Designing Research Posters

Ana Avilés & Li Wang
Research Services
Student & Scholarly Services

woodleywonderworks via flickr

Learning objectives for this session:

- Planning your content
- Designing your poster
- Examine examples
- Software & resources

Planning your content

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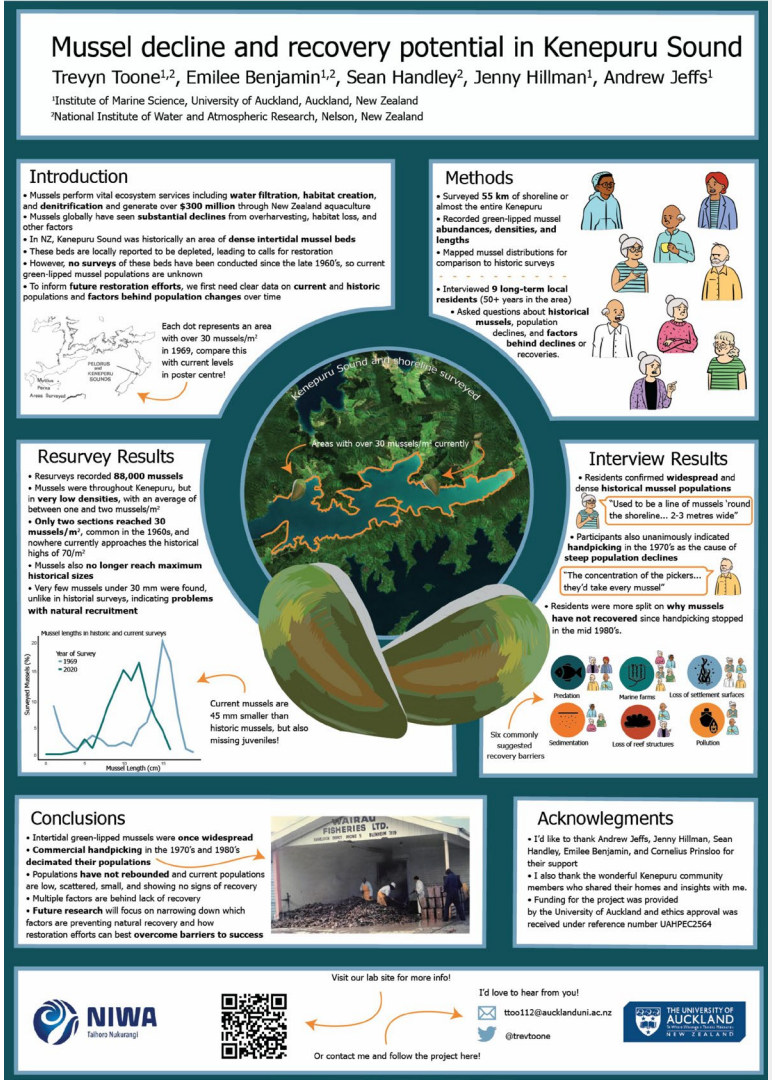
Why do you want to make a poster?

- Assignment
- Conference
- Research Showcase

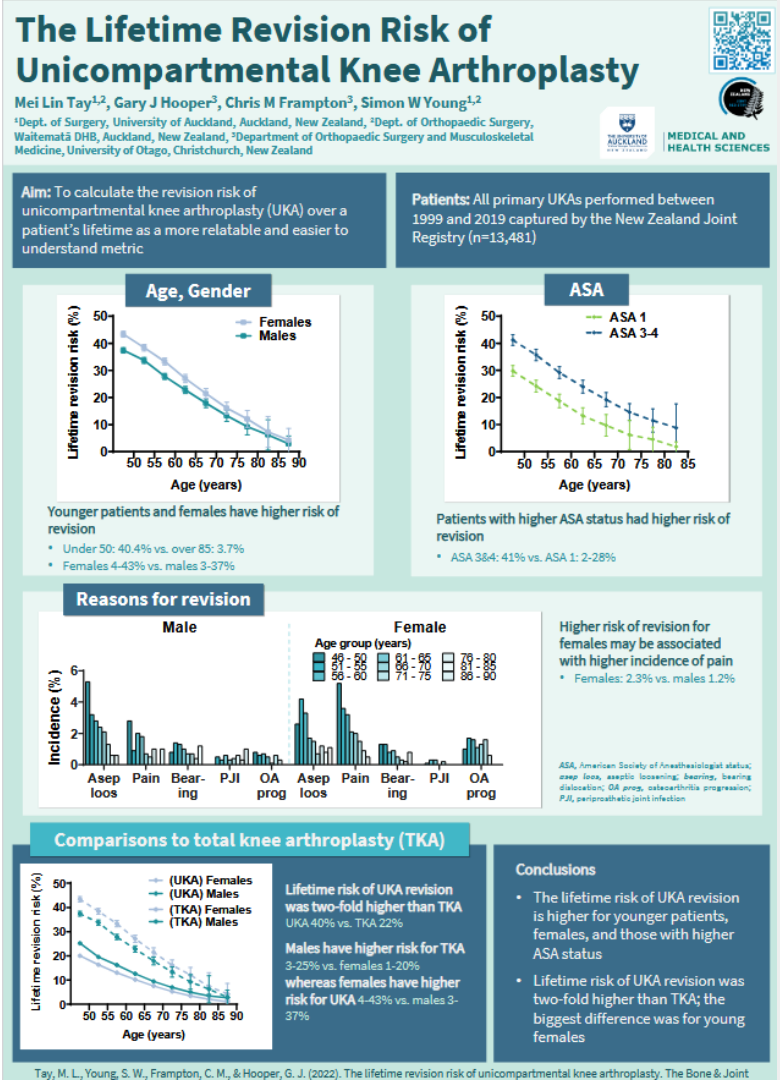
What is the purpose of your poster?

- Share your research findings
- Promote your research
- Look for funding
- Discuss your research methods



Who is your audience?

- Colleagues in your department
- Attendees of an academic conference
- General public



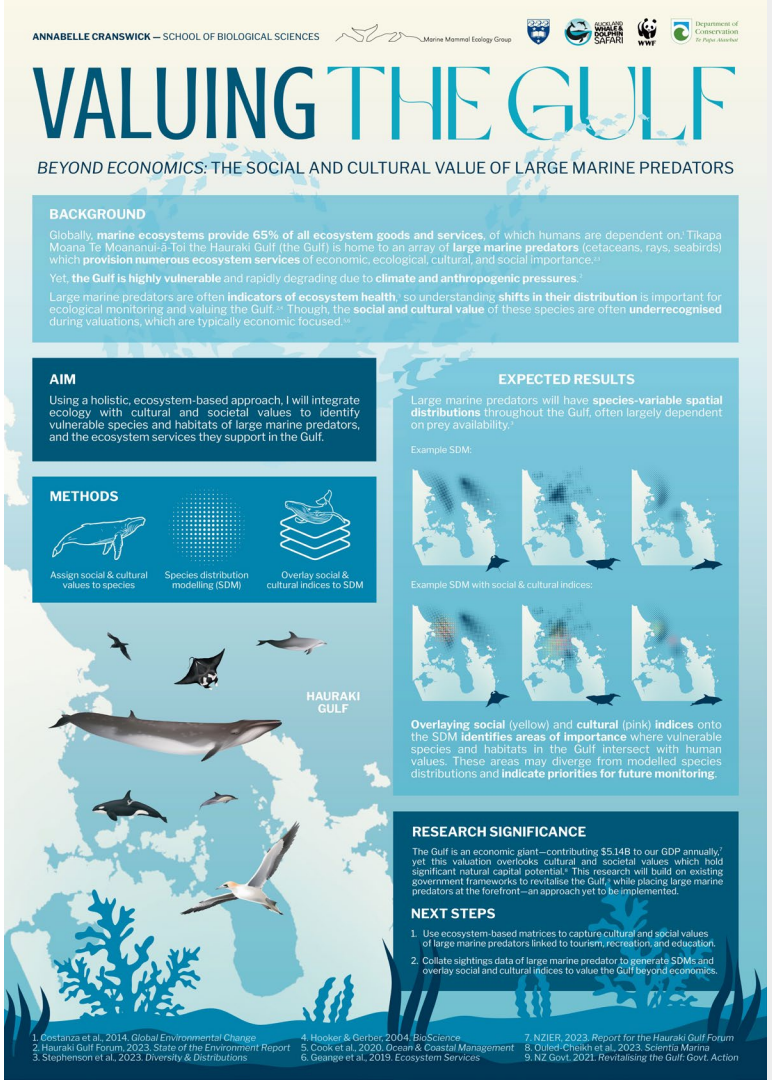
What is your key message?

- What should people remember about your research?
- What is the most effective way to convey that information?

ACTIVITY: Write a one sentence summary explaining your research topic.

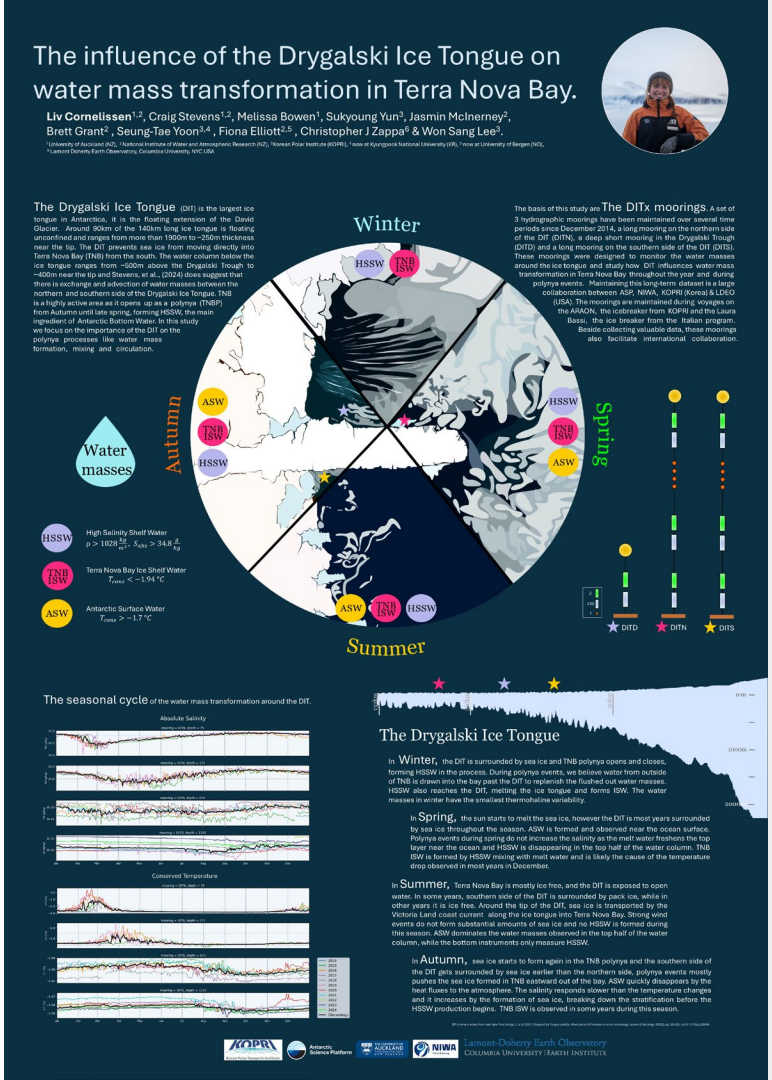
How will you communicate your message?

- How much context to include
- Methodology or findings
- Use of graphics or graphs
- Link to next steps
- Include references



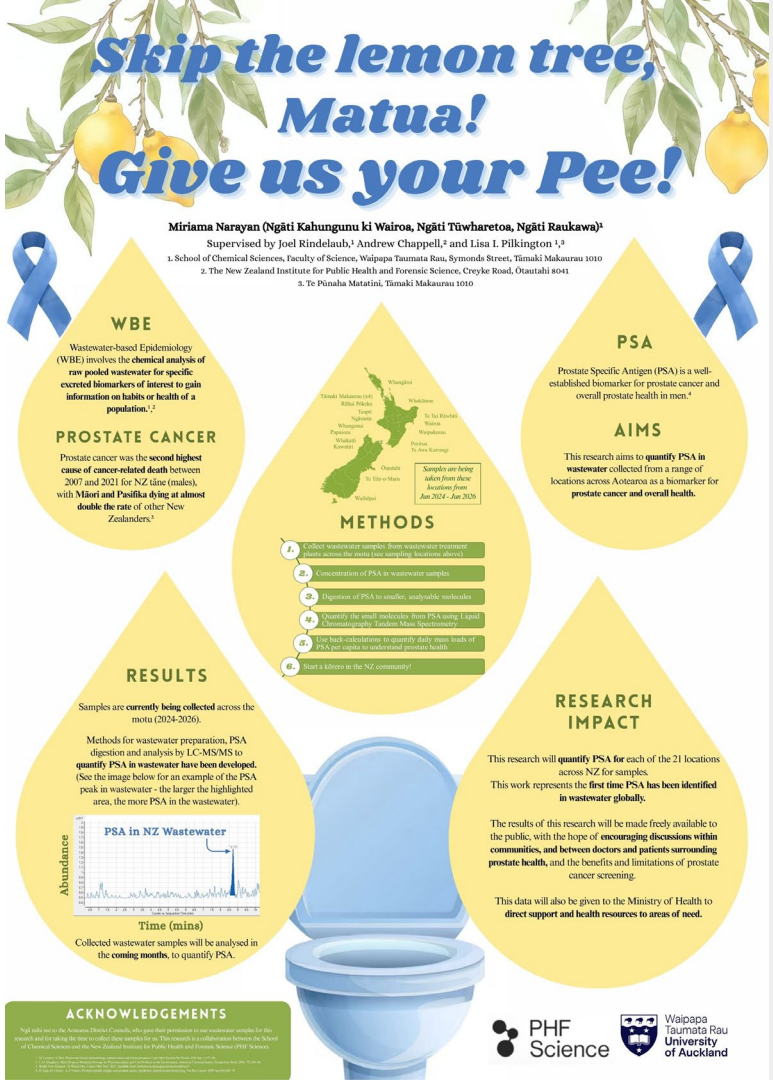
Are there other things to include?

