

banksia

bulletin

autumn 2023



**Open for
2023
Bayside
Community
Nursery
Gala Day
Saturday 1 April**



Bayside
CITY COUNCIL

From the Mayor

Welcome to the Autumn 2023 edition of *Banksia Bulletin*.

This edition is filled with many fantastic contributions from our Friends group volunteers, and I would like to thank everyone for making this *Banksia Bulletin* an exciting read.

From evidence-based research on air quality to rare and interesting sightings of birdlife, marine life, and rare caterpillars and plants, this is one of the biggest editions of *Banksia Bulletin* we have published.

I would like to acknowledge Bayside's Australia Day 2023 Award recipients who were formally recognised for their contribution to our local nature environment.

Susanne Motherwell, a resident from Vincent Street Sandringham, received the individual environment award for her work protecting the 50-year-old Pin Oaks that have created a magnificent avenue.

Ms Motherwell and her neighbours successfully applied to Council for the entire avenue to be included on Bayside's significant tree registry.

Council was thrilled to be able to register not just an individual tree,



Susan Motherwell and Mayor Cr Hanna El Mouallem



We are planting more than 2,200 indigenous and park trees a year on Council land and increasing and protecting other vegetation to create a cooler, greener and more wildlife-friendly Bayside as part of our Urban Forest Strategy.

We encourage everyone living in Bayside to look around and identify significant trees that could be registered and protected.

Find out more at bayside.vic.gov.au/services/trees-parks-and-beaches/significant-tree-register

Councillor Hanna El Mouallem
Mayor



Cover photo: Purple Swamphen
By Pauline Reynolds

but the first avenue of trees. We thank Ms Motherwell and the Vincent Street residents for their work in putting the submission together.

This is a wonderful example of the work Bayside is doing to expand its tree canopy, which is part of our plan to tackle climate change by planting more trees.



RMGC representatives and Mayor Cr Hanna El Mouallem

The Royal Melbourne Golf Club is one of the most iconic landmarks in Bayside. We were very proud to recognise the environmental achievements of this long-standing local tenant which continues to protect, enhance, and propagate the land it occupies.



In this issue

Special features



6

HONOURING BOB WHITEWAY



10

REPORT ON BIRD SURVEYS AT BAY ROAD HEATHLAND SANCTUARY



14

AIR POLLUTION IN BAYSIDE



24

'MORE POTENT THAN CYANIDE'

Other articles

NURSERY OPENS FOR 2023	4
CONTROLLED ECOLOGICAL BURN AT BALCOMBE PARK	8
LOOKING FOR SOIL SLEUTHS	9
A RARE, EXCITING FIND	13
AS FATAL FUNGUS TAKES IT TOLL, CAN WE SAVE FROG SPECIES ON THE BRINK?	18
THE 30 PERCENT GOAL: IS BIGGER ALWAYS BETTER FOR BIODIVERSITY?	21
VOLUNTEER GROUPS	26

Please [click here and subscribe](#) to have *Banksia Bulletin* delivered directly to your email inbox.



Nursery opens for 2023

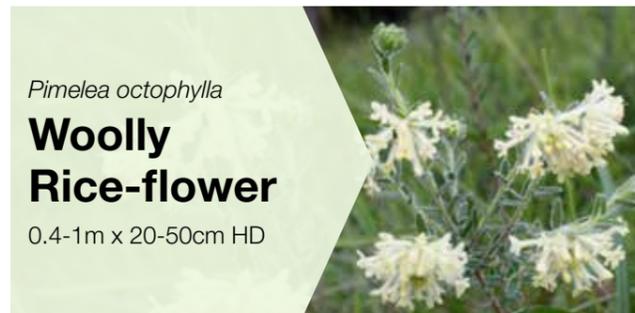
**Saturday 1 April
9am-2pm**

Join us for a special Gala Day to celebrate the opening of the Bayside Community Nursery for season 2023.

The Bayside Community Nursery was established in 1978 and is considered one of the first in the world devoted to the propagation of indigenous plants.

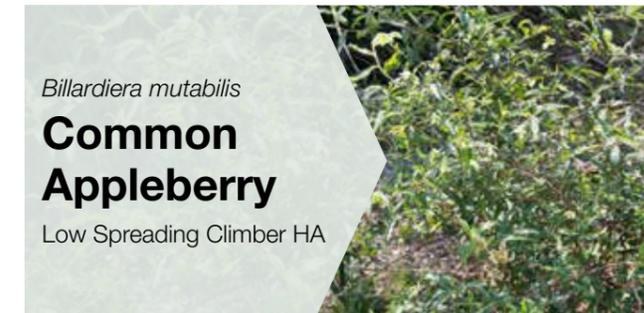
Come down and enjoy an all-day barbecue, speak with knowledgeable staff and volunteers about indigenous plants and make a purchase.

Here's a sneak peek of some specialty plants that will be for sale on Gala Day. These plants are only available in 140mm pots and retail for \$12.95 each. Only while stocks last, so please get in quick!



KEY
H - heath/woodland
C - coast (dune scrub and woodland)
D - prefers dry, well drained soils and tolerates dryness once established

W - prefers or tolerates moist soils, wetness, periodic inundation
Sh - prefers or tolerates full shade
A - adaptable, grows well in most soil types and aspects



Bayside's new Volunteer Hub

Bayside has created a volunteer hub showcasing volunteer programs and opportunities run by both Council as well as volunteer-involving organisations within the municipality.

The new hub is a result of feedback Council received during its consultation for the *Volunteer Recruitment, Retention and Recognition Plan 2022-2026*. It replaces the Bayside Volunteer website (www.BaysideVolunteering.com.au).

Visit the [new volunteer hub](#) and view volunteering opportunities.

Promote a volunteering opportunity by clicking 'List your opportunity here' on the volunteer hub.

For more information, please email LBristow@bayside.vic.gov.au

Looking for more volunteer resources?

The Victorian Department of Environment, Energy and Climate Action resources hub for environmental volunteers and landcarers includes a toolkit for attracting and motivation volunteers. [Check it out!](#)



Honouring Bob Whiteway

The life and work of highly respected, passionate, and dedicated conservationist, Bob Whiteway, has been honoured with a memorial installed at Ricketts Point, Beaumaris.

Councillor Laurence Evans, together with Bob Whiteway's daughter, Jane Mack, and representatives from Ricketts Point Marine Care, BRASCA, and Beaumaris Secondary College, unveiled two interpretive signs at Ricketts Point on 23 January – Bob's birthday.

Bob sadly passed away in September 2021. His many conservation efforts have been well recognised with awards including the Victoria Coastal Award for Lifetime Achievement (2002), Bayside Citizen of the Year (2003), and the Order of Australia Medal (2013) for his contribution to conservation and the environment.

He was instrumental in lobbying the Victorian Government for the inclusion of Ricketts Point in the Victorian Marine National Parks and Sanctuaries legislation and also in the eventual proclamation of the Ricketts Point Marine Sanctuary in 2002, ensuring this unique local marine environment was protected for future generations.

To recognise Bob's lifelong passion for the environment, and his dedication to protecting the coastal and marine environment, Bayside has informally named a section of the coastal pathway at Ricketts Point the 'Bob Whiteway Memorial Walk'. Interpretative sign boards containing information about Bob's life and significant achievements have been installed.



(L-R) Jane Mack and Cr Laurence Evans

About Bob Whiteway

Born on 23 January 1934, Bob was a long-standing and well-respected member of the community of Bayside.

He is well known in the community through his lifelong passion for the environment and in particular, his dedication towards the coastal and marine environment.

He was a geography and physical education teacher for over 42 years, most of these at Beaumaris High School. He is fondly remembered by many of his students and colleagues for his new and unconventional methods of teaching like taking students out of the classroom and encouraging them to explore and learn about their local environment. He established the Skin Diving Program, teaching his students about the marine environment at Port Phillip Bay.

Through this program he realised how the marine environment was becoming more and more depleted, which started a 16-year campaign for Ricketts Point to be declared a marine sanctuary, which was finally realised in 2002.

After his retirement, Bob continued to work for the environment through BRASCA, keeping weeds at bay, planting,

Bob Whiteway OAM
Memorial Foreshore Walk

This section of coastal path has been dedicated to and named after local resident **Robert 'Bob' Whiteway OAM**, in honour of his significant contributions to the environment.

Bob was a long standing and well-respected member of the Bayside community. His life-long passion for the environment, in particular his dedication to the coastal and marine environment, was unparalleled. A teacher of 37 years at Beaumaris High School, Bob was as much proud of educating others about the environment as he was in mentoring it. Mentoring the classroom to the coast, Bob introduced generations of students to the coastal and underwater wonders of Ricketts Point and its surrounds.

Bob will be forever remembered for his instrumental role in the nomination and eventual proclamation of the Ricketts Point Marine Sanctuary. His tireless lobbying of both local and state governments for over a decade ensured this special and beloved marine environment was protected for future generations to come.

To further protect the Sanctuary, Bob established, and was the inaugural President of, Marine Care Ricketts Point Inc, which carries on Bob's work in educating about and protecting the Ricketts Point Marine Sanctuary. His conservation efforts were recognised by many. Bayside is proud to remember Bob as a Life Member of Beach Rock and Sandringham Conservation Association Inc. (BRASCA), the recipient of the Victoria Coastal Award for Lifetime Achievement in 2002, being named Bayside Citizen of the Year 2003, and his award for an OAM in 2013 for his contribution to conservation and the environment.

Bob had a unique ability to connect with both young and old and to inspire people to love and care for the environment. He was an engaging and enthusiastic speaker and an extraordinary educator.

All Victorians owe him a great debt of gratitude for his insight and resilience in preserving the precious area.

and watering native plants. He was also instrumental in keeping Cheltenham Road in its current natural state.

We are lucky that in retirement Bob found the time to recount his experience as a teacher and environmentalist in two books. The first, *Teacher Inside Out*, recalls his experiences as a teacher and in *Teacher Down Under* he tells the story of how his love for the underwater world lead to the creation of Ricketts Point Marine Sanctuary.

In retirement he continued to pass on his knowledge of the marine and coastal environment, giving talks and tours for local schools and community groups. His passion for our local environment inspires many to this day; a real legacy for which we are grateful.

Bob passed away on 12 September 2021, aged 87.

He is remembered by his family and many in the wider Bayside community as a beautiful gentle soul who loved Mother Nature and his fellow man. He has always focused on the potential in everything and everyone, and it was hard to resist his enthusiasm, wonderment, and care. He was always engaging; inclusive in everything he set his mind to.

Through his life-long passion, commitment and perseverance to protect his local environs and its inhabitants he has left this world a better place and his legacy will live on.



