundew) refer to the glistening drops of mucilage at the tip of each tentacle that resemble drops of morning dew. The plants use these to snare unsuspecting insect victims which are then digested and used to by the plants as 'nutritional supplements'.

'Australian blue bottle jellyfish - Portuguese man o war' by Oonagh **BODIN**

This jellyfish is actually made up of zooids. The blue bottle is not a single organism, but made up of a number of zooids. Each zooid has a specific role and together they function as if it were an animal.



The **PHOTOS**

'Pier Life' by Paul **CARNELL**

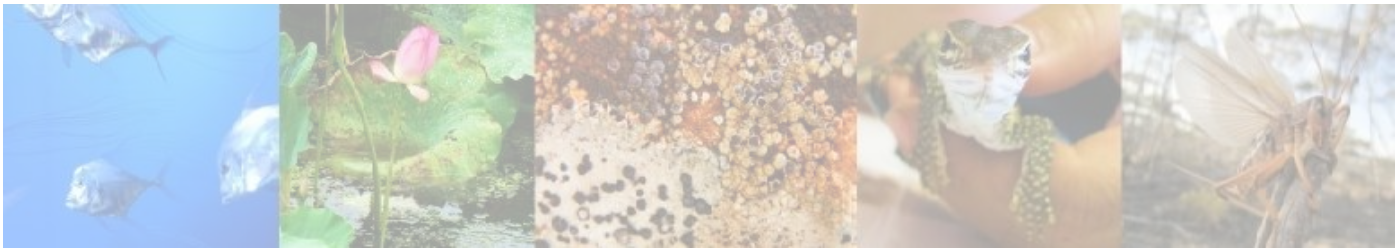
Description: The sessile invertebrate communities in southern Australia can be just as diverse as coral reefs, yet few realise or own wetsuits thick enough to explore this colourful world. The communities at St Leonards pier are a good representation of those at Port Phillip Heads Marine National Park, but are observable in a more snorkeler friendly environment.

'Crumpled Dragonfly' by Nicole **COGGAN**

Newly emerged after metamorphosing from its aquatic, nymph life stage into an adult, this dragonfly is waiting in the sun for its wings to unfurl before it goes hunting for insects

'Someone to scratch my back?'
by Kevin **FARNIER**

The photo was taken at Gresswell Conservation Reserve in 2011 just after I started my PhD. Obviously, spotting a kangaroo was at that time the most exciting experience for me, who had just arrived from Switzerland (where cows were way more common). This one couldn't really decide whether scratching his back was more important than keeping an eye on me, so it decided to do both at the same time, which explains the funny posture.



The **PHOTOS**

'Jungle Bells' by Mackenzie **KWAK**

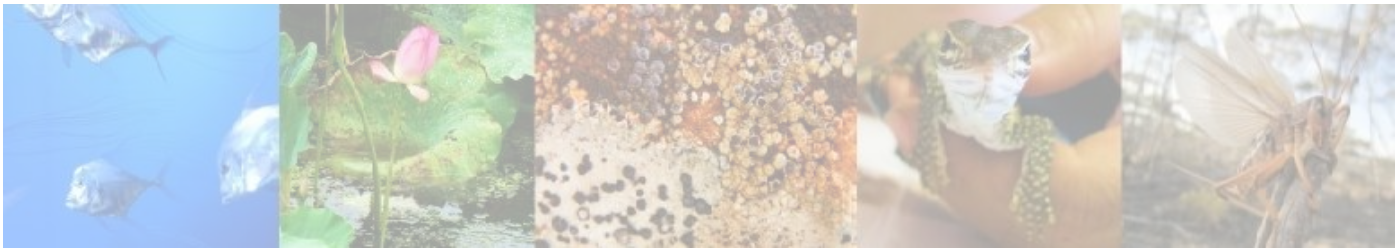
The carnivorous plant *Nepenthes ampullaria*, a native pitcher plant photographed in Bukit timah national park, Singapore. This species supports the old world's smallest known frog species the 'Mantang narrow-mouthed frog' as well as a species of vampire crab, both totally reliant on the plant for a home. Despite this mutualism, it is still a voracious predator in its rainforest home.

'Scorched Lookout' by Jose Antonio **RAMOS**

Fire is an integral, yet unpredictable part of many Australian ecosystems, so species have to take advantage of fire events as best as they can. This Tawny dragon (*Ctenophorus decresii*) is enjoying a bit of sunlight on top of a recently-burnt grass tree, while keeping an eye out for potential predators (Flinders Ranges National Park, October 2013).

'*Mycena heimalis*' by Alexander **SANBROOK**

Mycena heimalis; located in the outer suburbs of Melbourne where it feeds on an abundance of decomposing wood, suiting its sapotrophic nature. The picture captures a functioning ecosystem where the humidity is naturally high for the mycelium to form fruits, indicated by the healthy bodies and water droplets.



