Indigenous Science Network Bulletin

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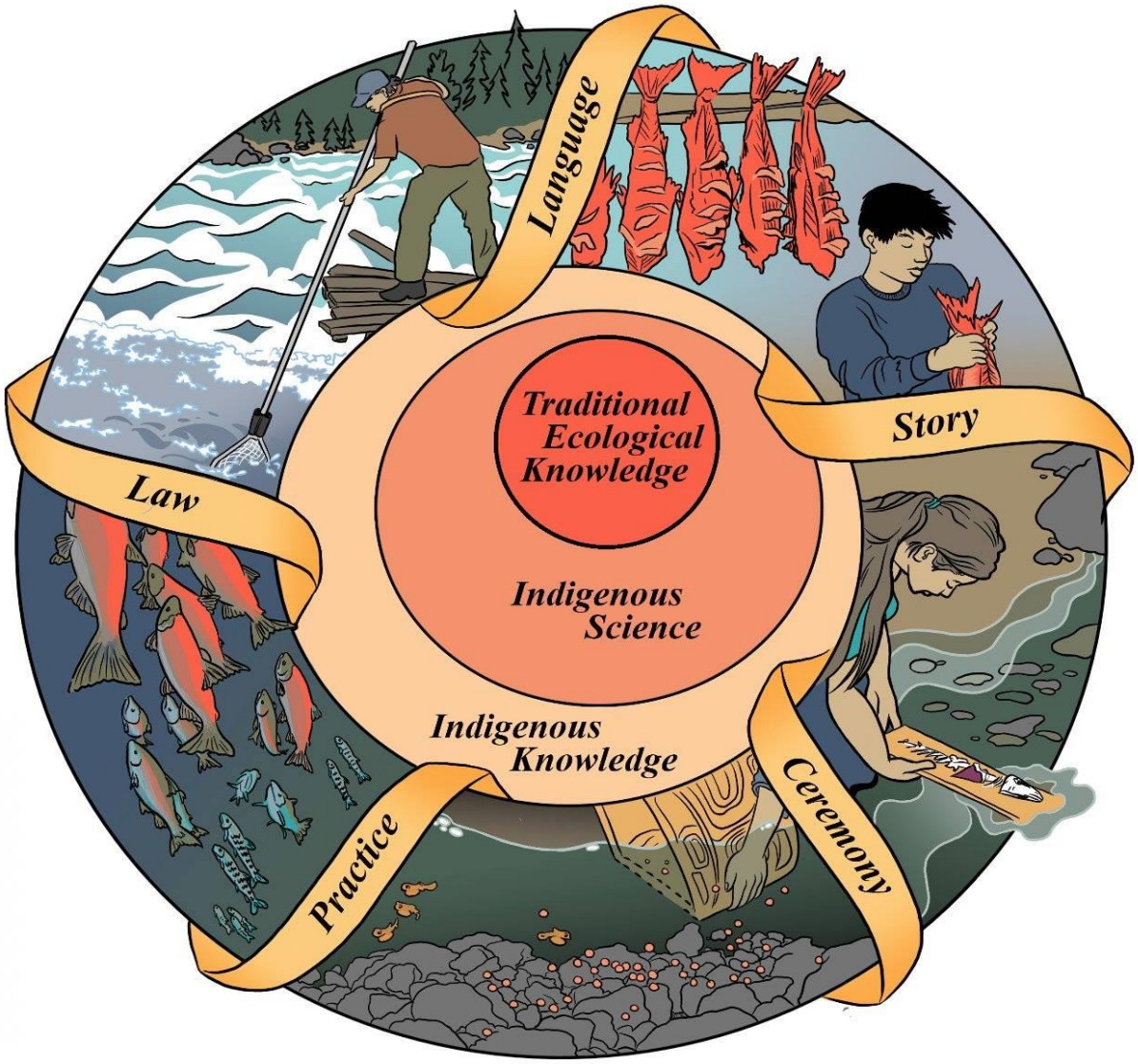
Coordinator: Mark Linkson **Contact:** IndigenousSciNet@yahoo.com

Promoting First Nations' science, teaching & education



This beautiful image explores the relationships between Indigenous science and the overall Indigenous worldview. Although created with the assistance of First Nations peoples from Canada, it is easy to see how closely the image aligns with other First Nations' lives. This image was shared 157 times from our Facebook page and reached over 23 500 people, which are exceptional numbers and shows how deeply the image resonated with viewers. The image is taken from a book to be released early in 2022. Illustration by @nicoleMcomix. For more information see author Andrea Reid's post on Twitter.

FROM THE COORDINATOR

In this edition of the bulletin, we present another collection of items and stories related to First Nations peoples and their science. I live in Cairns, and recently this community (which sits betwixt two UNESCO World Heritage listed natural wonders, the Great Barrier Reef and the Far North Queensland Wet Tropics Rainforests) hosted a significant meeting of representatives of Australia' First Nations peoples. Over 120 of them met here to discuss climate change, its effects and how authentic partnerships with Indigenous communities may hold the key to some potential solutions. For more on this, see below item in the **News and Views** section *"We want to be included".*

Another of the stories in this issue looks at the creation and use of fish traps across Australia (not coincidentally a fish trap is pictured on our header – they are wonderful examples of Indigenous technology and science knowledge working together). One of the images discussed shows two Aboriginal men sitting at the base of a weir collecting fish as they become trapped by the mechanism. Incredibly (unsurprisingly), this image was once used as evidence for the inherent laziness of Aboriginal people! "Look at them indolently throwing fish into a basket…" With racists you just can't win. Design a better fish trap – therefore confirm your lack of work ethic. Fortunately, times have changed and the wider community can now see and appreciate the beauty and efficiency of First Nations' science and technology.

As a former science curriculum support materials writer, I think many of you will find useful tips and ideas set out in the resource for tertiary teachers: *Developing Space for Native American Students in STEM.* Check out the story and download within our **Resources** section! Our membership has again increased via word of mouth and invitations extended via Facebook and Twitter. If you have joined us in the last three months, WELCOME! Your interests and enthusiasms are important drivers of our work. Please consider contributing to future bulletins. We welcome membership input.

ISN REGIONAL CORRESPONDENTS

The group of Indigenous academics and educators who make up our First Nations editorial team have been joined by volunteers from across the globe. They have all agreed to assist in the gathering of items for our bulletin. So far, we have the following members who have stepped up:

AFRICA

Femi OTULAJA, University of Witwatersrand, SOUTH AFRICA
Keith LANGERHOVEN, University of the Western Cape, SOUTH AFRICA
Sina Joshua FAKOYEDE, Federal University Oye-Ekiti, NIGERIA

ASIA

Prem PHYAK, Chinese University of Hong Kong, CHINA
Indra Mani RAI, Tribhuvan University, NEPAL

AMERICAS

Coimbra SIRICA, Burness Global, USA
Wanda BAUTISTA, Burness Global, USA
Claudia LIEVANO, Burness Global, USA
Andrew DAVIS, Fundacion PRISMA, EL SALVADOR
Lucas TOLENTINO, Global Alliance of Territorial Communities, BRAZIL
Michel LAFORGE, Global Alliance of Territorial Communities, ECUADOR

Original artwork for the Indigenous Science Network from Tiwi designs by Jennifer Coombs, Melville Island, NT, AUSTRALIA

A very big welcome to you all and many thanks for your future potential contributions. And yes, we do not yet have anyone assigned to **EUROPE** or the **PACIFIC**, so please consider volunteering if you live in those parts of the world! For this edition, we have 40 items from Australia and 20 from the rest of the world. Perhaps Australian media features more Indigenous stories than other jurisdictions? Whatever, let's try and improve this for next time! Please enjoy this issue. And please forward this bulletin to any friends / colleagues who may appreciate or benefit from our work.

Mark Linkson, Coordinator ISN

Aims of the Indigenous Science Network

Originating from a meeting in 1998 of science educators and Indigenous community members in Darwin, Australia. We agreed that there should be a central place for Indigenous knowledge in any science curriculum. We have grown to cater for scientists, educators and Indigenous community members from across the world:

- To promote First Nations science, teaching and education
- To support all educators who would like to improve their knowledge and understanding of Indigenous science and how to access and use it in their teaching
- To involve Indigenous scientists, educators and community members who support the inclusion of Indigenous knowledge in teaching science and are open to dialogue and sharing about their own experiences.

We acknowledge and pay respect to the past, present and future Traditional Custodians and Elders of the Aboriginal and Torres Strait Islander peoples of Australia and all First Nations peoples across the world. We celebrate and promote the continuation of their cultural, spiritual and educational practices.

ISN Facebook page and Twitter account

In renewing this Network, a Facebook page and Twitter account have been created. The Facebook page now has around 840 followers and the Twitter account has around 900 followers (as at 30 April 2021). Most of these people are not official members of the network (not having supplied an email address) but some do contact us via those sites to be enrolled. It means we can improve and widen our reach by posting to those media. Hyper-linked image above leads to our ISN webpages.

Items posted on Facebook focus on Indigenous science, environmental, welfare and equity issues. More pointedly, the Twitter account covers many Indigenous issues, much more than just science and has contributions from First Nations peoples of all settler countries. If you are not yet a Tweeter, I would encourage looking into it. The Coordinator of this Network, Mark Linkson, has been running both these media but would be happy to share the load with other members if you are keen. We could loan the accounts out a week at a time. Let me know! The logos above contain hyperlinks to our live and continuing everyday media presence. However, the Bulletin is our most important and significant work, the ephemera of social media is but a fleeting fancy, although some of the issues and stories that first crop up on social media do translate to future stories in the Bulletin. Significantly for our visibility, on Twitter we have been followed by the **UN Biodiversity** account (with over 75k followers) and they have tagged us in some recent tweets.

INDIGENOUS SCIENCE NETWORK EDITORIAL: MAY 2021

Jesse King *is a Waanyi man with a passion for education and the opportunities it provides for everyone. He is keenly interested in the opportunities 21st-century pedagogy offers for learners of all abilities and backgrounds. Jesse has experience in classroom teaching and coaching, school leadership, curriculum development and Indigenous Knowledges in Science, Technology, Engineering and Mathematics (STEM). He has close ties to the Mount Isa and Central Queensland regions through his father and mother's family. Jesse is currently the Team Leader – Digital Solutions at the Stronger Smarter Institute. He is also one of eight First Nations Co-editors with the Indigenous Science Network.*

A fairer education system could help unlock children's strengths and pride in their identity.

The recent Australian film, *In My Blood It Runs* introduces audiences to Dujuan, a vibrant, energetic and confident young man who commands the attention of those around him. His story resonates with so many educators and parents because it's all too familiar. It is a tale of navigating the path of two very different educational systems. One, the oldest, continuous system on Earth, where Dujuan is recognised as a young man and future leader. The other, the Western education model.

Navigating this third cultural space between different systems of knowledge is something that educators grapple with every day, often unknowingly. Understanding the nuances of each space and how to build bridges between the two allows us to unlock the potential and create a third cultural space, to envision new solutions that previously could not be imagined.

As educators, the responsibility for change lies with each of us. Enacting transformational change in a complex system can be daunting – a complex system is made up of many complicated parts. It's these complicated parts that we can influence. We are in the driver's seat to effect meaningful change. It is up to us, as difficult as it may be at times, to continuously interrogate and improve our systems for all of our children, especially our most marginalised. During discussions about pathways to move forwards, especially in relation to Indigenous education, counter arguments are often presented with all of the reasons why we can't. It's an insidious defence mechanism of our dominant system, to point out all of the barriers, to default to the deficit, to focus on "the gap".

But to enact meaningful change, we need to take strength-based approaches and reject deficit-thinking relating to Indigenous education initiatives. **Instead of focusing on the reasons we shouldn't enact change, let us focus on the reasons we should.** Instead of focussing on the barriers of complexity, focus on the rich opportunities that present themselves within complexity.

These complex challenges shouldn't be ignored or glossed over through a rose-coloured lens. We're asking for recognition of the strength it takes to face these challenges and confront a system that often doesn't recognise one's worldview. We're yet to meet an educator who doesn't want the best for their students, or who doesn't ensure they give their best for their students and help them as best as they can. Most educators we have the privilege of working with recognise that their best doesn't always achieve the desired outcome, but they are well aware of the responsibility for change that lies with them.

The work we undertake at the Stronger Smarter Institute focuses on processes to bridge Australia's education systems and strive for transformational change in Indigenous education. At Stronger Smarter,

we work with educators and community to enact the Stronger Smarter Approach. This is the subtle shift away from the *rhetoric* of having high expectations of our students and towards a *mantra* of having high expectations for our students.

The current system expects the best from our teachers yet doesn't provide them with the resources and tools to enact their best. Resourcing and equipping teachers to navigate and create third cultural spaces enables opportunities to unlock the strengths children bring into the classroom. It provides the students with a chance to be proud and strong in their identity and smart enough to achieve in any educational setting in the world.

Since the great work done in Cherbourg by Dr Chris Sarra, the Stronger Smarter Institute is now able to articulate the Stronger Smarter Approach more deeply and weave educators through the concepts of Responsibility for Change, Strength-Based Approaches, High-Expectations Relationships, and Strong and Smart. We have, as a majority, come through an education system that has a poor track record of including Indigenous histories and cultures from a strength-based position. This education system has also failed to recognise the strength and value of Indigenous Knowledges. The Stronger Smarter Approach flips this paradigm and offers solutions, grounded in Indigenous ways of knowing, being and doing.

We have the opportunity to shine the spotlight on the realities and inequities in our systems. An opportunity to not only imagine a better future, but to actively work towards one. An opportunity to have the challenging conversations required to understand each other's perspective and move forwards as a nation. Education is a right, not a privilege.

Jesse King

*This editorial was based on an article written for the **ABC News** website. See it here.*

INDIGENOUS SCIENCE NETWORK: BULLETIN ITEMS

Items are listed under five headings being **News and Views; Resources; Papers; Indigenous Astronomy** and **Conferences / Seminars**. Weblinks for most items are contained as hyper-linked addresses or as hotspots within illustrations. Some items will not have links. All links were active at the time of publication (11 May 2021).

ACKNOWLEDGMENTS: This issue contains contributions from and reference to the following network members: Mike Michie, Gregory Smith, Joel Rioux, Michelle Hogue, Karli Noon, Duane Hamacher, Rowena Ball, Brad Moggridge, Liz McKinley, Jesse King and David Broun. Apologies if I have missed anyone. Many thanks and to all members, your future submissions are most welcome.

Aboriginal and Torres Strait Islander people should be aware that this bulletin may contain images and names of deceased persons.

