Central Queensland Koala Volunteers

August 2021

The Central Queensland Koala Volunteers is drawing to an end

Dear Members,
After many years, the Central Queensland Koala Volunteers has decided to wind up their activities.
I want to thank you for your support over more than 20 years of research. Much has been achieved. In a later newsletter I will give a fuller account of the research and community outcomes that have been built on your support. Hopefully, we'll have some reminiscences from some of the original team as well.
This decision has been made because the koala research profile at CQUniversity is changing. I have significantly reduced my research activity, and the next generation in central Queensland koala researchers are taking their own direction in koala research and stakeholder/community engagement.
The CQKV will continue to support the remaining research activities that I am pursuing for the next few years until the
funds in hand are exhausted; a decision for which I am most grateful. This will focus primarily on the long-term research/monitoring on St Bees Island, but
also a small project looking at post-fire recovery of habitat in the Clarke-Connors Ranges. This is in conjunction with Dr Michael Hewson.
Dr Hewson, along with Dr Rolf Schlagloth and Dr Flavia Santamaria, form the next generation researchers in CQld. Dr Schlagloth is now the primary first contact
for the koala research team under the banner of "Koala Research-CQ". They have set up an on-line approach to community liaison and public engagement. This takes the form of (a) a koala research page on the CQUniversity corporate web site, (b) koala research web site outside of the CQU corporate envelope and (c) a
digital chat portal. They will have an online fundraising capacity.
The research profiles of each of these scientists can be viewed at the CQU koala research page where there will also be a link to the other, more extensive site.
Recently they have met to review and refine their research strategy for CQld. Hopefully, this will be available online when finalised.
So, the CQKV will continue for the next 12 months or so as the banked funds are applied to the research activities. We won't be seeking additional membership fees over this time. We will continue to report on the remaining activities. At that time, the web site will be shut down and the newsletter will cease. The main constraints on research and activity over the last year has been related to the Covid disruptions.

There are still complications arising from those that need to be worked through.

Alistair Melzer

Congratulations!

…to **Shirley Hopkins on her 90th birthday** this year. Shirley has been, and continues to be, an energetic and enthusiastic supporter of the volunteers both as Treasurer but also as the driver of our fundraising and investment activities.

Eucalypt seedlings have reappeared in parts of St Bees Island

St Bees Island

Research activity on St Bees Island ceased during 2020 due to Covid restrictions by CQUniversity and changes in the management on Keswick Island where eb base our research team. I was able to return to St Bees in May this year. This trip was primarily a maintenance trip given the year long absence. The week-long trip focused on repairing the research shed, clearing weeds and gutters and equipment festooned with mud-wasp nests.

However, I was able to monitor one of the three arrays of trial plots on the island. These plots are part of a collaboration with the Queensland Parks and Wildlife Service. This collaboration seeks to develop the correct environment for regeneration of the eucalypts that the koalas eat on the island – *Eucalyptus tereticornis* (blue gum) and *E. platyphylla* (poplar gum). Seedlings and saplings of these two species have been absent or exceedingly rare since we started on the island in the 1990's. This has been attributed primarily to browsing by goats and swamp wallabies (both introduced to the island), but also to overgrowth by lantana. The QPWS team has successfully eradicated the goats. They are now working to reduce the impact of the swamp wallaby. They have also reintroduced a fire regime to the island undertaken strategic lantana control focused on the primary koala habitat areas.

We are undertaking standard monitoring and controlled trials to measure the effect of fire and herbicide on lantana dominance and on eucalypt seedling germination and establishment. The main result from the May visit was the finding of eucalypt seedlings in the treated plot and under a reduced wallaby browsing pressure.

The research team on that trip was Leif Black from CQUniversity and Colleen Foelz from the Queensland Museum. Whilst I was working on the vegetation monitoring plots, Colleen and Leif were working on a broader investigation on the biota on St Bees Island that may provide indicators of ecosystem change over time.

