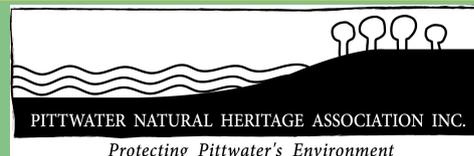


Pittwater Nature

Issue 4 February 2021



News and stories from Bushcarers, Wildlife carers, Community and home gardens

The Pittwater River and the Barrenjoey Tombolo

We hear a lot about Climate Change and Sea Level Rise. How could this affect our coast-line?

It's happened before. If we'd come here during the last Ice Age, we wouldn't recognise the place at all.

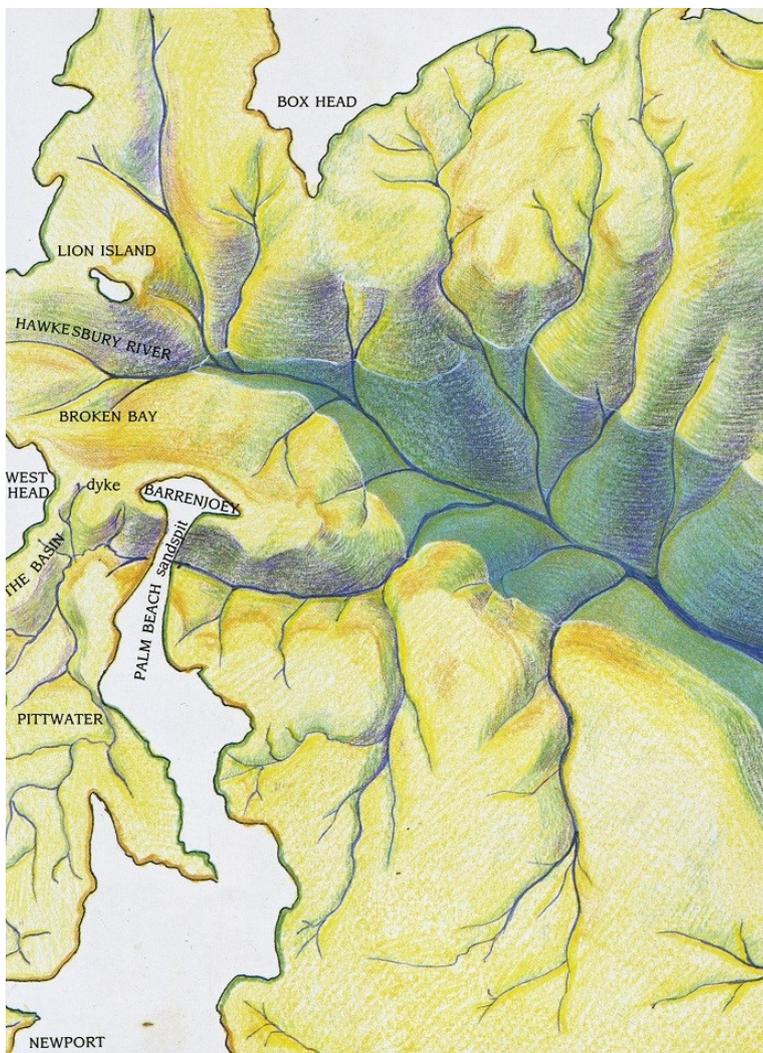
About 14 000 years ago, the Pacific coastline was about 20km further east. Our beaches, so familiar today, did not exist. From today's Palm Beach, you'd be going a long way downhill for a surf. And you'd need a thick wetsuit. But that landscape would have been familiar to Aboriginal people.

When the sea level was lower, streams flowed faster and eroded bedrock in river channels. The Hawkesbury River has a huge catchment. Its fast flow eroded the old Pleistocene bedrock channel between Barrenjoey and Box Head so that it is about 125 metres below the present sea level.

Seismic investigations of bedrock drainage patterns in Pittwater contained a surprise, for this waterway which now widens out to merge into Broken Bay did not join the ancient Hawkesbury River drainage channels to enter the sea north of Barrenjoey until very recent times, geologically speaking.

The old channel etched into the bedrock under Pittwater showed that it was a steep-sided V-shaped valley, parallel to the coast, and deepening steadily towards the north. Off West Head the channel swings abruptly eastward and heads for the ocean across bedrock between Barrenjoey and Palm Beach where the bedrock is at 76 metres below sea level.