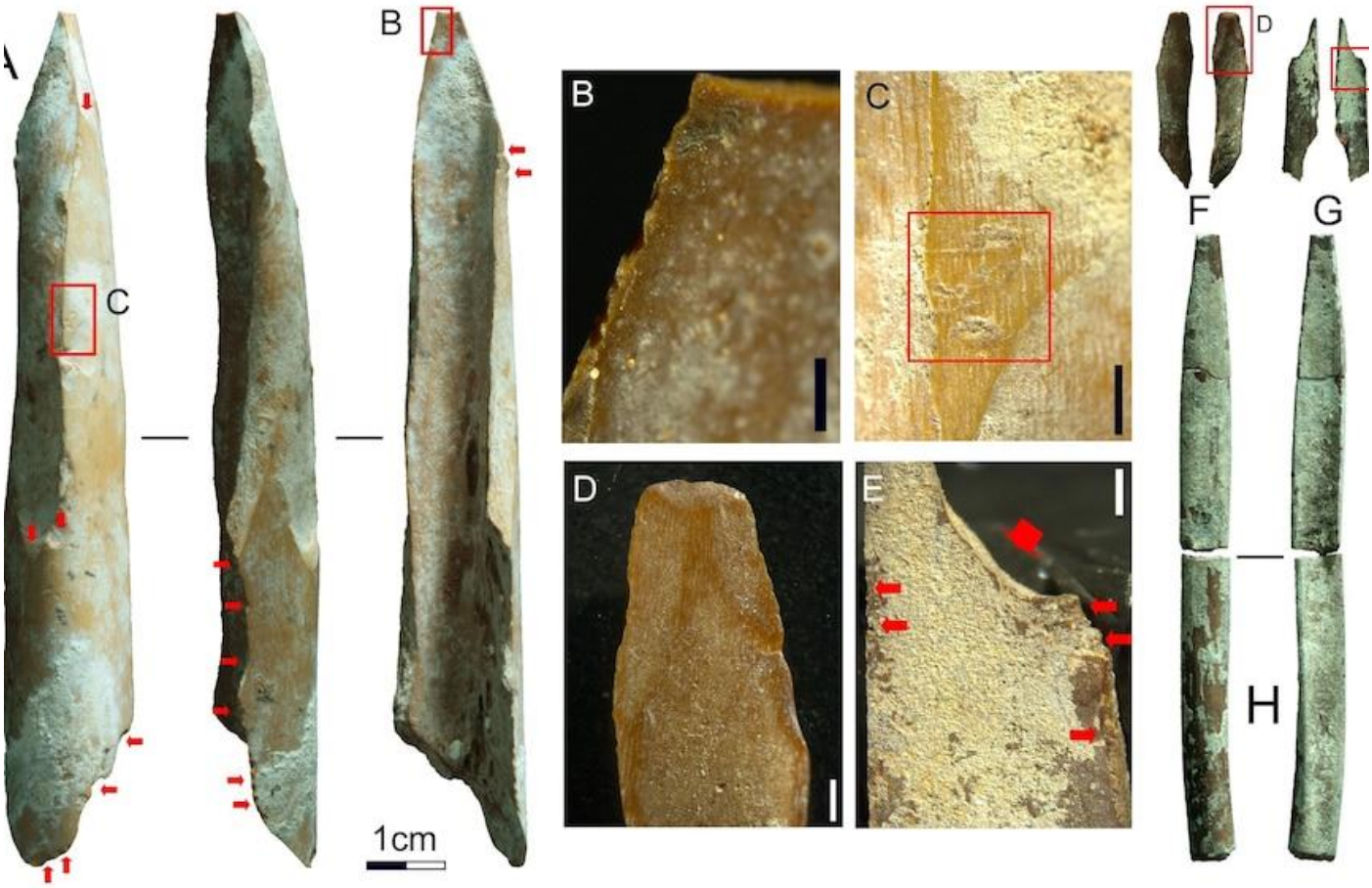
ONLINE HOME FOR THE BULLETINS

All ISN bulletins since 1998 have been stored on Mike Michies' personal website and can be downloaded from there:

http://members.ozemail.com.au/~mmichie/network.html.

Eventually we will need to find a more permanent home. Member suggestions regarding this are welcome.

Kangaroo-bone tools found in Riwi cave in the Kimberley are thought to be 35,000 years old *(Vanessa Mills, ABC Kimberley: 8 April 2021)*



Bone tools analysed by archaeologists date them between 35,000 and 46,000 years old. *(Supplied with the ABC article)*

Bone tools found in a remote north Australian cave have been dated as being more than 35,000 years old, making them some of the oldest in the nation. Eight tools made from kangaroo bone have been excavated from Riwi Cave in the southern Kimberley, by archaeologists in the early 1990s with support from the nearby Mimbi community.

It's only now that better dating techniques could put the tools at between 35,000 and 46,000 years old. Carved from Kangaroo ulna, tibia or fibula, the pointed bone tools were used to process spinifex resin, basket weaving, working plant fibres or to hunt birds and fish.

It's rare the tools survived northern Australia's harsh climate for almost 46 thousand years and shows the range of skills first Australians were using. "Bone technology in Australia tends not to survive the long periods of time that people have been here," Michelle Langley from Griffith University said.

'We want to be included': First Nations demand a say on climate change *(Lorena Allam, The Guardian: 27 March 2021)*

The mangrove forests on Admiralty Island at Trinity Inlet in Queensland. Traditional Owner, Gudjugudju Fourmile, estimates that the mangroves will be submerged by 2040. *Photograph: Brian Cassey/The Guardian*

More than 100 traditional owners and leading scientists from across Australia met in Cairns to build a national First Nations voice on climate change. From marine heatwaves and rising seas to bushfires and mass species deaths, climate change is having a major impact on First Peoples, their country, health and culture. Internationally, Indigenous people make up less than 5% of the world's population, but they manage and protect 80% of global biodiversity.

The CSIRO convened the National First Peoples Gathering on Climate Change. One hundred and twenty traditional owners from more than 40 nations met with climate scientists and Bureau of Meteorology experts to share insights about where, why and how fast the climate in Australia is changing. Aboriginal knowledge holders and the scientific community at the conference agreed on guidelines for ethical and culturally appropriate partnerships, which are essential to mitigation and adaptation.

How to tell the new season is starting, according to the Noongar people of WA *(Tyne Logan, ABC News: 27 March 2021)*

Noongar Boodja country covers the entire south-western portion of Western Australia, approximately from Jurien Bay to Esperance and everywhere west. It's one of the largest Aboriginal cultural blocks in Australia. There's no exact date to the start and finish of a new season — instead that's defined by the changes in the natural environment. Here's what to look out for to signify the start of *Djeran*, according to Indigenous elder and Noongar man Noel Nannup. The first key sign is the wind change. "The primary thing is the wind shift from the north-east to the south-west," he said.

Mr Nannup said the "boney" white blossoms of the marri tree indicate a season change *(ABC Local: Anthony Pancia)*

Applications for the Aboriginal and Torres Strait Islander Scientist Award now open

The Australian Academy of Science is calling for applications for the Aboriginal and Torres Strait Islander Scientist Award.
The Academy has recently broadened the award's remit to also include research support of up to $20,000.

The award recognises research in the physical and biological sciences conducted by outstanding Aboriginal and Torres Strait Islander PhD students and early- and mid-career scientists. It allows interdisciplinary and sociocultural research that could straddle the social sciences and humanities.

The aim is to support the recipients' research and/or the expansion and growth of their research networks and international knowledge exchange through visits to relevant international centres of research. Awards are for up to $20,000, with additional support provided to attend the Academy's annual Science at the Shine Dome event.

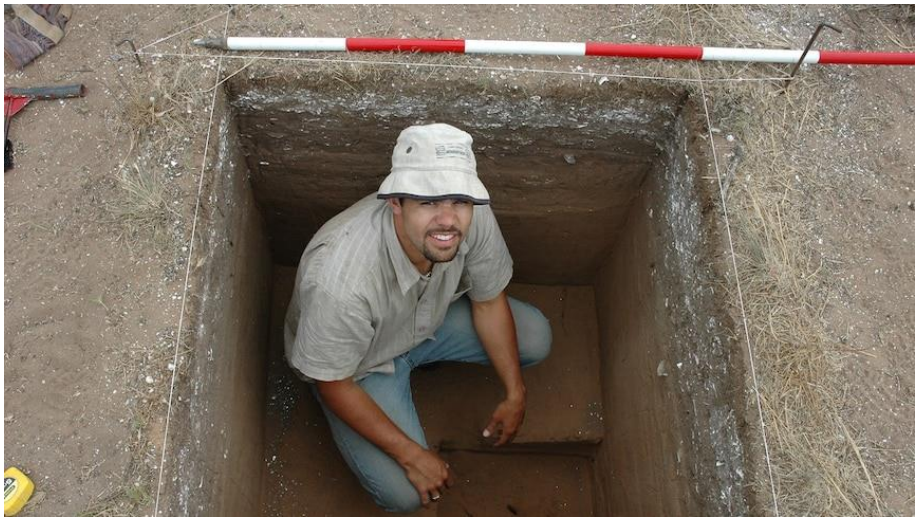
The deadline for the 2022 round of applications for this award is 9:00am (AEST) **Tuesday 1 June 2021.**

For enquiries email the Academy's awards team or call +61 2 6201 9407.

For more information on all the awards on offer in the 2022 award round download the awards fact sheet and visit the Academy's website.

Ancient Aboriginal technology unearthed in rare bone discovery on Ngarrindjeri country

(Anita Ward, ABC Riverland: 17 March 2021)



Research leader and Ngarrindjeri man Chris Wilson says the discovery provides a better understanding of Aboriginal bone technologies. *(Supplied: Flinders University)*

A rare glimpse into ancient Aboriginal technology has been uncovered in the form of a bone artefact on Ngarrindjeri country, along the Lower Murray river system in South Australia. Radiocarbon dated to be between 5,300 and 3,800 years old, the bone was detected in amongst a midden site that was excavated in 2008, but has only just been processed and recorded. Research leader and Ngarrindjeri man, Dr Christopher Wilson, said the find builds upon the present understanding of traditional practices and potential uses for the bone tool. "Even one find of this kind provides us with opportunities to understand the use of bone technologies in the region and how such artefacts were adapted to a riverine environment," he said.

How to be a good Indigenous ally *(Summer May Finlay, NITV News: 26 Jan 2021)*

How can non-Indigenous people be useful allies to Aboriginal people? As a somewhat outspoken Aboriginal woman, it's something I'm asked a lot. We need good allies. We are only three per cent of the Australian population. We can't raise the profile of issues affecting us without our allies. But what does a good ally look like? How do non-Aboriginal people support us but avoid paternalism and cultural appropriation? Well, the truth is there is no simple answer, and good intentions often aren't enough. In lieu of an 'ally rulebook', here are some tips which may help non-Aboriginal people stay on the right side of that line.

When Ed Sheeran toured Australia in 2018, he wore an Aboriginal flag t-shirt that he'd purchased from the Tandanya cultural institute in Adelaide. He then opened his performances — to audiences of made up of tens of thousands — with an Acknowledgement of Country. This, simple act, is a great example of how to be an ally. *(WireImage)*

1. Preference our voices
2. Be ok with not always being part of the conversation
3. Be there for the good times *and* the bad
4. Say something when you hear someone say inappropriate things about Aboriginal people
5. Don't take it personally when we don't agree with you
6. Don't go it alone
7. Understand that Aboriginal people are *not* all the same

(For elaborations of each tip, please hit the hyperlink contained within Ed Sheeran above.)

Questions raised over bid to extract 40,000 megalitres of water a year from arid Central Australia *(Oliver Gordon, ABC News: 10 Feb 2021)*

An application to use 40,000 megalitres of water a year for a major fruit and vegetable project in Central Australia should be rejected, according to a water expert and a key Indigenous group. CLC executive director of policy, Josie Douglas (pictured right), urged the NT Water Controller to turn down the licence application until more was known about its potential environmental impacts. "At the end of 2020 the Central Land Council met with native title holders and residents, and people were very concerned," Dr Douglas said. "It is the very strong view of the Central Land Council that a project of this size, where a public resource is being provided for free, must meet the most rigorous scientific standards, and a precautionary process must apply at every step of the way," she said.

Dr Josie Douglas is urging the NT Government to reject the application until more is known about its potential impact. *(ABC News: Dane Hirst)*

Western science and Aboriginal people *(Steven Ross, City of Sydney)*

A potted history of the racist assumptions of western science about Aboriginal people, with reference to the unseen and unacknowledged Indigenous science undertaken at the time of first contact in Australia.

Aboriginal weapons drawn by T R Browne and published in Thomas Skottowe's "Select Specimens from Nature" in 1813 *(Mitchell Library, State Library of NSW – PXA 555)*

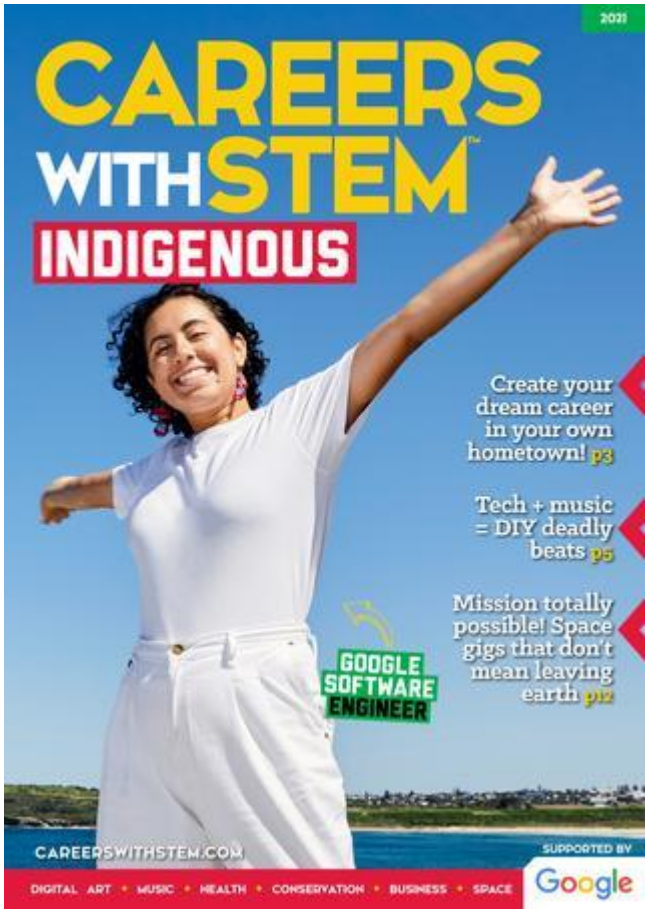
The dominant scientific discourse which informed descriptions of Aboriginal peoples in the 19th century was 'The Great Chain of Being' which arranged all living things in a hierarchy, beginning with the simplest creatures, ascending through the primates to man. From the 17th century onwards it was the practice to distinguish between different types of man, with Europeans at the top of the chain. Contrary to western scientific beliefs, Sydney's Aboriginal people farmed the waters of Sydney Harbour and surrounding rivers, and maintained kangaroo feeding grounds, such as those near today's Victoria Park near the University of Sydney. The Gadigal people traded with other Aboriginal groups and maintained religious, social and political systems, which included complex cosmological and botanical information.

Oldest-known rock art in Australia is 17,300-year-old kangaroo in the Kimberley, wasp nests show *(Belinda Smith and Erin Parke, ABC Science: 23 February 2021)*

A montage of 39 photographs of the 17,300-year-old kangaroo with an accompanying illustration. *(Supplied: Photos: Damien Finch Illustration: Pauline Heaney)*

As far as Australian icons go, it's hard to look past the kangaroo. Now it turns out the quintessential macropod is also the subject of Australia's oldest-known rock painting. The 17,300-year-old roo, portrayed in dark mulberry paint on the ceiling of a rock shelter in the Kimberley, is one of a suite of animal depictions — and the odd human-like figure — unveiled in Nature Human Behaviour today. Traditional owners and archaeologists worked together to calculate the age of "naturalistic" rock art, in Drysdale River National Park, painted by ancestors of the *Balanggarra* people. To do this, the researchers dated not the artwork itself, but fossilised mud nests built by industrious wasps all those years ago. And while traditional owners have known about these paintings, no-one knew how old they were.

Careers with STEM Indigenous *(Heather Catchpole: February 2021)*



"Careers with STEM: Indigenous" career guide, was launched in February to inspire young Indigenous students in Australia and New Zealand to pursue STEM courses and careers. We've partnered with some awesome Indigenous organisations, designers, artists and STEM professionals to bring you our first ever Indigenous special issue: packed with 31 role models, Indigenous-first STEM stories, scholarship opportunities & heaps more!

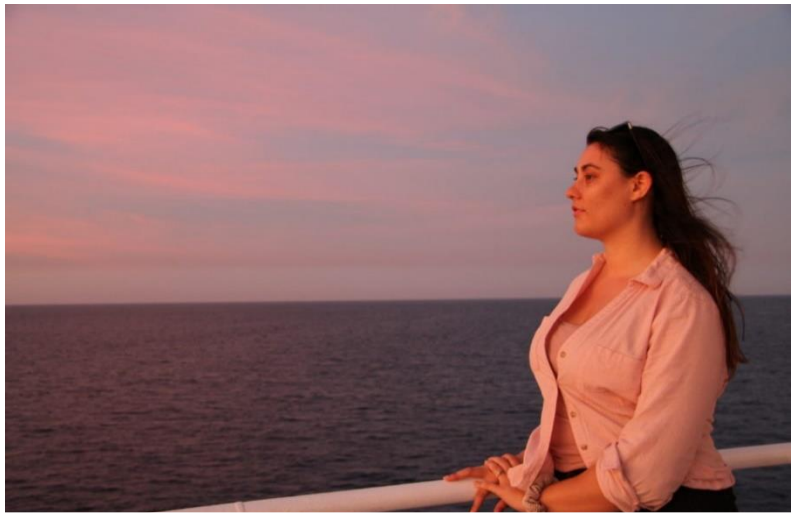
The magazine celebrates and showcases the science, technology, engineering and maths that busts stereotypes about who works in STEM and what those jobs look like, while providing an Indigenous-first and inclusive viewpoint of STEM.