Our underwater discoveries

By Amy Weir, Bayside City Council, Biodiversity & Conservation Planning Officer



My brother Rob and I have recently been taking advantage of the relatively warm summer waters of the Bay and enjoying at least one snorkel each week within Ricketts Point Marine Sanctuary.

When conditions are favourable, we meet early on the beach and head out to explore one of our favourite snorkel sites at either Quiet Corner or Table Rock. It has become a

fascinating, relaxing (and addictive) way to start the day. With each dive, we have become more familiar with the underwater landscape and our local fishy friends. Rob and I would like to share a small snippet of some of the creatures we have discovered on our dives, captured on GoPro, that hopefully inspire you to explore our marine life for yourself.

Controlled ecological burn at Balcombe Park

Coming: April 2023

By Jo Hurse
Bushland & Nursery Operational Supervisor

The Citywide Bushland Crew will conduct a controlled ecological burn at Balcombe Park Reserve in April 2023.

The 4000m² site will be the largest ecological burn prepared in Bayside. While the same sized area underwent an ecological burn last year, these were at two separate sites – Bay Road Heathland Sanctuary and Long Hollow Heathland Sanctuary, which were both roughly 2000m².

The main objective of an ecological burn is to restore the original vegetation type. Balcombe Park is comprised mostly of sand heathland and damp sands herb-rich woodland. Both of these plant communities are dependent on fire to stimulate recruitment.

Fire is an important management tool in managing Bayside's seven inland reserves. The plant communities are highly adapted to fire. The heat of the fire and the chemicals released in both the smoke and the ash all act to stimulate the germination of seeds indigenous to the area, which are adapted to surviving in a smoke-prone environment – even seeds that have been lying dormant for 60-80 years.

Balcombe Park has been invaded by Coastal Tea-tree (*Leptospermum laevigatum*) and Coastal Wattle (*Acacia longifolia subsp. sophorae*). Both plant species are regarded as a weed this far inland.

Some understorey at this site, like stands of Sandhill Sword-sedge (*Lepidosperma concavum*), indicates the potential for good regeneration.

This will be the fifth controlled ecological burn at Balcombe Park Reserve over the past two decades (2001, 2008, 2016 and 2019).

We look forward to seeing the results of the 'mosaic burning' style, which aims to improve the overall health of Bayside's inland bushland reserves and a return of the diverse plant communities that they once were.

Balcombe Park ecological burn 2019.



Looking for soil sleuths



Source: EPA Victoria

EPA Victoria has launched a new global initiative to help people dig a little deeper to understand what makes up the soil in their gardens. GardenSafe is a free program that turns you into a soil sleuth, helping you to investigate soil health and potential contaminants in your garden. Through GardenSafe you can access important information to help you use your garden for optimal results, especially when it comes to growing veggies. GardenSafe will analyse your soil sample for common contaminants and

help you understand what you need to do to minimise any potential risks. Send in your soil samples to get a personalised report and guidance on growing fruit and vegetables safely in your garden. Protecting the environment is everyone's business. Opt in to this program to learn more about your environment. For more information visit the EPA website. Sign up for the program is here. Email gardensafe@epa.vic.gov.au with questions.



Look out for these signs

Three sites in Beaumaris will be planted this year as part of Council's implementation of its **Park Improvement and Habitat Linkage Plan**. We will be installing these signs at planting locations to provide more information.

Planting for wildlife

We're increasing biodiversity across Bayside by strategically planting to increase flora and fauna.

We're replanting this site to create a green corridor for local wildlife. This is part of our park improvement and habitat linkage plan.

As part of this replanting we're

- planting low growing indigenous plants propagated at our Community Nursery
- improving the landscape of the park

For more information

 bayside.vic.gov.au/HabitatAndLinkageImprovement or scan this QR code.



Report on bird surveys at Bay Road Heathland Sanctuary:

18 November 2021-19 December 2023

Eastern Rosella

President of BirdLife Bayside Tania Ireton has led 18 bird surveys in Bay Road Heathland Sanctuary and recorded these on the Birdata website.

Story and photos: Sue Forster

Convenor, Friends of Bay Road Heathland Sanctuary



Yellow-tailed Black-Cockatoo

The 20-minute surveys took place over nine days (two surveys per session), each starting at 8am.

The first four surveys occurred in November 2021 followed by monthly surveys that began on 17 June 2022, once Birdata had established Bay Road Heathland Sanctuary as a shared site on its website.

A 20-minute survey officially covers 2ha but, due to the winding nature of Bay Road Heathland Sanctuary's internal paths, it is impossible to cover the 2.1ha Sanctuary in one survey. Hence, there is overlap in the areas covered by each session's two x 20-minute surveys.

Between three and five observers attended each session including Tania Ireton, Sue Forster, Laura Paterson, Rosie Bates and Annie Dennis.

A bird is listed if it is seen and/or heard by more than one observer during each survey.

Since November 2021, 29 bird species have been recorded by the surveys.

The most species recorded in the two combined surveys on any one date was 17 (18 November 2021 and 12 August 2022). The fewest recorded was 10 (8 July 2022 – a particularly cold and wet session). The largest number of species in one 20-minute survey was 14 (26 November 2021 and 11 November 2022) and the fewest was six (8 July 2022).

Construction of the Bayside Netball Centre was underway on Sandringham College's playing fields in September 2022. Although the weather was fine and sunny, the combined survey species count dipped noticeably to 13 from a total of 17 in August. By November it had risen to 15, and in December it was 16.

The largest bird count at any survey was 56 (our first survey of 26 November 2021). We recorded an unusually large number of Red Wattlebirds (7) and Little Wattlebirds (6) as well as an average number of Noisy Miners (18).

The smallest count was 27 (second count of 17 June 2022). This may have



Common Bronzewing



Noisy Miner



Juvenile Grey Butcherbird

been an aberration as the first count produced 42 birds.

Five regularly recorded species are listed as feral or pest (the indigenous Noisy Miner and introduced Spotted Dove, Rock Dove, Common Myna and Common Starling).



Spotted Dove

The 24 non feral/pest species observed include:

- Eastern Rosella
- Rainbow Lorikeet
- Musk Lorikeet
- Galah
- Little Corella
- Sulphur-crested Cockatoo
- Black-faced Cuckoo-shrike
- Magpie-lark
- Australian Magpie
- Grey Butcherbird
- Pied Currawong
- Little Raven
- Welcome Swallow
- Silver Gull
- Pacific Black Duck
- White-faced Heron
- Spotted Pardalote
- Brown Thornbill
- White-browed Scrubwren
- Common Bronzewing
- Crested Pigeon
- Red Wattlebird
- Little Wattlebird
- Eastern Spinebill.

Some of these species, like the Sulphur-crested Cockatoo, Little Corella, White-faced Heron and Pacific Black Duck, have only been seen once, sometimes flying overhead. The Black-faced Cuckoo-shrike was seen in trees within the reserve, albeit on one occasion. Some of the smaller birds, such as Brown Thornbills and White-browed Scrubwrens, are rarely seen but regularly heard in denser vegetation that protects them from Noisy Miners. Spotted Pardalotes and an Eastern Spinebill were heard in two surveys, but they have either been seen or heard on other occasions by staff and volunteers. Single male Common Bronzewings were seen in two surveys, but up to four were observed outside surveys. Crested Pigeons have only been recorded in two surveys.

Noisy Miners and Rainbow Lorikeets are the only species recorded in every survey. Australian Magpie, Pied Currawong, Little Raven, Brown Thornbill and Red Wattlebird have



Crested Pigeon



Juvenile Australian Magpie



Red Wattlebird



Musk Lorikeet



Immature Pied Currawong

been recorded in most surveys while Eastern Rosella is in 11 surveys and Welcome Swallow is in 10 but only in small numbers (1-3 per survey).

Musk Lorikeets visit in summer, when the Manna Gums and Creeping Mistletoe are flowering - 17 is the maximum recorded. Magpie-larks (single or in a pair) and Grey Butcherbirds are often seen and heard.

Aggressive Noisy Miners pose a major problem for other birds in the Sanctuary, both resident and visitors. They have been seen attacking much larger Yellow-tailed Black-Cockatoos in the Sanctuary (see iNaturalist Australia records).

The greatest number of Noisy Miners recorded during a single survey is 25 (21 October 2022). On this occasion, an outside group appeared to be challenging a resident group over territory.

More usually, the count is between 10-20 Noisy Miners per survey.

The species under greatest threat from Noisy Miners are likely to be Brown Thornbills, White-browed Scrubwrens, and other honeyeaters, particularly Red Wattlebirds and Little Wattlebirds. In 2022, the greatest number of wattlebirds recorded was five Red Wattlebirds on 21 October, but none were seen in December; Little Wattlebirds were recorded singly in just four surveys. Up to five Brown Thornbills were heard in most surveys, and up to two White-browed Scrubwrens in seven surveys.

Species observed with juveniles in the Sanctuary were: Eastern Rosella (18 and 26 November 2021 and 19 December 2022), Australian Magpie (21 October 2022), Grey Butcherbird (19 December 2022),

Pied Currawong (26 November 2021), and Noisy Miner (21 October 2022). It is likely that Noisy Miners nest in the Sanctuary, but the nest sites of other birds are unclear.

In addition to the 29 species listed in these surveys, the following birds have had 2021-2022 photo observations uploaded to iNaturalist Australia: Tawny Frogmouth, Yellow-tailed Black-Cockatoo, and Common Blackbird (all inside Bay Road Heathland Sanctuary); and Masked Lapwing and Straw-necked Ibis (on adjoining playing fields prior to construction). In summer 2021, a pair of Australian King-Parrots and a dead Bassian Thrush were found in the Sanctuary.

To view the complete surveys, go to [Birddata website](#), select the Shared Sites tab and type Bay Road Heathland Sanctuary in the filter.



A rare, exciting find

Story by Pauline Reynolds
Photos by John Eichler,
Pauline Reynolds and Val Stajsic

On 20 February, John Eichler spotted Emperor Gum Moth caterpillars in a Coast Manna Gum (*Eucalyptus pryoriana*) at George Street Reserve. On a leaf nearby were 12 hatched eggs, so we could have missed one caterpillar or perhaps we lost one. Emperor Gum Moths are rare now due to the European Wasp, which eats the caterpillars and the wings of the newly emerged moths. It was most heartening to see both the moth and the caterpillars. Perhaps the moth is making a gradual comeback, which John mentioned in his *Banksia Bulletin* article in **Autumn 2018**.



