



COS10025 Technology in an Indigenous Context Project unit

School of Science, Computing, and Engineering Technologies

Seminar Week 1: Introduction to Unit / History of Indigenous STEM

Shannon Kilmartin-Lynch

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Shannon Kilmartin- Lynch

Taungurung man from North-East Victoria, I have a bachelor of Engineering out of RMIT with a major in Civil & Infrastructure. Currently doing a PhD in waste utilization methods, as well as background work on Indigenous knowledge systems and their applications – your seminar Lecturer for Weeks 1, 2, 5, 7 and 10.



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Acknowledgement of Country

We respectfully acknowledge the Wurundjeri People of the Kulin Nation, who are the Traditional Owners of the land on which Swinburne's Australian campuses are located in Melbourne's east and outer-east, and pay our respect to their Elders past, present and emerging.

We are honoured to recognise our connection to Wurundjeri Country, history, culture, and spirituality through these locations, and strive to ensure that we operate in a manner that respects and honours the Elders and Ancestors of these lands.

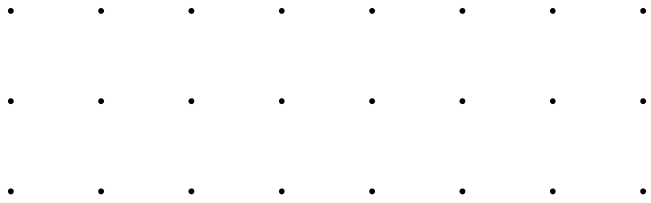
We also respectfully acknowledge Swinburne's Aboriginal and Torres Strait Islander staff, students, alumni, partners and visitors.

We also acknowledge and respect the Traditional Owners of lands across Australia, their Elders, Ancestors, cultures, and heritage, and recognise the continuing sovereignties of all Aboriginal and Torres Strait Islander Nations.

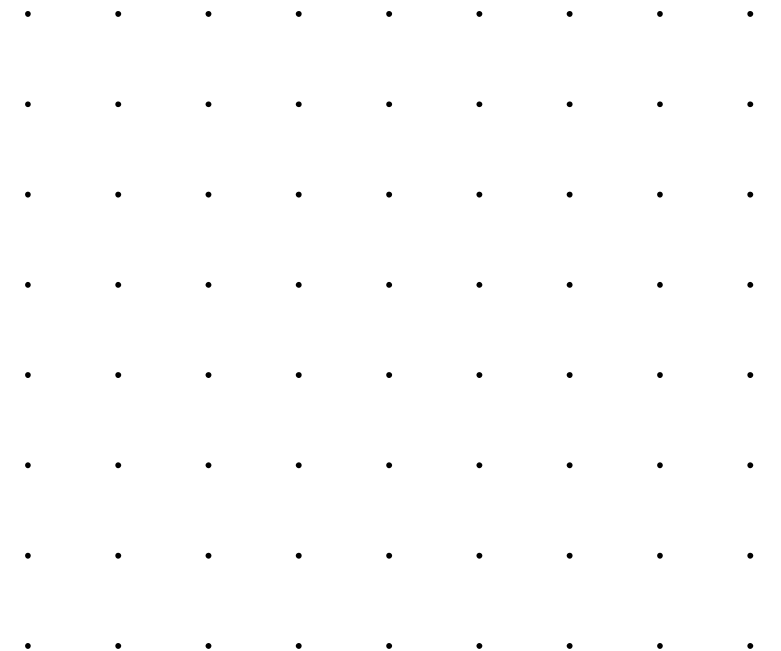
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Introduction to the Unit

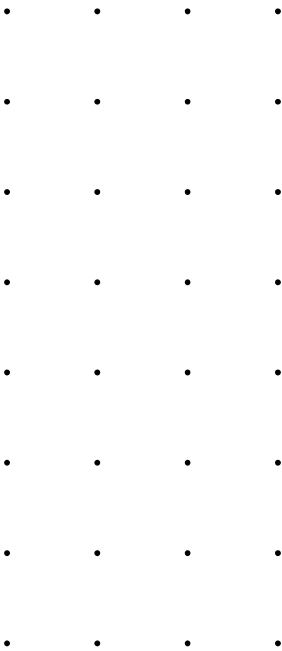


Teaching Team

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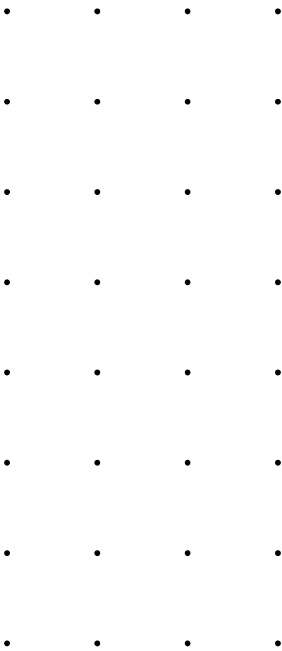
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How this unit works:



Week	Week Beginning	Teaching and Learning Activity		Student Task or Assessment
		Seminar	Workshop	
1	27 Feb	Introduction to Unit / History of Indigenous STEM	Introduction to the Unit & Explore Indigenous projects	
2	06 Mar	Culture and application technology in the Australian context	Formation of student teams & Understand STEM Technology	Individual Assessment: Week 1 lecture quiz/test (graded) in Canvas Team-based Assessment: Workshop reflection/activity during workshop
3	13 Mar	Culture and application technology in the Australian context continues	Cultural locations and townships &	Individual Assessment: Week 2 lecture quiz/test (graded) in Canvas

How this unit works:



4	20 Mar	Indigenous STEM knowledge systems and western knowledge systems	Problem Definition	Individual Assessment: Week 3 lecture quiz/test (graded) in Canvas Team-based Assessment: Workshop reflection/activity during workshop
5	27 Mar	Indigenous STEM knowledge systems and western knowledge systems continues	Selecting one concrete problem and working on five design ideas	Individual Assessment: Week 4 lecture quiz/test (graded) in Canvas Team-based Assessment: Workshop reflection/activity during workshop
6	03 Apr	Indigenous STEM knowledge systems	Discuss and finalise your design ideas and /or find other alternatives	Individual Assessment: Week 5 lecture quiz/test (graded) in Canvas Team-based Assessment: Workshop reflection/activity during workshop

What will be cover today?

