



The Avicultural Society of New South Wales (ASNSW)

(Founding in 1940 as the Parrot & African Lovebird Society of Australia)

The Secret Life of Sydney's Parrots

(ASNSW Meeting - March 2014)

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B.Sc. (Hons), M.Appl.Sc (Coastal Management)

Outline and Rationale

Hi, my name is Adrian Davis and I am from [Sydney University](#) where I just finished my PhD. I have spent the last few years looking at parrots. Part of that involved tree hollows, how they use them and specifically what they are competing with. So I guess I am stepping away from what you would normally have at your meetings in terms of aviculture and moving more into ecology. So still based on parrots, I guess it is a different angle.

So why did I do this?

What made me decide to look at parrots for the last few years?

Increase in parrots over the last 30 years

Well over the last 30 or 40 years there has been a dramatic increase in a lot of parrot species throughout [Sydney](#), particularly the [Rainbow Lorikeets](#). Since about 1970 in Sydney, Rainbow Lorikeets have increased quite dramatically and many other parrots have as well.

Parrots are hollow nesters

The key thing about parrots is they are hollow nesters, they require hollows to breed and without hollows they can't breed. They are an obligate hollow nester.

Limited number of hollows within the city

Within our cities we only have a limited number of hollow bearing trees left because we have cleared a lot for development and presumably this will continue to happen so that as time progresses we will continue to lose more trees.

So what is going to happen for the parrots that rely on these hollows and also to other animals as well such as [owls](#) and [Possums](#)? It is not just the parrots that are using these hollows it is a variety of animals that are relying on them.

Changes over the last 100 years

So as I said, there have been a lot of changes over the last 100 years. In the early 1900s there were really only two parrots that were seen within 10 kilometres of the Sydney [GPO](#) and they were the [Turquoise Parrot](#) and the [Ground Parrot](#). The nearest sightings now (and correct me if I am wrong) is the Turquoise Parrot at [Wisemans Ferry](#) and the Ground Parrot, the most recent sighting was around [Berry](#) in the [Shoalhaven](#). Wisemans Ferry is about 50 kilometres out from the GPO possibly even more and Berry is obviously quite a bit further. So we can see that there has been a dramatic change just in these two parrots alone and as I said, the Rainbow Lorikeet has increased dramatically and also the [Sulphur-crested Cockatoo](#).