Air pollution in Bayside

In Bayside we are blessed to experience lower levels of exposure to air pollution than most suburbs of Melbourne. There is very little industry located within Bayside causing significant air pollution and the afternoon sea breezes help to disperse air pollutants away from our homes.

By Associate Professor Vicki Kotsirilos AM,

MBBS, Awarded Hon Fellow RACGP, FACNEM, FASLM, President Sandringham Foreshore Association

However, we do experience 'hot spots' within Bayside causing significant air pollution that may negatively impact human health. These hot spots include shopping centres, car parks, living or working beside major roads, and even two-minute drop-off centres at schools when idling our vehicles. Children, the elderly and people with pre-existing heart and lung disease, are at the highest risk of being harmed by air pollution. Like smoking, air pollution is an independent risk factor for chronic diseases especially heart and lung disease and the risk of mortality.¹

There has been an explosive number of studies in the last decade that demonstrate exposure to even low levels of air pollution, even below current government standards, causes harmful effects on health.

Traffic pollution is the major contributor to urban air pollution in Australia. In line with international studies, Australian research demonstrates there is no safe level of air pollutants even well below the threshold standards². Therefore, any increase in population exposure to vehicle emissions will result in an increase in health detriments.

The World Health Organisation air quality guidelines state, "*there is little evidence to suggest a threshold below which no adverse health effects would be anticipated*"³. Air pollution is often difficult to measure as many pollutants interact with changes in weather and wind, so measurements even at 100 metres apart can be very different. Some people can smell vehicle emissions,

whilst others have adapted to the smell and can no longer smell the pollution.

Australian medical practitioners are concerned with the negative health impacts of air pollution on human health. Air pollution in Australia is attributed to over 3,000 premature and preventable deaths per year, as well as contributing to poor lung and cognitive development in children, asthma, heart disease, lung disease and cancer, especially when living in close proximity to major sources of pollution^{4,5,6}.

Many people who live, work and/or attend schools near major roadways are exposed to higher levels of pollutants such as sulphur dioxide, nitrogen dioxide, ozone, particulate matters PM_{2.5} and PM₁₀, carbon monoxide, diesel particulates and volatile organic compounds. When combined, all these pollutants impact human health and can potentially affect any organ in the body.

Industry, coal-fired power stations and motor vehicles are the main sources of pollutants in Australia⁷. In Bayside, traffic-related air pollution from fossil fuel vehicle emissions e.g. petrol and diesel vehicles are the main sources of air pollution. Diesel powered vehicles emit higher amounts of air pollutants compared to petrol vehicles, and the emissions from diesel vehicles, when inhaled, can be carcinogenic⁸.

The incidence of asthma has grown in Australia; over the last 10 years, the prevalence of asthma increased in the Australian population from 9.9% in 2007-08 to 11.2% in 2017-18⁹.

Recent research by the Australian Child Health and Air Pollution Study (ACHAPS) of children (7-11 years) across 12 Australian

cities found small increases in nitrogen dioxide (NO₂) exposure are significantly associated with increased risk of asthma and reduced lung function¹⁰. In urban areas, vehicle emissions contribute up to the majority of nitrogen dioxide emissions.

The causes of asthma are multifactorial but reducing nitrogen dioxide levels from vehicle emission can have substantial benefits for children's health and help reduce asthma prevalence. A recent study in California found lowering NO₂ levels by improving vehicle emissions can significantly reduce the incidence of asthma in children¹¹.

Asthma prevalence of children who live in areas with more street trees is significantly less than in children living in areas with less trees¹².

Lifestyle related chronic diseases

In hospitals we are witnessing more and more lifestyle-related chronic diseases such as obesity, diabetes, cardiovascular diseases, pulmonary diseases, and cancers. Outdoor exercise in a clean environment offers a long-term solution to address hospitalisation-related illnesses and chronic diseases, with significant cost savings to our community.

Doctors well recognise the importance of a healthy lifestyle, exercise and healthy eating to help treat and prevent chronic diseases. Exercising outdoors is more beneficial to health compared with exercising indoors¹³, but exposure to air pollution whilst exercising outdoors such as cycling can be more harmful¹⁴.

Health benefits of urban forests and trees

There are worldwide efforts and strategies to develop urban forests and retain green spaces within an urban environment to help with air purification and climate regulation, recognising the health benefits these strategies have on our community^{15,16}. Studies and research demonstrate that planting more trees, encouraging leafy suburbs, green spaces, parklands, and urban forests improve the general health of communities^{17,18}. A review of the literature found green spaces are associated with positive mental health outcomes¹⁹. Studies have found living in areas with higher amounts of green spaces is associated with lower risk of mortality, especially cardiovascular mortality^{20,21}.

Urban green space is associated with improved general well-being and mental health^{22,23}.

Increased tree canopy is associated with improved sleep, in middle to older-aged adults²⁴.

A recent study analysing health data of over 100,000 Australians over a 10-year period demonstrates urban green space, particularly trees, can reduce cardiovascular disease risk²⁵. A 10% increase in tree canopy cover within 1.6 km of a household was associated with a 3% reduced risk of death. Tree canopy cover was associated with reduction in risks of all-cause mortality, cardiovascular disease mortality, and heart attacks. Trees, not open grassed area, produced the most benefits for cardiovascular disease prevention.

Trees improve air quality by reducing air pollution, which consequently reduces the incidence of cardiovascular disease – as this study demonstrated – but also asthma²⁶, allergies, mental diseases, and psychiatric disorders^{27,28,29,30}. Trees also shade and cool our cities, keeping us cooler over the summer months, which has a number of health benefits.

Some of the scientific evidence demonstrating the harmful effects of air pollution:

1. Increases morbidity and mortality especially from fine particulate air pollution, ie earlier deaths from exposure to ambient air pollution.
2. Increased risk of mortality, particularly for the elderly, even in areas of air pollution considered at "safe levels". Exposure to air pollution at levels well below current quality standards is linked to an increased risk of death. Increased risk of cardiovascular disease and deaths, such as cardiac arrests, heart failure onset and mortality associated with heart failure, deep vein thrombosis [blood clots], heart disease, and myocardial infarction (heart attacks).
3. Higher risk of developing hypertension [high blood pressure].
4. Increased risk of stroke and mortality associated with stroke.
5. Higher risk of out-of-hospital cardiac arrest associated with elevated ambient PM_{2.5} and carbon monoxide.
6. Reduced lung function, increased respiratory symptoms and diseases, respiratory-related deaths, chronic obstructive airways disease, cardiopulmonary disease, lung infections, and asthma.
7. Increased risk of asthma and poor lung development in children, including when women are exposed to pollutants during pregnancy.
8. Systemic inflammation from exposure to ambient nitrogen dioxide in people with lung disease eg chronic obstructive pulmonary disease (COPD) patients, especially in former smokers.
9. Increased risk of inflammation and cardiovascular disease in adults.
10. Carcinogenic and lung cancer risk in non-smokers. Lung cancer risk due to deep penetration into the lungs of the fine particulates of 2.5 microns or less from diesel or petrol exhaust fumes. Air pollution shortens survival from lung cancer. PM_{2.5} particles or less are more toxic and carcinogenic as they penetrate deeper into the lungs and vascular system of the body.
11. Air pollution is associated with poor sleep and depression.
12. Dementia, poor cognition, and concentration. The researchers found that long-term exposure to air pollution impacted human cognitive performance, concentration, verbal and math skills, particularly in the elderly, potentially resulting in significant health and economic costs.
13. Increased mortality due to residents working or residing in industrial areas of high air pollution resulting in increased risk of cancers, lung cancer, mortality and neurological diseases.
14. Increased sick leave from work.
15. Greater healthcare utilisation by both children and adults for respiratory infections.
16. Increased risk of hospitalisation due to pneumonia in children.
17. Increased risk of diabetes and diabetes-associated mortality.
18. Pregnancy risks – small for gestational age, and adverse birth outcomes and may increase stillbirths.
19. Poor sperm quality and infertility.
20. Non-lung cancers: PM_{2.5} was significantly positively associated with death from cancers of the kidney and bladder. NO₂ was positively associated with colorectal cancer mortality.

Elderly and children are particularly prone to heat stroke, so benefit from spending more time in the shade during heatwaves.

Research during the COVID-19 pandemic lockdowns demonstrated those who spent more time in blue-green spaces e.g. beaches, lakes, rivers, parks, forests, that is nature, coped better with the lockdowns and was beneficial for mental health^{31,32,33}. Nature replenishes us – it helps to improve sleep, support mental health, lift mood, reduce depression and anxiety, increase happiness, life satisfaction, relaxation, reduce the risk of diabetes, stress hormones e.g. adrenalin and cortisol levels, blood pressure and boosts the immunity.

Strategies to improve air quality and community health include:

1. Reducing air pollutant sources such as reducing the use of vehicles on the road. Try to shop locally and consider if it is feasible to use a bike or walk to shops.
2. Avoid idling vehicles such as at car parks and two-minute drop-off centres at schools – children are exposed to significant levels of air pollution at drop-off centres which may trigger asthma.
3. Retain as much green space as possible in urban environments.
4. Develop urban forests to help mitigate air pollution and improve air quality³⁴. A City of Melbourne paper cites a New York study that found an urban forest removed 1,821 metric tonnes of air pollution at an estimated value to society of \$9.3 million per year³⁵.
5. Protect trees on your property, avoid cutting them down unless they are a danger to you or your family. Retaining and planting more trees improves air quality, consequently, improves the health of the population and reduces the incidence of respiratory diseases, asthma and allergies^{36,37}. Certain trees also trap and filter pollen on windy days.
6. Plant and retain more trees to provide shade and help us to keep cooler over summer period, reducing sun exposure and hence protecting from skin damage and skin cancer effects. Trees help us keep cool over the summer months during heatwaves. Heatwaves are particularly harmful for those who are unwell, the elderly and children.



Smooth barked Apple Myrtle at 19-21 Cheltenham Road

7. Plant and retain trees to remove carbon dioxide from the air that traps heat in the atmosphere, thereby reducing the risk of climate change.
8. Build and retain parkland to improve the psychological wellbeing of the individual. Parklands, spending time in nature and green spaces improve well-being and help people to relax and exercise more^{38,39}. The psychological benefits of green spaces and biodiversity are well recognised⁴⁰.
9. Fostering more green spaces to improve air quality for exercise in nature, thereby breathing clean air during exercise rather than polluted air if exercising along major roads. Encouraging outdoor activity offers greater opportunities for exercise, nature and bird watching for relaxation and community cohesion.
10. If affordable, consider an electric vehicle for your next car. Exposure to vehicle pollution is reduced by better vehicle emissions standards, improving public transport, reducing the use of diesel fuel, and by encouraging a shift to tighter Euro 6 vehicle emission standards or electric or hybrid vehicles to reduce air pollution.