- Acknowledge collaborators
- Include your institution
- Showcase the researcher
- Promote publications, websites, or future research



Using your poster to network

- Talking points
- Don’t overwhelm etc

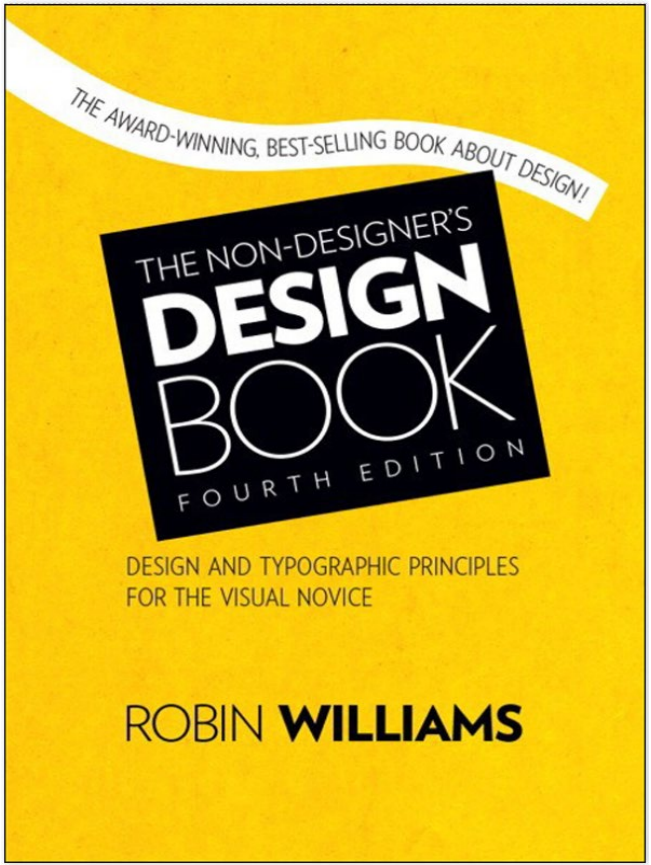


Designing your poster

Photo by Steve Johnson on Unsplash

Basic principles of good design

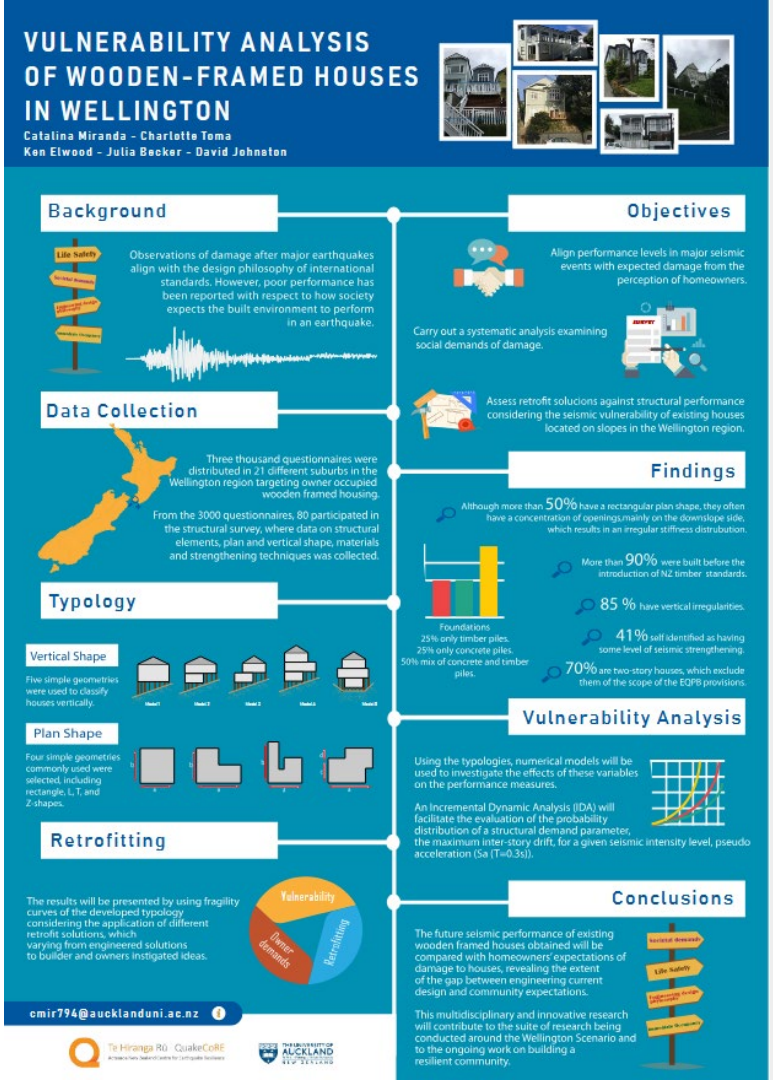
- **P**roximity
- **A**lignment
- **R**epetition
- **C**ontrast



Williams, R. (2014). *The Non-Designer's Design Book* (4th ed.). Berkley, California: Peachpit Press

Proximity

- Items relating to each other should be grouped close together.
- Space is used to create separation.



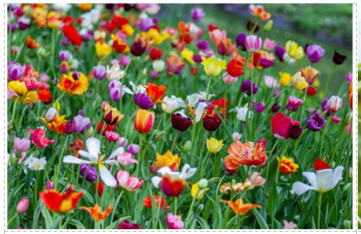
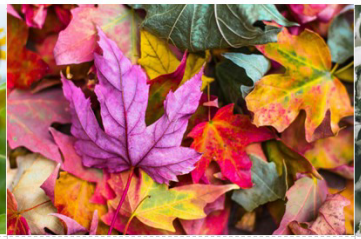
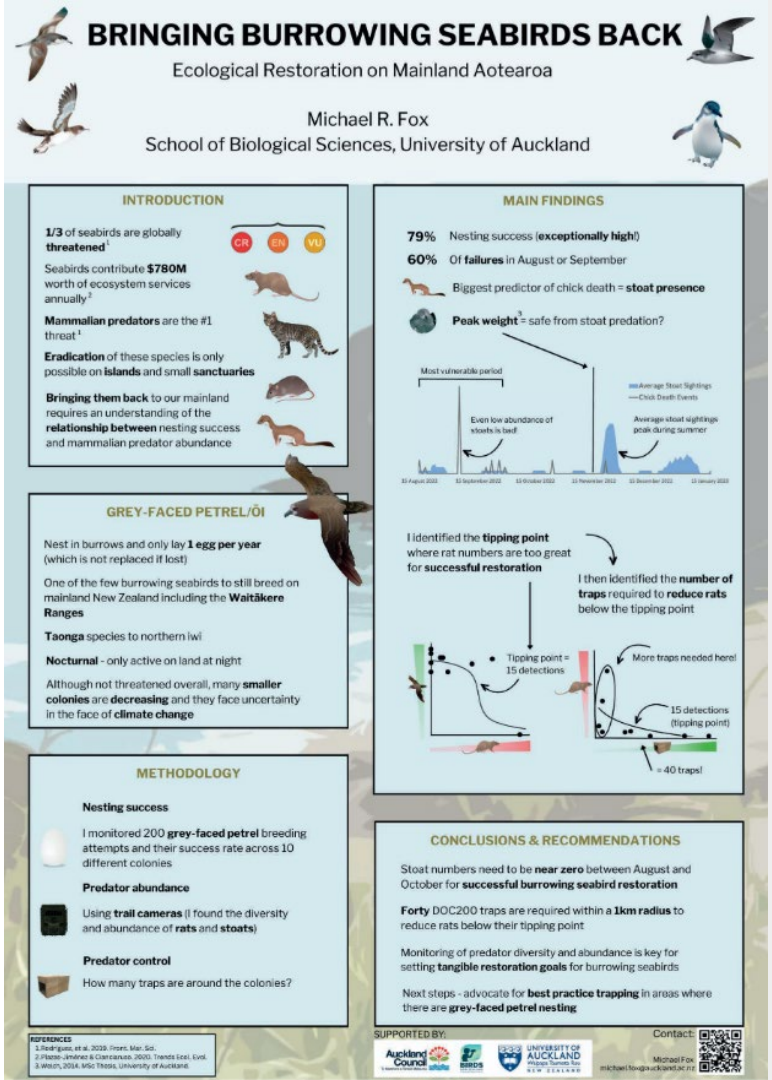
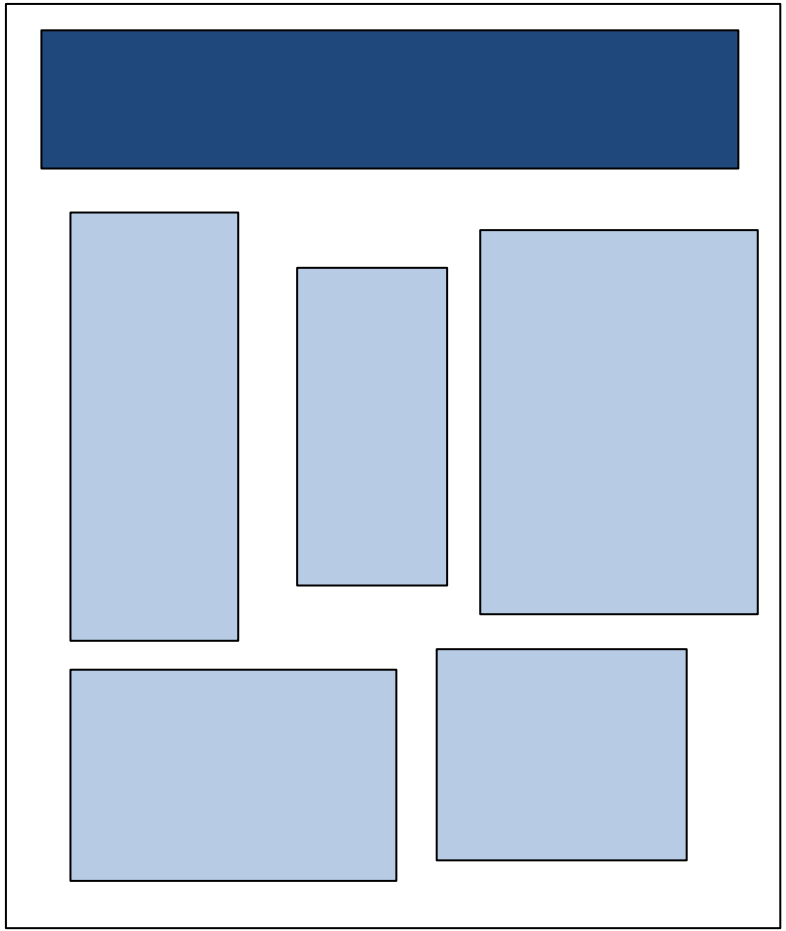
		

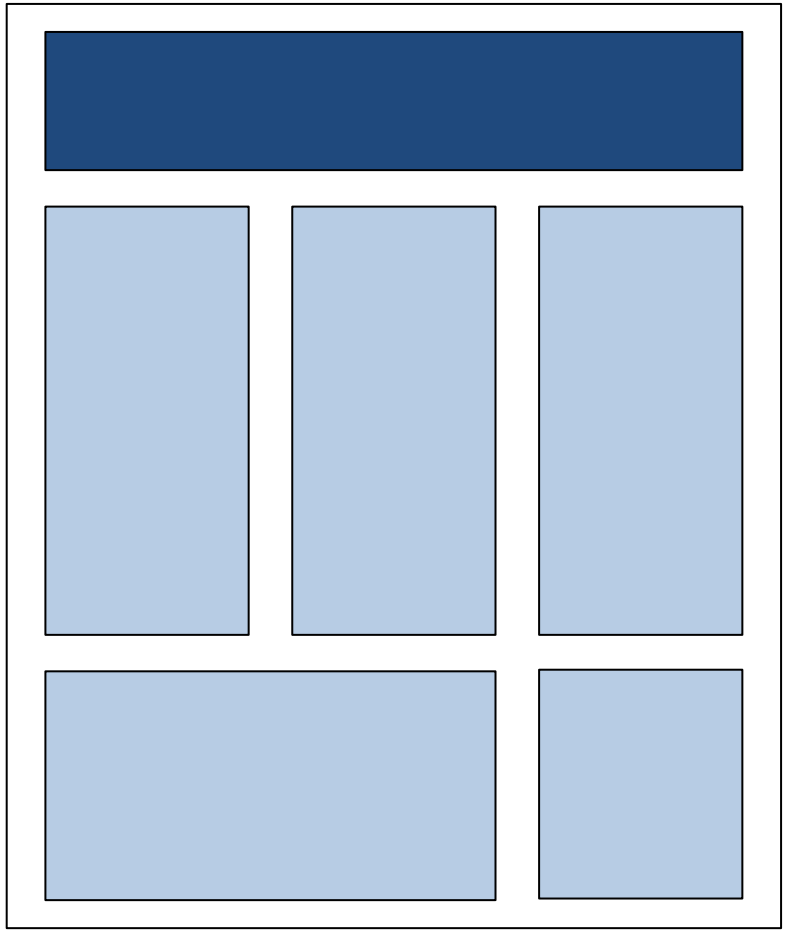
Photo by Yoksel Zok on Unsplash	*Photo by Kasumi Sasaki on Unsplash*	*Photo by Jeremy Thomas on Unsplash*	*Photo by John Price on Unsplash*
SPRING	**SUMMER**	**AUTUMN**	**WINTER**
Spring, also known as springtime, is one of the four temperate seasons, succeeding winter and preceding summer. Spring and "springtime" refer to the season, and also to ideas of rebirth, rejuvenation, renewal, resurrection and regrowth.	Summer or summertime is the hottest and brightest of the four temperate seasons, occurring after spring and before autumn. At or centred on the summer solstice, daylight hours are the longest and darkness hours are the shortest, with day length decreasing as the season progresses after the solstice.	Autumn, also known as fall in North American English, is one of the four temperate seasons on Earth. Outside the tropics, autumn marks the transition from summer to winter, beginning in September (Northern Hemisphere) or March (Southern Hemisphere). Autumn is the season when the duration of daytime becomes noticeably shorter and the temperature cools considerably.	Winter is the coldest and darkest season of the year in temperate and polar climates. It occurs after autumn and before spring, when the hemisphere is oriented away from the Sun as a result of the tilt of Earth's axis. Different cultures define different dates as the start of winter, and some use a definition based on weather.