- A brief introduction to 80,000 years of Indigenous Australian history
- A brief introduction to invasion and colonisation.
- The effects of colonisation on Aboriginal and Torres Strait Islander peoples and knowledges
- An introduction to Indigenous STEM (explored in further weeks)

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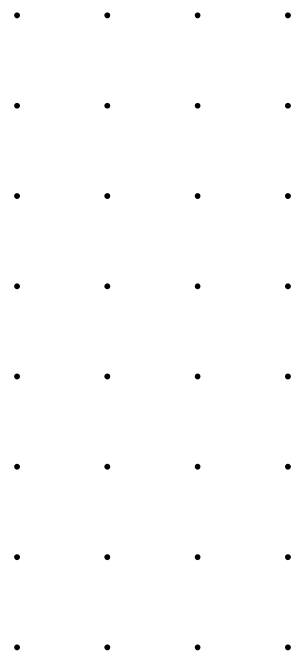
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An Introduction to the 80,000+ year history Indigenous Australia

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Who do you think was the first non-Indigenous person, or people, was to engage with Aboriginal and Torres Strait Islander Australian peoples?

**Note that we do not say 'discovered'.



Who do you think was the first non-Indigenous person, or people, was to engage with Aboriginal and Torres Strait Islander Australian peoples?

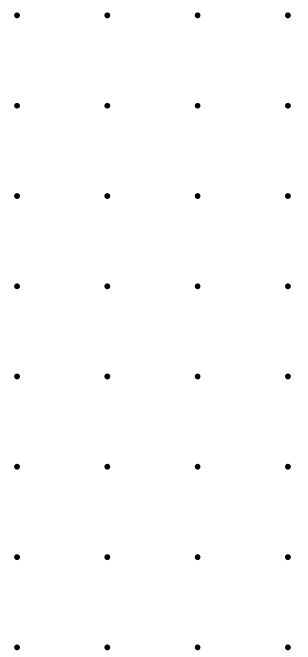
~~COOK?~~ X

~~MATTHEW FLINDERS?~~ X

The Dutch, Spanish and Macassans (now Indonesia) all made contact with Indigenous Australians prior to Cook and Flinders.

The Dutch navigator Willem Janszoon made contact 164 years prior to Cook!

*A part of engaging with Indigenous Australian history is to “*unlearn*” what you think you already know, and what the eurowestern education systems have perpetuated.



Brief Introduction to Indigenous Australia Cont.

Aboriginal and Torres Strait Islander Australians are the longest continuing culture in the entire world.

Aboriginal and Torres Strait Islander peoples have inhabited Australia for 80,000+ years.

Indigenous Australians are diverse in both language and cultural customs. With over 500 established clans with varying dialects and deities and belief systems.

The cultural and linguistic backgrounds of an Indigenous Australian from the NT, and an Indigenous Australian from Victoria are as different as people from different countries (see languages map on next slide).

European occupation
200 years

Aboriginal occupation
40,000 years

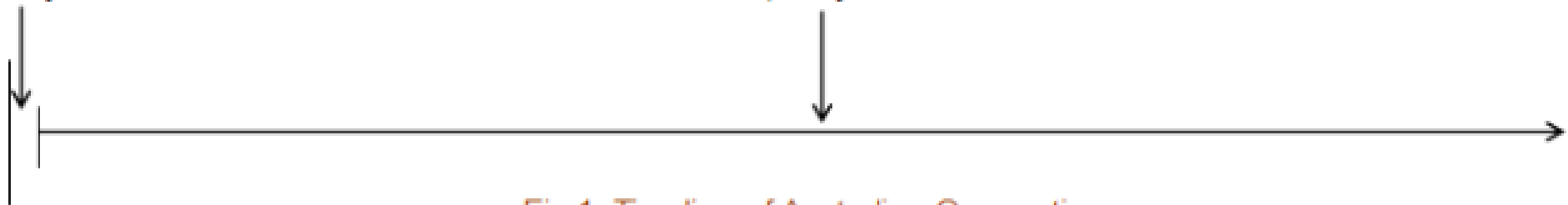
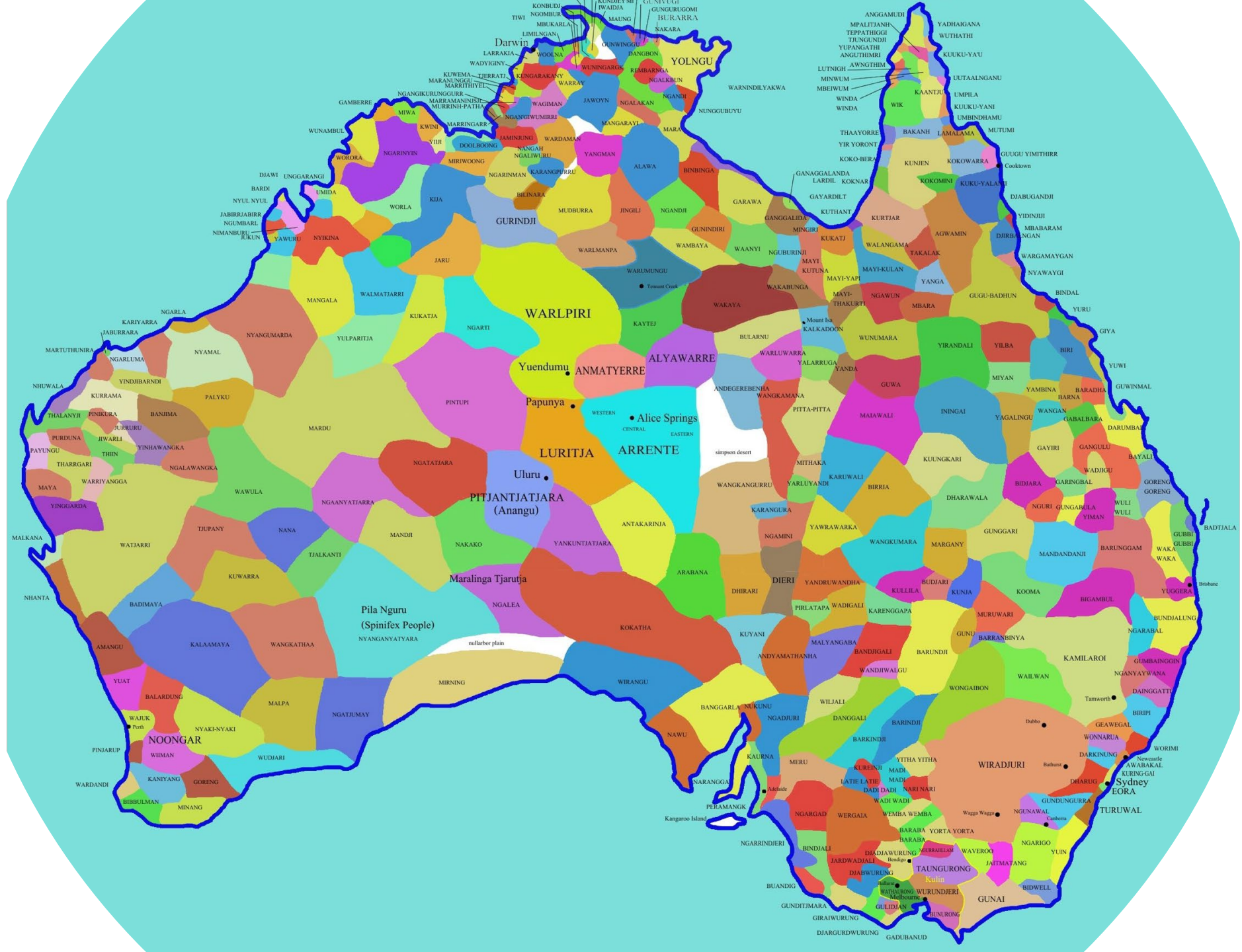


