

The Royal Society of Victoria

Promoting science since 1854

SCIENCE VICTORIA

NEWS FROM THE ROYAL SOCIETY OF VICTORIA

MARCH 2022



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THE OFFICIAL
NEWSLETTER OF
RSV

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News and notices



New RSV Members

Ms Fern Hames,
Director, Arthur Rylah Institute for Environmental Research

Dr Rachel Nowak
Director, Executive, Scientist, Writer - Rachel Nowak and Associates

Unless Members request a ballot, these will be considered by Council and, if elected, will be confirmed at the next Ordinary Meeting of the Royal Society of Victoria.



SCIENCE VICTORIA

Monthly newsletter of the RSV

THE ROYAL SOCIETY OF VICTORIA INC.
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From the President- Climate Impacts and Biodiversity Investment

SCIENCE IS IN THE NEWS.

The role of the Royal Society of Victoria continues to be redefined by daily events in Australia. The last month has seen record floods in both Queensland and New South Wales. Unfortunately, our media outlets and the general public seem to have little awareness of the compounding effects of anthropogenic global warming on river catchment hydrology.

Although the link between more severe and frequent floods and our changing climate isn't difficult to make, there is little understanding of the new realities for planners, insurers and community leaders as we endeavour to adapt.

The recently released *sixth assessment* report of the

Intergovernmental Panel on Climate Change offered the strongest warning of "widespread and pervasive" impacts; larger impacts are coming, they're coming faster than previously thought, and Australia is directly in the 'firing line.' I refer you to *Chapter 11*.

Importantly, in terms of the Royal Society of Victoria's program, the report was clear that **the climate crisis is inseparable from the biodiversity crisis**. Equally important is the statement that "a liveable future remains within grasp" but that the window of opportunity for action is "brief and rapidly closing".

There is a great need for all Australians to understand that we must urgently invest in our unique biodiversity. This necessity is being taken up globally in programs such as the global finance sector's *Taskforce for Climate-Related Financial Disclosure* (TCFD). In parallel, there are new groups promoting the need for *Science Based Targets* in all decision making.

The RSV has now established a Natural Capital Finance Working Group under the leadership of economist Gordon Noble MRSV. This initiative is designed to integrate purposeful investment in good biodiversity outcomes and is an area in which the RSV can play a leadership role.

In parallel, our biodiversity Position Paper process seeks to establish the gaps to be filled in current processes across all sectors and broker further scientific advice to industry, government and community at a number of levels.

Our membership of independent scientists and scientific thinkers holds the potential to be a great asset for our state and we wish to explore all possibilities for navigating the uncertainties of our era to achieve optimal outcomes.

Our membership is growing, and I encourage you to discuss the Society with your friends and colleagues as we endeavour to promote science-based decision-making to the community through a range of new initiatives. In this regard, I am anxious to hear from all

members, including our new members, on how you think we might best achieve positive outcomes across our state. Please write to me at president@rsv.org.au. We would like to publish your letters and thoughts in future editions of this newsletter – please feel free to respond to the letters we publish from other members also, as we seek to foster productive discussions and a marketplace of ideas.

Rob Gell AM MRSV

President

Letters to the President -The value of investment in science

To talk about “investment” is to talk about an activity that, although most people think is fairly straightforward – you allocate money to an asset or activity in hopes that it will give you a desired return in the future – in reality it involves a complex set of presuppositions, values, appetite for risk and attitudes that, although usually overseen, they nonetheless affect the level of return you get from said investments because they affect not only how the investor allocates her resources (when, and how much someone invests in something), but also affect the way the economy operates at large (how the markets and the collection of investors are affected by non-monetary decisions). Throughout this letter I will argue that these “non-intuitive” investments are as or more important than the financial investments we make in science – some of which we currently might not be able to quantify – and that we should take the time to consider “investing” in them. The list presented here is, understandably, not exhaustive.

The CSIRO has recently unveiled that for every \$1 invested in research and development (R&D) in Australia, the latter creates \$3.5 in economy-wide benefits in today’s dollars with a 10%

average annual return even on very conservative estimates and assumptions.¹ However, R&D – and science more broadly – currently operates very inefficiently. It can therefore be argued that although the returns and benefits listed by the CSIRO on investing in science, although impressive in their own right, are a severe underestimation of the potential benefits that science holds if it is conducted under the right conditions – conditions that we should also invest in improving. What are some of these inefficient conditions? I would point, first, to the way we allocate scientific funding.

One of the main systems we have for allocating taxpayer money to research is peer-reviewed research funding (PRRF) in which scientists – often teams of scientists – write a project proposal hoping it gets selected for funding. The system, however, is simply inefficient – and by *efficiency* here I mean the appropriate or optimal distribution of resources (not only money but time and scientific brainpower as well) that maximises scientific productivity and innovation while minimising resource misallocation.

Our current PRRF system channels too much time and brainpower away from productivity: a study

¹ CSIRO Futures (2021) Quantifying Australia’s returns to innovation. CSIRO, Canberra

by Danielle L. Herbert and colleagues estimated that the 2012 NHMRC round saw 550 working years of researchers' time spent on just preparing proposals for submissions, translating into AUD \$66 million in annual salary costs.² This, for a funding rate of 21% of all valid submissions, which by extension means that 79% of those resources brought no immediate benefit whatsoever, and most likely a substantial portion of those simply did not make it through any future resubmission round which also involved additional resources spent. That was 2012, however. Nowadays the success rate is circa 10% and while I do not know the estimates of how much time was spent in the latest rounds, if I put together the explosive number of PhDs Australia has awarded in the last 10 years³ with the *decreasing* amount of funding for science on the same period⁴ and considering the current lower success rates, I can safely hypothesise that things have not improved, and most likely have gotten worse, even when accounting for plenty of those new PhDs moving to other industries or other countries.

This appraisal on the inefficiency of our current PRRF system is compounded – dare I say, is made worse – by several factors. The first one is that the hyper-competition that the scarcity of financial resources begets transpires into all aspects of scientists' lives, further hindering their productivity. Danielle L. Herbert and her team, once more, report from a sample of 215 researchers⁵ that the vast majority of them prioritised grant-writing over other work (97%) and personal (87%) commitments, became stressed by the workload (93%), and restricted their holidays during the grant writing season (88%). I personally know many who are sick and tired of having to choose between putting all the extra hours

into grant writing and enjoying time with their children and family, haunted by the fear that by forgoing grant writing for a couple of weeks they might be outcompeted by people who don't face the same pressures and can afford to be more competitive. Needless to say, a stressed, burnt-out and overworked scientist is hardly one who will have the mental space to be productive and innovative, especially if we compound this with the gendered issue of household workload. This misallocated time and brainpower could be much better spent either doing more science (because writing proposals begging for money to do science is *not* doing science), supervising and helping often neglected students and collaborations, or even simply enjoying time with family and friends, thus recharging mental battery. All of these would invariably boost productivity of not only the scientists themselves, but of their scientific teams as well. After all, and as stated elsewhere, "the value of the science that researchers forgo while preparing proposals can approach or exceed the value of the science that the funding program supports."⁶

The second factor compounding the PRRF problem is that PRRF is not immune to economic pressures – that is, to the changes in human behaviour that are begotten from simple supply and demand. The hyper-competition in PRRF derived from the scarcity of funding – and the unquestionable importance of this funding to plenty of scientific activity, promotions, and careers everywhere in the world – translate into practices that some have qualified as "questionable"⁷ (while some might say they are outright wrong) and that are intended simply to maximise the chances of the grant getting funded, sometimes at the cost of other important values. Chief among them is that

- 2 Herbert DL, Barnett AG, Clarke P, et al, On the time spent preparing grant proposals: an observational study of Australian researchers. *BMJ Open* 2013;3:e002800. doi: 10.1136/bmjopen-2013-002800
- 3 Algorithm Editorial Team, 29 May 2019, Where are Australia's PhD students? CSIRO, visited 28 January 2022, <<https://algorithm.data61.csiro.au/where-are-australias-phd-students/>>
- 4 CSIRO Futures (2021) Quantifying Australia's returns to innovation. CSIRO, Canberra
- 5 Herbert DL, Coveney J, Clarke P, et al, The impact of funding deadlines on personal workloads, stress and family relationships: a qualitative study of Australian researchers, *BMJ Open* 2014;4:e004462. doi: 10.1136/bmjopen-2013-004462
- 6 Gross K, Bergstrom CT (2019) Contest models highlight inherent inefficiencies of scientific funding competitions. *PLoS Biol* 17(1): e3000065. <https://doi.org/10.1371/journal.pbio.3000065>
- 7 Conix S, De Block A and Vaesen K. Grant writing and grant peer review as questionable research practices [version 2; peer review: 2 approved]. *F1000Research* 2021, 10:1126. doi: 10.12688/f1000research.73893.2

often the success of the grant rides not on the value of the scientific idea behind it, but on what's known as "grantsmanship", which refers to "the art of writing successful funding applications, but is typically used to single out those aspects of the application that are not scientific but rather formal, stylistic and rhetorical."⁸ Because peer reviewers are also human and subject to natural biases like being swayed by linguistic style; we are not as objective as we claim we are. This often plays out in many other scenarios where the selling of the idea is often much more important than the idea or the research itself, like the famous 3-minute thesis competitions. The current PRRF system undervalues brilliant scientists that simply don't know how to "play the game." A second issue worth mentioning in this department is that on many instances authorship can be flagrantly violated if, for example, the author of the idea is not competitive enough or experienced enough to justify being the chief and lead investigator, in which cases the idea has better chances of being funded if it is "authored" by a more senior investigator. The young author usually has little room to complain if he depends on that grant to fund and kickstart her career, while a more senior author can draw from other grants or University funding and therefore does not face the same pressures to submit the grant. With a bit of imagination, one can safely hypothesise about all the power imbalances and abuses that these situations can create. This is even worse if a particular grant scheme prevents an author to draw a salary from the grant if she is successful.

