

**Submission
No 293**

INQUIRY INTO KOALA POPULATIONS AND HABITAT IN NEW SOUTH WALES

Name: Ms Maria Matthes

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To Portfolio Committee No. 7

Re – Planning and Environment Inquiry into policies and funding by government to ensure healthy, sustainable koala populations and habitat in New South Wales

Thank you for the opportunity to provide comments to this important inquiry into koalas and their habitat in NSW. My submission is:

- made as the principal expert with over 20 years living with and understanding Ballina's koala population, with an above average knowledge of Northern Rivers Koalas. In addition to my efforts in recovering Ballina's koalas, I am also a koala rescuer for Friends of the Koala Inc.
- made as the community koala lady. I have over 100 citizen science koala watching landholders who report sightings of koalas on their property, and are interested in participating in activities to help conserve our precious koala population.
- focussed on recovering Ballina's koalas, including past, current and future issues. It is no more than an introduction to Ballina's koalas and their issues.
- also addressing broader issues where relevant.

Addressing the Terms of Reference

(a) the status of koala populations and koala habitat in New South Wales, including trends, key threats, resource availability, adequacy of protections and areas for further research

Status of Ballina's Koalas

The majority of Ballina's Koalas, comprising an estimated 250-300 individuals, are part of the recognised nationally significant population under the Federal EPBC Act. It should be noted that the area of the nationally significant population was determined for the purposes of the Roads and Maritime Assessment for Section 10 of the Pacific Highway Upgrade under its EPBC Act referral. This spatial area was carried though into the Ballina Shire Council Koala Strategy.

There are approximately 100-150 individual koalas living on the Alstonville Plateau. There is significant interaction between the koalas on the Alstonville Plateau and the identified boundary of the nationally significant population, which has been detected in genetic studies associated with the RMS' Population Viability Analysis.

There were also 3-4 koalas estimated to be living at East Ballina. It is likely this subpopulation is now extinct.

Limited studies over 2012 -2015 suggested Ballina's koala population appears to be in a gradual decline, with deaths greater than the number of births. This is based on SAT surveys and transects undertaken to inform the preparation of the Ballina Koala Strategy and the Ballina Koala Population Study for Section 10 of the Pacific Highway Upgrade.

It appears that koala colonies are re-establishing in areas where they had been previously recorded but not observed in recent years. This may be a result of the loss of habitat from the Highway

construction or could be a result of the combination of a fire and storm disturbance to areas of habitat and Highway construction, or could be natural expansion and establishment from some larger colonies. Without the detailed monitoring, that our community has been seeking funding for, we will never know.

Although the genetic research (relatively small sample for RMS study) revealed low levels of inbreeding in the population, inbreeding depression (which is when inbreeding is causing a problem to an individual and subsequently to a population). Inbreeding depression can reduce the ability of a species to adapt to environmental change, including climate change. Ballina's koala population is robust in terms of its genetic diversity.

Much of the information of locations and changes in colonies/numbers of koalas comes from the local community notifying me over many years of when they see or hear a koala.

Ballina's Koalas Habitat

Studying the koalas and their habitat use in the Southern Koala Management Area has provided interesting insights to the local colonies, in part supported by other research. Ballina's southern koala subpopulation occurs in a variety of ecological communities. Some koalas stay in one area eg on the floodplain, or in the hills or in the heath, while others move between one or more habitats. All koala habitat is important for them to move around the landscape as they need. Having such a specific habitat and food, leaves a species vulnerable to environmental change, whether natural or human-induced. The habitat of Ballina's koalas is located in bush-fire prone land.

The heathland is interesting in that for the most part does not contain many koala food trees. Across the approx. 1000 ha in the Ngunya Jargoan Indigenous Protected Area and adjoining private lands (plus a small amount currently in the ownership of the RMS), the Wardell Heathland, has scattered individual food trees (primarily Swamp Mahogany, Scribbly Gum, and Red Mahogany), and random small clumps. This landscape supports, or supported prior to the 354 ha fire 18 months ago, at least 20 koalas. One koala came out of the heathland 3 months after the fire, looking haggard.

Koala habitat is simple, koala habitat use is complex – every koala is an individual, every colony and every population is unique. Koalas are a landscape species requiring suitable habitat across the landscape. Landscape features required for individual koalas to complete their lifecycle – adequate nutrients and moisture, nutrients for mum during pregnancy and post-natal rearing, habitat for young dispersing animals, habitat to deal with disturbance, shelter.

The Plateau koala subpopulation is mostly limited to planted windbreak trees and in yards. Macadamia plantations are also regularly used for sheltering on hot days.

Ballina's Koalas Food Trees

Ballina's koalas mostly eat the following species. Some do not eat much of the primary species and rely more on secondary species.

Primary:

- Forest Red Gum *Eucalyptus tereticornis*
- Tallowwood *Eucalyptus microcorys*

- Swamp Mahogany *Eucalyptus robusta*

Secondary:

- Flooded Gum *Eucalyptus grandis*
- Forest Red Gum X Swamp Mahogany *Eucalyptus patentinervis*
- Blackbutt *Eucalyptus pilularis*
- Red Mahogany *Eucalyptus resinifera*
- Sydney Blue Gum *Eucalyptus saligna*
- Scribbly Gum *Eucalyptus signata*
- Grey Ironbark *Eucalyptus siderophloia*
- Forest Oak *Allocasuarina torulosa*
- Swamp Oak *Casuarina glauca*
- Pink Bloodwood *Corymbia intermedia*
- Brush Box *Lophostemon confertus*
- Swamp Box *Lophostemon suaveolens*
- Paperbark *Melaleuca quinquenervia*

Ballina's Koalas mostly avoid their food trees when they are flowering. I hypothesise that the reasons for this are: 1) the nutrients in the leaves undergo a change when the tree is putting its energy into flowers and fruit; and 2) they cannot stand the disturbance and noise of the Rainbow Lorikeets during the day and the flying-foxes at night.

Koalas select their habitat for their individual needs at any time, therefore where they are can vary temporally and spatially as needed. Habitat use is most likely regulated by the distribution and presence of feed trees, the toxicity of leaves at any point in time, tree and leaf nutrition and chemicals, developmental trajectory, reproduction factors, leaf chemical imprint, moisture, protein, concentration of nitrogen, tannins, fibre, gut health, all contributing to the selection of an individual's selection of its food trees. They have a strong affinity to their individual trees, including sheltering trees.

Number of trees visited, number of meals eaten and how long is spent feeding in a 24 hr period varies. Koalas selecting trees and leaves by smelling – they may grab a handful of leaves, smell it, then flick it away. The toxicity in leaves is in part temperature dependent with high temperatures leading to increases in toxicity. They can't avoid ingesting certain toxic compounds often in significant amounts, koalas obviously manage this. When their gut isn't well they tend to eat more from non-Eucalypt species and Melaleuca medicine. Further research is required to understand the way koalas regulate intake to avoid toxicity – is it conditioned aversions mediated by nausea, and non-conditioned aversions – recognition of limits of detoxification, regulated by meal length, and time between meals, and/or feeding on non-Eucalypt low-no toxicity species?

Ballina's Koalas in the Landscape

At the landscape level the patches with food trees (and that is an individual koala thing) are most important, but the ability for safe dispersal between trees, and the protection of trees for sheltering are also very important. Ballina's koala habitat in the landscape can be isolated paddock trees, small remnants, windbreak trees, linear corridors, large remnants, trees in yards, weeds. It could be a small area – 1 tree, or a clump, roadside vegetation, a stepping stone, a large area.