Our next trip is planned for August. I will be joined by two volunteers from Rockhampton. We will coincide with teams from QPWS and the University of Queensland (our longer colleagues Dr Bill Ellis, Dr Sean FitzGibbon and Dr Ben Bath). I will be undertaking an island wide census of koalas and swamp wallabies to track changes in the island population. Unfortunately, we cannot take any further volunteers on this 10-day trip due to constraints on the capacity of the Keswick Island facility as they refurbish the accommodation and other infrastructure.

I am currently analysing the census data collected over the last 20 years. A quick

look suggests the population fluctuates significantly on a roughly 10-year cycle that seems to be linked to broad wet/dry cycles. There is more to do to understand the primary local driver of these changes. I'll be working with our colleagues Bill, Sean and Ben as well as Michael Hewson to better interpret what is going on. So more later, I hope.

Alistair Melzer

Royal Society of Queensland Research Project

Humble Cow: A Koala Serial Killer?

Alex Jiang
The University of Queensland, St Lucia, QLD 4072, Australia
2018

Background to Project

Koala (Phascolarctos cinereus) populations are declining in Australia, with habitat loss believed to be one of the major factors leading to this decline (Seabrook et al., 2003; McAlpine et al., 2006).In Queensland, clearing of koala habitat in coastal zones is mainly associated with urban development, while in rural areas of central Queensland it is associated with the expansion of cattle grazing from the beef and dairy industries (Preece, 2007).Consequently research is urgently required into the potential conflicts between cattle and koalas to guide management strategies which will enable cattle and koalas to co-exist. The recent concept of "Koala Beef" is intended to encourage the conservation of koalas in cattle grazing land by developing a koala-friendly beef industry (Ellis et al., 2017). Koala Beef encourages the preservation of remnant bush as koala habitat on grazing properties, with vegetation corridors to connect these habitats remnants so that resident koalas are able to survive and traverse to new areas safely, while maintaining the economic profitability of the cattle property.

Study Area

The University of Queensland is conducting a broad-ranging koala research program (the Hidden Vale Koala Project - HVKP) on a large private property, referred to as Hidden Vale, locating in south-east Queensland. Approximately 75% of this property is Nature Refuge, but it also includes beef cattle farming, extensive mountain bike trails and an ecotourism resort. The HVKP is expected to continue for at least 2-3 years from mid-2018, with its main focus being the investigation of the abundance, distribution, disease prevalence, fecundity and mortality of the koala population in this area.
The HVKP property includes a large area of koala habitat which is also grazed by free-range cattle herds. Therefore, as part of the broader HVKP, it offers a valuable opportunity to investigate the potential koala-cattle interaction issues raised in inland central Queensland.

Objectives of the Research

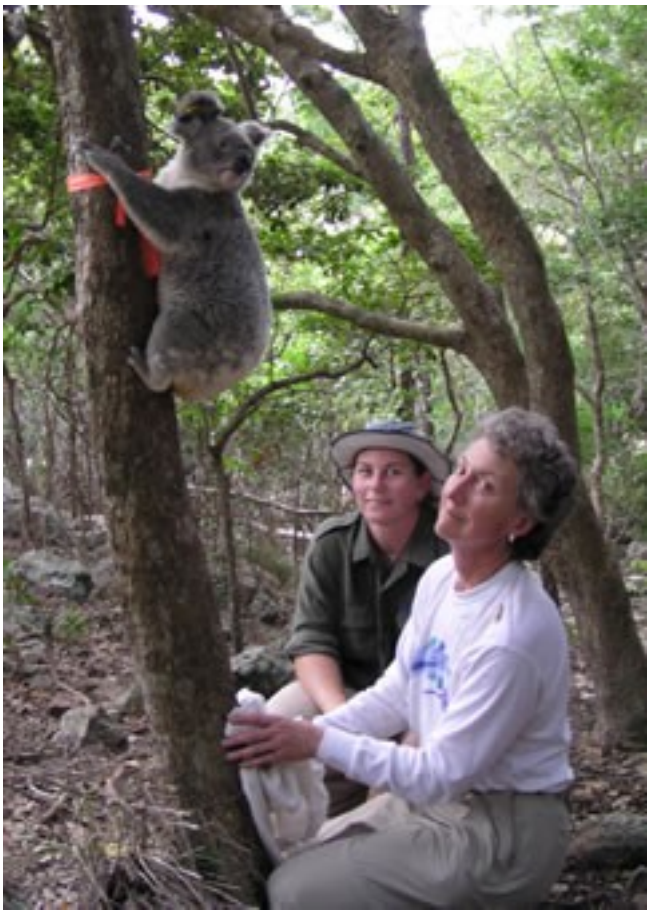
The objectives of the research funded by The Royal Society of Queensland are to:

1. Investigate the scale and frequency of cattle-inflicted injuries/deaths to koalas via a nation-wide online survey.
2. Test cattle reactions towards koalas by the use of a koala model mounted on a motorised vehicle.
3. Investigate the impact of cattle on koala movements and hence their home ranges, including variations in location and size.

The assumption is that if the presence of cattle in koala habitat has adverse effects on free-ranging koala populations:

a. cattle would be found to be a significant cause of injury or death of koalas

b cattle would be found to display aggressive behaviour towards the koala model
c the home ranges of koalas would decrease in size or they would move away to avoid potential contact with the cattle.



Gail Tucker with hat one of our past Researchers while she was studying her degree

Implications for Koala Conservation

The findings of this study will have several important implications for koala conservation in rural areas, especially in central Queensland where the overlap of koala home ranges and cattle grazing is extensive comparing to coastal areas. Findings of the research may assist koala conservation in the following ways:

1 Guiding koala conservation and mitigation management strategies. Extra monitoring and preventative approaches may be required to manage the potential adverse impacts when koala population home range overlaps with cattle grazing land.
2 Alerting cattle farmers in respect to the potential threat of domestic cattle on local koala populations and advising changes to their cattle management procedures which might minimise such risks.
3 Establishing the theoretical basis of the “Koala Beef” project, the aim of which would be to identify koala-friendly farm management strategies and protocols.

Literature Cited

McAlpine, C. A., Rhodes, J. R., Callaghan, J. G., Bowen, M. E., Lunney, D., Mitchell, D. L., . . . Possingham, H. P. (2006). The importance of forest area and configuration relative to local habitat factors for conserving forest mammals: A case study of koalas in Queensland, Australia. Biological Conservation, 132(2), 153-165. doi:10.1016/j.biocon.2006.03.021

Preece, H. J. (2007). Monitoring and modelling threats to koala populations in rapidly urbanising landscapes: Koala coast, south east Queensland, Australia. (Ph.D.), The University of Queensland,

Seabrook, L., McAlpine, C., Phinn, S., Callaghan, J., & Mitchell, D. (2003). Landscape legacies: Koala habitat change in Noosa Shire, South-east Queensland. Australian Zoologist, 32(3), 446-461.

Royal Society of Queensland Research Project

What Do Koalas Eat Where and Does This Shape Their Microbiomes?

Dr Michaela Blyton[1]

[1]*The University of Queensland, St Lucia, QLD 4072, Australia*

2019

Background and Significance of the Research

Throughout their wide geographic range, koalas (*Phascolarctos cinereus*) always eat *Eucalyptus* leaves. Few animals can stomach let alone survive on these fibrous, toxic leaves and koalas are thought to rely on their gut microbiomes to help them digest their nutritionally-poor diets. Our research has revealed that the microbes that make up the koala's gut microbiomes vary over their range, with koalas from proximate populations having more similar microbiomes compared to koalas from opposite ends of the continent. These patterns extend to the microbes' ability to breakdown and make different compounds, thereby, potentially influencing the koala's nutrition. Our work suggests that climate and dispersal patterns play a role in shaping these patterns but we don't know how diet is involved.

Within one population we found that individuals that feed on different eucalypts have distinctive microbiomes, while those with similar diets have similar microbiomes. Yet, the microbiomes of koalas on St. Bees Island differ from those on North Stradbroke Island, despite koalas on both islands reportedly feeding on *Eucalyptus tereticornis*. By contrast, koalas at Clermont, Surat and Gunnedah have similar microbiomes and are thought to have similar diets. To resolve these discrepancies we need accurate information on which *Eucalyptus* species the koalas are eating.

