

How to Speak Wombat

Presented on behalf of Jackie French
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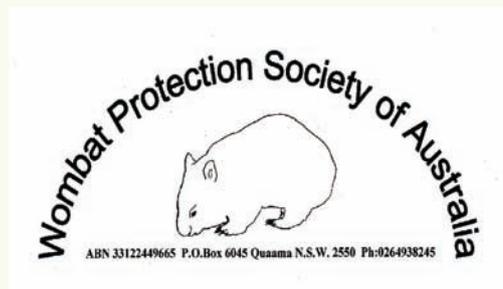
Keynote Speaker **Jackie French**

Jackie French is an author from the Araluen Valley. She has lived with, tracked, studied and written about wombats for 35 years.

How to Speak Wombat

The wombat is one of our iconic animals, but so much we think we know are either myths, or based on small studies over a short time in a limited area. How complex is wombat communication; how proficient are they as engineers, and how far does wombat intelligence range? Can we even be sure of the basics - how long they live; when, why and how often do they breed, and how long is a wombat courtship?

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Saving the Northern Hairy-nosed Wombat

Wombat Myth and Wombat Magic, or

How to learn to speak wombat in 35 years of often smelly lessons

Consider the wombat. Four short legs, negligible ears, a face that is mostly nose. Whiskers optional – some wombats have luxuriant ones, others just stubs.

And that is what most Australians see - either asleep or blearily snuffling at the zoo or, more likely, bloated by the side of the road. Ex-wombat.

Few people ever see the secret side of wombats: that mischievous wombat grin, not a stretch of the mouth like humans but still... somehow... a grin, usually at someone else's expense; the look of ecstasy is it flattens into doormat position on your lap while you scratch behind its ears or, even better, rub (more a confined kick) its back with your boot, so it melts into fur and happiness.

The yips in the night of wombat courting behaviour, the sudden 'mad wombat' lunges when caught up in a solo game, boxing shadows in the moonlight.

Few Australians have ever lived with wombats. Many – the wonderful carers of wildlife rescue societies – may rear young wombats or look after injured ones. But a wombat brought up by humans behaves very differently from a wild wombat. Even researchers usually either study wombats kept in zoos and wildlife parks or wild wombats for only six months at a time.

But wombats vary as much as humans do. Each wombat is an individual and wombat behaviour changes depending on the weather, the number of other wombats around, the locality and many other variables.

Wombats are one of Australia's most iconic animals, but we know very little about them – and what we do know may be either incorrect or misleading.

How do we know how wombats behave?

From 'general knowledge' – which may be folklore. And from PhDs and other scientific studies which should be accurate.

But imagine a Martian scientist studying an Australian family for three years – the length of a generous study. They might well assume that all Australians speak English, eat cornflakes for breakfast and have pink flowers on their toilet paper.

But of course we don't all do that. We assume that humans have 'culture', i.e. that our behaviour and choices are not primarily instinctive, and because of this one lot of humans will vary from another. We also accept that the human species has enormous variations, even though genetically we may be closer to each other than a Tasmanian wombat and one from southern N.S.W..

We also assume that animals – like wombats – don't have 'culture', i.e. learned behaviours that are passed on from other wombats. We too often take it for granted that:

1. If you study one lot of wombats you can apply those results to all of them and
2. That you can rear wombats away from other wild wombats and they'll instinctively know most of the wombat skills to survive.

Neither is accurate.

Wombats vary – just as humans do.

Wombat burrows vary from a simple hole from only 1.5 metres long to complex warrens that run for more than 200 metres. But they also vary in the way they're used. I knew one wombat who regularly picked and collected lavender branches to

make her bed. Others prepare beds of soft sand. Others just lie and sleep wherever they happen to come to a halt.

Wombats can also slow their heart rate extraordinarily – but not all will do this, and those that do may only do so in the most extreme times.

How much is innate, and how much is learned?

Humans usually assume most animal behaviour is innate, instinctive. Even those who care for injured wombats may subconsciously subscribe to this, assuming that a baby wombat can be reared by humans then returned to the wild with no preparation except letting it gradually get used to the territory.

In the past 35 years I have spent at least two hours a day (or night) and often more observing wild wombats. (I'm lucky to live in a deep valley. When the sun sinks below the ridges the wombats emerge much earlier than they do where there's direct light for longer.) I've kept detailed notes on the complete lives of 76 wombats in that time and observed many others for shorter periods of time; watched them live, love, breed and die in both drought and good times; traced the evolution of networks of holes. I have learned that:

- . behaviour among wombats varies from individual to individual just as it does with humans;
- . wombat behaviour – including food preferences, mating habits and tolerance of other wombats – also varies according to the season and on whether the wombat grew up during a lush or a drought time;
- . much wombat behaviour is learnt, some as an adult from other wombats, including but not limited to their mothers.

I know the wombats at this end of the valley very well. But I have learnt enough to know that what is true here may not be true for other wombats in other areas.

Wombat communication

There is a noise that all wombats make. It's roughly translated into English characters as

'Aaaaaarrggghhh...'

I have noted another 17 wombats sounds: a throaty 'grrrhhh', and a loud oomph of a sniff, that sounds as though the wombat has borrowed a vacuum cleaner hose for its nostrils; a 'heh heh heh' sound, a screech, a 'hff hff hfff' and many others.

All 78 wombats I have studied make noises similar to these. But if you record them and play them back to another wombat, usually – though not always – they ignore them or are alert only because it's a sound.

Wombats, I suspect, don't have what we regard as words. I have never known a wombat even to recognise the name its handlers have given it.

But these sounds are still communication. I suspect in fact that it's not the sound itself that matters. Our human ears look for vowels and consonants. A wombat, I think, listens to dynamics like loudness and pitch. A noise that can be a soft call for attention can also be a scream of rage. You'd write it out the same way phonetically, but without the pitch or intensity it doesn't convey meaning.

My longest close association with a wombat is with the one I call Mothball. We have been together for 16 years now – by her choice, as she's free to go bush, and indeed did so for several years, coming back only as the 90's drought grew worse. At one stage I began to wonder if wombats might be telepathic – I once swore at her, for demands during a very difficult time. I didn't raise my voice – but she vanished for 12 days. My voice was a quiet mutter but the pitch was angry. It's no coincidence I think that bower birds, red-necked and black-tailed wallabies make similar sounds for both challenge and fear.

But wombats do communicate.

True wombat communication is by smell.

As I was writing this paper I farted – please excuse the graphic detail – by an open door. Four wombats arrived within nine minutes to investigate.

Yet wombats do communicate, and I suspect often a great deal of data can be communicated too.

Wombats see the world by smells. This makes sense in a land that is dry, where a nicely positioned piece of dung can give out odours for weeks. Humans are lousy smellers. Our sense of smell is about as good as a wombat's sense of hearing. If we smell something revolting, it takes humans about forty-five seconds to register it, 'Aha, I think I smell something... yes, yes, I really can smell something. Eerk, it's revolting... I think... yes, rotten prawn heads from last week... '

Wombats go through much the same process when they hear something. 'Yes, yes, I think I hear a noise... yes, it is definitely a sound. I think... yes, yes, it's a car. Run...'

By which time the car is just about on them and the person driving thinks, 'Dumb animal' as the wombat literally runs under the wheels. If only the wombat had been able to smell the car, it would have been different.

I watch the wombats here as they graze up to my study when I'm playing music. They are certainly within earshot before they register the sound, then they will stop eating and think about it for up to a minute: which direction is it coming from? What is it? Is it coming closer?

They can HEAR a sound of the same loudness at the other end of the orchard – but, again, it is one thing to hear and another to process the information.

But smell... that's where a wombat is a genius. Bloodhounds are poor relations in the smell stakes compared to wombats. A tracker wombat would be invincible – if anyone could convince a wombat to do

something imagined by another creature. I have had wombats track my fresh scent for just over two kilometres, in an area where I had walked many times in the past few days, yet the wombat was unerringly able to work out exactly where I was. (I had, in fact, tried confuse it so I could go for a walk without lugging a 10 kg wombat with me when it grew tired of walking).