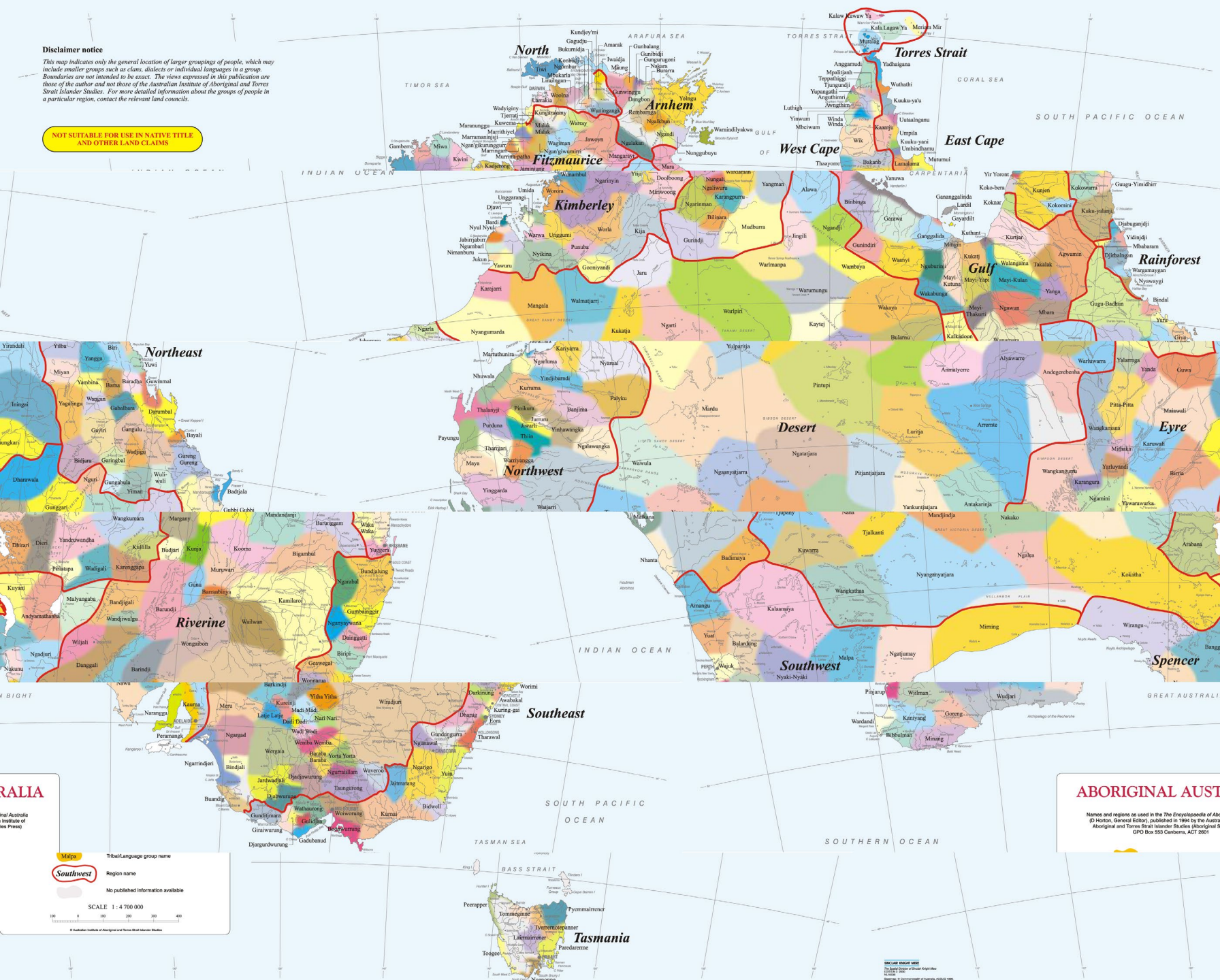
Fig 1. Timeline of Australian Occupation



Disclaimer notice

This map indicates only the general location of larger groupings of people, which may include smaller groups such as clans, dialects or individual languages in a group. Boundaries are not intended to be exact. The views expressed in this publication are those of the author and not those of the Australian Institute of Aboriginal and Torres Strait Islander Studies. For more detailed information about the groups of people in a particular region, contact the relevant land councils.