Objectives and Implications

This study will leverage extensive pre-existing data, samples and significant prior funding to determine how the species and nutritional composition of the koala diets affect the composition and function of their microbiomes across populations. To do this we will identify which species of *Eucalyptus* koalas are eating at sites across Australia, including St. Bees Island and Clermont in central Queensland.

A better understanding of koala diets will assist identification, conservation and restoration of their habitat. Further, understanding how koala diets interact with the microbiome to influence koala nutrition is vital to assist rehabilitation and translocation of koalas.

Approach and Study Design

We will characterise the diet (*Eucalyptus* species eaten) of 187 koalas from 20 populations across four states. This will allow us to compare koala diets across the country and to connect koala nutrition and microbiome composition. The nutritional composition of the koalas' diets will be determined from data on the chemical make-up of the eaten eucalypt species. This information will be combined with

existing data on the composition and function of the animals' microbiomes.

As part of a completed ARC grant, we have already collected the required samples and characterised the koalas' microbiomes by shotgun sequencing of DNA extracted from faecal pellets. We have also characterised the nutritional composition of candidate eucalypt species from the areas where the koalas were sampled using near-infra-red spectrometry (NIRS) and chemical analysis. However, determining the composition of the koalas' diets was beyond the scope of that project and required the development of new genetic techniques.

Identifying what koalas eat in different parts of the country is trickier to answer then one might think. For one, koalas often feed at night in different trees to those that they rest in during the day, making direct observations difficult and labour intensive. Other researchers have used microhistological analysis of leaf cuticle fragments and chemical analysis of hydrocarbon cuticle waxes from faecal pellets to reconstruct diets, but neither method is able to differentiate between many eucalypt species. Standard genetic approaches to faecal diet analysis (e.g. DNA barcoding) do not work for eucalypts due to their genetic similarity. We have developed a new approach that utilises state-of-the-art next-generation sequencing to characterise koala diet composition.

Investigators

Dr. Michaela Blyton, a Research Fellow at the University of Queensland, will be the chief investigator on this project and will undertake the primary data analysis. Dr. Ben Moore, a senior lecturer at Western Sydney University, will contribute to data interpretation and manuscript preparation in his role as co-investigator.

Acknowledgement

This award from *The Royal Society of Queensland* was sponsored by the Australian Koala Foundation. The Royal Society's sincere thanks are extended to Ms Deborah Tabart for facilitating this grant.

Literature Cited

Brice, K. L., Trivedi P., Jeffries T. C., Blyton M. D. J., Mitchell C., Singh B. K., & Moore B. D. (2019). The Koala (*Phascolarctos cinereus*) faecal microbiome differs with diet in a wild population. *PeerJ*. 7, p.e6534

Blyton, M. D. J, Soo, R. M., Whisson, D., Marsh, K .J., Pascoe, J., Le Pla M., Foley, W., Hugenholtz P., & Moore B. D. (2019). Faecal inoculations alter the gastrointestinal microbiome and allow dietary expansion in a wild specialist herbivore, the koala. *Animal Microbiome*. DOI: 10.1186/s42523-019-0008-0.

CQ KOALA VOLUNTEERS Financial Report at 30th June 2021

S5 Saver Account	$8,114.50
S26 Cheque Account	$298.90
12 Month Term Deposit	$13,963.96
Total Assets	**$22,377.36**

Shirley Hopkins Treasurer

Comparing Koala Retrovirus Infection Between Central and South-east Queensland Koalas

Dr Bonnie Quigley[1]

[1]University of the Sunshine Coast, Queensland, Australia

2019

Background and Significance

The survival of the koala (*Phascolarctos cinereus*) is under serious threat, with this iconic marsupial declared `vulnerable' by the Australian government in 2012. A major contributor to this decline is disease, with *Chlamydia* widely recognised as the major infectious threat and the relatively recently discovered retrovirus, Koala Retrovirus (KoRV), a threat itself and worse when combined with *Chlamydia*. KoRV is from the same family of viruses as HIV and has been detected in all south-east Queensland koalas tested to date (1). Currently, seven subtypes of KoRV (A-I) are recognised and KoRV-B infection is significantly linked to chlamydial disease and cancer deaths in koalas from south-east Queensland (1, 2). However, similar testing has not been conducted in other parts of Queensland. Testing location is important, as genetic analysis of Queensland koalas revealed two different lineages of koalas co-occurring north of Brisbane, with possible biogeographic barriers at the St Lawrence Gap (near Rockhampton) and the Brisbane Valley (at Brisbane) (3, 4). This suggests that it may not be accurate to extrapolate test results from koalas around Brisbane to koalas north of Rockhampton. With strong evidence that KoRV is involved in very serious koala health conditions, it is time for focused research into KoRV across Queensland.

