

Martin Smith

Ranger – Coffs Coast Area, NSW National Parks & Wildlife Service

BL Tell me your name, and what your role is, and what you do.

MS My name's Martin Smith. I'm a New South Wales National Parks and Wildlife ranger and I work out of Coffs Harbour on the north coast of New South Wales. The patch that is mine to manage is basically south of Coffs Harbour and includes the beautiful Bellinger River Valley. I've been a ranger since 1983, way back last century, I enjoy my work very much and one of the things that I've specialised in over the last thirty years is the conservation of koalas in New South Wales.

BL Are you out and about on a typical day? What is a day like for you?

MS That role has changed considerably, largely due to the imposition of technology on our profession. When I first started in the early eighties, it'd be four days out in the field and one in the office. Once we got PCs and all the programmes, and remote sensing technology, and beautiful GIS mapping systems, it's changed now so that I'm basically four days in the office and one out in the field on any average week.

BL That's quite different. What other changes have you seen, and that's really an important longevity of experience, are there other changes that you've seen that you think are really critical to the understanding and saving of the koala?

MS The role of the ranger in New South Wales has evolved from being boots on the ground, practical land manager, to more of a planning officer.

Our ranks of field officers, which are supporting us in our work, they've got the good job. They spend every day out in the field basically implementing programmes that we draw up and our job has become more and more complex, over the years that I've worked in it, in that the number of parks in New South Wales has probably quadrupled in thirty years. The budgets have increased, community expectation, in terms of picnic areas, walking trails, that's certainly imposed a large maintenance liability on us, that form of public expectation.

The other big change has been fire management. The New South Wales National Parks and Wildlife Service now do over 80%, by area, of hazard reduction burning in New South Wales. Combined with that is the increase, huge increase, in the amount of wildfires we're responding to and I have a pretty important role, in the New South Wales National Parks and Wildlife Service, in that I'm an Incident Controller, Operations Manager and Planning Officer for bushfires, so I spend a great proportion of my working life, not so much managing land, but stopping the land, the natural areas, from being damaged by fire.

BL Is there something you'd like students to know about this summer, koalas, the conservation efforts that will change as a result of the bushfires we've seen?

MS Good news story here is that our area, the Coffs Coast area, which includes the Orara Valley to the north-west of Coffs Harbour, the Bellinger River Valley to the south-west, and many of the hinterland hills, which have large koala populations, were relatively unscathed by the fires. We're a big, green island on the coastal strip of New South Wales in that our reserves were not



greatly impacted by fire. The few fires that we had basically crept around underneath the trees and didn't scorch the crowns of the trees. Where most of my time was spent this fire season was in what we call 'out of area' fires. I was at Coomera, I was at Grafton, and particularly at Kempsey where the fires down there were devastating.

Personally, the impact on fires in my area, it's a stronghold for the species in New South Wales, and therefore the world. Our koala populations are probably one of the few bright spots in that research indicates the populations are stable, if not slightly increasing.

To the south, of course, the Port Macquarie koala populations were devastated by fires, as they were around the Kempsey Macleay Valley area. I think the true extent of the impacts are yet to be fully ascertained.

I think one of the things that gives me some cause for optimism is that fire is a natural part of the Australian landscape and that koalas have evolved with fire. They've got a whole host of behaviours that help to protect them from fire. One is that they can smell fire, and smell smoke, before we even get a hint that there's a fire in the vicinity, and the second really important behavioural trait of the animal is that they will climb down trees and head for the most moist gully and sheltered area they possibly can if they think that the fire is going to burn out the trees that they're in.

BL One of the other folks that I interviewed ... she said that they were focussing their tree planting efforts on gullies and on the cooler, wetter areas with climate change prediction modelling. Is that something that you also are working towards or do you feel that there are other key areas to work on when there's so much to do?

MS My knowledge of koalas extends over a number of different eco-types, or vegetation communities. I've worked on koalas in the Sydney Basin where there's Hawkesbury Sandstone. I've done a lot of work around the Namoi River, the north-west slopes and plains of New South Wales, around Gunnedah and Mullaley, and now I'm working in Coffs Harbour.