Alignment

- Every element should have a visual connection with another element.
- This improves readability and guides the eye from one section to the next.







In typesetting, justification (sometimes referred to as 'full justification') is the typographic alignment setting of text or images within a column or "measure" to align along both the left and right margin. Text set this way is said to be "justified.“

In justified text, the spaces between words, and, to a far lesser extent, between gyphs or letters (known as “tracking”), are stretched or sometimes compressed in order to make the text align with both the left and right margins.

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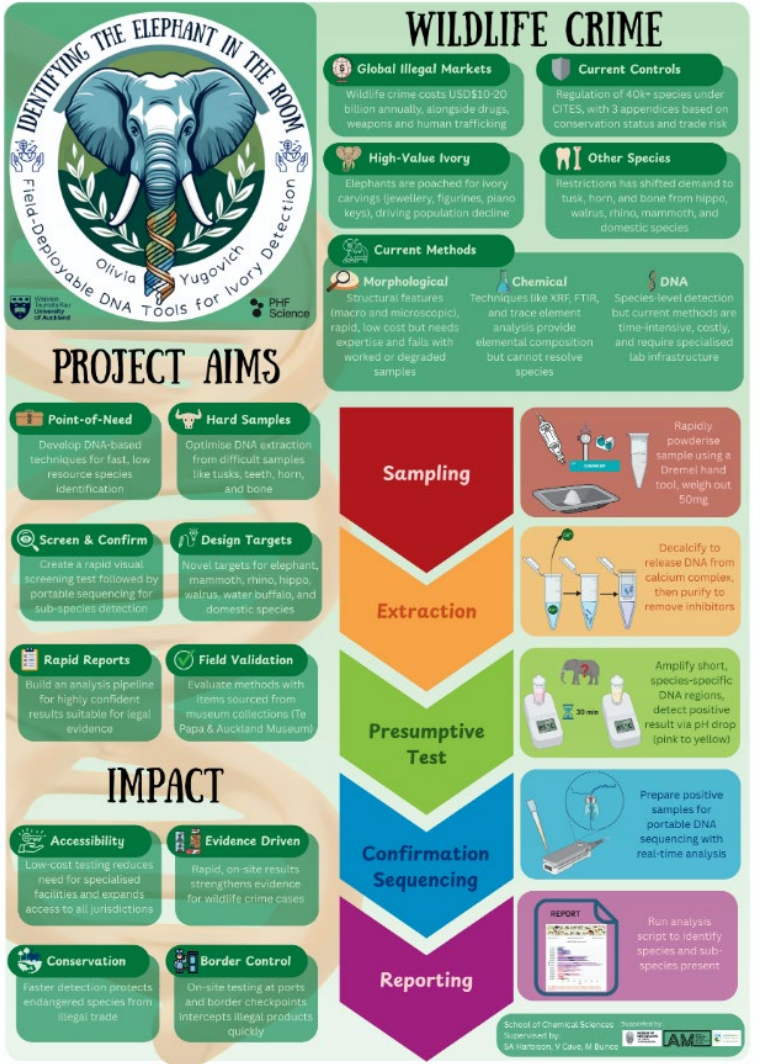
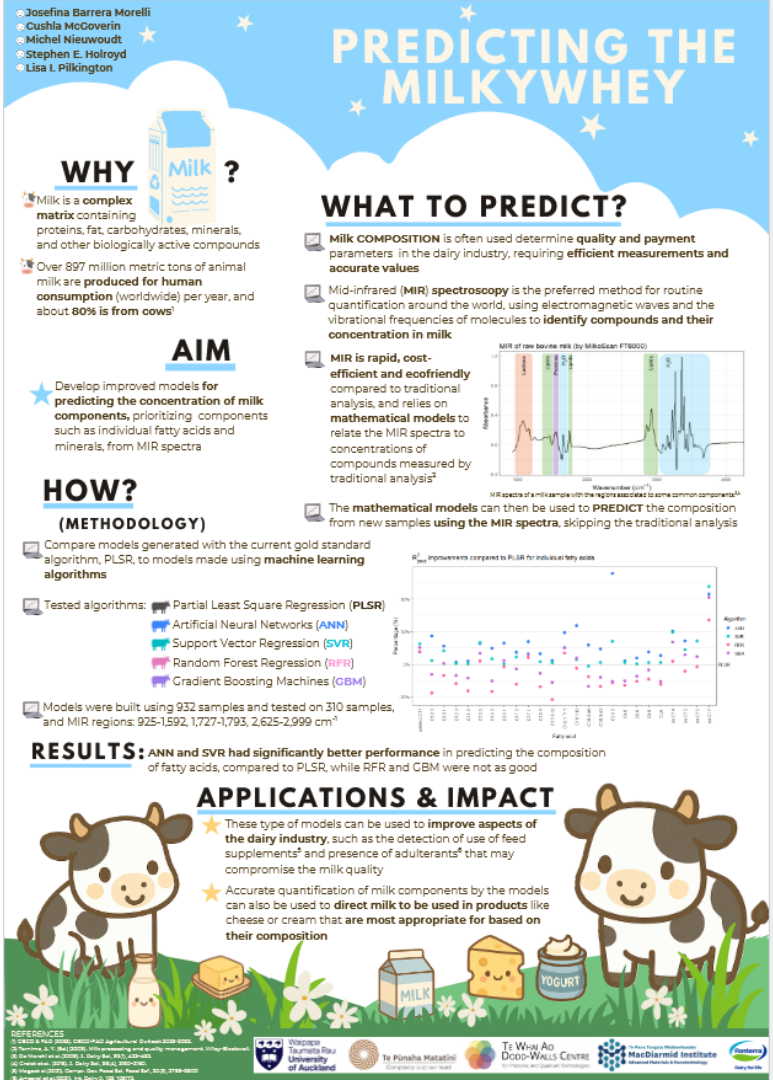
Repetition

- Repeat visual elements including colours, shapes, textures, fonts, spatial relationships, etc.
- Develops organisation
- Strengthens unity



Contrast

- This involves arranging opposing elements to create visual interest and highlight key information.
- Contrast helps users understand what is most important.



Event!

Campus book sale on 8th May 2025 starting at 10am and running until 2pm.

Textbooks, fiction books, biographies, Atlases and LOTS more!!

Lots of books for sale come and fill a bag for twenty dollars or individual books are sold from five dollars each. Come early to get the best deals at the General Library on City Campus.

See our website for more details:

www.auckland.ac.nz/events

CAMPUS BOOK SALE

WHEN
8 May 2025
10am - 2pm

WHERE
General Library
City Campus
5 Alfred Street, Auckland Central, Auckland 1010

BOOKS FROM $5
FILL A BAG FOR $20

WWW.AUCKLAND.AC.NZ/EVENTS

TEXTBOOKS

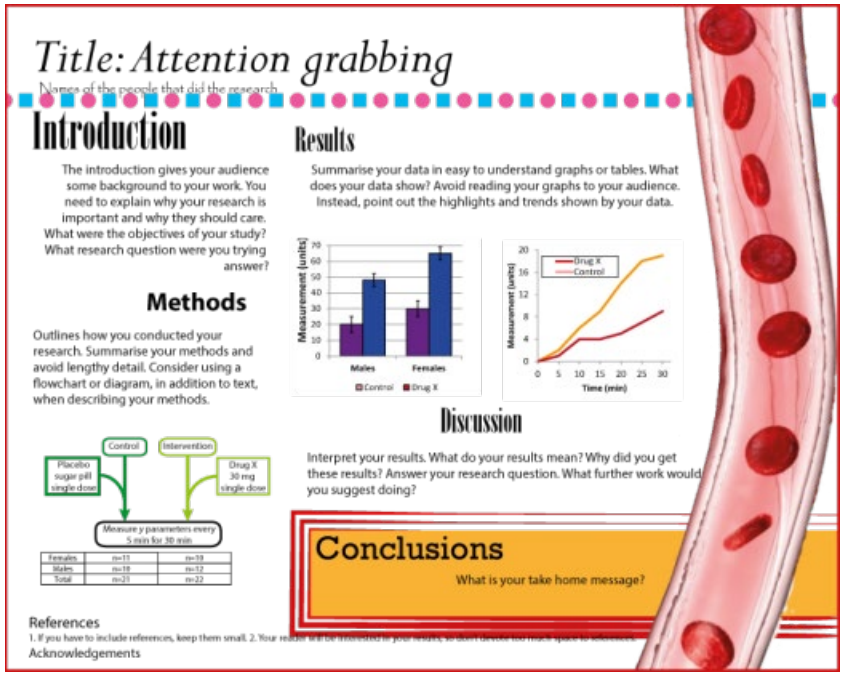
BIOGRAPHIES

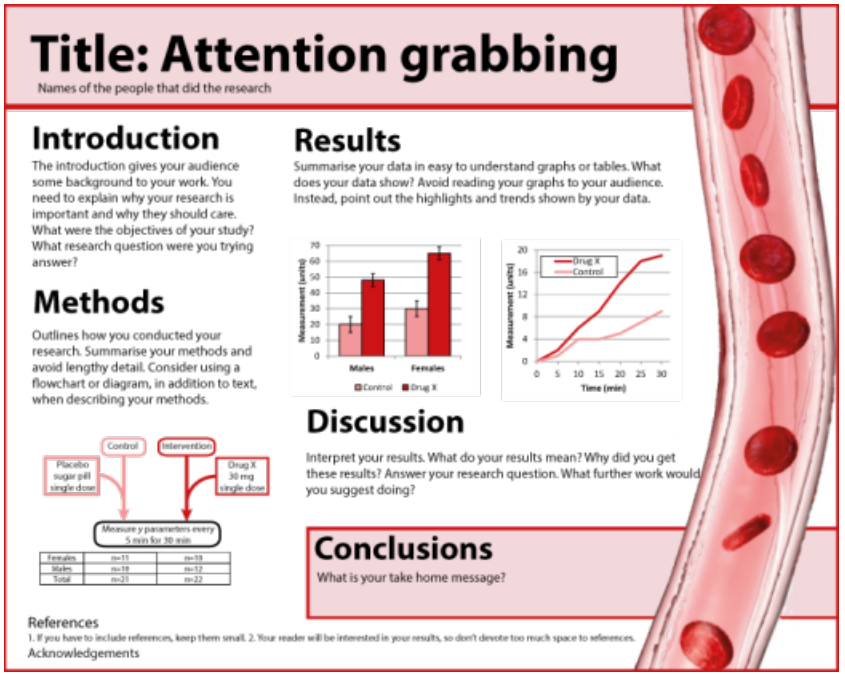
FICTON BOOKS

ATLASES

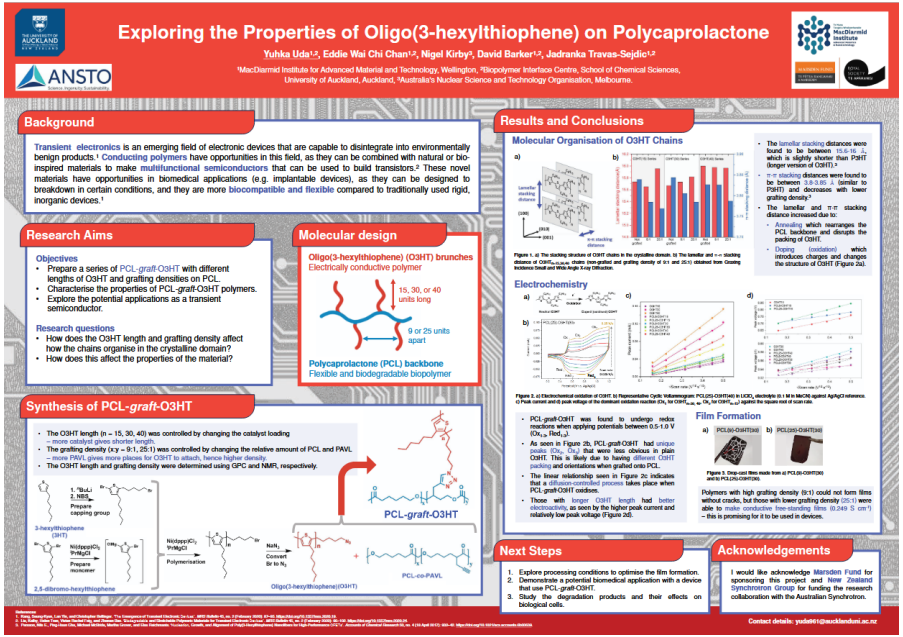
Waipapa Taumata Rau
University of Auckland

P.A.R.C in action





P.A.R.C in action



Exploring the Properties of Oligo(3-hexylthiophene) on Polycaprolactone

Yuhka Uda[1,2], Eddie Wai Chi Chan[1,2], Nigel Kirby[2], David Barker[1,2], Jadranka Travas-Sejdic[1,2]

[1]MacDiarmid Institute for Advanced Material and Technology, Wellington, [2]Biopolymer Interface Centre, School of Chemical Sciences, University of Auckland, Auckland, [3]Australia's Nuclear Science and Technology Organisation, Melbourne.