Most koalas have a home range – there is the odd roaming koala that never settles down. A group of koalas with overlapping home ranges is known as a colony. The size of an area occupied by a colony will depend on the available and suitable habitat in that area of the landscape. Social factors also play a role, in general a colony will comprise an alpha male, an alpha female, and a hierarchy of dominance under them. Young females are generally absorbed into the colony it was born in, whereas young males are usually forced to disperse at around 18 months-2 years old. Occasionally a young male will stay in its maternal home range (such as my Laurie).

The koalas share home ranges with other koalas, rarely share a tree at the same time, but common for more than one koala to share a tree over time, as well as clusters of overlapping home ranges. Both males and females scent mark with urine and faeces, males also mark with scent gland, mostly at the base of a tree, and most frequently during breeding season. There is much more to learn about this but it is likely that it conveys messages about individual identity, sexual maturity, health, and the koala's position in the hierarchy.

Koalas live in social groups, complex regulated by communications, foraging and social strategies that have evolved over millions of years to exploit patch resources without direct competition. Koalas spend around 80-90% of time alone during breeding and almost 100% alone during non-breeding. They make a particular noise to indicate they are in a tree when another approaches or gets too close.

Daily koala movements are mainly nocturnal but they do often move through the day. Within their home range, koalas generally change trees on a daily basis, sometimes several trees in 24 hrs, sometimes they will stay in a tree for two or more days, rarely longer than a week and only then if it is a very large tree. There are also finer scale shifts in activity on a day to day, weekly, monthly and yearly basis. Ballina's Koalas sleep or rest 17-22 hrs/day, feed 1-4/hrs a day, with 4-8 sessions ranging from 10mins to 2hrs. The remainder of time they are awake, grooming, moving between trees and social activities.

Seasonal movements increase at the landscape scale at the beginning of breeding season and again at the end of breeding season. During breeding season they will also move more – July to November most trauma dog and vehicle from being on the ground – concern the potential impact on local colonies and populations overall by healthy breeding koalas being prematurely removed. Koalas dispersing are mostly healthy young individuals.

Reactive movements are related to habitat loss which may be permanent (land clearing) or temporary (fire, storm, heatwave, drought). Depending on the scale of the loss as to level of movement, and whether the koala will be disoriented and confused.

Key Threats to Ballina's Koalas

The main threats to Ballina's koalas are:

- 1) Habitat loss – Permanent loss of food trees through Private Native Forestry Operations, new landholders to the area, and Pacific Highway Upgrade. Temporary loss as a result of natural events such as fire, flood, storm, heatwave, drought. The loss of habitat contributes to many other threats such as disease, vehicle strike, wild and domestic dog attack, starvation, and injury.

- 2) Disease – primarily Chlamydia and Retrovirus and the associated ailments of a depressed immune system. Conjunctivitis leading to blindness if not treated early enough. Cystitis thickened bladder wall, can't store urine, drips out, painful, resulting in death. Reproductive cysts on ovaries sterilises koala, painful and results in euthanasia (costly but should be looking at hysterectomies and alternative treatments for this). Pneumonia often resulting in death. Disease is the biggest killer of Ballina's koalas. A vaccination program incorporated into a research and monitoring program for Ballina's koalas is essential to give them a buffer against the disease. A comprehensive trial as part of the Moreton Bay Rail Link was highly successful. See Attachment 1 for some examples.
- 3) Vehicle Collisions – takes out a number of koalas every year. If it is a young healthy female or female with a joey, then the loss to the population over 10 years is enormous. The local road koala fencing with grids and locked gates installed by RMS appears to have reduced the number of vehicle collisions. There are still a number of hotspots where koalas are hit. For example, I have retrieved over 8 koalas from out the front of my property where koalas have been hit. For many of Ballina's koalas the trees on the roadsides are their preferred trees. This could be because of the increased moisture under the road that the roots are able to tap in to. These areas need targeted measures implemented. More work in this space – education, signs, police road patrols, trials of new ideas, such as radio-tracking the koalas that live on roadsides with real time data recording. This will provide a summary for the period on the time of day they most likely cross, how many times they crossed the road etc. This information could then be used to educate the community in a more appealing way. This could be tied into a research and monitoring program for Ballina's koalas.
- 4) Wild and Domestic Dog Attack – at the moment there are at least 10 wild dogs that are hanging around koala habitat of Ballina's koalas. They have taken calves and not sure about koalas. Landholders occasionally encounter koala carcass after wild dog attack.

During the construction of the Moreton Bay Rail Link in Queensland koalas were radio-tracked. In the first 18 months following the habitat clearing over 100 koalas had been killed by wild dogs. In particular one dog, named the Amcor Dog, was responsible for the death of over 60 koalas.

Domestic dog encounters are not common that we know of although 3 in the last 18 months. Sometimes they are serial offenders. A koala that has been in contact with a dog may have internal injuries such as a punctured organ. Injuries can sometimes be treated if the koala is rescued quickly enough. If the dog's saliva enters an external wound, it can quickly lead to septicaemia, resulting in death.

RMS have been implementing a wild dog control program but that has scaled down and the dogs are back. An on-going 10 yr program is required. Education for landholders with dogs, perhaps some funding for establishing koala friendly fences and dog yards to reduce the risk, would also be important to recovering Ballina's koalas.

5) Natural Events

Severe storms can result in disorientation, defoliation of trees , starvation, dehydration, stress, joey separation (when severe storm is bombarding koalas often go to the ground, a mother can go leaving joey behind),injury (branches whipping in eyes, trapped under fallen debris, falling from tree, particularly young and less experienced climbers may have injury or death), death. Often after such an event, delayed effects observed 3-12 months down the track with disease and starvation. In one storm cell that ripped through the core habitat in January 2016, 4 of Ballina's koalas died, including Dirty Harry, a joey trapped by one arm under a fallen trunk who spent 24 hrs scratching to free himself with his free arm. He died from infection; a joey found in washed down leaf litter on the side of the road.

Floods can result in displacement, disorientation, injury. In the most recent floods a koala was washed down with the floodwater. It took him several months to settle into a new area.

Fire in koala habitat is generally a stressful event. Koalas move to the top of the tree for safety, if flames move to canopy, koala will move out to end of branch and may even jump to fire ground. Some koalas get caught on the ground moving to a safer area. This can result in burns, broken bones (falling from trees), smoke inhalation, dehydration, starvation, increased stress levels, and travel more in search of food (increased risk of vehicle collisions and dog attack). Also leads to temporary loss of habitat, temporary loss of food, require larger area in landscape to access food, increases competition for habitat (and interspecific aggression).

Much of the area occupied by Ballina's koalas is long time unburnt bushfire prone land. The fuel levels are high. A high intensity fire that gets into the canopy would be catastrophic. Landscape scale community fire management and planning is needed. We have begun this process but need additional resources to develop this further.

The fire in the Wardell Heath 18 months ago impacted on several koalas. See Azam's Story in Attachment 2.

The impacts of droughts and heatwaves are an underestimated impact on coastal koala populations, thought more to impact on western populations. I have observed the effects of heatwaves and drought on Ballina's koalas causing dehydration and starvation, on ground more in search of food and water, reduced breeding ability, increased stress, and delayed onset of disease. Healthy koalas in 6 weeks (up to 12 months) after the heatwave-drought (which was followed by the storm cell reducing available foliage by around 30% for around 18 months), reduced to skin and bone, serious cases of chlamydia, retrovirus activated, blood cell counts in disarray.

Ballina's koalas need more research in the natural disasters space, including leaf chemistry, temperatures of tree species and different sized trees cooling and warming properties.