Produced by Refraction Media and Indigenous STEM organisations Indigitek, Pūhoro STEM Academy and AATEA in collaboration with Google, this 20-page digital magazine, Careers with STEM: Indigenous, celebrates the contributions of Indigenous people to STEM – historically, now and into the future.

Saltwater science and sea country research *(Mibu Fischer, CSIRO: 25 October 2019)*

Mibu Fischer is a Quandamooka saltwater scientist with engagement skills for strengthening partnerships between First Nations communities and the research sector. Her specific interests are around Traditional Knowledge (science) and management practices being considered within modern day fisheries, coastal and conservation management. She joins with other Indigenous and Traditional practitioners to strengthen the global indigenous voice and leadership in areas of marine research and coastal indigenous livelihoods. Her goal is to bridge a gap that draws attention to the indigenous communities facing the frontline of impacts and changes to coastlines, ecosystems and livelihoods from climate change impacts.

Coastal and marine researchers are increasingly aware of the marine rights and interests that Traditional Owners have. As collaboration with Aboriginal and Torres Strait Islander communities becomes commonplace, so does the blending of two different knowledge systems. There is a growing demand for Aboriginal and Torres Strait Islander practitioners to lead sea country research. Traditional Owners should also be appropriately acknowledged for their involvement in collaborative projects.



Mibu Fischer, Quandamooka woman and CSIRO scientist.

Is an Aboriginal tale of an ancient volcano the oldest story ever told? *(Colin Barras, Science: 11 February 2020)*

Long ago, four giant beings arrived in southeast Australia. Three strode out to other parts of the continent, but one crouched in place. His body transformed into a volcano called *Budj Bim*, and his teeth became the lava the volcano spat out. Now, scientists say this tale—told by the Aboriginal *Gunditjmara* people of the area—may have some basis in fact.

A 19th century drawing of the lake in the crater at the top of Budj Bim. *EUGENE VON GUERARD/WIKICOMMONS/CREATIVE COMMONS*

About 37,000 years ago, Budj Bim and another nearby volcano formed through a rapid series of eruptions, new evidence reveals, suggesting the legend may be the oldest story still being told today. The study raises a provocative possibility, says Sean Ulm, an archaeologist at James Cook University, Cairns, who was not involved with the work. “It is an interesting proposition to think about these traditions extending for tens of thousands of years.” But he and others urge caution, as no other stories passed down orally are believed to have survived that long.

Indigenous curriculum sees enrolments double at Minto's Campbellfield Primary School *(Nakari Thorpe, ABC Western Sydney: 8 March 2021)*

Minto's Campbellfield Public School's student population has doubled during Nicole Wade's time in the job. *(ABC News: Nakari Thorpe)*

Nicole Wade remembers being a young student wanting to be invisible at school, hoping to "blend into the walls" and "into the carpet" and praying a teacher wouldn't ask her a question. She felt a strong disconnect from students and teachers alike, who didn't recognise her as an Aboriginal person despite her deep sense of pride in her Noongar heritage. "Maybe [it was] around the colour of my skin, maybe they didn't think that's what an Aboriginal person would look like," she said.

She's now principal at Minto's Campbellfield Public School in Sydney's south-west, where the school population has doubled during her six years in the job. Implementing Indigenous culture and history into the curriculum has drawn increased enrolments from Aboriginal and Torres Strait Islander families out of the area. "I want to make sure that every single child is valued as an individual and all of the things they bring about themselves —whether or not they're Aboriginal — their cultural backgrounds and their diversity is shared and used from a strength-based approach," she said.

Indigenous perspectives in the curriculum: The science of spear-throwers

(Jo Earp, Teacher Magazine: 1 April 2021)

Embedding Indigenous perspectives into the curriculum has seen Queensland students conduct a hands-on inquiry into the science of the woomera – an Australian Aboriginal spear-throwing device. The Year 7 students at Townsville State High School have been working with cultural expert Les Tanna to investigate how the construction of the spear-thrower affects its function. It's the culmination of a physics inquiry unit on levers.

Year 7 students at Townsville State High School try out their woomera (spear thrower) skills. *Image above supplied with original article.*

The unit was written by the CSIRO, then Year 12 Coordinator and science teacher Braden Askin and Head of Science Sarah Chapman refined and implemented it for their own school context.

'They go through how to link the Indigenous culture and perspectives to the Australian Curriculum, how we might go about the inquiry, so, the practical side of it, how to gradually release responsibility to students,' Askin tells Teacher.

'They give you a lot of resources and information. It really gives the groundwork to build up from so we can shape and develop it into something that fits our context, fits our school, fits the year level, fits our students, and is something that will engage them.'

Traditional knowledge finally being utilised in wildlife conservation *(Phil Staley, ABC Far North: 17 Feb 2021)*

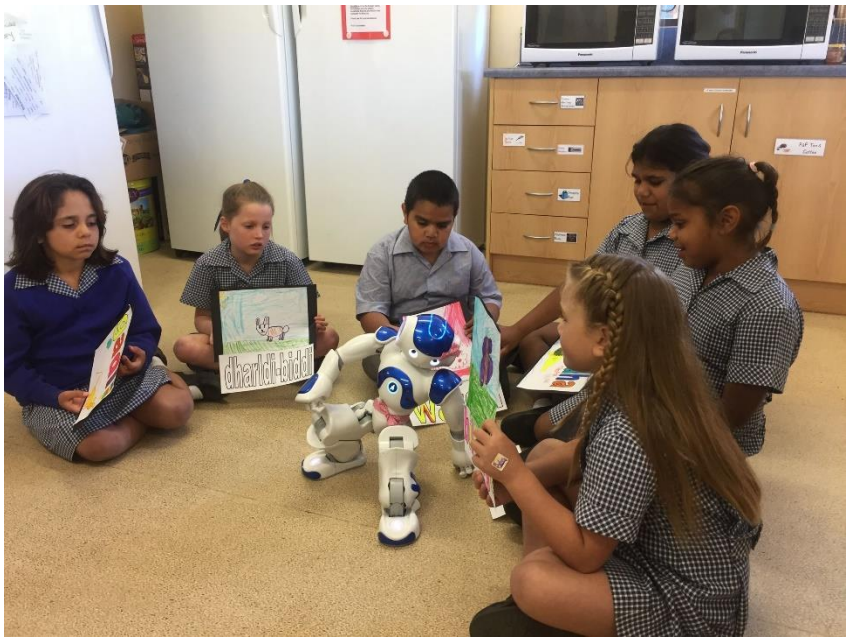
Wildlife experts at a symposium in Far North Queensland say traditional owners must have more input if the 188 threatened species living in the Wet Tropics region are to survive. The Threatened Species Symposium held in Cairns this week saw a gathering of experts from multiple wildlife, ecological, conservation and government departments to fully grasp the challenge of keeping some species alive.

A cassowary eating berries. *Photo: Reuters*

Indigenous wildlife rangers were also part of a series of presentations aimed at helping animals like the Southern Cassowary, Northern Bettong, Mahogany Glider, Gouldian Finch, Magnificent Brood Frog and others. Phil Staley spoke to multiple ecologists, all of whom agreed the conservation of all wildlife was best approached using knowledge from traditional owners of the land, something not necessarily done well in the past.

Why is Aboriginal and Torres Strait Islander histories and cultures a cross-curriculum priority? *(Caty Morris, ACARA: 14 Dec 2017)*

Although this article is four years old, our network was in hiatus soon after publication. It contains information and links which teachers of Indigenous students, regardless of location, should still find useful.



As one of the three cross-curriculum priorities of the Australian Curriculum, the Aboriginal and Torres Strait Islander Histories and Cultures priority provides opportunities for every Australian student to engage with the world's oldest, continuous living culture.

Through the Australian Curriculum, students can appreciate that contemporary Aboriginal and Torres Strait Islander communities are rich and diverse – helping make Australia unique and special. Students can gain insights that will equip them with skills – such as cultural responsiveness – to be successful in our increasingly complex and rapidly changing world. To help teachers make this rich learning opportunity a reality for students, there are some resources on the Australian Curriculum website:

An overview of the priority and the nine Organising Ideas

Illustrations of practice showing how teachers are integrating the priority across the leaning areas. As an example, Gordonvale State High School in Queensland demonstrates Fire: a burning question through Science, while Margate Primary School in Tasmania tells us about What happens when cultures collide

Guiding principles for promoting and implementing the priority

A Framework for Aboriginal languages and Torres Strait Islander languages.

The Bulletin of the Indigenous Science Network is distributed four times a year via email directly to members. Membership is open to all. If interested in being a part of the Network, please contact the Coordinator via email at IndigenousSciNet@yahoo.com. Issues distributed in February, May, August and November each year.

Tips to commemorate and teach about Sorry Day *(Jessica Staines, Koori Curriculum: 3 May 2021)*

TeachEzy.com

National Sorry Day is held on 26th May every year to remember and recognise all those who were affected by the 'Stolen Generations', as well as the negative impact of Australian government policies, practices and attitudes towards the Indigenous people of Australia throughout history.

Stolen Generations refers to Aboriginal children forcibly removed under Government policy up until 1969. It is not officially known exactly how many children were removed due to poor record keeping and tampering. However, it is estimated that one in every ten Aboriginal people over the age of 25 were forcibly removed from their families during their childhood.

Tips to commemorate and teach about Sorry Day

1. Research and attend Sorry Day events in your community
2. Watch the 2008 apology that Kevin Rudd Made on behalf of the Australian Government.
3. Light a candle for the Stolen Generation who were removed from their families and communities
4. Hold a minute silence
5. Plant a native hibiscus plant. This plant was approved by the National Stolen Generations Alliance as the official symbol for Sorry Day.
6. Create a bush tucker commemorative reconciliation garden
7. Read the book "Sorry Day"

ARE YOU AN INDIGENOUS WOMAN INTERESTED IN A STEM TEACHING CAREER?

stronger smarter institute

You should apply:

If you are interested in a STEM Teaching career
If you are currently teaching or working in a school
If you are studying at University

The support you will receive

Financial Support , Networking, Mentoring, Professional Development
Peer Support, Personal & Professional Support

Applications Open: 1 April - 31 May 2021

Australian Government
National Indigenous Australians Agency

NIAA

stronger smarter institute

What is STEM?

STEM stands for Science, Technology, Engineering andMathematics. STEM in education can be applied across all subject areas and is about using a range of skills to investigate the world.

Education in STEM must provide Australia with both expert practitioners and a knowledgeable and receptive community.[1]

What interests align with STEM education?

If you are intested in the following you could excel in a STEM teaching qualification:

- Fishing
- Cooking
- Tinkering
- Drones
- Sports
- Bush walking
- Networking
- Technology
- Photography
- Gardening
- Crafting
- Plants
- Animals
- Family
- Art

Who can access this support?

If you are any of the following you can register interest with the Stronger Smarter Institute for a support in achiving STEM teaching qualifications:

- University Student
- Community Member
- Indigenous Education Worker
- Primary School Teacher
- Degree Holder
- Secondary School Teacher

Aboriginal peoples and Torres Strait Islander peoples have been applying STEM thinking for millenia, and continue to do so today

For more information contact the team:

IGSA.ToSI@strongersmarter.com.au

or

(07) 5499 4135

Australian Government
National Indigenous Australians Agency

NIAA

‘The environment is supportive and constant’: USask students praise ISAP, STEM Accelerator courses *(Shannon Boklaschuk, University of Saskatchewan: 12 Mar 2021)*

Janice Osecap (left) is a student in the College of Education and Lisa Tourangeau is a student in the College of Nursing.

In this article, Indigenous students from the University of Saskatchewan (USask) are lauding a series of preparatory courses available through Indigenous Student Achievement Pathways (ISAP). These pathways are designed for Indigenous students who want to pursue a degree in science or post-secondary education in a related professional college.

The goal with ISAP’s STEM-focused programming is to broaden degree options for incoming Indigenous students. Through the community focus of this co-curricular program, and emphasis on collaborative learning in courses and tutorials, USask hopes to also enrich the academic and social experience of future Indigenous leaders and build a strong Indigenous applicant pool to the diverse certificate and professional degree programs that USask offers.

The Culturally Responsive Indigenous Science Project *(Washington State University)*

The Culturally Responsive Indigenous Science (CRIS) Project is a collaboration with three tribal communities in the Northwest. The Project catalyzes new approaches to Indigenous science teaching and learning through land-based science curriculum and hands-on enrichment programs. Weaving Indigenous knowledges and languages with western science through multimodal technologies and digital tools to increase Native American students’ learning, engagement and achievement across the sciences. Through a community-based approach to curriculum design, the project team collaborates to develop land-based science curriculum that weaves together traditional ecological knowledge, language, technology and western science in ways that address national science standards while honouring tribal culture, language, and sovereignty.

10 Ways Well-Meaning White Teachers Bring Racism into Our Schools

(Jamie Utt, Everyday Feminism, accessed 15 April 2021)

Don't let your white fragility stop you from truly connecting with your Indigenous students. Its OK to admit that we sometimes get it wrong and we sometimes act in racist ways. That is the almost inevitable result of comfortably living within a dominant culture that has previously smashed the living daylights out of First Nations peoples. Yes you didn't do the smashing BUT please realise where your privilege comes from and then make good choices. Altough written for teachers in the USA, it remains a really challenging article that makes all dominant culture teachers better consider their unintentionl bias and dare we say it, casual racism!!

Though I know there are actively racist teachers out there, most White teachers mean well and have no intention of being racist. Yet as people who are inscribed with Whiteness, it is possible for us to act in racist ways no matter our intentions. Uprooting racism from our daily actions takes a lifetime of work. Thus, as we head into the first weeks of school all over the US, here are 10 ways that White teachers introduce racism into our schools paired with things we can do instead:

Implicit biases take the form of subtle, sometimes subconscious stereotypes held by white teachers, which result in lower expectations and rates of gifted program referrals for black students. *Photograph: Alamy* Image taken from Guardian story: Teachers' implicit bias against black students starts in preschool, study finds

1. Lowering or Raising Achievement Expectations Based on Race/Ethnicity

2. Being 'Race Neutral' Rather than Culturally Responsive

3. Using Racially Coded Language

4. Intentionally or Unintentionally Mispronouncing Names

5. Enforcing Harsh Discipline Practices That Disproportionately Impact Students of Color

6. (Inadvertently) Valuing Whiteness

7. Tokenizing Students' Cultures to Connect with Them

8. Culturally Appropriate in an Effort to Connect with Students

9. Devaluing What Non-Teachers Contribute to the School Community

10. Doing Little or Nothing to Advocate for More Teachers and Staff of Color

For elaborations of the 10 points above, please click on the hyperlink contained within the image.

Worldwide Indigenous Science Network

Not to be confused with the publisher of this bulletin (the Indigenous Science Network borne out of Darwin, Australia in 1998), the Worldwide Indigenous Science Network was created in 1989 in the USA and focuses on supporting and promoting Indigenous science and its practitioners. Membership includes tribal elders, scientists, conservationists, scholars and women's organizations from cultures around the world. All share a common vision of rediscovering and applying ancient wisdom for today's time. They have a website which contains stories of traditional environmental knowledge and related Indigenous science practitioners. Well worth a visit.

Kyrgyz Healer, Zhaparkul Ata and artist Mairamkul greet the children of Power Line School in South Africa. The children had just shared their indigenous tribal dances. *Image taken from WISN website (07 April 2020)*

"If you are trying to find your indigenous mind and powers, WISN offers the Indigenous Mind program. If you are an indigenous healer who wants to network globally or need urgent assistance, WISN offers Elders' networking support. In accordance with the issues and with respect to the forces of Mother Earth, we conduct cutting-edge research using our innovative indigenous science approaches and protocols. In all of the actions and programs, we strive to promote respect, understanding and empowerment that comes from knowing our true identities and relation to life in all of its forms."

ISN members are encouraged to submit items exploring any aspects of Indigenous science teaching or education. As the Bulletin is not an official journal or organ of any recognised institution, we are not required to enforce any formatting, editing or reviewing regimes. We do have an Advisory Board made up of eight First Nations Co-Editors who view all items before publication. If you are doing something valuable in Indigenous science, teaching or education, please consider telling your story here!