NOT SUITABLE FOR USE IN NATIVE TITLE
AND OTHER LAND CLAIMS



- Broken down into 16 regions
- Within each clan there were distinctive groups
- Taungurung people had two deities
- Separated in 15 groups

Who is an Indigenous Australian?

An Indigenous Australian is someone who is of Indigenous descent

Who chooses to identify as an Indigenous Australian

And who is accepted by the Indigenous community which they reside in, as being an Indigenous Australian.

Aboriginality and Indigeneity is not a skin or eye colour, it is a complex culture based on lore, kinship, community and land



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Brief History of British Colonisation

1770 – Cook charts the East coast of Australia*

1788 – The First Fleet arrives in Botany Bay, Sydney to establish a penal colony (an exile of prisoners).

Britain took Australia on the basis of Terra Nullius : Land belonging to no-one.

Which of course, was not true!



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Sovereignty & the “right” of ownership

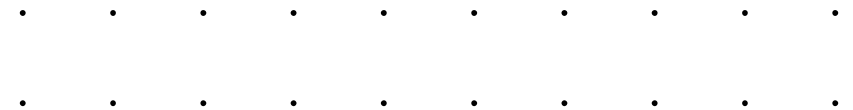
By the mid-18th century certain conventions had developed among European states regarding acquisition of new lands

Where a region was not already held by another European state, that region might be acquired in one of three ways:

conquest

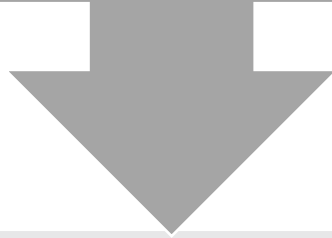
cession

unilateral possession



Sovereignty & the right of ownership Cont.

The right of possession was determined by evidence of the Indigenous people mixing their labour with the land



If there was no evidence of this, then the region was regarded as land belonging to no-one (*terra nullius*) and was available to any European state who 'discovered' and occupied it

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Captain Cook's instructions (1768):

‘with the consent of the natives ...
take possession of Convenient
Situations in the [Southern
Continent] in the Name of the King
of Great Britain; or, if you find the
Country uninhabited take
Possession for His Majesty by
setting up Proper Marks and
Inscriptions, as first discoverers
and possessors’.



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James Cook and Joseph Banks

Cook (and Banks) concluded (incorrectly) that Aboriginal and Torres Strait Islander Australians were:

‘living in the pure state of Nature, the Industry of Man [having] had nothing to do with any part of it’

And; that Indigenous Australians had only reached the ‘first stage of civilisation’ — that of hunter-gatherers; they *“did not build houses or roads; they had no observable political institutions”*.

This of course was not true! Indigenous housing, political and legal systems, just looked very different to Eurowestern ones.

Aboriginal and Torres Strait Islander peoples had established borders between ‘countries’, and lores which were followed, they just did not look like the British laws and borders. Aboriginal and Torres Strait Islander peoples cultivated food (yams etc), farmed animals, and created dams to collect fish etc. Indigenous sciences, including food and medicine sciences and knowledges, were incredibly comprehensive and accurate (more on this later).

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What happened after British arrival?

Indigenous people were killed in droves – in misunderstandings*, in fights over resources, for sport, from disease; both deliberate and accidentally spread diseases.

Indigenous women were raped and sold, and their children taken from them. Many of these children were never returned. **

Indigenous people were forced into slave labour, the men in fields and on stock ranches, the women in domestic duties.

Indigenous people were driven from their ancestral lands and forced into missions and reserves.

English language was enforced by law, use of traditional languages were outlawed and resulted in the loss of hundreds of language groups. Some of which are being revived today.







