

## Rebecca Montague-Drake

Koala Ecologist, The Hastings-Macleay Koala Recovery Partnership

- BL Probably the best place to start is to find out who you are and what you do, so if you could tell us your name and what your koala role is, what you do.
- RMD My name is Doctor Rebecca Montague-Drake [distortion] and I'm the Koala Ecologist with the Hastings-Macleay Koala Recovery Partnership. So, that partnership is a joint one between some councils here on the north coast, the Post Macquarie Koala Hospital, and the New South Wales Government's 'Saving Our Species' programme.
- BL Tell me what you do, like maybe even what is a typical day like or what's a key project, typical project or activity that you might do that kids might be interested in.
- RMD So my role is pretty varied. At the heart of it, it's a cross between participating in scientific programmes that seek to increase our understanding of koalas, such as monitoring programmes looking at their population by tracking them in the field and so forth. I work a lot with landholders to try and have some positive on-ground outcomes, such as the protection of good habitat and replanting habitat, and I also spend a lot of time just providing information about koalas to a whole range of people, from school students to government representatives. So, basically, at the end of the day I do whatever I can to make a difference for koalas.
- BL That's great. So, I'm just curious about that. What kinds of things that people ask you? Do you do radio interviews, for example, or...
- RMD Yes, yes, do those, just requests for information from landholders or Landcare groups or councils, as to how they should go about something, or whether that's appropriate, or how something should be planned. We provide submissions into input for legislation, so when there's a proposed change to the legislation in New South Wales, we tend to put something forward about that.
- There's a number of bits of legislation that govern what can happen with koala habitat in New South Wales.
- The newest one that's come in is called 'State Environmental Planning Policy – Koala Habitat Protection' and it's brand new. It just came in on the 1st of March. It replaced an old bit of legislation that had the goal of maintaining wild koala populations across their range. And, of course, we all know that that didn't work. Koala populations continued to decline under that legislation, so we're all hoping that the new bit of legislation will be much better for koalas and result in much better outcomes.
- BL That's fantastic.
- RMD There are other bits of koala legislation in New South Wales, such as the Biodiversity Conservation Act and the Local Land Services Act, under which koala habitat can be legally cleared, so that's something that students should definitely be aware of, how those bits of legislation work, and there's a lot in that.



BL I wanted to ask you what attracts people, what do you see attracts people to koalas? They seem to be very, people are really curious about koalas and they're really emotionally engaged. What do you think is doing that?

RMD I think it really comes down to the question 'How can you not love koalas?', you know, they have those big fluffy ears, their adorable black noses and their cuddly appearance, and it just really touches people at the heart. You know, I've heard analogies that they remind people of the teddy bear that they had when they were a kid.

But I think in our area it goes deeper than that. So, in the Port Macquarie area they're really very much a cultural icon and the town of Port Macquarie has long aligned itself with the koala and people just love living alongside them here. The fact that we can have them in our trees, in the streets and in back gardens, is something that people find absolutely fantastic. They're also really important for the Indigenous people of our area, part of their culture and spirituality. They're known as 'Guula' in our area and many families even have them as a totem.

BL What's the language in which the word 'Guula' exists?

RMD Biripi.

BL Great, well, that's really interesting. I wondered a little bit about the idea of, I've noticed there's kind of a magic when I've been with my family, and with kids, and when they see koalas, it's like they've seen a magical creature, they're so excited, but I'm also interested in that long history of spirituality in Australia and the importance of the koala to forest people, so to people who live around the bush and around koala habitats.

What do you think, what do you think people get right about koalas?

RMD I think most people understand that koalas need eucalypts, or what they call gum trees, but what they don't know is that koalas are extremely fussy about what trees they eat and only a few eucalypt species are actually food sources. So, when people see the bush, they don't understand that not all of that area is koala habitat. In fact, there's actually very little good koala habitat remaining adjacent to the coast in most of New South Wales and that's a real shame because that was some of the best habitat that was out there.

BL Okay, and is that a recent, a result of recent clearing and development, or is that something that's been happening gradually over the last...

RMD It's basically been ongoing since European settlement, but definitely the pace of development in regional areas of coastal New South Wales has certainly ramped up in the last decade.

BL So the sea change is not good for the koala.

RMD No, that's correct.

BL Tell me a little bit more about the trees that they prefer to eat. I know that I've seen them in trees that I understand are not their food trees. Do you they rest in other trees and what are their favourites that you know of?