Wombats don't just use their sense of smell to track. For years I wondered why, wherever there is a wonderful view in the valley, there'd be a wombat 'sit' – a place where wombats literally sit and... and what? Look at the view? They are too short-sighted. Watch for predators? Again, they couldn't see them...

Then I realised. Wombats 'smell' a view the same way we see one. We look out and see a complexity of shapes and colours. Wombats sense an even great complexity of smells – and like we put together all we can see to make up a view of a whole landscape, they can put all the smells together too to experience that same landscape in their own way.

Communicating with wombats may be a bit like communication with an alien from Alpha Centauri – we rely on different organs to pass on data, even though there is some overlap. The fact that wombats smell well, and we don't, has led to a myth that wombats are less intelligent, say, than a dog.

Wombats can show extraordinary intelligence – but only if they feel like it. A dog will try to please, and display its intelligence. A rat will always try to get out of the maze. A wombat is more likely to think about it, and either try to crash through or have a scratch and go to sleep – an excellent behavioral adaptation in an often harsh and variable land where you may need to conserve your energy.

Wombats can work out how to open cupboard and screen doors if they've learned that they can be opened... though they usually just scratch and bite through them. It's more fun.

If there is lush food about, many wombats will spend their spare time not conquering the universe, but sleeping. They use their intelligence only when they need to and for their own wombat purposes.

Can wombats use tools?

I have known one wombat to use a lever repeatedly – a tomato stake that she pulled out of the ground then used to lever a large rock out of her hole under the vegetable garden fence. I watched her manipulate it reasonably dextrously with her mouth.

I have known another to push a box to a chair to climb up to chew a mop to attract our attention; several who will push a chair or box into position to get through a window to reach humans. These have all been hand-reared wombats, but the lever user was a wild wombat who had had no contact with humans before. She was also very dedicated indeed to getting into the land I had enclosed as 'my' vegetable garden, and the lever event (She did it twice as I watched, and I suspect used it at other times too when I was asleep) was only one of her strategies.

Can wombats count?

I tested this accidentally. A hand-reared wombat got two carrots each night but one time I was running out of carrots. I gave him one – and he bashed the door in anger at not getting his due ration. The next night I gave him one carrot, snapped into two pieces – and he was content.

For the next three weeks I experimented, cutting one carrot into three, and getting him used to taking three pieces, then four, then five, then six. Each time he objected if he got fewer than he deserved (or at

least had grown to expect) even though it was the same quantity of carrot.

But when we had got to six it rained and he moved away. We never met again. I have no idea if all wombats can count to six, whether they can count to much more than six or if I simply met a single wombat of arithmetical genius and the experiment can never be successfully repeated.

Can wombats pass information to other wombats?

A hand-reared wombat learned that carrots grew in the ground – next morning all carrots were pulled up and chewed. She then discovered that if carrot roots delicious, so were parsley roots.

Within three weeks parsley as far away as Ballalaba – 20 kilometres or so as the crow flies – were being pulled up and the roots chewed. Within four years the fashion stopped – possibly because drought made parsley growing problematic for a while and the wombat forgot. But no one had ever had wombats eat their parsley root before.

In the 1995 drought, too, I opened the back door one night to find a hand-reared wombat, Rikki, with four (later seven) strange and quite wild wombats. They were waiting to be fed. The wild wombats looked a bit embarrassed, but duly ate the bowls of wombat nuts and lucerne I put out and arrived every afternoon after that. They – and Rikki – vanished when the drought broke.

I have no doubt that somehow he had communicated that he knew where there was reliable food. Those wombats were waiting.

Wombats Play games

Baby wombats have a game that may be instinctive – they jump out at other wombats, or wallabies or a passing human and try to knock them over. They show little fear of humans unless their mother growls

or warns them in other ways – I’ve played with many wild babies in the moonlight.

Dogs play games too, but they don’t change roles. Humans throw balls for a dog – I have never known of a dog who decided it was the human’s turn to fetch.

But if you play with wombat babies – wild babies – they may decide it’s your turn to hide. I once watched my son play with a wombat – a wild wombat he had befriended. The wombat rolled him down a slope. After about half an hour it decided it was time to change roles – the wombat lay down to be rolled instead.

It didn’t work. Wombats are the wrong shape to roll. But it was interactive imaginative play of a kind I have never seen with a domesticated animal.

I need to add here that my son can make a noise that wombats will follow. I add it just because someone might, at some stage, know how this happens. Is it pitch? A certain sound? Does he just smell like a dominant male? I truthfully have no idea. But he grew up with wombats; when he was a toddler he made friends with the largest male I have ever seen – one night I suddenly wondered where he was, looked out and saw this almost-baby with his arms around a wild wombat, feeding it a carrot as he had seen me feed hand-reared ones. They were friends for many years.

Wombats are not one of his priorities now. But I do wonder if at some level he understands them better than I ever will.

So what have I learned about wombats? Some data – and a lot more questions.

How many wombats exist?

Over the past decade there have been many claims of wombat plagues – wombats breeding up to pest levels. None, I believe, have any scientific basis. Even if there had been a wombat census in a specific area – which I doubt – it is unlikely to have given any accurate data on wombat numbers.

In times of drought or fire wombat numbers may appear to rise because wombats seek out water sources or the grass on road verges and are, hence, more easily seen.

Wombats may travel more than 20 kilometres in dry times, often to the most visible area i.e. by roads, streams, dams. Humans therefore believe, because they are seeing more wombats, that the population is increasing.

As far as I know apart from my own there has been no census of bare-nosed wombats, and none that compares wombats in the same area over several years of varied weather and that tracks wombats out of that territory, too.

When I began studying wombats we had approximately 97 wombats in a roughly five square kilometre area, though most of those lived in the far smaller areas near the creeks, especially during dry times.

In 2004 there were about 23 wombats in the same area. The numbers had been reduced I suspect mostly by mange and drought, and to some extent by competition with feral goats, though we have been able to keep that to a minimum in this particular area. There is no grazing competition from domestic animals here.

Numbers began to rise a few years ago as injured young were released as they recovered. Any figures I collect may be now now misleading.

35 years ago we had two distinct wombat types here: one small, round-shouldered, pointed noses, from mid-brown to an almost gold

colour, though the latter was usually as the wombat's coat faded with age.

We also had another quite different type – massive, almost a metre tall at the shoulders, square noses, flat backed, from dark brown, almost black, to an almost white grey.

The last of this possibly distinct sub-species vanished last year: I called him Flat White. His genes remain – I saw him mate once with a wombat who had been reared here.

Were there or are there wombat sub-species? I suspect there may never be the money to find out.

How often do wombats breed – and what encourages or discourages their breeding?

This is another unknown. I would distrust any study which tried to give a definitive answer, as individual wombats vary so much and mating varies with the season too.

How often do wombats breed?

This is another unknown. It varies enormously from wombat to wombat, and not just in response to available food and suitable habitat, though I suspect this makes a difference.

Some wombats around here bear one young about every three years, but some females have borne only one in their life; one wombat had borne only two, while a wombat we named Two and a Half, seemed to bear one every eighteen months or even more frequently for eleven years or more – she was an adult with a baby at heel and one in her pouch when I first sighted her and began to keep notes, so she may well have had more young before that.

Drought or a lush year doesn't seem to have any effect on breeding – there are as many babies in pouches in droughts as there are in lush years. (This may very well be different in more arid areas – around here

there are no differences in kangaroo breeding rates in good or bad years either, though this varies enormously out west.)

Most wombats don't go on heat again till the baby has left home completely, though as I have said before, this isn't always the case.

When does the baby leave the pouch?

There seems to be no set time for a baby to leave the pouch or become independent. It varies enormously according to the temperament of both the mother and the baby, as well as the availability of food and holes. Hole availability is a major factor in breeding, I suspect – but only suspect. A young wombat can't safely range into new territory far away without holes or at least culvert pipes to shelter in at night – or farmer's sheds.

Baby wombats are supposed to be mostly out of the pouch at ten months. But I have known one left alone each night in its burrow when it was still so young it was still pink and only partially furred, and another still living in its pouch when it was over a year old and the pouch was dragging on the ground and the baby so big that only half of it could fit in the pouch. (Its Mum had to use forcible methods to get it out.)