Objective

The objective of this study is to determine the prevalence and diversity of all seven subtypes of KoRV in two distinct areas of Queensland. We will evaluate whether there are differences in KoRV between south-east Queensland koalas and Central Queensland koalas that could affect management practices (like relocating koalas) between these areas.

We expect all Queensland koalas to be infected with at least one KoRV subtype, however, we anticipate different patterns in virus diversity between the biogeographical barriers. Learning how these patterns differ between koalas will be important for KoRV vaccine development (underway by the USC research team) and will inform *Chlamydia* treatment and koala translocation strategies across Queensland.

Investigators

Dr. Bonnie Quigley, University of the Sunshine Coast, is a post-doctoral research fellow with 12 years' experience in microbiology research. Dr. Quigley currently works with Prof. Peter Timms, a world-leading expert on chlamydial disease and vaccination in koalas. Dr. Alistair Melzer, is an established koala ecologist and research program leader of the Koala Research Centre of Central Queensland at CQU.

Literature Cited and Consulted

1 Quigley, B. L., Ong, V.A., Hanger, J., & Timms, P.. (2018). Molecular dynamics and mode of transmission of Koala Retrovirus (KoRV) as it invades and spreads through a wild Queensland koala population. *J Virol*., *92*:e01871-17.

2 Chappell, K. J., Brealey, J. C., Amarilla, A.A., Watterson, D., Hulse, L., Palmieri, C., Johnston, S. D., Holmes, E. C., Meers, J., Young, P. R.. (2017). Phylogenetic diversity of koala retrovirus within a wild koala population. *J Virol*., *91*.

3 Neaves, L. E., Frankham, G. J., Dennison, S., FitzGibbon, S., Flannagan, C., Gillett, A., Hynes, E., Handasyde, K., Helgen, K. M., Tsangaras, K., Greenwood , A. D., Eldridge, M. D., Johnson, R. N.. (2016). Phylogeography of the koala, (*Phascolarctos cinereus*), and harmonising data to inform conservation. *PLoS One*, *11*:e0162207.

4 Bryant, L. M., & Krosch, M. N. (2016). Lines in the land: a review of evidence for eastern Australia's major biogeographical barriers to closed forest taxa. *Biol J Linn Soc Lond.,119*, 238-264.

5 Nyari, S., Waugh, C. A., Dong, J., Quigley, B. L., Hanger, J., Loader, J., Polkinghorne, A., Timms, P. (2017). Epidemiology of chlamydial infection and disease in a free-ranging koala (*Phascolarctos cinereus*) population. *PLoS One*, *12*:e0190114.

6 Nyari, S., Booth, R., Quigley, B. L., Waugh, C. A., Timms, P. (2019). Therapeutic effect of a *Chlamydia pecorum* recombinant major outer membrane protein vaccine on ocular disease in koalas (*Phascolarctos cinereus*). *PLoS One*, 14:e0210245.

7 Phillips, S., Quigley, B. L., Timms, P. (2019). Seventy Years of *Chlamydia* Vaccine Research - Limitations of the Past and Directions for the Future. *Front Microbiol*.,*10*:70.

8 Quigley, B. L, Carver, S., Hanger, J., Vidgen, M. E., Timms, P. (2018). The relative contribution of causal factors in the transition from infection to clinical chlamydial disease. *Sci Re., 8*, 8893.