Indigenous Science and Peace Studies *(University for Peace, San Jose, Costa Rica)*

The University for Peace was established by the UN General Assembly in 1980 and has been training leaders for peace for the past four decades. In conjunction with the Worldwide Indigenous Science Network (no connection with the ISN) a Masters course has been created to link the best of Western and Indigenous science. This innovative degree program provides students who yearn to go beyond conventional educational paradigms with powerful and transformative tools to look directly into looming natural / environmental catastrophes and transform them. Guided by Indigenous Elder advisors, knowledgeable in international peace and world class faculty, students learn to navigate these two ways of knowing to propagate peace and renewal of life.

The confluence of cutting edge Western and Indigenous science and knowledge has opened the doors to a new paradigm of peace and development. The **Master of Arts in Indigenous Science and Peace Studies** (ISPS) brings these two ways of knowing together to challenge a failing framework with time-tested methodologies that sustain life and create transformative opportunities amidst the global catastrophes we face right now. The transformation of policy, diplomacy, development models, and innovative technologies in ways that respect the interconnections of people and facilitate stronger and more sustainable solutions across all sectors of society, is at the core of the programme. Taught from the perspective of indigenous science and wisdom, ISPS offers students the opportunity to be immersed in exchanges with Indigenous knowledge keepers, community leaders, scholars and scientists from around the globe.

Click here to see the programme philosophy.

Click here for the full programme prospectus.

Subjects (aka Program Specific Courses):

Ethnoautobiographical Inquiry - Ancestral and Historical Research 1
Bridging Paradigms – The Role of Dreams and Dreaming
Indigenous Knowledge & Research Methodologies
Colonial History, Decoloniality, & Sovereignty
Indigenous Science Methods
Ethnoautobiographical Inquiry - Ancestral and Historical Research 2
Representing Indigenous Mind – Decolonial Representation in Publications and Media
The Science of Archaeoastronomy & Indigenous Star Knowledge
Interventions – Capstone Project Preparation
Model UN Conference: Committee on Indigenous Rights
Thesis/Capstone/Internship

Member Feedback

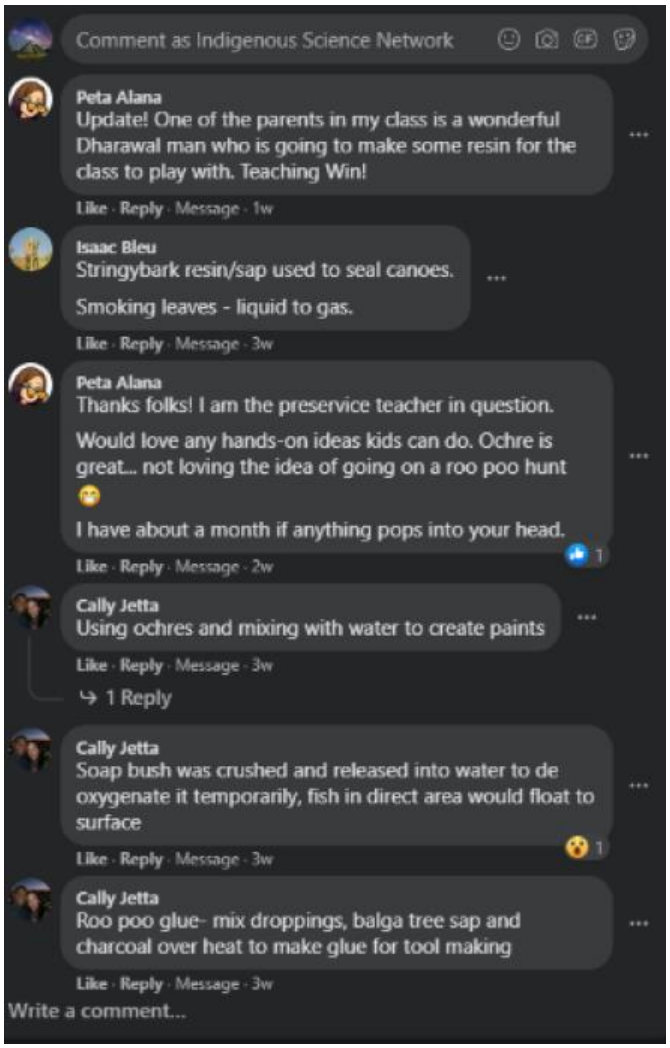
In order to encourage participation, we would like to provide a section of each Bulletin for member feedback. If there are any items in this issue that you would like to comment on, please send your feedback to the Coordinator ISN at **IndigenousSciNet@yahoo.com.**

Assistance with a science lesson

Contact was made recently via our email address by a pre-service teacher looking for some resources for a science lesson. Our Facebook page was enlisted and proved helpful:

I have a request from a pre-service teacher in Australia who is preparing a science unit on changes of matter for her Year 4/5 class. She would like to include examples taken from traditional Indigenous life experiences. She suggested the way beeswax is collected as a liquid then changed into a solid to use as adhesives in preparing weapons and dijeridu. Any other ideas out there that people would like to share?

Which garnered the following responses:

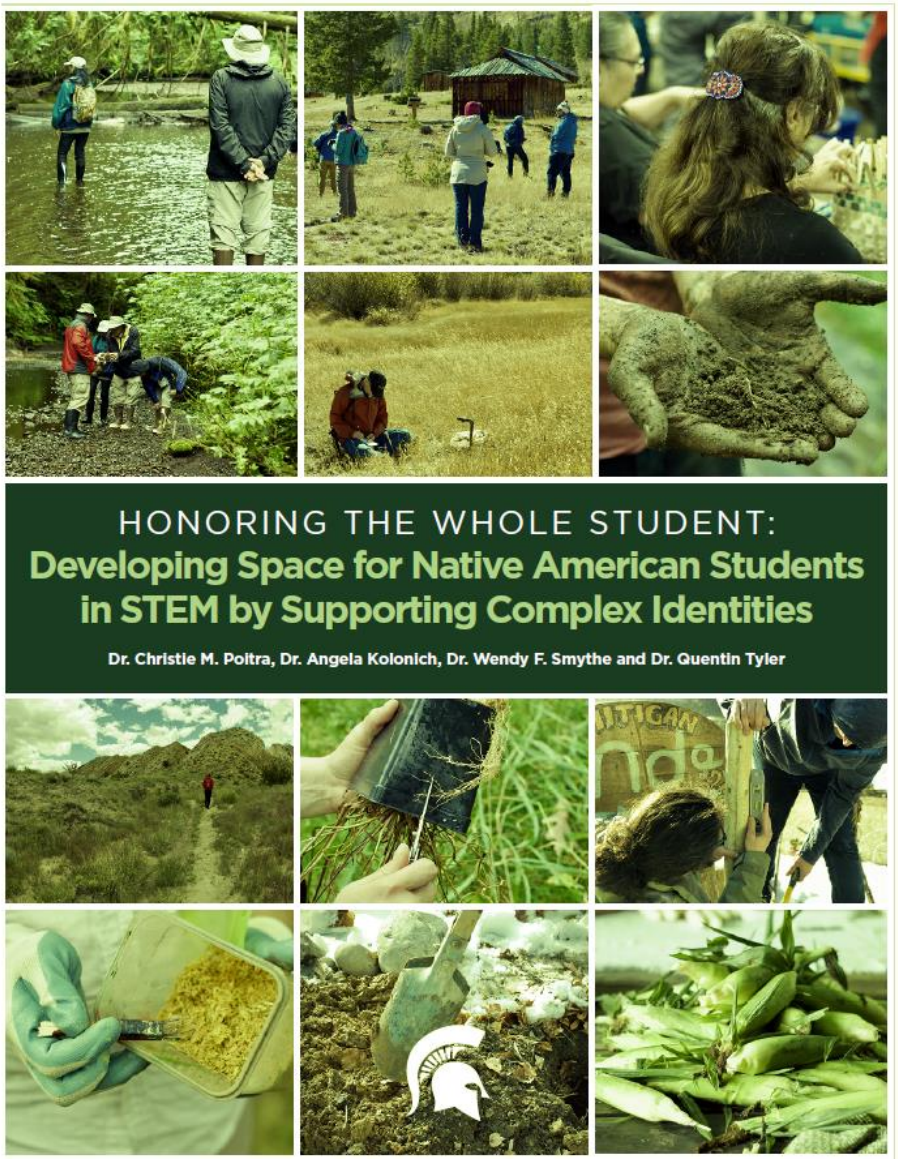


And thanks mainly to Cally Jetta, member of the ISN FB page, some wonderful ideas were shared.

RESOURCES

Developing Space for Native American Students in STEM by Supporting Complex Identities *(Native American Institute, 2020)*

Provided here is information and link to download a copy of a STEM resource written for post-school Native American contexts. This resource is very specific to those contexts, however, educators working with other First Nations peoples may see wider truths that can be applied.



The motivation for this workbook is to provide Science, Technology, Engineering and Mathematics (STEM) faculty the support and tools needed to reflect on their instructional, mentorship, and teaching practices—individually or within a community of learners. The goal is for STEM faculty to foster a deeper understanding of how to more dynamically support Native American students. The activities in this workbook are intended to generate conversation and reflection about the challenges faced by, and world views of, Native American STEM students. This workbook also responds to the broader deficit narratives about Native American students.

Poitra, C., Kolonich, A., Smythe, W. & Tyler, Q. (2020). *Honoring the Whole Student: Developing Space for Native American Students in STEM by Supporting Complex Identities.* East Lansing, MI: Native American Institute.

As scholars from under-represented groups, we are committed to promoting asset-based language and narratives about Native American students. As the workbook provides a narrow cross section of potential scenarios as thought-provoking activities, it is important to not assume that all Native American students have the same experiences in higher education, or will require the same type of support. Furthermore, it is damaging to view this workbook as all-encompassing of Native American identities and lived experiences. We envision this workbook being used by STEM faculty and academic staff interested in Diversity Equity and Inclusion (DEI) issues, with a specific focus on Native American student populations. This workbook may be used to supplement the work of faculty and academic staff already actively engaging in DEI learning. This workbook is also intended for use by individuals looking for resources on supporting Native American students, more broadly. Lastly, we would like to highlight that engaging with this workbook requires the learner to approach these activities in an authentic and culturally humble way.

Living Knowledge - Indigenous knowledge in Science Education

*The Living Knowledge website (completed circa 2008) was part of a three-year Australian Research Council (ARC) research project **Indigenous knowledge and Western science pedagogy: a comparative approach**. The project aims were to determine the most effective ways of incorporating Indigenous knowledge within the NSW secondary school science curricula. Although now 13 years old, the structure and information contained within the website (which is still live) are worth viewing.*

From the website:
The most significant research problem is the precise nature of the relations between Indigenous and Western science. While Indigenous knowledge custodians and leading non-Indigenous researchers agree that a degree of equivalence exists between these two knowledge systems, the problem of defining equivalence is a complex one: it requires the investigation of Indigenous and European sciences as discrete systems and then seeking to understand what relationships exist between them.

It aims to do this in part by using on-line resources based on the Saltwater Collection to demonstrate Yolŋu environmental knowledge and aspects of the Yolŋu world-view. (The Yolngu come from North-East Arnhemland in the Northern Territory of Australia). The YCEC intends to take advantage of this opportunity to develop materials that can be used in its own science curriculum in the main community school and in the schools associated with the more remote homelands communities such as Yilpara and Gängan.

What is Yolŋu science?
The Yolŋu worldview does not separate science from other kinds of thinking. Yolŋu 'science' is embedded in Yolŋu 'law', laid down by the ancestors and passed on down the generations as a code for living. Yolŋu law gives each clan rights to areas of land and sea and the means to manage these. Clan names, songs and designs associated with each clan's country store detailed knowledge of that country's environment, gained through thousands of years of observation. There is much knowledge of natural patterns and processes embedded in clan names, songs, ceremony and designs.

Indigenous STEM Education Project *(CSIRO)*

The Indigenous STEM Education Project aims to increase participation of Aboriginal and/or Torres Strait Islander students in science, technology, engineering and mathematics (STEM). Funded by BHP Foundation and delivered by CSIRO, the Indigenous STEM Education Project demonstrates the link between the traditional ecological knowledge of Australia's First Nations Peoples and the science curriculum and how it can be taught using inquiry-based methods. The project has a national footprint working with primary, secondary and tertiary students in remote, regional and metropolitan areas.

Inquiry resources
These program resources identify content descriptions in the Australian Curriculum which can be related to a traditional Indigenous context and developed into a hands-on scientific inquiry. Sample lessons from Year 5 to Year 9 are linked to the image right.

The CSIRO's Indigenous Science Hub

The CSIRO (Commonwealth Scientific & Industrial Research Organisation) is an Australian government agency responsible for scientific research. In recent years they have made efforts to include and promote Indigenous science knowledge and Indigenous educators and scientists. They have a wonderful collection of Indigenous resources which all Australian teachers should be aware of.

CSIRO acknowledges the extraordinary contributions Aboriginal and Torres Strait Islander people have made, and continue to make, to our culture, the economy, and science. We are working with Indigenous communities and organisations to create Indigenous-driven science solutions that support sustainable futures for Indigenous peoples, cultures and Country. See links below to selected Indigenous science related resources from the CSIRO webpages *(retrieved 20 April 2021).*

Our Knowledge, Our Way

Our Knowledge Our Way in caring for Country: Indigenous-led approaches to strengthening and sharing our knowledge for land and sea management.

Sharing the knowledge for caring for our Land

© Emma Burchill

Indigenous knowledge

We are working with Indigenous collaborators to support the strengthening of Indigenous knowledge and knowledge systems so we are all able to weave and share knowledge in ways that recognise the integrity, validity and context of each different knowledge system.

Managing Country

We are partnering with Indigenous land and sea managers to develop tools and methods to support them to do their business, address risk and change, plan and manage Country to create environmental, social, cultural and economic benefits.

Indigenous ecological knowledge

ala.org.au

In partnership with Indigenous communities working on country, the Atlas of Living Australia (ALA) is exploring the role of information management platforms in bridging the boundaries between traditional and contemporary Indigenous knowledge and western science.

Aboriginal Fish Traps *(Sovereign Union – First Nations Asserting Sovereignty, Facebook: posted 11 April 2021)*

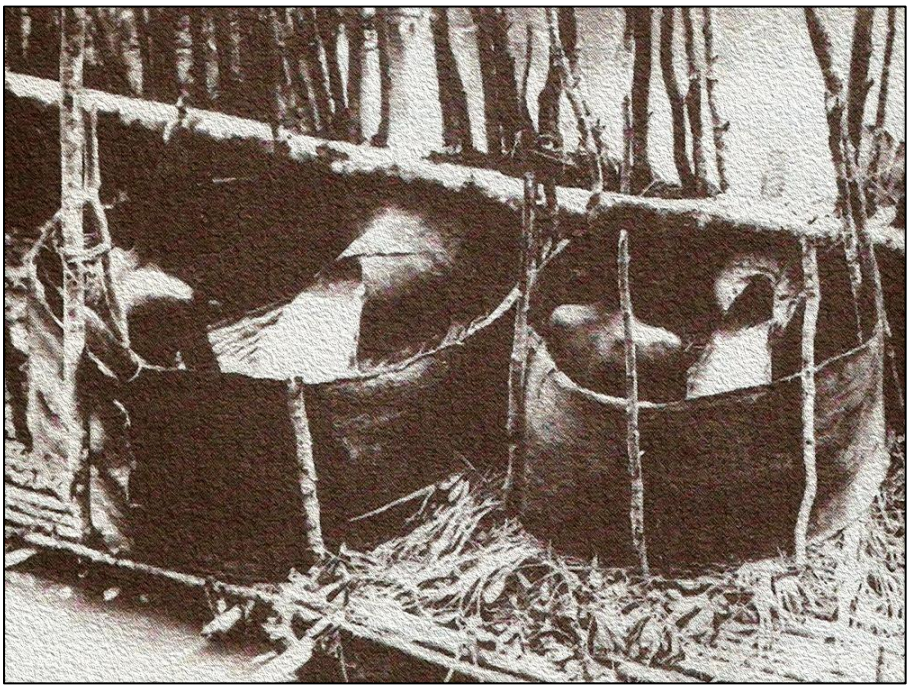
First Nations peoples used many methods of fishing and it appears that one of the principal methods was trapping them, using especially constructed weirs made of rock, bark or wood and once built, controlling the catches could be as easy as removing and replacing a few stones or sticks. The remains of a great number of large stone fish traps are still visible across Australia.