We assume that baby wombats become independent at between 15 and 18 months – but I've known one forcibly taken for a long walk by its mother and abandoned in distant unfamiliar territory at less than a year old, and another still hanging around with mum at two and a half years old.

We assume that we can judge a young wombat's age by its weight. But the wombats in our valley – in the same season – vary from the size of a corgi to higher than my knees and built like sumo wrestlers. A 20 kg wombat can be a baby or a young adult.

What triggers wombat breeding?

I simply don't know. In our area it certainly isn't uniformly seasonal, nor have I been able to pin-point any reliable trigger.

Around here wombats mostly mate from late winter to early summer, but you can't depend on this, especially if a drought breaks in mid-summer (most droughts here break in January or February). I've known wombats mate in February (possibly the fact that it as a lush grassy year may have helped them feel horny) and in autumn. They can mate at any other time of year, but these matings may not be productive, as most pouch young appear at their mother's sides in late spring. But this is certainly not invariably the case: of 78 pouch young, seven appeared in late summer and one in mid-winter.

Female wombats become much more bouncy and aggressive just before they go on heat and are more likely to growl at any wombat – or human – who comes close to them. Their vulva looks swollen and moist and there is a darker brown oily substance on the fur – which stinks. In fact the whole wombat will smell more strongly too. (And if I can smell it 50 metres away, male wombats half a kilometre away are probably aware of a really interesting pong.)

Sometimes the female wanders in search of males about this time – Sneazy and Growler used to trot off in one particular direction, so I wondered if they had a particular male they preferred to mate with, as there were other male wombats around.

But mostly the males come to the female –usually only one at a time, sometimes two and, on two occasions here, three or four wombats. I have heard wombats fighting when females have been on heat – it's tempting to think they have been fighting over her, as other species do, but it may just be that their hormonal excitement makes them quarrelsome over who gets what tussock or bit of ground.

Wombats' courtship is loud and long. It usually takes about three days, but in some circumstances takes far less –or possibly far more, as it's hard to know what olfactory courtship has been going on, unnoticed

by humans. As we don't speak wombat we may be missing most of the courtship process.

It can also take up to three weeks for the female to accept the male – he'll chase her, she'll chase him and can often get quite vicious, tearing his ear or nipping at his balls – wombats usually go for the vulnerable bits and there are very few vulnerable bits on a wombat.

Some times two or three males gather around hopefully, sometimes one will fight another, other times they assess each other, in the fashion of males of any species, then one gives up and wanders off after a preliminary snark or grunt.

Finally what seems like genuine anger becomes playful aggression – they nip and chase each other for between half an hour to two hours.

This courtship chasing may cover about a hectare; I've known it cover several hectares; I have only once known it to be in less than half a hectare. I don't know if wombats will mate regularly within smaller areas.

On available evidence, however, I believe that just like human mating can be anything from fabulous to lie back and think of England, wombat mating is only truly fulfilling when you can run, leap, bite, tear at trees, chase each other around a bush and prance between the shadows. And they do not like humans watching – all my peering on wombat sex has been done through windows, when they had no idea I was there, couldn't smell me and believed themselves hidden under our bedroom.

I need to emphasise though that this is not invariable behaviour. Males usually chase females- yet I have seen female wombats try to lure males to bite and court and chase them; I have known one male who was of the 'wham bam thank you ma'am' school of mating – Flat White – who refused to respond to the biting and scampering behaviour of the female, and just mated, after less than a minute's courtship. It was a successful mating –luckily his colouring makes it easy to work out which are his offspring without DNA sampling.

Wombats on heat smell. All adult wombats smell, even to an olfactorally challenged human, but wombats on heat smell even stronger, mostly from the dark brown liquid they secrete and that gets brushed onto their fur. Wombats don't just excrete this substance (it's not urine – adult wombats do urinate, but not often) when they're on heat. It's dribbled into the entrance of their hole or around the most important features of their territory - one young wombat dribbled nicely all around our house every night for about three weeks, then she lost interest - or maybe she had achieved her objective. Even I can tell when a wombat nearby is on heat – I suspect males from more than one kilometre away (and probably more) can smell it too.

Wombat droppings from a female smell particularly sexually interesting to a male wombat when a wombat is on heat. Male wombats that have ignored piled droppings for months will suddenly decide to pay attention to a female, either because of the droppings' scent or because of drops of the brown liquid deposited at the same time. A female on heat will leave oily drops along with her droppings and these may be dropped as she walks too. They are very, very pungent – even I can tell if a wombat is on heat from about thirty metres away.

As to what happens when a male smells a female on heat... the male wombat may stop to think for a minute, then just keep eating; he may sniff to find out exactly where she's gone and follow; he may scratch the ground and just keep sniffing, a bit like a human male gazing at a centrefold who just wants to continue the enjoyable experience without doing anything about it; he may also give a sexy little grin, his upper lip lifting and the bottom lip, well, grinning. This is a definite 'I'm horny' grin, though it's very like the 'I'm passionately interested in something' grin i.e. the butting down the back door grin that wombats can give at other times.

That top lip curl is called 'flehmen' – and many male animals who have the right-shaped top lip do it most spectacularly – stallions are probably the most notable but also bulls, chimps and gorillas. It's a way of concentrating and experiencing the smell of the pheromones and exciting themselves further.

Like humans, wombats have 'oestrus cycles'. Each cycle is 33 days, as opposed to a human females 28 (on average) days. During that time they are probably fertile for less than a day – one good night's mating, in other words.

About four or five days before that the female wombat becomes particularly bouncy. She'll be more likely to start a new burrow in the newly watered rose garden (but will probably lose interest after ten minutes). She'll be more aggressive too, barking at any other wombat who gets too close, especially males who may start to gather. If no males do gather, she may wander off looking for one - Two and a Half (a most maternal wombat who almost continuously had a baby in pouch or at heel) used to wander over two hills and half way up the mountain to find a mate – always in the same direction. (As we had several males around here at the time I have to assume she didn't fancy any of them.) As well as the distinctive pong a female wombat's genital opening swells up and looks moist too while she is on heat.

Wombats actual mating varies – as it does with humans. Some go for a one-night stand – male wanders into range, chases female for half an hour, female tries to bite his balls, ears, nose, then they mate, which takes from ten minutes to half an hour (yes, like humans, wombats sexual technique and staying power varies), usually lying on their sides with the male curled round behind the female, either gripping her with front paws or sometimes biting her neck, but I have once seen a more dog-like position – again, I don't know if that was a successful mating or a more raunchy part of courtship.

The actual mating mostly happens in the hole – usually the one the female is using at the time. I have only seen it four times outside – once by our back door, after a particularly furious bit of foreplay and several gallops around the house, the other times in an area that wombats believe is their hole but I can see, under our bedroom floor.

I do suspect that for successful and frequent mating the female needs a choice of males; that they need days, if not weeks, of propinquity to learn each others' smells and how they vary; they must have at least 24 hours of mutual smelling; they need to be well fed with an instinctive expectation that feed will be available for the next year; and they need at least an acre for their courtship, preferably about half a square kilometre .

Baby wombats will engage in sexual play and if two are raised together may get into the sexual position, though rarely for more than a few seconds.

Do wombats mate for life?

A cautious 'no' on that one. I have known only two female wombats who mated with the same male all their reproductive lives. In both cases the male lived about half a kilometre from the female. The male moved closer when the female was in heat, and stayed nearby for about three weeks. I must emphasise however that the females may have mated with other males when I didn't observe it; I have no idea if those males mated with other females. I only know they were productive matings because both males had characteristics that were easily recognisable in their young. I do think, however, that both male and female wombats choose their mates in a way that may not be simply instinctive – in other words, you can't just put a male captive wombat in with a female captive wombat and say 'go to it'. Like human mating, wombat mating is complex and I suspect it is not easy for an outsider to even comprehend what variables are involved.

Can wombats predict the weather?

Tonight's weather- yes, and maybe tomorrow's. next year's? I don't know.

In the past 15 years I have successfully predicted what next year's rainfall will be here by observing how many babies are in the pouches.