This sudden change of direction is due to the presence of a volcanic rock bar which connects Barrenjoey to West Head and now lies at only 12 metres below sea level. The bar is a Jurassic volcanic dyke 170 million years old. As the seas rose steadily from 14 000 years ago, the Pittwater River gradually became a swamp because unlike the Hawkesbury it did not have a flow active enough to counteract the silting of its bedrock channel. Up to 9000 years



Our coast 14 000 years ago.

From: The Nature of Hidden Worlds. Mary White

We care for our natural world in the Pittwater area, by looking after bushland, caring for wildlife, producing sustainable food in community gardens, and at home.

Pittwater Natural Heritage Association (PNHA) is publishing this newsletter to help us keep in touch and encourage each other in our various volunteer activities.

We welcome your contributions. Contact us: pnhainfo@gmail.com and on Facebook



ago the bedrock from West Head to Barrerjoey and beyond to the east formed a rocky cliff along the southern shore of Broken Bay. The Pittwater drainage was quite separate.

Then as the sea rose the bar was breached. The Pittwater River could flow into Broken Bay. The tide started scouring out the sediments which had silted up Pittwater Valley. The Pacific rose. The coastal plain narrowed. Along-shore currents carrying sand gradually built up the sandspit, or tombolo, on the bedrock connection between Barrerjoey and Palm Beach. The old channel where the Pittwater River had run eastwards to the ocean was silted up and closed. By 6000 the whole system stabilised, as we know it today.

Coastal zone expert Angus Gordon kindly provided information and maps from studies of coastal zone morphology published in 1988. He told us: "The infill of the old Pittwater River is still only partially complete as demonstrated by "The Pittwater Deep" which is a deep section of Pittwater in the middle of the waterway east of Careel Bay and south of Sand Point. It is still a little under 30m deep whereas the rest of Pittwater is generally less than 10 m deep.

"The seismic work has shown that the upper reaches of the Pittwater river reached back past Pittwater High through Mona Vale with the reef just offshore from Bongin Bongin Beach (Basin Beach) being the

actual top of the catchment. That is, the underlying rock valley of the Pittwater River stretched north from Bongin Bongin! Very different to today."



Almost an island. The Barrenjoey tombolo in the 1920s.

We asked him if he had ever heard that waves once broke across the tombolo, from the ocean into Pittwater.

“I don’t have knowledge of the waves breaking over the tombolo in the 19th century. However it wouldn’t surprise me as there were several very large storms in the 1880s and 1890s, including the Maitland Storm, 1898. From the available information I believe some were at least as big as the 1974 storm and in 1974 waves did wash over the tombolo and into Pittwater. How do I know? I was there the morning after the May event and saw the debris line that showed that. I later spoke to someone who was in one of the houses below Barrenjoey who said that they were very concerned that they would be cut off as a result of the wave overwash.

“Today there is no way such overwash could happen and most people would think I was being ridiculous when they look at the tombolo today. What they don’t realise is that in the late 1970s, as Public Works, and under the Beach Improvement Program, we spent what in today’s terms would be in excess of \$1M completely rebuilding the tombolo and revegetating it. That caused a bit of an uproar at the time but was necessary to prevent Barrenjoey becoming an island and the Hawkesbury from having two entrances.”

We wonder: If sea level rise continues, what will our coast be like in 100 years’ time?

References:

1. Angus Gordon OAM, Principal Consultant at Coastal Zone Management and Planning. Personal communication.
2. Cainozoic Morphology of the Inner Continental Shelf near Sydney NSW.
- A. D. Albani, J. W. Tayton, P. C. Rickwood, A. D. Gordon, J. G. Hoffman.
Journals and Proceedings of the Royal Society of NSW 1988 Vol. 121.
3. The Nature of Hidden Worlds. Reed 1990. Mary White.

Not a Sea Urchin

This fibre ball comes from the seagrass **Posidonia**, not a seaweed but a flowering plant with fibrous ribbonlike leaves. The balls are formed when the leaves break off and get tossed around by waves and currents. Why exactly this happens is not certain. In the early 1900s fibre was collected for its high cellulose content and was used in the manufacture of suits, explosives and household products, according to the Beachcombers Education Kit. <https://beachcombers-kit.fish.wa.gov.au/species-list/seagrasses-and-algae/fibre-ball/> Perhaps it was the dead leaves on the tideline, rather than the fibre balls.