- 6) Climate Change – sea level rise is predicted to inundate some of the currently preferred habitat of many of Ballina's koalas. Habitat shifts and loss of habitat, inundation by sea

water, reduced water available for trees during droughts and heatwaves, increased prevalence and severity of disease risks with increases in wetter and warmer conditions, increase in temperature and less rainfall potential for lower quality of food (higher concentrations of toxic chemicals and increased CO₂ in leaves reduces nutrients in leaves), lower digestibility, hardening of leaves, more fibrous leaves (question whether more fibre wears teeth down quicker, leading to starvation at earlier age), and drier habitat more fire prone. In addition, trees which are stressed are more susceptible to insect attack defoliating trees in a matter of weeks. This event occurred in the Forest Red Gums in 3 of the last 5 summers, coinciding with heatwave conditions, and reduced available food resources significantly.

For koalas that only eat from one or two species this could have implications for the persistence of resident koalas to climate variability eg severe storms, fire, heatwaves, drought. Sea level rise could trigger toxic dieback from salt intake, fine balance between nutrients and toxins, with leaves getting out of whack. Koalas have a limited ability to adapt rapidly to changes.

Early koalas were rainforest dwellers. Koala habitat is likely to have expanded or changed 11-5million years ago with the drier Eucalypt forests. Over time there has been 18 koala like species. The last two were our current koala species and Giant Koala who coexisted with the modern koala for a short time before becoming extinct 50,000 years ago. It is the largest tree-dwelling marsupial that ever lived. Now there is one – will it survive?

- 7) Stress and Immuno-depressed disorders – I cannot emphasise enough the impact of chronic stress on koalas, and Ballina's koalas. Each koala is an individual and will respond differently to habitat loss and is scale dependent larger loss greater response. Studies on Ballina's koalas related to stress and Highway construction revealed elevated levels and some evidence of chronic stress. Need raw data to explore details of effects more.

Dr Ed Narayan stress expert explained to me that minimal stress = happiness, high stress = fear, anxiety, and energy directed to survival. Koalas are a low energy species not getting much from gum leaves, rest so much to deal with low nutrient diet. Koalas also have little fat, stress causes a redirection of energy reserves from survival to increasing fat reserves and reproduction, and creates an energy water thermoregulation deficit. In summary chronic stress activates the hypothalamus-pituitary-adrenals and can result in

- Suppressed growth and development - Disruption of thyroid
- Inhibited reproduction - apoptosis of the testes
- Increased oxidative stress – affecting the kidneys
- Effects on lymphocyte maturation and proliferation - cancer, dysfunctional natural killer cells
- Increased endotoxic shock susceptibility – affecting kidneys and lung congestion
- Increased mortality

- 8) Starvation – permanent and temporary habitat loss. Preventable with support.

Resource Availability

Resources are just not available at the level required to recover Ballina's koalas. This would also apply to every other population in the State. Every population is getting something, whether directly or indirectly, but it is piecemeal and ad hoc.

The LNP did manage to secure a small grant for rescue equipment and some equipment to assist with heatwaves. However, our community is struggling to get resources for what is needed (for food and shelter tree planting in particular areas, weed control, wild dog control, landscape scale fire planning and management, research and monitoring, health checks and treatments etc).

It seems that the Government associates Ballina's Koalas with the Highway and think that the RMS have everything under control. They are doing a good job at implementing the approval and doing additional work where possible, but Ballina's koalas need more and are more than just the RMS. For example, the RMS has fenced the area of the Pacific Highway where most road hits occur. This has reduced the number of koalas hit in this area. However there are insufficient underpasses to facilitate koala movement. This means koalas will expend additional energy trying to get to the other side (risk getting hit if they get onto the road), in times of drought could be left with limited access to sufficient food, and in the longer term could result in inbreeding depression as individuals are not able to spread their genes. See Attachment 3.

The RMS has purchased two wildlife cameras to assist in the rescuing of Ballina's koalas. A community member donated \$6000 toward the purchase of the desired thermal imaging camera and software. Another \$13000 is required but efforts have not been successful thus far.

One thing I have taken issue with is the Biodiversity Conservation Trust's Koala Conservation Program under the NSW Koala Strategy. \$240 million to establish conservation agreements in priority areas with in perpetuity payments to successful landholders. I have heard 3-11 people with Ballina's koala habitat, not necessarily koalas present, were successful. This will do nothing to help Ballina's koalas in the long term eg wild dog control on those properties does not consider wild dog behaviour and movements in the landscape. If 26 of the State's koala populations were given \$10 million over 10 years to implement local based koala research, monitoring and recovery actions, I believe our koalas would have had a chance. I see this as a waste of \$240 million that will do little to help the State's koalas.

Adequacy of Protections for Ballina's Koalas

Ballina's koalas occur in Tuckean Nature Reserve and Uralba Nature Reserve. Both of these reserves are severely infested with Lantana, Camphor Laurel and Wild Dogs, all which pose a risk to recovering Ballina's koalas. The koalas do not like Lantana and prefer to access trees without Lantana. They will if it is a favourite tree and the Lantana grows around it. It is likely that is why they travel on roads so often as it is easy going between trees. NPWS need resources to adequately manage the weeds and feral animals in their reserves.

Ngunya Jargoan Indigenous Protected Area and Jali Aboriginal Land Council lands have koalas. The IPA area is protected through agreements with the Federal Government. The JALC has various intentions for some of their lands. Funding is required to support the on-going management of these lands.

The RMS purchased a number of properties with koalas present. Some of these areas will be on sold in the future with a covenant protecting the habitat on the title of the land.

The remainder of koala habitat is on private lands. Some landholders have Conservation Agreements on their property, including those about to sign on to the Biodiversity Conservation Trust's Koala Conservation Program under the NSW Koala Strategy. Over 30 landholders were interested in participating but were deterred prior to submitting an expression of interest and others were culled at various stages of the process. Other than that it is goodwill of landholders.

The legislation, as discussed in the next section, does little to protect Ballina's koalas from those that are not aware of a koala's presence or do not understand the importance of a tree to the wellbeing of an individual, or do not have good will towards them. I know that is hard to believe but it is true.

Areas for Further Research

Areas for further research are identified above, in particular it is important to maximise opportunities within the one project. For example, when doing the population monitoring, wildlife camera monitoring, and radio-tracking, you are also

- collecting health information, demographic information, taking koalas in need of care to be treated, and giving vaccinations to those koalas that would be part of that study
- collecting scats for stress, DNA and health assessments as part of other research studies
- collecting leaf for nutrient, toxicity assessment
- collecting temperature information about trees koalas are using and not using, identifying trees with the most cooling properties to plant for climate change (need that thermal imaging camera)
- collecting data that will be useful for wild dog control programs, reducing the risk of vehicle strike through improved understanding
- engaging with the local landholders
- and more

The use of the wonderful citizen science community in locating koalas would reduce costs of having to find koalas other than those located during the population monitoring (SAT surveys and transects).

The RMS are doing some limited monitoring and research but a proper monitoring and research program is required for the entire Southern subpopulation and the Plateau subpopulation.

Recommendations

That Ballina's Koala Population be sufficiently resourced to give the population every opportunity to recover, including long term monitoring and research necessary to improve understanding of the population, habitat use over time, and success of recovery measures. This would be in the order of \$10 million over 10 years for the Preparation and Implementation of a Recovering Ballina's Koalas Community Action Plan that incorporates the issues and measures identified in the above sections.

(b) the impacts on koalas and koala habitat from:

(i) the Coastal Integrated Forestry Operations Approvals and Regional Forest Agreements

The Coastal Integrated Forestry Operations Approvals and Regional Forest Agreements do not have any relevance for Ballina's koalas. On a broader level, the broad scale logging of koala habitat between Grafton and Taree can only lead to the decline or extinction of the many koala colonies and/or populations that rely on this area for habitat. Selective logging will have a similar but slower effect, as these koalas are more likely to suffer from chronic stress over a longer period of time, which is likely to result in the onset of disease.

