



Analyse DNA  
like a PRO

# R-evolutionary Insights: Deep Dive into SNP -based Population Genomics



**Monday 11th – Friday 15th March 2024**

**Australian National University Kioloa Coastal Campus  
and online**



*Uniting to Preserve Biodiversity with  
the Power of Genetics and R*

# *Incantation of Initiation*

**Welcome, Fellow Magical Beings**, to our 5-day spellbinding journey in the mystical realm of Population Genetics using the ancient art of R! We're over the moon (and not just because we've mastered levitation spells) to have you join us at the enchanted **Kioloa ANU Coastal Campus**. Nestled among the spellbound forests of Murramarang Nation Park and the crystal-clear waters of southern New South Wales, our meeting lair couldn't be more perfect. When you're not weaving R spells, you'll find yourself spoiled for choice with magical brews (a.k.a. coffee) and breathtaking sceneries.

Our coven is as varied as the potions in a wizard's pantry, bringing together sorcerers from all corners of the realm. Here, every sorcerer and sorceress will don both the student's cloak and the teacher's hat, expanding their arcane knowledge in genetics for the noble causes of biodiversity conservation and ecosystem restoration. Expect a cauldron bubbling with interaction, where being right is as celebrated as making mistakes, where sensitivity meets resilience, and where every voice conjures new spells of knowledge, perspective, and innovation.

Our quest is to master key incantations in population genetics, with our wands pointed firmly at the R statistical grimoire. We're ditching the dusty tomes for hands-on magic, aiming to empower you to conjure your own population genetics enchantments by the end of our gathering. And fear not, there will be ample time to apply these spells on your own datasets.

Our magic words? Cooperation, flexibility, and dedication. We embark on this journey with a spirit of camaraderie, ready to share potions, carry scrolls, and lend a helping *wand* in times of need. The path may twist and turn, with unexpected dragons (breakdowns), storms (rain), and spells gone awry (tech hiccups), but our collective humour and knack for improvisation will see us through.

We are united by a deep-seated dedication to unravelling the mysteries of genetics, a passion that burns as bright within you as it does within us. We believe this adventure will be rewarding not just intellectually, but also aesthetically, socially, and culturally. We can't wait to embark on this enchanting journey with you. May our time together be as fulfilling as finding the philosopher's stone!



# Crystal Ball Glimpses

## (What to expect)

There will be 13 workshop sessions, each session a two-hour block with three segments, carefully concocted to maximize your mystical learning experience.

1. **The Lore of Theory:** We kick off with a hearty segment of theoretical enchantments, where you'll absorb the ancient wisdom of population genetics.
2. **R Alchemy:** With your newfound knowledge, you'll spend a spellbinding segment in the alchemical labs of R. Here's where you get to stir the cauldron and cast some serious coding spells, conjuring insights from the data.
3. **Practical Potion-Making:** In the last leg of each session, we will hear from fellow sorcerers about how they apply theory and analysis to the real world, brewing potions that can truly make a difference. It's all about taking genetics wizardry and using it to protect our precious realm of biodiversity.

Fear not if you encounter any mythical beasts (aka technical troubles) or brain-boggling riddles along the way! Our trusty tutors, both spirits of the cloud and guardians in the flesh, will be there to guide you through. They're like your personal patronus, ready to ward off any confusion. ***If questions bubble up like a potion gone fizzy, reach out to these magical mentors first to keep our sessions as smooth as a unicorn's mane.***

Our main point of gathering for in-person spellcasting will be at the “**London Shed**” (consult your Kioloa map). For those joining from afar, hop onto your digital broomsticks using this [Zoom magical portal link](#).

Don't fret if you miss a trick or two—every session will be captured in our crystal ball recordings and shared on the enchanted web, along with a treasure trove of workshop materials and resources.

If you find yourself in a magical muddle or just need a friendly incantation, give Luis a shout during the workshop at [luis.mijangos@gmail.com](mailto:luis.mijangos@gmail.com) or conjure him up on the blower at 043 1 45 73 76. He's there to lend a wizard's helping hand!

We've organised the following evening optional activities:

- **Bioinformatics Bonfire** (Monday 11<sup>th</sup>, 8-10 pm; Kioloa's fire pit). Gather 'round the magical flames where data meets storytelling under the starlit sky. It's a night for sharing tales of scientific quests, laughing over the quirks of bioinformatics, and connecting with fellow data wizards. Let the crackle of the fire inspire conversations and maybe even spark new ideas in the warm embrace of our enchanted circle.
- **Genetics Game Night** (Tuesday 12<sup>th</sup>, 7-9 pm; London Shed). Summon your inner competitive spirit at our Genetics Game Night, a realm where board games and trivia quizzes test your knowledge of the genetic universe. Prepare for an evening of laughter, learning, and a dash of friendly rivalry. May the best genome win!
- **R Roundtables** (Wednesday 13<sup>th</sup>, 7-9 pm; London Shed). Step into the circle of R Roundtables, where the language of magic (a.k.a. R) is demystified. Here, questions find answers, challenges meet solutions, and wisdom is shared freely. Whether you're an aspiring wizard of R or a seasoned spellcaster, this gathering promises enlightenment and empowerment.
- **Enchanted Forest Quest** (Thursday 14<sup>th</sup>, 3-5 pm; Kioloa's fire pit). Under the guidance of Uncle Owen Carriage, a revered Walbanja Elder, experience the sacred Welcome to Country ritual before venturing into the dusky woods.