Background

Transient electronics is an emerging field of electronic devices that are capable to disintegrate into environmentally benign products.[1] **Conducting polymers** have opportunities in this field, as they can be combined with natural or bio-inspired materials to make **multifunctional semiconductors** that can be used to build transistors.[2] These novel materials have opportunities in biomedical applications (e.g. implantable devices), as they can be designed to breakdown in certain conditions, and they are more **biocompatible and flexible** compared to traditionally used rigid, inorganic devices.[3]

Research Aims

Objectives

- Prepare a series of PCL-*graft*-O3HT with different lengths of O3HT and grafting densities on PCL.
- Characterise the properties of PCL-*graft*-O3HT polymers.
- Explore the potential applications as a transient semiconductor.

Research questions

- How does the O3HT length and grafting density affect how the chains organise in the crystalline domain?
- How does this affect the properties of the material?

Molecular design

Oligo(3-hexylthiophene) (O3HT) brunches
Electrically conductive polymer

15, 30, or 40 units long

9 or 25 units apart

Polycaprolactone (PCL) backbone
Flexible and biodegradable biopolymer

Synthesis of PCL-*graft*-O3HT

- The O3HT length (n = 15, 30, 40) was controlled by changing the catalyst loading
  – more catalyst gives shorter length.
- The grafting density (x:y ~ 9:1, 25:1) was controlled by changing the relative amount of PCL and PAVL
  – more PAVL gives more places for O3HT to attach, hence higher density.
- The O3HT length and grafting density were determined using GPC and NMR, respectively.

Results and Conclusions

Molecular Organisation of O3HT Chains

- The lamellar stacking distances were found to be between 15.6-16 Å which is slightly shorter than P3HT (longer version of O3HT).[3]
- π-π stacking distances were found to be between 3.8-3.85 Å (similar to P3HT) and decreases with lower grafting density.[3]
- The lamellar and π-π stacking distance increased due to:
  - Annealing which rearranges the PCL backbone and disrupts the packing of O3HT.
  - Doping (oxidation) which introduces charges and changes the structure of O3HT (Figure 2a).

Electrochemistry

- PCL-graft-O3HT was found to undergo redox reactions when applying potentials between 0.5-1.0 V ($Ox_{1,2}$, $Red_{1,2}$)
- As seen in Figure 2b, PCL-graft-O3HT had unique peaks (Ox_2, Ox_3) that were less obvious in plain O3HT. This is likely due to having different O3HT packing and orientations when grafted onto PCL.
- The linear relationship seen in Figure 2c indicates that a diffusion-controlled process takes place when PCL-graft-O3HT oxidises.
- Those with longer O3HT length had better electroactivity, as seen by the higher peak current and relatively low peak voltage (Figure 2d).

Film Formation

Polymers with high grafting density (9:1) could not form films without cracks, but those with lower grafting density (25:1) were able to make conductive free-standing films (0.249 S cm^{-1}) – this is promising for it to be used in devices.

Next Steps

1. Explore processing conditions to optimise the film formation.
2. Demonstrate a potential biomedical application with a device that use PCL-graft-O3HT.
3. Study the degradation products and their effects on biological cells.

Acknowledgements

I would like acknowledge **Marsden Fund** for sponsoring this project and **New Zealand Synchrotron Group** for funding the research collaboration with the Australian Synchrotron.

Contact details: yuda661@aucklanduni.ac.nz

1. Kang, Seung-Kyun, Lan Tip, and Jonathan Rogers. "Bio-Integrated Chemical Circuits." MRS Bulletin 40, no. 12 (February 2015): 1141–50. https://doi.org/10.1557/mrs.2015.28.
2. Lin Tung, Vidya, Jui-Cheng Chen, Yuchen Hsu, Sheng-Joue Liu, and Shih-Hui Chang. "Biodegradable Polymeric Substrate for Transient Electronic." Soft Matter 8, no. 11 (January 2012): 3139. https://doi.org/10.1039/c2sm07109h.
3. Pickens, Billy C., Ping-Hsun Chu, Michael McAllen, Martha Grover, and Elias Kiesenhofer. "Formation, Growth, and Alignment of Poly(3-Butylisothianaphthene) Nanofibers for High-Performance OTFT." Advanced Functional Materials 30, no. 4 (24 April 2019): 1904–41. https://doi.org/10.1021/acs.accounts.8b00558.

Towards Personalised Orthopaedic Care: Validation of the Digital Knee

Annah McPherson
Department of Exercise Sciences, The University of Auckland
Supervisors: Sarah Ward, Andrew McDaid

The Digital Knee®

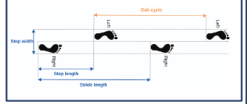
- Recent advancements in wearable technology has enabled the digitisation of parts of the rehabilitation care pathway.[1,2]
- OPUM Technologies have developed the Digital Knee® wearable sensor (an integrated accelerometer and goniometer) embedded into a commercially available knee brace which is paired with the OPUM Lab mobile application.
- Validation of gait metrics from the Digital Knee® against a gold standard system GAITRite® is required.[3,4]

Aim

- To determine the level of agreement of the OPUM Digital Knee® wearable with the gold standard measurement system GAITRite®, for assessing lower limb gait metrics.

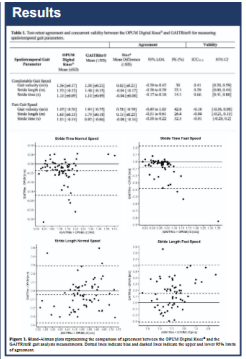
Methods

- 34 healthy participants were fitted with the OPUM Digital Knee® on their dominant limb.
- Walk over the GAITRite®, twice at normal walking speed, twice at fast walking speed.
- Outcomes: Stride length, stride time, gait speed.
- Parameters from Digital Knee® compared to that of GAITRite® using Bland Altman plots (mean bias, LOA, PE) and $ICC_{2,1}$ to determine agreement and concurrent validity of the two measurement systems.



The Digital Knee® is a valid tool for assessing lower limb gait metrics.

Results



Conclusions

- Stride time was moderately valid ($ICC_{2,1}$ = 0.66s), stride length and gait velocity demonstrated poor validity at a comfortable walking speed ($ICC_{2,1}$ = 0.29m; 0.41m/s).
- All gait parameters demonstrated poor validity at a fast-walking speed ($ICC_{2,1}$ = -0.16 to -0.01).
- The wearable sensor can be used to measure spatiotemporal gait parameters at comfortable walking speeds.

Future Directions

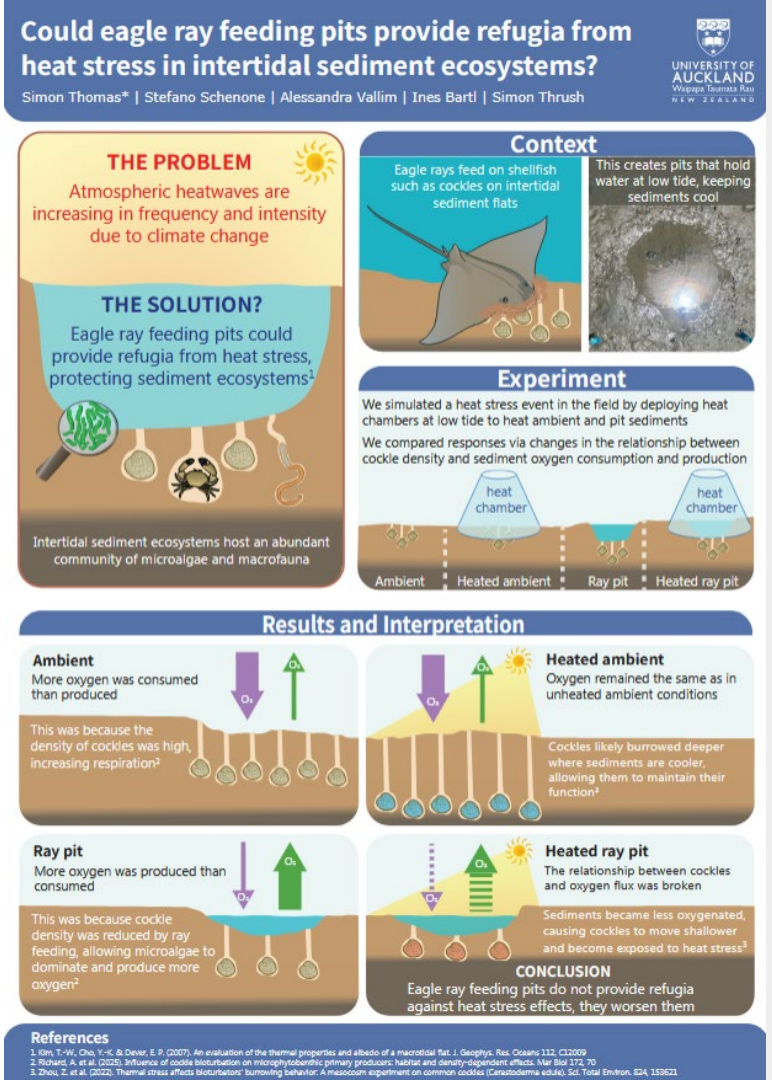
- This was a laboratory-based study, thus, assessing the device in a real-world environment is warranted.
- Validate the Digital Knee® in patients with knee pathologies.
- A different algorithm is required for fast walking speed in the OPUM Digital Knee®.

References

OPUM

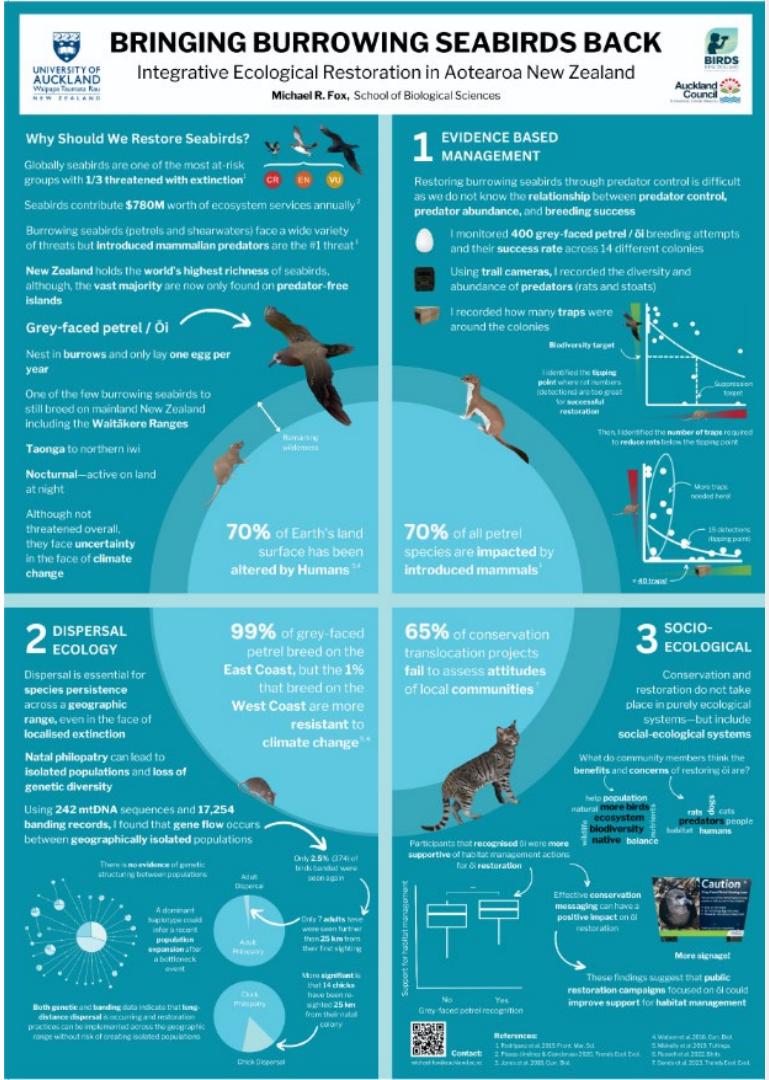
Layout

- Use columns to direct the reader.
- Your layout should be easy to follow with clear signposting or headers to help people navigate.



Layout

- Experiment with different column layouts to see what works best with your research.
- Consider the different elements you are including – background, methods, results, conclusion, etc.

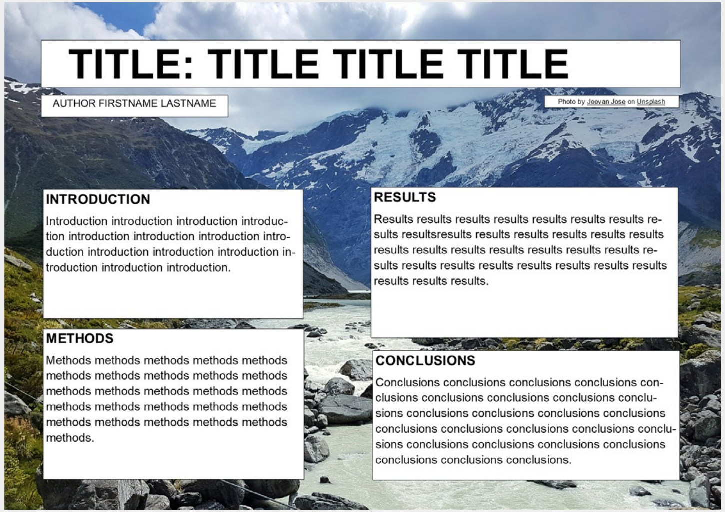


Background

- Make sure it is possible to read your text against the background.
- Think about how your background affects visibility of text.