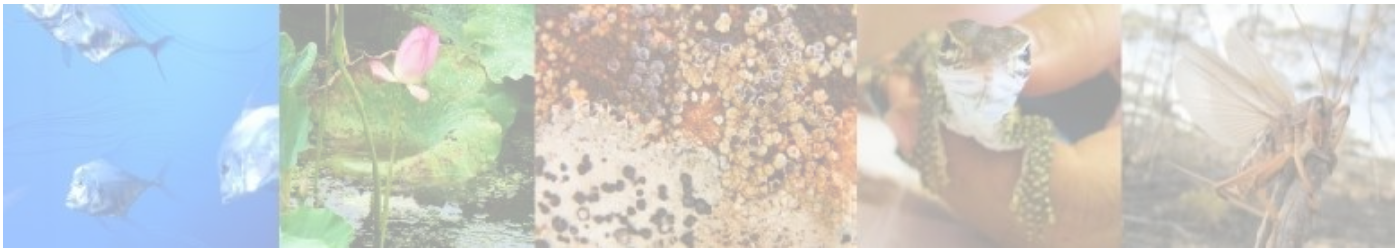
The **PHOTOS**

'Wrangling Robbers' by Thea **SHELL**

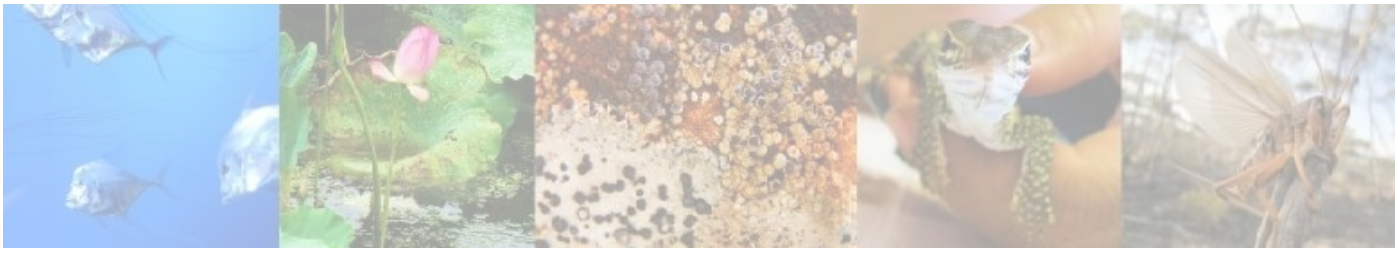
In order to understand growth and age rates, Parks Australia on Christmas Island 'wrangle' giant Robber Crab (*Birgus latro*) with practiced care, respect and cable ties. Microchips and shell markings help to determine individuals which wander island wide. It's thought this individual could be as much as 80 years old.

'Paper Parasols' by Jen **WILTSHIRE**

These delicate structures are the fruiting bodies of a saprotropic *Mycena* fungi growing on a moss covered trunk in the old growth forests of the Otways. Most *Mycena* are extremely small, rarely exceeding a few centimeters in diameter but for those who are willing to slow down and appreciate the beauty of small things, they can be quite stunning.



Time	Schedule	Details
1200-1210	Welcome	
1210-1300	Opening talks	"Carnivorous Plants: Competition & Trickery " (Mackenzie Kwak, La Trobe) "Fungal community dynamics and leaf litter decomposition in Australian alpine streams" (Stephanie Suter, La Trobe - Albury Wodonga) "Ecology microbial succession in the early development of the gastrointestinal system of calves" (Cesar Guzman, La Trobe) "Unlocking the potential uses of Australian native trees" (Shanthi Joseph, Swinburne)
1300-1330	Poster session I & photo viewing **Tea & coffee**	
1330-1430	Talks II	"From use to effectiveness: how well do crossing structures mitigate the impacts of roads on wildlife?" (Kylie Soanes, Melbourne Uni) "The secondary invasion of rainforest on Christmas Island" (Luke O'Loughlin, La Trobe) **"**The effect of fire on rare plants and their role in ecosystem function" (John Patykowski, Deakin) "Tracking on the cheap" (Blake Allan, Deakin)
1430-1500	**Afternoon tea**	



Time	Schedule	Details
1500-1600	Talks III	"Faunal refuges in fire-prone landscapes: does planned fire moderate the impact of mega-fire on bird assemblages?" (Natasha Robinson, La Trobe) "Sex, Stress and Conservation" (Nicola Khan, La Trobe) "Restoration of ecosystem engineers affects habitat use by a key detritivore" (Nicole Coggan, La Trobe) LiDAR remote sensing for coastal habitat mapping" (Ali Jalali, Deakin) "Getting to the root of the problem: tackling heavy metal contamination from the ground up" (Jen Wiltshire, La Trobe)
1600-1630	Poster session II & photo viewing **Tea, Coffee**	
1630-1700	Talks VI	"Synthetic Biology - Engineering bacteria to act as environmental sentinels" (Lara Bereza-Malcolm, LaTrobe) Farm dams- Water storage structure; water barriers to hydrological flows or evaporation ponds (Rakhshan Roohi, La Trobe)
1700-1720	**Final (keynote) talk**	"A super-volcano, thesis and life' (Maddie Willcock, Monash)
1720-1730	Announce prizes	
1730-1800	Mingle **(beer & snacks provided)**	