A wooden weir was reported by a naturalist in 1849 in anabranch [river diversion] of the Murray River between Robinvale and Mildura (Argus, 30 March 1850). Peter Beveridge (1889) described the existence of many of these structures adjacent to the Murray River at Tyntynder:

> *They make stake weirs across the drains, the stakes being firmly driven into the soil within an inch of each other, so that anything having greater bulk than that space must perforce remain on the landward side of the weir. Without any stretch of the imagination, the reader can easily fancy the shoals of fish which congregate behind these weirs when the river is falling, and what a very simple matter the taking of them must be. When fish are required, a native takes his canoe into the midst of one of these shoals, and harpoons as many as he wishes, or until he becomes tired of the fun* (Beveridge 1889).

One of the first written accounts of 'native stick weirs' in the basin came from Charles Sturt who observed them in anabranches of the Macquarie River in the Macquarie Marshes during December 1828:

> *We passed a singular scaffolding erected by the natives, on the side of the channel, to take fish; and also found a weir at the termination of it for the like purpose so that it was evident the natives occasionally ventured into the marshes* (Sturt, 1833)



BARK FUNNEL FISH TRAPS

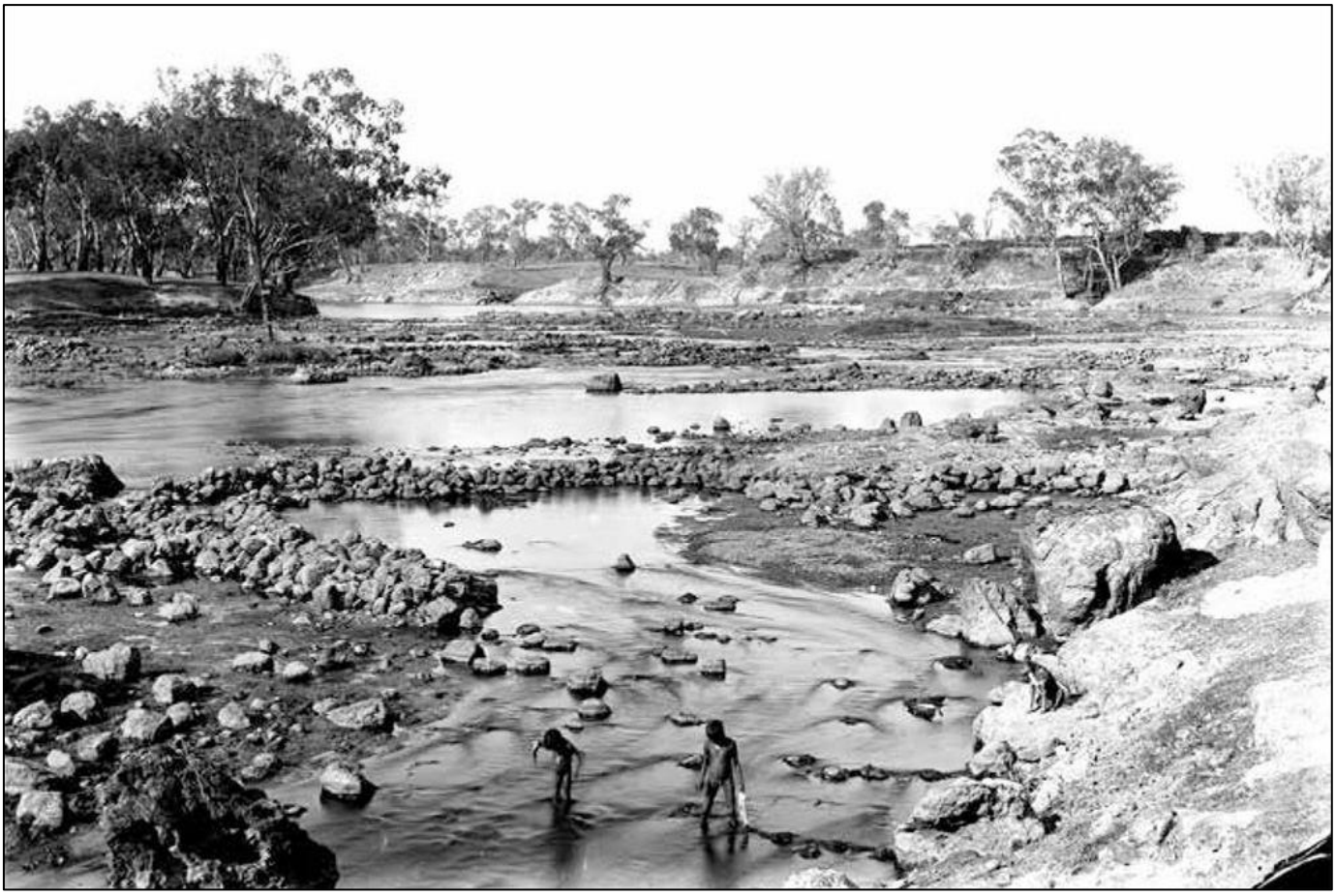
A river is blocked in its entirety by a dam wall with 2 bark funnels the only avenue for water and fish to flow through. Water from the river is funnelled into a bark enclosure in which sits a man, waiting for fish to land on the raised platform built above the water mark.

This image is a photo from the Glyde/Goyder River, north-central Arnhem Land, Northern Territory, 1930s. (Photo: Donald Thomson)

Dame Mary Gilmore (as seen on Australia's $10 note) lived for many years with and near Indigenous peoples. She made the following observations:

> *That the aborigines made fish-traps and fish-balks (as we used to call them when we came across them) is a fact. Sixty years ago, there were many of the smaller balks in existence, and white people knew them and made use of them for other purposes than those intended by the aborigines. The larger fish-traps were made for the great gatherings, and were invariably based on a running reef or*

natural outcrop of rock. There were a number of these places of gathering known to my people, and I often heard them spoken of. One of these was on the Clarence, one at Brewarrina, one on the Upper Murray, and one down near Hay or Nerrandera – it was near the swamps between these two places, the swamps being sanctuaries.



BREWARRINA FISH TRAPS - A complex network of river stones arranged to form ponds and channels that catch fish as they travel downstream, this trap is believed to date back at least 40,000 years. There are fish traps similar to this right across the continent and in both sea and rivers, but often in poor repair. *(Image from National Heritage Places)*

Where there were billabongs stone traps were not in use, as floods filled the bends and lagoons, and the fish had room to feed and grow as freshes replenished the supply. But on the long, slow waters of inland rivers stone traps were made where a suitable place was available, and these were keyed by temporary stones so that the size of the fish to go through them could be regulated.

The keys on one smaller stone trap on the Upper Murrumbidgee were shown my father and the manner of them explained to him. They were so placed and fitted that the current would not shift them and they could not be embedded in silt after floods. They were keyed, spaced and angled in a certain way to meet force, and yet let the water through.

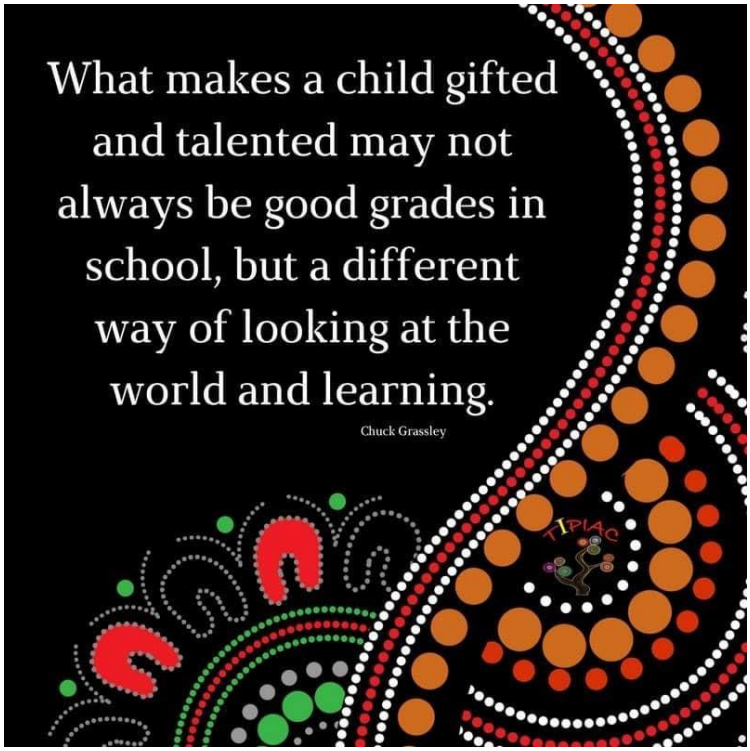
The small balks were made on tributary streams, and it was a public tribal duty to see that they were neither clogged nor broken down. As white settlement increased and stock took the place of human beings, my father pointed out, again and again, that these barriers were being destroyed, that the conservation of fish in the streams depending on them, that (as the aborigines taught) without them, the great fish would devour the smaller fish as the waters went down and that the end would be loss – a loss that the years since have proved to be fact, for we have had to replenish rivers that were once alive with fish.' (Mary Gilmore 1933)

The Dr Mandawuy Yunupingu AC lecture *(Rowena Ball, Australian Mathematical Society: December 2020)*

The Australian Mathematical Society @AustMS has created the annual Mandawuy Yunupingu lecture, to celebrate a great Indigenous educator and to centre Equity, Diversity, and Inclusion in mathematics. ISN member Rowena Ball had the honour of giving the inaugural lecture in Dec 2020. Rowena is a founding participant in the National Indigenous Research and Knowledges Network, and a member of the Australian Institute of Aboriginal and Torres Strait Islander Studies. She has a passionate interest in Indigenous scientific and engineering knowledge and heritage, and in encouraging young Indigenous people into STEM-based careers. She has published influential public policy papers on Indigenous engagement with STEM, and maintains a science blog with an Indigenous focus for students at remote Indigenous schools.

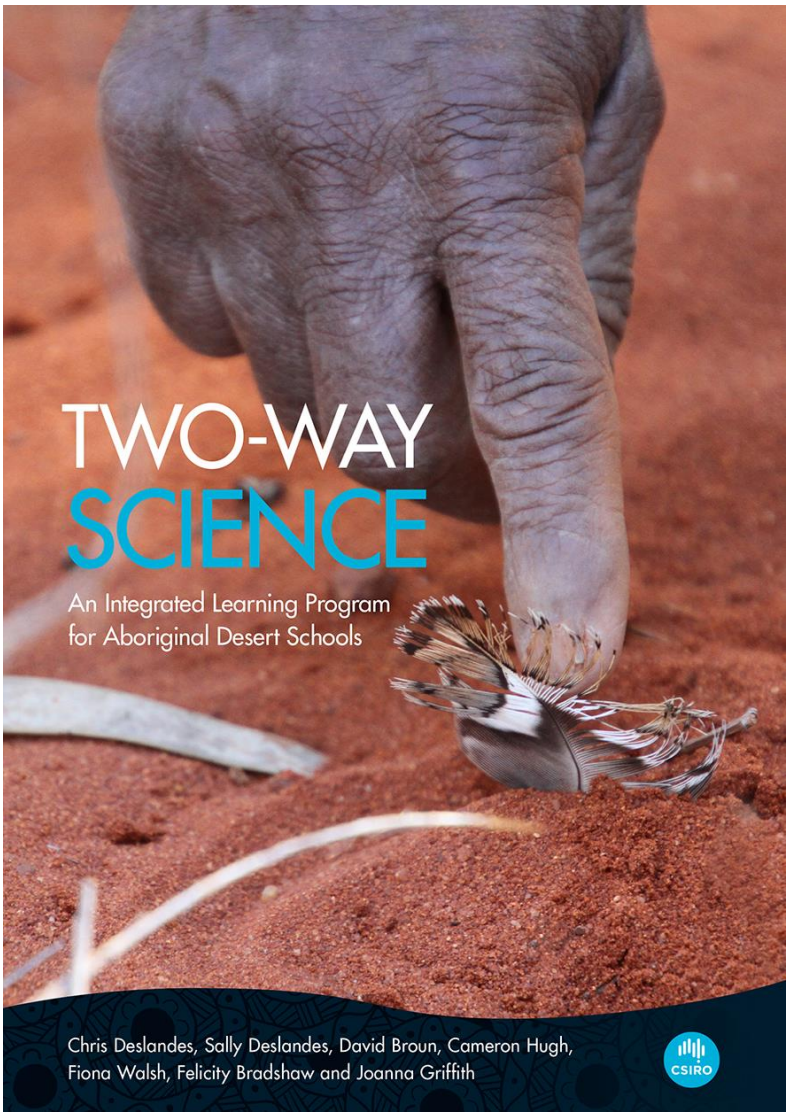
Title: **Clocks and cars and coded stars, and other complex things**

Abstract: In this lecture for the inaugural Mandawuy Yunupingu series I shall pay my respects to the Seven Sisters of the night sky, by taking you along a journey through maths and science songlines of cultures and histories. On this adventure first we meet some of the institutional gatekeepers of mathematics, and from them we learn how important advances in maths were driven by the economic imperatives of applied, real-world problems, such as the need to finance voyages of colonial invasion, robbery and slavery. We then take a tour of some lands of the Seven Sisters, where I tell stories about maths I do with school students of First Nations. Following a songline – literally – I shall describe current research on an Indigenous mathematical transform. As we move towards a broader and more inclusive understanding of mathematics, freeing us from the cultural confines of the white male priesthood that has been the dominant paradigm, we may begin to see exciting new research opportunities at the interface.



Two-Way Science – An integrated learning program for Aboriginal desert schools

Published by CSIRO in December 2019, this book helps connect the cultural knowledge of local Indigenous communities with Western science by supporting schools and communities to develop integrated learning programs that connect with the Australian curriculum. A two-way Science approach promotes Indigenous leadership in education, and fosters partnerships between schools, communities, Indigenous ranger programs and scientists.



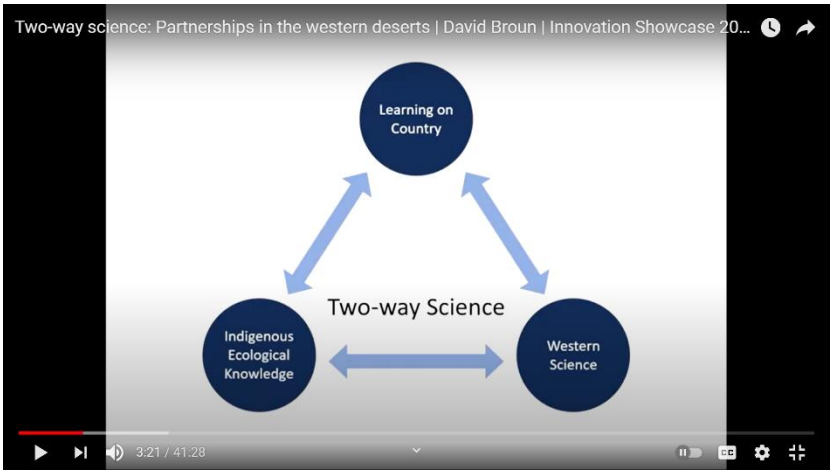
This book contains curriculum-linked education activities for primary and middle school students, and background knowledge for teachers, based on the desert regions of Australia. It outlines the pedagogy and practice of Two-way Science for primary school teachers, giving examples of Two-way Science process, activities and integrated planning ideas.

Containing images of activities, equipment and work samples, the book features quotes from senior Traditional Owners about the value of traditional ecological knowledge transfer. The book is organised into topics, units and activities that are consistent with a holistic Indigenous world-view and are linked to Australian science curriculum outcomes.

TOPICS
Places, maps and country
Water
Animals
Plants
Seasons, weather and astronomy

Two-way science: Partnerships in the western deserts | David Broun | Innovation Showcase 2019

The Science Pathways for Indigenous Communities program, funded by the BHP Foundation and delivered by CSIRO, has worked with seven schools in Western Australia since 2016 to develop unique integrated two-way science learning. In this video, David Broun, program coordinator at CSIRO, shows us how these experiences reframe remote Aboriginal community education as a field of opportunity in rich cultural and environmental landscapes. The accompanying book can be accessed un the previous item above.



Winds of Change

Winds of Change is the premier nationally distributed magazine with a single-minded focus on career and educational advancement for American Indians/Alaska Natives/Native Hawaiians/First Nations, with an emphasis on STEM.