LEST WE FORGET



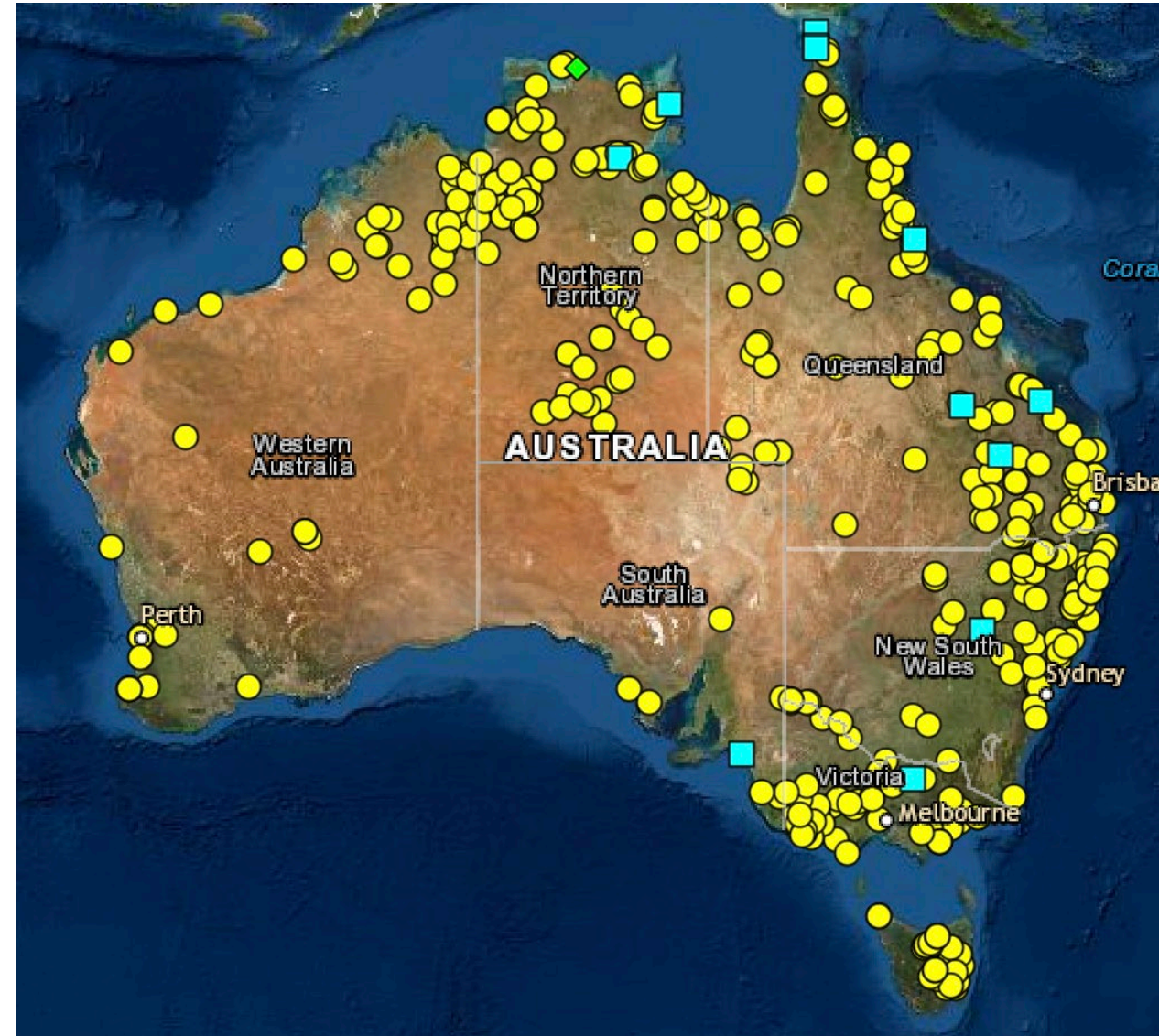
- Tasmania Genocide from early 1800s-1876
- Bathurst Massacre 1824
- Cape Grim Massacre 1828
- Fremantle Massacre 1830
- Convincing Ground Massacre 1833-34
- Battle of Pinjara 1834
- Myall Creek Massacre 1838
- Waterloo Creek Massacre 1838
- Bonalla Massacre 1838
- Campaspe Plains Massacre 1839
- Murdering Gully Massacre 1838
- Wiradjuri Wars 1830-1840s
- La Grange Massacre 1865
- Dampier Archipelago Massacre 1868
- Barrow Creek Massacre 1874
- Goulbolla Hill Massacre 1876
- Arrheim Land Massacres 1880-1890s
- Bottle Mountain Massacre 1884
- Halls Creek Massacre 1890
- "Killing Times" Kimberley Region 1890-1920s
- Canning Stock Route Massacres 1906-7
- Mistake Creek Massacre 1915
- Bedford Downs Massacre 1924
- Forrest River Massacre 1926
- Tully Falls Massacre 1927
- Coriston Massacre 1928




Colonial Frontier Massacre Map

View here:

<https://c21ch.newcastle.edu.au/colonialmassacres/map.php>



Missions and Missionaries

- Aboriginal and Torres Strait Islander peoples had to suffer the ethnocentric & racist attitudes held by many missionaries
- Segregation in dormitories, and enforced Christian education
- Traditional customs and culture were outlawed, no traditional language or engagement in cultural practices.
- The idea was to “Christianize and civilize” the Indigenous population.

Removal of Indigenous children from their family was official government policy from 1909 to 1969.

It was managed by the Aborigines Protection Board (APB). They placed children in government institutions and missions

The APB had the power to remove the children without parental consent, and without a court order. They labelled the children ‘destitute’ and ‘neglected’ **. This made it easy to remove them from their families for their ‘moral’ and ‘spiritual’ welfare.

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Stolen Generations

Stolen children were not allowed to speak their Aboriginal languages or have contact with full-blooded relatives.

Those 'not of full blood' were expected to assimilate into the broader society under the White Australia Policy.

The education in missions: bible stories, sewing & cleaning for girls, and stockwork & gardening for boys.

Once girls turned 14 they were expected to find employment with white families as domestic servants.

By the 1980's, 100,000+ children had been removed.

This removal of children has serious and continuing effects on Indigenous people and their wellbeing. Leading to many Indigenous Australians to suffer from transgenerational trauma.



Aboriginal and Torres Strait Islander Health

Before invasion, Aboriginal and Torres Strait Islander peoples were believed to be in excellent health. Healthy diet and high activity levels and small manageable family sizes. The main causes of death were injury, disease, old age, 'pay back' killings, Infant mortality, & endemic diseases – dysentery, trachoma and yaws.

During Colonisation, dispossession (loss of land, culture) & depopulation (reduction of population) went hand in hand.

The frontier spread rapidly:

Broome (2005) noted that by 1860, 20 million sheep occupied 400 million hectares of land;

non-Aboriginal population reached over 1 million; post-gold rush

Cahir (2001): Loss of land meant loss of *raison d'être* – *reason to live*

Cahir (2012) Aboriginal people not expected to live

The population of non-Indigenous people increased rapidly, Melbourne and Geelong in 1851 were the fastest growing cities the world had ever known. Ballarat wasn't a town in 1851 but by 1854, there were 30,000 people living in it. Melbourne and Geelong the same. Incredible increase in non-Indigenous populations.

Many historians (Broome 2010; Reynolds 1982; Clark 2003 et al) claim: Massive decline in Aboriginal population was largely the result of introduced diseases (**Smallpox, Syphilis etc.**); population fell from approx. 1 million in 1788 to 60,000 in 1920 (Butlin 1983).



Introduced (intentional and deliberate) diseases were devastating

Aboriginal and Torres Strait Islander peoples had no natural immunity to introduced diseases.

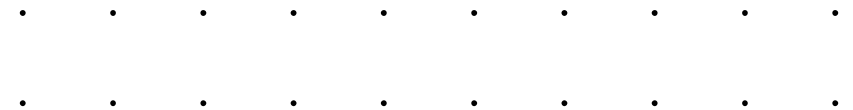
Disease was spread over large areas of the continent through people-to-people contact, from colonizer to Indigenous communities.