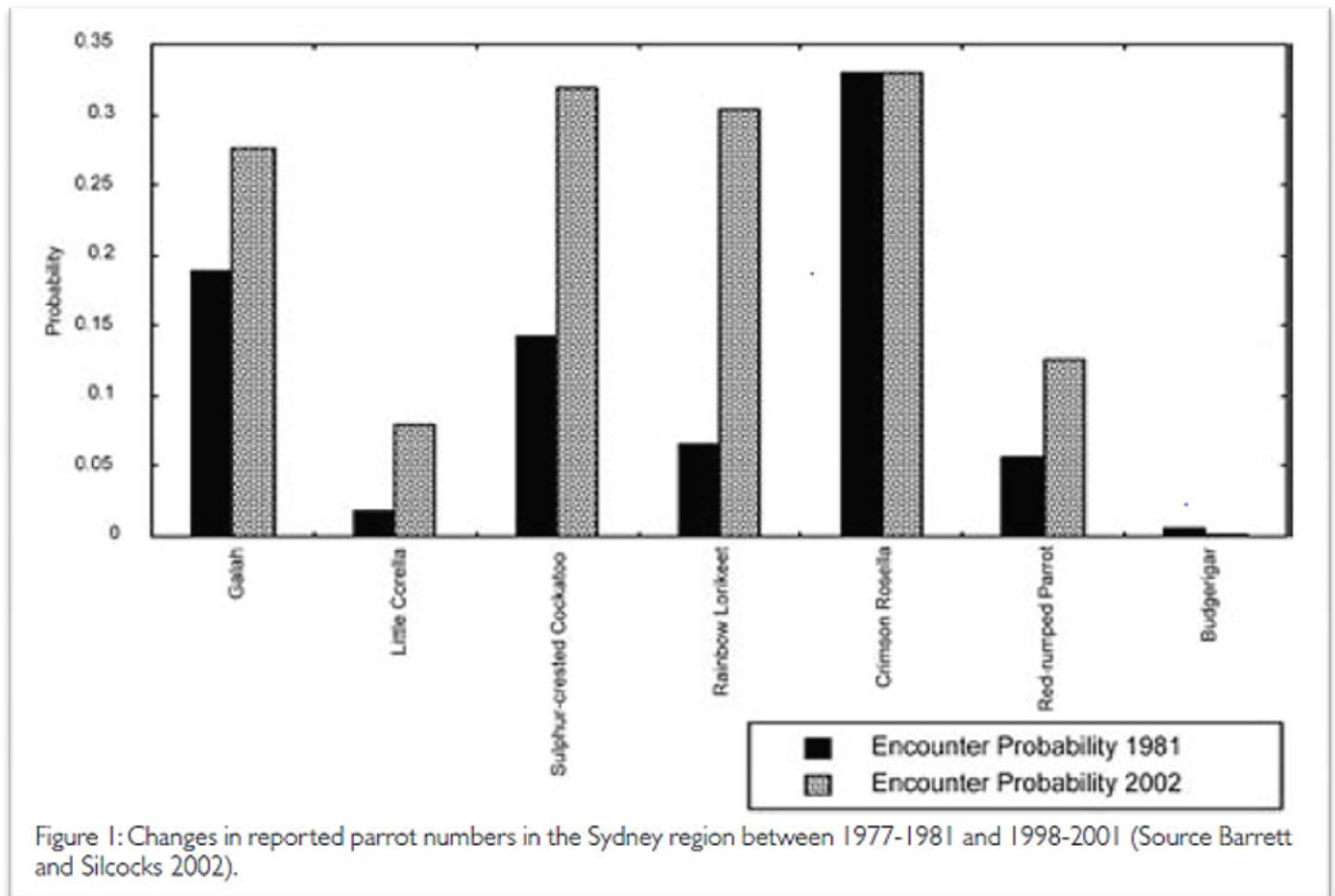
Rainbow Lorikeets
Photo by Lynn Stinten

The Sulphur-crested Cockatoo has always been present; it has just expanded its range. It used to be present on the slopes of the ranges in the [Cumberland woodlands](#) whereas now it is present right through to the middle of [Circular Quay](#) and also present in much higher numbers than what it used to be.

It is not just Sydney we are seeing this in; [Canberra](#) is also seeing increases in the number of Rainbow Lorikeets. In [Melbourne](#) Rainbow Lorikeets have increased and [Red-rumped Parrots](#) have increased as well. [Musk Lorikeets](#) is another species that has increased in Melbourne and they are also continuing to increase in Sydney as well.

Changes in recorded parrot numbers in Sydney region 1977 - 2001

This is a graph that I have taken from another study ([Burgin and Saunders 2007](#)) and it also says the same thing.



We have got the [Galah](#), the [Little Corella](#), the Sulphur-crested Cockatoo, the Rainbow Lorikeet, [Crimson Rosellas](#), the Red-rump Parrot and the [Budgie](#).

So we can see that the "black" is 1977 to 1981 and the "grey" is 1998 to 2001 and that is the number of parrots that were around that were counted in surveys in those two intervals in time. We can see that pretty much all the parrots have increased, but most dramatically the Sulphur-crested Cockatoo and the Rainbow Lorikeet. The Galah has increased, the little Corella has increased. You may see large flocks appearing particularly of Little Corellas and a few [Long-billed Corellas](#) around summer particularly, and particularly around the city. In [Victoria Park](#) where they are, I stopped counting at 120. I have been to golf courses and one that I went to in the [Guildford](#) area I stopped counting at 300 Corellas. So there are some quite large flocks that have appeared.

One of the birds that hasn't changed is the Crimson Rosella. It is still the only bird that I know of that is in a higher abundance in forests than these other parrots were. All the parrots that we are talking about today are present in Sydney in a higher abundance than they are in the forests; except for the Crimson Rosella. I don't know why this is. It may be something about the ecology; it is obviously not being disadvantaged as it seems to be doing quite well.

What are some of the reasons behind these changes?

One of the things I looked at was bushfire and drought.

- Are we seeing the affect of bushfires?
- Are we seeing the affects of drought?