Department of Primary Industries (DPI) are doing some sound monitoring, which has limitations in understanding the effect of forestry operations, more just detecting the presence of koalas, in particular males who vocalise more frequently than females. It does not determine the sex of the koala, its age, its health, the quality and availability of habitat, whether it is resident or transient, or whether it is under stress from the forestry operations.

DPI are also doing some radio-tracking monitoring in conjunction with Port Macquarie Koala Hospital of koalas released into one of the State Forests. This monitoring is yielding interesting results of the koalas movements in recently logged and longer time unlogged areas, with koalas moving between the two areas. This may be used as an erroneous argument for DPI to suggest that logging doesn't have an impact on the koalas. Rather, in my experience, the koalas often spend the day in larger trees, unless they are unwell, and often move to younger trees during the evening to feed on the more moist and nutritious leaf. This is also consistent with research by Rod Cavanagh.

It should be noted that research by Dr Ben Moore suggests that koalas do not tend to feed in young Tallowood trees due to the high levels of toxicity, taking around 18 years for them to be palatable. Forest Red Gum and other food tree species take around 4-10 years before their leaf is palatable and the tree can support the weight of the koala. Koalas do not only use their primary Eucalyptus food tree species, regularly feeding on other species and sheltering in non-Eucalypt species.

Of great concern is lack of a requirement for pre-clearing surveys for koalas. Too often koalas are in trees that are felled. The detection of koalas by non-expert koala spotters is significantly reduced by those not trained and experienced.

Recommendations

- A moratorium on logging in Compartments where koala food trees are present until detailed study and mapping of koala habitat is completed.
- Prohibit logging and associated infrastructure (gear, sheds, tracks etc) in koala habitat
- Require pre-logging koala surveys, undertaken by experienced koala spotters (not wildlife spotters) in compartments in and around koala habitat
- Education and training for Forestry Corp and contractors with koala care groups
- If logging is going to continue in koala habitat, which I do not support, a koala stress study before habitat disturbance (establishment of snagging tracks), through the logging period, to post logging, and associated activities (burning remnants), must be carried out to determine the stress of habitat disturbance on the koalas. Dr Edward Narayan is the expert in using koala scats to detect changes that indicate stress and chronic stress.

(ii) the Private Native Forestry Code of Practice

The Private Native Forestry Code of Practice has had an impact on three colonies of Ballina's koalas from 2013 to the present. PNF operations have been undertaken at Coolgardie, Laws Point West Wardell, and on Old Bagotville Rd Bagotville.

The PNF operations are continuing at Coolgardie and appear to have stopped elsewhere. Areas of high koala use prior to logging were significantly reduced after. It is not known whether koalas moved outside logging area and found new habitat, whether they were killed during operations, or whether they died later from stress induced disease.

On Old Bagotville Road the koalas have started to return. Unfortunately the Laws Point koala colony that was recovering following the PNF was subsequently faced with additional clearing of habitat by RMS.

Private Native Forestry should be prohibited from koala habitat.

(iii) the old growth forest remapping and rezoning program

I am not entirely familiar with this program. If it is limited to Forestry Corp estate, it will not impact on Ballina's koalas. However, if it is extended to private land, it has the potential to impact on Ballina's koalas in the Coolgardie area and the Blackwall Range. The impacts would be similar to those discussed in other sections related to loss of habitat.

(iv) the 2016 land management reforms, including the Local Land Services Amendment Act 2016 and associated regulations and codes

This has been an awfully administered piece of legislation to neither landholders nor biodiversity. I will use a case study to illustrate

A local community member called to say koala habitat (planted windbreak trees were being cleared). I went out to have a look. The owner and tree clearer had just left when I arrived at the location, but what appeared to be the clearing supervisor was still there and we had a chat. I explained that koalas were regularly observed in the area and that we had rescued and released back many koalas from the Red Lane area. He advised that LLS had been out on Monday and said it was OK to clear them because they were planted. Koalas were observed to the north and south of the clearing and there was one koala in a tree to be cleared above where we were standing. He told me that tree won't be cleared until the koala had moved more than 50 m from the tree as they don't clear within 50m of a koala in a tree. Another 4 or 5 trees were to be cleared.

All I could do was ask him to contact Friends of the Koala if by accident they miss a koala in a tree, or if they find a koala in the logs or if they see a koala on any of the fallen trees as they often come back. He said he would.

I called LLS Lismore who provides advice on clearing under the LLS Act. The person I spoke to said he hadn't been out to the site but had spoken to someone on the phone. He wouldn't provide details of the conversation - fair enough. We discussed my understanding of whether other approvals are required for threatened species habitat and of the LLS Act Native Vegetation Provisions - in that if it falls outside of the LLS Act and the landowner-tree clearer knows it is koala habitat then they would require a licence from OEH under the Biodiversity Conservation Act, and that they know it is because they told me and were taking precautions, and that LLS were looking at it as Category 2 regulated

land and that it was ok under the allowable activities ie planting and possibly imminent risk to person and property. He didn't really answer but said he would forward factsheets that would explain it. I am not sure what Category of land the advice was provided as imminent risk and planted trees apply to a category 2 land (which isn't mapped) and OEH licence required for Category 1 exempt.

I looked at the Native Vegetation Regulatory map and none of the Categories under the LLS Act have been mapped for that property. I looked at the information on the mapping for core koala habitat, which informed me that Core Koala Habitat is to be mapped as Category 2 regulated sensitive lands and that Core Koala Habitat is based on approved KCPOMS. I double checked my understanding that these windbreak trees were mapped as primary habitat - yes they are. I called the Native Veg Regulatory Mapping (02 63609000) and the lady there explained that the mapping is only partially released with 2 layers not done (Category 1 unregulated land unrestricted management and Category 2 Regulated Land code-based management). When I said I thought the core koala habitat was to go into Category 2 regulated sensitive lands, she said that was correct and she thought they had done all that mapping. I told her it wasn't and what do we do. She said the local Council will have to approach them (I imagine this will require the primary habitat mapping, a justification for the inclusion of the planted windbreak trees as core koala habitat) to have it put on the maps. Note Core Koala Habitat can only be mapped as Regulated Sensitive Land if in the opinion of the Chief Executive of OEH it is Core Koala Habitat. I don't know if it has been considered and rejected or whether the CE of OEH has even seen it. It is most likely that their mapping was done prior to the approval of the KPOM and therefore has been missed.

Note - clearing that knowingly harms a threatened species or is likely to damage threatened species habitat requires an approval (generally a licence) from OEH under the Biodiversity Conservation Act, where the clearing is proposed in native vegetation Category 1 - exempt land. As the area has no mapping, it is possible that this area may require OEH approval given that it hasn't yet been mapped. Under Category 2 Regulated land approval is not required for allowable activities which includes imminent risk and planted trees post 1990. It is still landholders responsibility to go to the Federal Government under the EPBC Act. However, I don't think this was necessary because in the KPOM the area west of Wardell Road was not mapped as part of the Nationally Significant Koala Population (despite having about 20% of Ballina's koalas) and the Feds would say that.

The next day the tree with the koala in was cleared and all the stumps poisoned so they wouldn't resprout. Since then a female koala (Sarah) was recovered dead with a joey. It appears that she may have been injured and suffered a slow death. The joey couldn't be saved. A few koalas have died as a result of being hit by vehicles in that area. There were no prior cases of vehicle collisions with koalas in that area prior to this clearing. Are they related, can't be certain, but timing would suggest it played a role.