It's interesting, your comment about planting in gully lines, I think that's very important for the koala because it much prefers to get the moisture it needs to remain healthy from the vegetation it consumes and the proportional content of moisture in leaves that grow in gully areas is much higher than ones that grow on the ridge area. So, in times of drought or water scarcity, you're going to find more moisture laden foliage to consume in a gully line than you would on a ridge top.

As well as the fire issues, fires always burn hotter and harder on exposed ridges, where it's more sunny and exposed to wind. The gully lines are, not only better tucker, but also more comfortable and secure places for koalas to live because of reduced fire threat, reduced exposure to wind and reduced exposure to sunburn and sunlight.

BL A lot of students would need to know how big a population needs to be to remain genetically stable, or even to increase in population. I wonder if that's a theme you'd be willing to chat about for a bit.

MS One of your questions to me was 'What do people most get wrong about koalas?' and I think it's the issue that I'd like to raise, in answer to that question, is that people think that because there's a koala about, they extrapolate and think that the whole population in the local area is okay, if that animal that they see is healthy.

Now, often people see koalas in what we call islands of remnant vegetation. They're surrounded by busy roads, by domestic dogs, by urban areas, or by open paddock areas where foxes, feral dogs, and even feral cats, can attack them, maim them or kill them. Connectivity in the landscape is a really important thing and a lot of my work over the decades with koalas, and particularly my tree planting projects, is all about knitting the landscape back together again so



the koalas have safe ways to move from one patch of favoured remnant habitat to another, by moving through the tree tops rather than exposing themselves to the dangers that take out so many of our koalas when they're on the ground.

Getting back to your question about genetic diversity, it's a widespread understanding, amongst conservation biologists and ecologists, that you need to have genetic diversity to maintain a healthy population of wild animals over multiple generations.

Now the figure of individuals that's required to maintain that genetic health over multiple generations is not a hard and fast figure I could pull out of a hat, simply because you need to know the genetic diversity that exists within a population. For instance, on Kangaroo Island, down in South Australia, they have many thousands of animals, but, even though they've got high numbers, they're all related to each other because the population there grew from a small number of animals that were transported there in the 1930s. The Kangaroo Island population is very important to talk about because their genetic likenesses lead them to all suffer a same genetic weakness, which is kidney stones. A lot of them die in pain at a young age because of their genetic similarities. They're all prone to a fairly common disease, nephrosis, which leads to poor health throughout the whole community of koalas there.

The same occurs in Victoria where their population's too, largely a product of translocation of ... a small number of individuals into a remnant patch of forest. They end up breeding with their cousins and brothers and sisters and they share genetic material and they share the weaknesses of the parents of those individuals.

In New South Wales we do not support the translocation of koalas and in the national park that I manage, where we've probably got one of the most important wild koala populations in New South Wales, if not the world, Bongil Bongil National Park just south of Coffs Harbour, we have an estimated 400 to 500 individuals and that is an entirely wild population and the genetic diversity in there, we believe, is very healthy and quite wide.

At a guess I would think you need about 300 individuals of wild koalas to maintain genetic health over multiple generations. Three thousand of the Kangaroo Island individuals will not maintain genetic diversity because they're already quite similar, being a translocated population.

BL What unit of measurement do you use to measure genetic diversity? Is there a standard here?

MS It's widely known in Victoria and South Australia that that is the greatest risk to the population. In western Victoria, around Warrnambool and Portland, they have koala populations of very similar genetic make-up that similarly suffer from this nephrosis, this kidney stone problem. It's the same source population for the animals that ended up on Kangaroo Island.

How you test for it is through basic DNA testing. We are confident in New South Wales, because we haven't translocated large numbers of animals across the landscape, that all of our koalas that exist in native forest and that have historical information supporting the belief that they've always been there, at least during white settler times, we believe that the genetic diversity is great.