Bushfires

There has been anecdotal evidence that when a bushfire goes through there is a lot of mortality for the larger parrots as well as the hollow nesting birds. In [Brisbane](#) there was a large wild fire that went through some suburban bushlands and there were a lot of accounts in the next few weeks of unusual birds or unusual numbers of birds appearing in people's backyards.

- So is any of this due to bushfires?
- Perhaps they are seeking refuge in the city?

When a bushfire goes through obviously burning the bush, there are not as many food resources there, so perhaps they are coming into the city. The only bird that I found that was affected by this was the Crimson Rosella. Not so much with the other birds.

Droughts

The Sulphur-crested Cockatoo and the Galah responded to drought. So drought outside the city, we saw in those years of drought and following drought, an influx of the Sulphur-crested Cockatoo and the Galah.

Increased Resources

We are certainly not saying that these bushfires and droughts are responsible for these increased numbers, but we are seeing pulses come through. These birds might be coming in but they are adding to the flock that is already there. I suspect that once they are here they don't leave because when you are in the city you have free food and it is warmer, so why would you leave your nice hotel to go back to your not so nice house?

- **Artificial Feeding**

The Rainbow Lorikeet probably relies on a lot of artificial feeding as do a lot of the parrots through seed bells, seed feeders and nectar feeders; in particular the Rainbow Lorikeets (which I won't get into today) but a large part of my PhD was looking at nectar and the role of fruit trees and how we are planting hybrid [Grevilleas](#) and [Callistemons](#) and [Banksias](#), and what that is actually doing to the flow of nectar. In short we are planting all these plants and supplying a source of nectar all year round and at a much greater volume, and it is supporting these guys whereas normally that wouldn't have this support.

- **Fewer Predators**

There are also potentially fewer predators in the city.

I suspect that birds of prey are actually increasing in the city because the birds are increasing and the possums are increasing too. Nobody has actually tested this but I would argue that over the last 10 years there might be an increase in birds of prey. In fact I saw a [Wedge-tailed Eagle](#) in the sky which I was quite excited about.

You don't have [Goannas](#) that are nesting predators that you would have in the forest. However you do have [cats](#) and you also have [foxes](#), so there may be fewer, or it may balance out. No one has tested it.

- **More stable climate**

It is a more stable climate. Cities have what is known as an urban heat island effect so it is warmer in the city. In the middle of winter you might have fewer frosts than what you would have out in the forests so it is a warmer environment and more stable for the birds. So again they prefer to nest in the city and roost in the city than out in the colder areas and national parks.

Tree Hollows

What is a tree hollow?

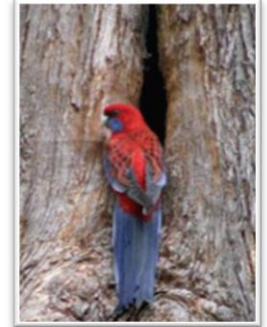
A tree hollow is a natural cavity in a tree. There are several main types of hollows.

- **Main stem**

You have hollows that occur in the main stem so they are main stem hollows or fissures.

They are in the main trunk. They are quite long and they are quite vertical.

They tend to have a quite narrow entrance or they can be quite large and sometimes you will see these in [Angophoras](#). Often the Cockatoos will use those.



Main Stem Hollow

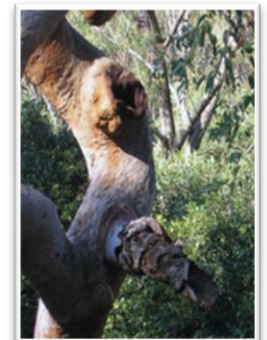
- **Main branches**

You also get hollows in main branches, in one of the big boughs coming off that have different dimensions.

- **Pipes**

These are known as pipes or spouts.

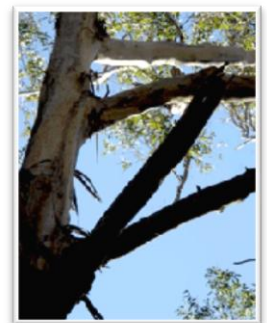
That is a [Blackbutt](#) in the photo on the right. You see them quite often in Blackbutts where you have a big pipe or spout coming off and there has been some literature that has said that certain parrots nest in Blackbutt spouts.



Main Branch Hollow

So this also brings into question that it is not only the number of hollows, but who uses these hollows as well.

So we might have thousands and thousands of hollows but they are in the main trunk of the tree, but if parrots will only use spouts, and we don't have that many, then what's going to happen then?



