

# Science for Saving Species

## Research findings factsheet

Project 6.3.4



National Environmental Science Programme

## Using totemic species to engage students with Indigenous Traditional Ecological Knowledge and biodiversity conservation

### In brief

This project developed and trialled the Totemic Species in Schools program at a pilot primary school in Melbourne, Victoria. The program engages young students with Indigenous Traditional Ecological Knowledges and biodiversity conservation by incorporating Indigenous sciences into the Western school curriculum.

Students at Carlton North Primary School worked with Wurundjeri Traditional Owners to learn about and create habitats for the matted flax-lily, which is Endangered in Victoria. Surveys of students, teachers and parents were used to evaluate the outcomes of the program.

Knowledge of, connection to, and care for threatened species were effectively imparted through the program. We found that students felt that they had an increased understanding about the matted flax-lily and its ecology following

the program. They also felt more connected with nature and indicated that they had learned about the Traditional Owners and the importance of the totemic species.

After the program, teachers felt that they were more well-equipped to teach students about Traditional Ecological Knowledge in a culturally appropriate manner. Parents/guardians also felt very positive about the program, referencing

their child's high engagement as well as their own interest in learning more about Indigenous culture and totemic species.

Additionally, the program was shown to improve student engagement with nature and science, and this permeated through to parents and guardians, which is beneficial for improving biodiversity conservation engagement.



Students taking part in a smoking ceremony hosted by Wurundjeri Traditional Owners at the school. Image: Liyat Haile



## Background

Community support is essential for improving conservation outcomes for threatened species and ecosystems. One way to increase support is to improve community engagement with species. Research has shown that people are generally more likely to want to protect plants, animals and ecological communities when they feel invested in them or responsible for them. Further, using the environment in teaching has impact, connecting students with, and increasing their sense of responsibility to, the environment.

Totemic Species in Schools is a program that incorporates Indigenous science and Traditional Ecological Knowledge into Western school curriculums holistically. Traditional cultural learnings emphasise respect for country and all of its inhabitants. The program was designed to allow for Traditional Ecological Knowledge and culture to be taught while engaging

students in biodiversity conservation and sustainability.

The program also worked with Traditional Owners to establish habitats for threatened "cultural" species, particularly the matted flax-lily (*Dianella amoena*). The flax-lily is a culturally significant species for the Wurundjeri people. Its berries and leaves are used for food and tea, weaving and making whistles to deter snakes.

This Victorian species is found nowhere else and is listed as Endangered. It is threatened by loss and fragmentation of its habitat. Populations have been impacted by and cleared for urban developments, and perhaps only around 1,400 plants remain. The other three species of focus in the program were kangaroo grass (*Themeda triandra*), velvet tussock grass (*Poa rodwayi*) and the chocolate lily (*Arthropodium strictum*).

## Research aims

This project aimed to develop and evaluate the Totemic Species in Schools program, focusing on how engagement with the Totemic Species in Schools program influenced connection to nature, and attitudes towards biodiversity and threatened species in participating students, teachers and parents/guardians. We also investigated how the program impacts the participants' understanding and appreciation of Traditional Ecological Knowledge and culture.

Students learning about indigenous plant species in an excursion to the Melbourne Museum. Image: Georgia Garrard





## What we did

We conducted the trial of the Totemic Species in Schools program at Carlton North Primary School in Victoria during term four of 2019. RMIT researchers, Carlton North Primary School teachers and representatives of the Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation were all involved in the project

The curriculum looked at embedding Indigenous knowledges and western knowledge in a balanced and holistic way. This was focused through the biology curriculum, and contributed to a term worth of work. All curriculum looked at sustainability, and the environment, and incorporated interactive and outdoor activities.

The school constructed a grassland ecosystem habitat, including numerous planted individuals of the Critically Endangered matted flax-lily.

We collected data through pre- and post-program surveys of students, teachers and parents/guardians.

We developed questionnaires to investigate the effectiveness of this program in embedding Indigenous Traditional Ecological Knowledge and connection to nature within the school program. We looked at how the participants' connections to nature changed over the period of the program, and how their views towards Indigenous Traditional Ecological Knowledges were changed by the end of the project.

The questions were grouped into three main categories:

1. Connection to nature
2. Understanding and awareness of Indigenous cultural and totemic species
3. Non-identifying demographic questions (that might influence the participants' relationship with nature or Indigenous culture).

For students, questions were based on a 16-item scale relating to four dimensions, including enjoyment of nature, empathy for creatures,

sense of unity with nature, and sense of responsibility for nature. For adults, we used a six-item scale of nature-relatedness.