I think we need Interim guidelines (immediately) to prevent this type of thing happening again until the mapping has been reviewed and finalised. The guideline need only be as simple as "if it is mapped as koala habitat in the KPOM then until the final NVRM is done the KPOM mapping is to be considered as Category 2 regulated sensitive lands. Also need to remove the enabling of an approval through a process for the clearing of mapped koala habitat."

(c) the effectiveness of State Environmental Planning Policy 44 - Koala Habitat Protection, the NSW Koala Strategy and the Biodiversity Conservation Act 2016, including the threatened species provisions and associated regulations, in protecting koala habitat and responding to key threats

State Environmental Planning Policy 44 - Koala Habitat Protection

SEPP 44 was a great planning policy in its day. With so much knowledge now available about koala habitat and koala habitat use, it is due for a review that strengthens its ability to meet its intent of protecting koala habitat. Core koala habitat protection is insufficient as all occupied and unoccupied habitat is now critical for their survival. Ballina Shire Council has prepared the Ballina Koala Strategy for Ballina's koalas which contains a Comprehensive Koala Plan of Management under SEPP 44. The limitations of SEPP 44 carry through into the CKPOM.

This will guide developers and Council's staff in minimising impacts but really does not reduce the impacts. For example, a house and shed were recently built on Thurgates Lane, adjacent to the Highway construction. A number of koalas have been observed in this area. The house and shed were built on cleared land so it wouldn't seem an issue for the koalas. However the people that bought the property are using it for horses, have a number of medium sized dogs that roam freely, have no interest in engaging on the topic of koalas. Furthermore they have limited access on the right of carriageway, which the community and those with the right of access were hoping to be able to replant a row of trees to provide safe carriage for koalas from the connectivity structures under the new highway to the vegetation on the range. It isn't easy but we will persist.

The NSW Koala Strategy

The NSW Koala Strategy has its limitations, but is a good framework to begin with. It is forming the basis of the *Recovering Ballina's Koalas Community Action Plan* which has been started.

The NSW Koala Research Plan is also a good start and hoping that the Koala Monitoring Plan will be too.

Very disappointing is the BCT Conservation Agreements as discussed above. The other disappointing aspect is that for Ballina's koalas so much of the population is on private land. The landholders are not financially wealthy nor time rich. For the entire State only \$100 000 was allocated for on-ground works on private land.

This is a watch this space and will depend on the Government's genuine intention to save koalas in NSW.

The Biodiversity Conservation Act 2016

The Biodiversity Conservation Act just does nothing, That the science said Section 10 of the Woolgoolga to Ballina Pacific Highway Upgrade demonstrated the risk to the nationally significant Ballina's koala population, and it was still deemed acceptable is beyond me. Laws Point (see Attachment 3) is the most likely place of collapse of a colony, and that is starting to play out. Females present at the time of approval or born after, that are no longer alive are Yazhi, Gladys, Jug. Females still alive are Rana, Bellamina and Jenna. Rana and Bellamina are getting older now and not likely to have many more joeys each. Jenna around 2 ½ years old is in a precarious position of not having the priority over food remaining at the site, which is not enough to sustain the number of koalas. The boys – Con is dead, Aubrey hasn't been sighted, George Lawsy is doing really well, and a young male is doing okay. Once Bellamina and Rana die, all hope on sustaining this colony hinges on Jenna's survival and wellbeing. I would love her to be vaccinated to give her a chance at keeping this colony more than the living dead. If the girls are gone the boys wont hang around. It will be tragic if

this colony which has been present for well over 220 years, possibly thousands, should all of a sudden disappear because of one bad government decision after another.

One of the problems is that as I have said koala habitat use is complex and koala conservation can only be achieved through detailed understanding of the local population and colonies, what trees are important to which koala, how they operate, their demographics, how individuals respond to disturbance etc. Having consultants who don't know the local koala population or won't listen to local community and experts, and governments who take what is given to them as acceptable, because they don't understand the complexities of koala conservation and habitat use.

I don't know what to say other than that the original NSW Threatened Species Conservation Act was a good piece of legislation that should have only had minor review. Instead too many self-interest groups rallied the Government to weaken the laws.

(d) identification of key areas of koala habitat on private and public land that should be protected, including areas currently at risk of logging or clearing, and the likely impacts of climate change on koalas and koala distribution

Too big to answer in limited time. All Ballina's koala's habitat should be protected from logging and clearing. Likely impacts of climate change addressed above under Threats.

(e) the environmental, social and economic impacts of establishing new protected areas to conserve koala habitat, including national parks

The environmental impacts of establishing new protected areas, including national parks will benefit those colonies and/or populations living in those areas, provided there is and will do nothing for those colonies and/or populations that are not. It also relies on sufficient resource to manage those areas.

The social impacts are the great pleasure people get from seeing healthy koalas in the wild.

(f) any other related matter.

No time but lots of additional issues that could have been discussed eg Rural Fires Act, SOS Program, and necessary and sufficient support for koala care groups and facilities.

I am prepared to provide further information to the Committee, and to participate in the hearing on the 16th August by telephone.

Yours faithfully

Maria Matthes

Attachment 1: Koalas with disease and some koala mortality records



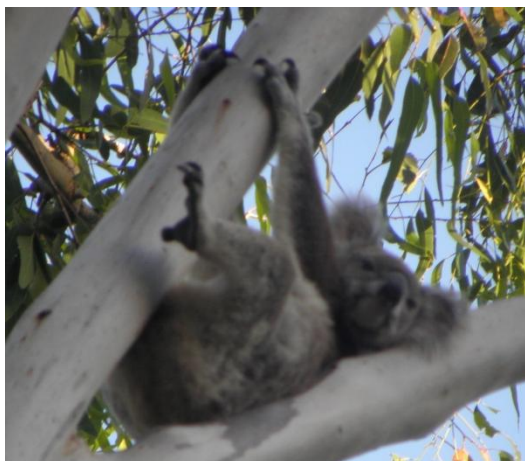
This boy lives on Old Bagotville Road and is not well. He has cystitis, his fur is brown and matted, and he is a likely candidate for also having Retrovirus.

It is almost certain that he will die soon or be euthanased.

This boy lives on Old Bagotville Road. He has cystitis and conjunctivitis in his left eye. He is probably treatable if caught soon.



This little girl has cystitis. She will likely be euthanased.



A small subset of Ballina's Koalas that have died - July 2016 – 30 June 2017

28 August 2014 – Pacific Highway - unknown, hit by vehicle, dead

2 December 2014 – Lynwood – female, domestic dog attack, dead, part of PVA

18 December 2014 – Pacific Highway, female– hit by vehicle – dead, part of PVA

26 February 2015 – Old Bagotville Rd – female – decomposing body in tree, ? part of PVA

13 April 2015 – Old Bagotville Road - male– hit by vehicle – dead, part of PVA

15 April 2015 – Pacific Highway – female – hit by vehicle – dead, part of PVA

17 April 2015 – Bartletts Lane – female – chronic cystitis, blisters and boils, euthanased, part of PVA

30 April 2015 – Bruxner Highway – female – hit by vehicle – dead, part of PVA

? – Old Bagotville Road- male Old Man, part of PVA

8 May 2015 - Pacific Highway – unknown, hit by vehicle, dead, hit few days before

8 May 2015 – Wardell Road Lynwood – female, hit by vehicle, broken ribs, dead, ? part of PVA

8 May 2015 – Wardell Road Lynwood – female, pouch young, hit by vehicle, with mother, broken ribs, euthanased, ? part of PVA