Third and finally, some have argued that the ranking system is poorly predictive of grant productivity.⁹ This is not to say that grantees are not productive, but that PRRF does a poor job at predicting and awarding those grants that will be the *most* productive of the round. This is because there are not enough number of reviewers to

provide statistical precision, and because there is important disagreement in scores for the same application depending on how much or little the reviewer knows about the subject in the grant at hand; reviewers who are "closer" intellectually to the grant at hand are better equipped to be more critical of the proposal, or to better understand its value, implications, innovation, or future projections.

Many have proposed changes to the PRRF system, however one proposal I read stuck with me due to its potential to solve not only PRRF-related issues, but many other problems that escape the domain of science (see below). It is the case for a modified lottery.^{10,11}

A modified lottery, in its purest form, states that the grant money should be allocated randomly to scientific proposals that clear a previously agreed upon realistic threshold of quality and feasibility – the modification is that the lottery is *only* for those proposals that clear the threshold, not for every proposal submitted. One might argue "how is this any different to the current PRRF system we have?" to which the answer is: because the threshold for scientific quality and feasibility is much, much lower than one would expect from thinking that *only* the awardees of a current grant round cleared the threshold. The latter are simply just the most heavily groomed grant proposals of the round, which feeds into some of the problems I mentioned earlier – this solidifies inefficiency and other issues into the system, while many still feasible and valuable proposals are simply left unrewarded. Peer reviewers are already good at weeding out unfeasible, low-quality, and questionable proposals; this is a testament to their expertise. Past this threshold it is however unclear why a certain proposal should take priority over another, especially considering the potential that scientific endeavour holds to create benefits for wider society that are often unrelated to the

8 Conix S, De Block A and Vaesen K. Grant writing and grant peer review as questionable research practices [version 2; peer review: 2 approved]. F1000Research 2021, 10:1126. doi: 10.12688/f1000research.73893.2

9 Fang FC, Bowen A, Casadevall A. NIH peer review percentile scores are poorly predictive of grant productivity. Elife. 2016 Feb 16;5:e13323. doi: 10.7554/eLife.13323.

10 Fang FC, Casadevall A. Research Funding: the Case for a Modified Lottery. mBio. 2016 Apr 12;7(2):e00422-16. doi: 10.1128/mBio.00422-16. Erratum in: MBio. 2016;7(3). pii: e00694-16. doi: 10.1128/mBio.00694-16.

11 Gross K, Bergstrom CT (2019) Contest models highlight inherent inefficiencies of scientific funding competitions. PLoS Biol 17(1): e3000065. <https://doi.org/10.1371/journal.pbio.3000065>

scientific topic at hand – artificial limbs, insulin pumps, shock absorbers for buildings, for example, were all brought about from *space exploration*.¹²

A modified lottery solves many PRRF-related problems, and brings about a system that is fairer, more equitable and, importantly, much more efficient than the current PRRF system we have:

- *It liberates scientific brainpower and time both from contestants and from peer reviewers.* Since the threshold to make it into the lottery is much lower than the one artificially created by hyper-groomed proposals, this releases the pressure on contestants to invest countless hours in incessantly reviewing and grooming the proposal to the detriment of their other professional and/or social and family commitments. Proposals just need to be feasible and valuable by more realistic expectations (for example having the ability to carry out the research rather than having the most extensive track record of all submissions, or the most convincing and carefully curated preliminary data). Since peer-reviewers are scientists too – and sometimes grant contestants at the same time – this also liberates them from having to review proposals over and over to make decisions about scoring because a pass/fail decision is much easier and more intuitive than a score one.
- *It bypasses current biases in the system.* Many have decried cronyism, sexism, racism, and other biases in our current PRRF system. Whether these criticisms are justified or not, a modified lottery, by design, bypasses these biases especially if applications are blinded by name and gender at submission. As the realistic threshold for feasibility and quality are naturally lower, a modified lottery removes the pressure to have the most extensive track records to outcompete everyone (which puts women at a disadvantage for taking time off to raise children) and, if blinded, it removes the ability to

rule for or against an application based on the gender, race, or surname (or even friendship) of an application. Considering the current distributions of male and female researchers in many scientific fields,¹³ a modified lottery can bring about more balanced gender outcomes in funding, or at least one that is more reflective of the composition of the field at hand, without having to push for even more discriminatory practices like affirmative action to bring better balances to the equation: the funding allocation would be randomised between all the worthy submissions regardless of their demographics and regardless of their competitiveness past a reasonable cut-off point. Additionally, the modified lottery system has the benefit of countering one of the most pervasive but sometimes less spoken-about biases we have in most human systems: the Matthew effect, where already successful scientists run at an ever-increasing advantage over less successful ones despite the quality of their proposals.

- *It bypasses conservatism and risk-aversion and thus boosts innovation.* By selecting the *most* feasible, the *most* groomed applications by scientists with the *longest* or *best* track records who *best* play the grant-writing game, PRRF in Australia reflects a trend that holds true for the wider Australian population: we are a risk-averse, highly compliant, and conservative nation. This is not just my appraisal: a recent report by CSIRO and Business Council of Australia¹⁴ also highlights this cultural aversion to risk-taking (see also the second instalment of this letter). A quick look around at the Australian response to COVID should make this point painfully evident. A modified lottery pushes the system to embrace the necessary risks for innovation highlighted in this and other reports by taking away the power of PRRF to allocate funding based on risk-aversion and conservatism.

12 Josie Green, 8 July 2019, Inventions we use every day that were actually created for space exploration, USA Today, visited 29 January 2022, <<https://www.usatoday.com/story/money/2019/07/08/space-race-inventions-we-use-every-day-were-created-for-space-exploration/39580591/>>

13 Science in Australia Gender Equity (SAGE), 25 May 2021, Gender Equity in Higher Education, Science in Australia Gender Equity (SAGE), visited 29 January 2022,

14 CSIRO Futures (2021) Unlocking the innovation potential of Australian companies, CSIRO, Canberra

I am confident others will see benefits other than the ones I have listed, and risks that I am positive will never outweigh the benefits of the proposal. It is now just a matter of momentum. With the right push for this “non-intuitive” investment – that is, for policy change in the PRRF department – alongside a most-deserved increase in funding from the government, science in Australia can sail in course for the innovative and efficient future that it requires to thrive in the highly disruptive waters of the 21st and upcoming centuries. Science can then bring the rest of Australia alongside it to the high-reward future that seemingly small but nonetheless significant “non-intuitive” investments can bring about.

The “non-intuitive” investments Australia can make to boost its scientific reach, innovation, capabilities, and efficiency are understandably not constrained to peer-reviewed research funding only. I was fortunate enough to participate in the Reboot STEM forum from the Australian Academy of Science last year, and I had the opportunity to look into the so many ways scientists around Australia think science could be improved. We touched on many topics, which I believe could be argued to be part of these “non-intuitive” investments. I will argue two more to complement my previous communication.

Expanding the horizons for scientific careers: Becoming a professional grant writer and team leader that is forced to outsource the science to their postdocs and PhD students due to time constraints and prioritising grant writing is hardly what many of us envisioned when we put our money, time, and soul into our scientific training. For many of us, spending too much time writing grants is the last thing we want to do, especially if this takes away from doing the science we love (that is, performing experiments, analysing data, troubleshooting the methodology, and writing the papers). It is however as if the only possible pathway for scientists (in Academia at least) is to get further and further away from the laboratory the more we progress in our careers. Does it

have to be this way? It should not be a mystery that people are the most productive when they do what they are passionate about, and even though doing things we do not like doing is part of every job, the moment it takes a little too high priority and consumes too much of our time we slowly but surely drift away intellectually, become demotivated and desperate to find alternatives. Basically, the opposite of productive. Increasing the budgets of grants (so that researchers can hire more postdocs instead of having to rely on PhD students to do the science and be productive) and the previously mentioned modified lottery (which means the pressure on ‘track record’ is lightened) could help expand the horizons for scientists to follow the type of professional careers they want, even after their PhDs.