But not this year. Despite good grass and good long-term human predictions of rain there are fewer young in pouch and at heel. This however may have something to do with drilling and blasting from a proposed gold mine upstream – or it may be because after years of drought there are relatively few young wombats of breeding age.

Some wombats certainly can predict storms three or even four hours ahead, and make for high ground or demand to be fed earlier. All too many wombats drown in floods, but it's possible that the ones that do have no viable alternative shelter to go to.

Are wombat really good diggers?

The 'little Aussie digger' is one of the great wombat myths.

Wombats dig instinctively. Most are superb diggers. But most are lousy engineers. Most 'new' wombat holes either collapse or are really new entrances to very old holes – perhaps hundreds of years old. I suspect the new holes that work are a matter of either luck or rare instinctive genius. Mother wombats teach their young how to dig for roots and how to enlarge their burrows. But I have never known a mother to dig a new major hole, or even try to, with a baby in her pouch or at heel – they just do some renovations.

In 35 years of study over ten square kilometres of heavily colonised wombat territory I've known 37 wombats who dug or attempted to dig holes. I have only known two 'new' holes that were successfully established. I have however seen 41 attempted new holes that failed.

Possibly we just have a sub-species of engineeringly-challenged wombats. Again, it is impossible to generalise without more data collected from more areas. I suspect, too, that if there was greater population pressure on the land I studied, there may have been more holes.

Often humans assume a new hole has been dig because a new entrance has appeared. In all cases I've investigated here, the wombat has somehow sensed the existing labyrinth below and opened up a new front door.

Consequences: you can't assume wombats will move quickly into vacant grazing land. If holes are destroyed by logging or heavy vehicles or overgrazing, it may be decades or even centuries before they are naturally reestablished. Note: wombats find it easier to dig into creek banks. One consequence of habitat destruction especially by overgrazing is that wombats are lured into new 'easy' holes by dams or creek banks, which can either collapse or be flooded.

Can you watch wombats without them running away?

Yes- and not be being a 'wombat whisperer'. Firstly, only one person- multiple sounds and smell confuse. Secondly, make a noise. I sing- wombats are not scared of humans but are easily startled, and as I've said, not good at processing sound. If you sing- not an aria, but melodic and repetitive, or even just chant 'rhubarb rubrab rhubarb' - they know where you are. I can usually get to within two metres of wombats- but you need to move slowly and always let them know where you are.

Try to wear familiar smelling shoes or boots, too, so the wombat can recognise an old acquaintance easily. And always wear tough and loose jeans, so nay bites are to the jeans not your flesh. Never approach a female with a baby at heel or in her pouch, though some mothers are happy for humans to play with their babies I the moonlight- possibly just to give them a good uninterrupted time to graze.

Are wombats muddle headed?

No. Wombats are single minded. A wombat does not appear to multitask. If a wombat wants to scratch, it does. If it is running to safety it seems unaware of any other data till its reached its objective – even if it's a car bearing down on it.

What size is a wombat's territory – or do they have territories at all?

There is no such thing as an 'average' wombat territory. Some wombats defend their land – or a small part of it – and don't like to share with other wombats. Others appear happy as long as another wombat is more than 2 metres away.

Most wombats share land with other wombats and usually burrows too – though they may not be there at the same time. In dry times wombats co-exist quite close together and most appreciate the necessity of other wombats sharing their territory and its grass and water. (Some bastards don't.)

The amount of land that a wombat wanders around most nights depends on how much tucker that land contains. Our four-hectare garden usually has about three resident wombats, but it is very good tucker land, with fallen apples and avocados to sustain the wombats for months in dry times.

In very dry times most wombats will act aggressively to another wombat feeding nearby – but won't hunt the wombat out of that feeding area just keep it a few metres away. But this varies from wombat to wombat.

The hills above our house are drier and grass is sparser and there will perhaps be one wombat to ten hectares, while higher in the mountains the density of wombats falls to maybe one wombat on twenty hectares or even less in dry times.

A wombat's range also depends on good hole building country – a good bit of dirt bank by a creek may be almost a wombat city, but the wombats who shelter there during the day will roam far afield to get food.

Sometimes territories seem to be occupied almost on a time-share basis – one wombat grazing there at dusk, another about 2 am, and yet another in the early morning, with a fourth, usually an elderly wombat, grazing during a winter's day.

Wombats mostly keep to the same territory and usually walk along the same tracks every night, except in grassy areas over which they wander as they eat, but they can range for several kilometres in a night, either to find a new place to eat or drink or to seek out other wombats or find a territory of their own – though I am not quite sure about the last.

Traveling wombats may seek out strange wombat holes to shelter in during the day. Even if another wombat is already in residence the resident wombat may allow the new wombat to shelter there, though sometimes they object. (Most wombats will also allow other wombats to shelter with them if they are suddenly startled by a dog or machinery.)

Wombats also travel long distances and then decide to come back home – and I have absolutely no idea why. Were they visiting? Wanting to explore? Feeling energetic? Maybe all of these or none – these are human reasons and wombats are definitely not human.

I have followed wombats more than two kilometres away and back again in a night – this was in a good season, so they weren't hunting for more food. I have known one wombat to travel about four kilometres away and return months later; I suspect, but have no evidence, that wombats may travel a good deal further than this.

How much room should a captive wombat have?

How can I answer this? I would pine if I had less than ten square kilometres around me to roam in – and I suspect there are wombats

who are the same. But there are humans who live mostly either behind an office desk, in front of a TV or choose to stay in a luxury resort – and I suspect there are wombats like this, too, who are content with a smaller area as long as its 'enriched' with holes, mounds and playthings – and the scents of many other animals around.

I suspect though that no captive wombat is truly at ease unless they have a minimum of quarter of a hectare, with access to at least another two hectares, as well as the smells of other wombats, male and female and of different ages. I can't emphasise enough how important this range of smells is to any wombat, captive or otherwise. A wombat without a complexity of smells is like a human who has been blinded – but possibly 10,000 times worse. It is literally unimaginable, as we lack the senses that they communicate with.

How long do wombats live?

Around here wild wombats live to an average age of about fourteen, though deaths from what looks like old age around six to ten years are quite common. Hand-reared wombats, however, who demand and accept supplementary feeding in bad times, can live to twenty or I suspect much longer. It is worth noting however that since I have been studying the wombats here we have gone through two severe and two smaller droughts, with few good years, so it is possible that if I had observed wombats through, say, the 1950s, I might have thought they had a longer life span.

Most wombats here die in their holes, and most appear to die of a complication of mange, either general weakness or infection. I suspect kidney failure is also a major killer – many wombats near to death have loose or smelly stools. Interestingly, the hand-reared wombats here

don't appear to suffer from arthritis as much as the wild ones, so I suspect there may be a genetic component to their susceptibility.

How far do wombats travel?

Some can range for about half a kilometre in a night; I tracked one more than 7km one night- an back again; others wander over no more than about 50 square metres.

How far do they cover in a lifetime? A young male may travel more than 10 kilometres – the furthest I have tracked one. Of 31 young males tracked, at least 18 travelled beyond the 10 kilometres territory I survey. At least 8 of those returned at some stage in their lives, possibly all of them who survived.

How aggressive can a wombat be?

How aggressive is a human? I personally am quite meek and mild – or at least I am 99.999% of the time.

Wombats vary aggressiveness, just as humans do.

Most wombats may growl or snarl, but won't attack. Those that do attack often seem practiced – a female may go for a male's testicles, a male may go for a female's side or ears, all wombats will go for the nose, and all will whip around and present their attacker with their bum, if possible – hard and bony and fairly invulnerable.

Some wombats nip and back off; others hold on and literally rip chunks out of the other. Once the opponents have fought once though, it is often a game of bluff – the one who stands their ground, snarling and maybe snapping at a branch or twig, is the winner – and this may not be the wombat who won the previous battle (though it usually is).

Of the eight truly aggressive wombats I have known, only two were male and the other six were females with young at heel. I have also known two wombats, Rikki and Bad Bart the Biter, who would sneak up from behind and go 'chomp'. This wasn't aggression, it was just their way of saying hello. They didn't realise that I lack tough wombat hide and musculature.