We developed our own series of questions for measuring a connection to Australian Indigenous culture that was appropriate for children. Our questions were centred on dimensions that are relevant to the evaluation of the program, including engagement with people of other cultures, knowledge of totemic species, knowledge of Indigenous culture, and a sense of a duty of care for nature.

Students completed the surveys before, during and after participation in the program. The post-program questionnaire also asked about the extent to which participants had shared learned information. Parents/guardians and teachers participated in the questionnaire after the program concluded.

**Table 1:** The Totemic Species in Schools program outline.

Week	Topic	Activity
Week 1	Introduction	Pre-unit investigation
Week 2	RMIT research introduction	RMIT Pre-survey
Week 3	Seeds	Scientific Drawing, Seed Planting
Week 4	Indigenous Farming and Care for the Land	Research and poster making
Week 5	Ecosystems	Interactive food web roleplay
Week 6	Excursion to Melbourne Museum	Native species worksheets
Week 7	Native Australian flora collage	Collage drawing
Week 8	Indigenous Incursion	Native ingredients baking and artefacts
Week 9	Planting	Planting for Indigenous garden
Week 10	Conclusion	Opening of garden



## Key findings

We found that students showed an increase in their knowledge of totemic species. Despite already high mean responses pre-program, two of the three "care for totemic species" measures showed differences in post-program student responses, indicating that the program further increased student care for the matted flax-lily. This included an increase in understanding of how the matted flax-lily is related to its habitat and other plants and animals in the surrounding grassland ecosystem. Students also demonstrated an understanding of the importance

of ecosystem management, including through cultural practices such as cool burning.

Student survey responses highlighted the local direct impact of planting the totemic species, indicating a greater awareness of the Endangered species, as well as a sense of stewardship towards it.

Some differences were apparent in participant responses by gender. For example, female students scored slightly higher on average in the connection to nature index than did male students pre-program – but not post-program.

Students strongly indicated post-program that they had learned a lot about Indigenous culture. Before the program, 43% of students could correctly name the Traditional Owners of the area where they lived; after the program, 81% of students who completed the survey could correctly name the Traditional Owners. There was also a mild, post-program increase in how important students thought the totemic species was for Indigenous culture.

Each post-program survey included an optional open-ended question asking participants for their feedback