Managing the PhD oversupply problem and connecting Academia and Industry more effectively: Data from a recent report from CSIRO & The Australian Mathematical Sciences Institute (ANSI) shows that the number of PhD’s in the Australian domestic workforce and the available staff positions follow two abysmally different trends: while the number of PhDs has increased *exponentially*, the number of available staff positions has only increase *linearly*, with an eye-watering slope that spells trouble for those who want to stay in the sector.¹⁵ And although many PhD graduates are finding jobs outside academia and in many other public and private sectors, it would be interesting to know what proportion of these PhD-filled positions *did* require a PhD awardee to be filled. I suspect not an overwhelming percentage. Conferring PhDs *en masse* without a workforce that requires them is simply spending resources (time, money, and brainpower) into a training regime that is not required by the position to be filled and that also devalues the degree by oversupply. In other words: it’s inefficient. This is even more pressing since previous research by Inger Mewburn and colleagues shows that 80% of job ads in Australia looking for employees with high levels of research

15

Paul X. McCarthy and Dr Maaike Wienk, 1 May 2019, Advancing Australia’s Knowledge Economy, AMSI & CSIRO Data61’s Ribit.net, available from <<https://amsi.org.au/?publications=advancing-australias-knowledge-economy>>

skills did *not* mention PhD as a necessary qualification.¹⁶ A good balance between the production of PhDs and the workforce demand for them should be the focus of much of our efforts: if we do need these people to drive the future of Australia, we should at least make sure there are positions available for them where they can utilise their newly acquired skills. Either that, or we should start thinking of cutting back on the number of PhDs we produce yearly – meaning we should investigate the incentives that drive the production of PhDs. Otherwise, we are simply funnelling resources into creating higher-order professionals that are basically overqualified and underutilised.

The report also shows that nearly half of the PhDs surveyed want to remain in universities and research institutes, and while it is understandable that there will never be enough positions for all of those who want them, it is also true that building bridges between Academia and the industry and other sectors has been a daunting task, which thus hinders commercialisation of research and innovation. A previous CSIRO report highlights from previous and numerous sources that these low levels of cross-sector collaborations are stagnating science in Australia: only 10% of companies who collaborated did so with universities or other higher education institutions, and around 13% of these companies did so with other research institutions. For larger companies with 200 or more employees that engaged in innovation collaboration, around 14% did so with universities or other higher education institutions, and around 18% did so with other research institutions.¹⁷ This, despite universities and research institutes being the place where PhDs are formed and where many of them want to spend their careers.

There have been many attempts to bridge Academia and Industry and other sectors. One successful example is the industry internship

model for PhDs, where students spend part of their formation working directly in industry positions as part of a previously established university-industry partnership collaboration. However, these are not the norm. Another successful model that I am happy to champion and promote – since it is not abundant enough – is what is known as “Hackathons”. These are events where innovation-driven minds gather to form teams and compete to propose the best solutions to a particular problem: the organiser presents the problem to the contestant teams and gives them 2-3 days to develop and present the idea/solution to the judges, competing for a prize. I had the opportunity to participate in a couple of them and not only they are an amazing collaborative experience, but they also serve to bring around innovative people from all walks of life to use their brains to solve problems these companies have. This model could be harnessed by more companies and industries to invite PhD students and graduates to get in touch with them and their needs, serving two important purposes at the same time: PhD students and graduates get in touch and interact with potential employers and their industries to maybe find a path they have not considered before, and employers get in touch with a pool of innovation-driven people, from which they could find their next perfect hire. Companies do not even have to disclose their secrets and problems to the public, in fear of intellectual property exposure: they could simply craft a closely related hypothetical problem to probe the contestants and their innovative skills. There have been many Hackathon events across Australia in the last 5 years, however many in my opinion they have been too centred on IT developments, and other industries and potential innovation pathways are underrepresented. Directly advertise these hackathons on university campuses and newsletters and boom! Let innovation begin.

At the core of many of these problems science

16 Mewburn, I., Grant, W.J., Suominen, H. et al. A Machine Learning Analysis of the Non-academic Employment Opportunities for Ph.D. Graduates in Australia. *High Educ Policy* 33, 799–813 (2020). doi: 10.1057/s41307-018-0098-4

17 CSIRO Futures (2021) Unlocking the innovation potential of Australian companies, CSIRO, Canberra

face, however, is a factor that I briefly mentioned earlier: we have a culture that is focused on compliance, risk-aversion, risk-management, and inflexibility. This is the opposite of what science and innovation require, and what a country needs to thrive in a hyper-competitive industrial future. Some universities appear to be more interested in mitigating liabilities than in providing scientists with an environment where they can perform science without being held back at every corner by red tape, never-ending risk assessments and a bureaucracy that holds their progress back sometimes for months on end. If we could lift the standard for what constitutes a risk worth the paperwork and oversight, we could liberate hours and hours of progress and innovation from these bureaucratic captors, thus increasing our efficiency. But for that our attitudes towards risk need to change. And I am not sure how to do that other than by changing policies and incentives for universities and companies so those who *do* want to take the risk can do so without being held back by those who are too afraid of taking the risk. Without disruptive people creating disruptive environments and disruptive innovations we

risk holding Australia endlessly in the economic Middle Ages of natural resource extraction and export. This is in my opinion a form of "trusting the market" in terms of scientific brainpower: trust the scientists and entrepreneurs and they will deliver, instead of actively managing science and putting barriers around innovation just because we are too afraid of what the risks will be.

Warren Buffet has instructed after his death to "put 10% [of his fortune] in short-term government bonds and 90% in a very low-cost index fund" since he "believe[s] the long-term results from this policy will be superior to those attained by most investors—whether pension funds, institutions, or individuals—who employ high-fee managers." Buffet trusts the market, and he is probably the most successful investor of modern times. Couldn't we all trust the (scientific) market a bit more instead of trying to endlessly manage it?

Yours sincerely,

Sebastian A. Quezada Rojas MRSV

2022 Appointment to RSV Council – Mr Richard Blundell MRSV

We are pleased to announce the appointment of Mr Richard Blundell to the RSV Council.

Richard has practiced as an electrical engineer, a business strategist, a small business manager and for the last decade, as a digital transformation consultant to industry and government. He is passionate about helping Australia reinvent itself in the digital era and build a sustainable society underpinned by science, technology and

effective stewardship of our environment.

He joins the RSV Council with the aim of helping us renew our value proposition to Victoria and to help better link business and government to the scientific expertise they need to navigate society's big challenges.

Richard will serve until the Annual General Meeting held in

2023, and may continue subject to election at the end of 2022 or further co-option by sitting Councillors under the Society's Rules.





World Wildlife Day

By Priya Mohandoss MRSV

Whether it be watching a David Attenborough nature documentary or being fortunate enough to have experienced the Australian wilderness or an Asian or African safari adventure, wildlife is something that fills us with intrigue and has an impact on us all.

Each year, on March 3rd, we celebrate World Wildlife Day to bring awareness of and allow ourselves to become immersed in the global importance of the biodiversity of plants and animals, their interaction within their ecosystems and, on a broader scale, the natural environment.

World Wildlife Day was first considered after a proposal was made from Thailand on 20th December, 2013, where it was decided to be recognised on that same day each year, December 20th. Yet, later, during its 68th meeting, the United Nations General Assembly announced for it be held on the 3rd March, since it was the same day that the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was put into effect. Since its initial observance in 2014, World Wildlife Day now has the status of being the most major global wildlife event.

Yearly, a different theme is chosen. In 2022, the focus is on "Recovering key species for ecosystem restoration." From the data compiled for the IUCN Red List of Threatened Species, over 8,400 species of wild plants and animals are registered as critically endangered, while nearly 30,000 or more fall into the endangered or vulnerable categories. As a result of this, it is estimated that over a million species worldwide are now threatened with extinction.

Although in Australia we are fortunate to have such a great diversity of species to support the growth and population of our ecosystems, there are still a number of factors threatening their existence. These include exotic, invasive species such as rabbits, cats and foxes, the spread of invasive weeds, and also the loss of native habitat due to human activities, such as clear-felling forests and the erosion of soils that support vital plant species. Other contributors are the impacts associated with air, land and water pollution.

While days such as this provide us with a wealth of opportunities to consider the protection of many of the world's species from further decline, they also allow us to reflect on the past to improve our approach to our planet's future.

<https://wildlifeday.org/>



#EucalyptoftheYear

#NationalEucalyptDay



Eucalypt of the Year 2022 – Vote Now!

National Eucalypt Day is Australia's biggest annual celebration of eucalypts held every year to celebrate and promote Australia's eucalypts and what they mean to our lives and hearts. As part of this celebration, we set out an annual challenge decided by popular vote: which species will be THE eucalypt of the year?

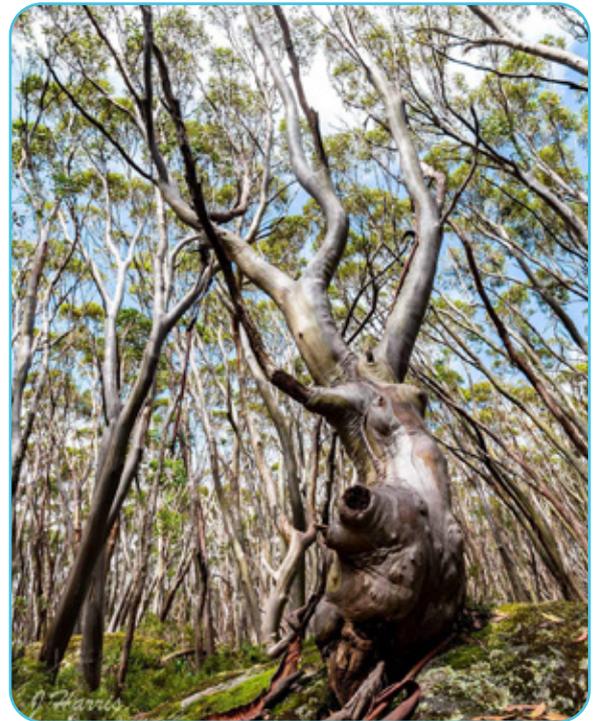
There are over 900 eucalypt species across the continent – eucalypts, corymbias and angophoras – from the towering Mountain Ash of south eastern Australia, to the haunting Ghost Gum of the outback, to the West Australian Mottlecak – “The Rose of the West” – with flowers as big as your palm. It will be exciting to see some fervent social media action culminating in the eucalypt that takes out this year's “Eucalypt of the Year,” and you can tell us how you voted by tagging @EucalyptAus using the hashtag #EucalyptoftheYear on Twitter.