Conclusion

State Government, leading universities and researchers have already highlighted concerns with air pollution and created policies and strategies to help create a beautiful, healthy, sustainable city^{41,42}.

About the author

Dr Vicki Karalis AM is President of the Sandringham Foreshore Association and a medical practitioner with an interest in environmental medicine and air pollution. She is a regular writer and lecturer on air pollution and climate change. Dr Vicki is an active volunteer in Bayside, hoping to make it a better and healthier place for our community.



In line with international studies, Australian research demonstrates there is no safe level of air pollutants, even well below the threshold standards⁴³. As our population grows, air pollution from more vehicles on the roads and consequent emissions will be a constant challenge to us all.

Every effort should be considered and thoroughly explored to reduce air pollution in our community.

Bayside City Council, Open Space team, are very aware of the harms associated with air pollution and the positive health contributions of open spaces, trees, and greenery.

Council is undertaking significant tree planting as part of Council's recently endorsed **Urban Forest Strategy** and **Park Improvement and Habitat Linkage Plan**, and many new plantings in addition to normal contractual planting in open space and streetscapes will be undertaken over the next 10 years as part of the recommendations contained within these plans.

Peaceful parks encourage exercise and relaxation. We need to protect trees, on our properties and within our community and in open spaces such as our parks.

Parks and nature reserves are precious in urban environments and should be protected and cared for with the utmost sensitivity – we owe it to our children to leave our planet and environment clean and healthy.

Footnotes

1. Qian Di, M.S, Wang Y, Zanobetti A, Wang Y, Koutrakis P, Choirat C, Dominici F, Schwartz JD. Air Pollution and mortality in the Medicare Population. *N Engl J Med* 2017, June 29; 376(26):2513-2522. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5766848>
2. Barnett A. It's safe to say there is no safe level of air pollution. *Australian and New Zealand Journal of Public Health*. 2014;38:5:407-408 <https://onlinelibrary.wiley.com/doi/full/10.1111/1753-6405.12264>
3. World Health Organization. *Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide: Global Update 2005*. Geneva (CHE): WHO; 2006. <https://go.galegroup.com/ps/i.do?p=AONE&sw=w&u=google scholar&v=2.1&it=r&id=GALE%7CA174061909&sid=classroomWidget&asid=acec1d40>
4. Stephen Begg, Theo Vos, Bridget Barker, Chris Stevenson, Lucy Stanley and Alan D Lopez. The burden of disease and injury in Australia 2003 May 2007. P234 <https://www.aihw.gov.au/getmedia/181b92b3-18a2-4669-aad3-653aa3a9f0f2/bodaiaa03.pdf.aspx>
5. Bowatte G, Lodge C, Knibbs L, Erbas B, Perret J, Jalaludin B, Dharmage S. (2018). Traffic related air pollution and development and persistence of asthma and low lung function. *Environment International*, 113, 170-176. <https://research.monash.edu/en/publications/traffic-related-air-pollution-and-development-and-persistence-of->
6. Health impacts of air pollution, Australia State of the Environment Report. AIHW (Australian Institute of Health and Welfare) (2016). Australian burden of disease study: impact and causes of illness and death in Australia 2011, AIHW, Canberra. <https://soe.environment.gov.au/theme/ambient-air-quality/topic/2016/health-impacts-air-pollution>
7. Australian Government Department of the Environment and Energy. Sulfur Dioxide fact sheet 2005 <http://www.environment.gov.au/protection/publications/factsheet-sulfur-dioxide-so2>
8. Michel Cames & Eckard Helmers Critical evaluation of the European diesel car boom - global comparison, environmental effects and various national strategies *Environmental Sciences Europe* volume 25, Article number: 15 (2013) <https://enveurope.springeropen.com/articles/10.1186/2190-4715-25-15>
9. Australian Bureau of Statistics 2018; National Health Survey: First Results 2017-18. ABS Cat no. 4364.0.55.001. Canberra: ABS. <https://www.abs.gov.au/AUSSTATS/abs@nsf/DetailsPage/4364.0.55.0012017-18?OpenDocument>
10. Knibbs LD, Cortés de Waterman AM, Toelle BG, Guo Y, Denison L, Jalaludin B, Marks GB, Williams GM. The Australian Child Health and Air Pollution Study (ACHAPS): A national population-based cross-sectional study of long-term exposure to outdoor air pollution, asthma, and lung function. *Environ Int*. 2018 Nov;120:394-403. doi: 10.1016/j.envint.2018.08.025. Epub 2018 Aug 17. <https://www.ncbi.nlm.nih.gov/pubmed/30125857>
11. Garcia E, Berhand KT, Islam T, et al. Association of changes in air quality with incident asthma in children in California, 1993-2014. *JAMA*. 2019;321:1906-1915. <https://www.ncbi.nlm.nih.gov/pubmed/?term=Garcia+E%2C+Berhand+KT%2C+Islam+T%2C+et+al+Association+of+changes+in+air+quality+with+incident+asthma+in+children+in+California%2C+1993-2014.+JAMA.+2019%3B321%3A1906-1915>
12. Asthma Children living in areas with more street trees have lower prevalence of asthma. -PubMed-NCBI J EpidemiolCommunity Health.2008 Jul;62(7):647-9. doi: 10.1136/jech.2007.071894. Epub 2008 May 1. <https://www.ncbi.nlm.nih.gov/pubmed/18450765>
13. Boere K, Lloyd K, Binsted G et al. Exercising is good for the brain but exercising outside is potentially better. *Sci Rep* 13, 1140 (2023). <https://doi.org/10.1038/s41598-022-26093-2>
14. Raza W, Forsberg B, Johansson C, Sommar JN. Air pollution as a risk factor in health impact assessments of a travel mode shift towards cycling. *Glob Health Action*. 2018;11(1):1429081. doi: 10.1080/16549716.2018.1429081. <https://www.ncbi.nlm.nih.gov/pubmed/29400262>
15. Mexia T, Vieira J, Principe A, Anjos A, Silva P, Lopes N, Freitas C, Santos-Reis M, Correia O, Branquinho C, Pinho P. Ecosystem services: Urban parks under a magnifying glass. *Environ Res*. 2018 Jan;160:469-478. doi: 10.1016/j.envres.2017.10.023. Epub 2017 Nov 5. <https://www.ncbi.nlm.nih.gov/pubmed/29078140>
16. Vieira J, Matos P, Mexia T, Silva P, Lopes N, Freitas C, Correia O, Santos-Reis M, Branquinho C, Pinho P. Green spaces are not all the same for the provision of air purification and climate regulation services: The case of urban parks. *Environ Res*. 2018 Jan;160:306-313. doi: 10.1016/j.envres.2017.10.006. Epub 2017 Oct 15. <https://pubmed.ncbi.nlm.nih.gov/29040950>
17. Urban Forest Strategy: Making a great city greener 2012-2032, City of Melbourne <http://www.melbourne.vic.gov.au/urbanforest> <http://www.melbourne.vic.gov.au/sitecollectiondocuments/urban-forest-strategy.pdf>
18. Vieira J, Matos P, Mexia T, Silva P, Lopes N, Freitas C, Correia O, Santos-Reis M, Branquinho C, Pinho P. Enviro. Res. 2018 Jan;160:306-313. doi: 10.1016/j.envres.2017.10.006. Epub 2017 Oct 15. Green spaces are not all the same for the provision of air purification and climate regulation services: The case of urban parks. <https://www.ncbi.nlm.nih.gov/pubmed/29040950>
19. Callaghan A, McCombe G, Harrold A, McMeel C, Mills G, Moore-Cherry N, Cullen W. (2021). The impact of green spaces on mental health in urban settings: a scoping review. *Journal of Mental Health*, 30:2, 179-193, DOI: 10.1080/09638237.2020.1755027 <https://www.tandfonline.com/doi/abs/10.1080/09638237.2020.1755027?journalCode=jimh20>
20. Residential green spaces and mortality: a systematic review Mireia Gascon a,b,c,d, Margarita Triguero-Mas b,c,d, David Martínez b,c,d, Payam Davdand, MDb,c,d, David Rojas-Rueda,b,c,d, Antoni Plasencia, Mark J. Nieuwenhuijsen http://diposit.ub.edu/dspace/bitstream/2445/99572/1/gascon2015_2007.pdf
21. Peter James, Jaime E. Hart, Rachel F. Banay, and Francine Laden 2016 Exposure to Greenness and Mortality in a Nationwide Prospective Cohort Study of Women, *Environmental Health Perspectives* 124:9 CID: <https://doi.org/10.1289/ehp.1510363>
22. Astell-Burt T, Feng X. Association of Urban Green Space with Mental Health and General Health Among Adults in Australia. *JAMA Netw Open*. 2019;2(7):e198209. doi:10.1001/jamanetworkopen.2019.8209
23. Residential green space in childhood is associated with lower risk of psychiatric disorders from adolescence into adulthood <https://www.pnas.org/doi/10.1073/pnas.1807504116>
24. Thomas Astell-Burt, Xiaoqi Feng, Does sleep grow on trees? A longitudinal study to investigate potential prevention of insufficient sleep with different types of urban green space, *SSM – Population Health*, Volume 10, 2020, 100497, ISSN 2352-8273, <https://doi.org/10.1016/j.ssmph.2019.100497>
25. Xiaoqi Feng, Michael A. Navakatikyan, Renin Toms, Thomas Astell-Burt, Leafier Communities, Healthier Hearts: An Australian Cohort Study of 104,725 Adults Tracking Cardiovascular Events and Mortality Across 10 Years of Linked Health Data, Heart, Lung and Circulation, 2022,ISSN 1443-9506, <https://doi.org/10.1016/j.hlc.2022.10.018>. <https://www.sciencedirect.com/science/article/pii/S1443950622011489>
26. Children living in areas with more street trees have lower prevalence of asthma. *Journal of Epidemiological Community Health* 2008 Jul Pages 647-9 10.1136/jech.2007.071894 [doi] <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3415223>
27. Air Pollution (Particulate Matter) Exposure and Associations with Depression, Anxiety, Bipolar, Psychosis and Suicide Risk: A Systematic Review and Meta-Analysis, *Environmental Health Perspectives* | Vol. 127, No. 12 <https://ehp.niehs.nih.gov/doi/10.1289/EHP4595>
28. Joanne B. Newbury, PhD; Louise Arseneault, PhD, Sean Beavers, PhD; et al Association of Air Pollution Exposure With Psychotic Experiences During Adolescence. March 27, 2019 <https://jamanetwork.com/journals/jamapsychiatry/fullarticle/2729441>
29. Khan A, Plana-Ripoll O, Antonsen S, Brandt J, Geels C, Landecker H, et al. (2019) Environmental pollution is associated with increased risk of psychiatric disorders in the US and Denmark. *PLoS Biol* 17(8): e3000353. <https://doi.org/10.1371/journal.pbio.3000353> <https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000353>
30. Henriette Thisted Horsdal, MSc, PhD^{1,2,3}; Esben Agerbo, DrMedSc^{1,2,4}; John Joseph McGrath, PhD^{1,5,6} et al Association of Childhood Exposure to Nitrogen Dioxide and Polygenic Risk Score for Schizophrenia With the Risk of Developing Schizophrenia Psychiatry, November 1, 2019 <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2753791>
31. Contact with blue-green spaces during the COVID-19 pandemic lockdown is beneficial for mental health <https://www.sciencedirect.com/science/article/pii/S004896972037515X>
32. Dawel Amy, Shou Yiyun, Smithson Michael, Cherbuin Nicolas, Banfield Michelle, Calear Amelia L, Farrer Louise M, Gray Darren, Gulliver Melissa, Housen Tambri, McCallum Sonia M, Morse Alyssa R, Murray Kristen, Newman Eryn, Rodney Harris Rachael M, Batterham Philip J. The Effect of COVID-19 on Mental Health and Wellbeing in a Representative Sample of Australian Adults *Frontiers in Psychiatry*, Volume 11, 2020 <https://www.frontiersin.org/article/10.3389/fpsy.2020.579985>, DOI10.3389/fpsy.2020.579985, ISSN 1664-0640
33. Berdejo-Espinola, V, Suárez-Castro, AF, Amano, T, Fielding, KS, Oh, RRY, Fuller, RA. Urban green space use during a time of stress: A case study during the COVID-19 pandemic in Brisbane, Australia. *People Nat*. 2021; 3: 597–609. <https://doi.org/10.1002/pan3.10218>
34. Escobedo FJ, Kroeger T, Wagner JE. Urban forests and pollution mitigation: analyzing ecosystem services and disservices. *Environ Pollut*. 2011 Aug-Sep;159(8-9):2078-87. doi: 10.1016/j.envpol.2011.01.010. Epub 2011 Feb 11. <https://www.ncbi.nlm.nih.gov/pubmed/21316130>
35. Escobedo FJ, Kroeger T, Wagner JE. Urban forests and pollution mitigation: analyzing ecosystem services and disservices. *Environ Pollut*. 2011 Aug-Sep; 159(8-9):2078-87. doi: 10.1016/j.envpol.2011.01.010. Epub 2011 Feb 11. <https://www.ncbi.nlm.nih.gov/pubmed/21316130>
36. Australian Government Initiative [Australian Institute of Health and Welfare] on Health and the environment: a compilation of evidence - 11937.pdf see Section 4.5: <https://www.aihw.gov.au/getmedia/0567e647-f152-4aa9-9e4f-f0404b139574/11937.pdf.aspx?inline=true>
37. Asthma Children living in areas with more street trees have lower prevalence of asthma. -PubMed-NCBI J Epidemiol Community Health. 2008 Jul; 62(7):647-9. doi: 10.1136/jech.2007.071894. Epub 2008 May 1. <https://www.ncbi.nlm.nih.gov/pubmed/18450765>
38. Kwan Hui Lim, Dave Kendall, Kate Lee, Tweet all about it – people in parks feel more positive May 8, 2018 <https://theconversation.com/tweet-all-about-it-people-in-parks-feel-more-positive-95290>
39. White, MP, Alcock, I, Grellier, J et al. Spending at least 120 minutes a week in nature is associated with good health and wellbeing. *Sci Rep* 9, 7730 (2019). <https://doi.org/10.1038/s41598-019-44097-3>
40. Wood E et al. Not All Green Space Is Created Equal: Biodiversity Predicts Psychological Restorative Benefits From Urban Green Space *Front. Psychol*, 27 November 2018 | <https://doi.org/10.3389/fpsyg.2018.02320> <https://www.frontiersin.org/articles/10.3389/fpsyg.2018.02320/full>
41. Urban Forest Strategy 2014 Urban Forest Strategy Making a great city greener 2012-2032 <https://www.vicparkcollective.com/urban-forest-strategy> and <https://www.melbourne.vic.gov.au/SiteCollectionDocuments/urban-forest-strategy.pdf>
42. Professor Richard Sinnott, Director, eResearch; Department of Computing and Information Systems, Melbourne School of Engineering, University of Melbourne; Clare Walter, Honorary respiratory researcher, Royal Melbourne Hospital; Oncology Pharmacist. Cleaner safe air needs you! | Pursuit by The University of Melbourne <https://pursuit.unimelb.edu.au/articles/cleaner-safe-air-needs-you>
43. Barnett, AG. (2014). It's safe to say there is no safe level of air pollution. *Australian and New Zealand Journal of Public Health*, 38: 407-408. <https://doi.org/10.1111/1753-6405.12264> <https://onlinelibrary.wiley.com/doi/epdf/10.1111/1753-6405.12264>