RMD Yeah, they do, so their food sources really vary regionally and they can vary in response to soil type as well, so on different soils one species may not perform as well as if it was on a nutrient poor, rather than a nutrient rich soil, and their food sources can actually vary as well, so it's pretty complex at the end of the day. In addition to that, what we're seeing, or what we know to be true from researchers, is that increasing carbon in the atmosphere changes leaf chemistry,



so for koalas that's a really important thing and might see them undertaking a bit of food source shifting in the coming years.

And you're right about, you know, about resting in trees that aren't their feed trees. There's an increasing recognition that shelter trees are equally as important for koalas as feed trees, and these tend to be things like paperbarks, so there's been studies done that koalas will actually hug paperbarks nice and close because they're very cool and they help koalas to cool down.

BL How interesting.

RMD In our area other trees, such as, yeah, there's a little rainforest tree, called a Cheese Tree, and that seems to be another preferred favourite that they'll rest in on really hot days, because they've got that lovely, rainforest-y, broad, deep green glossy leaf so nice and shady for koalas to sit amongst those.

BL This is going to be a silly question, but can koalas sweat?

RMD No, no they can't.

BL I assumed they couldn't, but, yeah, so they can't sweat so that's why they need to find something cool, such as a nice cool tree, such as the paperbark you mentioned.

RMD That's right and their fur is incredibly insulated as well. In fact, back in sort of the late 1800s, early 1900s, koalas were actually killed extensively for their fur, for their pelts, because it is so very insulated, and it was used to make hats for wars, for Army issue, for wars, and many, many, many koalas died throughout Australia over that time.

BL That's terrible.

RMD We have records, one particular very large property in this area, and 40,000 koala pelts came from that station in one year.

BL Wow, that's awful. That's really interesting, though, changing values too that people are now recognising, in some ways, the value of the native animals, but in other ways, such as land clearing, we haven't changed all that much.

RMD No.

BL Why do you care about koalas? Is there a moment, or is there a thing, or have you just got hooked with curiosity? What is it for you? What got you into this?

RMD Yeah, so koalas sort of remind me of my childhood and they were actually the reason that I became an ecologist in the first place. I grew up on the north coast of New South Wales and on my rural property we would hear koalas calling all the time at night when we first moved there and then, over the years, as logging operations on our mountain intensified, and there was a nasty fire in some area of koala habitat, we basically heard the koalas less and less until, in the end, we couldn't remember when we'd last heard one. So, that sort of inspired me to become an ecologist, but then, actually, it was about another twenty years until I became, you know, worked in our industry.

But I also care about koalas beyond just my childhood background. I think they're just such beautiful creatures. For those that have spent some time working with them, they even smell lovely. They've got this beautiful koala gum leaf smell and it's just beautiful, but to me koalas are also just this great litmus test about how much people value nature and wildlife. So, people



will often say to me ‘Well, why is so much attention given to the koala when there are so many other species that need saving?’ and I always say ‘Well, one, we need to start somewhere, and I honestly think that if we can’t save the koala as a nation, we probably won’t save any threatened species in Australia, because it’ll show that we just didn’t have the social or the political will to make a difference.’

BL That’s a really, really good point.

RMD The koala is both what we would call an umbrella species, whereby its protection protects a raft of other species that occupy its habitat as well. So, for instance, the koala shares its habitat with a highly endangered bird, the Swift Parrot, and a critically endangered dragonfly, the Giant Dragonfly, so by harnessing goodwill for the koala, and locking up areas of protection for the koala, we can, by virtue, protect other species that share its habitat as well, and those are just two examples of other threatened species who can benefit by protecting koala habitat.

BL And it’s the whole system, isn’t it?

RMD But the koala is also, the koala is also what we call a flagship species. So, a flagship species is one who is, usually, let’s face it, cute and fluffy, usually forward facing eyes, and something that the public really go, it’s got that ‘Aww, so cute’ kind of factor, and when we protect those flagship species they can be that poster species and for me the koala is one of those as well.

BL Yes, I really get that, that makes perfect sense. It’s a little harder to imagine yourself cuddling something that’s prickly, although people have a fascination for the stick insect and the, Lord Howe Island stick insect, and other wonderful, wonderful things. What do you think is the biggest threat, or threats, in your opinion, to koalas?

RMD I definitely think that the biggest threat, without any shadow of doubt, is habitat loss and fragmentation. So, habitat loss is just outright clearing, and fragmentation is when we cut the habitat up into smaller and smaller pieces, or put things like roads, busy roads, through the habitat, so that leads to road strike and so on for koalas. And while there are many threats that face koalas, such as domestic dog attack, vehicle strike, disease, drowning in swimming pools and so on, at the heart of all of this is habitat loss. If we could just give koalas large areas of quality habitat, remote from the impacts of human development, we would be giving them absolutely the best fighting chance of a survival.