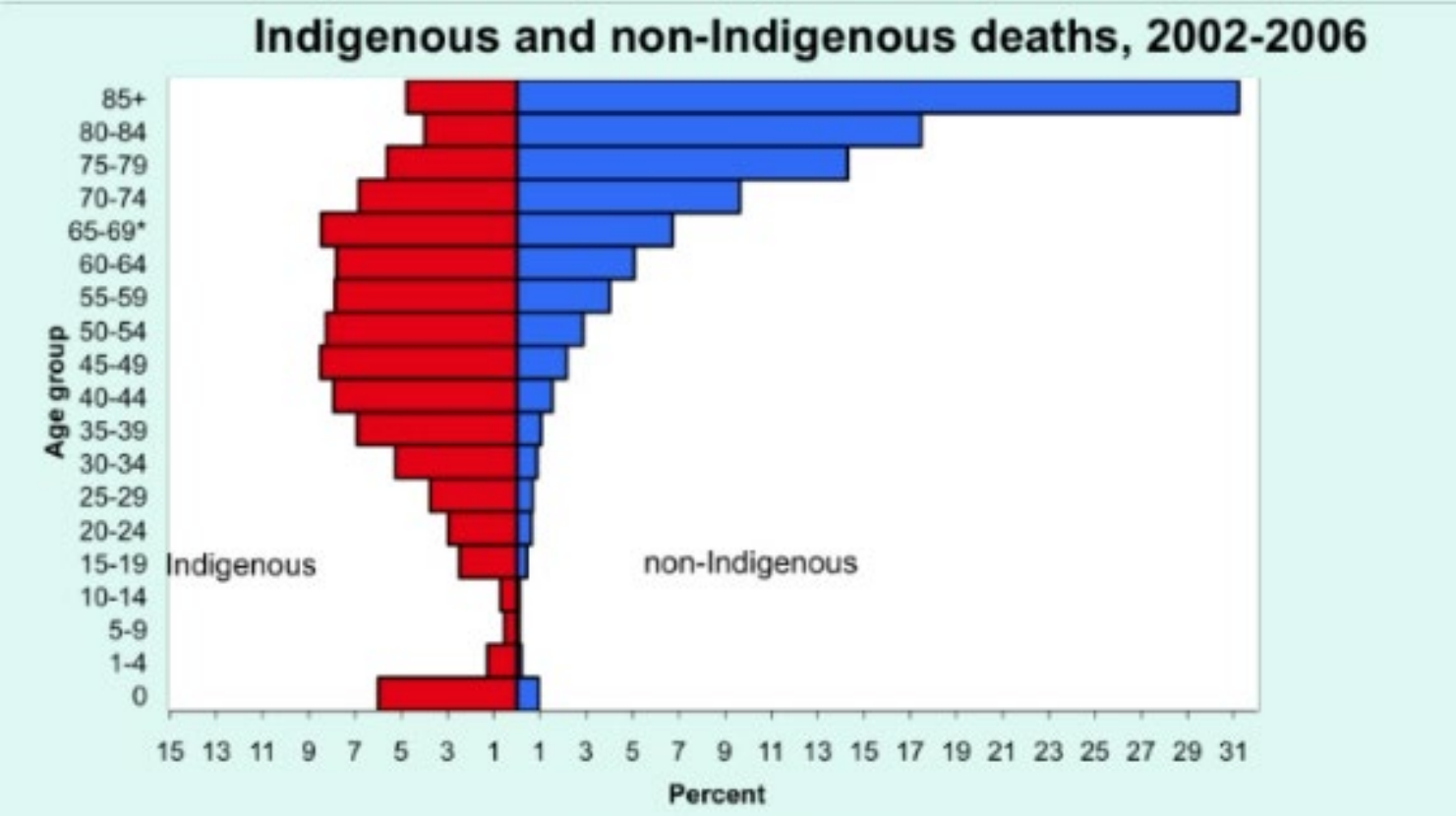
Prior to white invasion, there was no smallpox or Syphilis in Australia. After invasion, Smallpox was probably the biggest killer of Indigenous people, (50- 60% of those infected).

When smallpox came into Europe, the Europeans suffered huge loss of life. It's predicted that in the first-wave of smallpox in Europe, 60% of the population died. This creates a clear absence of the population, whole jobs vanished, because all the people who could do those roles perished. For example: the Europeans lost the ability to build a dome building, because those that knew how to- all of them, were lost to the black plague. It took them another few centuries to relearn and reexamine architectural understandings.

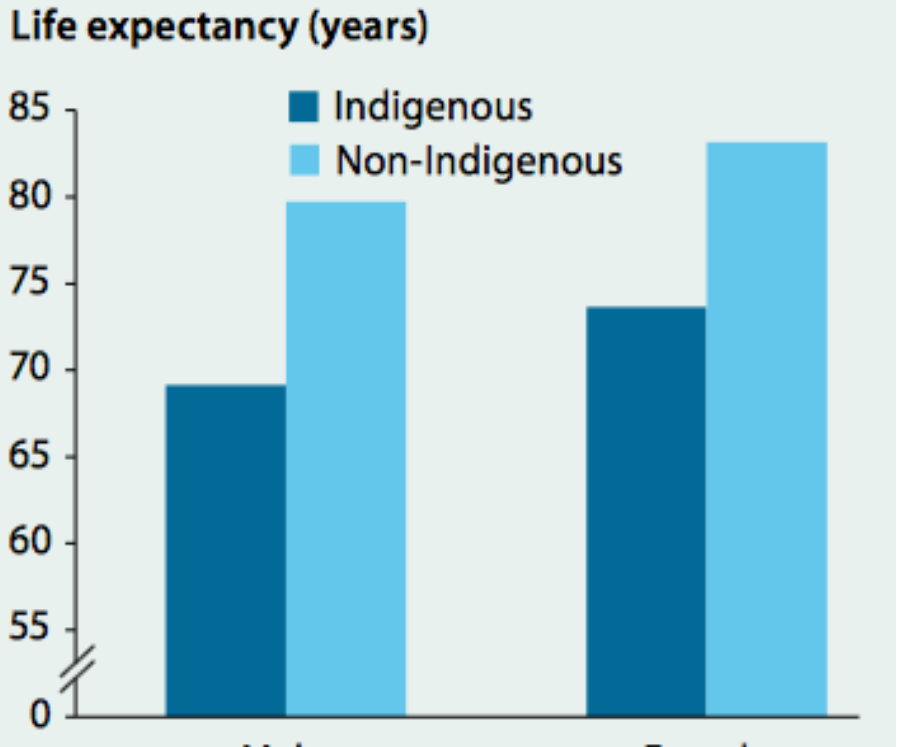
Similarly, to the first-wave of smallpox in Australia, where the Indigenous people lost cultural leaders, knowledge holders and languages.