As fatal fungus takes its toll, Can we save frog species on the brink?

A critically endangered Northern Corroboree Frog. Credit: Ken Griffiths/Alamy

The deadly chytrid fungus has wiped out as many as 90 species of amphibians. Now researchers from Australia to California are exploring a host of ways to save threatened frog populations – from relocation to safer habitats to reintroducing frogs treated with a sort of vaccine.

By Anna Gibbs
Source: [Yale Environment 360](#)

Scattered across one zoo and two sanctuaries in Australia, a couple of thousand northern corroboree frogs wait for science to advance. The captive-bred frogs – critically endangered – fill an important role: As long as they survive, their species won't go extinct. "It's an insurance population," says Ben Scheele, a wildlife ecologist at the Australian National University in Canberra. "We're buying time." The northern corroboree frog, native to Australia, almost vanished in the 1990s, declining along with other frog species around the world. In 1998, researchers identified the culprit as a type of chytrid fungus called *Batrachochytrium dendrobatidis* (*Bd*), considered today by many experts to be the most lethal wildlife

pathogen in recorded history. The fungus has infected more than 500 species of amphibians, mainly in the Americas and Australia, and wiped out as many as 90 species. Often when a pathogen kills off its host species, it dooms itself to the same fate. But because *Bd* can infect so many different species, disease ecologists say that it's unlikely to disappear anytime soon. Now, decades after the initial die-offs, scientists from Australia to Panama are taking stock of the survivors and asking how captive-bred frogs could be safely reintroduced to the wild. While a global solution remains out of reach, researchers are focusing on more targeted efforts that have the potential to help small populations recover. Possible solutions

include everything from treating frogs with a sort of vaccine, to relocating them to *Bd*-inhospitable habitats, to setting up frog refugia – tiny tents over clay bricks where higher temperatures can kill the fungus the frogs carry. "Chytrid will cause more species' extinctions unless we do something about it," says Scheele. "While that's sort of depressing in one sense, it's also motivating, because we know that there are things that we can do." An aquatic fungus, *Bd* swims to the skin of a host, where it releases compounds to suppress the frog's immune response and then feasts uninterrupted on its skin. Over time, the frog's motor functions begin to falter, and it loses the ability to breathe.



The life cycle of *Batrachochytrium dendrobatidis*. Credit: Brian Gratwicke via Flickr

The final blow is a heart attack, triggered by a depletion of electrolytes. "To see a frog die of chytrid is probably the worst experience I've ever had," says Anthony Waddle, a conservation biologist at Macquarie University in Sydney, Australia. "You're watching the soul of nature leave it." A pathogen's success usually depends on three factors: the susceptibility of its host; its lethality to its host; and the suitability of the host's environment. Like COVID-19 in humans, a *Bd* fungal infection can affect individuals very differently, even within the same species. By figuring out the secret behind an individual's survival, researchers hope they might be able to replicate those conditions for other frogs and tip the odds in their favor.

For instance, Scheele noticed that the few northern corroboree frog populations still surviving in nature have something in common: They all live at low elevations, where the climate is warmer and dryer than the mountaintops where some populations once lived. It turns out that despite its deadliness, *Bd* is actually quite fragile: the fungus prefers cool, moist areas, and it can't grow well above roughly 28 degrees C (82 degrees F). For the northern corroborees, which are locally extinct in most of their range, changing the host's environment could make a difference. To test this idea, Scheele and his colleagues, in 2020, released several hundred captive-bred frogs in a warm, dry site just on the edge of the frogs' historical range, then returned a year later to look for them. Finding frogs often poses a logistical challenge, but the inch-long northern corroborees have a quirk that makes them easy to find: simply call out

"Hey frog!" in a deep voice, and the frogs will respond with a ribbit. While some of the frogs that Scheele and his team found were infected with *Bd*, they counted approximately 70 survivors, which was notable for a species that had been nearly wiped out in most other areas. Some researchers are looking at ways to manipulate the environment itself rather than move the frogs. Waddle found that by covering clay bricks with a mini-greenhouse, he could easily create hotspots of 30 degrees C (86 degrees F) and higher. Green and golden bell frogs, which like to nestle in small spaces, will climb inside the tents of their own accord, killing the *Bd* on their skin as they warm up. Waddle's team plans to apply for funding to support the placement of these shelters along the east coast of Australia. The low-tech environmental interventions are inexpensive (about \$34 each), but they require substantial time and labor to set up and monitor. Still, conservationists are "just desperate to keep these frogs there," says Waddle. "They're going to try anything to do it." Others are focused on manipulating the frogs themselves. In 2014, disease ecologist Taegan McMahon made the cover of *Nature* after discovering that exposing several species of frogs to *Bd* prompts an immune response that protects them from future infection. Ideally, McMahon thought, you could vaccinate a frog without putting it through any infection at all. So it was exciting when frogs acquired the same resistance after exposure to dead *Bd*. Better yet, a similar effect was achieved when bathing the frogs in a solution of metabolites, or chemicals, released by the fungus. There was no

need to treat the frogs with the pathogen at all, either dead or alive. "We know it works in the lab. We know it works extremely well," says McMahon, now affiliated with Connecticut College. But "dumping it into the field is a whole different thing." To find out how *Bd* metabolites might affect other species and ecosystems, McMahon's former student KM Barnett, now at Emory University, last spring mixed *Bd* metabolites with water and poured them into small ponds in a California nature reserve, then returned a few months later to test metamorphosing tadpoles' levels of *Bd*. She also tested other invertebrates living in the pond to see how they're affected by the metabolites. One caveat, Barnett notes, is that metabolites are really just a prophylactic option, because they don't effectively treat frogs that have already been infected. That suggests that correct timing, in addition to dosage, is critical for this treatment to work. She expects to finish analyzing the samples this spring. Bathing frogs in solutions of beneficial bacteria, also known as probiotics, can also help them resist chytrid. But which bacteria are helpful? In 2008, disease ecologist Vance Vredenburg, of San Francisco State University, discovered that mountain yellow-legged frogs that made it through a *Bd* infection all shared a species of bacteria on their skin called *Janthinobacterium lividum*, which naturally produces a purple antifungal chemical. In 2010, Vredenburg bathed some mountain yellow-legged frogs in a *J. lividum* solution and others in pond water, then released them in the Sierra Nevada. Upon his return a year later, he found none of the pond-water frogs, suggesting they had died — but he did find 39 percent of the frogs that had been treated with bacteria. It was the first field evidence that probiotics might work. Since then, scientists continue to experiment, with varying success. When a researcher in central Panama tried *J. lividum* on harlequin frogs, which had been hit hard by *Bd* in 2009, the probiotic didn't work, no matter how many different ways he tried it. In her lab at the University of Massachusetts, Amherst, ecologist Molly Bletz has identified other types of bacteria that resist *Bd* on frogs native to Madagascar.