The KR-CQ has made a submission to the **Environment Protection and Biodiversity Conservation Amendment (Save the Koala) Bill 2021** and we encourage all likeminded friends of the koala to do follow the developments on this bill by registering for updates under https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/SavetheKoala

We expressed that as members of KR-CQ and many decades of research in our region, we are fully aware of the risks associated with habitat loss, climate change and drought, koala populations are facing throughout their range (including populations in Victoria). We agreed that something needs to be done to ensure the long-term survival of this Australian endemic marsupial flagship species.

While we generally support the idea of protecting koala habitat, it is not clear what the full purpose of the moratorium is. We acknowledged that a temporary suspension of habitat clearance is proposed, but no specifics were given on time limit or the conditions under which the moratorium would be lifted.

We argued that a blanket national moratorium, albeit inspirational, is a difficult goal to achieve in our society, given the different circumstances for, and laws governing, the different states and councils. A targeted moratorium, with clearly defined justification and consequent actions may be more achievable.

The apparent focus of the act is on land clearing or habitat fragmentation which are certainly, as already mentioned, major threats to koala persistence. However, climate change and variability are equally important. We also pointed out that there is a need for recognition, and the role, of koala population and habitat refugia (some habitat may be currently unoccupied but needed in future), as the appropriate management of the vegetation (in relation to fire and clearing) in those refugia or, in the case of offsets, recovering habitat on landscapes that previously would have acted as refugia. We noted that the majority of koala populations and koala habitat is retained on private lands, and in Queensland under a rangeland grazing regime. We believe that one mechanism that may be applied to encourage habitat protection is providing a package of incentives for property owners who currently retain, or are willing to retain, koala habitat.

We observed that the proposed moratorium on the clearing of koala habitat will require substantial inter-governmental dialogue if the current Australian Government plans to devolve the environmental regulation to State Governments under legislative changes planned to the EPBC Act take place.

Cheers Rolf

Mission

CQ Koala Volunteers *seek the conservation of the koala and other tree living mammals in Central Queensland by*

- *Supporting research into koalas, other arboreal mammals and their habitat through (a) providing volunteer support to research projects, and (b) assisting in the raising of funds for research and the volunteer teams;*
- *Developing public awareness of the needs of koalas, tree living mammals and their habitat requirements generally;*
- *Fostering community support for koalas and tree living mammals generally;*
- *Encouraging and assisting with the development of habitat rehabilitation projects where necessary through the region;*
- *Supporting the rehabilitation and release of sick, injured or displaced koalas and tree living mammals.*

The Central Queensland Koala Volunteers are not about stopping development. They seek to encourage planned development, which allows for the co-existence of koalas and other tree living mammals with human activity.
Funds are used to buy equipment for the researchers, to fund volunteer field teams and provide limited support for animal carers. Donations may also be made to the Koala Research Centre of Central Queensland and are tax deductible.

Office Bearers

Alistair Melzer*, signatory, Chairperson*
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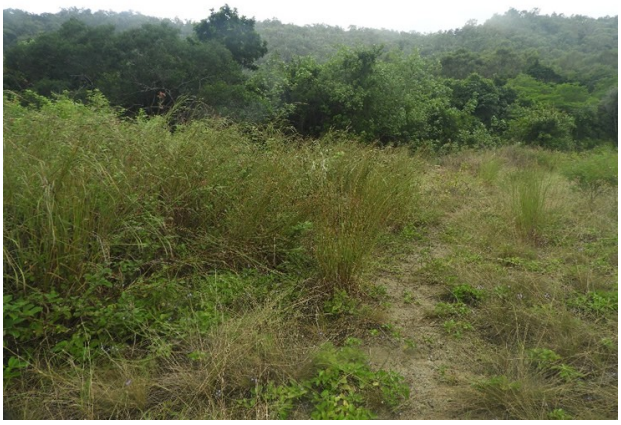

Re-establishment of black spear grass on St Bees Island beach flat following a reduction in swamp wallaby numbers by QPWS. (**A. Melzer 2021**)

On behalf of **Doreen Lovett** and myself (**Nick Quigley OAM**) we have had some tricky moments putting the Newsletter together, it has been a good learning curve and we have met some very interesting and dedicated Researchers. We thank Alistair (Left) for his dedication and Leadership.

The Koala pictures in this Newsletter were taken By Gail Tucker on her many field trips to St Bees Island