Contemporary Indigenous Health



birth, by Indigenous status and sex, 2010-2012



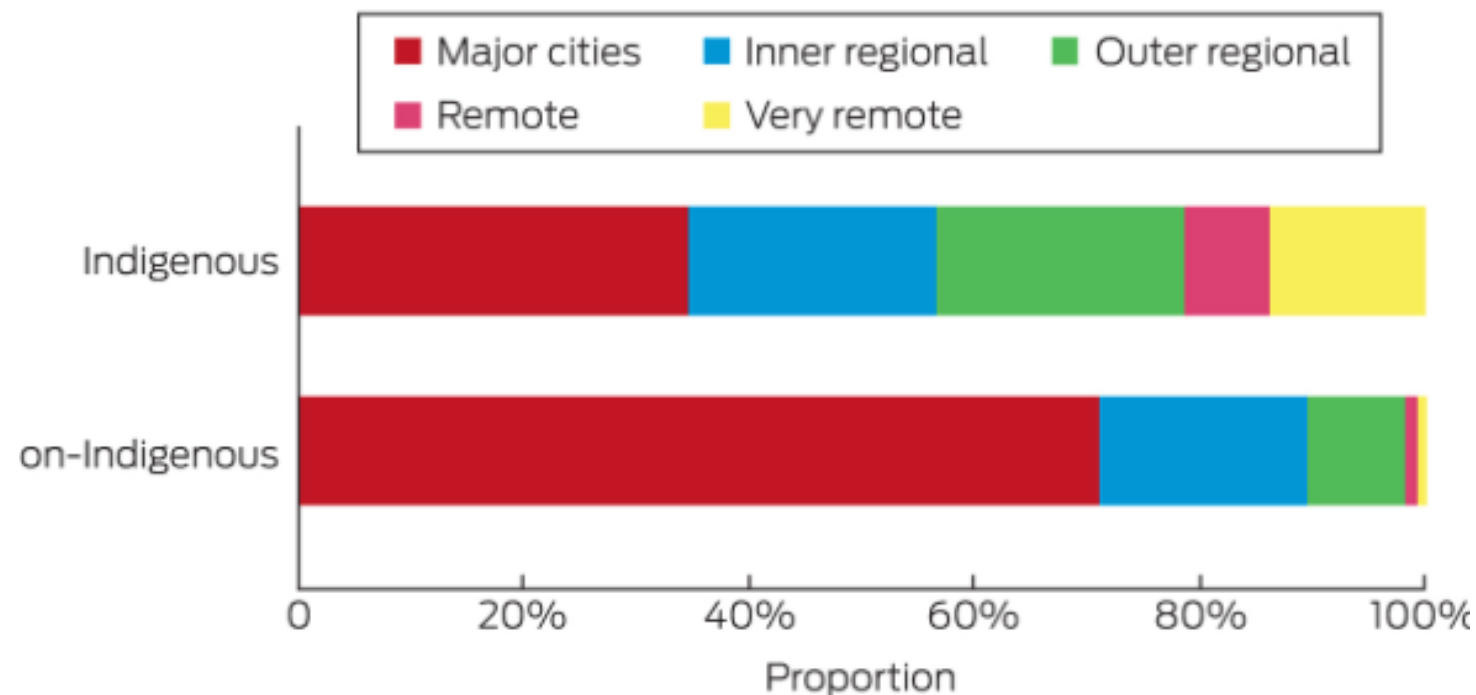
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Contributing factors

Factors contributing to contemporary Indigenous health outcomes

- Housing and the physical environment
- Infrastructure
- Education
- Employment and income
- Distance
- Language barriers
- Racism
- Generational trauma
- Colonisation and settler-colonialism
- Cultural Differences **



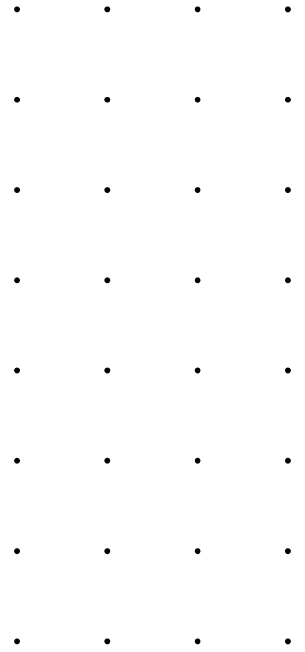


Intro to Indigenous STEM

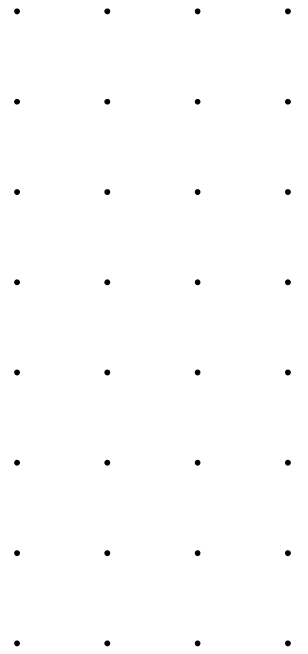
Indigenous STEM knowledges

Going forward we will look extensively at Indigenous STEM knowledges, including:

- Astronomy
- Land Management
- Health and Medicine
- Telecommunications and Narrative knowledges
- Mapping and Navigation
- Construction & Binding materials



Today – we will give a brief overview of Indigenous knowledge systems throughout STEM



A history of Indigenous technology

"Indigenous technology is a relatively misunderstood phenomenon" (Peters 2021).