One of the ways you can improve genetic diversity is to improve those linkages, improve those corridors between remnant populations, and therefore individuals can move from one patch of forest over to another and mix up the genes, add new genetic material to a next band, or local population of animals, through the natural migration of individuals across the landscape.

BL Are there behaviours, for example the stereotype that people might expect, that young adult males will be moving the most, is that a fallacy or is that correct?



MS I think that that's generally true. The known data that I've read, on the home ranges of the two genders of koalas, reinforce the belief that the males are far more likely to move greater distances particularly in the breeding season of September through to November. They're on the hunt for females to breed with whereas the females generally have smaller home ranges. The home range size of males and females is heavily dependent upon the population of animals and the ability of the patch of forest that they live in to provide food for them.

Bongil Bongil National Park, south of Coffs, is full of Tallowwood trees, and Grey Gums, and Swamp Mahogany trees, the top three species that koalas like to consume on the north coast of New South Wales, and therefore the density of animals there is estimated to be around six to eight hectares for females, probably 15 to 20 hectares for males.

However, the patchiness of the primary habitat, the three species I've just mentioned don't occur together in a patch of forest. Swamp Mahoganies, as the name would indicate, like swampy areas where they get their toes wet all of the time, whereas the Grey Gum tends to occur mainly on upper slopes and ridge tops.

There's patches of forest that are dominated by Blackbutt, *Eucalyptus pilularis*, and that species of tree is not a preferred koala food tree, so a patch of forest that might be 30 hectares in size, dominated by Blackbutt, may have very few koalas. A patch of forest dominated by Tallowwood, that's only five hectares in size, may have two or three animals.

The other thing that's important is koalas do move extensively across the landscape. I can tell a story about one animal that was injured at a place called Sawtell by a motor vehicle. It was picked up by the volunteer WIRES people. The animal was taken to the vet, patched up, taken back to a person's place to be rehabilitated. Two or three weeks later it was ready for release. It was given what's called a soft release, which is basically you open the door of the cage of an evening and wait for the animal to walk out of its own accord, because there was good quality forest around this person's home.

I found that animal about a year and a half later, and we know it was that animal, because it had a plastic ear tag in him, and it was nine kilometres away from the place where it walked out of the carer's backyard, and it was just across the creek from Sawtell where it was injured on the road. It, I believe, had some sort of homing instinct and was going back to where its home patch was.

BL Is that common, that they go back to their home patch?

MS It was a rare opportunity for me to know about this individual because of the ear tag. I don't know of other stories where animals have been tracked from a known release point over that distance, but the nine kilometres is certainly well over the average known home range of individuals. However, in times of fire, in times of drought they certainly will move.

Hunger is one of the strongest stimuluses for all living things. If an animal is hungry, if its habitat is burnt out, if it's feeling threatened that there's not enough food to keep it alive, it will move and it will move considerable distances. In Gunnedah I've found them on top of fence posts in the middle of sunflower fields where, as far as the eye could see, there was no trees. The animal was moving from one patch of forest to the other.

Unfortunately, I can't sit down and interview a koala and ask 'Why did you do that?', but they are found in open plains moving across the landscape and I think generally what propels them to move is they're not satisfied with the quality of food in the place that they left, and they're going to another location where hopefully they'll find more abundant food, food that is more moisture laden and therefore provide to themselves a better quality of life.

BL One of the questions ... from the schools was do koalas sleep a lot to conserve their energy in case they need to run away from predators, but actually this movement around would be using

a lot of energy in order to get a longer term benefit, which is a better food source. Is that fair to say or is that misrepresenting it?

MS I think it's a misrepresentation in that it's widely known that koalas are sedate, dozy or asleep for 16 to 18, sometimes 20, hours a day. Their movement is pretty much restricted to four hours a day. They might climb down from a tree that they're in and move a couple of hundred metres to another favoured food tree or they could sit in the same tree days on end.

I don't think that there's a particular standard that they adhere to, but generally speaking, 16 to 18 hours a day completely still is normal behaviour for a koala and that's why they're so enigmatic. They're difficult to see because often they're just a round ball high up in a eucalypt tree, unmoving and well-camouflaged amongst the grey trunks of the trees.