# Mystic Carriage Network (Transportation)

Sydney/Kioloa/Sydney

## Sydney to Kioloa Campus

- **Departure:** Monday 11th March 2024 - 9:00 am
- **Pick-up location:** Sydney Airport Domestic Terminal (see map below).



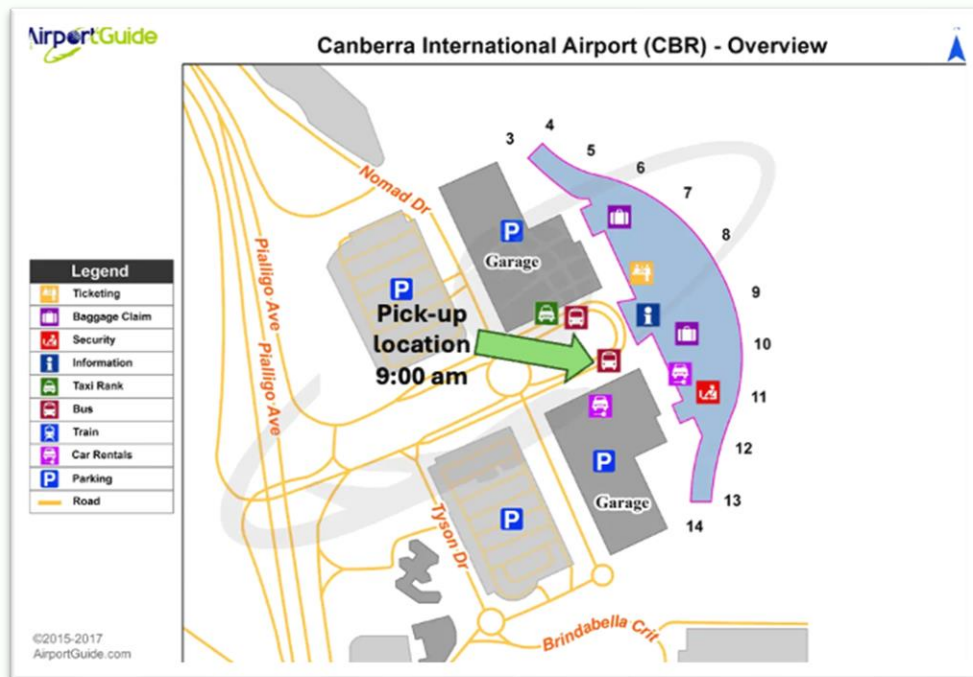
- **Arrival:** Kioloa Campus - 12:30 pm.

## Kioloa Campus to Sydney

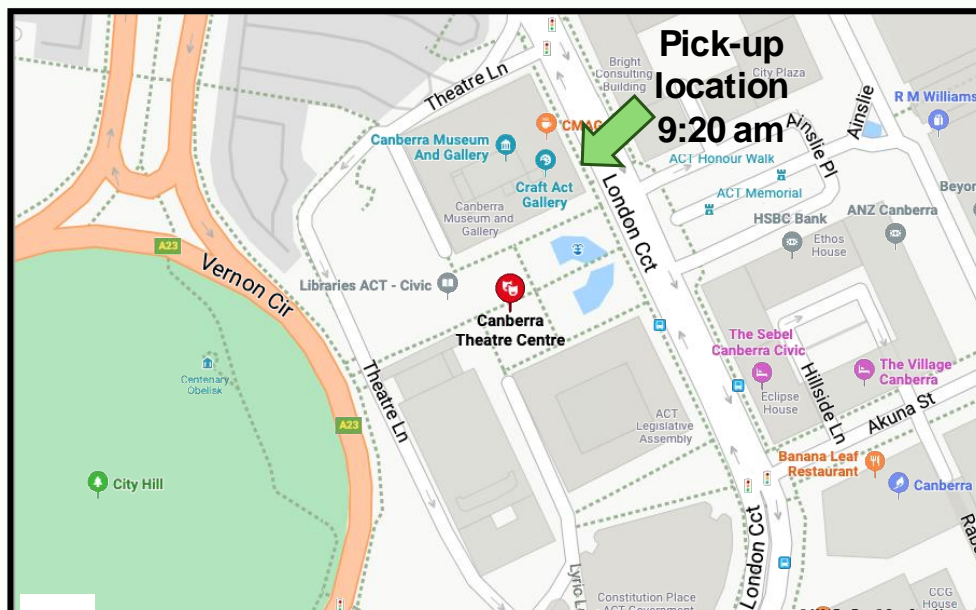
- **Departure:** Kioloa Campus 15th March 2024 - 4:00 pm
- **Arrival:** Sydney Airport Domestic Terminal - 7:30 pm.

## Canberra to Kioloa Campus

- **Pick-up location 1.** Monday 11<sup>th</sup> March 2024 at 9:00 am. Canberra Airport Domestic Terminal - Arrivals level outside of hire car offices (see map below).



- **Pick-up location 2.** Monday 11<sup>th</sup> March 2024 at 9:20 am. Canberra theatre (see map below).



- **Arrival:** Kioloa Campus - 11:30 am.

