



SCIENCE FOR ALL

‘CAMPFIRES AND SCIENCE’ AND ‘WILD DNA’



Publicly Funded Research Report

June 2018-December 2019

Supported by
The
Royal Society
OF VICTORIA
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About this document

This document has been written by ‘Science for All’ to summarise the research and associated public events we have run since October 2018 which have been supported by the Royal Society of Victoria and funded by both public donations and grants from the State Government of Victoria, Australia. For more information, visit: ScienceForAll.World

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About Science for All

‘Science for All’ is a not-for-profit organisation that supports everyone in the world to get involved in shaping the future of human knowledge.

We recognise that many of the challenges facing the planet today do not have solutions which fall into categories such as ‘public health’, ‘environmental studies’ and ‘education’. We recognise that knowledge takes many forms - this includes people who are subject area experts, people with traditional, indigenous or local knowledge – and those with big dreams and big ideas. Our aim is to bring together experts from these diverse areas to work in partnership with as many people as possible by using a combination of free face-to-face events in metropolitan and rural areas, as well as online tools. We do this through projects like ‘Campfires and Science’ and ‘Wild DNA’.

Involvement and inclusion

‘Science for All’ work to ensure that anyone, anywhere, can be involved in shaping every aspect of our research. All our projects are managed transparently in the public domain using online discussion tools. All our events and training are free to attend, for anyone or any age. Learn more about how you can get involved here: ScienceForAll.World/Contact

Acknowledgements

The work described in this document has all been made possible by the donation of the public, grants by the State Government of Victoria and many people volunteering their time, expertise and skills. Please note some events in this report have been funded by different grants. Thank you to all of them.

Thank you to Mike, Anna and James at the Royal Society of Victoria (RSV) who have helped in every way at every stage – without them and the support of the RSV this work would not have been possible.

This document was written in November 2019 by Jack Nunn, Director of ‘Science for All’, with the support of many other volunteers.

This report is dedicated to the late David Blair (Australian National University), who generously volunteered his skills, knowledge and time to help share his passion for the forest around our campfires many times.

Sharing

All information in this report is licensed under a Creative Commons license ([Attribution-NonCommercial 3.0 Australia - CC BY-NC 3.0 AU](https://creativecommons.org/licenses/by-nc/3.0/au/)). All data from this project will be shared in the public domain under similar licenses. For more information, visit: ScienceForAll.World

Project Summary

The main purpose of the project ‘Wild DNA’ was to connect Victorians to nature and create an inclusive community that supports anyone from rural or metro areas to get involved in creating and sharing new knowledge.

We started “Campfires and Science” in early 2017 with a focus on citizen science in biodiversity and during the period of this report, **we organised twelve free events including eight free “Campfires and Science” family friendly events in Victoria**, including events in critically-endangered Leadbeater’s Possum habitat. In addition we ran a number of free lab-based events.

Working in partnership with the community, we responded to feedback that people wanted more metropolitan events too, so we adapted our plan to meet these needs.

We invited **multiple experts to talk around the campfire** who gave instructions on how to conduct scientific biodiversity surveys, using equipment like thermal imaging cameras and environmental DNA.

We worked with Australian National University, Monash University and Victorian community organisations, and have **trained over 150 volunteers in biodiversity surveying techniques**. In combination with other grant streams we have co-created novel detection methods and trained over 25 people in the process, including using lab equipment, which is essential to the environmental DNA technique.

In addition we have also trained 3 people to run ‘Campfires and Science’ events and we have evaluated events with follow-up feedback. We will be reporting our work using the ‘Standardised Data on Initiatives (STARDIT)’ reporting tool, developed by Science For All: scienceforall.world/STARDIT

Highlights

- **Inclusive and accessible events** - We were thrilled by the number of people travelling out to the forest to come and learn about both eDNA and other techniques. Evaluation data also suggested that sessions from Aboriginal elders were a particular highlight for people.
- **Many more people than expected volunteered** for in-depth training in using eDNA sampling techniques which means that we have developed more community capacity than planned. In addition we have trained 3 people to facilitate these events.
- **The successful events have built and strengthened partnerships** with many organisations in Victorian and beyond, which means that the work of this project will continue into the future.
- **Public, online communication meant that anyone, anywhere could be involved.** At the time of writing, the 'Wild DNA project - expert advice discussion group', nearly 50 people are members of the group, including from universities and institutions around the world with relevant expertise. Similarly, a considerable number of people involved are students or recent graduates seeking to apply and develop their experience.
- **The project developed people's skills and knowledge** - A number of students and recent graduates involved in the project reported that involvement with 'Science for All' directly contributed to them gaining employment. 'Science for All' has been asked to provide over 10 professional references for volunteers during this project and a number have now entered full-time employment.
- **Novel methods of detection developed for 'citizen scientists'** - the ability to share knowledge and research - and to bring people with skills and time together both online, face-to-face both in the forest and the lab has meant that unique and invaluable connections have been made. This led to novel DNA primers being tested. It has also meant that the focus of the research has been developing useful, accessible (affordable and simple!) techniques that can be used by many people around the world for years to come.

‘Science for All’ events – October 2018 – September 2019

The following events were all made possible by public donations and funding from the Victorian State Government Department of Environment, Land, Water and Planning. Thank you to everyone who made these possible.

‘Campfires & Science’ at Plenty Gorge 15th September 2018

This special ‘Science for All’ event on 15th September 2018 at Plenty Gorge, was hosted by the new Whittlesea Tech School and was supported by the Royal Society of Victoria. We gathered around a campfire with some delicious free food:

We worked with people of all ages to teach them how to gather environmental DNA samples to look for platypus in Plenty Creek by Enviro DNA with a world first as we carried out campfire-side sequencing of the sample.