You have until 20th of March to vote online at <https://www.surveymonkey.com/r/V7YH78D>.

About National Eucalypt Day

Held annually on 23 March, National Eucalypt Day aims to raise awareness of eucalypts and celebrate the important place that they hold in the hearts and lives of Australians.

The National Eucalypt Day program aims to meet the promotion, education and conservation objectives of Eucalypt Australia by addressing the themes of tree breeding and genomics, primary education and public awareness. Check out the list of this year's events, activities and celebrations at <https://www.eucalyptaustalia.org.au/national-eucalypt-day/>



Snow Gum (*E. Pauciflora* subsp. *Acerina*) on the Baw Baw Plateau near Mt Erica in Victoria. Photo: James Harris, winner of the 2021 National Eucalypt Day Photography Competition

Victorian Senior Secondary Certificate Reform

Young people have lived through a pandemic, and Victoria's economy is rapidly changing. We need to ensure students build the skills and capabilities to thrive in further education and training, move into a rewarding career and live a great life.

Senior secondary education, vocational and applied learning builds critical and creative thinking, communication skills, teamwork and collaboration, curiosity, and innovation. It provides students with real-world knowledge, including about the workplace, and practical and transferrable skills.

In 2019, the Victorian Government commissioned John Firth to conduct a review into vocational and applied learning pathways in senior secondary schooling (*Firth Review*). The Firth Review found that we need to do more to make vocational and applied learning in schools high quality, relevant to the needs of employers, and available to all students.

The Firth Review recommendations provide a roadmap to reform.

The Department of Education and Training, the Victorian Curriculum and Assessment Authority (VCAA) and the Victorian Registration and Qualifications Authority are working closely with stakeholders to implement these changes, which will include:

- A single senior secondary certificate incorporating VCAL into VCE
- Access to a broader range of high-quality VET courses for all students
- Transforming careers education to give students personalised, professional advice linked to the latest employment data
- A new foundation pathways certificate to replace Foundation VCAL
- High quality and well supported school-based apprenticeships and traineeships for more students across Victorian schools and senior secondary education providers.

2020 Release of the Firth Review Recommendations



2021 Design and development of new certificates and curriculum



2022 Release of final certificate designs and new curriculum



2023 First enrolments in the VCE Vocational Major and Victorian Pathways Certificate



2025 All Victorian schools deliver the fully integrated senior secondary certificate

More information can be found on the [VCAA website](#) and the [Department of Education and Training website](#).





HOW TO PARTICIPATE

We invite students, parents, caregivers, schools, TAFEs, universities and other service providers, peak bodies, industry, employers and the wider community to provide feedback to the discussion papers.

Your input will help shape the reforms and ensure Victoria delivers the best vocational and applied learning pathway choices for senior secondary students.

We will be seeking input on a wide range of topics, including:

- The design and delivery of vocational specialisation within the VCE and the foundation pathways certificate
- Ensuring all Victorian students have access to high quality VET courses aligned with their strengths and interest and to industry growth areas

- What support schools need to more easily provide excellent vocational and applied learning experiences to their students
- Understanding the workforce implications of new certificate designs and delivery models
- A new model for school-based apprenticeships and traineeships.

Read the Discussion Papers and respond to the questions at <https://engage.vic.gov.au/project/consultation-senior-secondary-reform/page/vet-delivered-school-students>. You can also upload a submission.

If you have any queries, please contact pathways.reform@education.vic.gov.au.

Enrolment options





Wye River Coastal Adaptation Plan

OVERVIEW

The Wye River foreshore has recently experienced extensive winter storms and a persistent eastward shift, leading to the loss of the Wye River Surf Life Saving Club disability and beach access ramps. The Great Ocean Road Coast and Parks Authority (the Authority) and the Department of Environment Land Water and Planning (DELWP) have reinstated the beach access ramp and completed short-term protective works at the Wye River to address significant erosion concerns.

Some of the short-term works included sand scraping and beach renourishment, which aimed to slow the rate of erosion. Continued erosion however led to the deployment of a temporary geo-container seawall and sandbag groynes which has successfully redirected the flow of the river away from the sand dune and Surf Life Saving Club.

A Review of possible Long-Term Management Options has been developed by experienced coastal engineers, which includes a range of options (from nature-based through to hard engineering solutions) to reduce the impact of coastal hazards for this site. Four long-term options were investigated; managed retreat, an integrated sand management program, a rock groyne and a rock seawall.

The findings outline protective structures such a rock seawall would have negative impacts on beach amenity

while an integrated sand management program is the recommended option.

- DELWP and the Authority are seeking
- feedback on the values of the Wye
- River community and the findings of
- the review. The feedback received
- from this public consultation will help
- shape current and future decision
- making for Wye River.

Once consultation ends, 'A What We Heard Doc' will be made available which will present the community's feedback from this engagement.

Review the documentation and respond to the survey at <https://engage.vic.gov.au/wye-river-coastal-adaptation-plan> . Consultation closes on 18 March, 2022.





Viva Energy Gas Terminal Inquiry and Advisory Committee

OVERVIEW

The Minister for Planning will appoint a joint Inquiry and Advisory Committee (IAC) to advise on the Environment Effects Statement (EES), draft Planning Scheme Amendment (PSA), Environment Protection Authority (EPA) development licence applications and public submissions on the proposed Viva Energy Gas Terminal project.

The IAC will consider the EES, consider submissions (including conducting a public hearing to hear from submitters who want to be heard), and advise the Minister for Planning on the environmental effects of the Project.

The work and scope of the IAC will be guided by Terms of Reference issued by the Minister for Planning. The Terms of Reference will be published here when issued.

The appointment of the IAC members is in progress. The names of the IAC Members will be published here following their appointment.

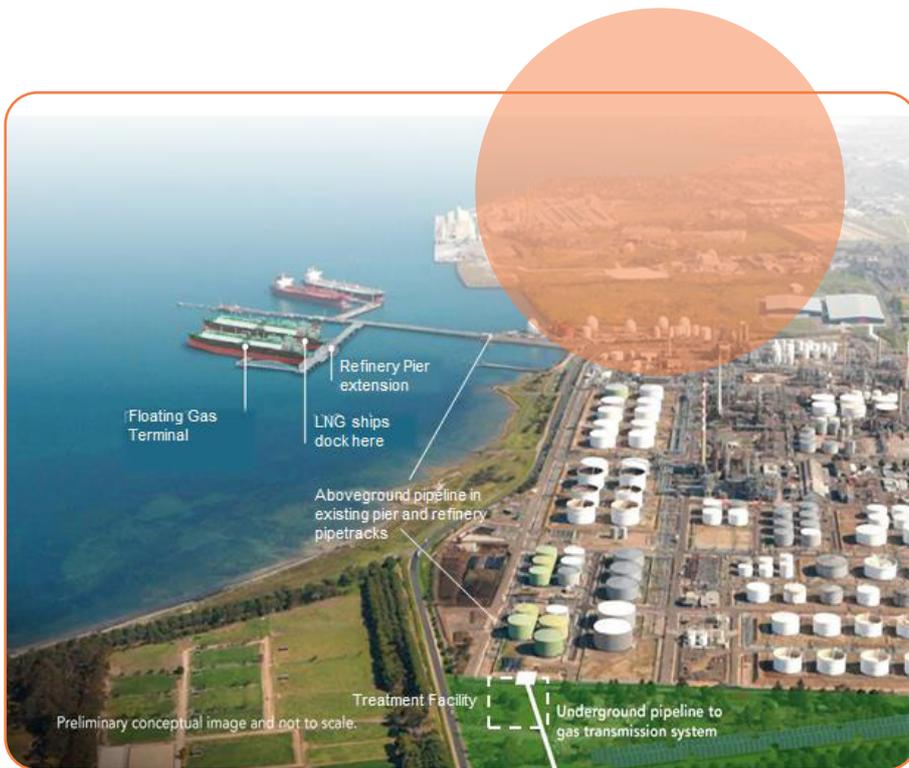
The IAC may also be separately appointed as a panel by the Minister for Energy, Environment and Climate Change under the *Pipelines Act 2005* to consider and advise on the pipeline licence application and submissions that relate to the pipeline licence application. If appointed as a Panel, the members

must act in accordance with the requirements of the Pipelines Act and its instrument of appointment.

THE PROPOSAL

The Viva Energy Gas Terminal Project (the project) comprises the development of a gas terminal using a ship known as a floating storage and regasification unit (FSRU) at Refinery Pier in Corio Bay, adjacent to Viva Energy's Geelong Refinery. Viva Energy Gas Australia Pty Ltd (Viva Energy) is the Proponent.

The project would bring natural gas from other parts of the country and overseas to supply the south-eastern Australia market.