## Kioloa Campus to Canberra

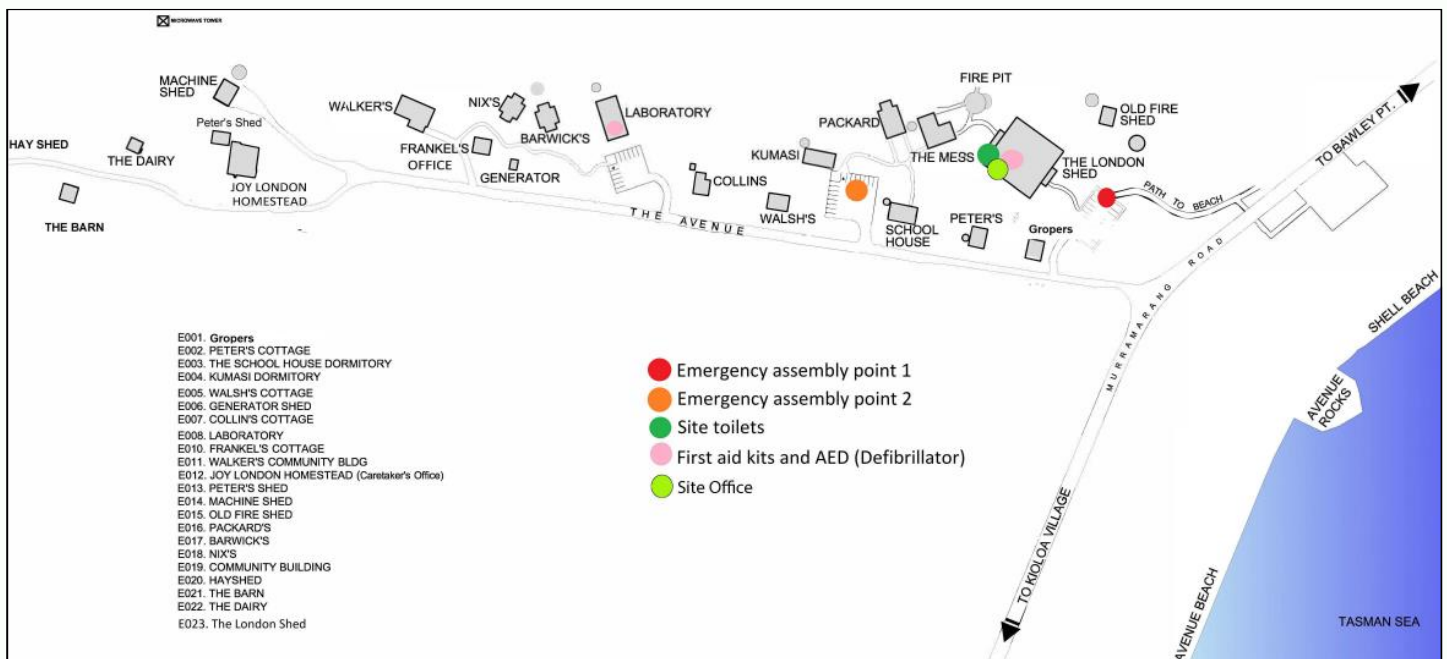
- **Departure:** Kioloa Campus 15<sup>th</sup> March 2024 - 4:00 pm.
- **Arrival:** Canberra Airport Domestic Terminal - 6:30 pm.

# Enchanted Conclave Grounds (Kioloa Campus)

Tucked away in the enchanted realms of **Murramarang Nation Park**, amidst the whispering spotted gum trees and the shimmering shores of southern New South Wales, our mystical campus stands as a haven of knowledge. Here, in this secluded sanctuary far removed from the hustle and bustle of the academic citadel, the Kioloa Coastal Campus beckons as a place of learning, teaching, scribbling of scrolls, and pursuit of scholarly quests since the year of 1975, under the banner of the Australian National University.

Spanning a vast expanse of 348 hectares of magical lands on the south coast, this campus, once a noble homestead, is steeped in both European and Indigenous lore. It is a treasure trove of natural wonders, from lush vegetation to diverse wildlife, offering a rich tapestry for an immersive educational odyssey. Here, amidst this living library of flora and fauna, scholars and mystics alike find an unparalleled setting to weave their academic spells, explore the mysteries of nature, and embark on a journey of discovery that transcends the ordinary.

## Kioloa map



### Important information!!!

#### Campus Induction and Risk Assessment

All visitors are required to complete the Kioloa Visitor and Guest Induction **BEFORE** arriving at the station. Please follow [this link](#) and choose the third option "Kioloa Coastal Campus Visitor and Guest Induction".

After completing the assessment, send your certificate to the e-mail: [PopGenR@outlook.com](mailto:PopGenR@outlook.com).

### **What to bring?**

- **Laptop.**
- Beach towel.
- Toiletries – Bawley Point Village Shops are 4km away.
- Mosquito and insect repellent. Repellent also helps against ticks, leeches, and bushflies.
- Sensible clothing, and sensible footwear, for all types of weather. It can turn cold in summer, too, and it is often windy and rainy here.
- Sunscreen and a sunhat, and a raincoat.
- Water bottle and snacks to tie you over.
- Headlamp.

### **Wi-Fi/Ethernet and mobile coverage**

- The network ANU Secure is available onsite. Other universities can use your own institution's Eduroam.
- Telstra Mobile Service only available at Kioloa Coastal Campus. No Optus, Vodaphone etc

### **Accommodation**

- Rooms will be shared between 2 and 3 persons.
- Rooms include a single towel and bathmat.
- Bathrooms are cleaned daily.

### **Kioloa Guest rules**

- Parties are not permitted.
- No disruptive behaviour (including excessive noise between 10pm and 6am)
- Guests are to treat all people onsite with respect.
- No fires when Fire Danger Rating is High or above.
- In an emergency guests should follow the site warden's direction
- A Risk assessment must be completed and signed before guests leave the avenue to enter the ANU's paddocks, or Bushland.
- All guests are encouraged to complete a Risk assessment before working or visiting the beach or ocean.