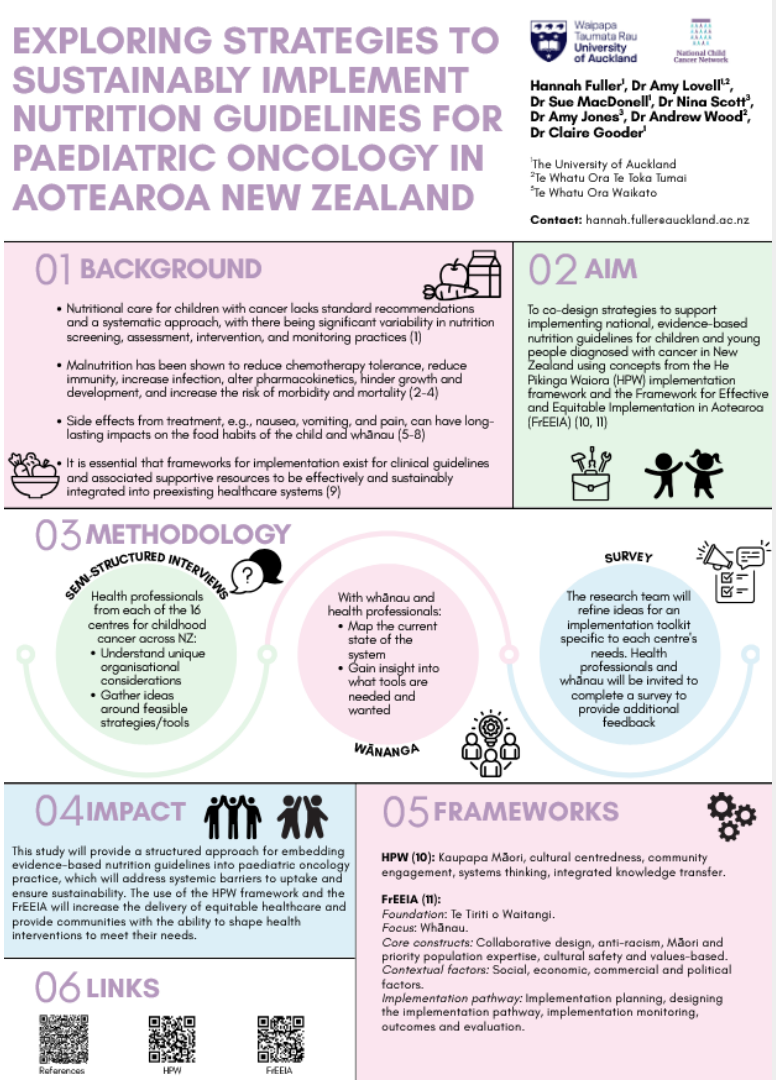
Background

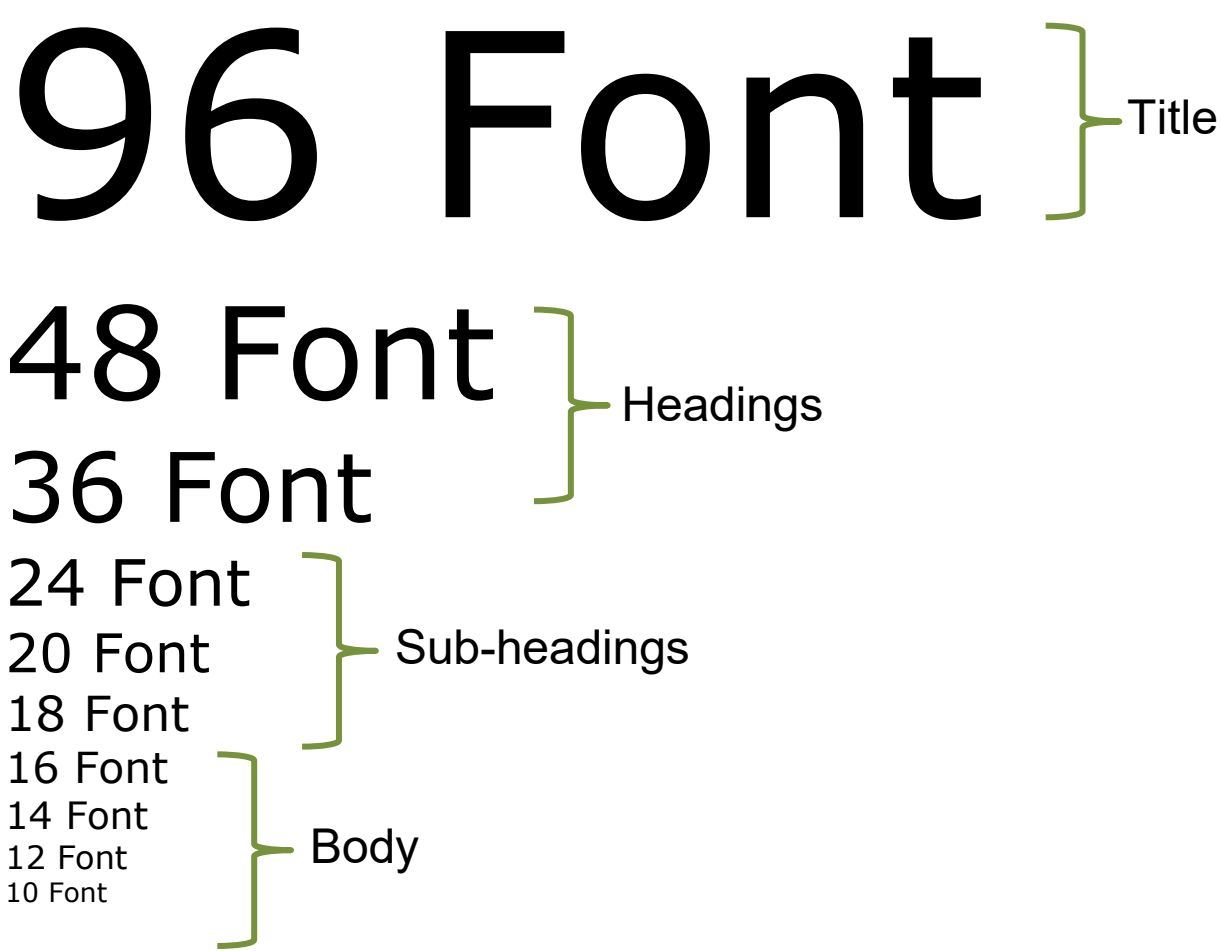
- Consider using a neutral background and including your image in a separate section.
- If you are using an image as a background, consider putting your text in a neutral box to ensure it is readable.



Text

- Use professional fonts that people can read easily.
- Think about the size of your text; title, headings, sub-headings, body, etc.
- Check your spelling and grammar. People will notice errors!

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Title
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Sub-headings
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10 Font
Body

1000 words

Introduction
According to the French historian Max Gallo, "for over two hundred years, posters have been displayed in public places all over the world. Visually striking, they have been designed to attract the attention of passers-by, making us aware of a political viewpoint, enticing us to attend specific events, or encouraging us to purchase a particular product or service."[1] The modern poster, as we know it, however, dates back to 1870 when the printing industry perfected colour lithography and made mass production possible.
"In little more than a hundred years", writes poster expert John Barnicoat, "it has come to be recognized as a vital art form, attracting artists at every level, from painters like Toulouse-Lautrec and Mucha to theatrical and commercial designers."[2] They have ranged in styles from Art Nouveau, Symbolism, Cubism, and Art Deco to the more formal Bauhaus and the often incoherent hippie posters of the 1960s.
Mass production
Posters, in the form of placards and posted bills, have been used since earliest times, primarily for advertising and announcements. Purely textual posters have a long history: they advertised the plays of Shakespeare and made citizens aware of government proclamations for centuries. However, the great revolution in posters was the development of printing techniques that allowed for cheap mass production and printing, including notably the technique lithography which was invented in 1796 by the German Alois Senefelder. The invention of lithography was soon followed by chromolithography, which allowed for mass editions of posters illustrated in vibrant colours to be printed.
Developing art form
By the 1890s, the technique had spread throughout Europe. A number of noted French artists created poster art in this period, foremost amongst them Henri de Toulouse-Lautrec, Jules Chéret, Eugène Grasset, Adolphe Willette, Pierre Bonnard, Louis Anguetin, Georges de Feure and Henri-Gabriel Ibels.[3] Chéret is considered to be the "father" of advertisement placards. He was a pencil artist and a scene decorator, who founded a small lithography office in Paris in 1866. He used striking characters, contrast and bright colours, and created over 1000 advertisements, primarily for exhibitions, theatres, and products. The industry soon attracted the service of many aspiring painters who needed a source of revenue to support themselves.
Chéret developed a new lithographic technique that suited better the needs of advertisers: he added a lot more colour which, in conjunction with innovative typography, rendered the poster much more expressive. Not surprisingly, Chéret is said to have introduced sex in advertising or, at least, to have exploited the feminine image as an advertising ploy. In contrast with those previously painted by Toulouse-Lautrec, Chéret's laughing and provocative feminine figures meant a new conception of art as being of service to advertising.
Posters soon transformed the thoroughfares of Paris into the "art galleries of the street." Their commercial success was such that some of the artists were in great demand and theatre stars personally selected their own favorite artist to do the poster for an upcoming performance. The popularity of poster art was such that in 1884 a major exhibition was held in Paris.
Commercial uses
Lithograph poster for Ranch 10, a Western-themed play by Harry Meredith which opened in New York City in August 1882
By the 1890s, poster art had widespread usage in other parts of Europe, advertising everything from bicycles to bullfights. By the end of the 19th century, during an era known as the Belle Époque, the standing of the poster as a serious artform was raised even further. Between 1895 and 1900, Jules Chéret created the Maîtres de l'Affiche (Masters of the Poster) series that became not only a commercial success, but is now seen as an important historical publication. Alphonse Mucha and Eugène Grasset were also influential poster designers of this generation, known for their Art Nouveau style and stylized figures, particularly of women. Advertisement posters became a special type of graphic art in the modern age. Poster artists such as Théophile Steinlen, Albert Guillaume, Leonetto Cappiello, Henri Thiriet and others became important figures of their day, their art form transferred to magazines for advertising as well as for social and political commentary.
In the United States, posters did not evolve to the same artistic level. American posters were primarily directed towards basic commercial needs to deliver a written message. However, the advent of the travelling circus brought colourful posters to tell citizens that a carnival was coming to town. But these too were very commercially utilitarian, of average quality, and few saw any real artistic creativity.
Many posters have had great artistic merit and have become extremely collectible. These include the posters advertising World's Fairs and Colonial Exhibitions.
Political uses
A framed poster displaying the national motto of the United States, "In God We Trust," in a New Philadelphia High School classroom.
Other times of great turmoil also produced great posters. The 1960s w the rise of pop art and protest movements throughout the West; both made great use of posters. Perhaps the most acclaimed posters were those produced by French students during the so-called "événements" of May 1968. During the 1968 Paris student riots and for years to come, Jim Fitzpatrick's stylized poster of Marxist revolutionary Che Guevara (based on the photo Guerrillero Heroico), also became a common youthful symbol of rebellion.[4]
After the September 11 attacks, public schools across the United States posted "In God We Trust" framed posters in their "libraries, cafeterias and classrooms." The American Family Association supplied several 11-by-14-inch posters to school systems.[5]
Poster printing

Many printing techniques are used to produce posters. While most posters are mass-produced, posters may also be printed by hand or in limited editions. Most posters are printed on one side and left blank on the back, the better for affixing to a wall or other surface. Pin-up sized posters are usually printed on A3 Standard Silk paper in full colour. Upon purchase, most commercially available posters are often rolled up into a cylindrical tube to allow for damage-free transportation. Rolled-up posters can then be flattened under pressure for several hours to regain their original form.

500 words

Introduction
According to the French historian Max Gallo, "for over two hundred years, posters have been displayed in public places all over the world. Visually striking, they have been designed to attract the attention of passers-by, making us aware of a political viewpoint, enticing us to attend specific events, or encouraging us to purchase a particular product or service."[1] The modern poster, as we know it, however, dates back to 1870 when the printing industry perfected colour lithography and made mass production possible.
"In little more than a hundred years", writes poster expert John Barnicoat, "it has come to be recognized as a vital art form, attracting artists at every level, from painters like Toulouse-Lautrec and Mucha to theatrical and commercial designers."[2] They have ranged in styles from Art Nouveau, Symbolism, Cubism, and Art Deco to the more formal Bauhaus and the often incoherent hippie posters of the 1960s.
Mass production
Posters, in the form of placards and posted bills, have been used since earliest times, primarily for advertising and announcements. Purely textual posters have a long history: they advertised the plays ofShakespeare and made citizens aware of government proclamations for centuries. However, the great revolution in posters was the development of printing techniques that allowed for cheap mass production and printing, including notably the technique lithography which was invented in 1796 by the German Alois Senefelder. The invention of lithography was soon followed by chromolithography, which allowed for mass editions of posters illustrated in vibrant colours to be printed.
Developing art form
By the 1890s, the technique had spread throughout Europe. A number of noted French artists created poster art in this period, foremost amongst them Henri de Toulouse-Lautrec, Jules Chéret, Eugène Grasset, Adolphe Willette, Pierre Bonnard, Louis Anguetin, Georges de Feure and Henri-Gabriel Ibels.[3] Chéret is considered to be the "father" of advertisement placards. He was a pencil artist and a scene decorator, who founded a small lithography office in Paris in 1866. He used striking characters, contrast and bright colours, and created over 1000 advertisements, primarily for exhibitions, theatres, and products. The industry soon attracted the service of many aspiring painters who needed a source of revenue to support themselves.
Chéret developed a new lithographic technique that suited better the needs of advertisers: he added a lot more colour which, in conjunction with innovative typography, rendered the poster much more expressive. Not surprisingly, Chéret is said to have introduced sex in advertising or, at least, to have exploited the feminine image as an advertising ploy. In contrast with those previously painted by Toulouse-Lautrec, Chéret's laughing and provocative feminine figures meant a new conception of art as being of service to advertising.
Posters soon transformed the thoroughfares of Paris into the "art galleries of the street." Their commercial success was such that some of the artists were in great demand and theatre stars personally selected their own favorite artist to do the poster for an upcoming performance.