Such balls are also found on Mediterranean beaches from another species of *Posidonia*. Strangely, you can buy them over the internet, whether for suits, explosives or innocent craft work we know not. We recommend a walk along the Pittwater shore off Governor Philip Park to find your own.



Meet the Nightshade Family

Plant Families 101: Solanaceae

You're already very familiar with many members of this family, mostly as vegetables.

The flower structure is what tells us they are closely related. But the way they grow varies widely – woody shrub, annual vegetable, climbers.

Also called the Nightshade family, their flowers are usually white, mauve or purple. Their fruit/berries often start off green and go red or black when ripe. Many species originate in Central and South America, are poisonous in parts, and may have pharmaceutical uses. Deadly Nightshade *Atropa belladonna* is from Europe, Western Asia and North Africa.



A plant family usually contains smaller groups of plants. The genus *Solanum* is one, another is *Capsicum*, and there are more. (Genus: singular, genera: plural).

Aubergine, or Eggplant, *Solanum melongena*, is native to India, and still grows wild there.

But this plant family is more common in the New World. You'd wonder how the Italians managed without tomatoes before they were brought over to Europe from the Americas. Pizzas could never have been invented! What? No tomato sauce?

Language alert: Tomato *Solanum lycopersicum* from the Greek *λύκοπερσικων* meaning "wolf peach". Tomato from Spanish *tomate*, from the Aztec word *tomatl*.

Also from South America, potatoes *Solanum tuberosum* are now a staple food in many countries – you've heard of the Irish potato famine – including in the Hill regions of Nepal. In South America about 4000 edible varieties occur. **Warning:** green potatoes are a no-no, likewise the eyes or sprouts, containing a poisonous alkaloid. Throw them out.

Another genus *Capsicum* includes many species of - yes - Capsicums and chillies. Also originating in South America, they have spread around the world. *Capsicum annuum*, green, or red when ripe, will be in your salad, but take care with varieties of *Capsicum chinense* (not from China – botanical mistake) which include the hottest chillies with one type of over 2 million Scoville Heat Units.

The large pendulous flowers of the shrub Angels Trumpets *Brugmansia* – several species - smells lovely but its leaves and seeds are extremely poisonous. Right. This



beautiful yellow specimen grows beside Cabbage Tree Rd Bayview.



Brazilian Nightshade



In local gardens and bush are two climbers native to South America. Potato Vine *Solanum laxum* a.k.a *S. jasminoides* (above left) has white flowers and black berries. Brazilian Nightshade *S. seafortianum* has purple flowers and red berries. Both are invasive pests.

Several native members of this family occur in Pittwater bushland. A pioneer plant in disturbed sites, you can see Kangaroo Apple *Solanum aviculare* (left) about 2 metres tall along the track to the Irawong waterfall in Warriewood. It grows in leaps and bounds, they say, left. Others are small and very prickly.

The native small tree Corkwood *Duboisia myoporoides* has been spotted in bushland near the Deep Creek bridge on Wakehurst Parkway.