### **Cleaning and damage**

- Smoking in room (including vaping). \$165 cleaning fee in addition to any other cleaning fee that may apply.
- Replacement keys. \$150 per replacement.
- Room soiling/damage- \$165 cleaning fee, and in addition as applicable at cost, mattress replacement, professional floor clean, furniture/fixture/fitting clean or replacement, and tariff at the daily rate applicable to your booking until the room is restored to lettable condition.
- Breakages - reasonable replacement cost of damaged or broken items (itemised).

### **Housekeeping**

- Drinking water - Kioloa treats rainwater to meet the Australian drinking water guidelines. Please be mindful when showering.
- Power usage - Power failures are more common as we are in a remote area. As such save work regularly and be conscious of turning off power points when not in use.



# WATER SAFETY AT KIOLOA

## BEWARE! The Beach at Kioloa is NOT Patrolled by Lifeguards

All beaches in South-Eastern Australia are extremely hazardous.

Because of the steep, short continental shelf almost 96% of offshore wave power reaches the shoreline. This contrasts with, say, the Atlantic coast of the US where only 8% of deep ocean wave power reaches the shoreline.

The waves that you see breaking are NOT the only waves that drive inshore currents and rips. Large, low, long-period waves can generate very strong currents which can take swimmers used to other coasts by surprise.

- If you are not an experienced and strong swimmer be very cautious.

- Never swim alone.

- Don't swim under the influence of alcohol or drugs.

- Don't swim directly after a meal.

- Never run and dive in the water, even if you have checked the depth before. Water conditions can change.

- Float with a current or undertow, stay calm, don't swim against it. Signal help

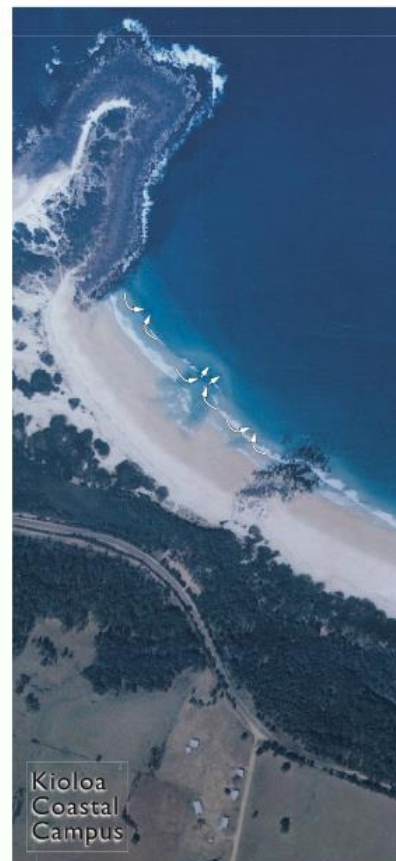
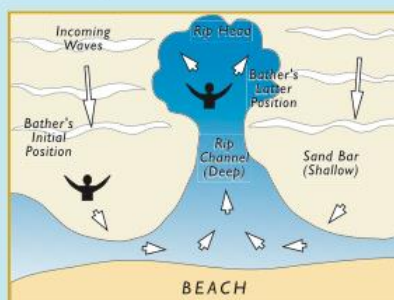
- If you get into trouble, DON'T PANIC.

- If you swim wisely you won't get caught in a rip. If you do get caught – try swimming across the current, not against it. If it is too strong for you – keep afloat and raise one hand for help.

- The most important thing to remember is that a rip weakens – so don't panic.

### RIPS

Rip currents are the major cause of swimmer difficulties necessitating surf rescues. A rip current is formed by water seeking its own level, usually as a result of large sets of waves approaching the beach and building up water which later returns to sea to even out water levels, thus causing a drag outwards. The larger the surf, the more intense the rip.



### COMMON SIGNS OF A RIP ARE:

- Discoloured brown water, due to sand which has been stirred off the bottom.
- Foam on the surface extending beyond the break
- Waves breaking further out on both sides of the rip
- Debris floating seaward
- A rippled appearance, where the surrounding water is generally calm

### WHAT TO DO IF YOU ARE CAUGHT IN A RIP

- Don't Panic! A swimmer with limited ability should ride the rip out from the beach.
- Swim parallel to the shore for 30 - 40 metres. Return to the shore where the waves are breaking, parallel to the rip.
- Stronger swimmers may swim shorewards at 45° to the rip to escape it – but this is tiring.

### KNOW THE WAVES & SURF

**SURGING** - waves may never break. They are usually are found where the beach is very steep or in the edge of rocky shores. They can knock you over and drag you into deep water.

**SPILLING** - waves usually have less force and are safest for body surfing. They are usually found in sheltered bays where the sea floor slopes gradually, and near sandbanks at high tide.

**PLUNGING** - or dumping waves break suddenly and can throw you to the bottom with great force, and they can create strong drift currents. They usually occur at low tide and where sandbanks are shallow. You can be knocked unconscious or very badly injured in these waves.

