



Biology Educators of Aotearoa, New Zealand
Te Rōpū Whakaako Koiora o Aotearoa

Term 3 2023 Newsletter

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President's Report

BEANZ has recently received a number of queries regarding our involvement in the NCEA standards refresh programme. BEANZ has not been involved beyond some members being on the RAS and SEG groups. However, since the Level 1 standards were released, we have had multiple communications with the Ministry of Education (MoE) writers to ensure that the wording is accurate, reflective of scientific concepts and instructive for teachers to be able to fulfil the requirements of the standard without guess work. These communications have on occasion also been in conjunction with other science subject associations, to ensure strength of voice.

The standards currently on the NCEA website are not the finished article. I recently had a face-to-face meeting with a MoE writer and BEANZ will continue to keep communication channels open. We will not get everything we would like, partly because we are not the only party with a voice in this and eventually, regardless of personal preference, a product must be made available for teachers to work with.

In saying that, if you can see a glaring issue, please feel free to send it through to the BEANZ email address biologynz@gmail.com. I have faith that the Level 1 standards will be comprehensive, tightly written and sufficiently directive in their final iteration but this iteration may not exist until teachers have used them in their classrooms and provided feedback.

A number of the BEANZ executive were privy to early versions of the Level 2 standards and it seems that the process for these will be no different.

I do like the idea that Level 1 will be 'systems', Level 2 will be 'organism' and Level 3 will be cellular and subcellular. Going from big to small makes sense when most Level 1 students are likely to drop Science at the end of the year.

The roles of BEANZ in all of the changes is to advocate for Biology teachers when necessary (and I feel that BEANZ has been quietly doing this) and to provide teachers with resources that can be used immediately. If you see potential for a unit of learning within your local context but you don't have time to work on it, please get in touch about what you need.

Nga mihi nui

Erica Jar

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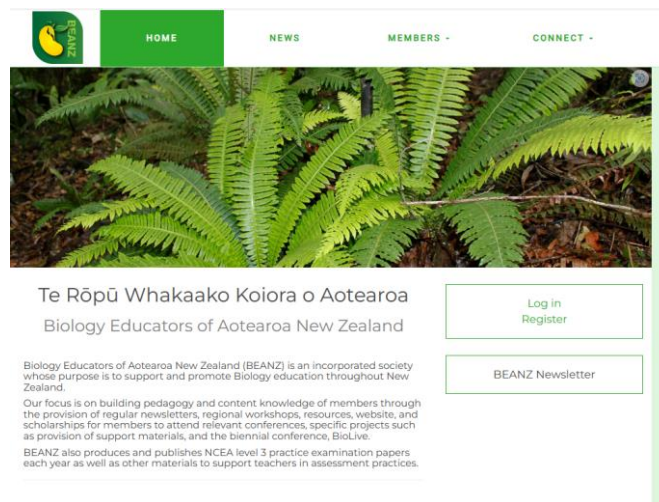
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NCEA Update

The Ministry of Education has launched a new NCEA Implementation newsletter which schools and teachers can subscribe to, hopefully this is another positive move to try and ensure the right information reaches the right people. Click on the following link to check it out: [NCEA Update: Issue #1](#). The first paragraph contains a subscribe link.

New to the BEANZ Website A Resource That Works in the New Zealand Classroom



Hot off the BEANZ production line comes a unit of work on impetigo (school sores). This is a skin disease endemic in many communities in the top of the North Island. It is a preventable illness and can result in rheumatic fever, a severe and debilitating illness requiring hospitalisation. The unit of work supports learning across the new Science standards and the Chem/Bio 1.1 Microorganisms in the Taiao standard. Within it, students learn to read scientific articles, tables of data and graphs, as well as undertaking fair-test investigations. If a school is considering using this unit, please feel free to contact BEANZ biologynz@gmail.com and we will endeavour to come to your school to workshop its use.

Pet Genetics

Jane Young's "Pet Genetics" (2011). Triple Helix Resources Ltd. ISBN: 978-0-9582742-7-2. It comes with an Accompanying CD – A Resource for Teachers (ISBN: 978-0-9582742-8-9), which is purchased separately. It's only a 64-page read but it is chock full of examples of genetics that is relatable to students and covers examples of single gene traits right through to traits that are polygenic, polymorphic and traits that are influenced by the environment.