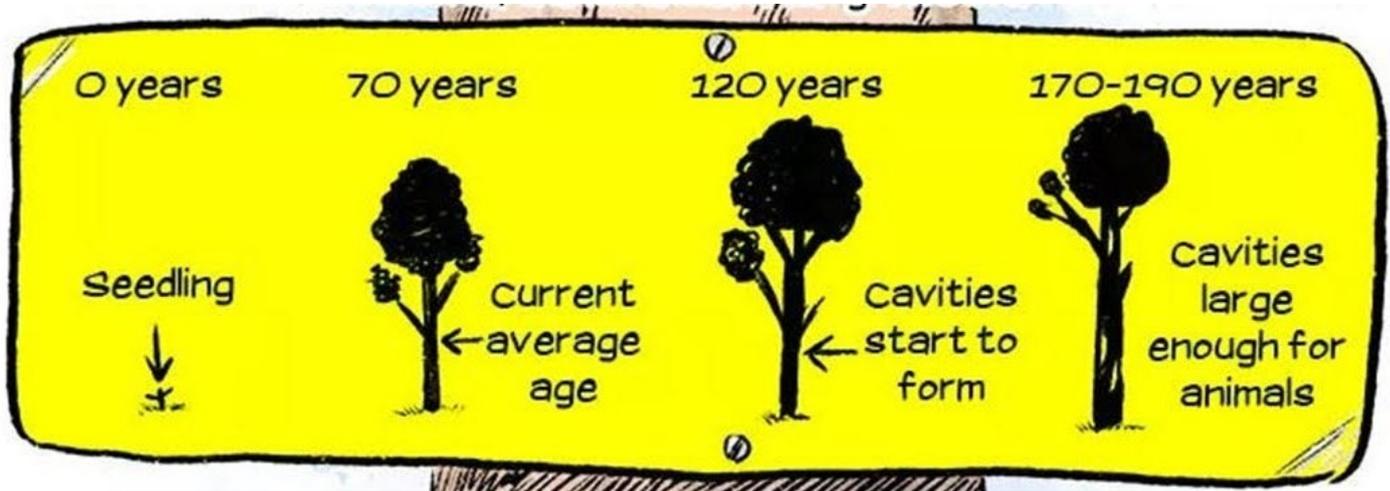
Bush regenerators know Blackberry Nightshade, *Solanum nigrum*, a weed from Europe, also the small tree Wild Tobacco *Solanum mauritanicum*. Lots along the Wakehurst Parkway on the slope below Oxford Falls

It's interesting that a plant family widely characterised by toxicity can provide food for us humans.

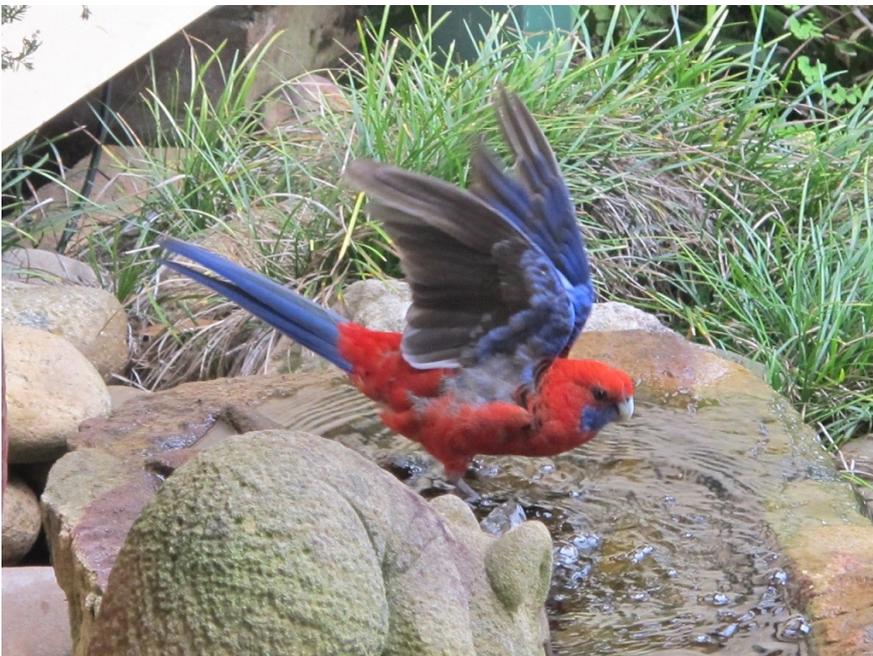
Dollar Bird *Eurystomus orientalis*

So named because of a white spot on each wing visible when the bird is in flight, another common name Roller comes from their rolling courtship display and aerial acrobatics in pursuit of their insect prey. They arrive here in September each year, nesting in tree hollows. Though breeding is over about the end of January, some remain in Australia for a few months, returning to New Guinea, the Solomons and the Philippines. You might have heard their cackling call. Listen here: <https://youtu.be/RLZ2rMM2juU> Photo: Chelsey Baker





If we plant a canopy tree today, Dollarbirds and Rosellas may nest in it in the lifetimes of our elderly grandchildren and great grandchildren. No time to waste.



Crimson Rosella

We don't see these birds very often in Pittwater, so delighted with this wonderful visitor to North Avalon.

Crimson Rosellas are normally encountered in small flocks and are easily attracted to garden seed trays. Once familiar with humans, they will accept hand held food. Natural foods include seeds of eucalypts, grasses and shrubs, as well as insects and some tree blossoms. More: <https://www.birdsinbackyards.net/species/Platycercus-elegans>

Thanks to Geoff Searl for this photo.