# Arcane Agenda Scroll (Program)

Day 1	Session	Time	Topic	Presenters
Monday 11/03/24		9 am – 1 pm	Arrival	
		1 pm – 2 pm	Lunch	
	1	2 pm - 4 pm	Welcome, Intro dartR	Oliver Berry, Andrzej Killian, Arthur Georges, Bernd Gruber, Renee Catullo
		4 pm – 5pm	Dinner	
	2	5 pm – 7 pm	Pop Gen In Conservation & Restoration	Bill Sherwin, Carlo Pacioni, Renee Catullo
		8 pm – 10 pm	Bioinformatics Bonfire	
Day 2	Session	Time	Topic	Presenters
Tuesday 12/03/24		8 am – 9 am	Breakfast	
	3	9 am – 11 am	Sequencing Technologies	Jason Carling, Andrew Kowalczyk, Renee Catullo, Jason Dobry
		11 am - 12 pm	Morning Tea	
	4	12 pm – 2 pm	Data Management, Reproducibility & Integrity	Jiajia Li
		2 pm – 3 pm	Lunch	
	5	3 pm – 5 pm	Effective Population Size	Bernd Gruber, Carlo Pacioni, Bill Sherwin
		5:30 – 6:30 pm	Dinner	
		7 pm – 9 pm	Genetics Game Night	
Day 3	Session	Time	Topic	Presenters
Wednesday 13/03/24		8 am – 9 am	Breakfast	
	6	9 am – 11 am	Management Of Small Populations	Catherine Grueber, Kate Farquharson
		11 am - 12 pm	Morning Tea	
	7	12 pm – 2 pm	Natural Selection	Luciano Beheregaray, Chris Brauer, Jonathan Sandoval
		2 pm – 3 pm	Lunch	
	8	3 pm – 5 pm	Landscape Genetics	Bernd Gruber, Robyn Shaw
		5:30 – 6:30 pm	Dinner	
		7 pm – 9 pm	R Roundtables	
Day 4	Session	Time	Topic	Presenters
Thursday 14/03/24		8 am – 9 am	Breakfast	
	9	9 am – 11 am	Lineage Divergence	Arthur Georges, Sally Potter, Craig Moritz
		11 am - 12 pm	Morning Tea	
	10	12 pm – 2 pm	Sex Linked Markers	Diana Robledo, Floriaan Devloo-Delva
		2 pm – 3 pm	Lunch	
		3 pm – 5 pm	Enchanted Forest Quest	
		5:30 – 6:30 pm	Dinner	
	11	7 pm – 9 pm	From Genes to Kin: Dissecting Relatedness & Kinship	Jinliang Wang, Luis Mijangos, Natasha Marosi
Day 5	Session	Time	Topic	Presenters
Friday 15/03/24		8 am – 9 am	Breakfast	
	12	9 am – 11 am	Genetic Structure	Arthur Georges, Bernd Gruber, Bill Sherwin
		11 am - 12 pm	Morning Tea	
	13	12 pm – 2 pm	Combining Genomic Resources	Luis Mijangos, Sally Potter, Jason Dobry
	14	2 pm – 3 pm	Wrap up, take home messages, discussion	
		4 pm	Departure	

## Our Sorcerers (Speakers)



**Luciano Beheregaray** is the big kahuna in Biodiversity Genomics at Flinders Uni. Born in the Brazilian Pampas, Luciano has swum upstream all the way from a BSc and MSc in Biological Oceanography in Rio Grande to a Ph.D. in Evolutionary Genetics from Macquarie University in Australia. After a postdoctoral fellowship at Yale, working on projects in Amazonia and the Galápagos, Luciano returned to Australia, setting up his own lab at Flinders Uni in 2009. Under his guidance, the Molecular Ecology Lab has seen over 25 Ph.D. and 31 Honours students graduate, producing more than 250 refereed publications. Luciano's been recognized as one of the world's Top 2% Scientists. Despite his heavyweight status in science, he's known for mixing science with sand and surf at annual lab retreats, proving you can have your cake and eat it too.



**Oliver Berry** leads CSIRO's Environomics Future Science Platform. This is an R&D program that blends genomics with data science and nano-engineering to solve challenges for the biodiversity, biosecurity, and health sectors. Over 15 years, Olly and his team's research has led to ground-breaking ecological research and policy influence. He is proud to be a part of the team that created dartR because it has benefited such a broad community. He also digs science outreach and education and is an enthusiast for natural history.



**Chris Brauer** is devoted to the conservation, ecology, and evolution of aquatic biodiversity, focusing on how populations and species dance to the rhythm of their environment through genomics and transcriptomics. For his Ph.D., he delved into the world of the southern pygmy perch, a threatened freshwater fish, swimming through the murky waters of genetic and environmental mechanisms affecting small populations. If genomics had a coolness scale, Chris would be off the chart, probably jamming to the DNA double helix like it's his favourite rock band's guitar riff.



**Jason Carling** is the tech wizard behind the curtain at DArT, where he's been instrumental in cooking up the main tools for all things marker data and sequencing library methods, including DArTseq, Targeted Genotyping, and DArTresseq. He's not just about creating these tools; he's also a maestro at automating pipelines with the analytics team. They're all about making data services slick, quick, and integrated within the One DArT domain, ensuring data storage and analytics are ready for the fast lane of high volume and throughput applications. Essentially, Jason's the guy making sure DArT's data services run smoother than your morning coffee. And let's be honest, with his knack for automation, he's probably trying to find a way to make the coffee make itself too!

## Our Sorcerers (Speakers)



**Renee Catullo**, from the University of Western Australia, is on a mission to crack the genetic code of Australia's biodiversity, focusing on the elusive northern Australian frogs. Her standout achievement involves a decade of dedication to the *Uperoleia* genus, shedding light on their evolutionary secrets. Renee's fieldwork is as adventurous as her research is ground-breaking, often chasing cyclones for science. She's essentially the Indiana Jones of frog research, minus the fear of snakes but with an equal penchant for dodging flying branches in the name of genetic discovery.