The key components of the project include:

- Extension of the existing Refinery Pier – a new pier arm, new berth and ancillary pier infrastructure
- Localised dredging for the new berth and ship turning basin, and deposition of dredged sediment at the existing Point Wilson dredged material ground
- The FSRU continuously moored at the new Refinery Pier berth, which would receive liquefied natural gas (LNG) from visiting LNG carriers, store and convert the LNG into natural gas when needed
- A new treatment facility located at the Geelong Refinery to check that the gas meets transmission system standards, where odorant and nitrogen (when required) is added
- A 7-kilometre pipeline to transfer the gas from the FSRU to the South West Pipeline connection point at Lara, comprising a 3-kilometre aboveground section and a 4-kilometre underground section.

VIEW THE PROPOSAL

You may view and download the EES, draft PSA, EPA development licence applications, the pipeline licence application and any related documents at the Proponent's [webpage](#).

The [public notice](#) provides further details on the locations of where hard copies of the EES and project documentation are available to view should Covid-19 restrictions allow.

INQUIRY AND ADVISORY COMMITTEE PROCESS

Public Exhibition

The Project will be on public exhibition for 30 business days between **Monday 28 February 2022** and **11.59pm on Monday 11 April 2022**.

You are invited to make a submission to the IAC during this time. Submissions must be made in writing. To make a submission please lodge it using the online submission form below.

When making your submission you can ask to be heard at the IAC's public hearing. Anyone seeking to be heard at the public hearing must submit a written submission and indicate on the submission form that they would like to be heard at the hearing.

If you make a submission, you will be notified about the timing and location of the Hearing after the exhibition period has closed.

DIRECTIONS HEARING

The IAC will hold a Directions Hearing, likely in the **week commencing 2 May 2022** or the **week commencing 9 May 2022**.

The purpose of the Directions Hearing is to:

- discuss and make arrangements for the Hearing, including finalising the dates and format of the Hearing
- give directions about the conduct of the Hearing and the exchange of information in the leadup to the Hearing, including any expert witness reports
- discuss site inspections
- consider any procedural issues
- answer any questions people may have about the IAC process including the Hearing.

Further information about the Directions Hearing (including whether it will be held in person or conducted online) will be published here once arrangements have been

finalised. The IAC will follow the health advice from the Victorian Government and the Chief Health Officer in relation to the conduct of the Directions Hearing and the Public Hearing.

PUBLIC HEARING

The Public Hearing will likely commence in the week beginning Monday 20 June 2022. Depending on how many submissions are received and how many submitters want to be heard, the Public Hearing is anticipated to run for four to five weeks.

The purpose of the Public Hearing is to give people an opportunity to speak in support of their written submission. The Public Hearing is open for anyone to watch.

The IAC will consider all submissions, irrespective of whether a submitter requests to be heard.

A timetable for the Public Hearing will be published after the Directions Hearing.

REPORT

The Terms of Reference will specify when the IAC is required to submit its report to the Minister for Planning.

HAVE YOUR SAY - MAKE A SUBMISSION

Submissions are invited between **Monday 28 February 2022** and **11.59pm on Monday 11 April 2022** and can be made by completing the form in the link below.

If you wish to be heard at the Hearing, select the option that you

wish to be heard when completing the online form.

Each submission will be treated as a response to all the exhibited documents. You don't need to make separate submissions about the EES, draft PSA, EPA development licence applications and the pipeline licence application. You should include all your views about the project and its effects in one single submission.

Please contact Planning Panels Victoria at 136 186 (select option 6) if you cannot fill in the online form and need to make a hard copy written submission, or if you have issues lodging your submission on the form below. Electronic submissions are preferred.

[Online submission form](#)



Beach Enterprise Project - Pipeline Licence Application

OVERVIEW

Beach Energy (Operations) Limited proposes to construct and operate a buried 10.8 km long DN200 pipeline to convey natural gas from the existing Enterprise 1 well site at Sharps Road, Port Campbell, to the Otway Gas Plant.

HOW TO PARTICIPATE

Written submissions are invited to midnight on the **18 March 2022** from any person who may be affected by the grant of the pipeline licence application.

Submissions can be made by completing the form below and uploading your submission. Following exhibition, the Minister for Energy, Environment and Climate Change will determine whether to refer the submissions to a panel under the Pipelines Act 2005 or proceed to determine the pipeline licence application. If you wish to

be heard by the panel (if appointed), you must select that you wish to be heard. The panel will consider all written submissions, regardless of whether you request to be heard by the panel or not.

A copy of the Pipeline Licence Application and supporting technical reports is in the Documents Library, accessed from the link provided below.

For questions about the project pipeline licence application and accessibility requirements, please contact: Blair McNaught, Community Relations Manager - Beach Energy, on mob: 0477 299 636, or by email: blair.mcnaught@beachenergy.com.au.

NEXT STEPS

In accordance with the Pipelines Act 2005, each submission will be provided to the applicant, giving them the opportunity to address the matters raised.

In accordance with the Pipelines Act 2005, the submissions may also

be considered by a panel appointed under the Act. If a panel were to be appointed, the panel must give reasonable opportunity to the applicant and any person who has stated in a submission that is referred to the panel, that they wish to be heard in respect to their submission.

The Minister for Energy, Environment and Climate Change must consider the submissions along with other matters when determining the pipeline licence application.

View the document library and make a submission at <https://engage.vic.gov.au/beach-enterprise-project-pipeline-licence-application>





Events, Opportunities and More



The First Astronomers

Book Launch: The First Astronomers

Wednesday, 9th March

6:00 to 8:00pm

SCIENCE GALLERY MELBOURNE

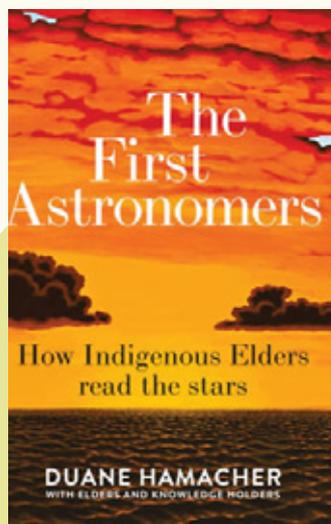
"A work of enormous scope." -
Professor Brian Schmidt AC, Nobel
Laureate in Physics and Vice-
Chancellor of the ANU

Join us for the launch of the new
book *The First Astronomers: How
Indigenous Elders Read the Stars*,
by Duane Hamacher with Elders &
Knowledge Holders: Ghillar Michael
Anderson, John Barsa, David Bosun,
Fr Ron Day, Segar Passi and Alo
Tapim OAM.

Published by Allen & Unwin, it is
available in softcover, as an e-book,
and as an audio book narrated by
Adam Sims.

The First Astronomers takes us on
a journey across space and time
to reveal the wisdom of the Elders.
These living systems of knowledge
challenge conventional ideas about
the nature of science and the
longevity of oral tradition, pointing
the way for a world facing the
profound disruptions of
climate change.

The First Astronomers shows us
how respectful collaborations
can drive exciting and innovative
solutions to global challenges that
impact us all.



THE LAUNCH

The book launch will feature
N'arweet Dr Carolyn Briggs AM,
Professor Marcia Langton AO, Uncle
Ghillar Michael Anderson, Duane
Hamacher and will be MC'd by
Professor Alan Duffy.

The event will be held in the West
Gallery of the Science Gallery at 114
Grattan Street, Carlton from 6-8 pm.

Doors open at 6:00 pm with
drinks and an exhibition of "Star
Knowledge of the Torres Strait".
This includes 11 linocut artworks
from Torres Strait Islander artists
focused on astronomy (including co-
author David Bosun).

The speakers and panel discussion
will take place from 6:30-7:30 pm,
followed by a book signing by the
authors from 7:30-8:00 pm, with an
8:00 pm finish time.

50 copies of the book will be
available for sale, so be sure to
bring your own copy to ensure it can
be signed.

THE SPEAKERS



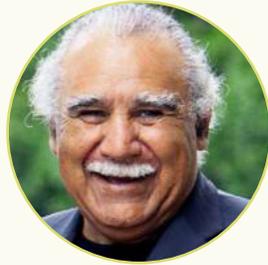
N'arweet Carolyn Briggs AM

is a senior Yaluk-ut Weelam and Boon Wurrung Elder, and the Boon Wurrung representative in the City of Port Phillip. She is the founder and chair of the Boon Wurrung Foundation and was awarded the National Aboriginal Elder of the Year in 2011 by the National NAIDOC Committee. N'arweet Dr Carolyn earned a PhD in Media & Communication from RMIT University assisting Indigenous urban youth in understanding Indigenous knowledge.



Professor Marcia Langton AO

is a Yiman woman from Queensland, Redmond Barry Distinguished Professor, Associate Provost, and Foundation Chair of Australian Indigenous Studies at the University of Melbourne. She is an anthropologist, geographer, Fellow of the Academy of Social Sciences in Australia, and renowned public figure. Professor Langton wrote the Foreword for *The First Astronomers*.



Uncle Ghillar Michael Anderson is a Senior Law Man, Elder, and leader of the Euahlayi Nation from Goodooga, New South Wales. He is a co-founder of the 1972 Aboriginal Tent Embassy and was taught Euahlayi customs and traditions through his people's sacred ceremonies. He is a traditional astronomy expert, having published several academic papers on Aboriginal astronomy and is a co-authoring Elder of *The First Astronomers*.