Teaching Resources from Science Journal for Kids

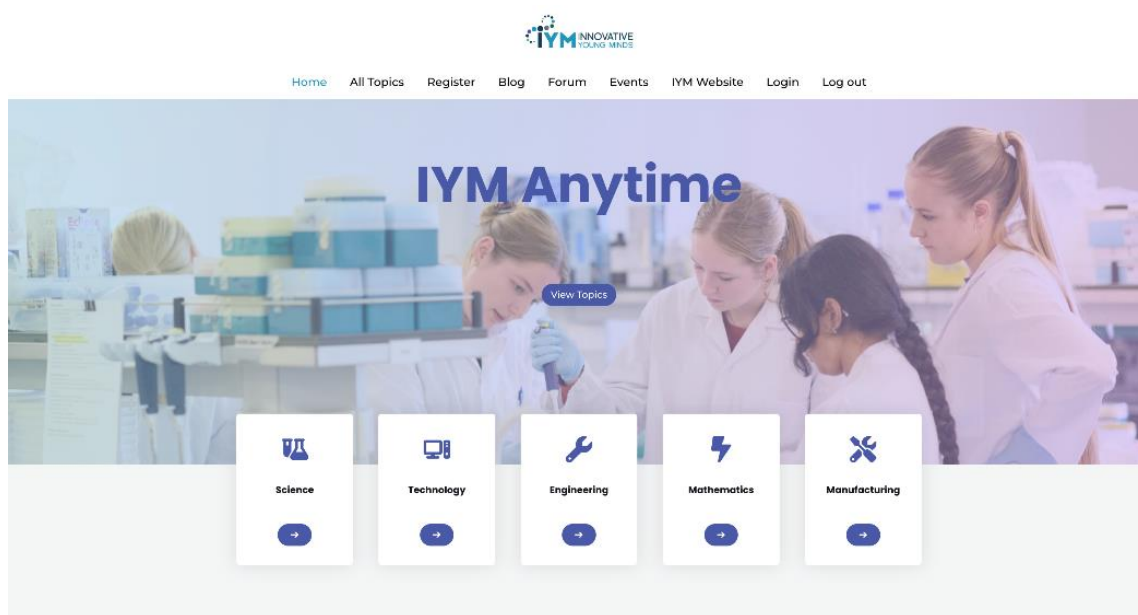
How many of us are looking for great resources to support students with learning how to read journal articles? Science Journal for Kids (<https://sciencejournalforkids.org/>) rewrites scientific articles for students from year 9-11, complete with abstract, method, results and discussion, all in full colour. The original article accompanies their version along with further reading and questions for the students to think about. Here is an example:

www.sciencejournalforkids.org/wp-content/uploads/2023/07/mussel_farm_article.pdf

IYM's New Initiative: IYM Anytime

Article from Emma Stoddart – BEANZ Regional Representative for Wellington Central

With an aim to inspire the next generation of female innovators in science and technology, Innovative Young Minds Charitable Trust (IYM) is excited to announce the launch of IYM Anytime – an interactive online platform that enables young women to explore study and career options in STEMM – science, technology, engineering, mathematics and high-tech manufacturing.



Established in 2017, Innovative Young Minds (IYM) is the brainchild of the Rotary Hutt City club, who had a goal to inspire a new generation of female innovators who better reflect our diverse society. Rotary Hutt City partnered with Hutt City Council to establish IYM Residential and IYM Online – interactive programs which showcase the wide range of study and career opportunities available in STEMM.

IYM Anytime is an extension of IYM's online and residential programs. It will allow young women to immerse themselves in the world of STEMM from the comfort of their home or school. It's all free and accessible, anytime, anywhere.

IYM began with a residential program, to showcase the rich STEM environment of the Hutt Valley and Wellington region. 40 young wāhine spent 6 days exploring a variety of science and technology businesses, Crown Research Institutes and tertiary education providers. During these visits, participants experience hands-on science and technology activities and hear from women who have built careers and businesses in the sector.

With COVID interrupting our usual offering in 2020, IYM Online was created. IYM Online offers participants a wide range of research and career opportunities available in STEM through our engaging and interactive programme. Being offered online, we are able to open this program to up to 100 participants throughout New Zealand and the Pacific Islands. Participants are set collaborative tasks, as well as viewing virtual tours of laboratories and listening to panel sessions of women working in a variety of STEM areas.