It is not about the use of technology by or for the benefit of Indigenous peoples. It refers to the myriad ways in which indigenous knowledge is used to improve people's lives – ancient practices that have existed in different parts of the world and are still relevant and widespread today.

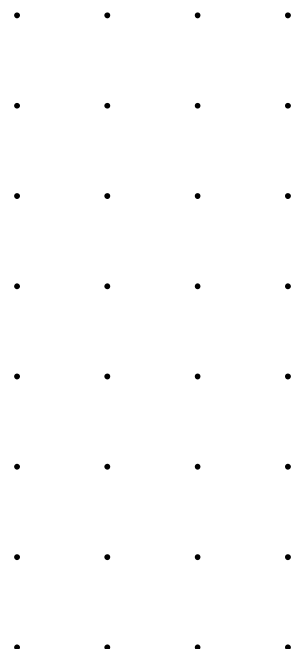
Indigenous knowledge and technology have traditionally been linked. Fundamental concepts of indigenous knowledge can and should support the development and role of technology in multiple ways, Including:

- relationality and connection
- reciprocity
- reflexivity
- Country

The relationship / connection involves a local understanding of everything that is connected. One action can affect many others - similar to the basic Western scientific concept of "cause and effect".

Acceptance and understanding of reciprocity ensures that the benefits of using the technology do not come at the expense of others (including people, plants, animals and the wider environment).

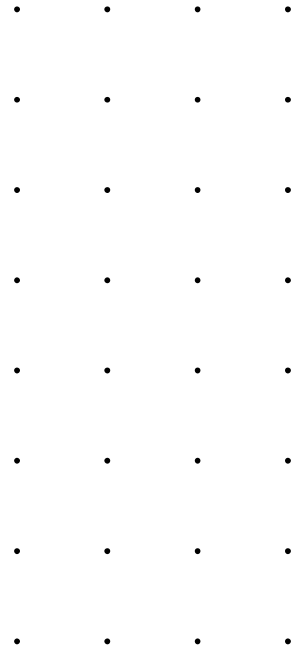
Reflection involves a continuous cycle of reading and listening that underlies the generation and transmission of knowledge for indigenous peoples and cultures.



What is Country? And what roles does Country play?

Country refers to the grounding of knowledges in our land and all it contains. Our knowledges and languages come from the land, and this is where they belong. This makes our knowledges contextual and specific to a certain group. Understanding the specifics of a certain group is crucial to gaining cultural knowledge.

Danièle Hromek's :“Country soars high into the atmosphere, deep into the planet crust and far into the oceans ... incorporating the tangible and intangible...caring for Country is not only caring for land, it is caring for ourselves.”



Indigenous Australians were the First Farmers!

Aboriginal and Torres Strait Islander peoples were sophisticated farmers

Indigenous oral knowledges and practices, alongside western researchers found that Aboriginal people grew crops of tubers such as yams, grain such as native millet, macadamia nuts, fruits and berries.

People reared dingoes, possums, emus and cassowaries, moved caterpillars to new breeding areas and carried fish stock across country.

There is strong evidence of sophisticated farming and agriculture practices.

Early explorers watched women harvesting yams, onions, and cultivating the land, creating reserves of flour and grain.

The Taungurung people of the Kulin nations mastered food preservation, bogong moths which were a staple food source were harvested during season and stored in preservation huts to be consumed throughout the year.



Budj Bim: Oldest Aqueduct site in the world!

In 2019, the UNESCO added the 6,600-year-old Budj Bim Cultural Landscape near Portland, south-west Victoria, to the UNESCO World Heritage List.

The site proves that Aboriginal Australians built fish traps, channels, weirs and ponds to harvest eels, and also had permanent stone houses.

The site is considered one of the largest and oldest aquaculture sites in the world and became the first Australian World Heritage site to be nominated exclusively for Aboriginal cultural values.

Bruce Pascoe's book *Dark Emu* challenges the notion that Aboriginal people were hunter-gatherers and did not settle down, grow food or have permanent structures.

Not only does Budj Bim bust the myth that all Indigenous people were nomadic and not agriculturally inclined, it is also considered one of the oldest aquaculture sites in the world.



Brewarrina Fish Traps: Baiame's Nguunhu

Shows Indigenous land management and ingenuity in other parts of Australia

Traps reflect an ancient genius as they were adaptable to seasons as well as fluctuating water levels

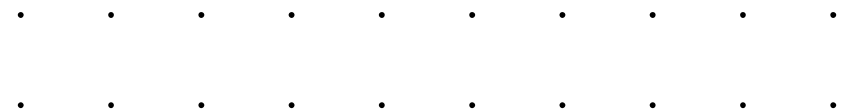
They consisted of stone walls that would lead to holding ponds where the fish were harvested by local First Nations people

According to oral history the technology behind the fish traps was inspired by nature – by the pelican

Traps acted like a pelicans beak where the fish could be scooped out.

Instils the connection to country Indigenous people have being inspired by the pelican

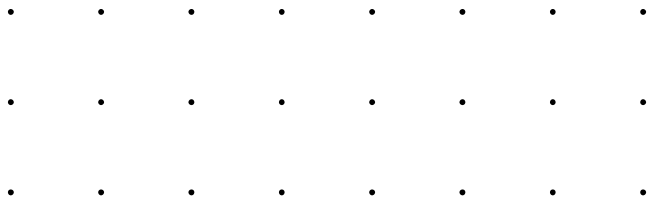
The site was also a basis for trade, food production and consumption which itself voids the concept of terra nullius.



Indigenous land management

- For over 80,000 years, Australia's Indigenous peoples have cared for country. Despite harsh climates, drastic climate changes which include mega-droughts and an ice age, Indigenous Australians have managed to not only survive but actively thrive.
- Utilising traditional fish & eel traps, fire & burning as well as planting, sowing and storing of seeds, plants and plant products. We were able to create a system that was sustainable and supplied us with enough food throughout the seasons and regenerated each year.
- This was done through a series of land management techniques that worked with the specific environment.





27th Feb, 2023