The Mission of AISES and Winds of Change Magazine

The American Indian Science and Engineering Society (AISES) is a non-profit organization committed to significantly increasing Indigenous representation among science, technology, engineering and math (STEM) education programs and career paths all across North America. This people group, due to many extenuating factors, has historically been on the outside looking in when it comes to STEM initiatives.

One of the society's core ways of growing the professional and educational success of American Indians, Alaska Natives, Native Hawaiians, First Nations and other Indigenous peoples of North America is through their Winds of Change Magazine, which is published 5 times a year. This magazine aims to push future generations of Native peoples to advance their education and careers by highlighting AISES' advancements and shining a light on Indigenous innovators, movers, and shakers in the STEM fields. To further this goal and extend their reach, AISES has recently embraced digital solutions to share Winds of Change with mobile users.

Indigenous Education Institute

The Indigenous Education Institute (IEI), was created in 1995 as a non-profit institution with a mission to preserve, protect and apply traditional Indigenous knowledge in a contemporary setting, that of Indigenous peoples today, around the world. IEI has developed numerous projects that preserve traditional knowledge, protect the knowledge in terms of Indigenous protocol, and apply it to areas such as astronomy and other science disciplines.

IEI is located in Friday Harbor, Washington State, with branch offices in Albuquerque, New Mexico, and Ganado, Arizona, and is composed of key administrators and board members from various Indian Nations. The Board of IEI is comprised of Indigenous leaders, with an International Advisory Board of noted individuals from all walks of life.

Video Resources from IEI

Sense of Place Series: Indigenous Perspectives on Earth and Sky

Rethinking our Science: Blackfoot Meta-Physics waiting in the wings (20 May 2020)
Dr. Little Bear compares the historical foundations of scientific thought from European and Indigenous perspectives, identifying paradigm differences that have become contemporary challenges to collaboration in resource management.

’Imiloa: Sharing Hawai’i’s legacy of exploration (18 June 2020)
Ka’iu Kimura spoke about the importance of place and of growing up in a Native Hawaiian family with close ties to places of familial connections on Hawai’i Island. She discusses the creation of the `Imiloa Astronomy Center on the University of Hawai’i campus in Hilo, and how it was built on a foundation of collaboration between culture, science and community amidst tensions over the further development of astronomy in Hawai‘i.

The Fortress, the River and the Garden – a new metaphor for symbiosis between Indigenous and scientific knowledges (20 August 2020)
Dr. Kimmerer is the author of Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge, and the Teachings of Plants. She continues her work as SUNY Distinguished Teaching Professor at SUNY College of Environmental Science and Forestry.

Native Astronomy Through Native Eyes (10 September 2020)
Dr. Gregory Cajete, PhD is Professor Emeritus and former Director of the Native American Studies program at the University of New Mexico. He is a renowned author and artist from Santa Clara Pueblo, New Mexico. He has pioneered reconciling Indigenous perspectives in science with a western academic setting. His focus is on teaching culturally based science, with its emphasis on health and wellness.

He Lani Ko Luna, A Sky Above – In losing sight of the land you discover the stars (15 October 2020)
Pwo navigator Chad Kālepa Baybayan spoke about the resurgence of Oceanic Wayfinding, the indigenous art of non-instrument navigation and orientation at sea, voyaging on board double-hulled deep-sea canoes and modern-day efforts to recapture the spirit of traditional expeditions of exploration.

A Hub for Indigenous Science, Technology and Society - Indigenous STS

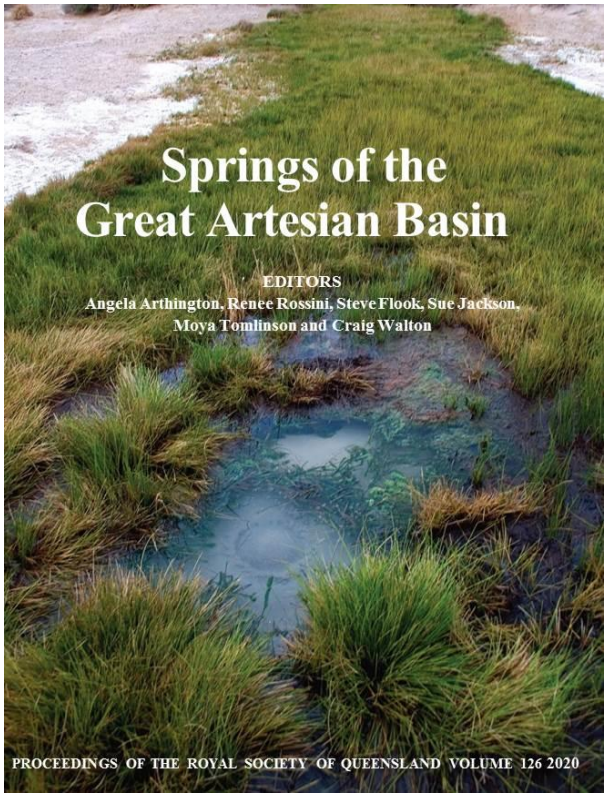
(University of Alberta)

INDIGENOUS
science | technology | society

Indigenous Science, Technology, and Society (Indigenous STS) is an international research and teaching hub, housed at the University of Alberta, for the bourgeoning sub-field of Indigenous STS. Our mission is two-fold: 1) To build Indigenous scientific literacy by training graduate students, postdoctoral, and community fellows to grapple expertly with techno-scientific projects and topics that affect their territories, peoples, economies, and institutions; and 2) To produce research and public intellectual outputs with the goal to inform national, global, and Indigenous thought and policymaking related to science and technology. Indigenous STS is committed to building and supporting techno-scientific projects and ways of thinking that promote Indigenous self-determination.

PAPERS

Aboriginal People and Groundwater
(Brad Moggridge: 2020)



Brad is a valued ISN member and writes of this paper:

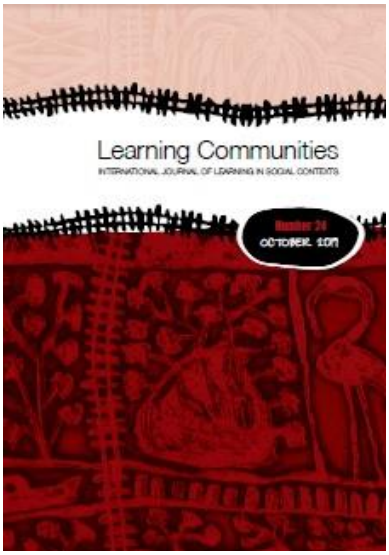
Hi all

After being awarded my Master's 16 years ago along with submitting my thesis- **Aboriginal People and Groundwater** to UTS's National Centre for Groundwater Management, it is finally published (in a shorter form), and so glad Prof Angela Arthington believed in it and now hope it adds to the scholarship of our understanding and value of groundwater.

Please check it out and have a look at the other 18 amazing papers:

http://www.royalsocietyqld.org/2020-springs-special-issue-vol-126/

Towards an understanding of Indigenous perspectives through the eyes of pre-service science education students *(Gregory Smith & Michael Michie: Oct 2019)*

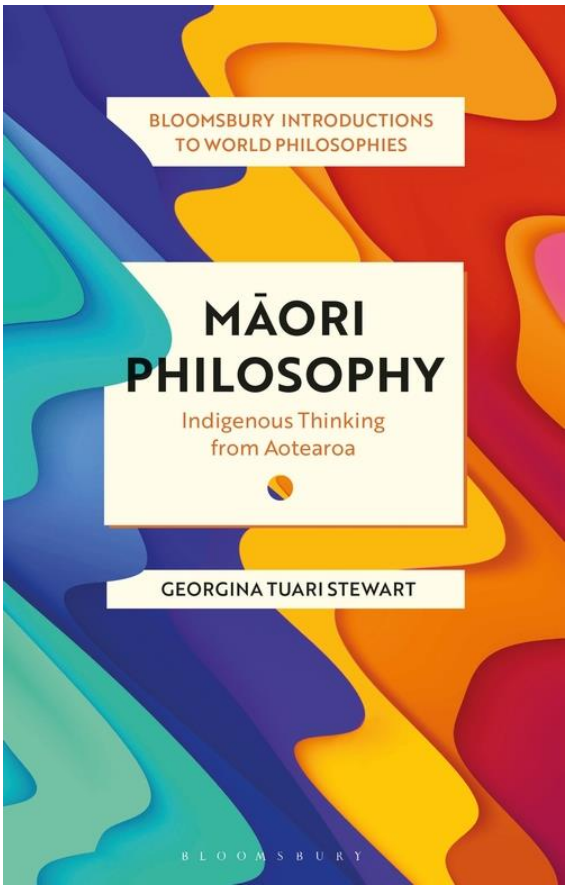


This paper presents an analysis of 'Indigenous perspectives' as presented by 150 pre-service teachers of science education. They were presented with an open ended task that required them to choose a concept or topic in school science, and then incorporate their understanding of an Indigenous perspective relative to their chosen science concept. The demonstration of their science concept Indigenous perspective used network visualisation: concept maps or mind maps. Here the connections between Western science knowledge, Indigenous knowledge and knowledge application elements of the visualisations represented student constructed understandings or perceptions.

Smith, G., & Michie, M. (2019). Towards an understanding of Indigenous perspectives through the eyes of pre-service science education students. *Learning Communities: International Journal of Learning in Social Contexts*, 24, 22-39. DOI: https://doi.org/10.18793/lcj2019.24.03

Māori philosophy: Indigenous thinking from Aotearoa *(Georgina Stewart: 2021)*

Māori philosophy is for anyone who wishes to use Indigenous philosophies in their own research, scholarship and teaching. Covering the symbolic systems and worldviews of the Indigenous peoples of Aotearoa, New Zealand, this book is a concise introduction to Maori philosophy. It addresses core philosophical issues including Maori notions of the self, the world, epistemology, the form in which Maori philosophy is conveyed, and whether or not Maori philosophy has a teleological agenda.



> "A significant, groundbreaking and fascinating book that examines Maori philosophy in a meaningful and contemporary way. It will become a core text for the many courses that draw on Indigenous knowledge and Matauranga Maori, educating and challenging the way we think." – Linda Tuhiwai Smith, Professor of Maori and Indigenous Studies, Waikato University, New Zealand

Stewart, G.T. (2021). *Māori philosophy: Indigenous thinking from Aotearoa.* London: Bloomsbury Academic.

Miskâsowin: Indigenous Science, Technology, and Society, *(Jessica Kolopenuk, Faculty of Native Studies, University of Alberta, Edmonton: Feb 2020)*

Indigeneity has been a site of relationally produced knowledge deemed scientific and political. In this article, I offer an experimental description of *Miskâsowin*—an Ininiw/Cree theory of science, technology, and society. This methodological piece is part of an overall project that seeks to understand how changes in technoscience often correlate with changes in the relationships and biotechnologies that colonial nation-states and their citizenries, scientific fields and their researchers, and bio-economies and their consumers use to form themselves through, in spite of, and (sometimes) as Indigenous peoples. Creating Indigenous theories of the techno-sciences that affect them is disruptive of colonial ontologies of knowledge and sovereignty. *Miskâsowin* is part of an emergent subfield of Indigenous Studies: **Indigenous Science, Technology, and Society (I-STS).** I use this framework to map partial connections whereby Cree concepts of *tapwewin* (truth-telling), *miskâsowin* (finding one's core), and *misewa* (all that exists) resonate with relational academic theoretical frameworks including that of Pierre Bourdieu, Michel Foucault, and Aileen Moreton-Robinson. I do so in ways that are uniquely adapted to my (the researcher's) relationships (and the genealogies that they are routed through) with genomic knowledge and indigeneity; with the scientific and policy fields in Canada (and beyond); and with my own research/er integrity.

Kolopenuk J. Miskâsowin: Indigenous Science, Technology, and Society. *Genealogy. 2020; 4(1)*:21. https://doi.org/10.3390/genealogy4010021

Incorporating Two-Ways Thinking about Time into the Science Curriculum

Michael Michie[1], Joël Rioux[1] and Michelle Hogue[1,2]

[1] Batchelor Institute of Indigenous Tertiary Education, Darwin NT 0820, Australia

[2] University of Lethbridge, Lethbridge AB, T1K 3M4, Canada

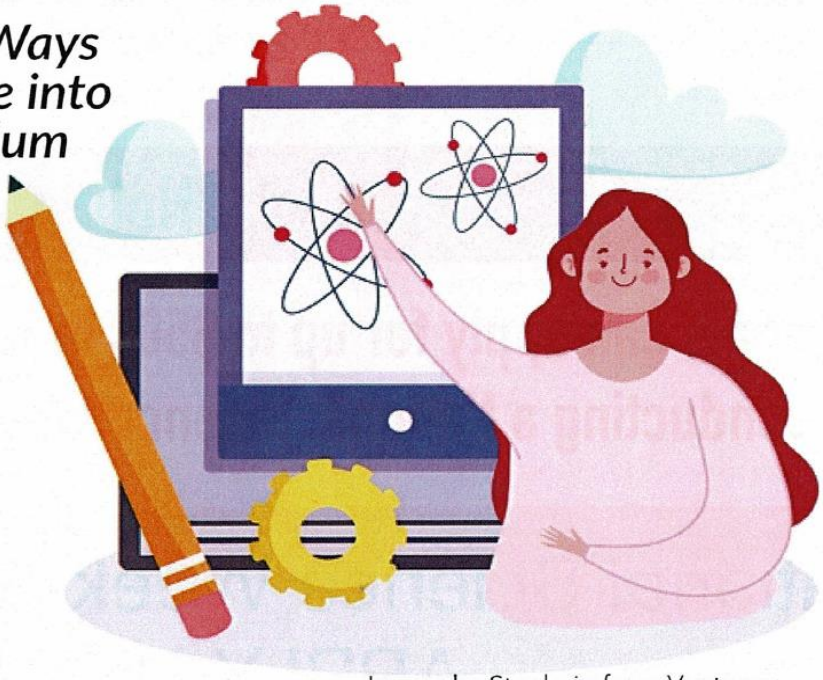


Image by Stockgiu from Vecteezy

Michie, M., Rioux, J., & Hogue, M. (2021). **Incorporating two- ways thinking about time into the science curriculum.** *Teaching Science, 67*(1), 36-43.

Abstract

We suggest that two interpretations of time — linear time and cyclical time — that complement each other when planning lessons, can be used in both Western and Indigenous science. The idea of time in the Australian Curriculum: Science is examined and seen to be primarily associated with the Western science tradition, so it is suggested that the curriculum could be more inclusive of Indigenous ways of thinking with transdisciplinary links to mathematics also being included. It is suggested that the inclusion of the 'Aboriginal and Torres Strait Islander Histories and Cultures' cross-curriculum priority into science can be achieved in three ways: as Indigenous perspectives, through the Two-Ways approach, and through the Two-Ways approach with epistemic insight. Possible activities relating to seasons and cycles are suggested for the inclusion of these Indigenous perspectives in the science classroom.

If you would like to be sent a copy of the paper, please contact co-author Mike Michie via email:

Michael.Michie@batchelor.edu.au

Ruddell, N. (2021). **Mutual cultural responsivity: Towards a framework for contemporary school science – an open letter to educators and school communities.** *Teaching Science, 67*(1), 31-34.

Indigenous and Western Scientists and Knowledge Holders Partnering for the Public Good

(Katarzyna Nowak and Jared Gonet, Union of Concerned Scientists: 7 April 2021)

We are two conservationists: a First Nations Yukoner and Canadian, and a first generation immigrant-settler with dual Poland-U.S. nationality. Our paths crossed through mutual interest in Indigenous-led stewardship, Two-Eyed Seeing, and holistic approaches like One Health. We are proponents of two-eyed seeing which means, "To see from one eye with the strengths of Indigenous ways of knowing, and to see from the other eye with the strengths of Western ways of knowing, and to use both of these eyes together". With two-eyed seeing, it becomes easier to see, for example that the health of people, wildlife and our shared environments is so intertwined as to be one ("One Health").

Protect the Arctic Refuge youth rally in front of the Yukon legislative assembly. *Image supplied with paper.*

We think that an exciting paradigm shift is underway that could transform how we engage with governments and other institutions for the public good.

Now is a time for justice for all species, places — for our planet. Scientists would do well to learn from civil rights movements, become advocates, communicators, and sources of deep equity that push against dominant western narratives that limit equity and too often represent a singular lived experience. We must practice science with a heart. We must tell stories that address the crises we face. We must open ourselves to spirituality and to diverse ways of knowing.