IYM Anytime is specifically targeted at young women in Years 9 – 13. This is because research consistently shows that women are significantly under-represented within STEM in Aotearoa New Zealand, something IYM is working hard to change so the sector better reflects our diverse society.

IYM Anytime offers:

- In-depth content - A collection of interviews, blog articles, virtual tours and educational resources covering a wide variety of STEM disciplines.
- Mentoring - any young woman using IYM Anytime can access free one-on-one mentoring to gain individual guidance, careers advice, and access to a comprehensive database of scholarships and information on other science camps and experiences.
- Community engagement – Through discussion forums and online events, like-minded young women will be able to connect with others who share their passions, exchange ideas and build a support network.
- Inspiring role models - IYM Anytime showcases profiles and stories of successful women who have broken the barriers in their respective STEM fields. This includes interviews with young women who attended an IYM programme and have gone on to join the STEM sector.

Our future plans for IYM Anytime include creating a teacher and careers adviser guide on how to use the resources in class. We would also like to include where and how the resources and activities link to the New Zealand curriculum or new National Careers System Strategy.

IYM Anytime is set to officially launch on September 25 2023. However, we are offering early access to those receiving this BEANZ newsletter. We encourage you to create an account and explore the current resources. Shortly after creating an account, you will receive a short survey to ask about your experience with the website and for feedback on what you would like to see made available in the future. As we receive feedback, we will continue to grow the content available.

<https://anytime.iym.org.nz/>

For more information, or a physical or digital copy of the promotional poster for sharing with your students, please get in touch with Emma at info@iym.org.nz.

Biology Blossoms at NZIBO

During the Easter break, 22 students attended the New Zealand International Biology Olympiad (NZIBO) training and selection camp in Auckland. Students had the opportunity to work in the School of Biological Sciences labs at the University of Auckland and undertake fieldwork with the School of Natural Sciences, Massey University. The programme aims to inspire young biologists with the breadth and depth of leading edge biology research being undertaken in New Zealand, teaming them up with some of our best scientists and biology educators.

Students came from schools from throughout New Zealand, from Invercargill to Northland. For some this was their first chance to visit these universities. They really appreciated the chance to share their common love of Biology with other talented secondary school students, researchers, and academics.

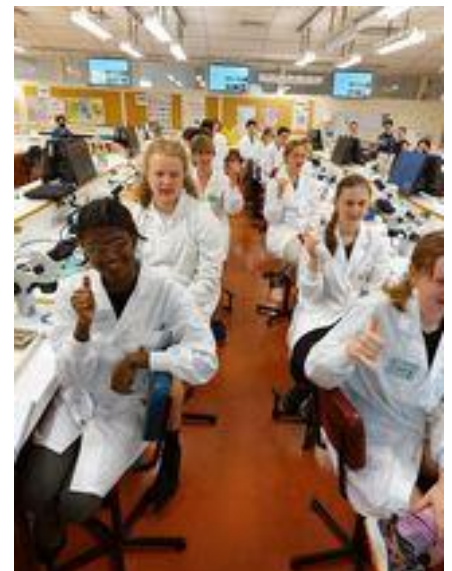


Dr Hilary Sheppard, lecturing on development before the students did some hands-on learning about development using a zebrafish model.

The students working in the Stage II labs at the University of Auckland. Dr Chris Squire and his team, including Jenn Jury (centre photo) made sure the students had the opportunity to learn all the practical skills they will need for their future university studies. They made the mahi fun too, learning how the mussel feeds using an action song (photo at right).

One of the many highlights of the camp was working with Dr Hilary Sheppard, a senior lecturer in developmental and stem cell biology. Her research uses a targeted genome engineering technology called CRISPR/Cas9 in human skin cells to generate patient-specific gene-edited skin sheets for people with a rare condition called epidermolysis bullosa (EB). She plans to take a small sample of patient skin, fix the defective gene and generate large sheets of skin in the lab which can be used to replace damaged areas of skin on the patient. To learn about the clinical application of biology techniques that the students have only read about and see the difference it makes to patients was inspiring.