I have know two of the 76 wombats I have been studied to be truly nasty, biting any creature they could snap at. But appear young and healthy, and were still just as aggressive I old age.

Wombats appear to have an instinctive battle plan, sneaking up behind their opponent so they can't be as easily smelled; chomping and back away if it's a threat battle, or going for the neck, nose or testicles if it's a genuine assault. It doesn't appear to be learned, as hand reared wombats will follow the same procedure, but it's possible that hand reared wombats may simply pick up the strategy quickly. Once it's been done to them they'll copy it. .

What do wombats prefer to eat?

Mostly what they learn to eat as babies, but they will vary their diet enormously in bad times – the wombats at our place switched to fallen avocados, apples and pears in the 2003 drought. I would never advocate this as a particularly suitable wombat diet – but it's worth noting that they ended the drought fatter than when it began, and with no mange. But when there is available grass they won't eat fruit.

Most wombats have individual preferences. Several at our place prefer kikuyu, even though there are only small small patches of it. They particularly like it in winter, possibly because other grasses may be low in protein then. Some like poa tussock, others will dig up and eat couch grass roots even when there is plenty of grass. Some like a varied diet.

Others, especially those who have been hand reared or have grown up in a lush season with plenty of one kind of grass, are conservative eaters.

The implications of this for captive wombats may be that, unlike smells, wombats are not gourmets. They like food that satisfies them, but unlike say *Wallabia bicolor*, they don't seek out particular tastes.

And by the way – even though I have written a book about a carrot-loving wombat, I have only known three wombats, two of which were hand reared, to eat carrots by choice, rather than as a survival food. That book just happened to be about one particular much-loved wombat. I apologise for perhaps adding to the wombat myths around.

Do wombats drink?

Yes, in hot times, but not if they get sufficient moisture from grass or dew. Wombats usually take the same path to water and drink at the same place. But I have noticed here that if there is a strange scent around from a dog they may avoid that drinking spot for days rather than drink where a dog has drunk or, in some cases, rather than cross a dog's track. But this varies, and wombats who are more familiar with dogs' smells seem less worried by a reasonably old scent.

Can wombats swim?

Some wombats can swim. It's a sort of four-legged dog paddle, with the nose held high above the water and everything moving frantically below – though unless you get in the water with them and duck down to look it will just look like the wombat is floating while some submerged person pushes it along.

I have seen wallabies and kangaroos swim for pleasure after a drought, but every wombat I have seen swim did it to get somewhere. Wombats are muscular creatures and can swim against quite a strong current.

Not all wombats work out how to swim before they drown – it may be a skill that only a few acquire, or perhaps Australia does indeed have

sub-species of wombats and some wombats can swim instinctively. I don't know how to test this without a pool and at least twenty wombats – and the wombats might well object. It seems unfair to try this just to satisfy human curiosity.

Can wombats climb?

I have known one wombat, a hand-reared one, to climb a two metre reinforcing mesh fence, balance precariously on top of it, then dive down head first so she could join me among the carrots. She did this several times till I put bird netting along the fence to stop her.

I have never known another wombat climb a fence. On the other hand, why climb when you can push through or dig under?

Does mange mean death?

For years I believed that a well-fed wombat wasn't susceptible to mange, that it was only when they were forced out in daylight that their skin became irritated and mange was able to colonise. I now no longer believe this. Instead, I think that healthy populations can tolerate a certain level of mange infestation. It is only when they are under pressure – which can be from psychological stress as well as food stress or too much sunlight – that the mange increases to a level where the irritation is extreme. That in turn /leads to less sleep, wombats out in sunlight and vigorous scratching that breaks the skin and makes wounds that then become infected.

We may not ever eradicate mange, but if we can keep the level down with topical drenching with measured doses and supplementary feeding, then deaths from mange are not inevitable or even likely.

Wombats and Arthritis

About thirty-seven years ago I noticed wombat bones that were worn at the edges, much like illustrations seen of human bones affected

by arthritis. Since then I have collected wombat bones, with notes about their owners.

As with humans, the older a wombat is the more likely it is to have arthritis. Elderly wombats love to bathe in warm sand on winter afternoons. This may help with parasites, but I think it's mostly because the warmth helps their aches –especially as it's only old wombats who do this. Some wombats may be genetically more susceptible than others to arthritis, but as I don't know the male parent of most of the wombats here, I can't be sure of this. Not all very old wombats are arthritic and some quite young ones can be. Drought or lush years don't seem to make any difference, so it probably is reasonably independent of diet, but again I can't be sure.

A semi-final story

Wombats have adapted to a land where they need to conserve energy. Some do this better than others.

For years I shared my garden with a wombat I called Sneazy – a wild wombat, who I never touched, fed or interacted with. But she loved our doormat – she'd sleep on it. I suspect the accumulated smells in a doormat are a bit like a soap opera for a wombat.

Then one morning when I went out Sleepy was still on the doormat, totally still. I tried to wake her. She was stiff and cold.

A vet friend was coming for breakfast. We lifted her, still on the doormat, onto the table and my friend inspected her, looking for injury or illness. But she seemed unharmed.

So we dug a grave down in the orchard. We carried her down on the doormat. We lowered her into it – and Sneazy woke up. This was not a dead wombat. She ran off into the trees, and from then on left the doormat well alone.

But even a vet had failed to find a heartbeat. This was a wombat who could slow her metabolism to the point where she seemed dead.

When a wombat is asleep with its head on the ground or its paws it's only dozing and will easily wake. It's probably conscious of what's happening around it at some level. A wombat asleep on its side will wake reasonably easily. But it can be very difficult to wake a wombat asleep on its back with its legs in the air, a position they only take when adult and feeling very secure – and possibly in times of drought or when food is scarce.

I have never known a wombat to sleep as soundly as Sneezy, but once you know that one wombat can do something, you need to add it to the possibilities of the species.

A final story

I thought I knew wombats well, until about five years ago. Bryan and I drove up the mountain road about 6 pm. We could hear a logging truck in front of us. As we came around a bend I barked – it looked like a large wombat was somersaulting down the road.

It wasn't. It was a large female, dead, her head crushed, presumably by the truck in front of us. Her baby – about ten months old perhaps – was frantically pushing his nose under her body, heaving her up and rolling her over and over down the road.

We stayed and watched. I was crying by then, and so was Bryan.

It took about 40 minutes for the baby to roll and shove and push his mother to their hole. He managed to get her just inside, then clambered in himself.

I know we shouldn't anthropomorphise. But I have no doubt the baby hoped that if he could just get his mother back to their burrow, if they could sleep during the day, when he woke up the next night it would all be better.

I had never guessed that a wombat could plan and imagine something quite as complex as getting that body more than 500 metres over rough ground to a hole and the hope that she might recover in its safety. After 33 years I realised how little I knew about wombats after all.

Of course it wasn't all better for that baby wombat and not for hundreds or thousands of wombats each day. We have no accurate figures on road kill; no accurate census of wombats; certainly no accurate figures on how populations have changed. Possibly the study I have done in the Araluen Valley over the past 35 years is the only long-term study done on aging populations, and that has probably come to the end of its statistically significant usefulness, as so many orphaned wombats have been and will be released nearby. This also means that any work I might do on a possible local sub-species is no longer valid either. (Please don't think I am against the release of the orphans – their release is another subject entirely. But they do mean that any studies I do now may no longer be of a truly wild and local population.

So what are the most urgent needs if we are to understand and preserve this extraordinary species?

1. A complete moratorium on wombat culling.
2. An accurate census in various areas, over at least a ten-year period.

It may also be possible to use satellite tracking to do a wombat census – or to use satellite tracking.

Wombats leave tracks on roads, wallaby tracks and on dewy grasslands. Once you know when and where to look the signs are obvious.

But the sign of a mange infected wombat is also obvious – they stop more often to scratch. If a wombat stops every two metres or less to scratch it can be surmised that they have a severe mange infestation which needs treating.

I have no experience of using satellite imaging for tracking – I track using my feet and eyes. But it would be very good indeed to see this investigated by someone more technologically capable.