Blackbutt pipe or spout hollow

- **Dead Trees**

Then we have dead trees and dead trees cause a lot of hollows as well.

- **Fire Scars**

Also, scarring from wildfires can generate hollows.

- **The Importance of Hollows**

There are over 300 vertebrate species in Australia that rely on hollows at some stage in their life either for breeding or roosting; at some stage in their life they need hollows.



Dead Trees

Fifty four of these are on the Central NSW coast alone and are either listed as threatened, vulnerable or endangered. Thirteen of them are listed as endangered. So of 260 birds worldwide with 114 native birds in Australia that rely on hollows for nesting, that means that 15% of all land birds rely on hollows, so they are quite an important resource.

Formation of tree hollows

So how do they form?

In Australia there are no primary cavity hollow excavators. What that means is that in America and Europe and in the different continents you have got animals or birds that will actually excavate out hollows. [Woodpeckers](#), for example, will actively excavate. We don't have any animals in Australia that will actively excavate. Some birds like Cockatoos may chew around the edge of their holes. They may do that to line the nest and some do it to try and increase the size of the hole, but that is the only extent that they will really go to.

What they rely on then is what is called "secondary hollow development" and that occurs from [fungus](#). When you get a storm a bough may break off and when you get a bushfire the fire goes through and scars the tree. This creates a break in the outside of the tree which allows fungus and disease to get in and then that rots and that is what forms the hollow.

- › No primary cavity excavators in Australia
- › Hollow dependant fauna rely on secondary hollow development
- › Decay is necessary. Sapwood is breached, often due to branch loss from fire or wind.
- › Fungal attack on heart wood.
- › 100-150 years
- › Black Cockatoos require larger hollows in trees over 200 years old.

This process however takes over 100 years. So for a large enough hollow to occur that's a suitable size for a larger parrot you are talking about 150 years. If you are looking at a [Black Cockatoo](#) you are talking about 200-250 years plus for one of these large hollows to occur. So we know for this to occur it takes a really, really long time and we also know that we have removed a lot of trees from the city over the last 50 years. About 10 years ago we realised that we do need to do something about this, so we have started planting and revegetating, but with these trees it is going to take another 100 years for them to form hollows.

This brings in the question of nest boxes and artificial hollows as well.

Threats to tree hollows

As I mentioned before, urbanisation is probably the biggest threat, such as land clearing and removal of the trees for development particularly in a city like Sydney where we sprawl. We are starting to move upwards in the cities but we are still scrawling. Australia is a scrawling nation so that results in more clearing of land and more clearing of trees.

Safety is a big issue as well. Obviously in the 1980s with legation, Council's don't want rotten boughs falling on people's heads. However, hollows will only form in diseased limbs, so they are going to be chopped off.