The opportunity to study development, biostatistics, microbiology, biochemistry, and animal and plant physiology at university level made for an inspiring, if intense, programme of learning



Visiting Tawharanui sanctuary and studying bird behaviour in the field and spending a day at Leigh Marine Laboratory with the research scientists was a fantastic opportunity, even if the weather wasn't the best.



The students working with Dr Richard Taylor on echinoderm allometry and the effect of the marine reserve on growth and reproduction. There was time to visit the Marine Discovery Centre too!



Field work at Tāwharanui Regional Park with Dr Michelle Roper and her team.

Being selected for the camp required lots of mahi, with students completing many hours of online tutorials since September 2022, followed by a two hour exam that tested their understanding of their learning. Over 200 students sat the camp selection exam, so it was fiercely competitive for students to be chosen for the camp.

Following 10 days of fun, laughter, and intense learning, students sat both a 3 hour practical and a 3 hour theory exam. The NZIBO team was selected with consideration of the mahi they had put in during the tutorial programme, the results of the camp selection exams, and the ability of the students to represent New Zealand, at a challenging international event where they competed against the world's best young biologists.

Team leaders Dr Angela Sharples, Chairperson NZIBO and Nick Bryant, Treasurer NZIBO, both Deputy Principals at Matamata College, formed part of the international jury of scientists who reviewed the practical and theory exams before the students sat them and got a chance to share their love of biology with scientists from 79 countries. Incredible Professional Development under pressure!

The New Zealand Biology Olympiad team were united in success at the 34th International Biology Olympiad (IBO), in Al Ain, United Arab Emirates. The team of Ashleigh Bernacchi (Pinehurst School), Allan Han (Macleans College), Jacob Miller (Mount Albert Grammar School), and Jifei Shao (St Cuthbert's College) achieved international success against the best in the world. Jacob Miller and Allan Han won Silver medals and Jifei Shao and Ashleigh Bernacchi brought home Bronze. With the top 4 students competing from 79 countries, the competition for medals was fierce.

As the 'team behind the team', the volunteers of the NZ International Biology Olympiad (NZIBO) committee have worked hard to support young biologists from around New Zealand to achieve academic excellence in science. All at NZIBO couldn't be prouder of these young academics who represented us so well in the UAE. Reflecting on the success of students at the IBO, NZIBO Chair, Dr Angela Sharples said: "The ambitious target for New Zealand is for our students to compete against the best young scientists in the world and bring home both the medals and a lifelong passion for the biological sciences that will grow science research and innovation in NZ. To win 4 medals is an outstanding achievement by our students. They are truly among the best young scientists in the world. To deliver performance of this scale takes a great team of people at NZIBO and from our partner universities; Massey University – Te Kunenga ki Pūrehuroa, University of Auckland – Waipapa Taumata Rau, and University of Otago – Te Whare Wānanga o Otāgo. This year we also received crucial support from the Biology Educators Association of New Zealand (BEANZ) and Royal Society Te Apārangi.

With science educators and academics providing 1,000s of hours of support for our students and over 400 students participating in the NZIBO programme each year, this is an important package of investment in science education, driven entirely by passionate volunteers."



Nick Bryant Team Leader, Ashleigh Bernacchi (Pinehurst School), Allan Han (Macleans College), Jacob Miller (Mount Albert Grammar School, Jifei Shao (St Cuthbert's College),), and Dr Angela Sharples, Team Leader.

With Spring, the NZIBO cycle begins again! In August, 325 students sat the entrance exam and 241 students were chosen for the tutorial group which included 38 with automatic re-entry who had participated in our 2022-23 programme and 10 wildcard entries to ensure ethnic, school, and regional representation. Excitingly, students from 4 new schools took part! Students must be either permanent residents of NZ or NZ citizens, to represent New Zealand at the International Biology Olympiad and this is also taken into consideration when students are selected for the NZIBO camp.

Key Dates:

- Tutorial programme starts – Wednesday 24 September 2023
- Camp Selection Exam – Wednesday 28 February 2024
- 2024 Camp – TBC (school holidays 13th April – 28th April inclusive)
- IBO 2024 - 2 to 10 July, Astana, Kazakhstan

NZIBO has been contacting schools through our teacher contact list to confirm the teacher in charge of NZIBO at your school. If this teacher has changed it would be great to have the contact details of the new person. We would not be able to offer NZIBO without your support, so thank you in advance for encouraging your Y11 and Y12 students to participate and supervising them when they sit the exams and beyond. Should you have any questions or want to get involved with NZIBO please contact Dr Heather Meikle, Secretary NZIBO at

registration@nzibo.org

(N.B. this is a new contact address for NZIBO).