3. Investigation of using dingo or coyote urine along roadways to keep wombats from grazing along the verges. This is effective in the US and Northern Europe for keeping grazing species away from roads and traffic – and wombats appear to be extremely sensitive to the scent of a meat-eating predator, though again, not all wombats and not all of the time. But if it could reduce the road toll by even a third it would be worth it.

Compulsory animal tunnels under new road systems – could double as drains.

4. Centralised wombat research so that it is impossible for National Parks to defend ignorant decisions.

5. Research into the role wombats and macropods play in preserving grass seed and microflora fauna in drought.

Wombat droppings survive for up to six years of drought, with grass seeds intact ready to sprout once it rains again. They may also preserve the soil bacteria and micorrhizal associations needed to fix nitrogen from the air or for plant roots to absorb phosphorus and other elements in the soil more easily. There is just enough evidence to indicate that this does happen – we need far more study to know how significant a role wombats or for that matter macropods can play for ongoing Australian soil health. The farmers who shoot wombats and `roos may in fact be helping to destroy their land's future.

6. Campaign to pressure the National Parks and Wildlife Service to actively treat mangle.

7. Make it illegal to keep wombats in enclosures smaller than half a hectare except temporarily for research purposes. Instead, hand-reared wombats who appear too timid to be released into the wild could be kept in large reserves, where humans could be encouraged to wander at night, even helping to hand feed perhaps, but sharing the extraordinary joy of being with a creature who is neither food nor pet, but as wild as a captive wombat can ever be.

Appendix 1

What baby wombats learn from their mothers

We assume that wombat, and nearly all animal behaviour is instinctive. It isn't. Wombats learn – and wombats also teach.

As pouch animals, baby wombats are with their mothers more than most mammals and there is a lot of opportunity for learning.

We assume that human children need education, love and stimulation in the ways of being human and if, like Romanian orphans, they are left untended and unstimulated they will never function properly as adults.

Well, it's the same with wombats. They are NOT totally instinctive... and if you want to raise a wombat who can cope in the wild, you also need to understand what every mother wombat teaches her offspring.

So what DO mother wombats teach their young?

What every young wombat should know...

1. **Where to leave droppings**

Wombats communicate by smells. In fact wombats 'see' the world by the way its smells. Wombats will have favourite 'sits' where the grass is worn from years of 'watching' the view down the valley – but the

wombat will be 'seeing' the view from its smell, which means the wombat will be 'seeing' the world not just the way it is now but what it was like yesterday, and I suspect months or years ago too, and even perhaps some of what it will be like tomorrow or next year... but a wombat's predictive ability is another story.

A dropping may mean many things, but one thing it certainly does mean is that the wombat is not so much marking out a territory, in the way a wolf might, but announcing its presence.

When a new wombat moves into an area, it will 'mark' both tracks and high places – in our case wombat arrivals mark our front and back doors and each staircase. And any wombat who wants to challenge or say 'Here I am too' will leave droppings nearby.

Mother wombats teach baby wombats to leave their droppings inconspicuously under shrubs or, in our case, often under zucchini leaves or pumpkin vines. They do this by snapping at the young one if it leaves a dropping near their own or in a prominent place.

If a young or newly released wombat leaves its droppings by a track, on a rock or log – especially if they have been allowed to leave droppings anywhere – then they risk being challenged or attacked by other wombats, especially females with young.

How do you toilet train a wombat?

And this is the crux of the problem for carers. The mother wombat is usually with her offspring throughout the day and night though not always (see earlier section). This means that like a human parent she will see when the youngster is about to leave a dropping, and either nudge him or her or bite them, depending on their temperament.

Carers rarely, if ever, have this level of involvement with their wombat babies. But if young wombats are bashed up, this lack of toilet training may often be one reason why.

Solution: Provide discreet places for the babies to leave their droppings – under bushes and leaves – even fake ones. Place their droppings under them – then give them firm hints (see below on how to give a firm hint) that this is where their droppings need to be.

But don't expect them to leave ALL their droppings in one place, like a cat litter tray. You'll need many places – wombats also need to be able to leave droppings all around their world.

2. How to find food... and what to eat

Wombats are conservative – perhaps the most conservative of large animals. If times are good a wombat will spend its spare time sleeping, not creating art or song or wandering off to explore the world.

Wombats, like many animals including humans, usually only eat the foods they were introduced to as babies. Which means that an orphan wombat raised by humans won't have had exposure to many different natural foods – different grass varieties, new growth from poa tussocks, fallen fruit, how to dig up young kurrajong or other roots, which bark can be safely gnawed.

The answer for carers? Well, you can't very well go around gnawing on bark. But you can make sure you expose the baby to many different types of grass, encourage them to try as many different foods as possible, including chewing on roots, so that when bad times come – or even if they are placed into unfamiliar territory – they'll be able to forage better.

Perhaps every carer needs a parsnip or sweet potato patch, to teach the orphan that food can be found under the ground, and often needs to be dug for or at least hunted out.

Every orphan wombat we have been given has been a picky eater, happy to eat lush grass but unable to forage or even supplement their diet with a wider range of foods, which possibly may make them healthier

and less liable to mange. But interestingly their offspring have foraged much more widely.

3. Dust bathing

Wombats may dust bath for many reasons – it may help with parasites or soothes and warms arthritic pain or just plain feels nice. And I suspect it is a learned activity.

4. Fighting

Wombats need to know how to protect themselves when another wombat attacks and how to attack if necessary, too, by creeping up directly behind the other wombat so they can't be smelled.

Wombats' most vulnerable spots are their testicles, which females sometimes try to rip off, and their neck, ears and eyes. Their least vulnerable spot is their bum – hard and bony. An experienced wombat knows to turn their back FAST when attacked so they only get a shallow wound.

I suspect, but have no hard data, that most orphan wombat injuries are to the head, often with severe tearing. The injuries experienced by most 'wild' young wombats result in scar marks on the bum that soon heal.

The solution?

Play with the orphan wombat, particularly the 'pounce' game that baby wombats seem to play instinctively in the wild with their mothers, passing and often surprised wallabies, shadows, and even passing humans. (Note: even though this game is instinctive, you need places to hide behind and willing, or at least submissive, companions to play it.)

The baby hides behind a bush, then leaps out and butts the opponent from behind. Then they may take turns and the other one leaps out to attack them.

So... play creeping up behind the baby wombat and pouncing. (Don't hurt it – just roll it over or clutch it). Be responsive if it seems to want to play creeping up on you.

5. Surrender...

Most wombat confrontations end in the retreat of one of the parties, not a fight. The art of surrender is one of the most essential things a baby wombat learns – exactly when the scream of an angry wombat or its scent, means it is going to seriously attack and it's time to run, at least a few metres away to signal submission.

I have never known a hand-reared wombat to know how to fight; more importantly, I have never known them know how to surrender. Orphan wombats miss out on one of the most important cultural lessons of wombatness – and we wonder why they get bashed up.

The solution: truthfully, I don't know, apart from early 'soft release' so they have a place to retreat to if attacked, and where they can recover from any injuries. But I suspect a wombat who has learned the game above may be better able to cope with their first few confrontations.

6. General good manners

When baby wombats go past the bounds of good manners with their mother they are nudged, nipped or even badly bitten – enough to leave a scar. They learn to play, and play rough, even fight. But they also know how not to go too far.

I am not an expert in wombat etiquette. But I've worked out a few of the rules.

a. It is not good manners to come up directly behind a wombat (this may mean you are about to attack – see Fighting).

b. It is not good manners to eat within two metres of another wombat, or even further away if it's a drought or their neighbour is aggressive. Orphan wombats are often kept with other wombats

and are/they become used to feeding together. This too can get them bashed up once they are released into the wild. (Perhaps wombats raised together should be fed separately – but this may also be totally counterproductive. Perhaps it/this also needs to be trialled. See below.)

c. It is very bad manners to move quickly towards another wombat. This too can be interpreted as an attack. But baby wombats kept together may learn to play together – and they may assume that wild wombats are happy to be with them too.

It is worth remembering that wombats only ever have one offspring at a time and, although baby wombats play with their mothers, their own shadow and even passing wallabies, who get out of the way quickly, or the odd stray human, they rarely, if ever, naturally play with another baby.