**Floriaan Devloo-Delva**, is making a splash at CSIRO, his work in adaptation genomics and epigenomics, especially among fishes, is legendary. His *pièce de résistance*? The development of "sexy\_markers" for identifying sex chromosomes in white sharks, a tool with profound implications for marine conservation. Floriaan's journey from the University of Tasmania to CSIRO showcases his profound impact on marine science, making him the Aquaman of genomics. He's likely pondering whether his next breakthrough can make dolphins even smarter, or at least teach them to appreciate his research.



**Jason Dobry**, from DART, dove into the genetics and ecology of non-model organisms, including monitor lizards during his PhD at the University of Canberra. He's crafted and funded his own PhD project, set up breeding colonies, developed cytogenetic research tools, and engaged with various stakeholders for wildlife research. His career spans roles like Marine Molecular Geneticist, founder of Alchemy Genetix LLC, and Senior Scientist at Amplicon Express Inc, showcasing a diverse skill set from genetic test development to vaccine production. Jason's journey from wrestling supporter to genetics guru shows that whether it's supporting athletes or sequencing DNA, he's always ready to tackle the challenge—just don't ask him to wrestle a python for a DNA sample!



**Kate Farquharson** is the bioinformatics wizard at the University of Sydney, where her magic lies in peptide discovery within Aussie species. Her significant achievement? Leading a ground-breaking project on genetic adaptation in conservation breeding programs, contributing vital insights for wildlife conservation. With her skills in synthesising and interpreting data, one might say she's got more analysis tricks up her sleeve than a kangaroo has hops.



## Our Sorcerers (Speakers)



 UNIVERSITY OF  
CANBERRA

**Arthur Georges**, a distinguished professor at the University of Canberra, has revolutionized the understanding of sex determination in reptiles. His major achievement? Unravelling how environmental factors influence sex in reptiles, a game-changer in herpetology and conservation genetics. Arthur's work has far-reaching implications, from conservation strategies to understanding evolutionary processes. He's the Dumbledore of herpetology, albeit more fascinated by dragon eggs than by magic ones, and probably wonders if he could genetically engineer a lizard to brew his morning coffee.



 UNIVERSITY OF  
CANBERRA

**Bernd Gruber**, from the University of Canberra, is a master at blending spatial and ecological modelling with genetics. His crowning achievement? Developing dartR, a tool that's revolutionizing genetic data analysis in conservation projects. His approach to research is as innovative as it is impactful, making him the Houdini of ecology – he makes complex data disappear into meaningful conservation strategies. Bernd might secretly wish to decode the genetic basis for why every odd sock goes missing, solving one of life's great mysteries.



 THE UNIVERSITY OF  
SYDNEY

**Catherine Grueber**, at the University of Sydney, has made significant strides in conservation genetics, particularly with threatened birds and mammals. Her standout achievement? Her research into the genetic impacts of conservation actions, such as translocations and captive breeding, providing crucial insights for improving the management of genetic diversity worldwide. Catherine thrives on connecting population genetic theory to data and actions, and loves travelling all over the world (mostly via videoconference!) to discuss conservation genetics with colleagues.



 DArT

**Andrzej Kilian**, founder of DArT in 2001, has been a pioneer in genomics, creating a technology that simplifies high-throughput genotyping across various organisms. His work at DArT supports global food security, sustainable agriculture, and biodiversity, making significant strides towards understanding and improving agricultural and environmental practices. Andrzej's commitment to science and humanity illustrates a unique blend of innovation with a purpose. Andrzej, much like a maestro in an orchestra of genomes, harmonizes the complex notes of genetics to compose a symphony for a sustainable planet, ensuring every note contributes to the grander vision of global harmony and well-being.

## Our Sorcerers (Speakers)



**Andrew Kowalczyk** is the bioinformatics wizard at DArT. Andrew is the go-to guy when it comes to making sense of complex data and turning it into something even the most tech-averse biologist can handle. With a toolbox filled with degrees in Software Engineering and Statistics from the University of Melbourne, Andrew is on a mission to develop applications that not only crunch numbers but also deliver them through user-friendly graphical user interfaces. His work is essential in helping non-technical users navigate the vast sea of genomic data produced at DArT, making it possible for scientists, breeders, and ecologists to improve agricultural and biodiversity outcomes without getting tangled in the data weeds.



**Jiajia Li**, from the Australian National University, is pioneering in the field of bioinformatics, providing crucial support to researchers and students. She regularly teaches workshops such as Introduction to Linux, Python, Snakemake workflow, and advanced data visualisation. Enhancing the programming and analytical capabilities within the Research School of Biology and Biological Data Science Institute, making her the Gandalf of bioinformatics – guiding researchers through the complex landscape of genetic data. Jiajia's work is instrumental in advancing biological research, and she might just be on the verge of creating a spell (or script) to automate all bioinformatics analyses, giving researchers more time for coffee breaks.



**Natasha Marosi**, known affectionately as Tashi, is the Conservation Director at Beqa Adventure Divers and the founder of the Fiji Shark Lab. Currently, Tashi is delving into the social dynamics of Bull Sharks as part of her PhD, which are frequent visitors to the area she studies. Tashi is the person you're likely to chat with during surface intervals, eager to share insights about these marine predators, their behaviours, and the conservation efforts she's passionate about. She's the go-to for shark tales and conservation details, and if you're lucky, she might just reveal why Bull Sharks are the introverts of the sea.



**Luis Mijangos**, at DArT, he combines his passion for technology and conservation, using genetic data analysis to protect biodiversity. His standout achievement? Applying his expertise in genetic data analysis to conservation projects, making him the tech-savvy guardian of the planet. Luis's contributions are crucial in the fight against biodiversity loss, and he's probably brainstorming ways to use genetic data to convince plants to grow in perfect Instagram-worthy arrangements.