Associate Professor Duane

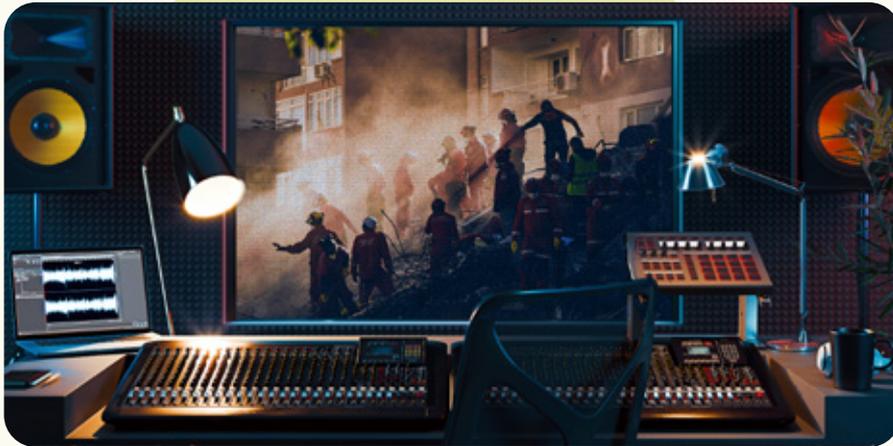
Hamacher is an astronomer and social scientist in the ASTRO-3D Centre of Excellence and the School of Physics at the University of Melbourne. His work specialises in the intersection of astronomy with culture, heritage, history, and society. He is leading initiatives in Indigenous astronomy and dark sky studies and is the author of *The First Astronomers*.

THE MC



Professor Alan Duffy is an astrophysicist, Director of the Space Institute at Swinburne University, Lead Scientist of the Royal Institution of Australia, and a leading public personality in astronomy and science communication. He has appeared on TEDx twice and his research involves creating simulated universes on supercomputers to understand how galaxies form.

This event is generously sponsored by the University of Melbourne, The Royal Society of Victoria, the ASTRO-3D Centre of Excellence, the Science Gallery, and the Laby Foundation. Places are limited and registrations are essential; please book your place online at <https://rsv.org.au/events/the-first-astronomers-launch/>.



Earthquakes, Pandemics and the Communication of Science

Thursday, 24th March 2022

6:30 – 8:00pm

You don't have to look far to see the impact of science on the world we live in. At any given moment, we are surrounded by the fruits of our discovery and innovation. But we often fail to acknowledge the importance of communication in the way science changes our world. Done well, communication can be transformative. Done badly, communication can lead to lives being lost.

Join Dr Shane Huntington to discuss the critical nature of communication in any career that utilises science, taking you on a journey from earthquakes to pandemics.

ABOUT THE SPEAKER



Dr Shane Huntington OAM is a speaker, trainer and facilitator. He has been providing consulting services in communication and strategy for over 20 years.

He is the host and producer of 3RRR's science radio program *Einstein A Go-Go*. Over the last 30 years he has interviewed thousands of scientists and explained hundreds of scientific concepts to the public. Shane is a prolific writer, with his articles on [Medium.com](https://medium.com) read more than 100,000 times. In 2020 he

was awarded an Order of Australia in recognition of his science communication work.

Shane is the Chief Executive Officer of *Little Big Steps*; a charity helping kids with cancer. He is the Founder and Director of the Innovation Group Pty Ltd, a scientific equipment supplier in Australia and New Zealand since 1999. Until April 2021 he was at the University of Melbourne, where he had a distinguished career as an academic and leader of university strategy.

Shane was the Founder of the *Telescopes in Schools* Program, a Victorian-based initiative designed to bring the wonders of Astronomy and education to low-SES schools in Melbourne's Northern and Western suburbs and rural districts through the provision of research-grade telescopes and support.

Shane was an academic until 2008, with a PhD in Physics. His specialty was in Photonics and Imaging, and he has published more than 70 refereed journal papers. During his 10 years as a researcher, he acquired more than \$6M in competitive grants.

He holds an honorary appointment at the University of Melbourne in the School of Engineering and is an Ambassador for the *Lost Dogs Home*.

Tickets are available from <https://rsv.org.au/events/communicating-science/> to participate in the webinar via Zoom and/or Eventbrite. RSV Members are prompted to enter their promotional code to access a member's ticket. Alternatively, you can watch along via [Facebook Live](#) at the appointed time without buying a ticket.

Walking the Thin Green Line-Oceania

MEET THE EXPEDITIONER: AMANDA DUDGEON

A passionate Ranger for over seven years, I have lived and worked across many parts of Australia. From south coast islands to the desserts of central Australia and now the sub-tropical rainforests of NSW. It's been a pretty amazing career so far.

I've always strived to make a difference in the world and have an inconveniently strong curiosity.

Inspired by the remarkable rangers I've had the privilege of working with, and the legendary Sean Willmore, I'm embarking on my most audacious project yet:



A JOURNEY ACROSS OCEANIA

1 Year, 3 Oceans, 8 Nations and over 30,000km World Ranger Day (31 July) 2022 to World Ranger Day 2023

The Mission

To be the catalyst that initiates meaningful change for Oceania Rangers, their communities and the natural and cultural heritage they protect - #standwithrangers

01 - Record and share the stories of Oceania's Rangers

Travel through Oceania filming Rangers telling their stories in the field and share the journey through social media.

02 - Connect schools and students with Rangers and the places they protect

Provide lesson plans for teachers, hold virtual field trips with Rangers in their parks and do in person school talks during the journey

03 - Walk the Thin Green Line for fallen Rangers

Hike 1km for every Ranger on the 2023 IRF Roll of Honour (~1500 km) to honour the lives, contributions and sacrifices of Rangers who have given their lives in the line of duty.

04 - Release a feature length documentary by World Ranger Day 31 July 2024

Produce and release a documentary to mark 20 years since Thin Green Line Foundation Founder Sean Willmore embarked on his own journey to make the original documentary, *The Thin Green Line*, that started it all

05 - Raise funds for the Thin Green Line Foundation to support Ranger lead initiatives in Oceania

Raise money for the TGLF Oceania Fund that will finance Ranger-led initiatives in the Oceania region and support Indigenous and First Nations rangers to access development, exchange and networking opportunities



WALKING THE THIN GREEN LINE OCEANIA





Find out more

Walking the Thin Green Line hopes to be the neuron, the connector, the catalyst that initiates meaningful change for Oceania Rangers, their communities and natural, cultural and historic heritage they protect.

Funds raised by the expedition will go to a special Oceania Fund within the Thin Green Line Foundation (<https://thingreenline.org.au/>) to support Rangers in the Oceania Region through projects that directly align with these strategic pillars: Developing capacity and capabilities, equipping Rangers, emergency support, and connecting rangers.

Find out more and get involved in supporting Amanda's journey at <https://www.walkingthethingreenline.com/get-involved-1>.



Impact

With our partners at the Thin Green Line Foundation, we hope to raise awareness for the critical role of rangers in conservation, culture and community. We aim to generate a shift in the way rangers and their work are perceived, shining a light on the benefits of rangers to the broader community and the importance of recognising and supporting rangers as essential frontline workers in conservation.

Funds raised will go to a special Oceania Fund within the Thin Green Line Foundation that will specifically support:

- Ranger to Ranger projects within the region
- sponsorship of First Nations and Indigenous Rangers and Ranger Associations
- equipment to assist with marine and coastal protected area management and monitoring





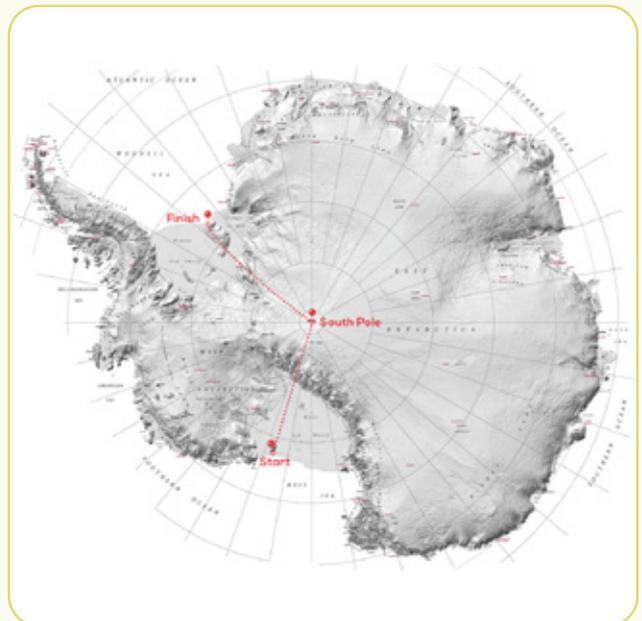
The Last Great First-Antarctica

A Journey for the Future of our Planet

In October 2022 Climate Advocates, Doctors and Polar explorers, Gareth Andrews and Richard Stephenson, will set off to ski 2600km, pulling their 200kg sleds with all their supplies, coast to coast across Antarctica.

They will endeavour to collect crucial climate data as they make their way slowly across the continent.

If successful, approximately 110 days later they would have achieved "The Last Great First" and provide scientists with a unique dataset to help to address climate change.



THE FIRST FULL UNSUPPORTED SKI CROSSING OF ANTARCTICA

This unsupported ski expedition starts where the Ross Ice Shelf meets the sea and finishes 110 days later, on the far side of the Antarctic continent at Berkner Island on the shore of the Weddell Sea.

You're invited to follow and support us to help achieve this extreme feat of human endurance.