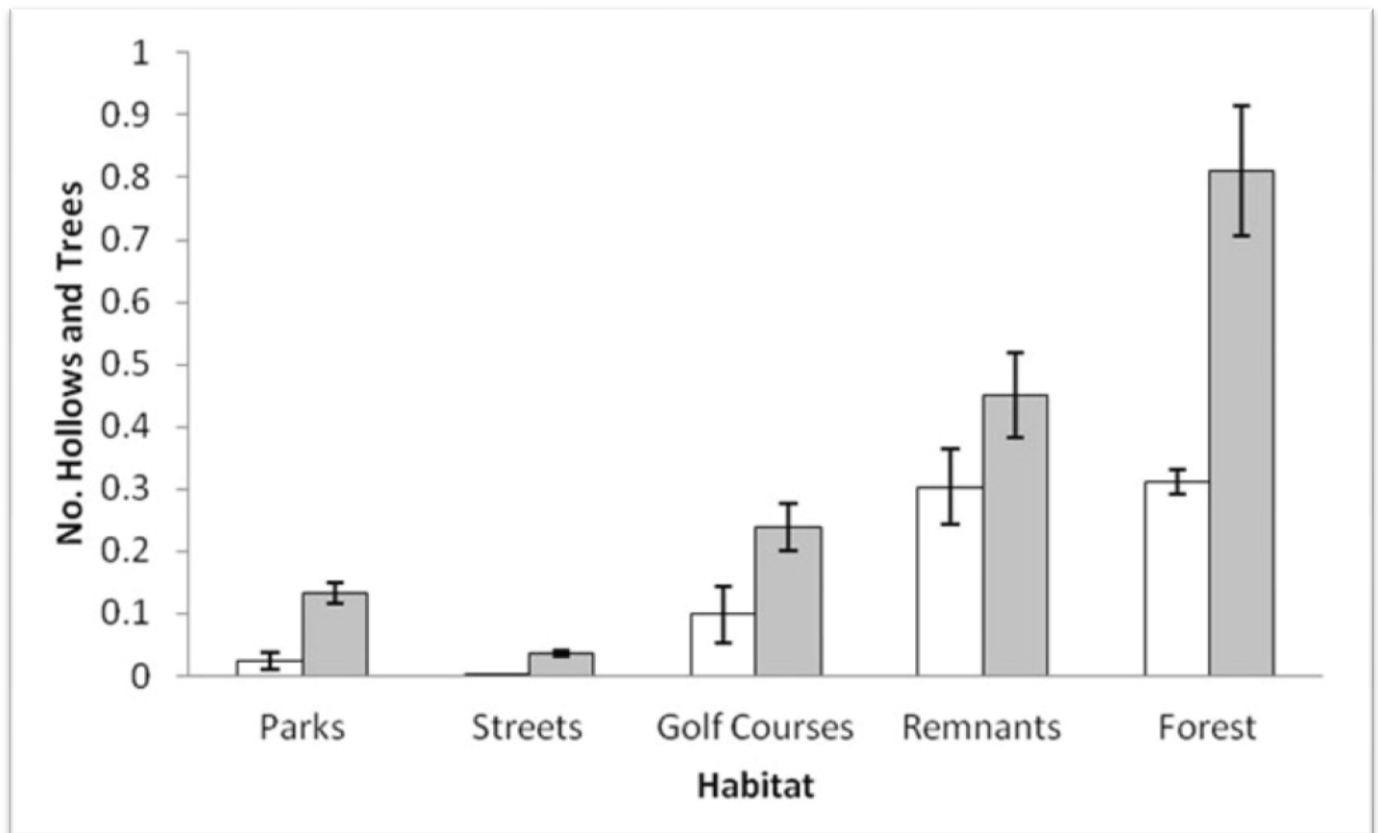
So the question arises how do we manage that?

How do we manage public safety verses leaving the limbs that will actually form a hollow?

There are some other agriculture issues as well in terms of inappropriate fire regimes. Fire is a double edged sword. It is needed to create hollows but it can also destroy hollows as well. So that is a whole other aspect to fire.

Abundance of trees and hollows

So part of what I did was I spent two years studying a 1,000 sites from Circular Quay out to [Penrith](#) and then vertically as well and I went all through the [Royal](#) and [Ku-ring-gai National Parks](#) and the [Blue Mountains](#) as well. I counted trees and I counted hollows. In the city I counted them in parks; and when I say parks I mean recreational sporting ovals, street scapes, golf courses and remnant bushlands and then in the National Park forests.

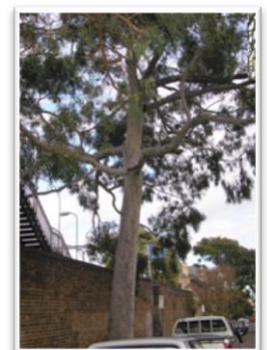


- **Parks and Streets**

The open "T" bars represent the number of hollows that were present in a tree and the filled in bars represent the number of hollow bearing trees. So we can see that the parks and streets didn't have many at all.

That is partly because of the types of trees we plant in the streets and partly because we don't vegetate them with big canopies anymore. So we don't have a lot of tree hollows there.

A typical street tree is the [Eucalypt Corymbia maculata](#) which does not form hollows until it gets really, really old. The Angophoras tend to form them a little bit younger and there are other species of Eucalyptus that even though they form them, they don't form them until a lot later.



Eucalypt *Corymbia maculata*

- **Golf Courses**

Golf courses vary. It depends on the golf course. Out at [Parramatta](#) and [Baulkham Hills](#) you have some really lovely golf courses with big old remnant trees with up to 20 hollows in those trees. Whereas if you go to golf courses in the [eastern suburbs](#), it is more scrub that they have got, they don't have the big tree hollows there.