300 words

Introduction
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eorges de Feure and Henri-Gabriel Ibels.[3]

Replace text with:

- Pictures
- Maps

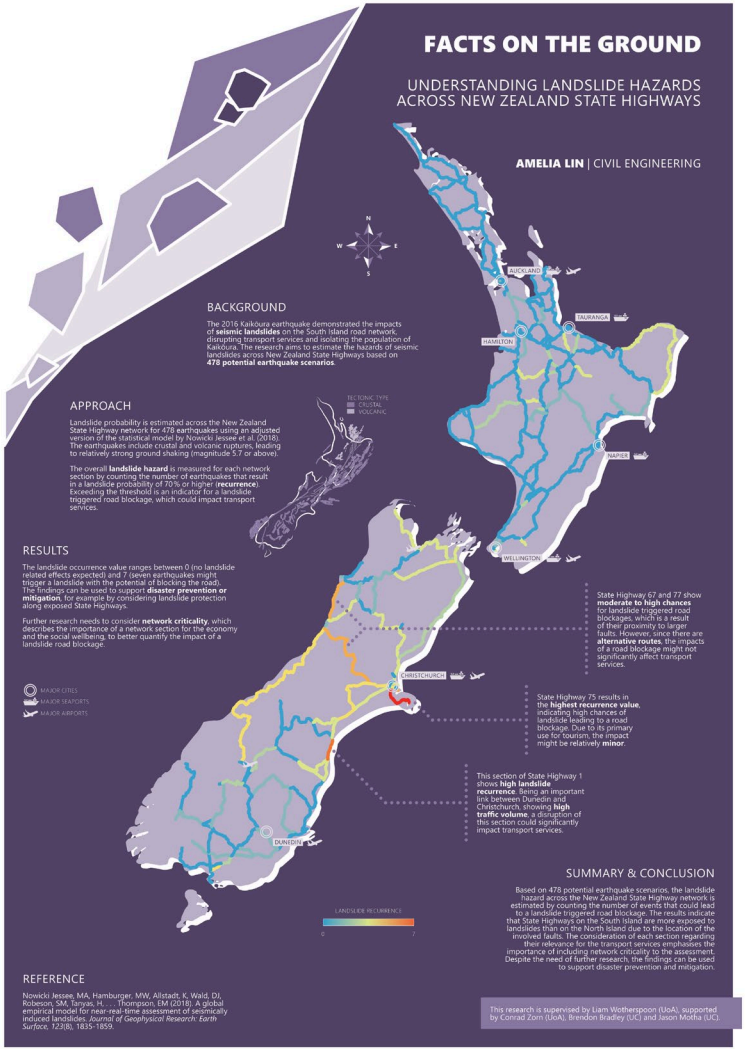
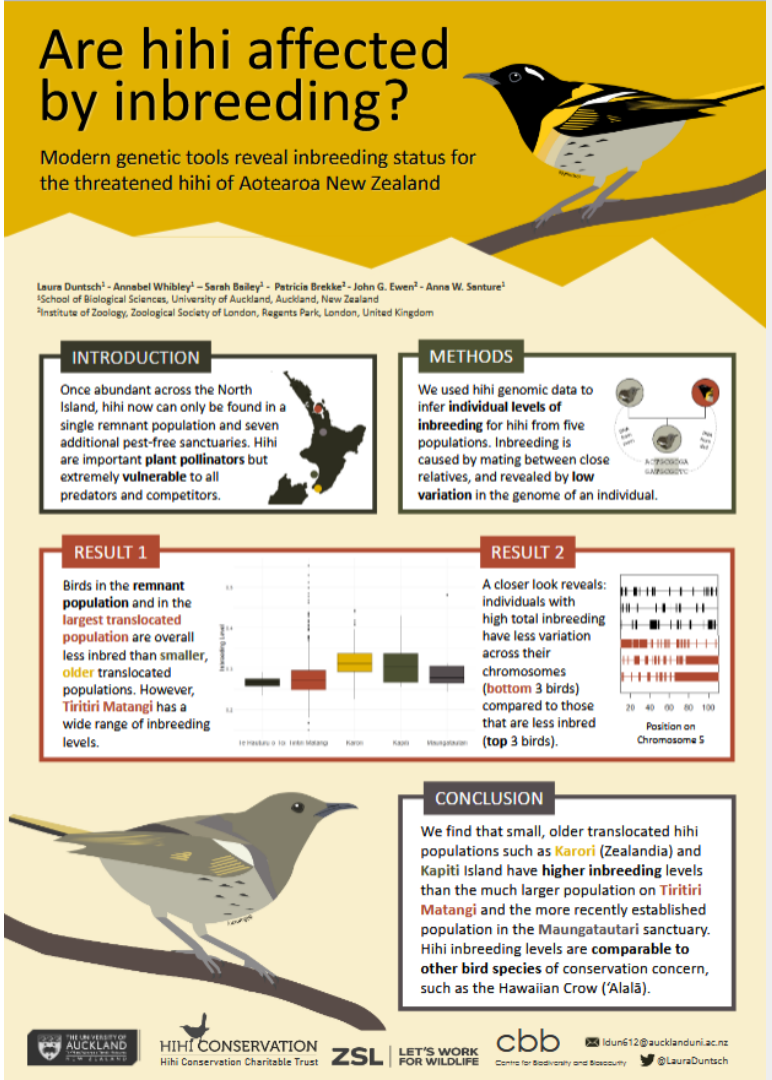


Image resolution

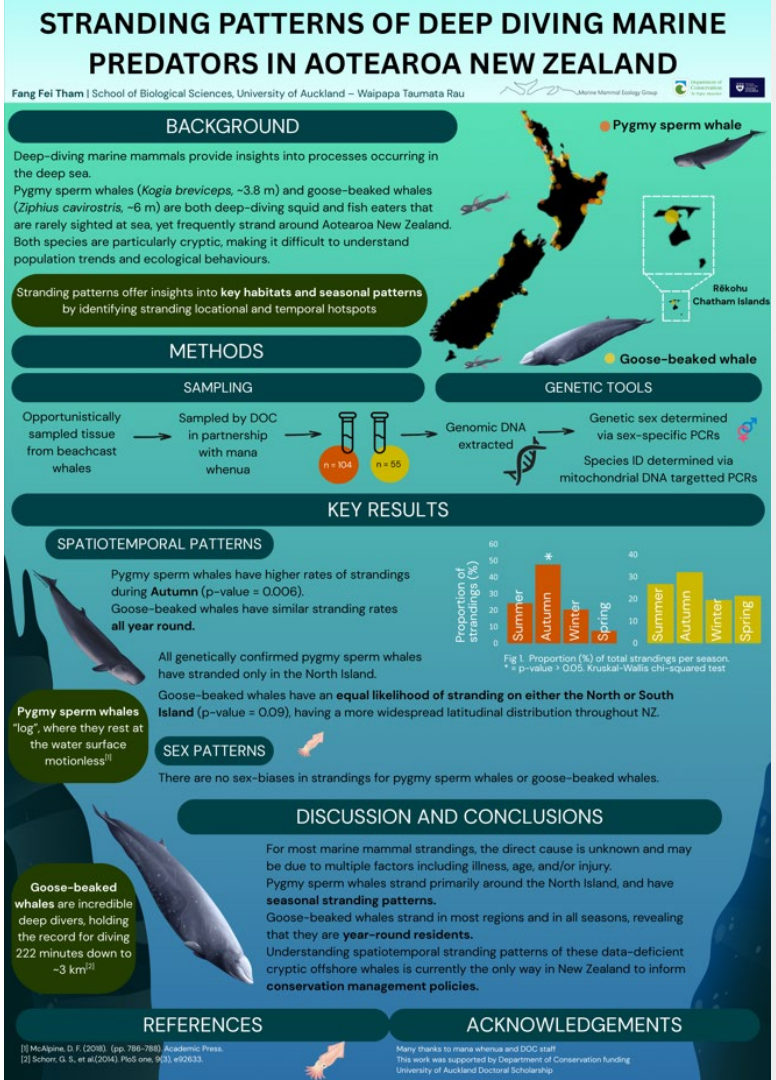
Replace text with:

- Diagrams
- Graphs
- Flowcharts
- Timelines



Colour

- Think about a colour that best represents your research.
- Is your research a “warm” topic? Use red, orange, yellow, etc.
- Or does it feel “cold”? Use blue, green, purple, etc.



Colour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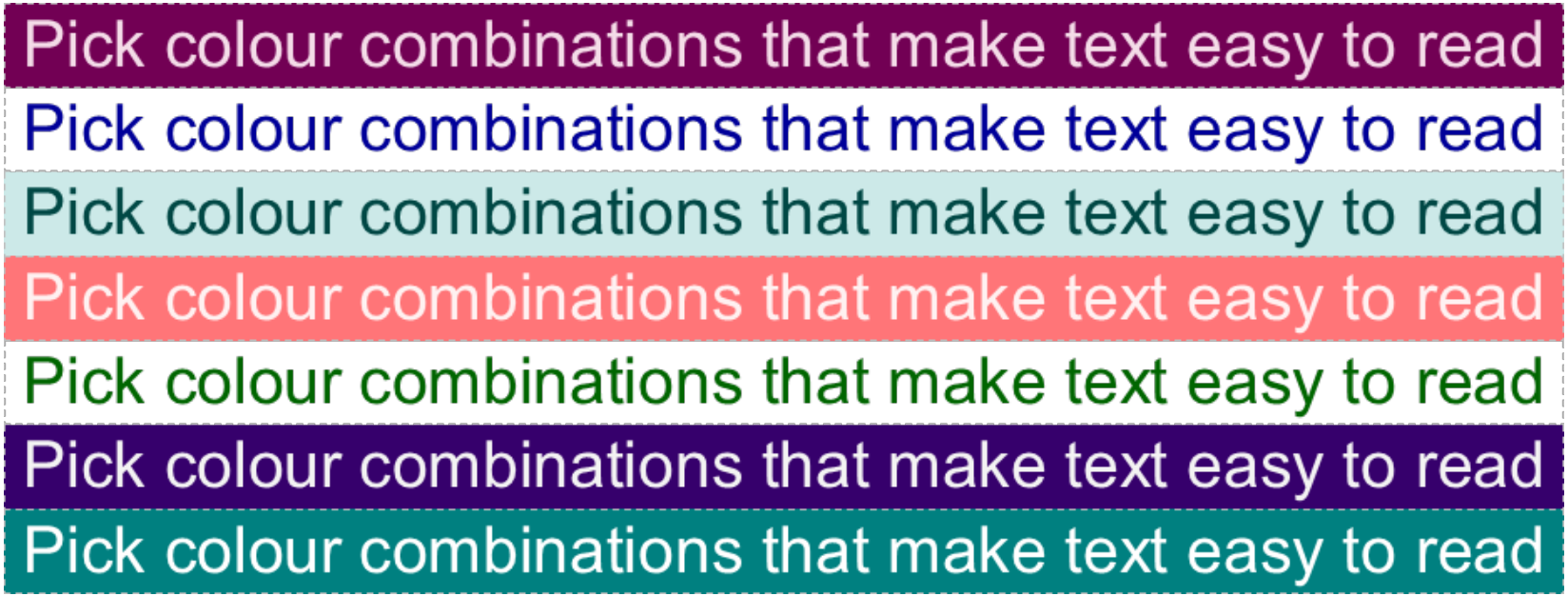
Colour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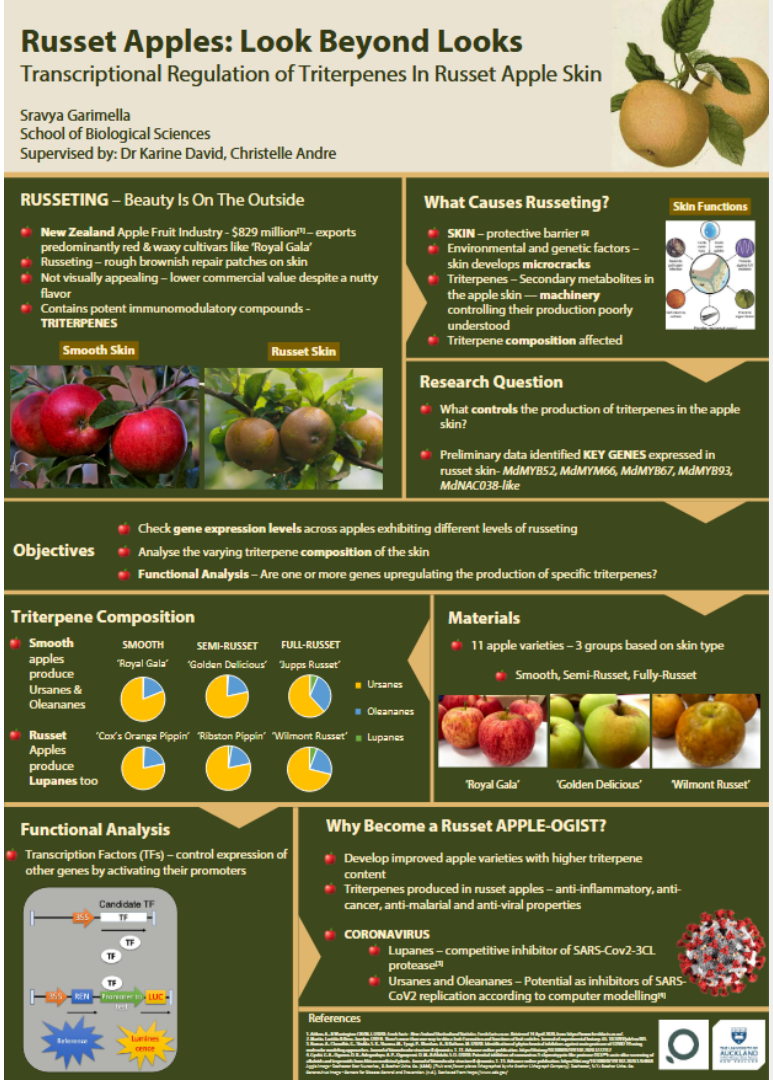
Colour

If you need ideas, you can explore existing colour palettes:

- Adobe
- Canva
- Pinterest
- Coolers
- Resene



Examples

- Figshare
- F1000 posters

Examine the examples and think about:

- Do you understand the content?
- Do you like the design?
- Any thoughts for improvements?