MEET THE DOCTORS

Dr Gareth and Dr Richard are both Critical Care Doctors and have been working on the COVID-19 frontline since the start of the pandemic.

They share a passion for adventure and have been exploring the polar regions together for the last 10 years.

Learn more and support the expedition at <https://thelastgreatfirst.com.au/>.



2019 Biomedical & Health Sciences Finalist Dr Rachel Brand (Swinburne University of Technology) presenting at the Royal Society of Victoria

Call for Nominations-Young Scientist Research Prizes 2022

The Young Scientist Research Prizes are open for 2022 nominations! Final year doctoral candidates at Victorian institutions can apply across four categories of science, with finalists presenting their work to the Society during National Science Week in August.

Applications for the 2022 competition opened on 1 March and will close at **5:00pm on 31 May, 2022**. Candidates should nominate themselves.

Your application for a prize should consist of an **application form**, incorporating your extended abstract - to be submitted electronically, then printed (from your confirmation email), co-signed by your Supervisor or Head of Department (to ratify your contribution to your doctoral research, particularly if it is a team research project) and submitted along with your **RSV Membership Form** (if required).

Your extended abstract presents a succinct summary of your research work. This is incorporated in the body of the application form to guide structure and length, and includes a title, rationale for the study, aims, methods, results, conclusions and significance, indicating why your research is important and of scientific interest. Our form will lead you through each element.

On the basis of the written abstracts, the judges will select a short list of two candidates in each of the four fields of Biomedical and Health, Biological (Non-human), Earth Sciences and Physical Sciences (eight finalists in total). We are planning to host a live event this year (on Thursday, 18th August), however should COVID-19 pandemic restrictions be imposed on gatherings, each of the short-listed candidates will be required to give a

10 minute oral presentation to camera at the Society's premises during July, followed by 5 minutes of discussion with a general audience of scientists and members at the Society at an online conference, to be livestreamed during National Science Week on the evening of **Thursday, 18th August, 2022** commencing from 6:30pm. Finalists who are unable to present or attend the 18th August event cannot be considered for an award.

First Prize winners will each receive a certificate and a prize of \$1000. Second Prize winners each receive a certificate and a prize of \$500. All finalists will also receive free student membership of the Royal Society of Victoria for a period of two years and the opportunity to participate in the Society's programs and access our professional networks for mentoring and collaboration as desired.

Forms and full guidelines on applications and eligibility are available from the Society's website at <https://rsv.org.au/awards-and-prizes/young-scientistresearch-prizes/>. Submission of the prize application form and abstract should be received as a single file via email marked for the attention of the Chief Executive Officer at rsv@rsv.org.au before the closing time and date, being **5:00pm on 31 May, 2022**. All late submissions will be deemed ineligible.

Call for Applications - Australian Science Policy Fellowship Program



The Australian Science Policy Fellowship Program is an initiative of the Office of the Chief Scientist that aims to grow the diversity of expertise in the Australian Public Service (APS) workforce. It provides a pathway for early- to mid-career scientists to become skilled policy practitioners so they can be conduits for bringing scientific expertise into the policy process.

Fellows are employed as policy officers by participating Commonwealth Government host departments for 12 months. The Fellows bring a highly valued skillset, including data and analytical skills, and fresh perspectives on policy work.

They receive on-the-job training in, and exposure to, policymaking. Fellows are also supported by the Office of the Chief Scientist, have access to mentors, and are provided with a range of unique opportunities, including networking. As a pathway program into the APS, participation in the program means Fellows become equipped to seek permanent employment in the public service, if that is their wish.

The 2021-22 cohort is the first cohort of the permanent program, following a successful three-year pilot. Launched in July 2018,

the program has placed 46 Science Policy Fellows across 12 Commonwealth Government departments. The vast majority of Fellows have subsequently moved into positions within the APS since completing the Fellowship program.

Participants in the 2021-22 cohort began in their host departments in July 2021. Fellows are working in diverse policy areas, such as the International Climate and Technology Branch in the Department of Industry, Science, Energy and Resources; Medical

Devices and Product Quality in the Department of Health; Research Programs and Policy in the Department of Education, Skills and Employment; and Plant Systems & Strategies in the Department of Agriculture, Water and Environment

Applications for the 2022-23 cohort of the Fellowship program are now open, and close on 21 March 2022. You can apply, sign up for updates and receive more information and resources, including profiles of the Science Policy Fellows who have been part of the program, at <https://www.chiefscientist.gov.au/australian-science-policy-fellowship-program>.





Call for Entries - Australian Museum Eureka Prizes

Rewarding excellence in the fields of research & innovation, leadership, science engagement, and school science.

The Australian Museum Eureka Prizes are the country's most comprehensive national science awards, honouring excellence across the areas of research & innovation, leadership, science engagement, and school science.

Presented annually in partnership with some of the nation's leading scientific institutions, government organisations, universities and corporations, the Eureka Prizes raise the profile of science and science engagement in the community by celebrating outstanding achievement.

Since the prizes were established in 1990, more than four million dollars in prize money, and a total of 451 Eureka Prizes have been awarded.

AWARD CATEGORIES

Research & Innovation

Applied Environmental Research
Excellence in Interdisciplinary Scientific Research
Infectious Diseases Research
Innovative Use of Technology
Outstanding Early Career Researcher
Scientific Research

Leadership

Emerging Leader in Science
Leadership in Science and Innovation
Outstanding Mentor of Young Researchers

Science Engagement

Innovation in Citizen Science
Promoting Understanding of Science
Science Journalism
STEM Inclusion

School Science

Sleek Geeks Science Eureka Prize – Primary and Secondary School

ENTRIES NOW OPEN

This year, 14 prizes will be awarded across the categories of Research & Innovation, Leadership, Science Engagement and School Science.

Entries close: 7pm AEST Friday 6 May

Finalists announced: Wednesday 27 July

Winners announced: Wednesday 31 August

Learn more and enter:

<https://australian.museum/get-involved/eureka-prizes/>



scienceinpublic

Media and Communication Masterclass

Tuesday 22 March 9am-5pm
 @The Royal Society of Victoria, 8 La Trobe St, Melbourne

Meet journalists from TV, print and radio and hear what makes news for them. Ask questions, practice being interviewed, get feedback and practical advice. You will learn how to find the story in your research and get media coverage that is true to your science and reaches the audience you want it to.

Book online at www.scienceinpublic.com.au. \$800+GST per person



Proceedings

Call for Papers



The *Proceedings of the Royal Society of Victoria* is our refereed journal, published twice annually by CSIRO Publishing. Current and recent editions are available online in open access format from <http://www.publish.csiro.au/rs>.

The *Proceedings* is one of Australia's oldest and longest-running science journals, a terrific platform for establishing an individual research presence, grouping papers derived from symposia on specific subjects, or simply joining a distinguished tradition of science published in or about our region that stretches back to the 1850s. We are always interested in hearing from authors.

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What is autism? Why is autism research important?

Improved diagnosis and awareness

Support where people need it

World-changing contributions

Inclusive workplaces

Change in status quo

Helping neurotypicals to understand

More autistic people in decision making

Better management of co-occurring conditions



Neurodiversity is a beautiful rainbow

This article follows a lecture *on neurodiversity* to Queers in Science, The Florey Institute of Neuroscience and Mental Health, and the Royal Society of Victoria as part of the Midsumma Festival on 27th January 2022. Speakers included Liam Leyden, Kate Huckstep, Emma Burrows and Sarah Gordon, all of the Florey institute of Neuroscience and Mental Health, Dr Daphne Cohen, and Dr Sophia Frenz.

Your brain will not be the same after reading this. Nor will you interpret this article in the same way as anyone else.

Every brain is unique, and we all interact with the world in different ways. Our brains are constantly growing and changing as they adapt to new information and circumstances. This article will become a memory – and (hopefully) new information.

'I've never had a different brain. Of course I think this way – it's weird to me that others don't,' says Dr Sophia Frenz.

The rainbow colours of the pride flag reflect both the immense diversity and the unity of the LBGTQIA+ community. It is therefore quite fitting that the 2022 Queers in Science Lecture discussed something as unique as the brain – something so diverse that no two people's brains are the same – but those who attended, and you who are reading this article, have come together to learn about it.

The term neurodiversity refers to the essentially infinite variability in our neuro-cognitive abilities and needs. It celebrates differences as beautiful rather deficits. Within this inherent diversity, neurodivergent people interact with and interpret the world in unique ways from what neurotypical people might expect.

By viewing neurodiversity as a normal variation between every single one of us, we can reduce stigma around learning and thinking differences. What if everyone noticed the strengths that come with neurodevelopmental differences such as ADHD, autism, and dyslexia, before the challenges? While the challenges should not be ignore, the strengths can lead to creative problem-solving and new ideas that benefit everyone.