BL What's the best way, in your opinion, to find koalas if you're looking for them in the bush?

MS I've got a great programme supported by a team of adored volunteers up here in Coffs Harbour. It's called The Community Koala Survey and we do this survey every year and we have done it systematically for the last seven years.

What we do is we go out into the forest during the breeding season. We go out at night when the animals are most likely to be awake and mobile. We go out just after dark when they're hunting around for their first meal of the day. We also go out in the breeding season and that's important because there's two main ways conservation land managers, or ecologists, detect koalas in the wild.

One is visually, by using spotlights, and the second is audibly by hearing the call of the koala. Now, the male koala is very vocal when its hormones build up during the early part of the breeding season, so we go out to do these surveys, and they're replicated surveys of 1500 metres' distance. We've got five locations scattered throughout the national park that I manage and, rather than count koalas, because it's impossible to count koalas in such thick forest, particularly where you've got to chase an area managed by State Forests or it might be private forest, by the time you've started the survey at one end of the park, koalas have either moved into or out of the national park into adjoining forest by the time you get to the other end.

So, we go out with iPods. We go out with loud hailers and on the iPod we have the call, the territorial call, recorded call, of the male koala. Now we, at reasonably high volume, play that sound out into the forest at night and a male koala that might be out there hears the sound, the recorded sound of the koala that we're playing, and will respond because it's a territorial threat to them. So, we record a koala not by seeing them, but by hearing them in the forest during the breeding season.

The other way we find them is we use spotlights, with appropriate training and technique so that the eyes of the animal aren't damaged when you find them. Koala eye shine is different from other native animals in terms of the colour that it emits, so even at a distance of a hundred metres, where you're not quite sure what that shape is, the eye shine colour will give it away and we use binoculars as well so we can pick the animals up at some distance. They're the two main ways to locate an animal. You got out at night. You go out, starting your survey work, about an hour after sunset and, if at all possible, that recorded male koala sound is a good way to stir them up and hear them out in the forest as well.

BL What colour is koala eye shine?

MS You're asking the wrong man, Bev, I'm colour-blind. They tell me it's a pearly colour, pearly silver, whereas some people see a hint of orange in the colour as well.

BL What got you into koalas? What started you off on this journey?



MS They're very likeable animals, as people around the world will attest, but I think what really gets me fired up with koala conservation is that they're an iconic mascot for a host of Australian species of wildlife.

The problems that koalas face are shared by a host of other native animals, many of them threatened species, Yellow-bellied Gliders, Squirrel Gliders, Greater Gliders, even the forest owls, the Sooty Owl, the Masked Owl, the Powerful Owl, all of them are reliant upon good quality native forest to survive.

Big patches of good quality native forest is relatively well-protected from fire and from other forms of damage that might threaten the species. In promoting koala conservation, you're actually promoting bio-diversity conservation. You're promoting the conservation of a whole host of other native animals that might not be as pretty, might not be as iconic, but for a lot of our wildlife it really is a case of 'no tree, no me'.

People will immediately be attracted to the koala. It's got something to do with the fluffy ears and the eyes pointing forward, I think. I haven't met someone that doesn't like koalas. They're a mascot for conservation, not just in Australia, but overseas as well, and they're a really good way to start to talk to people, and educate people, about the things we can all do to help conserve the beautiful, wonderful wildlife we have in Australia.

BL If you could recommend one thing that would help save the koala, what would you recommend?

MS I think the greatest threat to the koala in eastern Australia, and therefore the world, is the fragmentation and destruction of habitat. Critically, it's the breaking of linkages that provide koalas with easy access from one patch of high quality habitat to an adjoining one.

The koalas are most exposed to trauma, death and injury when they're on the ground. They need to have an arboreal tigtrope where they can move from one large patch of conserved forest to another. While the knocking over of a couple of hundred metres of trees, that might be only 50 metres wide, might seem insignificant in the great scheme of things, that couple of hundred metres of a thin line of trees may be critically important habitat for koalas that links one patch of habitat to another.