## Our Sorcerers (Speakers)



**Craig Moritz** is quite a legend in evolutionary biology at the Australian National University, with a knack for understanding Australia's unique biodiversity. His work isn't just about looking back at how species evolved; it's about steering them through the rapids of climate change. Craig is on a quest to find long-term climatic refugia, which are basically nature's life rafts, and he's all about preserving these areas and the critters that call them home. Moritz has a hand in a plethora of projects, like exploring insect genomes and diving into the genetic and taxonomic diversity that came to light after those devastating 2019-2020 Australian bushfires. His research is a mash-up of phenotypic and genomic diversity studies, involving some pretty cool critters like rainforest lizards and iconic Australian birds like the superb fairy-wren.



**Carlo Pacioni** is a bit of a wizard when it comes to wildlife, especially in his roles at the Arthur Rylah Institute for Environmental Research, where he dives deep into the worlds of epidemiology and wildlife disease investigations. He's also a maestro in population genetics and modelling, making him a crucial player in the game of conservation and management of wildlife populations. His significant achievement? Utilizing molecular data for wildlife management, making him a crucial figure in the conservation field. Carlo's innovative approach has far-reaching implications for preserving biodiversity.



**Sally Potter** is like the Indiana Jones of evolutionary biology, minus the whip and fear of snakes. Growing up in Adelaide, her love for camping and the great outdoors nudged her towards a life exploring Australia's unique biodiversity. She's a powerhouse at Macquarie University, running the Potter Lab where she and her team dig into the genetic secrets of Australian critters, particularly focusing on how these animals adapt and evolve. Her work is a thrilling blend of fieldwork and hardcore genomics, spanning from population studies to the nitty-gritty of phylogenomics. She's all about chromosomes and genome organization, especially when it comes to figuring out how these elements drive the speciation and adaptation of Australia's endemic mammals.



**Diana Robledo-Ruiz** is a name you'll want to remember in the field of conservation biology, specifically at Monash University. She's been making waves with her work on the Helmeted Honeyeater's genome, leading to significant advancements in genetic rescue operations. Her high-quality genomic research is not just for the birds – it's key to saving them from extinction and maintaining their unique identity. Diana is also the lead developer of `dartR.sexlinked` which will make your life easier when filtering genetic data! She is developing this and other genomic tools to keep the endangered Helmeted Honeyeater, Leadbeater's possum and Macquarie perch buzzing in the wild.

## Our Sorcerers (Speakers)



**Jonathan Sandoval-Castillo**, affectionately known as Yuma. His work dives into the biogeography, phylogeny, and evolution of marine organisms, with a special fondness for the speciation process in elasmobranchs—that's sharks and rays to you and me. From the Gulf of California to the Pacific Coast of Baja California, he's been on a quest to understand these creatures using molecular and ecological approaches. His career has seen him involved in various research projects, from seascape genetics and evolutionary history to conservation and fisheries management. He's the kind of guy who not only knows his stuff when it comes to the high seas but also has the bioinformatics chops to back it up, developing tools like SWINGER, which is all about helping endangered animals find their perfect genetic match without needing a family tree.



**Robyn Shaw** is a bit of a wonder woman in conservation biology at the University of Canberra, where she's combining genetics with grit to tackle some of Australia's toughest environmental challenges. Her office? The great outdoors of Australia's ancient landscapes. Her tools? Genetics and field data, which she uses to suss out how animals are dealing with everything from bushfires to invasive species. Her work is crucial, especially when it comes to coming up with big-picture solutions that help governments, NGOs, and industry players play nice with nature. But it's not all fieldwork and DNA sequencing for Robyn. She's also part of the academic community, working with various organizations to develop conservation strategies that work on a landscape scale.



**Bill Sherwin** has quite the reputation at UNSW for his intriguing blend of mathematics, genetics, and ecology. He's been a scientific research stalwart for nearly four decades, applying his brainpower to understanding and predicting the impacts of environmental changes on various species. From invasive weeds to cuddly koalas and even prawns, his research has covered a wild array of flora and fauna. Bill is known for his multidisciplinary approach, fusing information theory methods into the realm of biodiversity management and evolutionary biology. His work has led to forecasting and measuring biodiversity from the molecular level right up to whole ecosystems. His contributions have earned him the 2021 Australian Museum Lifetime Achievement Award, a nod to his impressive career and dedication to his field.



## Our Sorcerers (Speakers)



ZSL  
LONDON  
ZOO

**Jinliang Wang** is the go-to guru at the Zoological Society of London for bringing threatened species back from the brink. With a passion for population genetics, he's all about modelling genetic processes like drift and inbreeding and their impacts on small, fragmented populations. His work isn't just theoretical; it has practical implications for managing the genetic diversity of endangered species, which is critical for their survival and adaptation. Jinliang isn't one to shy away from the nitty-gritty of genetic data analysis either. He's developed statistical methods and software for crunching numbers on everything from effective population size to migration rates.

## Our Enchantment Aides (Tutors)



**Lauren White** is a molecular ecologist who employs DNA to unravel the mysteries of the natural world. Her research dives into how natural selection influences biodiversity, using genetic data from wild animals to address both fundamental and conservation-related queries. Lauren isn't afraid to get her hands dirty, often working with less-than-ideal genetic samples like ancient DNA, museum pieces, and even animal droppings, requiring innovative lab and bioinformatics techniques to get the job done.