Irrawong Bushcare

On the third Saturday afternoon of each month you'll find the Irrawong Bushcare group at work, along the track to the waterfall. Starting at 1 or 1.30, we work in shady places for about three hours, then stop for afternoon tea. Last time it was Devonshire Tea, beside the car at the Irrawong road entrance. Worth pulling up a few weeds for? Great birds here too: recently, Rufous Fantails and Golden Whistlers, and a Lyrebird if we're lucky. Come and join us on February 20, or contact Andrew Lee, Northern Beaches Council bushcare organiser on 0424 141 568.



What's happening on Tumbledown Dick Hill?

Just up the hill from Kimbriki is the site of a different approach to bush regeneration.

The vegetation and the soil you see today isn't what was there previously.

A site with Duffys Forest Endangered Ecological Community (DFECC) was going to be developed, at 1 Narabang Way (part of the Austlink Business Park near the tunnel).

How to save it? Gillian Tear of Total Earth Care Company tells us about **Soil Seedbank Translocation** and how it was done here.

Soil seedbank translocation is an underutilised bushland restoration method used to save important bushland and conserve biota. Not only does it translocate the seedbank of important flora species that may otherwise be lost to development, it includes the relocation of habitat features such as logs, hollows and leaf litter and the mycorrhizal fungi and biota important for the growth and development of the plant community and the integrity of the soil.



The soil seedbank translocation involves the removal of the topsoil typically including the O, A and B horizons of the soil from a donor site. This may vary slightly depending on the soil type or the plant community subject to translocation. These horizons are systematically removed and transported to a prepared recipient site, with minimal storing of the material to prevent degradation of the seedbank. The horizons of soil are systematically placed on the recipient site to replicate their natural occurrence.

Total Earth Care conducted a translocation in 2010, to an area along Mona Vale Road at Tumbledown Dick Hill. This site was previously a decommissioned works depot that was cleared of vegetation. The location, geology and close proximity to the donor site and to other areas of DFECC made it a perfect candidate as a recipient site.

We undertook five years of monitoring following the translocation to assess its success and collect information that could assist in future translocations. The monitoring showed clear changes in the structure and diversity of the community over time which is to be expected with successional changes in a regenerating community.



Monitoring Plot 2010



Monitoring Plot 2014

Approximately 50% (29 species) of the species noted on the donor site were found regenerating on the recipient site. An additional 33 species were found regenerating on the recipient site but not observed on the donor site. The emergence of species at the recipient site is most likely due to the biological traits of individual species including their required triggers for germination which can include fire and disturbance.

As such, the disturbance caused by the actual translocation itself would have triggered the germination of some species that may have otherwise been dormant in the seedbank at the donor site. However, some other species may have not received the required trigger such as fire to promote germination.

Soil seedbank translocation has proven to be an invaluable method of restoration which utilises topsoil that would have otherwise ended up in landfill. Other benefits of soil seedbank translocation include:

- Translocation of the entire community including mycorrhizal fungi and habitat features such as logs, hollows and leaf litter that are all important to a functioning ecosystem.
- Species regrow that cannot be propagated in a nursery.
- Avoids lead time that would be otherwise required to propagate plants for planting.
- Guarantees genetic provenance of all flora species.
- Biota can remain in the locality and assist in the movement of genetic material.
- Provides a greater diversity of flora species that may not be achievable with available nursery stock.
- Replicates a natural disturbance event that would trigger germination.
- Reduces trucks transporting fill long distances, thus reducing transport cost, fill disposal costs and emissions pollution.
- Reduced maintenance costs compared with other restorative methods.



It is highly recommended that soil seedbank translocation be used more frequently where bushland will be lost to development or clearing and be placed on recipient sites as an alternative option to replanting disturbed areas. This could be included as a condition of consent issued by councils where areas of bushland are to be cleared for development. Sites identified as Biodiversity Stewardship Sites to offset biodiversity impacts should be considered as recipient sites where the regenerating area would be managed under a 20 year management plan.

It is important to note that there are many considerations that go into the planning and preparation of sites for soil seedbank translocation from initial weed management, hydrology, recipient site preparation and the technical aspects of removing the soil from the donor site to the recipient site and post translocation management and monitoring. Therefore, it is imperative that qualified and experienced contractors are engaged to ensure the best outcomes for any soil seedbank translocations.