Stitch-iiing! together conservation and genomics

How a veryspecial birdfrom Aotearoa is givingus insights intoitsconservation butalso population genomics and the challenges facedby small populations

Hui Zhen Tan1,2, Katarina C. Stuart1,3, Joseph Guhlin4, Tram Vi1,2, Selina Patel1, Laura Duntsch5, Patricia Brekke6, John G. Ewen6, Anna W. Santure1,2

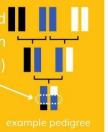
htan626@aucklanduni.ac.nz @huizhentan.bsky.social

What is conservation genomics?

- genomic management of populations to maximise genomic diversity and minimise inbreeding to promote long-term survival
- genomics looks at information from the entirety of the genome – higher resolution and precision compared to previous methods

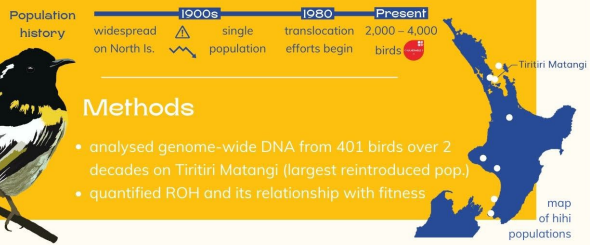
Inbreeding: the whys and hows

- affects fertility and survival within populations inbred
- individuals inherit identical genome sections from common ancestor, creating runs of homozygosity (ROH)
- long ROHs harbour harmful mutations
- more inbred = higher FROH (inbreeding coefficient)



Aboutthehihi / stitchbird *(Notiomystis cincta)*

- forest bird found only in Aotearoa New Zealand
- suffered drastic population declines and now exist in 1 remnant population and 7 managed sites – population bottlenecks!
- reproductive success data and pedigree available from long-term monitoring by dedicated conservation officers and volunteers

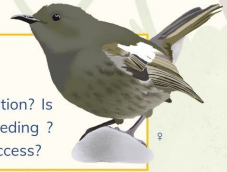


Methods

- analysed genome-wide DNA from 401 birds over 2 decades on Tiritiri Matangi (largest reintroduced pop.)
- quantified ROH and its relationship with fitness

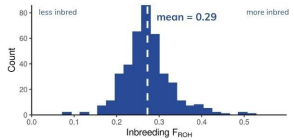
Research questions

- What are the inbreeding levels and how does it vary within a population? Is
- there evidence of inbreeding depression where fitness ↓ with ↑ inbreeding ?
- Are there regions in the genome associated with lifetime reproductive success?



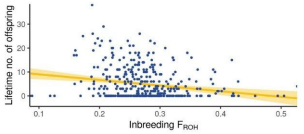
Results

moderate inbreeding levels



- moderate inbreeding on Tiritiri Matangi
- individuals vary in inbreeding levels

evidence for inbreeding depression



- genomic inbreeding highly significant predictor for lifetime reproductive success
- more inbred individuals have fewer offspring (lower fitness)

genes associated with reproductive success

- 161 sites in genome where genotypes are significantly associated with reproductive success
- Genes found in those sites e.g.:
  - KIAA1462 – impacts egg laying per formance
  - CHN2 – territorial aggression
  - TJP1 – reduced sperm storage efficiency

Summary & next steps

- provides support to explore genetic exchange between populations
- investigate inbreeding levels & effects in other populations e.g. Zealandia

Acknowledgements

Department of Conservation, Genomics Aotearoa, Hihi Recovery Group, Marsden Fund, Ministry of Business Innovation & Employment, New Zealand eScience Infrastructure, Ngati Manuhiri Settlement Trust, Supporters of Tiritiri Matangi, University of Auckland | Craig D. Millar, Kate D. Lee, Elizabeth Parlato, Emma Gray, Mhairi McCready, Phoebe Scherer, Pierre de Villemereuil, Sarah Bailey, Talia Hochwimmer

A RAY IN THE LIFE:

FINE-SCALE MOVEMENT OF OCEANIC MANTA RAYS (*MOBULA BIROSTRIS*) IN THE HAURAKI GULF

TAMSIN COOPER - INSTITUTE OF MARINE SCIENCES

BACKGROUND

Oceanic manta rays are **globally endangered**,[1] but in Aotearoa New Zealand are classified as **data deficient**.[2] While they are commonly sighted along the north-eastern coast of the North Island throughout the austral summer to autumn, **little is known about where they go and what drives this movement.**

Movement ecology allows us to **predict species' responses to future environmental changes and anthropogenic impacts**, and is critical for informing effective conservation management.

STUDY SITE

This research focuses on the **Hauraki Gulf** | Tīkapa Moana | Te Moananui ā Toi- a highly productive region influenced by a subtropical current, and a **potential hotspot** for manta rays.

SATELLITE TAGGING

- GPS location
- Depth
- Temperature

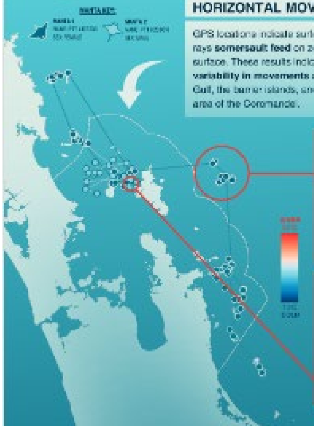
Of the **20** tags:

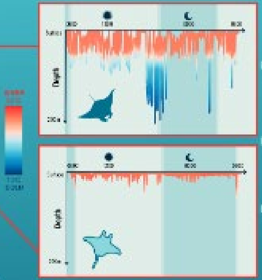
6 Showed high levels of movement in the Gulf

2 Tags recovered → super high-resolution data! (1s)

HORIZONTAL MOVEMENT

GPS locations indicate surface activity. Manta rays **somersault feed** on zooplankton at the surface. These results indicate **individual variability in movements** around the outer Gulf, the barrier islands, and the southern Gulf area of the Coromandel.





VERTICAL MOVEMENT

Manta rays regularly dive to **depths of 50m+** and occasionally over 200m.

Elsewhere isotope studies show that manta rays sometimes feed on mesopelagic fishes (200–1000m).[3]

Diving might also serve as an energy-efficient way for mantas to travel through 'gliding'.[4]

It has also been suggested that deep dives serve a navigational purpose, allowing mantas to better detect earth's magnetic field.[5]

Further analysis of Gulf mantas will reveal drivers of their dive behaviour.

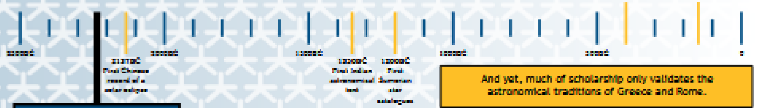
NEXT STEPS:

- Future work will aim to **infer behavioural states** such as transiting and foraging from movement tracks, and identify any patterns to this behaviour.
- We will then investigate how **environmental variables influence manta ray presence and behaviours**, and look into potential **drivers of diving behaviour** within the Hauraki Gulf.

"The Sky's Door is Opened for You"

Aspects of Astronomy in the Ancient Egyptian Pyramid Texts

Despite the "Birth of Astronomy" being linked to Ancient Greece, cultures such as those in Egypt, China, India and Mesopotamia were developing astronomical systems and constructing astronomical texts much earlier.



And yet, much of scholarship only validates the astronomical traditions of Greece and Rome.

~2326BC
THE PYRAMID TEXTS are one of the world's oldest astronomical texts. They represent a complex corpus of mythological and scientific understanding that was present in Egypt's Old Kingdom (2600-2150BC). Studying the Pyramid Texts and looking for references to astronomy helps us understand this science.

Sky-goddess, you have taken to yourself every god . . . that you may make stars of them in the starry sky, lest they depart from you as stars
PT 434 §§ 784-785, trans. R.O. Faulkner

The Pyramid Texts are possibly the most discussed piece of ancient Egyptian literature, but they are rarely considered through an archaeoastronomical lens.

Archaeoastronomy is the "science of stars and stones". It considers the astronomical traditions of civilizations and the ways in which they interacted with the sky. Reading the Pyramid Texts while keeping archaeoastronomical practice in mind is the best way to identify astronomical information.

Archaeoastronomy is a relatively small subfield, especially in Egyptology. Scholars like R.O. Faulkner (1966) and Alicia Maravelia (2018) have published articles on astronomy in the Pyramid Texts, but Rolf Krauss has written the only monograph: *Astronomische Konzepte und Jenseitsvorstellungen in den Pyramidentexten*, his 1997 post-doc thesis. Outside of this small sample, there is a noticeable dearth of publications on the Pyramid Text's astronomical data. This research project aims to fix that.

The Pyramid Texts reference complex astronomical concepts such as circumpolar stars (stars that orbit the celestial pole and so never set) and heliacal risings (the first appearance of a star before sunrise), as well as alluding to other astronomical traditions such as the development of a corpus of constellations and tensions within the calendrical systems. They indicate that ancient Egyptian astronomy was a thriving science in the 3rd millennium BC, and that people were engaging with the night sky.

sbꜣ "seba"
'star'

In the Pyramid Texts, stars feature heavily both as objects, and symbols of divinity.

In the Tomb of Niankhkhum and Khnumhotep, it appears in this market scene as a "dialogue" being spoken by one of the merchants. This piece of art reflects daily life around 50 years before the inscription of the Pyramid Texts. What conversations were people having about stars in a marketplace? What does this tell us about astronomy as a part of daily life?

ḫnsw "khonsu"
'god of the moon'

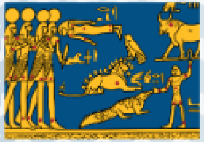
In the Pyramid Texts, Khonsu is an incredibly aggressive lunar deity, in contrast to his later depictions.

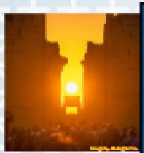
Khonsu, who slaughters the lords, cuts their throats. . .
PT 273 § 402

Why is the god of the moon so aggressive in the Pyramid Texts? Is it because Egypt was transitioning from a lunar to a solar calendar at around the same time, making the god of the moon fall out of favour? What can this version of Khonsu teach us about the ancient Egyptians' relationship with time?

These words are just two examples of the plethora of questions that can be raised by reading the Pyramid Texts through an archaeoastronomical lens. As this project progresses, I expect to be able to use the Pyramid Texts to build a "textbook" of ancient Egyptian astronomical knowledge as of 2500BC.

Using examples such as these, this project aims to defend ancient Egyptian astronomy, conceptualising it as a result of the scientific method, filtered through a mythic and religious worldview.





The astronomical concepts of the Pyramid Texts resonate through the literature, art, and architecture of ancient Egypt. Features of ancient Egyptian culture such as the **myth of the Secret Name of Ra, the astronomical ceilings of the Ramessids,** and the **sunrise syzygy at Karnak** are all informed by the astronomical traditions of the Old Kingdom. **These traditions are a valid science, and as such deserve to be studied and understood.**

FLEXING OUR MUSSELS: RESTORING NEW ZEALAND'S WILD INTERTIDAL MUSSEL REEFS

Trevyn Toone[1, 2], Emilee Benjamin[1, 2], Sean Handley[2], Jenny Hillman[1], Andrew Jeffs[1]

[1]University of Auckland Institute of Marine Science, [2]National Institute of Water and Atmospheric Research

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

NIWA
Taihoro Nukurangi

BACKGROUND

- Shellfish like oysters and mussels can build complex reefs that filter water, create habitats, and stabilize the seafloor (Grabowski et al., 2012)
- Shellfish reefs have globally severely declined in recent history (Beck et al., 2009)
- Restoration projects attempt to address these losses with mixed results (Fitzsimmons et al., 2020)
- The intertidal zone, or the area exposed on low tides but covered on high tides, has seen very low survival in traditional restoration efforts (de Paoli et al., 2015)
- We restored mussel reefs in an area with low predator abundance and high wave protection to test whether successful intertidal restoration is possible

Mussels can join to form dense reefs!

METHODS

- Study took place at the top of New Zealand's South Island
- 5 tonnes of adult mussels from aquaculture farms were restored to the seafloor
- Half of mussels were restored intertidally and half subtidally but they were restored at the same times, places, and from the same sources
- Mussels are monitored every three months for survival, growth, and health

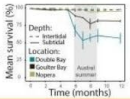
Mussels were restored at three sites at the top of New Zealand's South Island

As the tide rises, it covers the restored intertidal mussels

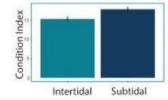
RESULTS

- After one year the subtidal mussesl showed very high survival!
- The intertidal mussels had high survival at one location, but many died of heat stress at the other two locations
- Subtidal mussels grew faster than intertidal and appear to be slightly healthier

Almost all mortality occured during the summer!



Condition index is a way to measure mussel health!



CONCLUSIONS

- To our knowledge this is the first restoration of intertidal mussels at this scale with high survival
- Intertidal restoration is possible as long as stress like predation, wave action, and heat is avoided
- While intertidal restoration is cheaper and easier, subtidal restoration may still result in healthier, larger mussels, so managers should decide based on their goals and resources

A successful restored intertidal mussel reef!

Subtidal mussels appear to be healthier and grow faster!

FUTURE RESEARCH

- We will continue monitoring these restored reefs to see if any baby mussels arrive!
- Research into different benefits from intertidal and subtidal mussels will impact future work
- Eventually, we hope to restore mussels intertidally and subtidally at a larger scale!

Intertidal and subtidal mussels may form different kinds of habitats!

I'd love to hear from you!

ttoo112@aucklanduni.ac.nz

@trevtoone

trevyntoone.com

Reach out to me!

Or see more about the project here!