Example of a Remnant Tree growing on a golf course

So it varies a lot, there is potential for conservation of trees and tree hollows on golf courses.

- **Remnant Bushlands**

In remnant bushlands we have more trees and more tree hollows and interestingly when we compare the remnants to the forests you can see that remnants and forests have the same number of hollows but forests have double the number of hollow bearing trees. Why that is I am not really sure but it is certainly interesting to look at and I suppose the number of hollow bearing trees is probably quite important as well.

With remnants even though they are often still quite in tack because they might be in gullies and they haven't been cleared, or they are on sandstone ridges so we can't clear them, collectively most of them have half the number of hollows than occur in the natural forest.

So all of this is telling us that what we really need to start looking at is hollow availability, hollow bearing trees, and what's happening with those hollows in our cities; or we will continue to lose them and that will change our ecology.

Hollow investigation

So how did I decide to look at this?

Well, I decided to climb trees.

I did what I never thought I would get to do with my PhD and that was to use a giant slingshot and that was a lot of fun.

In the photo on the right you can see an example of one of the sling shots that I used.



I got to spend two and half years vaulting ropes to the trees and then I got to climb trees.

I left cameras in the trees for two breeding seasons not just listing parrots but listing everything that was using the tree hollows to try and determine how frequently they were being used, what was using them, and if there was a level of competition involved.

The following is a couple of examples of what I found.



The first example is a remnant tree in [North Parramatta](#). As you can see it was a nice spout hollow and we have a [Brush-tailed possum](#). I don't know what it was doing. It was quite fat and how it thought it was going to fit in there I don't know, but it had a go.

In this same hollow, the next day we saw a Galah; it was having a look around.

Again the same hollow and we have a male [King Parrot](#) and the same hollow again and we have rainbow lorikeets.

So you can see that for that same hollow we already have four species that are potentially interested in using it.

Now I am not saying that they are all going to nest in it. The possum obviously probably wasn't even going to fit. The Galah, it may inspect it, it may not, it may decide to use it, or it may not be suitable. For the Rainbow Lorikeets it might be perfect. So the end user of that hollow is ultimately only going to be one species; but you can see the level of interest just in that one hollow which indicates that presumably there is a shortage of hollows.



This is the Royal National Park and you see we have a Crimson Rosella looking at one of the hollows there, a [Sugar Glider](#) (again in the Royal National Park using a hollow) and a [Common Ring-tailed possum](#) in the Ku-ring-gai National Park.

There are predators as well.

In this photo on the right is a [Lace Monitor](#) up in the Ku-ring-gai National Park.

It uses the hollow in a different way in that it doesn't really nest in it, it is a predator; so any nestlings or eggs in there it will eat.



It is one thing that we don't have in the city. We don't have Goannas so that's something that changes the ecology as well.



This is a [Powerful Owl](#) at [Epping](#) in the photo on the left not too far out on the other side of Kissing Point Road.

When I first went to that hollow there were egg fragments and feathers so there had obviously been something in there that had been preyed upon. That owl came back quite a few times.

There was another Powerful Owl in [Jannali](#) as well that came quite regularly as well to the same hollow. So there is certainly a few Powerful Owls around.

And on the right is one of my favourite birds, the [Yellow-tailed Black Cockatoo](#). We also had Sulphur-crested Cockatoos and Wood Ducks that were interested in using this hollow and we had Goannas in there as well.



Nothing actually nested in that but that may have been because the Goanna ate the eggs.

Competition for hollows

There are significantly less hollows in urban areas than in intact forest and woodland areas. What I did find was that the Rainbow Lorikeets and the Sulphur-crested Cockatoos were not surprisingly large, dominant and aggressive. However the Rainbow Lorikeets made the most number of visits out of all the birds and when I graphed it the Sulphur-crested were well down in comparison to a very significant amount of Rainbow Lorikeets that were visiting these hollows. So the interesting thing that came out of this was that the Sulphur-crested were aggressive but mainly in defending their own nests. They are a larger bird than a lot of the other birds that we get in the city and they need different hollow requirements so they tended to leave the other birds and animals alone if the other species left them alone.