?9 May 2015 – Wardell Road – female – hit by vehicle – dead, part of PVA

14 May 2015 – Wardell Road – Sweetie – female, chronic cystitis, euthanased, part of PVA

21 May 2015 – Red Lane – female, chronic cystitis, euthanased, part of PVA

11 June 2015 – Prost – male – retrovirus, old, sick, treated for about 3 months, euthanased ?date, part of PVA

28 June 2015 – Old Bagotville Road – male – wild dog or fox attack, dead, part of PVA

8 July 2015 – Pimlico Road – female – dog attack, dead, part of PVA

1 August 2015 – Old Bagotville Road – male – hit by vehicle – dead, part of PVA

26 August 2015 – Pacific Highway – unknown – hit by vehicle, dead

12 November 2015 – Wardell Road – male – retrovirus (leukaemia), found sitting on ground in yard, died soon after arriving for rescue,

27 January 2016 – Pacific Highway – male – hit by vehicle - dead

31 January 2016 – Dirty Harry – male – juvenile – forearm trapped under trunk following storm, alive,

4 February 2016 – Storm Girl - Bagotville Road – female – walking around disoriented, injured arm, possible fell out of tree during storm, was euthanased

16 July 2016 – Wardell Road, female with bad cystitis. He was euthanased.

20-21 July 2016 – Pacific Highway – killed by a vehicle strike – most likely a truck splattered over 70-80 m, dead

26 July 2016 – Humphrey B – Wardell Road, male conjunctivitis in one eye, blind, tight stomach, segmented scats (not whole), gingivitis, bladder in two segments lined with cysts and thickened bladder wall. He was euthanased. About 4 years old.

27 July 2016 – Josh – Bagotville-Old Bagotville Roads, male, eyes not clear, underweight, retrovirus. About 6 years old. He was euthanased.

31 July 2016 – Pacific Highway – hit by vehicle, dead

7 August 2016 – Storm – Old Bagotville Road, a small joey about 8 months old, found on side of road after a severe storm

30 August 2016 – Akila – female, hit by car, was a healthy breeding female, 4 years old

Clemantine – Rous Road, female, had been rehabilitated and released, hit xdays after her release.

Late August-early September 2016 – Buckombil Mountain - koala killed after dog attack- couldn't identify gender

19 October 2016 – Tor – Old Bagotville Road – found walking in circles on the road, conjunctivitis in one eye, severe internal complications, euthanased

22 October 2016 – Cnr Rous Mill and Dalwood Roads – female, hit by vehicle, euthanased

6 November 2016 – cnr Bruxner Highway and Duck Creek Rd – female euthanased

11 November 2016 - Katie – Buckombil Mountain Road, female, not looking good in tree low, on rescue noticed dog like marks on inside of legs, euthanased

15 November 2016 - Pacific Highway – unknown, hit by vehicle, dead, hit a few days before

24 November 2016 – Arlo – Male, Dalwood Road nr Rous Road, hit by a vehicle, broken pelvis, broken clavicle, broken arm, head injuries, euthanased

??29 November 2016 – Serena , female – euthanased 30 November 2016

??30 November 2016 – Abigail – female, cystitis – euthanased

1 December 2016 – Dally – Wardell-Dalwood Roads – female, cystitis, hit by car, died overnight

7 December 2016 – Missy – Wardell Rd, female

17 December 2016 – Pacific Highway – unknown, hit by vehicle, dead

?? – Cnr Bagotville and Wardell Roads – unknown, hit by vehicle, dead

21 May 2017 - Maxie – Old Bagotville Road – male, Retrovirus, covered in fly eggs and maggots,

10 June 2017 - Amell – Old Bagotville Road – male, retrovirus, ulcers in mouth and throat, hadn't eaten for probably a couple of weeks, had maggots down throat while still alive, found sitting on road after a storm

15 June 2017 - Big Fulla – Wardell Road – male, hit by car on Wardell Road, found 3 m up a Camphor Laurel still alive, probably hit a couple of days before being found, numerous unhatched fly eggs, substantial injuries, broken ribs, broken foot, skinned hands, gravel scrapes on mouth.

6 July 2017 – Clemantine – 1311 Wardell Road – female – bit underweight, large bilateral cysts, cystitis wet bottom with blisters, very brown fur, heavy breathing, something wrong with lung (possibly collapsed lung, pneumonia), euthanased, necropsy 6-7-17.

TO BE COMPLETED

Attachment 2: [The story of Azam and Yazhi](#)

[By Roads and Maritime Services/Pacific Complete and Maria Matthes, Friends of the Koala](#)

Pacific Complete (PC) have been implementing a Zero Harm policy for Koalas on the Woolgoolga to Ballina Pacific Highway Upgrade which they are taking seriously. During the Phased Resource Reduction Koala Monitoring Surveys, several koalas were identified near the proposed alignment. The RMS, PC, and project ecologists, Sandpiper Ecological, have kept FOK informed of their locations, and to ensure avoid or minimise impacts, regular joint site inspections have been undertaken.

The project ecologists in conjunction with FOK have identified a number of koalas with clinical signs of disease, and/or potentially exhibiting signs of stress. Some of these koalas have been subsequently rescued, and all but one was euthanased. There remains a few more still to capture, and several we need to keep an eye on. Two of the koalas in close proximity to the project footprint that required particular attention, are known as Azam and Yazhi. This is their stories...

Azam's Story – During the pre-clearing surveys, an adult male koala was observed by the Sandpiper ecologists occupying habitat within, and on, the eastern fringes of the project boundary, just north of Old Bagotville Road. He appeared healthy and although being monitored, was left to move on of his own accord. After a couple of days moving in a small area with limited food trees, the ecologists contacted Friends of the Koala rescuer, Maria Matthes, to assist in undertaking a visual health assessment.

Azam had found himself in the recently burnt vegetation between the Old Bagotville Road fencing and the proposed alignment clearing. Approximately 354 hectares of native vegetation burnt resulting in an reduction in available suitable foraging habitat east of the alignment. A number of his feed trees had been cleared and he had been feeding in the remaining feed trees. The distance to the gaps in the fence and habitat west of Old Bagotville Road were about 250 metres away.

On close assessment, Azam appeared to exhibit signs of being stressed, hungry, slightly mal-nourished, and possibly had mild cystitis, with some staining on his rump. (Fig. 1). In collaboration with Pacific Complete and Sandpiper ecologists, Friends of the Koala, decided due to the behavioural and health concerns, that an attempt to capture Azam that night was necessary. While waiting for the pen trap to arrive, Azam started to come down the tree, and with some gentle encouragement from Maria he continue to descend. With the project ecologists and Pacific Complete staff keeping Azam's attention, Maria was easily able to walk up to Azam and safely rescue him.

Following his rescue, Azam was transported to the Friends of the Koala Care Centre in Lismore where he had a preliminary assessment. Azam was approximately 4 yrs old, weighed 6.6kg and had a body condition score of 6/10. He was in pretty good condition. He did not have cystitis, with rump staining being the result of loose scats, most likely stress related. He was hungry, straight away eating the fresh leaves provided. Following a feed, Azam let out a loud bellow, most happy to have a good feed.

FOK's Koala Care Coordinator, Susannah Keogh, described Azam as "one chilled out dude" (Fig.2). When he wasn't chilling he was giving the girl koalas a hard time, bellowing away. Following two weeks of rehabilitation at the FOK Care Centre, Azam's health had improved, his tests came back Chlamydia free, and he was ready for release. With agreement from Jali Local Aboriginal Land Council, and support of the Ngunya Jargoona IPA rangers, Anthony Cook and Maddie Collins, Azam was successfully released within suitable habitat in the IPA (Fig.3). A limitation of the RMS' approval conditions is that they do not allow radio-tracking of koalas such as Azam. So Azam is on his own and

hasn't been sighted since his release. We hope that the habitat he was put in was less stressful for him than where he had been, and that if the northern side of Old Bagotville Road was part of his home range prior to the fence being erected, that he will undoubtedly find his home again.