Legacies of Indigenous land use shaped past wildfire regimes in the Basin-Plateau Region, USA *(Carter, V.A., Brunelle, A., Power, M.J. et al.) 2021*

Climatic conditions exert an important influence on wildfire activity in the western United States; however, Indigenous farming activity may have also shaped the local fire regimes for millennia. The Fish Lake Plateau is located on the Great Basin–Colorado Plateau boundary, the only region in western North America where maize farming was adopted then suddenly abandoned. Here we integrate sedimentary archives, tree rings, and archeological data to reconstruct the past 1200 years of fire, climate, and human activity. We identify a period of high fire activity during the apex of prehistoric farming between 900 and 1400 CE, and suggest that farming likely obscured the role of climate on the fire regime through the use of frequent low-severity burning. Climatic conditions again became the dominant driver of wildfire when prehistoric populations abandoned farming around 1400 CE. We conclude that Indigenous populations shaped high-elevation mixed-conifer fire regimes on the Fish Lake Plateau through land-use practices.

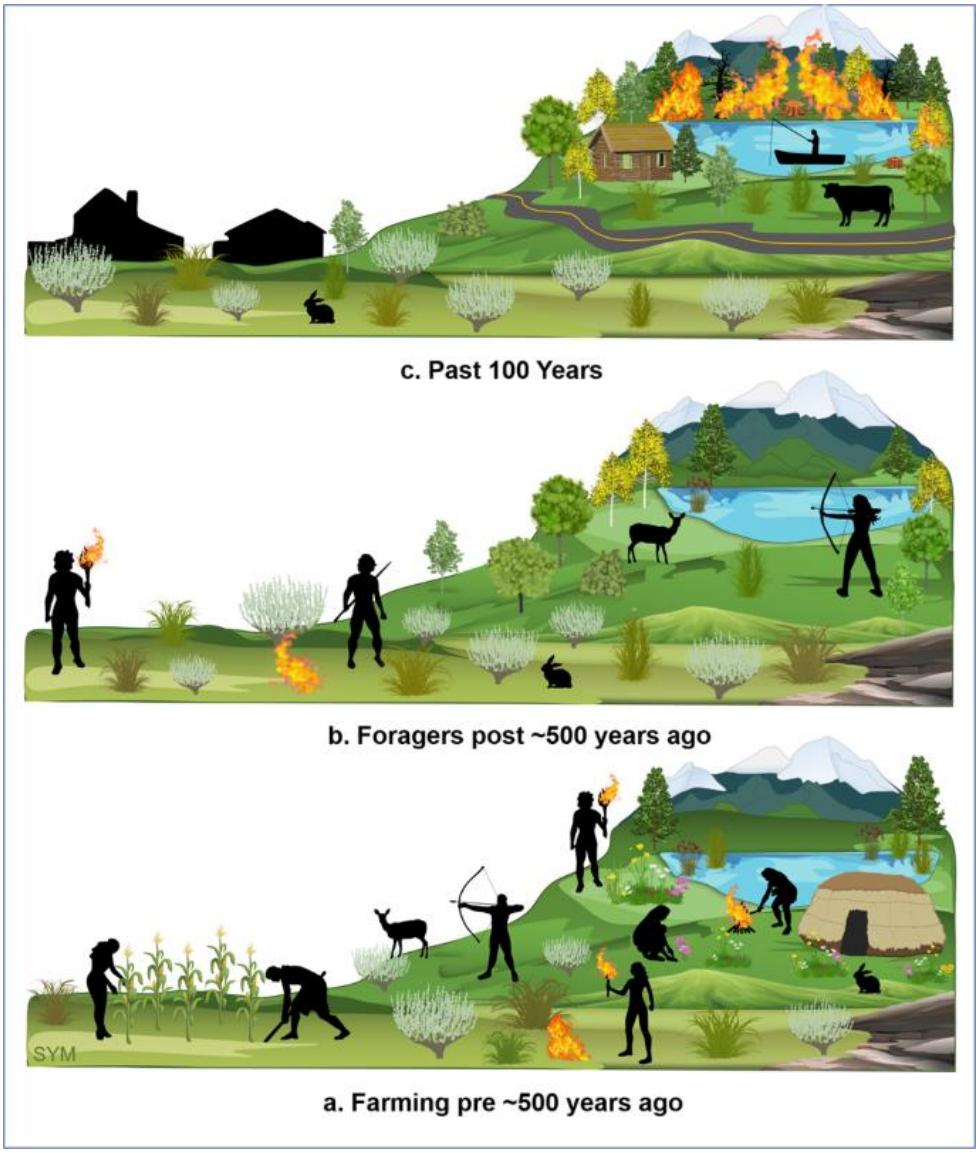


Fig. 4: Conceptual diagram illustrating changing land use over the past 1200 years in the Basin-Plateau Region of south-central Utah. *Image supplied with paper.*

Carter, V.A., Brunelle, A., Power, M.J. et al. **Legacies of Indigenous land use shaped past wildfire regimes in the Basin-Plateau Region, USA.** *Commun Earth Environ* ***2***, 72 (2021). https://doi.org/10.1038/s43247-021-00137-3

Indigenous Peoples Online Newsroom *(Covering Climate Now)*

Indigenous Peoples may be the most important—yet most overlooked—climate solution available, according to peer-reviewed science.

Ahead of Earth Day (22 April 2021), a global alliance of Indigenous Peoples representing communities from Brazil, Indonesia and Mesoamerica present local case studies illustrating what independent scientists have confirmed: saving the world's forests requires protecting the rights of Indigenous Peoples, who are the best guardians of those forests.

Earth Day is an annual event on April 22 to demonstrate support for environmental protection.

Reports and peer reviewed studies

A growing body of evidence suggests the conservation groups, governments and corporate actors that have committed to addressing climate change and biodiversity loss will fall short or meeting their goals, unless they partner with the Indigenous Peoples and local communities who manage the world's most forested and biodiverse landscapes.

Environmental Science & Policy: Vertebrate biodiversity on indigenous-managed lands in Australia, Brazil, and Canada equals that in protected areas November 2019 Link

IPCC special report on Climate change and Land. Chapter 7: Risk management and decision making in relation to sustainable development. December 2019 Link

Nature Sustainability: A spatial overview of the global importance of Indigenous lands for conservation July 16, 2018 Link

Ecological Economics: Titled Amazon Indigenous Communities Cut Forest Carbon Emissions November 2018 Link

ISN members are encouraged to submit items exploring any aspects of Indigenous science teaching or education. As the Bulletin is not an official journal or organ of any recognised institution, we are not required to enforce any formatting, editing or reviewing regimes. We do have an Advisory Board made up of eight First Nations Co-Editors who view all items before publication. If you are doing something valuable in Indigenous science, teaching or education, please consider telling your story here!

INDIGENOUS ASTRONOMY

This section of the bulletin is curated by Dr Duane Hamacher, Associate Professor of Cultural Astronomy, Centre for All-Sky Astrophysics in 3-Dimensions, School of Physics, University of Melbourne, Australia. Duane has a long history of involvement in this area and his regular contributions to this Bulletin are much appreciated.

Chaco Culture National Historical Park and Indigenous Astronomy *(Facebook page accessed 14 April 2021)*

Chaco Culture National Historical Park protects some of the earliest ancient Puebloan structures, including Pueblo Bonito and the largest kiva in the southwest at Casa Rinconada.

Established as a National Monument in 1907 and a National Historical Park in 1980, Chaco Culture National Historical Park protects some of the earliest ancient Puebloan structures, including Pueblo Bonito and Casa Rinconada.

Various petroglyphs found within the park appear to be correlated with sun and moon observations made in ancient times.

In 2013, Chaco was established as an International Dark-sky Park and has an observatory where modern-day astronomers can peer back in astronomical time and learn about the universe's past.

It's the #FirstDayofSpring! In the Northern Hemisphere, the March equinox (aka spring equinox or vernal equinox) occurs when the Sun crosses the equator line, heading north. This event marks the start of spring in the northern half of the globe. The Chacoan people were close observers of the skies and seasonal cycles, and their observations gave them the invaluable ability to time their agricultural and ceremonial events, which were central to their survival. Today, Puebloan descendants carry on many of these same traditions. *Image: Sunlight streams through stone opening at Chaco Culture National Historical Park. NPS/Davis*

Two Eyed Seeing: Hawaiian Indigenous Astronomy & NASA Moon to Mars

(Native Skywatchers: 12 March 2021)

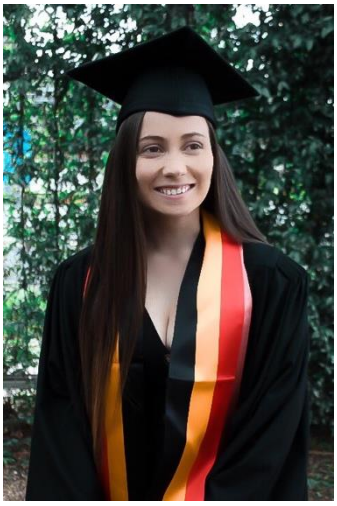
Video presentation on Hawaiian Indigenous Astronomy including the revitalization of Wayfinding and traditional Hawaiian methods of navigation. Students from the Volcano School of Arts and Sciences will present their research which will include a place-based activity, "Make Your Own Hawaiian Star Compasses" and essential understanding of the Hawaiian Star Families. Also, an important discussion on the parallels between the Indigenous Hawaiian process of choosing a crew and the NASA process used for the Artemis Moon mission (2024) and later the Mars mission (2030's), both grounded in similar missions of exploration but employing different technologies.

The Moon plays an important role in Indigenous cultures and helped win a battle over sea rights *(Duane Hamacher, The Conversation: 21 Feb 2021)*

This image shows Torres Strait dancers performing a *kab kar* moon dance. This dance was crucial in helping the Meriam Islanders win their legal battle for sea rights 10 years ago. *Image from Duane Hamacher.*

In the Torres Strait, the Moon plays an important role in culture, identity and daily life. Every aspect of our natural satellite - from its phase, position, appearance and brightness - has special significance and meaning. Lunar phases link to the changing tides, a relationship that is well established in Islander knowledge systems. One practical application links to fishing. Elders teach that the best time to fish is during a neap (lower amplitude) tide during the First or Last Quarter Moon, rather than a spring (higher amplitude) tide during the New or Full Moon phase. The spring tides are much bigger, meaning the tidal waters rush in and out more significantly, stirring up silt and sediment on the sea floor. This clouds the water, making it harder for fish to see the bait and fishers to see the fish. The waters of spring tides also pull fish out to sea. During the smaller neap tides, the water is clearer and fish don't move as far, making them easier to see and catch.

Congratulations to recent First Nations graduates!



LEFT: Krystal De Napoli, a Gamilaraay woman, recently graduated with a degree in astrophysics from Monash University!

RIGHT: Peter Reeve, a Wirangu man, recently graduated with a degree in physics and space science from the University of Adelaide!

Commemorative Coins

In March, the Royal Australian Mint released the third and final instalment of the Star Dreaming series of commemorative coins. The three coins featured different aspects of traditional Star Knowledge from across Australia.

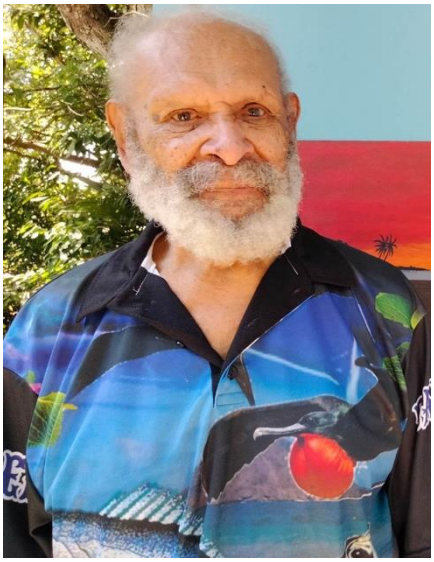
The first coin, *The Emu in the Sky*, features the work of Wiradjuri artist **Scott 'Sauce' Towney** from Peak Hill, NSW. Sauce specialises in drawing and pyrography (wood burning) and was a finalist in the NSW Premier's Indigenous Art Awards. The coin features *Gurgurmin*, the celestial emu, which is traced out by the dark spaces in the Milky Way. The coin features a male emu sitting on the eggs during the months of June and July when his celestial counterpart is stretched across the sky. It also shows men dancing in a ceremony, which takes place in August and September.

The second coin, *The Seven Sisters*, features the work of Wajarri-Noongar artist **Christine Jugarnu Collard** of Yamaji Art in Geraldton, WA. Her artwork has been part of the "*Ilgarijiri – Things Belonging to the Sky*" art exhibition that has travelled the globe. The coin shows the Pleiades star cluster, named *Nyarluwarri* in the Wajarri language, which represents seven sisters who flee to the sky after being chased by a man. When Nyarluwarri sits low on the horizon at sunset in April, the people know that emu eggs are ready for harvesting.

The third coin, *A Shark in the Stars*, features the work of Meriam senior elder and artist **Segar Passi**, on Mer in the eastern Torres Strait. Uncle Segar is a world famous, award winning artist who has exhibited his art globally. The coin features *Beizam*, the shark in the Big Dipper (Ursa Major). The changing position of the shark in the northern skies throughout the year is a seasonal marker that notes shifting seasons. Later in the year, the shark dives deep into the sea at dusk, splashing water into the sky that falls as the rains of the Kuki (wet season). This is signalled by lightning flashes.

From fireballs in the sky to a shark in the stars: the astronomical artistry of Segar Passi

(Duane Hamacher, the Conversation, 8 April 2021)



When Uncle Segar Passi watches the position of the setting Sun from his front patio, he notes its location and relates that to the time of year and changes in seasonal cycles. What he sees translates into his artworks. They are visually stunning, a rich tapestry of colours jumping off the frame with a palate that easily rivals Vincent van Gogh. This is reflected in the many awards he has garnered over the years. His artistic talent is matched only by the depth of his wisdom and cultural knowledge, which he teaches through his practice.

Images Below:
Kerkar Meb I (Left) and II (right), 2011. These paintings by Segar Passi show the changing orientation of the crescent Moon, which informs seasonal weather patterns. *Segar Passi. QAGOMA, Brisbane.*

Aboriginal Astronomers

To keep up with the latest events, talks, and science communication, please follow these Aboriginal astronomers on Twitter:

- Kirsten Banks (Wiradjuri) @AstroKirsten (pictured right)
- Karlie Noon (Gamilaraay) @karlie_moon_
- Krystal De Napoli (Gamilaraay) @KrystalDeNapoli
- Pete Swanton (Gamilaraay) @PeteSwanton
- Peter Reeve (Wirangu) @Reevesy_1979
- Dr Stacy Mader (Gidja) @stacy_mader
- Australian Indigenous Astronomy @AboriginalAstro

COSMOS

COSMOS Magazine now features a monthly 2-page article on different aspects of Indigenous Astronomy. The latest issue (Issue 90) features an article by Karlie Noon and Duane Hamacher about lunar traditions across Australia.