- > Significantly less hollows in urban area than in intact forest and woodland.
- > Rainbow Lorikeets and Sulphur-crested Cockatoos are large, dominant and aggressive.
- > Easily outcompete other parrots, birds, possums.
- > Rosellas often lose to Rainbow Lorikeets.
- > Many hollows are not suitable- e.g. Drowned hollows.
- > Sulphur-crested Cockatoos nesting in power poles and chimneys and Rainbow Lorikeets nesting in burrows under tree roots.
- > Plants
- > Bees

Whereby Rainbow Lorikeets were quite aggressive, interestingly they tended to lose out in aggressive interactions. One of the reasons that I think that the Lorikeets do so well is because they hollow guard. They will nest in one but they will also guard several other hollows as well. They don't "*put all their eggs in one basket*"; to maximise their chances of success they use several hollows.

Some other examples that I have seen that might indicate that the hollows are already in a short supply, or that we have an abundance of these parrots, is that in the city particularly you will see hollowed out power poles that don't have the metal cap on and there are both Sulphur-crested Cockatoos and Rainbow Lorikeets nesting in them. Cockatoos will nest in chimneys and I saw (as I was walking along near [Mrs Macquarie's Chair](#) in the middle of the city) two Rainbow Lorikeets came out from a burrow underneath the roots of a tree and then walked back in again. So obviously a burrow in a tree is not an ideal place for a bird to be nesting, but there they were.

Another threat as well is [feral bees](#), not only are they very annoying when I am checking on a hollow and get stung, but they are also quite good at taking over hollows as well and eventually once they reach a certain number of bees they will evict whatever native animal is using that hollow.

I had over 11,000 visitations that I recorded in total at 61 hollows over 5,401 days of recording.

There were 31 species, 6 were mammals, 14 were birds and 2 were reptiles which were just small skinks and goannas.

As I said before, it was the Rainbow Lorikeets and Sulphur-crested Cockatoos that dominated.

There were 180 interactions that were aggressive and they were mostly between the birds.

We had a lot more interactions in remnants; which again suggests that we have a much higher population and assemblies of animals that are trying to fit into these remnants.

Essentially from the graph that I showed you before there seems to be a comparable number of hollows that we have at the moment, but there are less hollow bearing trees, and we are trying to fit an increasing population of these birds and possums into these remnants where there is a limited number of hollows. The research is really about understanding what this actually means.

- > 11 879 visitations at 61 hollows over 5 401 days of recording.
- > 31 species
 - 6 mammals
 - 14 birds
 - 2 reptiles
- > Rainbow Lorikeets and Sulphur-crested Cockatoos dominated the city.
- > 137 aggressive interactions
 - 8 species of bird
 - 1 mammal
- > MORE interactions in REMNANTS
- > Majority of attacks for Rainbow Lorikeet were intraspecific.
- > Majority of attacks for Cockatoos were interspecific, of which most were won.

What are some of the implications of that?

There is a high usage of these hollows and we need to start looking at what types of hollows are around.

- Is it the spouts?
- Is it the big ones in the main trunks of the trees?
- How many of these are available and then what types of hollows are preferred by what types of species?

This information will be of particular interest when we start using nest boxes. We don't want to put nest boxes out that encourage [Mynas](#) or that encourage more Rainbow Lorikeets. It needs to be a specific type of box that actually works and targets one species.

We will need to think about things like whether we should use spouts, entrance diameters, depth and internal volume as opposed to depth; so all the characteristics that naturally occur in tree hollows.

- How much of this should we replicate?
- Is there any point replicating them?
- Are they being used?

Sometimes you can't get the species you want to use the type of nest boxes you have.

Graeme Phipps:

One of the things that always fascinated me with wild observation was how tight birds like it to be. You just can't believe what a small spout they will use. You watch something like a [Swift Parrot](#) and you think they're not going to fit in there, but they do.

Yes. Predators can't get in so they feel safe.

The following is a video of what happened when a Sulphur-crested Cockatoo decided three times to throw my camera out of the tree.

The first time I thought alright I'll put it back up again, that's fine. The second time (and this is a 20 metre [Blue Gum](#) we are talking about here so it wasn't easy to climb), and the third time I gave in. I just thought you can have it. I love them but they can be very annoying sometimes.

An interesting discussion and question time followed Adrian's very interesting presentation.

For more information see ["Habitat and Resource Utilisation by an Urban Parrot Community"](#) by Adrian Davis B.Sc. (Hons), M. Appl. Sc (Coastal Management).

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