Koalas like Azam, are why it has been important for FOK to work closely with RMS, Pacific Complete and project ecologists. We can be almost certain that if Azam wasn't rescued and released away from the unsuitable environment he was found in, his health would have continued to decline. Azam's story demonstrates the importance of the work done by FOK and the success that can come from collaborative efforts.

Yazhi's Story – As part of early Phased Resource Reduction Koala Monitoring Surveys, an unhealthy female koala with a dirty bottom and conjunctivitis was recorded in late May 2017. In June, during a joint site inspection between FOK, and Pacific Complete, an unhealthy female koala with cystitis and chronic-severe conjunctivitis was observed, likely to be same individual (Fig 4). Maria Matthes, in conjunction with Susannah Koegh, made a critical assessment that she was a priority for rescuing. Apart from her obviously having chlamydia and likelihood of her being blind, she was living in an environment where some of her food trees were proposed to be removed, and trees would be cleared and mulched around her. This was considered likely to be a terrifying ordeal for a blind koala. She was given the name Yazhi, meaning Little One, because she looked small in the tall trees (Fig 5).

Unfortunately the attempt to capture Yazhi was unsuccessful and she managed to escape by moving through the canopy into the adjoining tree. The tree she had moved into was not suitable for trapping or a tree-climber to assist in the rescue. Like many koalas that have had their vision impaired either through severe conjunctivitis or being blind, they know their habitat well, often making their capture and rescue more difficult. The next day she had moved on.

Despite Sandpiper ecologists keeping an extra eye out for Yazhi during the following Phased Resource Reduction surveys, and the RMS commissioning Sandpiper to undertake targeted surveys for Yazhi, with her welfare a priority for all, she failed to be seen again. Then, during pre-clearing ecological surveys in late October, Yazhi was again observed, in the same tree she was first seen, just outside the project boundary. Sandpiper established the pen trap and monitored the trap during the day and Maria took the night shift. After two nights, Yazhi climbed into the same neighbouring tree as before. Although not an easy tree to put a trap around with a large spreading shrub underneath, it was decided that rescuing Yazhi was critical, and a second trap was set up.

After seven long days and nights of waiting and hoping, Yazhi entered the trap in the early hours of the 3rd of November. She was transported to the FOK Koala Care Centre in Lismore for preliminary assessment, prior to being immediately transferred to the Currumbin Wildlife Hospital.

Yazhi was 6 years old, and despite having chlamydia, was in good condition. She had moderate cystitis, massive cysts, and was determined to be blind behind the conjunctivitis. Unfortunately, following assessment by the vet, her health condition meant she had to be euthanased. While very sad for everyone involved, Yazhi was likely to be in pain and suffering from the effects of the disease. Rescuing Yazhi was an enormous commitment from FOK, RMS, Pacific Complete, their contractors and ecologists, and one that we would all do again in such a situation.

Roads and Maritime Service/Pacific Complete would like to acknowledge and thank Friends of the Koala, particularly Maria Matthes, for her time, effort and assistance not only in the capture of the above mentioned koalas, but her ongoing dedication and passion in conserving koalas.

Attachment 3: The importance of Koala Watching - Ballina's Koalas and Highway Construction - how are they are going?

There are many hotspots along the construction alignment that are the main areas of koala activity and concern. I rely on local community members and RMS contractors to be active Koala Watchers for records and information. It has been with the support of many Koala Watchers over the last 12 months that we have been able to be proactive and reactive in the protection of Ballina's koalas, as well as gaining important information.

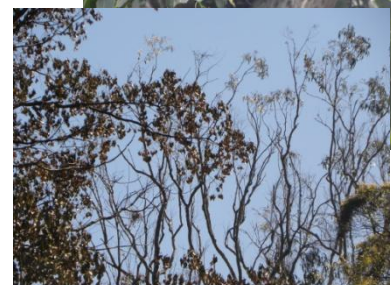
It has been very interesting to see how each of the individuals we identified prior to the approval as a koala of concern have been doing and how they are going. As important as what and how they are doing, is what we are doing. A few interesting examples of observations and actions we have taken are provided, mostly focussed on Laws Point, the primary area of concern, as well as some other areas.



Makawee lives on Thurgates Lane, near where the new Highway alignment and Thurgates Lane meet. There have been regular sightings of Makawee with her new joey. Both appear nice and healthy. We were concerned about Makawee because to provide visibility for local residents and workers crossing the new alignment, a few of Makawee's food trees, large Swamp Mahoganies, were cut down. These trees started reshooting providing a large amount of fresh foliage. Once the foliage was about 1.5 m high, Makawee and joey were in there eating. Being only metres from the edge of the alignment we have ensured workers are aware of the pair and when they are present near the alignment, there is extra vigilance and changes to the location of vehicle movements on the alignment. We thank our local Koala Watchers for all their support in making sure sightings of Makawee and her joey are reported, and to Pacific Complete and Lendlease for immediately implementing actions to ensure their protection, as well as keeping an eye out for them following the first sightings near the alignment.

Bellamina is a beautiful alpha female koala who has given us the joy of watching four of her joeys. She lives on the western side of Laws Point (where the new Highway alignment is going through) and has her favourite trees. Unfortunately, several of her food trees were cleared, along with those of the other koalas living as resident koalas in that area.

As predicted, with so many koalas needing the amount of feed they require a day, coupled with the potential dry periods and heatwaves, this was going to put extreme pressure on the remaining food trees, of which, a few in particular, were being hammered. These trees have maintained a state of very little foliage (right). As soon as there is new growth, it is being eaten.

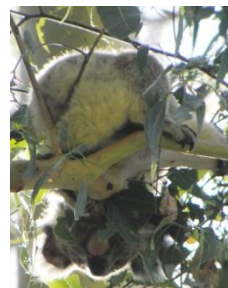


Bellamina had a favourite Forest Red Gum she visited when she had a back young joey. Unfortunately, this tree was collared preventing her access, and was earmarked for clearing. Her tree was still there and she could smell the leaves, she just couldn't get to them. Then the week it was to be cleared, a ringbarked Jacaranda fell into her tree. That night she was in her tree with her back young joey. We can only guess that she went to her tree every night to try to access it, as the chances she just happened to go there on the night the Jacaranda fell are remote. I was camping out there at night and for three days she didn't leave her tree.

One night I heard her joey chirping, I noticed Bellamina had left the joey in her tree while she went off to feed, before returning to it early in the morning. They stayed another day and night, before leaving early in the morning. Despite what could only be described as pleading and begging on my part, there was no way I could save that tree from ancillary works. The day they left the tree, it was gone, cleared and mulched, and if you didn't know it was once there, you never would.

Bellamina and joey continued to share feeding in the remaining trees, and with the dry and slow growth over winter-early spring, put extra pressure on those feed trees. When around 12 months old the joey (now named Jug) became independent. Over the Christmas break, I checked on all the Laws Point koalas. She has a new joey and from all external signs appears to be doing well. Bellamina was still using the remaining feed trees in their area, but had also moved 50-100m into the trees that were once part of Con's home range and his trees. Con was an old male koala that had been found dead at the base of a collared tree.