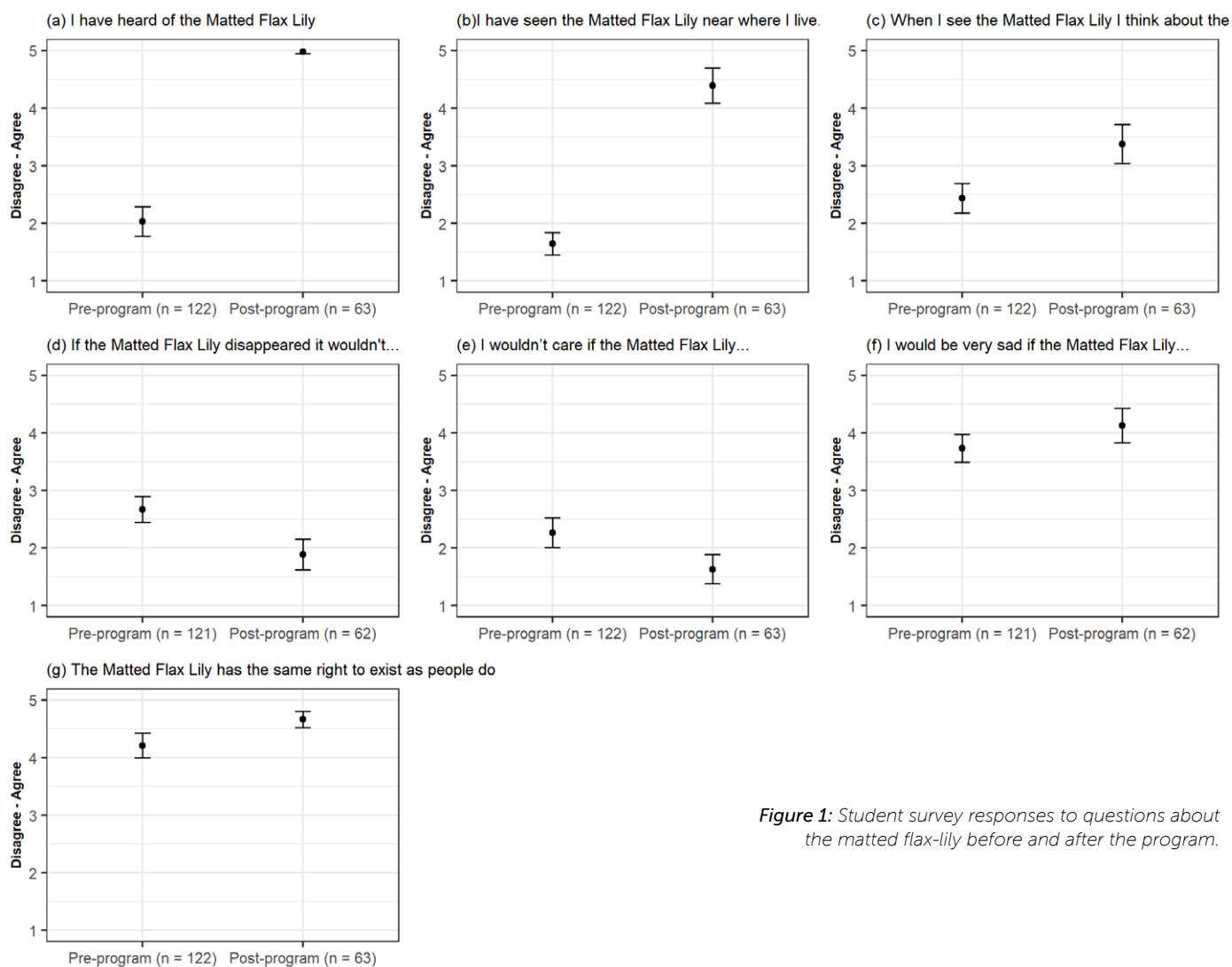


Figure 1: Student survey responses to questions about the matted flax-lily before and after the program.





## Key findings (continued)

and thoughts on the Totemic Species in Schools program. In these responses, the vast majority of students indicated that they enjoyed the program, with specific reference to its hands-on nature and the importance of learning about Wurundjeri culture. The high frequency of students mentioning Indigenous culture in their comments indicates particularly high student engagement with this element of the program. Many students commented on the importance of the learnings or expressed a wish to continue the program.

Responses from parents/guardians and teachers were similarly overwhelmingly positive about the program, with specific reference to their support for the learnings, their child's high engagement, as well as their own interest in learning more about Indigenous cultural and the totemic species.

Teacher confidence in implementing this learning sequence increased throughout the course of the term. While enthusiastic, teachers had an initial apprehension about their personal confidence levels in teaching this program. The main educators on the program both reflected on this phenomenon, as conversations with teachers throughout the sequence went from hesitant to enthusiastic. One teacher reflected that his personal confidence increased, and that he felt more confident in teaching and introducing Traditional Ecological Knowledges in a culturally appropriate manner.

Teachers and students seemed impacted beyond the program. Some students told the lead teachers that they wanted to bring the blue-banded bee back to their habitats and planned to plant some of the species they found in their own gardens.

This was reflected in the qualitative survey results: "I never knew about the matted flax-lily and that it was going extinct and now I'm planning to plant some in my backyard!" Teachers commented that they were more confident and felt like the lessons were rich and impactful for their students.

The qualitative information provided by students in the post-program evaluation revealed that the approach used to present the material to students was engaging and fun. Further, there is some evidence that combining Indigenous and Western science was an effective approach to teaching this material, with one student commenting that, "I really enjoyed science this term .... I feel much closer to our indigenous culture than I ever have".