The solution? I don't know this, either. It still seems better for a baby wombat to grow up with one of its own kind, even if it's a baby who knows no more than it does. But we still need to recognise that while this is good, it can also lead to later problems.

A Summary of Possible Strategies for Carers

1. Play. Interact with the orphan, the ways a mother wombat might – a lot. Wrestle with them, rough and tumble and tug-of-war, to develop muscles and coordination. Play with them, giving as much physical stimulation as you can. But also be firm with them.

Playing with a baby wombat won't make it more inclined to stay with humans – simply giving it food will do that. But it will give it more physical and mental skills. Let it follow you around the garden or anywhere it will be safe from dogs and cars but keep an eye on the weather and the baby's sun exposure.

2. Give the baby dirt to play in and dig in, branches to gnaw, lots of walks on grass and also through bushland as much as possible, so they learn about space and scents and terrain – they won't run away from you and get lost. On the contrary, they will keep you carefully within bumping distance! Don't worry if their claws are long – they need to be long to dig, so don't file them off or think that, like dogs, they need to run on concrete or hard ground to wear them down.

3. Feed many different foods – though of course only ones that suit a wombat's digestion. (We are not talking toast and marmalade here).

4. Let baby wombats forage in as many places as possible. If you can, have a patch of parsnips or sweet potatoes so they learn to dig, and a line of poa tussocks too so they learn to look for new shoots.

5. Provide discreet places to leave droppings and encourage them to use them, so that the baby won't inadvertently challenge large and dominant wombats.

6. As soon as possible, preferably as soon as the wombat is fully furred, place the orphan wombat into a 'soft release' site – one where they will live in a hole, but be bottle-fed and regularly checked and encouraged by a carer.

7. Don't be too hard and fast about when a wombat is ready to be released. Don't assume that a wombat is ready to be independent just because it is a year old, 18 or 20 months or has reached 20 kilos. It will depend on the individual, the season and many other factors. Some wombats are cissies, some are battlers, some good at interpersonal relationships and some will need a hell of a lot of guidance. Just like us.

But this early exposure to other wombats and a varied environment is essential if a wombat is to learn the skills it needs.

And possibly...

8. Feed baby wombats separately... but I'm not at all sure about this one. It needs to be trialled – it is possible that two babies together teach each other to eat more discreetly.

Appendix 2

How to Farm or have a Garden with Wombats

I choose to live with wildlife. I would hate to see our wildlife limited to the sort of reserves whites once tried to herd native Americans and Australians and other indigenous peoples into. National Parks are essential, but we need to allow other species into our everyday lives – not just for their sake, but our own.

I have spent more than half my life, now, working out ways that crops and gardens can still be grown without either killing animals and birds or – just as bad – displacing them.

Why? Why do I put up with wallabies in the corn, instead of reaching for the shotgun, like most farmers?

Why don't I live with a nice obedient Pekingese instead of a wombat who has never even considered how to please a human in her life?

Why, for that matter, have so many generations of humans put out food for wild birds, spent precious dollars taking an elderly dog to the vet, bought the one expensive cat food that their moggie will deign to eat, all for no obvious return?

The answer is, of course, that humans need animals. The need to live with animals is something that I think goes very deep into the basis of the human character. We too are animals, and if we recreate our world to be entirely human, then we will lose a great part of ourselves.

The Tithe Garden - how to share your land

A tithe garden is one that is shared with people and other animals.

Tithes were a Christian Church levy: you paid a tenth of your income to support the Church and help the poor. And though tithes were abolished decades ago, I have a feeling that the Church may have got it right – when it comes down to it, a tenth of your income/effort/land is probably what most of us can spare. (Often of course we can – and do – spare a lot more. But a tenth is a good BASIC amount.)

A tithe garden is one that you share.

In a tithe garden you can either assume that you own the garden – and plan to share a tenth with others... or assume that humans simply rent the world... and that one tenth of the garden just for you is a fair share.

I don't think it really matters morally which one you choose – all of our circumstances are different (we happen to have a lot of land and a reasonable climate and the knowledge and experience to make a small bit of land feed us. If you can only spare one tenth... fine. It's the decision to share that's important.)

Either way, a tithe garden means accepting that others have a role and rights in your garden, that it's not for you alone.

Once you acknowledge that you don't 'own it all' your sense of injustice at depredations (mostly) vanishes. Instead of really getting mad at the rosellas (a little bit of jumping up and down at them is good exercise and cathartic too) I just say: Okay, they're taking their share. (Maybe we just need to conquer an inbuilt human desire to conquer and control all that we see.)

It's as though there's a mental barrier you have to leap over. We've been brought up to accept that humans should have it all but when you cross that barrier and say: 'This is for you, this is for me...'

Well, most of your anger disappears even when the bastards take the lot.

In the past thirty years I have developed a range of strategies that we practice here, that allow us to grow fruit and vegies (and flowers) and still have wildlife living here freely. In fact we have made this area far richer for wildlife – I think we possibly have the highest wombat density this side of Alpha Centauri. And we also grow far more fruit and veg per hectare than most people would believe possible.

The strategies we use include:

- . Growing native fruits that birds prefer to introduced ones (birds like sourer fruit than us – which is why they eat your apples two weeks before you want to).
- . Netting and pruning fruit trees till they are above wallaby reach, then reusing the tree guards elsewhere.
- . Growing roses up fruit trees instead of on bushes – this keeps the roses from the wallabies and deters possums from eating the fruit.
- . Growing fruit in thickets, instead of neat lines – this makes it less attractive to birds, far more drought and frost resistant (we grow avocados, custard apples and sapotes here even though we go down to -9° C in winter. In fact we grow about 260 sorts of fruit – possibly Australia's largest fruit collection.)
- . Grow grevilleas and other natives for the birds - who do most of our pest control (plus both the birds and the flowers are beautiful).
- . Study which plants wallabies and wombats prefer – this will vary from season to season. (Blacktailed wallabies will eat rhubarb leaves if they are starving, for example, and wombats will eat green apples, but both ignore those foods in all but the worst years.)

We have only two small areas – Tiger Pens One and Two, because they look like they were built to keep tigers in, not wombats and wallabies out – that have been fenced to keep out wallabies and

wombats. I grow lettuce, carrots and corn in there but veg like potatoes, tomatoes, capsicum, chilli, okra, beans, cucumbers, burdock, zucchini, pumpkin, chokoes, chilacayote and many others can usually coexist with wildlife. (I don't count feral goats, rabbits, foxes, wild dogs or neighbours' starving cattle as wildlife.)

Farmers often exaggerate the amount of damage wombats, and other wild animals, do. Wombats eat grass – but they also eat tussocks and tough species that cattle and sheep don't like, and may help keep those in control. Often wombats are blamed for eating grass or causing erosion that is really the fault of rabbits – a wombat's big droppings on high spots are more obvious than rabbit's pellets.

The amount of damage a wombat does is subjective. One farmer may see half a dozen holes in their netting fence as a calamity; another may see it simply as a nuisance. Many farmers resent the intrusion of any non-domesticated animal onto their pasture – others revel in contact with other species. Wombats do very little harm economically – more often they are a psychological threat to a farmer's control over their domain. This threat makes some people exaggerate the damage wombats do.

Fences

No fence stops a wombat. If they can't push through it they'll dig underneath. If you've tried to fence rabbits out or young lambs in, wombat holes will negate weeks of fencing.

The easiest solution to wombat damage is to install a wombat gate. There are many designs around, all effective. Wombats are creatures of habit and will keep using the same hole – and will push through anything blocking their way rather than try to dig a new one. You can swing a neat gate made out of wood and wire if you like – or try an easier though uglier solution, an old car tyre filled with old fencing

wire. (The rim will keep the wire in, and the wire is usually too prickly for a wombat to press through.)

Tie the tyre to the top of the hole. It'll block rabbits and lambs, but a strong wombat will be able to push through it easily.

Another wombat 'gate' design we tried here was simply an old, two-metre long culvert pipe (broken and bought cheaply from the Council). We pushed this through the hole. Wombats went down it happily but lambs and wallabies didn't like to crawl that far. Unfortunately, I imagine rabbits wouldn't be deterred by it.