**Emily Stringer** is rocking her PhD at the University of Canberra, diving deep into conservation ecology and genomics. She kicked off with a mission to save the elusive Canberra grassland earless dragon and then hopped into the world of population genetics. Her main gig? Unraveling the genetic puzzle of an Australian rodent known for its dramatic population swings. Emily's all about cracking complex data to solve ecological mysteries, aiming to turn her findings into real-world conservation victories. Plus, she probably knows more about rodent family trees than anyone ever thought necessary!

## Our Spellcraft Coordinator



Australian  
National  
University



Centre for  
Biodiversity  
Analysis

**Claire Stephens** is a real go-getter at the Australian National University, where she's making waves as the Coordinator of the Centre for Biodiversity Analysis. This centre is all about ramping up the collaboration and impact in ecological and evolutionary sciences across the ANU, CSIRO, and University of Canberra. Basically, she's the maestro conducting an orchestra of scientific minds to create sweet symphonies in biodiversity and conservation.

# Your Adventure into RStudio Cloud Land!

To run our analyses in R during the workshop, we will dive into the magical world of RStudio Cloud, where the R code flows like rivers and plots and graphs grow on trees!

## Step 1: Summoning the RStudio Cloud Portal

- **Embark on the Journey:** Open your trusty steed (a.k.a. your web browser) and gallop over to [RStudio Cloud](#).
- **Forge Your Credentials:** Spot the "Sign Up" beacon in the realm's upper right corner and click it with courage. Click on the "Learn more" below the "Cloud Free" plan and then in the "Sign Up" button. A scroll will appear, asking for your name, your secret code (password), and your e-mail. Please use the same e-mail you provided when you registered to the workshop.
- **Prove Your Worth:** After submitting your details, a pigeon (or was it an email?) will fly into your inbox carrying a secret message. Click the link within to prove you're not a goblin in disguise.

## Step 2: Entering the Secret Workshop Chamber

- **Return to the Portal:** With your email now verified, make your way back to the [RStudio Cloud](#) realm and use your newly forged credentials to enter.
- **Finding the Secret Door:** *One day before the workshop*, a link leading to the workshop's chamber will be sent to your e-mail.

## Step 3: Joining the Fellowship of the Project

- **Locate the Treasure Chest:** Within the grand chamber (workshop space), seek the project "**PopGenR**" and click on it to reveal its secrets. As you open it for the first time, ancient RStudio Cloud spirits will work their magic to prepare your environment.

## Step 4: Teleporting Your Data Scrolls into the Cloud Realms of RStudio

- **Spot the Files Tab:** Peek into the lower right pane of your RStudio Cloud cauldron. You'll find the "Files" tab chilling there, waiting for your click.
- **Summon the Upload Spirits:** Give that "Upload" button a gentle tap.
- **Embark on a Quest for the File:** Hit "Choose File" and journey through the wilds of your computer to find the treasure you're looking to upload.
- **Unlock the Portal:** Found your file? Great! Click "Open" to unlock the portal, then confirm your choice with an "OK".

## Step 5: Conjuring RStudio in Your Own Realm

For most of your quest, you'll wield your magic directly in the cloud. No need to summon RStudio to your personal domain, as the cloud is equipped with all the arcane tools you'll need (input files, scripts, binaries and packages).

Should your quest require local spells, or should you simply prefer your own lair, here's your magic portal to get [R](#), [RStudio](#), and [dartR](#) all set up. If you've already been initiated and have these tools at your wand's tip, give them a zesty refresh before the workshop using this [handy guide for R and RStudio](#). And hey, don't forget to renew your spell components! Just murmur `'update.packages(ask = FALSE)'` into the R crystal ball (aka R console), and your packages will update as if by wizardry—no nagging prompts or anything!

May your plots be plentiful and your code error-free. Onward, to glory and data analysis!

# Grimoire of Preliminary Enchantments

## (Pre-reading material)

Before we kick off our workshop, there are a few magical basics we expect you've got tucked under your hats.

### R

- **R Interface and Script Casting:** Know how to wave your wand in RStudio and make those scripts fly.
- **Understanding Basic Data Types:** Get cosy with vectors, matrices, data frames, and lists - the potions and herbs of R.
- **Basic Operations and Assignments:** Be ready to cast simple spells and assign your magical results.
- **Basic R Functions:** Familiarize yourself with the incantations that make R do your bidding.
- **Subsetting and Indexing:** Learn how to navigate your way through datasets like a map to hidden treasures.

All these mystical preliminaries are laid out in this [enchanted OneDrive grimoire](#). If you're feeling a tad rusty, fear not! Embark on a quest through this [free introduction to R course](#).

Craving more arcane knowledge? Here is a list of great resources written by the Supreme Data Sorcerer *Hadley Wickham*:

- [R for Data Science](#)
- [ggplot2: Elegant Graphics for Data Analysis](#)
- [Advanced R](#)
- [R Packages](#)

And remember, even the most seasoned sorcerers need a little help sometimes. If you find yourself in a bind, consult this compendium of [helpful resources](#). It's like having a council of wise wizards just a spell away.

### Population genetics

Make sure you've got the basic **PopGen** concepts down by checking out the four fresh scrolls in this [OneDrive chest](#). If you're itching to brew up some stronger magic in population genetics, here are three legendary tomes penned by the grandmasters of the craft:

- Graham Coop's "[Population and Quantitative Genetics](#)" for that ancient wisdom.
- Joe Felsenstein's "[Theoretical Evolutionary Genetics](#)" for the arcane theories.
- Kent Holsinger's "[Lecture Notes](#)" for those secret insider tips.