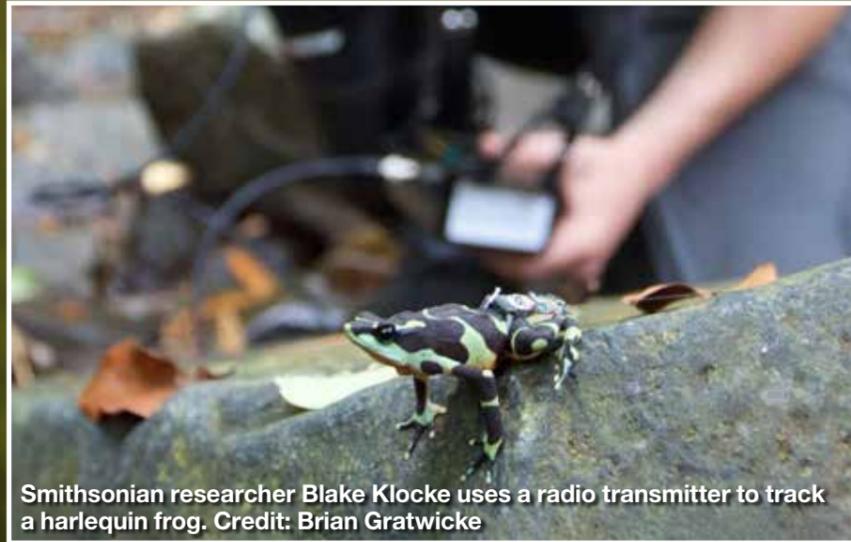
Green and golden bell frogs warm up atop bricks in a tiny tent. Heat helps protect them from chytrid fungus. Credit: Anthony Waddle

In 2012, Jamie Voyles, a disease ecologist at the University of Nevada, Reno, found that harlequin and other frogs in Panama seemed to be recovering – all on their own – from *Bd* infections. But tests in the lab showed that the *Bd* on the frogs’ skin was just as lethal as it was when the outbreaks started. Pathogens can become less deadly over time. But in *Bd*’s case, some frogs were simply becoming resistant to it.

No one has yet explained the frogs’ resistance, but Voyles suspects it’s related to a change in the chemistry of their skin secretions, which have antimicrobial properties. It’s possible that those secretions have evolved to become more potent, and Voyles and colleagues are working to figure out the mechanism involved. But the frogs’ resistance suggests one way that selective breeding for survivability could help raise a generation of frogs that naturally have a better immune response to *Bd* – something that conservation biologist Brian Gratwicke has started to do at the Smithsonian Tropical Research Institute.

Another option is to identify genes related to resistant frogs’ skin secretions and then genetically engineer other species with those genes. Biologist Tiffany Kosch of the University of Melbourne is currently looking for heritable resistance in the southern corroboree frog. The gene editing would be targeted specifically to this resistance, so she says she’s not worried about potential impacts on other species. Asked about unintended negative consequences for the host itself, she said, “I don’t see how our situation can really make things any worse for these frogs.”

Kosch emphasizes, though, that genetic engineering should be a last resort, because it’s expensive, challenging to execute, and can reduce genetic diversity in the host species.



Smithsonian researcher Blake Klocke uses a radio transmitter to track a harlequin frog. Credit: Brian Gratwicke

Researchers say that while there’s no silver bullet for *Bd* infections, there are a lot of bullets. Each intervention can slightly increase frogs’ ability to survive a *Bd* infection. Using multiple interventions for the same population of frogs — say, vaccinating selectively-bred frogs and placing them in an optimized environment — could keep them from teetering over the brink into extinction. The long-term hope is that reintroduced frogs would eventually reach a point where their population numbers are self-sustaining without the constant intervention of researchers.

In December, scientists announced the rediscovery of several species of harlequin frogs in Panama that were thought to be extinct. It was exciting to find the frogs alive, but their numbers are still worryingly low. Small populations are generally at increased risk of fizzling out to disease — not just because there are fewer individuals to kill but because they are more likely to breed with close relatives, which decreases their

genetic diversity and thus their ability to adapt to environmental change, says David Wilkie, an ecologist at the Wildlife Conservation Society.

“Chytrid is a global problem across a vast area,” Wilkie says. While the current proposed solutions may help these small, isolated populations, “that’s going to do nothing for ubiquitous large populations, other than hoping that nature allows a few of those critters to survive.”

For many frog researchers, that hope is enough. On his desk in San Francisco, Vredenburg keeps a jar of dead frogs he collected during his years of fieldwork in the Sierra Nevada, where he saw tens of thousands of dead mountain yellow-legs. “I definitely have plenty of reasons to not be an optimist,” he says, glancing toward his display. And yet he and other ecologists and conservation biologists remain optimistic. The field is abuzz with new ideas, he says, and young ecologists are bringing hope and energy. “We are actually more in control than we imagined. It’s more a matter of: Are we going to get our act together or not?”

The 30 percent goal: Is bigger always better for biodiversity?



A school of yellowtail in Mexico's Cabo Pulmo National Park, a small protected area rich in marine life. Credit: Octavio Aburto-Oropeza/ILCP/Tribune News Service via Getty Images

The UN biodiversity conference now meeting in Montreal is considering a proposal to commit to putting 30 percent of land and sea under protection by 2030. Some ecologists warn that focusing too much on the size of protected areas risks missing what most needs saving.

By Fred Pearce
Source: [Yale Environment 360](https://www.yaleenvironment.com/2022/09/20/360/)

In 2009, the U.S. government turned more than 190,000 square miles of pristine ocean centered on the Mariana Trench in the remote Pacific into one of the world’s largest protected areas. The same year, Mexico completed a management plan for the Cabo Pulmo coral reef in the Gulf of California, covering just 27 square miles.

Which action achieved the most? As the biggest United Nations conference on biodiversity in a decade gathers in Montreal this week, it is a crucial question.

The conference has big plans to protect biodiversity by more than doubling the area of the planet under protection to 30 percent of both land and ocean by 2030. By going big, the Mariana Trench protected area is a model of what is planned. But many ecologists say that by throwing a protective arm around an ecosystem under no current threat, it accomplishes little. Whereas Mexico’s tiny Cabo Pulmo

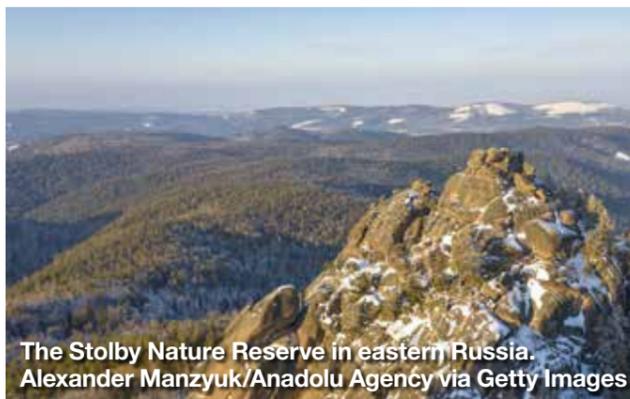
National Park, though only slightly more than one ten-thousandth the size, has done much more, bringing marine life back to a coral reef once lauded by French marine explorer Jacques Cousteau as “the world’s aquarium,” but then ravaged by fishing. Size maybe isn’t everything.

As well as pledging to put 30 percent of land and sea under protection, the draft text of the Global Biodiversity Framework being discussed at the Montreal Conference of the Parties to the UN’s Convention on Biological Diversity (COP15) also calls for 20 percent of damaged ecosystems to be “under restoration,” reducing alien species invasions by 50 percent, and establishing a funding stream of \$200 billion per year to do it all.

Such bold and measurable targets are aimed at giving international biodiversity commitments the same high profile as those on climate.

Many ecologists applaud the ambition and would like even more. The American biologist Edward (E.O.) Wilson, who died a year ago this month, famously called for half the world to be set aside for nature. In June this year, a major international assessment, headed by James Allan, an ecologist at the University of Amsterdam, reckoned that 44 percent of the land surface needs “conservation attention” in order to prevent “major biodiversity losses.”

Another study, published the same month, estimated that currently protected areas, even if properly policed, were insufficient to protect about half of the non-flying land mammals analyzed. “Hundreds of mammal species appear to have no viable protected populations,” says lead author David Williams of the University of Leeds.



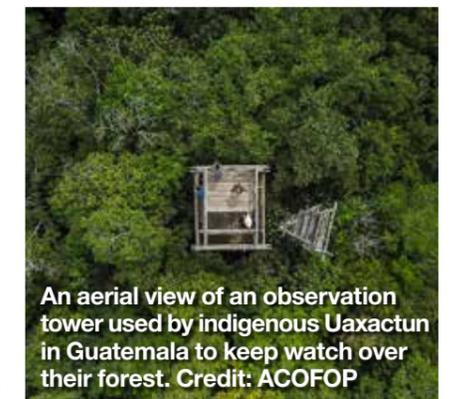
The Stolby Nature Reserve in eastern Russia. Alexander Manzyuk/Anadolu Agency via Getty Images



Key biodiversity areas that fall outside protected lands. Credit: Protected Planet



A flock of rheas gather in a soybean field in Brazil's Cerrado region, where farms have expanded into unprotected dry tropical forest. Credit: Yasuyoshi Chiba/AFP via Getty Images



An aerial view of an observation tower used by indigenous Uaxactun in Guatemala to keep watch over their forest. Credit: ACOFOP

They include some animals not formally recognized as threatened, including the white rhinoceros.