Following the hazard reduction burn there in late 2020, it is now vital that additional data is collected to assess the impact of fire on a regenerating translocated seedbank site, particularly at this stage of development when the community structure is still developing. The burn may benefit some species by triggering germination while it may



Eucalypt seedlings germinating after the 2020 hazard reduction fire, February 2021

be detrimental to others who have not reached maturity or been able to set seed yet. This information is vital to improve our information around managing translocated sites in the future and should be compared with data collected when fire was tested immediately post translocation.

Total Earth Care has been at the forefront of soil seedbank translocations within Sydney since 1995. These resulted in the production of Soil Seedbank Translocation protocols that are now the industry standard.

Gillian Tear

Environmental Consulting Project Manager

Total Earth Care Company <https://www.totalearthcare.com.au/>

What's Duffys Forest Endangered Ecological community?

This type of Sydney bushland is endangered because of clearing for development. The estimated original extent was approximately 1450 ha, of which less than 16%, or approximately 240 ha, remains. As well as in Duffys Forest, in the Pittwater area it occurs along the Mona Vale Rd ridgeline, for instance near the Forest Way/Mona Vale Rd intersection in Ingleside and at the Bahai Temple, to name a few locations. It's also on top of Bilgola Plateau. For typical plant species and soil information go to: <https://www.environment.nsw.gov.au/threatenedspeciesapp/>

Sydney Wildlife Rescue's Mobile Care Unit



The cutting of the ribbon just before driving to the fire grounds.

We can hardly believe that a year has elapsed since our Mobile Care Unit took its maiden voyage into the fire grounds last year.

We spent around three months travelling from the South Coast to the Blue Mountains and then to the Snowy-Monaro region, assisting with Search & Rescue, darting, triage and treatment of injured animals.

When COVID struck, we had to bring the van back home to the Northern Beaches.

Since then, we have been running regular 'clinic days' in the van on the Northern Beaches, outside the Coastal Environment Centre in Narrabeen. Our 3 volunteer veterinarians have been examining, diagnosing and treating a multitude of species – everything from bats and bandicoots to snakes and seabirds. Thanks to the amazing diagnostic equipment we now have in the van, we can do blood tests, faecal tests, x-rays and even ultrasounds!

We have recently begun microchipping our patients before release. It is a useful tool for us as the microchip allows us to record if a particular animal is a "repeat offender" and whether or not their initial malady is a recurring problem. We can also scan roadkill for microchips to see if they are a previous patient. (Thankfully as far as we are aware, none of our patients have become roadkill.)

Snakes are a particularly interesting animal to have microchipped as they are often relocated from unsuitable environments (wardrobes, toy-boxes, bathrooms and bbqs) back to the bush (but still within their home-range). As a general rule, we will only move a snake if it is inside a person's home or if it is in imminent danger (bailed up in the backyard by dogs or in a high-traffic area such as a shop-



Dr Margo and Dr Izi examining a ringtail possum patient

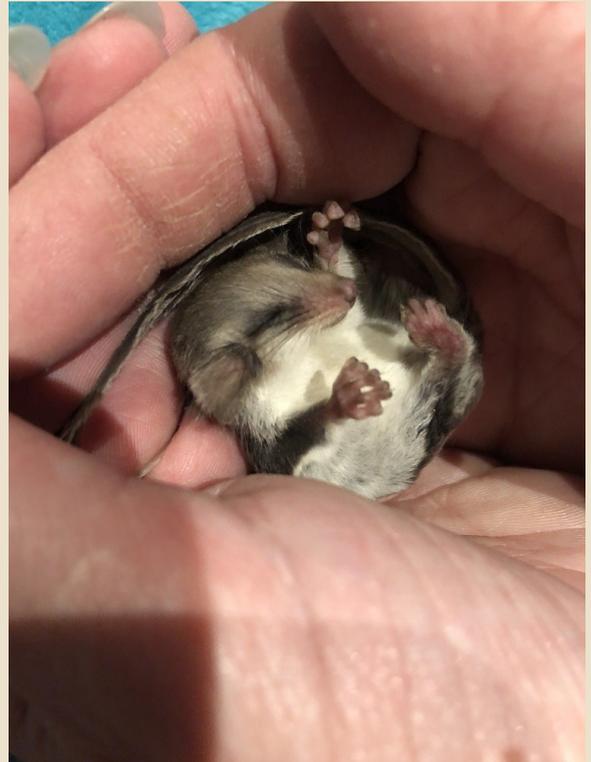
ping precinct). It is interesting to see that they will often resurface fairly close to their original site of rescue – a bit like a homing pigeon. This is one of the reasons we relocate them within their home-range – to ensure that they do not put themselves into unnecessary danger trying to get back to their area of familiarity.