Re-knitting the landscape, joining up these patches of forest, will not only help the koala avoid trauma and death and injury, but, importantly, it will assist in the mixing of genetic material to maintain that genetic health over multiple generations.

BL If students wanted to get involved, for example, with tree planting projects or with other projects, or citizen science, do you know of any that would recommend, that would think are great things, particularly as kids are at home at the moment, to get involved in? We all could plant some trees and have them do some seed raising. What sort of things are you aware of that kids in the area might be able to do?

MS The Tree Parents Project is, I think, a really good way for people to provide koalas with more habitat of high quality.

I've been involved with tree planting projects for over 30 years and it is very disappointing for me to see, and unfortunately it happens all too often, a great idea die from lack of interest over a longer period of time. I've seen a lot of tree planting projects fail because people have that feel good moment on a Saturday when they go out with their parents and they plant a tree and everything's great, it looks beautiful, and then you go back six months and the tree's dead or it's smothered in weeds or a wallaby's pulled it out of the ground or it's been vandalised.

The Tree Parents Project grew from that disappointment. What I realised was that trees are incredibly vulnerable, like koalas, to death and injury, when they're young and that the way that



we can promote greater success with our tree planting projects is to ask people to treat their baby tree, the little tube stock that they put in the ground, as a baby and that nurturing that over its vulnerable first three to five years of life will help to make it big and strong and improve its chance of success.

So, the project that I started in 2015 was one where I asked people in the local community to come on board, with the New South Wales National Parks and Wildlife Service, and get involved in a competition to grow koala food trees.

It's really important to know which trees to plant and it's also really important to know which species of tree is suitable for a particular part of the landscape. A shady site, a wet site, a dry and exposed site, different Australian eucalypts occupy different parts of the topography and landscape so you really need to know not just which species of trees koalas like in your local area, but where they grow best.

So, with the knowledge I had, and with the site that I had, which is a degraded Blackbutt plantation within the national park that I manage, I got ten teams together and I gave them two patches, beg your pardon, two hectares, of ground, which was their team patch, and I gave them 60 koala food trees. I nominated the places where the trees were to go, but I asked them to be the parents of these trees.

We had the planting day in May of 2015 and those ten teams planted out 600 koala food trees. It's generally accepted that community planting of trees, if you get 50 or 60% survivorship after 12 months, you're doing pretty well. A seventy percent success rate after 12 months is considered very good. After five years the 2015 Tree Parents Project in Bongil Bongil National Park produced survivorship of 97.5%. We only had 15 trees die out of the 600, after five years, and now I've replanted those, so after five years we've got 100% survivorship. The programme was so successful, and really changed a lot of people's perceptions about community tree planting, that I received funding to do it again in 2017 and, amazingly, I got exactly the same success rate, 97.5% survivorship.

We've got trees down there now, Tallowwoods, Grey Gums, Swamp Mahoganies, that are 15, 20 feet high after three or four years. They've been lovingly looked after by community volunteers and I have no doubt at all that the koalas will be in there chewing them and enjoying them as soon as we start to pull the cages down over the next six to 12 months.

BL Is that across New South Wales or simply in the north?

MS No, it's just a local project I've initiated up here. What I ask children to do, if they're planting trees, is to consider them as vulnerable infants when they put them in the ground. The only way that you can turn that baby into a koala food tree is to look after it for three to five years. There are multiple threats. They get smothered by weeds. They die through lack of moisture, so you need to water them. Critically, there's a lot of, both introduced and native, herbivores that will chew all the leaves off them and eat them, so you need to cage them in a cylinder of chicken mesh and you need to talk to them and sing them a few songs.

BL What kind of songs do trees like?

MS Depends on which team. Some of them even take ghetto blasters out there with them while they're working so it might be some doof doof music or rap, I don't know. Different teams have got a different recipe. There's one team out there that swears by goat poo. They got a really good result, in terms of annual growth on their trees, and all of them were powered by goat poo.