Jug is Bellamina's joey, was actively on her own after she left Bellamina. With regular sightings, they continued to stay close to one another. My first sighting of Jug as an independent koala was very special and she looked very healthy, even posing for a rump check. Fast forward six months, now a young juvenile, Jug was observed in one of the virtually leafless trees (a favourite of all koalas in the area). She was sharing the tree with George Lawsy and they climbed around each other without any fuss. She didn't look well.



I put a trap up to catch them. Jug was reaching for a branch and eating the last leaf on it, then grabbing another and eating the last couple of leaves on it. Climbing to another trunk and going through the process again. Her little arms couldn't reach the branches that had a little more leaf on. It took a few days after capturing George Lawsy before I had Jug. In that time I watched her eat gumnuts from the end of branches. The day before she was rescued, I did



watch her go back and forward through the canopy to the adjoining Pink Bloodwood and have a little feed each time.

Jug had a fair to poor body condition, her fur was dry and brown, and she was underweight for a joey of her age. She had a full health assessment and her results came back Chlamydia free. Over the next three months, Jug was given leaf and supplements to build up her body weight. Apart from a few ups and downs, she improved remarkably and at the time of her release looked like the Jug I first saw and nothing like the koala rescued. When it was almost time for Jug to return to the wild,

the decision of where to put her had to be considered. Jug was soft-released in the first week of January in a safe place away from roads and disturbance. She seemed happy to be free with access to as much food as she wants. Unfortunately six weeks later Jug showed up 70 m from her release site. She had not suffered through the drought and heatwaves well. She weighed hardly anything, had bad cystitis and was starting to get retrovirus. She was given the best chance but this time the best wasn't enough.



If only another route were chosen, if only the route were moved 100-200 m in a small area, if only two important trees had been retained, if only we could secure funding for monitoring, for equipment. If only are the saddest words of all. I live every day since then wondering if only for Jug in the hope that I can prevent a future one.

George Lawsy is an adult male with a very large home range which basically skirts and goes across the koala habitat at Laws Point, both the eastern and western sides. He is an interesting boy. Despite being a middle-aged male in his prime and having a large home range in which he resides, when he was captured he had no active scent gland. I thought "George Lawsy is a roaming male, how fascinating that you have this great home range and don't have a scent gland". When captured in the trap I looked and saw a beautiful big healthy looking male. I hoped he was as healthy on the inside as he looked on the outside... and he was. He was taken to Friends of the Koala for a full health check. His results from the Chlamydia test came back Chlamydia free. It was a relief to know that some of the koalas were coping with the changes. By the time he left the Care Centre a couple of weeks later, his scent gland was becoming active.

It was time to go home George Lawsy. As we approached Laws Point, George Lawsy knew he was home and started getting excited in the cage. The closer we got and passing some of his home range, the more excited he was. Approaching the release tree, he was almost jumping out of the cage. No hesitation when the cage was opened, he was home. At my Christmas check, he was over with Rana and heading back to the western side of Laws Point. He looked good and so did his scats.

Rana is another beautiful alpha female koala who has given us the joy of watching four of her joeys. She lives on the eastern side of Laws Point (not far from where the new Highway alignment is going through) and also has her favourite trees. I like to joke that other koalas can visit Rana but they can't stay, just like my cousin Rana her namesake. Hence her joeys move mostly west and sometimes north to establish their new home ranges, and the boys visit from time to time, including George Lawsy. There is only enough food trees on the eastern side to sustain one permanent resident koala and short term visitors. Despite getting older Rana continues to have beautiful joeys and seemed relatively unaffected by the Highway. I say relatively, as while we don't have firm evidence, Rana did appear to move a bit out of the ordinary during the period of heavy pile driving for the bridge construction.

Jenna is a beautiful little juvenile, which I suspect is Rana's last joey. Unfortunately, the first sighting of her on the western side of Laws Point was over the Christmas break, which means she is feeding from the same trees already under pressure. She looked extremely healthy. We will have to keep an eye on her as the last thing anyone would want is for her to suffer like Jug.



Pahana (A Richmond Valley koala from Broadwater's Koala Population) meaning lost white brother in Sioux-Lakota, was a heart-breaking rescue from Section 8. When FOK's rescue hotline rang and asked if I could check out a koala car hit at Boundary Creek (between Broadwater and Wardell), my response was "I can but I don't think it will be a koala, there is nothing there for them". The member of the public who reported the sighting thought it was still alive. As I approached the location of the report, I could see that it was a koala. I parked on the side of the road and looked around. If you can picture the river on the western side of the existing Pacific Highway, a small band of trees (various floodplain species not koala food trees) between the river and the Highway, cane paddocks to the east of the Highway, and beyond the cane a strip of vegetation running from the new bridge being constructed and Boundary Creek.



When I arrived Pahana was already dead. Hard to believe that with all the traffic on the road, only one person called. He had been run over across the pelvis. The blood had already started to darken in this area, most likely the injury when the rescue hotline was notified. His head had also been hit with fresh blood around one side of his face and on the road. It is likely that he was hit twice. He was a beautiful healthy 5-6 year old with excellent body condition.



Pahana had a very active scent gland, which means he has a home range and marks the trees in his territory. Our lost white brother was indeed lost. As there is no monitoring of the koalas during the construction, we can't say with any certainty where he was when construction commenced, where he went, or how he ended up there. The most likely scenario is that his home range extended both sides of the new highway approaching the bridge crossing, and that at some point he ended up on the northern side, followed the vegetation to the east and crossed the cane paddocks, to where he ended up on the existing Highway, in the north bound lane heading north (closest to the river). Although not likely another koala will be hit by a vehicle in this area, after notifying the RMS of this tragedy, signs to remind drivers to "watch out koalas about" were put in place. Displacement and disorientation is a by-product of habitat loss and fragmentation that we cannot allow to be ignored.

Fiesty Pat and **Lily** live around Wardell Road-Buckombil Mountain. They had their fixed home ranges. Not long after the Highway construction commenced, local Koala Watchers stopped seeing them around. We were concerned about their wellbeing as their long absence was unusual. After more than 12 months of no sightings, they appeared back at their homes. Fiesty Pat who is around 9 years old now, had never had a joey. When she returned, she had a new little back young. She looked a bit dehydrated so the landholder put out water and kept an eye on her. She was eating well and her scat looked okay. She had found her way back through the wilderness to her home. Lily also had gone missing and on her return, she looked nice and healthy. If it weren't for active koala watchers in our communities, our koalas that may need care would go unnoticed.

Working with the RMS

While I may have received criticism from some people in the broader community for working with the RMS after such a long and difficult battle with them for an alternative route, it is important to remember that we are only going to get good outcomes for our koalas if we are working together to share information to solve problems.

If anything, through our involvement, the RMS and contractors now have a greater knowledge about koalas and koala watching, and how the impacts in their pre-approval studies underestimated the impacts to the local koala colonies and individuals within them. As with any species, it is the young, the old, and the sick that are most vulnerable to change and associated stress. We have been able to demonstrate that more needs to be done in the sphere of mitigation, monitoring, and decision making.

For example, through firmly recommending the use of wildlife cameras to look at the effect of the tree collaring on the koalas, we have a greater understanding of the effects of such an action on koalas, particularly individual koalas. Such a proposal was experimental and while we assumed that because the koalas could still smell the leaves on their trees they would be stressed trying to get to the leaves. This expectation raised as much concern as questions, such as how often do they return to a tree to try to access it? In a night, do they try once and give up or keep trying? Is there a point where they accept they can't get to that tree anymore and move? How many collared trees do the koalas try to access in a night. We are hopeful that the outcomes of this awful experiment on Ballina's koalas will no longer be a tool in the pre-clearing toolbox to minimise impacts to koalas.