QRW-Maurice Wilkins Centre Biology Teacher Development Scholarship 2023 winners



Queenstown Research Week is New Zealand's biggest annual scientific gathering, bringing together around 1000-1500 participants every year. The week covers a wide range of areas of science and feature presentations from some of the world's leading scientists. The concept has developed from three different iconic New Zealand scientific meetings the Australasian Winter Conference on Brain Research, the Queenstown Molecular Biology Meetings and the NZ Medical Sciences Congress (Medsci).

QRW-Maurice Wilkins Centre offers three scholarships to attend the Queenstown Molecular Biology conference (28–30 August 2023, Rydges Hotel, Queenstown). This year the Queenstown lecture will be given by Professor David Julius, winner of the 2021 Nobel Prize in Physiology or Medicine.

The three 2023 recipients were chosen from a large group (18) of very deserving applicants. The 2023 awardees are: **Mel Young (Southland Girls' High School); Hamish McLellan (Nayland College) and Summer Edwards (Gisborne Boys' High School).**

QMB is a charitable society whose aim is to promote the discipline of molecular biology and to organize high level scientific meetings in New Zealand on subjects related to molecular biology. The primary aim has been to run the Queenstown Molecular Biology Meeting which has been held annually since 1991

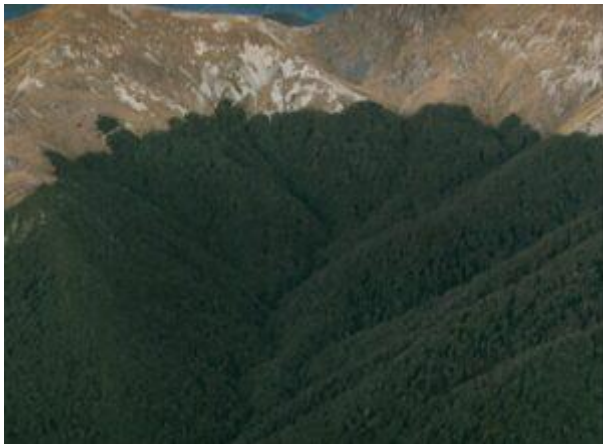


Out of the fire and into a mad world: How human arrival in New Zealand resulted in a flightless insect

By [Nic Rawlence](#)

When most people think of the consequences of humans arriving on an isolated island paradise, it wouldn't be making an insect flightless.

Most people would think about the rapid extinction of biodiversity and environmental modification that inevitably follows human arrival. In Aotearoa New Zealand this includes the sad loss of the [giant megafaunal moa](#), pouakai [Haast's eagle](#), and the [huia](#) to name a few, as well as the [widespread burning of forest](#). Others will mention the introduction of novel mammalian predators like the [kiore Pacific rat](#), [kurī Polynesian dog](#), and the myriad of sharp-toothed beasts Europeans brought with them. If people even think about the insects, it will be to wonder how many were munched into extinction by rats as they rapidly spread throughout Aotearoa in waves.



Once were treelines: There are few places left in Aotearoa where you can see a pre-human treeline. Image by Danilo Hegg.

It's the middle of winter and Jon Waters and I are halfway up a Central Otago mountainside amongst the tussocks covered in fresh snow. Our fingers are frozen solid turning over rocks on the hunt for stonefly (*Zelandoperla fenestrata*) nymphs in the bubbling brook that tumbles down the mountainside, while our minds are thinking of hot chocolates at the Kissing Gate Café nearby and whether we'll make it back to Dunedin before the next snowstorm. You'd be forgiven for thinking that this barren tussock and rocky tor landscape, made famous as the land of the horse lords in the Lord of the Rings movies, was natural. Majestic and beautiful as it is, this landscape is far from natural. Rather it's the product of the [widespread burning of forests 600-750 years ago](#).