BL So no trees equals no koalas.

RMD No, that’s right. The answer to how much area a koala needs is actually really variable. It all comes down to their ability to basically satisfy their nutritional requirements. On areas of really good quality soil, the eucalypts take up all the nutrients, suck it out of the soil and put it into their leaves which means that those leaves are really tasty and healthy for koalas, and they’re pumping out lots of leaf, lots of canopy. On much more infertile soils, what happens is that there isn’t the same amount of nutrient content in the leaves, or the moisture content in those leaves, and the canopies might be a little bit sparser, and so koalas have to travel a lot further to sort of pick and choose their food sources to get that right combination of nutrients to make up their nutritional requirements.

So that’s why areas along the coast are really important for koalas, because on those coastal flood plains you get these fantastic nutrient rich soils, whereas in other areas those soils simply don’t have the same nutrient value. So, on the coast, it’s varied, but in our radio tracking study we saw that, on the coastal flood plain, we saw that many female koalas had home ranges between six and ten hectares, whereas we know that out in our hinterland areas many koalas



had home ranges well in excess of a hundred hectares, so very, very variable indeed how much is enough for a koala.

And big differences between males and females as well, because what the males essentially do is they patrol a much larger territory, probably, you know, fraternising with the number of girls that occupy that territory, and keeping out rivals from their larger home range, so it's quite a complex thing.

BL Very interesting. I really appreciate you explaining that because I don't think I had sufficiently understood, or appreciated perhaps, that soil is terrifically important.

RMD Yes, it's very important.

BL I wanted to switch to talking a little bit about ecology and it would be lovely just to explain what ecology is as a field, I know it's incredibly broad, and the kind of 'koala-fications' that you need to work in the field that you're currently working in.

RMD Sure. So, the technical definition for ecology is that it is the science of the distribution and abundance of species. So, where do species live? What kind of habitat do they need? You know, what governs their reproductive processes? What makes some areas have more than others? These are the sorts of things that ecology looks at. We can dive deeper into what we call autecology, which is the study of singular species. We can look at landscape ecology, which is the way that habitat is distributed across the landscape and supports different animals in different, sort of, fragmentation scenarios. There's a lot of specialist fields within the sort of broader fields of ecology as a whole ...

I've always been really passionate about ecology. When I was much younger I did a university degree in environmental science and then I went on to do an Honours year and then I worked in consulting for a while, but found that that wasn't really the best fit for me. I really wanted to do ecology as a profession, so I went back to university and did a PhD in wildlife ecology, which was a fantastic experience, getting to live out in the deserts of, the far deserts of New South Wales for three years, in a remote homestead...

Catch lots of [distorted] every single day and radio track kangaroos and all sorts of fun stuff out there, and that was great, and then that sort of set me up to do ecology as a profession and, since then, I've worked for universities, state, federal and local governments, and sort of the national parks sphere as well, so I've been very, very lucky in my career.

BL That's fantastic. Do you find that ecology as a field is growing in the sense that it may be becoming, there may be new specialisms, there may be new needs for this kind of system-wide knowledge?

RMD Yeah, definitely. I think that, you know, in ways that we probably can't even envisage yet, you know, there will constantly be new chapters that open up in ecology. You know, increasingly, I think we're seeing the combination of technology with ecology, so, for instance, drones is something people are looking at at the moment, integrating drones to search out and detect animals, and that's something we certainly couldn't have envisaged ten years ago even, but now they're sort of building in... knowledge with the technology, so how to combine those two things to maximise search patterns for the drones, and that's just one little example. Yeah, there'll always be a need for ecologists out there and there's lots of specialist fields that you can work in in that regard.

BL If you could make one thing happen to help save koalas, what would it be?



RMD The number one thing that I would do would be to overhaul the laws that permit the clearing of native vegetation to ensure that they result in more meaningful ecological outcomes and actually promote the long-term persistence of koalas and other species. I think that that is just so important. But if I was to be greedy and take up a second thing, I would actually reduce global carbon emissions. Many people don't realise that koalas are really impacted by climate change. We talked before about how the way that increasing carbon levels are changing the value of their feed, but it's also leaving them really vulnerable to impacts such as bushfire and drought, and, in fact, for those reasons the koala is one of the top ten International Union for the Conservation of Nature's flagship species for climate change.

BL And this summer, more than ever, I think it's been brought home to so many people that this is not something we can take for granted.

RMD No, that's right.