But while more protected areas are needed, some ecologists warn that a fixation on maximizing their size to achieve the 30-percent target is the wrong approach. They fear perverse consequences, including wasted money, missing out on what most needs protecting, and causing counterproductive conflicts with Indigenous and local communities.

Any expanded network of protected areas should be “based on biodiversity rather than total area,” says Williams. “The worry is that one big target like 30 percent subsumes different objectives.”

The first draft of the framework included targets for protecting specific ecosystems and quantified objectives for species and genetic diversity, says Sandra Diaz of the National University of Córdoba Argentina, who was involved in advising the process. But these precise objectives have been replaced by “vague aims,” she complained in *Nature* last month. “Formally protecting a proportion of the planet’s most pristine ecosystems will by itself fall far short,” she warned.

There is history to this. Too many protected areas have already been created that do little more than replicate existing biodiversity protection, says Christian Hof, an ecologist at the Technical University of Munich. “The uncoordinated expansion of protected areas can result in wasted resources, if care is not taken to protect as many species communities and environmental conditions as possible.”

New protected areas should be chosen not for their size, he says, but for their ecological value. That value may derive from the number of species a protected area contains or the uniqueness of the collections of species found in it. Further value may come from maintaining and enhancing connections between biodiversity hotspots – so that animals

can make their seasonal migrations or retain areas for hunting, and natural processes such as river flows can function properly.

Williams says that existing protected areas are often “too poorly connected to provide robust and resilient protection” for the species they contain. This summer, a team headed by Robin Naidoo, lead scientist at WWF-US, quantified that concern. It mapped globally important areas for current animal movements and found that two-thirds of them are unprotected. Moreover, about a quarter are in natural landscapes suitable for agricultural expansion.

Such wildlife corridors often have an importance out of all proportion to their size, meaning they may be sidelined by governments pushing to meet percentage protection targets. And that importance will likely increase. “Connectivity among protected areas will become even more important when species that are currently under protection shift their ranges to track changing climatic conditions,” says Hof.

While the draft framework mentions the importance of connectivity, there is no target or “headline indicator” to require and track progress in achieving it, says Naidoo. This is despite a recommendation for such an indicator from an expert workshop convened in April by the UN Environment Programme and others and attended by scientists from more than 100 countries.

Other neglected forms of connectivity that need protecting to maintain biodiversity include places that are hard to fence off for protection, such as the world’s diminishing number of wild, undammed rivers and border zones between ecosystems, such as coastlines. Lacking protection, “intact coastal regions are now rare,” says Brooke Williams of the University of Queensland. Most are in just three countries with Arctic shores: Canada, Russia, and Greenland. The draft framework being discussed in Montreal

calls for better “connectivity” between land and sea protection but lacks a target for addressing it.

Many ecologists voice concern that the push to maximize areas being protected could incentivize protecting ecosystems that are largely intact and under low threat of disturbance. Such protection is easy to achieve at scale, because there are few competing commercial demands on the land. But it may not deliver much for nature. This lure is already creating a distortion of conservation priorities. “Lots of Greenland is protected but isn’t threatened, so what is that protection actually doing?” asks Williams.

Piero Visconti, an ecologist at the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria, cites U.S. “protection” of remote wilderness in Alaska and Australia’s extensive designation of protected areas in its remote arid interior. Recent additions there have resulted in 50 percent of the land area of Australia now being “protected.” While that puts the country well ahead of the proposed 2030 international target, it still leaves arguably the country’s greatest biodiversity treasure, the Great Barrier Reef, at dire risk from pollution, shipping, and other threats. In November, a UNESCO team said the reef should be added to the list of World Heritage Sites “in danger.”

Similar questions have been raised about the recent rush by the United States, Britain, France, and other governments to declare as protected areas vast expanses of remote and pristine ocean, such as the Mariana Trench region. Luiz Rocha at the California Academy of Sciences has noted that such initiatives “protect areas that nobody uses [but] invariably exclude the only areas that would benefit from spatial protection, those close to the shore.” A 2018 study found that the U.S. has fully protected only about 1 percent of the waters around its continental shores, but 43 percent of remote waters under its control, mostly in the Pacific Ocean.

In theory the Global Biodiversity Framework, like past commitments from the biodiversity convention, will require protected areas to be “ecologically representative.” But Williams says “it is not clear the degree to which anyone [has] really checked this. The headline is normally the total area protected.” So some ecosystems get much more attention than others.

Iconic tropical rainforests often attract greater protection than dry tropical forests in the same countries that are at much greater risk from conversion to agriculture. This bias can push ecological destruction into unprotected areas. For instance, increased protection of the Brazilian Amazon in the early (pre-Bolsonaro) years of this century appeared to encourage deforesters into the country’s Cerrado region of minimally protected dry woodlands, which lost trees four times faster than the Amazon in the decade from 2008.

Ana Buchadas of the Humboldt University of Berlin recently estimated that tropical dry forests covering an area twice the size of Germany have been lost globally since 2000, along largely unprotected frontiers in the Gran Chaco and Cerrado regions of South America, parts of Southeast Asia, and increasingly in Africa.

Many other underappreciated “Cinderella ecosystems” have been marginalized when countries set conservation priorities. In a global analysis with Munich colleague Matthias Biber and Alke Voskamp, of Senckenberg Biodiversity and Climate Research Centre in Frankfurt, Hof found that protected areas on land are rarest in hot deserts such as the Sahara and the Arabian peninsula. Deserts contain many rare species uniquely adapted to the dry conditions, yet policymakers often regard them as ecologically worthless. Hence the growing enthusiasm in some countries for planting trees to “green” deserts and capture carbon.

A more fundamental question that many believe should be asked in Montreal is how well the present model of protection works. There is growing concern among ecologists and others about whether top-down protection by governments is the best way to deliver effective biodiversity outcomes. In many developing countries, supposedly protected areas are little more than “paper parks” with minimal on-the-ground policing or management. And where park authorities are engaged, the result is often conflict with local communities.

In the run-up to COP15, a coalition of Indigenous rights groups, including Survival International and Amnesty International, condemned the 30-percent target as likely to “devastate the lives of Indigenous peoples.” It would encourage the continued adoption by governments of “exclusionary protected areas” that have in the past resulted in “widespread evictions, hunger, ill-health, and human rights violations,” the groups said in a joint statement.

Research backs up this concern. A recent land-use modeling study by Roslyn Henry of the University of Edinburgh and colleagues found that a “strictly enforced” 30 percent target for land protection that excluded farming from newly protected areas could cause up to 200,000 additional deaths annually from malnutrition by 2060, depending on how much of those areas was in low-income regions.

In any case, there is instead a growing realization that the most effective on-the-ground protection of biodiversity is frequently offered by locals themselves. Though often still seen by park managers as threats, the evidence is that Indigenous and local communities are often nature’s best defenders — especially when they have established collective rights to the land and its resources. Advocates of this bottom-up approach to conservation say it is no surprise that Indigenous lands

contain an astonishing 80 percent of the world’s biodiversity.

“For Indigenous peoples and local communities, state-protected areas are a double-edged sword,” says David Kaimowitz, chief program officer at the Tenure Facility in Stockholm, which helps rural communities secure their land rights. “On the one hand they help them avoid threats from mining, logging, and agribusiness. But they often lose control over their territories. Governments usually refuse to recognize their land rights, and sometimes even expel them.”

The international community has been slow to recognize the virtues of Indigenous conservation, says Kaimowitz. For instance, since its creation in 1990, the giant Maya Biosphere Reserve in northern Guatemala has seen areas under formal government protection widely illegally deforested, while neighboring forest lands controlled by local Mayan communities have repelled invaders far better, while providing a livelihood for forest communities.

A similar story is playing out in the governance of marine protected areas (MPAs). It is becoming clear that those MPAs that engage local fishing communities as partners rather than adversaries – by permitting rather than banning their activities – achieve the best conservation outcomes. “How MPAs are governed may be at least as important to conservation outcomes as the size of the area and the specific fishing regulations in place,” concluded Robert Fidler of Florida International University and colleagues in a study published in May.

The concern now is that a rush to achieve a 30 percent target for protected areas on land and at sea will encourage unilateral state takeover of lands already being managed and conserved by Indigenous communities, though often without a formal “protected” label attached. Nature, as well as those communities, could be the loser.

‘More potent than cyanide’:

how to stay safe from Blue-ringed Octopus

Blue-ringed Octopus are famed for being one of the most venomous animals on the planet, and the symptoms from a bite are the stuff of nightmares. But how worried do you need to be?

By Zoe Doubleday

Marine Ecologist and ARC Future Fellow, University of South Australia

This article is republished from *The Conversation* under a Creative Commons license. [Read the original article.](#)

It's a common myth that Blue-ringed Octopus are found only in the tropics. These tiny marine animals are, in fact, found all around Australia, including Tasmania.

There are three official species in Australia, with a maximum size ranging from 12 to 22 centimetres, and they are all extremely venomous. There are also many scientifically “undescribed” species, which have yet to be named and officially added to the blue-ringed family.

The venom of Blue-ringed Octopus contains tetrodotoxin, a potent neurotoxin claimed to be a thousand times more potent to humans than cyanide.

First discovered in Pufferfish, tetrodotoxin is actually found in more than 100 species including the Panamanian Golden Frog and Rough-skinned Newt. But levels of the toxin varies hugely between species, and levels in Blue-ringed Octopus are high.

Surprisingly, scientists are debating where Blue-ringed Octopus and other marine animals source their tetrodotoxin. One theory is that it's produced by bacteria that live inside the host species, the other is that it's sourced from the diet.

Most of these animals use tetrodotoxin for defence, but Blue-ringed Octopus also use it to hunt and kill their prey, such as fish and crabs.



A Blue-ringed Octopus in a shallow tide pool. Credit: Shutterstock



Tetrodotoxin is found in over 100 species, including Pufferfish. Credit: Stelio Puccinelli/Unsplash, CC BY

Are Blue-ringed Octopus proliferating?

The media often report spikes or record numbers in Blue-ringed Octopus sightings.

While we don't have the long-term data to confirm this, the populations of some octopus species are increasing. For example, there are reports the common European octopus is proliferating in France right now.

Octopus are short-lived – the Blue-ringed Octopus only lives for a few months – and are highly responsive to changing environmental conditions.

Hypothetically, some human-made habitats, such as breakwalls and lobster pots, or marine litter, such as bottles and cans, could be providing additional habitat for Blue-ringed Octopus.

Likewise, climate change could confer an advantage to some octopus species that can better adapt to warming waters.