Before the arrival of humans in Aotearoa, this area was [covered in forest](#). Importantly, the tree line, where the forest gives way to natural alpine tussock and herb fields, was much higher than today. Bubbling creeks, like the one I froze my fingers in, ran down the many gullies that carved up the hill country. Native [galaxiid fish](#) called these little isolated streams home, feeding on stonefly nymphs, while the adults lived out their short adult life flying around at dusk protected by the forest canopy overhead.

As anyone that's been to Central Otago during summer knows, it can get very hot and windy making al fresco dining and wine tasting all but impossible. Under their protective canopy of the forest, the bubbling brooks the stoneflies called home would have been sheltered. In contrast, those hardy individuals that lived in the windswept upper reaches of the stream above the climate-driven treeline lost their wings. All the better to stay well-grounded than be blown to the four corners of the compass on a regular basis.



I'll huff and puff, and blow your house down: Living in the alpine zone can be hard work, especially when there's no shelter around. Image by Nick Foster.

Detective work by palaeoecologists looking at sediment cores from swamps and lakes stretching back into the mists of Aotearoa's prehistory showed that shortly after human arrival in the late 13th Century, the steady accumulation of pollen rain was joined by something else – particles of charcoal. Lots and lots of charcoal. This tell-tale signal was a clear sign of the [human-induced burning](#) that destroyed half the lowland and montane forest in New Zealand within a few centuries of Polynesian arrival that was only added to by Europeans. Any forest that survived in Central Otago became restricted to isolated refuges, away from pesky people. The new tree line could be significantly lower by several hundred metres depending on where these remnants were. In the geological blink of an eye, many of the stoneflies that were minding their own business in their

sheltered little homes were thrust into a brave new world, one above the human-induced tree line where the wind regularly tried to huff and puff and blow them away.

Now [new research](#), led by Brodie Foster of the University of Otago, has shown that the stoneflies that found themselves in this mad world evolved flightlessness and lost their wings in a very short time. While 600 years may seem a long time to you and me, when the generation time of a stonefly is a [long two to three years](#), it's a very short time indeed on the evolutionary toilet paper of time. Amazingly, the switch from flighted to flightless stoneflies matched local human-driven treelines ([from 600-1000 metres above sea level](#)), not the climatically controlled pre-human one. The sheer speed of this change is reminiscent of [peppered moths](#) in Europe during the Industrial Revolution that became darker in colour to blend in on soot-covered trees, compared to lighter-colored ones that no doubt failed at playing hide and seek with hungry predators.

So how did this remarkable change in stoneflies happen? It's likely that the change in treeline from burning significantly altered the selective evolutionary pressure on the genes controlling flight and wing formation in the populations that experienced this pronounced shift. Stoneflies that became flightless would have preferentially survived into adulthood to reproduce and pass their flightless genes onto the next generation. Over multiple generations, the evolutionary trajectory of the stonefly populations above the treeline was changed forever.

New research like Brodie's and colleagues is increasingly providing ever more fascinating details about the evolutionary consequences of human colonization of Aotearoa from the extinction of [previously unknown species](#), to [biological turnover events](#) and now [human-induced flightlessness in insects](#). I for one will be excited to see what scientists find next and can't wait until our next family road trip to excitedly tell my natural history-obsessed kids about this cool new science. Humans causing insects to become flightless. Who would have thought?



Evolutionary tinkering: Selective pressure since forest clearance has resulted in wingless stoneflies (bottom) evolving from flying ancestors (top).

Dr Nic Rawlence

BEANZ Tertiary Representative
Director - Otago Paleogenetics
Laboratory
Senior Lecturer in Ancient DNA
Department of Zoology
University of Otago, Dunedin



Biology Educators of Aotearoa New Zealand
 Te Rōpū Whakaako Koiora o Aotearoa
Regional Representatives 2023



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Your BEANZ Executive

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Treasurer:	Peter Sutton	
Website Coordinator:	Ben Himme	
Assessment Coordinator:	Kenneth Loh	
Curriculum Development:	Penny Daddy	
Executive:		
Toni Waugh	Kamal Nair	
Jessica Richards	Lila Beneteau	
Gerd Banke	Jennie Merchant	
Tertiary Representative	Nic Rawlence	
National Administrator	Allan Smith	
Non-executive positions:		
Regional Representatives	Mike Stone	
BEANZ Facilitator	Stephen Williams	