We undertook a radio tracking study of koalas near Port Macquarie and the title of it was actually called 'A Year in the Life of a Koala – Spatial and Temporal Partitioning of Home Ranges'. So, what we were trying to understand was, we know that koalas have these home ranges and, as we talked about before, some of them can be really big, like a hundred hectares, so we wanted to understand if koalas divide up their home range across the year and use different parts at different times, and what we could see with the males, who had the bigger home range in particular, but also some of the females, that they really did divide that home range up, so occupying cooler, wetter places, or more shady places, in the summer months, and then moving, for instance, to more open woodland-type habitats, or higher elevations, to escape cold air drainage, in the cooler months.

Now, that really has important implications for understanding koalas and protecting them because what we know is that for many developments they might do a one off survey of an area and decide 'Oh, there were no koalas present, it's not koala habitat', but what our study is telling us is that it might not just be koala habitat at that particular time, but later in the year it will be used by koalas, so this is really important that we understand the way that koalas move around their home ranges and utilise different areas. It makes perfect sense that they would do that because, basically, for energy efficiency you want to effectively harvest an area for leaf, intensively, and then move on to another little spot within your home range, and harvest that little area intensively, and then move on to another little spot and harvest that area intensively.

BL Of course.

RMD Other things that we saw were females taking little detours out of their established home range to go and, presumably, meet a male. They would often depart out of their home range into the home range of a male that we knew occupied that area and we would see him move towards here at that time. So that's him basically bellowing, advertising his presence, and her popping over to say 'g'day'. There was just lots of other information that came out of that study as well about, again, how we think that we know what koala habitat is like, but, in fact, that is definitely not absolute, so there is some suggestions that to be koala habitat an area must support a particular percentage of koala food trees, but we can see that even areas that don't support that many koala food trees, if they have really good soil, they are still very much an important part of koalas' home ranges.

BL Fantastic.

RMD Our radio tracking study also revealed, for those that had free water, such as a dam, present within the area, that we could again see them undertaking regular trips to visit water sources, or, at least, the trees around those water sources, so either they were drinking, which may have



been the case in that hot dry weather that we have been experiencing, or otherwise they were utilising the trees that grew around the water sources which supported much higher moisture levels in their leaf relative to those in the rest of the landscape.

- BL Because they get most of their moisture through the leaves they're eating. They're not heavy drinkers.
- RMD No, they're not. Unfortunately, though, in these hot, dry times, or if they get the disease chlamydia, which impacts their kidneys, they will need to drink a whole lot more, including free water at times, particularly as it gets dryer and dryer, the eucalypt leaves just don't have that same amount of water content anymore, so they're unable to get enough water from the leaf itself, so they will need to actually then go and drink.
- BL That makes sense. It's like eating an apple that's not crunchy enough to satisfy your thirst. I can see that. One last thing I'm curious about, and then I think we should wrap ourselves up, but my question is, what makes a koala habitat really desirable and is there a hierarchy so that some males have better habitats than others and therefore they're higher up in a pecking order, and females likewise, or is that a little simplified?
- RMD No, so the males tend to have the much broader home ranges, that overlap multiple girls' home ranges, and those do tend to be sort of the quality areas, with the really good soils, the good abundance of koala food trees, good soil moisture levels, these are the really important things, and, for our area, a good sub-shrub layer that allows koalas to take that shelter from those hotter conditions. These are really important things. But we get hung up on what makes the most important koala habitat, but there's something really important that people sometimes fail to recognise, and that is that next cohort. So we've got our dominant males, and some of our dominant females, occupying those best spots, but often in the periphery around those best areas, in what we sometimes call 'secondary habitat', which might be poo-pooed by some people as not particularly important, that's where the next generation of young males is hiding out, waiting for those older ones to fall off their perch and they can then move in and take over his good territory or, you know, defeat him in the next little koala battle. So, even though we might see that secondary habitat as of lesser importance, really it's just as important, in the long-term scheme of things, to make sure that those future generations are surviving and coping, ready to take over those good spots.
- BL Fantastic. So, it's about the genetic diversity and the continuation of a population rather than just right now, this moment. Great.
- RMD That's right, and equally important are those areas we mightn't consider to be koala habitat, because they don't support the right koala food trees, but these areas can be really important for connectivity in, like you say, genetic transfer across the landscape in koala movement.
- BL Fantastic. That's a topic I'd love to know about, but we'll probably have to leave for the moment. I can't thank you enough. That's absolutely packed full of information that's going to be fantastic. Thank you so much for joining me today, Rebecca. I really appreciate it.