But we simply do not know if this is the case for Blue-ringed Octopus. Octopus populations may also undergo natural “boom and bust” cycles in response to fluctuations in temperature, food, and other factors in their environment, resulting in rapid increases and decreases in population numbers.

How to keep safe

Blue-ringed Octopus deliver venom by biting using their parrot-like beak, which is found at the base of the arms.

Blue-ringed Octopus bites are rare – they are docile, shy animals and are not interested in people. But they may bite when they are threatened or provoked, so NEVER, EVER pick them up.

And remember, these octopus only flash their characteristic blue rings when upset, so stay clear of any small octopus, no matter what they look like.

Blue-ringed Octopus are found in shallow coastal waters, including the foreshore, so accidental encounters do happen. Their preferred habitats include rocky reefs and coral reefs, seagrass and algal beds, and rubble. Given they're found throughout the Indo-West Pacific, you may encounter them while on holiday.

Be careful exploring rock pools, cracks or crevices, or picking up empty shells or bottles at the beach, where the octopus may make a home or den, or even when



Blue-ringed Octopus are found all over Australia. Credit: Shutterstock

retrieving fishing gear, such as octopus pots or lobster pots.

Curious, young children may also be at risk of an encounter as they explore the beach environment – I know my own toddler would seek out the ideal octopus habitat if given a chance.

This month also, many dead Blue-ringed Octopus were found on the beach after a mass death event of marine critters in South Australia. It's best not to pick them up as they could be dying and stressed. Please also keep pets and young children well away as ingestion could lead to poisoning.

What to do if bitten, and symptoms to watch for

All three Blue-ringed Octopus species in Australia have killed people, but cases are extremely rare. The severity of symptoms depends on how much venom someone receives.

A mild case of envenomation may result in tingling around the mouth and mild weakness. A severe case may lead to flaccid paralysis (weak or limp muscles), including respiratory paralysis and the inability to breathe.

A tricky thing with Blue-ringed Octopus is that bites may be painless, so people can be unaware they have been bitten. But the onset of symptoms can be rapid (within minutes) and so an equally rapid first-aid response is crucial.

If you believe someone has been bitten by a Blue-ringed Octopus, remove them from water immediately and seek urgent medical care. You do not need to put anything on the bite, such as vinegar

or hot water. Rather, pressure bandaging and immobilisation is recommended, as for snake bites.

If the envenomation is severe, first aid is also focused on providing basic life support, particularly breathing support. Full first aid response details can be found [here](#) and [here](#).

Importantly, undertaking a first-aid course may help equip you with some of the skills to support a person who has been bitten before medical help arrives.

While there is no antivenom available for a Blue-ringed Octopus bite, the venom has short-lived effects (usually hours).

At the end of the day, enjoy the ocean. But if you see any small octopus, whatever you do, do not pick it up.

The author gratefully acknowledges clinical toxicologist, Professor Julian White AM (Women's & Children's Hospital, Adelaide), who provided advice on this article.

Friends Groups

Friends of Balcombe Park

Convenor: Ian O'Loughlin
Mobile: 0412 432 618 **Email:** ianoloughlin@optusnet.com.au
 **Upcoming working bees:**
Dates: Apr 30, May 28 **Time:** 10am-12pm

Friends of Bay Road Heathland Sanctuary

Convenor: Sue Forster
Phone: 0431 688 606 **Email:** sue.forster@optusnet.com.au
 **Upcoming working bees:**
Dates: Apr 15, May 13 **Time:** 10am-12pm

Friends of Bayside Roads

Contact: Derek Jones
Phone: 0417 360 747 **Email:** derekhjones36@gmail.com

Friends of Beaumaris Reserve

Convenor: Chris Sutton
Phone: 0438 327 924 **Email:** sutc@bigpond.com

Black Rock and Sandringham Conservation Association Inc.

 **Upcoming working bees:**
Dates: Apr 4, 18, May 2, 16 **Time:** 10am-12pm

Friends of Brighton Dunes

Convenor: George Leighfield
Phone: 0432 465 707 **Email:** gleighfi@gmail.com
 **Upcoming working bees:**
Dates: Apr 4, 18, May 2, 16 **Time:** 8am-9.30am

Friends of Cheltenham Park

Convenor: Valerie Tyers
Phone: (03) 9588 0107 **Email:** valerietyers@hotmail.com
 **Upcoming working bees:**
Dates: Apr 2, May 7 **Time:** 10am-12pm

Friends of Donald MacDonald Reserve

Convenor: Kim Croker
Phone: (03) 9589 2443 **Email:** kcroker@bigpond.net.au
 **Upcoming working bees:**
Dates: Apr 5, May 3 **Time:** 9am-11am

Friends of Elster Creek

President: Thijs Honningh
Secretary: Anubhooti Jaiswal
Email: friendsofelstercreek@gmail.com
Meeting point: Elwood Canal, Glen Huntly Road Bridge

Friends of George Street Reserve

Convenors: Pauline Reynolds & Val Tarrant
Phone: (03) 9598 6368 **Email:** pauline.reynolds.au@gmail.com
 **Upcoming working bees:**
Dates: Apr 16, May 21 **Time:** 10am-12pm

Friends of Gramatan Avenue Heathland

Convenor: Jo Hurse
Phone: (03) 9283 2052
 **Upcoming working bees:**
Dates: Apr 2, May 7 **Time:** 1pm-3pm

Friends of Long Hollow Heathland

Convenor: Rob Saunders
Phone: (03) 9515 3383 **Email:** robsaunders357@gmail.com
 **Upcoming working bees:**
Dates: Apr 30, May 28 **Time:** 8am-10am

Friends of Merindah Park & Urban Forest

Convenor: John de Cruz Douglas
Phone: 0417 386 408 **Email:** jdecdouglas@internode.on.net

Friends of Mother Stock Areas

Convenors: Pauline Reynolds and Rob Saunders
Phone: (03) 9598 6368 **Email:** pauline.reynolds.au@gmail.com
Phone: (03) 9515 3383 **Email:** srednuas@hotmail.com

Friends of Native Wildlife

Convenors: Anne Jessel & Elizabeth Walsh
Phone: 0412 545 441 **Email:** info@bayfonw.org.au
Website: www.bayfonw.org.au

Friend of Picnic Point Sandringham

Convenor: Terry Reynolds
Phone: (03) 9598 2978 **Email:** reynolds_family@hotmail.com

Friends of Ricketts Point

Convenor: Diana Pearce
Phone: 0448 573 256 **Email:** dipearce39@icloud.com
 **Upcoming working bees:**
Dates: Apr 12, May 10 **Time:** 9.30am-11.30am

Friends of Ricketts Point Landside

Convenor: Sue Raverty
Phone: (03) 9589 2103 **Email:** sraverty@westnet.com.au
 **Upcoming working bees:**
Dates: Apr 18, May 16 **Time:** 1pm-3pm

Friends of Table Rock

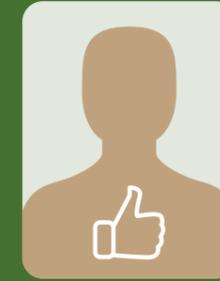
Convenor: Ken Rendell
Phone: (03) 9589 4452
 **Upcoming working bees:**
Dates: Apr 25, May 30 **Time:** 10am-12pm

Do you want to know more about Bayside and the Banksia Bulletin?

Please refer to our website
www.bayside.vic.gov.au



Working With Children Checks



All volunteers, regardless of their role, are responsible for safeguarding children and young people from harm. As part of this commitment, Bayside requires volunteers to hold a Working with Children Check (WCC) and complete Safeguarding Children and Young People training. If you are a volunteer and do not have a WCC, please contact Laura Bristow via email, lbristow@bayside.vic.gov.au for help. Training sessions will be held in coming months.

Environment Groups

Bayside Earth Sciences Society Inc.

President: Murray Orr
Email: baysidefossils@gmail.com
Website: www.beaumarisfossils.org

Beaumaris Conservation Society Inc.

President: Caroline Lawton
Contact: PO Box 7016, Beaumaris 3193
Email: pre@bcs.asn.au
Website: www.bcs.asn.au

Black Rock and Sandringham Conservation Association Inc

President: Craig Brunnen
Phone: 0488 303 887 **Email:** brunnen@gmail.com
Secretary: John Neve
Phone: 0479 196 260 **Email:** jneve@ozemail.com.au

Elsternwick Park Association

President: Natalie Davey
Phone: 0425 718 423 **Email:** natalie_davey1@optusnet.com.au

Marine Care Ricketts Point Inc

President: Elizabeth Jensen
Phone: 0419 354 998 **Email:** elizabethjensen@outlook.com
Website: www.marinecare.org.au

Sandringham Foreshore Association

President: Dr Vicki Karalis
Email: sandyforeshore@optusnet.com.au
Website: sandringhamforeshore.tumblr.com

School Groups

St Leonard's College Conservation Group

Contact: Simon Daniels
Phone: (03) 9909 9300 **Email:** simon.daniels@stleonards.vic.edu.au



Editorial Policy

The purpose of publishing the Banksia Bulletin is to circulate information, report on events, and to profile relevant environmental issues important to our community. The Bulletin is also published to support the network of people involved in enjoying and protecting our local environment.

Bayside City Council encourages people from our local community groups to submit articles of interest, share experiences and news about any upcoming events. All articles are reviewed prior to publication and Council reserves the right to omit or edit submissions.

Acknowledgements

Thank you to all the people who have contributed to this issue of Banksia Bulletin.

Disclaimer

The views expressed in the Banksia Bulletin are not necessarily those of Bayside City Council nor its representatives.

Editor

Tom Vercoe
 Manager
 Open Space and Recreation

Content Coordinator

Amy Weir
 Biodiversity and Conservation
 Planning Officer
 Please send articles and photos to
 banksia@bayside.vic.gov.au

Copy deadlines

Winter 2023
 Friday 19 May 2023

Banksia Bulletin is published quarterly by Bayside City Council to service people interested in enjoying and protecting the local environment.

If you would like to be added to the Banksia Bulletin mailing list, please contact Bayside City Council on 9599 4444 or email: banksia@bayside.vic.gov.au Please indicate whether you would prefer to receive your Banksia Bulletin by email or via post.

Corporate Centre

PO Box 27 Royal Avenue
 Sandringham VIC 3191
 Telephone: 9599 4444
 www.bayside.vic.gov.au
 banksia@bayside.vic.gov.au
 Hours of business
 8.30am-5pm
 Monday-Friday
 (except public holidays)

Do you want to know more
about Bayside and the
Banksia Bulletin?

Please refer to our website

www.bayside.vic.gov.au



Spot the Praying Mantis
By Pauline Reynolds