REFERENCES

Beck MW et al. (2009) Shellfish Reefs at Risk: A Global Analysis of Problems and Solutions, Arlington, VA

Fitzsimons JA et al. (2020) Restoring shellfish reefs: Global guidelines for practitioners and scientists. Conservation Science and Practice

Grabowski JH et al. (2012) Economic valuation of ecosystem services provided by oyster reefs. BioScience 62:900–909

de Paoli et al. (2015) Processes limiting mussel bed restoration in the Wadden Sea. Journal of Sea Research 103:42–49

Structural Resilience and Functionality Implications of Designing to Various International Standards

Nikki BUCK | Georgi CLARKE | Max STEPHENS | Lucas HOGAN
The University of Auckland | nbuc77@aucklanduni.ac.nz

OBJECTIVE

This research compares the seismic performance of reinforced concrete buildings designed to various international codes in terms of economic loss and functionality as a way to improve the resilience of structures designed in New Zealand.

APPROACH

The framework is developed through the design and assessment of four 10-story concrete moment frame buildings designed using New Zealand material properties and seismic hazards but with design procedures and detailing requirements based on New Zealand, United States, Japanese, and Chilean standards, respectively.

01 | CASE STUDY BUILDING

A reinforced concrete (RC) moment frame building designed to Japanese standards was selected as the case study building. The structure is a full scale 10-story building tested at the E-Defense shake table facility in Japan in 2018.

The structure has plan dimensions of 12m x 8m and is 25.75m tall. The lateral force resisting system consists of two 3-bay perimeter moment frames in the longitudinal (y) direction.

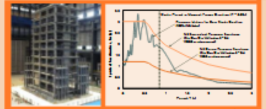
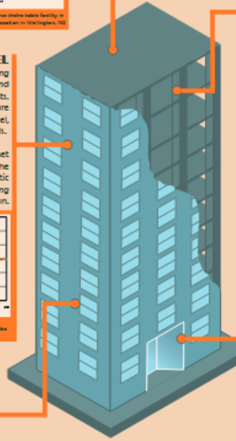


Figure 1: (a) 10-story RC moment frame building tested at the E-Defense shake table facility in Japan (Sato et al., 2017) and (b) Equivalent Demands for a structure location in Wellington, NZ



02 | MOMENT FRAME DESIGN

The case building is re-designed in the moment frame direction following New Zealand, United States, Japanese, and Chilean standards with columns designed as rectangular and beams designed as "T" sections.

The moment frames are designed for the demands on a structure located in Wellington, NZ (Z=0.4) with site class D soil conditions. All designs use New Zealand material properties for concrete and steel reinforcement. Larger design demands and a focus on limiting drift can result in buildings that are more elastic and have larger beams and columns; as is typically the case with Japanese and Chilean moment frame buildings.

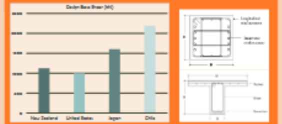


Figure 2: (a) Comparison of design base shears for each moment frame design and (b) Typical column and beam cross-section design

03 | NONLINEAR MODEL

A nonlinear 2D model of the case study building moment frame was created in OpenSeespy and validated with results from E-Defense shake table tests. The beams and columns of the moment frame are modelled with fibre sections combining steel, unconfined, and confined concrete materials.

Beam-column joints are modelled with rigid end offset lengths based on beam to column strength ratios. The nonlinear model will be used to conduct a probabilistic structural response assessment (PSRA) for each building design considering a range of hazards for Wellington.

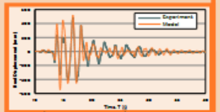


Figure 3: Roof displacement history results of nonlinear structural model compared to results from E-Defense shake table tests with 100% JMA Kobe earthquake shaking

04 | LIFE CYCLE COST EVALUATION

Results from the PSRA will be used to conduct post-earthquake loss assessments for each building design using the FEMA P-58 Performance Assessment Calculation Tool (PACT) to provide estimates for annual losses in terms of repair cost. PACT uses a fragility-based approach to estimate damage to structural and non-structural components.

The life cycle cost for each design will be calculated as the total construction cost plus any additional repair costs.

05 | RISK-BASED FUNCTIONALITY ASSESSMENT

Finally, a risk-targeted approach will be used to assess the post-earthquake functionality level of each building design. An initial framework has been developed that provides a scaled functionality risk of each non-structural component in terms of building safety, building access, and tenant function.

These results will be compared to the results from the loss assessments and the framework will be adjusted based on non-structural components that had that greatest impact on the lifecycle cost of the building.

Figure 4: Proposed functionality framework output for an NZ flexible moment frame with comprehensive seismic protection and normal occupancy type building (Clarke)

EXPECTED RESULTS & FUTURE WORK

The building functionality of each design will be quanitifed using the proposed risk-based approach that relates component-level damage to building-level function. Results from the loss assessment will be used to update the functionality assessment framework by indentifing which non-structural components are most likely to impact building functionality based on their sensitivty to damage. The results from the loss and functionality assessment will be used to provide recommendations for potential design strategies currently used in other countries that would improve the resilience of concrete structures in New Zealand.

REFERENCES
Sato, E., Tasouchi, Y., Fukuyama, H., Inoue, T., Kajiwara, K., Shiohara, H., ... Mukai, T. (2017). 2018 Three-dimensional Shaking Table Test of a 10-story Reinforced Concrete Building on the E-Defense: Part 2. 16th World Conference on Earthquake Engineering, 16WCEE. Santiago, Chile.

EQC | QuakeCoRE | The University of Auckland

MATAĪ TREE-TMENT
Lignan in the Heartwood of Healing

School of Chemical Sciences
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Waipapa Taumata Rau University of Auckland

BACKGROUND

Plants have be used as inspiration for making new medicines for a long time. A popular example is the discovery of aspirin (salicylic acid) from a similar compound – salicin – found in willow bark.

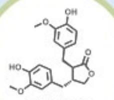
Lignans are a specific class of compounds found in all plants that are well known to have a range of biological activities in humans.[1-3] Thus, they offer a lot of value for scientists when developing new pharmaceuticals.

New Zealand has a vast variety of native plants that each contain different lignans to offer as potential medicines. One notable example is **Matairesinol**, which was found in the matai tree here in New Zealand in 1910.[4]

MATAIRESINOL

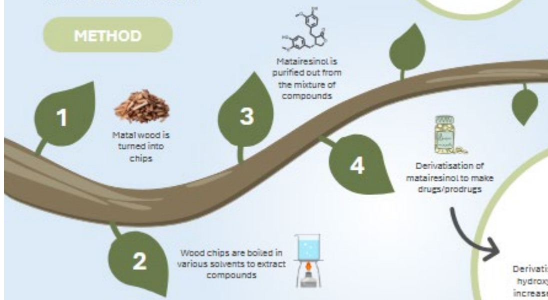
Matairesinol has been found to have anticancer and anti-inflammatory activity[5,6] and has not been found in any other plants in the world in substantial amounts.

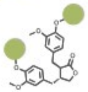
This project will aim to extract matairesinol from the matai tree. Extracted matairesinol will be modified and these derivatives will be tested for their potential as medicinal compounds.



Development into new medicines

METHOD





Derivatisation will involve functionalising the hydroxyl groups. These changes will aim to increase the compound's solubility, potency and processability.

The new groups added will be similar to those that have been used to make other lignans more 'drug-like'.

TIKANGA MĀORI

TIKA = 'right' or 'correct' **TIKANGA MAORI** = The right way of doing something

Because matai is a native New Zealand plant it is a taonga (treasured) species we will consider the tikanga of how we source, harvest and handle the plant material. This will ensure:

- The matai is respected as taonga
- Its use will be sustainable to allow its resources to be available for future generations

SUMMARY

This project will appropriately obtain matai wood in accordance with tikanga. Maitairesinol will then be extracted from any wood acquired and subsequently derivatised to create a new generation of bioactive molecules

ACKNOWLEDGEMENTS

We thank Heartland Timbers NZ for the supply of matai wood and the University of Auckland for funding, including a doctoral scholarship

REFERENCES

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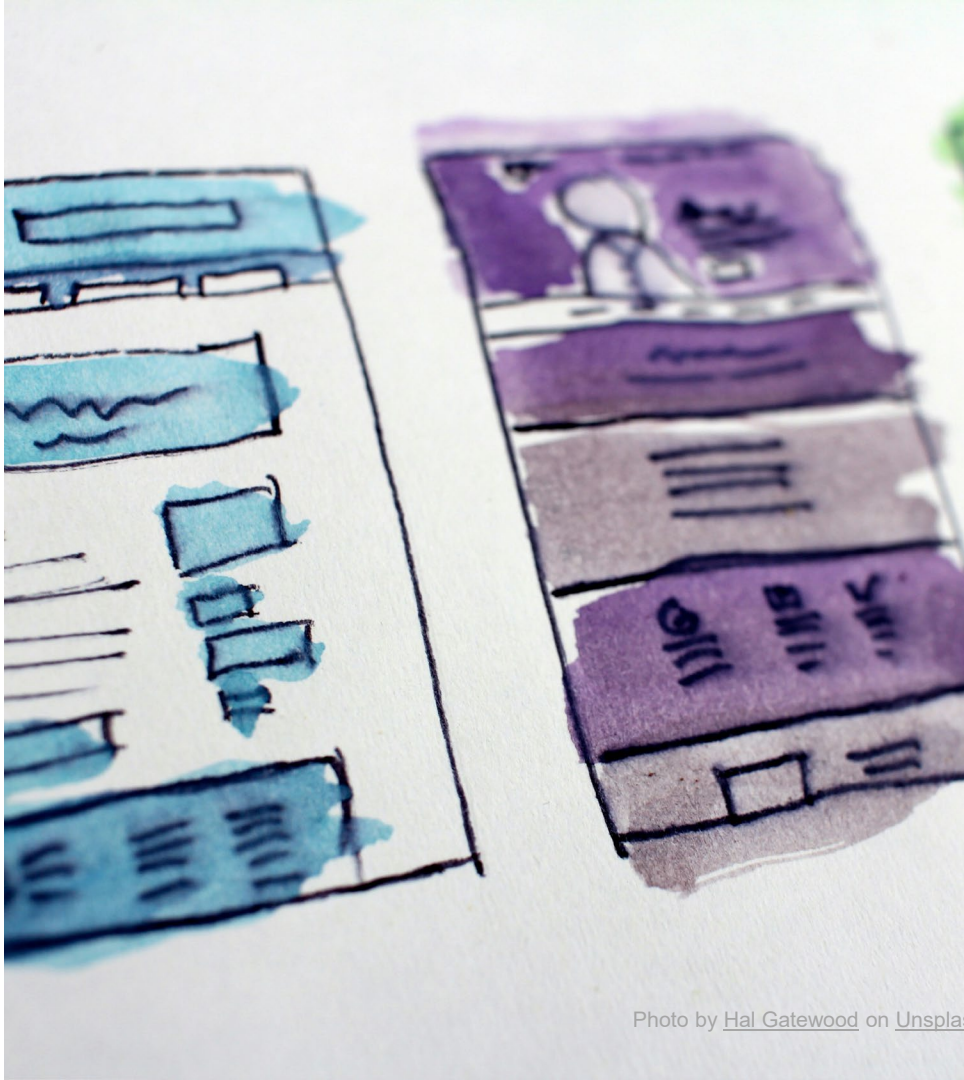
2. Barker, D. Lignans. Molecules 2019, 24 (7), 1424.
3. MacRae, W. D.; Towers, G. H. N. Phytochemistry 1984, 23 (6), 1207–1220.
4. Easterfield, T. H. Transactions and Proceedings of the Royal Society of New Zealand 1910, 43, 53.
5. Wu, Q.; Wang, Y.; Li, Q. Aging (Albany NY) 2021, 13(20), 23780-23790.
6. Sung, Y. Y.; Lee, A. Y.; Kim, H. K. Journal of Ethnopharmacology, 2016, 187, 49–56.

Software & Resources

What software are you familiar with?

- Adobe – Illustrator, Photoshop, InDesign
- Canva
- Microsoft Powerpoint
- Microsoft Publisher (retiring Oct 2026)
- Inkscape
- Poster Genius - $$$



Printing

- Warehouse Stationery
- Local Print Shop
- Are there specific sizing requirements needed for your poster?

Photo by Emiliano Vittoriosi on Unsplash

Where can I find images?

- Unsplash
- Pixabay
- Pexels
- Britannica ImageQuest (access through Libraries & Learning Services databases)
- Noun Project (for icons)

Photo by Soragrit Wongsa on Unsplash

Entering a competition?

- Become familiar with the judging criteria.
- SGS Research Showcase academic poster category marking rubric.

School of Graduate Studies Research Showcase 2025

Poster Competition - Judging Criteria

Poster number ☐

The key with this poster presentation is to strike a balance between academic content and presentation of the work to a broad audience.

Subcategory	Details	Score
Academic Content	Context / Background: How well does the poster explain the background, context and aims / objectives of the research? How effectively does the entrant explain the importance of the research?	/10
	Is there a critical engagement with literature / other research in the field?	/10
	Methods: How effectively does the methodology emerge from the poster?	/10
	Conclusions: How effectively are the conclusions of the research discussed? How well does the poster explain the research outcomes expected?	/10
	Subtotal	**/40**
Design	Presentation: Is the poster well structured, and is its message conveyed in a coherent and competent manner? Does the poster catch – and keep – the viewer's attention?	/10
	Creativity: How innovative, creative and effective is the poster?	/10
	Subtotal	**/20**
Appeal to a Broad Audience	Comprehension: How well are the main concepts explained to a broad audience?	/10
	Appeal: How effectively does the poster provoke thoughtful insight and/or questions for viewers?	/10
	Language: How well does the entrant use language to appeal to a broad audience? Are technical terms understandable and accessible to a general audience?	/10
	Impact: How well does the poster explain the potential benefit of the research beyond academia?	/10
	Subtotal	**/40**
	Total	**/100**

Make your poster available online

Figshare

- Gives your poster a DOI for permanent discoverability.

ResearchSpace

- Showcase your research on the University Discovery Profiles system.

Questions?

Feedback

Scan the QR code or use the direct link. We really appreciate all your feedback about our workshop!

https://tinyurl.com/mvaecx87