The brain is essentially a bustling hub of communication and differences stem from variations in how the brain is "wired" together. Approximately 86 billion neurons are housed in the brain with each connected to up to 10,000 others. The thousand trillion connections between

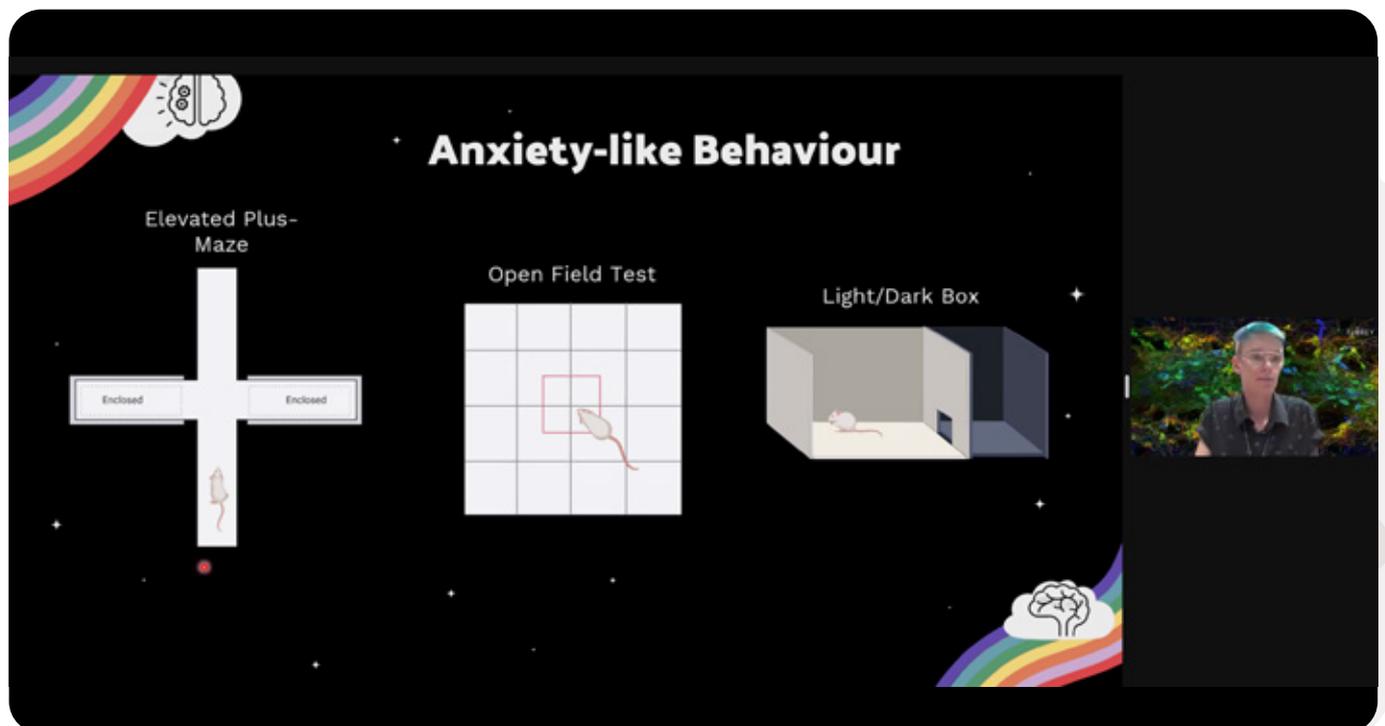
them all, called synapses, lend themselves to so many possible permutations.

The genetic architecture of each person's brain is influenced by their genes and life experiences. Throughout life, our behaviours and environment can cause molecular changes that affect how genes work – turning genes up or down, and on or off. These changes subsequently influence proteins, the molecular machines of cells, and how individual neurons in the brain communicate.

Liam Leyden studies the complexities of how one neuron is connected to thousands of others in neural networks. Individual neurons are continuously bombarded with either chemical or electrical signals across the synapses. Liam is interested in how the brain processes sensory information. As we interact with the world,

neural networks in the brain need to reflect and respond to the external environment. By measuring the activity of individual neurons and the synapses that link them together, he can form a picture of how they contribute to behaviour and cognition processes.

For insight into the intricate neural mechanisms of behaviour, Kate Huckstep uses animal models. For example, to study anxiety-like behaviour, they assess the exploratory behaviour of mice in different new environments. As foragers prone to predation, rodents have a natural tendency to explore a test arena but tend to avoid open, brightly lit areas. This behaviour can be altered by drugs or genetic mutations that affect innate anxiety. By studying animal behaviour at a molecular level, Kate hopes to develop behavioural and pharmacological support for highly stigmatised conditions.



The most common tests of anxiety-like behaviour in rodents. They tend to avoid the more aversive areas of the arena (the open arms of the elevated plus maze, the centre of the open field, or the light area of the light/dark box).

While Kate has mice running around mazes, Dr Emma Burrows trains mice to play games on touchscreens. She is interested in how genetic mutations linked to autism change a mouse's memory, attention span and ability to solve problems. She was first introduced to the different realities that children with autism face at the age of 17, working closely with a young, autistic boy. He taught her how differently he saw the world. She witnessed the challenges he faced, but also saw his unique skills. While it could be difficult to draw his attention away from something, he would be highly focused, even throughout repetitive tasks. By linking animal models to the lived experiences of people with autism, Emma hopes that her research will improve diagnosis and awareness, support, and inclusion.

Dr Daphne Cohen and Dr Sophia Frenz face challenges daily as neurodivergent individuals. Growing up, Daphne had always wondered why she was a little different from those around her, and a diagnosis several months ago finally gave her an answer. For Sophia, it was somewhat reassuring to have a word to describe the inner workings of their brain as they come across as outgoing and sociable but realised that they were not quite like everyone else. (There was also a little vindication in their diagnosis as their brother had been assessed as a child but they had not – the wrong child had been checked!)

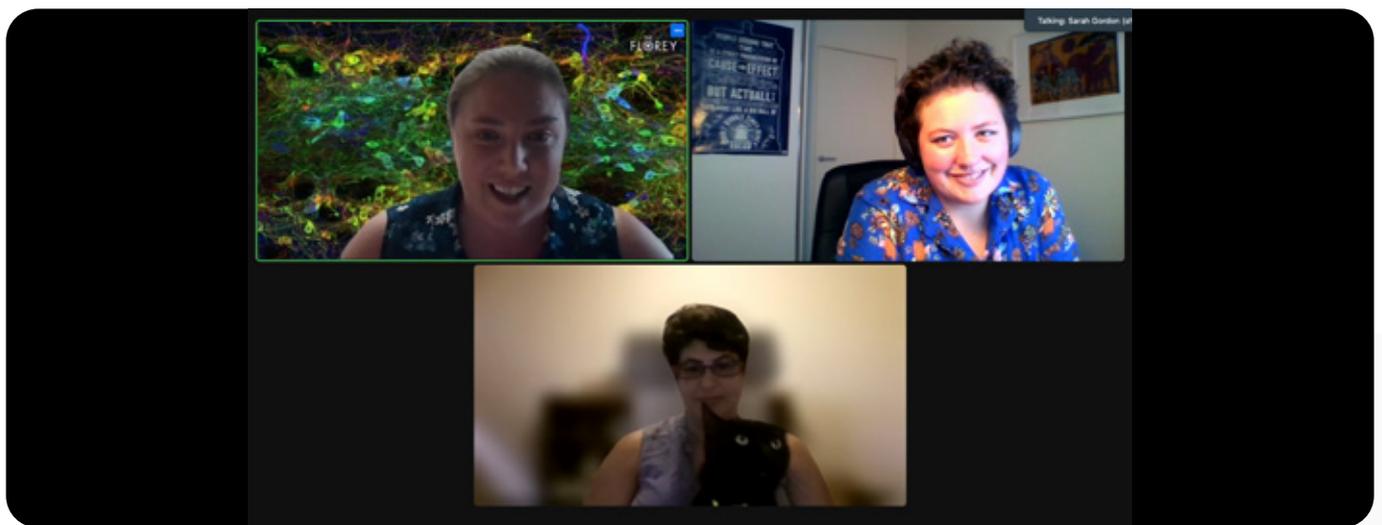
It is unsurprising that both Daphne and Sophia made it to adulthood without being diagnosed. Many neurodivergent females and non-binary people slip through the cracks. Until recently, it was simply accepted that more males have learning disorders such as autism as part of the 'male brain' theory. However, the basis for differences in diagnosis rates is less likely to be biological, but rather, due to biased research and/or diagnostic pathways.

A diagnosis does not guarantee support, but it is an important first step. Sophia is a great advocate for more inclusion and consideration of individual accessibility needs in workplaces. Their access and support needs might change daily but having options available is crucial.

They also encourage neurotypical people to be straightforward so that they do not have to question how people are feeling, and importantly, let them have "bad days".

Both Daphne and Sophia have surrounded themselves with "their people": a community of people with similar lived experiences. Sophia realised that most of their friends were neurodiverse – they do admit that committing to a PhD does require a certain highly-focused mindset, and students with autism tend to choose STEM majors at university at higher rates than neurotypical students. Many of Daphne's friends were also diagnosed with ADHD last year and she therefore self-diagnosed herself before receiving a formal diagnosis. She had simply thought that everyone experienced the world as she and her friends did.

While this article can only scratch the surface of Daphne and Sophia's conversation and experiences, the idea of community seems a fitting point to end. Daphne and Sophia have benefited from being with others who are neurodivergent. Queers in Science was formed to build a community of LGBTQIA+ people in STEM, and it just so happens that it was the first Queers in Science Lecture that brought me to "my people" as a queer scientist myself – I cannot emphasise enough how valuable having a community like this is. Whether it be neurodiversity or diversity in sexuality and gender, our differences are something to share and celebrate.



Panel caption: Dr Sarah Gordon with Dr Sophia Frenz and Dr Daphne Cohen