Karlie Noon and Duane Hamacher, **Lunar Traditions of the First Australians**, Cosmos, Issue 90

WEBSITES

To learn more and attend upcoming events, please follow us on social media and visit our website

- www.aboriginalastronomy.com.au
- www.facebook.com/AboriginalAstronomy
- twitter.com/aboriginalastro

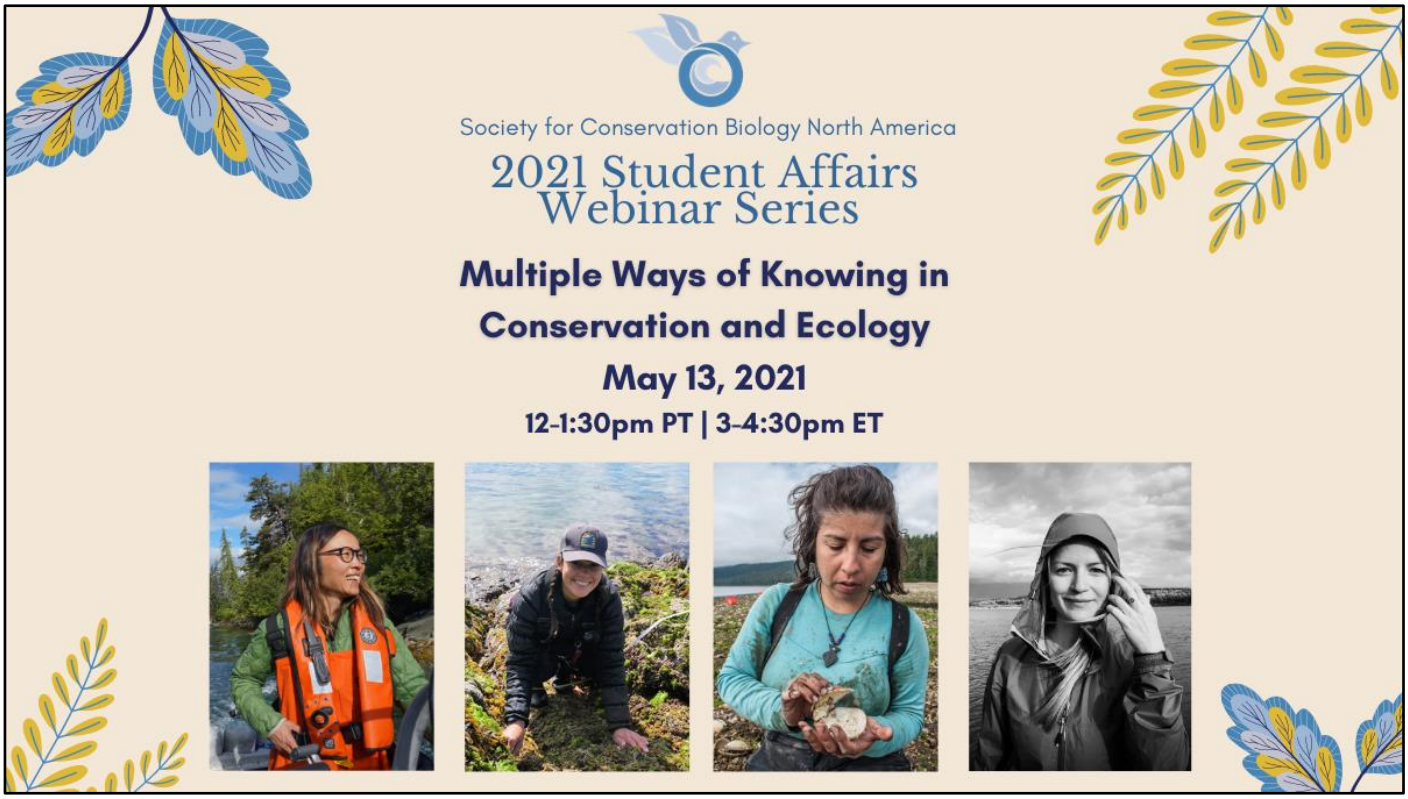
CONFERENCES / SEMINARS / WEBINAIRS

Multiple Ways of Knowing in Conservation and Ecology

SCB North America's Student Affairs Committee is hosting a 2021 webinar series on topics of interest to conservation students, early-career professionals, and others! The fourth webinar in the monthly series is:

Multiple Ways of Knowing in Conservation and Ecology
Thursday, May 13
12-1:30pm PT | 3-4:30pm ET

Ecosystems have been occupied, managed, & conserved since time immemorial. Pairing Indigenous Knowledge with western science, each with their own integrity, can allow for a more comprehensive view of ecosystem changes and species interactions.

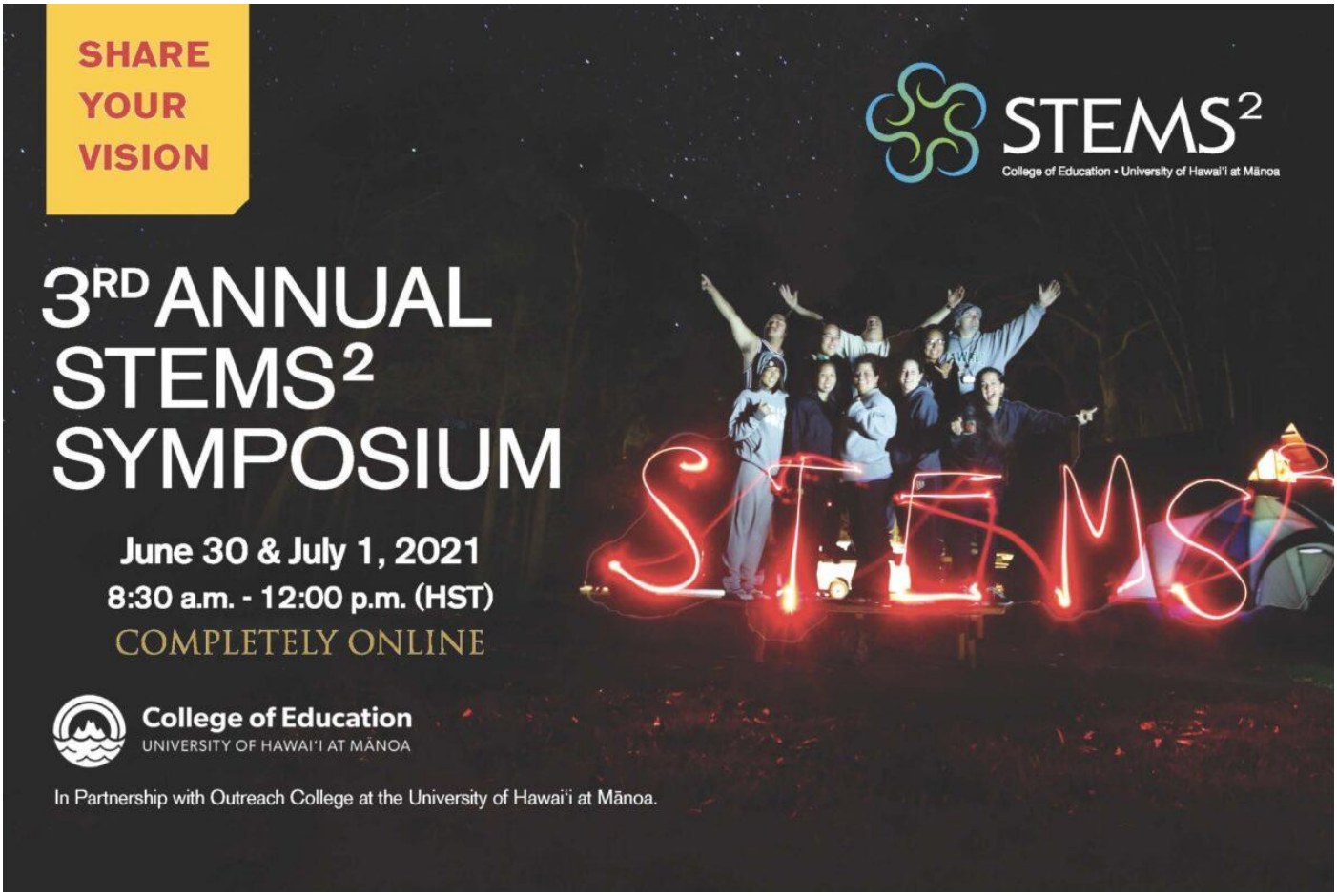


Join us as we discuss key concepts and case studies with (left to right in image above):

Dr. Lynn Lee, Marine Ecologist, and
Niisii Guujaaw, Resource Conservation Biologist, at Gwaii Haanas National Marine Conservation Area Reserve and Haida Heritage Site,
Dr. Sonia Ibarra, Coordinator for the Tamamta Program at the University of Alaska Fairbanks, and
Dr. Andrea Reid, PI. at the University of British Columbia Centre for Indigenous Fisheries

Registration is required, please register at this link: https://us02web.zoom.us/meeting/register/tZcqdOqqrjIjE92xfutWrPVrMDLHprgv5c3J

3rd Annual STEMS^2 Symposium: Call for Proposals



Submit a proposal by May 14, 2021!

We invite you to share your knowledge with fellow teachers, students, policy makers, cultural practitioners, and STEM and STEMS2 (Science, Technology, Engineering, Mathematics, Social Sciences and Sense of Place) enthusiasts at the 3rd Annual STEMS2 Symposium.

When: June 30 & July 1, 2021 from 8:30am-12:00pm

Where: ZOOM

Registration: Details will be sent out later this month

Cost: FREE! (opportunities to donate)

Our goal is to create a dynamic learning environment grounded in the value of A‘o (to teach and learn in a reciprocal relationship). We are looking to highlight work that focuses on interdisciplinary/transdisciplinary, place and culture-based education.

stronger smarter institute

Incorporate Indigenous Knowledges into your STEM teaching programs!

Announcing our SSiSTEMIK Pathway Professional Development program in Perth, WA, June 2021

Jarlarla

Waanyi-Garrawa

adjective

to ignite... to set ablaze

SSiSTEMIK Pathway's latest on country PD offering will ***jarlarla (set ablaze)*** your understanding of Indigenous Knowledges as living, rigorous and robust with the STEM curriculum

Jarlarla will:

- Expand your knowledge and understanding of STEM and Indigenous STEM opportunities in Australia
- Expose participants to IK experts and strategies to engage IK experts in your community
- Help you understand how to locate and evaluate culturally competent IK resources
- Develop your ability to apply culturally responsive resources and practices
- Get you to collaborate and create place-based solutions to how implement IK into your individual school context

FIND OUT MORE

When: 21/6/2021 - 23/6/2021

Where: Perth, Western Australia

Cost: $Cost: $1500 ex GST / person (educator price, $3000 non-educator)

Special offer: Travel and Accommodation subsidies available

REGISTER NOW

Australian Government
National Indigenous Australians Agency

NIAA

stronger smarter institute

Incorporate Indigenous Knowledges into your STEM teaching programs!

Announcing our SSiSTEMIK Pathway Professional Development program in Katherine NT, August 2021

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- Get you to collaborate and create place-based solutions to how implement IK into your individual school context

FIND OUT MORE

When: 3/8/2021 - 5/8/2021

Where: Katherine, Northern Territory

Cost: $1500 ex GST / person (educator price, $3000 non-educator)

Special offer: Travel and Accommodation subsidies available

REGISTER NOW

Australian Government
National Indigenous Australians Agency

NIAA

VAEAI is the peak body for Koorie education and training in Victoria, providing policy advice to the State Government. VAEAI is a state-wide community-based organisation comprised of 30 Local Aboriginal Education Consultative Groups (LAECGs), across eight regions in Victoria.

ASERA Conference 2021

The Australasian Science Education Research Association

Promoting science education research in all contexts and at all levels of education

ASERA 52, the next Australasian Science Education Research Association Conference, will be held in Adelaide from 30 June - 2 July. There is the option of participating face-to-face or online. The call for papers is open. Details of how to send your abstract are available at:

https://asera.org.au/conferences/2021-conference/call-papers-asera-52

Conference of the European Science Education Research Association (ESERA 2021)

ESERA 2021
Fostering scientific citizenship in an uncertain world
30 Aug - 3 Sep 2021
Organised by
University of Minho, Braga, Portugal

The University of Minho (UMinho), in Braga, Portugal, is proud to organise the ESERA Conference 2021 to be held from 30 August to 3 September 2021. This 14th Conference of the European Science Education Research Association (ESERA 2021) will be held as an exclusively virtual conference due to the current Coronavirus situation and travel restrictions.

We expect this ESERA Conference 2021 will bring together the international science education research community where we will be able to share our research and to engage in discussion about the pressing issues in science education. “Fostering scientific citizenship in an uncertain world” is the theme of this 14th edition, which was selected having in mind the severe social and educational changes resulting from this recent public health problem.

We hope you will join us for an excellent virtual ESERA Conference!

Prof. Graça S. Carvalho, (UMinho)
The ESERA 2021 Conference President

2021 INTERNATIONAL CONFERENCE ON TECHNOLOGIES IN STEM 'LIVE'

ICTSTEM 2021 is moving forward with a physical event in 2021!

We're pleased to announce that 2021 International Conference on Technologies in STEM (ICTSTEM 2021), organized by East Asia Research and supported by Australia's Curtin University, will be live, in-person, in Singapore from December 14-15, 2021! Learn from the masters of STEM education at the premier conference for the global Educator community. The conference aims to further the application of technology education within STEM and specific learning areas. Within Technology education, students use design and/or computational thinking and technologies to generate and produce designed solutions both digital and physical for authentic problems. As such it applies to many areas of STEM.

We invite practitioners and researchers to network and share their experiences. Teachers, and heads of learning areas as well as teacher educators, researchers and HDR researchers from K to higher education are all encouraged to attend. A broad range of technology education topics, including significant developments as well as innovative uses of technology that promote learning, performance, and instruction, will be presented at ICTSTEM 2021.

Keynote Speakers:

Dr. Jeremy Pagram, Former Technologies Coordinator School of Education Edith Cowan University
Dr. P John Williams, Professor of Education and the Director of Graduate Research, School of Education, Curtin University

You'll find this conference lively, informative and inspiring. We have set the last day of registration to be on the 15th Nov 2021, giving you ample time to decide. There are virtual options if travelling is difficult. Head over to our ICTSTEM 2021 website www.sldt.ear.com.sg to find out more. Go for it.

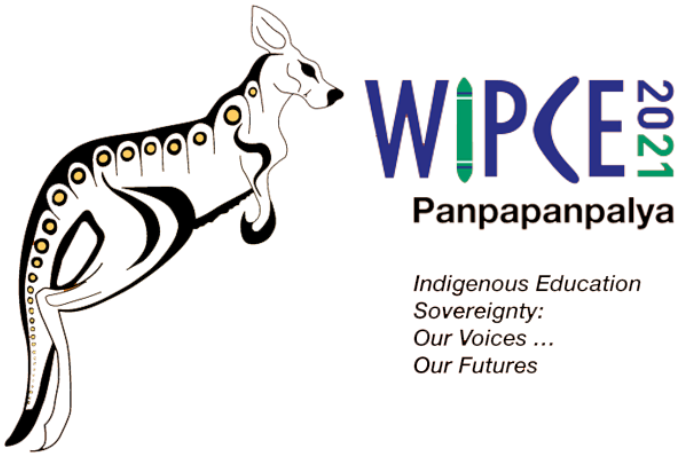
2021 Australian Conference on Science and Mathematics Education (ACSME)

The conference theme will be *Sustainable transformation of science education*. The pandemic forced us to carefully think about what a science education could look like today in order to equip graduates for the ever-changing world. By necessity, faculties of science are engaged in large-scale experimentation with online delivery, in the process discovering what works well and what doesn't. As we emerge from this highly disruptive experience, how will we reshape science education in a way that it is sustainable and meaningful for a complex world facing numerous challenges? We promise it will be another memorable event to share good practice and discuss the latest developments relevant to the teaching and learning of science and mathematics.

ACSME 2021 will explore this theme through many lenses, and will address questions such as:

- What cannot be taught online effectively?
- What does real science and mathematics teaching with technology look like??
- What is the best blend of online and face-to-face teaching?
- How should we change our assessment practices?
- How do we make sure that no student is left behind in this transformation?
- How do we engage the secondary school teachers to be part of this journey?

WORLD INDIGENOUS PEOPLES' CONFERENCE ON EDUCATION
ADELAIDE, SOUTH AUSTRALIA, 1 – 5 NOV 2021



Postponed from 2020, WIPCE 2021 will feature an exciting Indigenous education program of keynote presentations, networking, interactive workshops and discussion forums with an associated rich and diverse cultural program. An estimated 370 million Indigenous peoples live in all continents of the earth and represent a significant part of the world's vast cultural and linguistic diversity and heritage.

Indigenous peoples possess unique knowledge systems, which are recognised as crucial for sustainable development. At the same time, social, economic and political marginalisation of Indigenous peoples is pervasive in all the regions across the world.

Indigenous peoples face fundamental challenges when attempting to reconcile their own forms of culturally transmitted learning with systems of formal education. Over the past 30 years, WIPCE has endeavoured to address this issue and has grown to become a major international event in the Indigenous education movement. The WIPCE conference draws Indigenous representatives from across the globe to share successes and strategies for culturally grounded education. The needs of young Indigenous educators and leaders will be a key feature of WIPCE 2021 youth forums. WIPCE attracts Indigenous education experts, practitioners, scholars, students and communities, with up to 5,000 delegates expected in 2021 – the largest and most diverse Indigenous education forum on earth.

The Bulletin of the Indigenous Science Network is distributed four times a year via email directly to members. Membership is open to all. If interested in being a part of the Network, please contact the Coordinator via email at IndigenousSciNet@yahoo.com. Issues distributed in February, May, August and November each year.