Dr Lou microchipping a diamond python prior to release

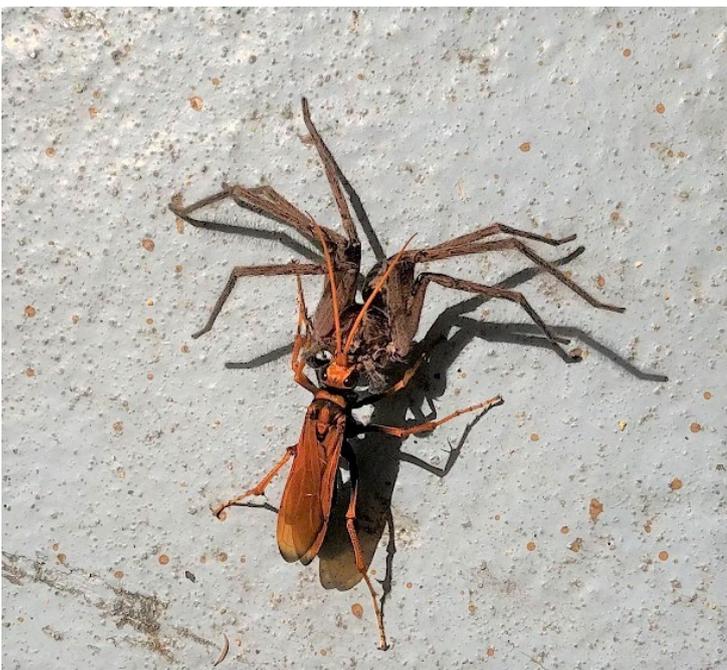
Many of our patients are tiny orphans that come in for weekly check-ups and weigh-ins. Not everyone knows that bandicoots, gliders and antechinus are marsupials. Right: **Feathertailed Glider**

We try to stress that if a marsupial is killed (either by vehicle strike or other means) their pouch-young can still remain intact and very much alive! If you come across a deceased animal and are not sure if it has a pouch where joeys can reside, please contact Sydney Wildlife Rescue on 9413 4300 for advice.



Lynleigh Grieg, Sydney Wildlife Rescue
Photos: Margaret Woods

Prey and Predator 1



From **Peter Marshall, on Bilgola Plateau:**

“It was very interesting to see this wasp in operation. At first it was flying around, apparently aimlessly, then it landed and started to explore the steps leading down from our deck. Then it suddenly appeared with a Huntsman spider - dead I think - in its grasp and hauled it to the edge of a step and dropped it into the leaves of a plant growing there. It was as if it was hiding it.

The wasp then seemed to hunt around the step, up a wall and into the space under the deck. It did this several times as if scouting out the suitability of its next move. It then returned to where it had hidden the spider, got hold of it and pulled it up the wall and disappeared into the space under the deck. Quite exciting to see.

Our comment: It's amazing how this wasp, dragging a spider heavier than itself, by its head, can navigate backwards around obstacles and over fences to the hole it has made previously. It lays an egg on the spider, paralyzed but still alive. The wasp larva feeds on the living spider. Hopefully the spider is unconscious until it dies.

This big wasp will sting if you approach, so do not get between it and its prey.

At night with torch



Cicada emerges: 10.56 pm 11.14 pm



Prey and Predator 2:

Preying Mantis and Cabbage White Butterfly



Peter Marshall



PITTWATER NATURAL HERITAGE ASSOCIATION INC.

Protecting Pittwater's Environment

PNHA's Mission Statement is:

To promote and facilitate the enhancement and understanding of the natural heritage and ecological systems within the Pittwater area.

The PNHA vision is:

An engaged and aware community working to conserve and enhance its natural heritage.

Find us: pnha.org.au and Facebook <https://www.facebook.com/PNHAaus/>