Bryan also ties a flap of two thicknesses of netting between two heavy bits of iron and ties this above the hole – result, a heavy gate that wombats can push past, but wallabies don't.

Electric fences

Wombats can also be kept out with electric fences. Place two electrified wires on each side of the netting fence about 30 cms from the fence and 30 cms above the ground. This will also help keep out wild dogs, dingoes, most foxes and at least cut down rabbit invasion.

Erosion

Wombats are often blamed for erosion, probably because if land is cleared or new gullies formed or banks eroded away, wombats will build tunnels there – then when the erosion gets worse they get blamed.

Wombats don't cause erosion. They don't even make it worse. They just happen to be there at the time.

Grazing Competition

Wombats eat most grass species. They'll eat young oats too (at least some wombats will – many ignore them) and occasionally

wheat. Their favourite food, however, is tough native grass, especially kangaroo grass and poa tussock and, around here, sword or bladey grass. They also like rushes, wire grass, various leaves, succulent roots and bits of thin twig. None of these are relished by sheep or cattle and, in fact, wombats may help to keep these in check and from competing with introduced grasses by eating them before they seed and spread.

It is also easy to overestimate how many wombats you are pasturing. One wombat produces about 100 scats a night, spread prominently on tall rocks, by posts and on any rise or bit of pipe left around. Droppings can take a long time to decompose, especially in winter when they freeze or if cattle or horses have been drenched with a vermicide that also kills the dung beetles that feed on their droppings, so there are few dung beetles to break up the wombat droppings (though this is usually done by different beetles). If you wonder how many wombats you're supporting, count the FRESH scats – the soft moist ones – then divide by a hundred.

Wombats are also blamed for fouling dams. Wombats don't foul dams – and may not even drink at all if pasture is lush.

Vulnerability

Most wombats aren't killed deliberately. Wombats are frequently poisoned with poisoned grain and baits meant for rabbits and birds. They are trapped by wild dog traps. Many are shot by farmers who resent their damage to fences or simply feel that a non-domesticated species has no place on their farm.

Even more wombats however are killed by starvation from clearing, by the pressure of cattle feet that collapse their burrows, by ploughing (even occasional ploughing will rid your area of wombats).

How To Encourage Wombats

Most 'wombat retention' techniques should be used anyway, for other reasons like soil and watercourse conservation.

1. Establish shelter-belts

Keep belts of bush around dams, wet gullies, springs and watercourses – these will help stop erosion and water fouling as well as provide shelter and habitat for wombats.

Leave belts of bush on rocky areas, around fence lines, tops of hills, steep land etc – this will also act as a reservoir for bird and other predators to help control pests like Christmas and other beetles, mites and other pasture pests.

2. Wildlife corridors

If you have bits of bush link them together with corridors, fenced and revegetated if necessary, and link dams, wet gullies and swampy areas too. Make sure they're not interrupted by fences or roads.

3. Avoid barbed wire

In our barbed wire loving district you often see `roos with their feet caught in barbed wire, wallabies with ripped tails, possums who've been tangled. Avoid barbed wire if you can. If your fences are good – taut and well strained – barbed wire may not be needed. Barbed wire is very useful for restraining cattle who don't want to stay in a designated paddock (the other cow's grass is always greener syndrome is undoubtedly a real bovine phenomenon but some cattle are genuinely starving and their choice is break out or die of malnutrition) but unnecessary for most animals with thinner hides.

4. Don't burn your pasture.

Burning is an old-fashioned device to destroy weeds and give you young bright green spring growth. Actually it'll eventually increase your weed problem unless carefully managed – weed seeds won't have

any grass competition and will be the first species to come up on burnt land. Burnt pasture becomes compacted, lower in organic matter and loses much of its nitrogen. The bright green growth is temporary as the first flush makes use of the depleted but readily available store of nutrients.

Burning starves wombats, even if they survive the fire. But as most wombats die in their burrows you may not realise how many are lost.

5. Clear road verges.

If you really care about your wombat population, try to have a cleared space near any fences next to a road. Many farmers leave a belt of trees next to these fences or there are trees on the road verge – often the only trees around. Wombats congregate there and so are killed by traffic.

Have your green belts somewhere else, on internal fences, not external ones. A clear strip next to external fences will not only deter wombats, it'll help act as a firebreak – you can either plough it or use a herbicide at the start of the fire season.

6. Stock more lightly

Don't calculate the maximum stocking rate of your land – calculate the maximum stocking rate in a poor year – then take off a tenth and stick to that. Or be prepared to be much more flexible in your stock management and ownership regimes – you don't have to own all the animals that graze on your place. Look carefully at agistment arrangements (these can have weed implications), buying in stores that can be turned off as fats in a few months in abundant seasons and electric fencing as ways of increasing both your management flexibility and your ability to manage your farm for the greatest biodiversity as well as productivity/profitability.

The ability to move animals around in different grazing patterns and at different intensities is of prime importance in terms of retaining a wide range of plant species and keeping weeds, woody and otherwise, under control. It also enables you to create good firebreaks in seasons when these are imperative.

7. Pay rent to wildlife – accept it is their land too

Back to the one in ten system: one tenth of the carrying capacity of all Australian land should be reserved for wildlife; one tenth of our land mass for non-human forests; one tenth of pasture allowed to go to non-profitable stomachs or left to go back to trees. (Some of us of course have the view that it should be one tenth to humans and nine tenths to everyone else... but I'm trying to be restrained here.)

Native animals are part of the natural ecology of our farms. Their feet suit the soil, their grazing techniques suit the natural pasture. Australians have discarded many 'useless' parts of our ecosystems such as destroying natural predators like wasps with spraying, leading to even more massive pest depredations; 'improving' land by draining and clearing - reducing the flocks of ibis that keep plague locusts in check; leaving park-like clumps of trees that are vulnerable to Christmas beetles – assuming anything that isn't immediately useful can be dispensed with. A million mistakes made out of ignorance, destroying before we understand.

Who wants to live in a world just of human beings and their domesticated dependents? For us, wombats are one of the privileges of owning land – furry obstinate creatures, whose lack of domestic docility is one of the chief joys of farming with them.

If I were asked for one clear, overwhelming financial reason why you should encourage wombats on your property, I couldn't give one. Yes, they are useful in our orchards – they eat the grass around

mulched trees, add manure, eat fallen fruit. They help keep poa, reeds and other weeds in check. For most farmers this probably isn't enough.

I've used wombats here simply as one example. I could have spoken about `roos or wild ducks, or any one of the species that do intrude to some extent on our human activities.

The question is: How much should they be allowed to intrude?

For many farmers the answer is not at all. One blade of grass that goes to a wallaby instead of a sheep is too much and the 'intruder' must die.

For others there's an unspoken threshold – they can tolerate a certain amount of wildlife, but then the guns come out. This may be quite a high level of tolerance in good times but in bad times any competition with stock may be seen to be a luxury. Even a few years of shooting or trapping may be too much for vulnerable populations. (If an animal population falls below a certain size they may become too inbred to survive.) And so the wildlife disappears again.

If you are a farmer reading this, who feels wombats intrude on your property, consider:

- . making a Voluntary Conservation Agreement that may give you tax or local government rates relief in return for protecting wildlife on your property (contact your local National Parks to see if this is available in your state);
- . investigating whether grants for fencing corridors or planting species for wildlife may be available through Landcare;
- . working out exactly how much wildlife costs you – compare that to feral pests like rabbits. Work out how much wildlife you can afford to keep (as opposed to blindly assuming that anything that eats a blade of 'your' grass must be eliminated).

The world would be boring if it was inhabited only by humans and their pets and useful species. Not just boring – I think we would lose our souls.

I'm not sure what a soul is. But it is an essential part of being human. And being human we evolved with other species and with trees and flowers and a myriad of living things. I know that when I am in cities, surrounded by only humans and their products, I find life very simple. There are only the complexities of one species, not 100,000.

Possibly there is a moral reason to share my land. But mostly I do it for myself, because without other species, I would be less.