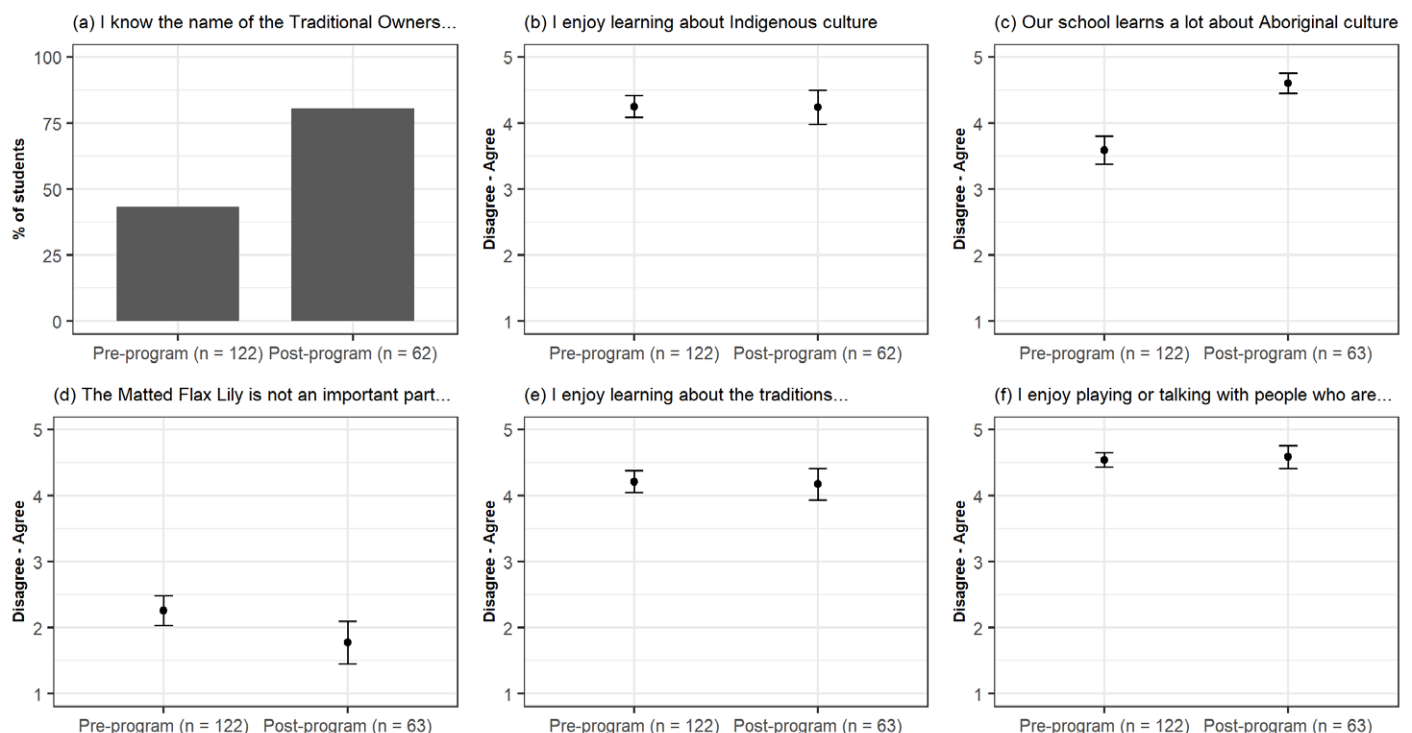


Figure 2: Student survey responses to questions about Traditional Owners and Indigenous culture before and after the program.



*BELOW: The matted flax-lily (Dianella amoena) is Endangered in Victoria and a culturally significant species for the Wurundjeri people. It was chosen as the totemic species which students learned about and created habitats for. Image: DavidFrancis CC BY-SA 2.0 Flickr*

## Implications

Our results are particularly important for teachers, Researchers, Traditional Owners and environmental organisations.

We found that engaging students in hands-on scientific learning helped them develop an appreciation for threatened species as well as for Traditional Ecological Knowledges. The program's positive effects were also evident for teachers and parents/guardians.

The program was shown to be a useful method of improving conservation outcomes, as building a sense of investment in species and ecosystems can help to strengthen support for environmental and conservation actions.

The survey produced for this study for evaluating program outcomes has the potential to be useful in multiple contexts in which there is a desire to gauge the level of cultural awareness and/or nature connectedness of a school cohort. As an approach to

building cultural awareness, the program evaluation revealed an improvement for students in both knowledge and respect.

Broadly, this research has the potential to positively impact teaching of Indigenous content within Australia. Currently we see a disconnect between teacher confidence and government promises in this context. Since the inclusion of Indigenous Traditional Ecological Knowledge to the Australian curriculum, there has been a lack of available research and resources as to how teachers can appropriately incorporate it in their teaching, and how to teach Traditional history and Ecological Knowledge to non-Indigenous students. This program provides clear direction as to how Indigenous science can be embedded in a holistic way in existing the curriculum.

Benefits to the health and wellbeing of children are also likely to stem from greater interaction



with biodiversity. The program allows teachers to simultaneously incorporate and increase student engagement with nature and science, as well as to increase students' personal feelings of responsibility to the environment.

## Use of terms

In this factsheet, the terms 'Indigenous' and 'Traditional Owners' are both used throughout. This is purposeful and refers to the differentiation of the Traditional Owners of the land that this project was run on – the Wurundjeri people of the Kulin nation – and Indigenous culture, referring to both Aboriginal and Torres Strait Islander culture taught in the program.

## Further Information

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