Josh from EnviroDNA demonstrates how to test for DNA in river water to look for platypus.

We all had a ‘drone-selfie’ taken by [Mick Russel](#) and a demonstration of how drones can be used to help research.

We had Dave, an elder from the Wurundjeri Tribe Council, talking about the importance of indigenous knowledge and how to integrate it into other kinds of knowledge systems. He spoke about an experimental archaeology project to build a bark canoe in the Plenty Gorge.

We learned about nocturnal animals and the positive effect of changing to LED street lighting with less white in the spectrum from [Alicia Dimovski](#).

We learned about how the organisation ‘[Wildlife of the Central Highlands](#)’ trains the public to use thermal imaging cameras to spot critically-endangered animals in order to carry out research.

We heard from Whittlesea Council about their Biodiversity Strategy and how people can get involved in shaping it.



Uncle Dave from the Wurundjeri Woi wurrung Cultural Heritage Aboriginal Corporation talking around the fire at the 'Campfires & Science' event at Plenty Gorge 15th September



Trent from Wildlife of the Central Highlands (WOTCH) demonstrates thermal imaging technology used in surveying.

Campfires and Science: Wild DNA 2019 13th October 2018

This free event hosted was attended by nearly 30 people, who had a chance to come and learn how to collect environmental DNA samples. This event focussed on collecting samples to look for the endangered Barred Galaxias fish in and around the area of Marysville. This event was the first in a series of events which are part of our new and exciting 'Wild DNA' project, funded by the Victorian Government.



Citizen scientists getting trained in collecting environmental DNA from rivers to look for endangered fish on October 13th 2018

Campfires and Science: Wild DNA in Toolangi 2019 16th March 2019

This free 'Campfires and Science' was attended by around 50 people who met to head outdoors, light a campfire, and share knowledge. At our second free 'Wild DNA' environmental DNA sampling event we worked with the Australian National University, teaching people how to gather samples and look for a critically-endangered species which live in the trees. We also tested a new way of finding species on this trip, using mosquito traps to look for DNA in the blood of animals they had taken blood from! After a free vegan dinner, we also heard from local experts who shared their knowledge, including a recitation of a famous local poet. The event was moved to Toolangi at last minute owing to uncontrolled bushfires, and feedback about the event was highly positive.

This event was run with the kind support of the Royal Society of Victoria and with a grant from the Department of Environment, Land, Water and Planning, State Government of Victoria, Australia.



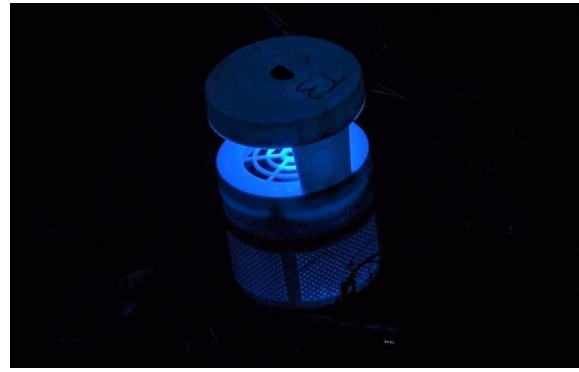
Ziggy reporting his sighting of a Sugar Glider after returning his mosquito trap, used for sampling DNA on 16th March 2019



The late David Blair (far left) entertains and educates the group about the work of the Australian National University in the Central Highlands



Jack (Director of Science for All) processing samples from the mosquito traps



A mosquito trap is set to capture blood samples from wild animals

Campfires and Science: Future Forests – 21st May 2019

Victoria's unique biodiversity and enormous trees are managed by the Victorian State Government and in May 2019 they were asking for members of the public to give feedback on how these forests should be managed in the future. This free event brought together people who have worked in the logging and sawmill industry, experts on forest management and people who work for the State Government in understanding the views of the public about forests. We got to hear from all of them around the fire, along with some free food!

The first speaker was Christopher Robbins, who share his knowledge of flora and fauna from living and working in the Otways for over sixty years. He also shared his perspective from his time working in small mill teams, selectively felling trees to mill for timber, and witnessing the rise of modern forestry practices.

The next speaker was Patrick Baker, Professor of Silviculture and Forest Ecology at the University of Melbourne. He spoke about the tension that sometimes exists between 'managing' a forest and the inherent 'messiness' of the natural ecology of forests. The final speaker was Penny Richards, from Melbourne University's School of Ecosystem and Forest Sciences. She spoke about her research in studying community attitudes towards forests.

This event followed a free Royal Society public lecture, and was supported by the Royal Society of Victoria, hosted by the Box Hill Institute Integrated Technology Hub and supported in parts by money crowd-funded by the public and matched by the State Government of Victoria.



The first 'Campfires and Science' event to be held in a carpark!

Supported by
The
Royal Society
OF VICTORIA



CAMPFIRES & SCIENCE

Love **camping**?
Love **science**?
Get involved!

'Campfires and Science' is a growing community of people who head outdoors, light a campfire, and share knowledge.

We lead regular free events in the wilderness and metropolitan areas to support scientific research and provide hands-on learning about how to do research.

Next event

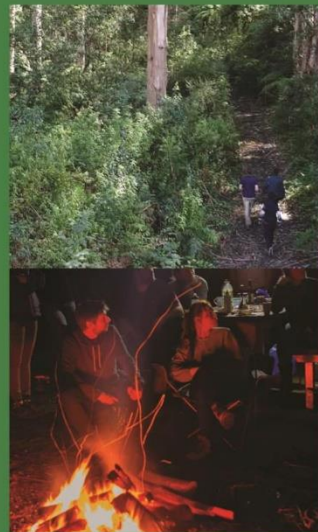
Date: **21st May 2019**

Time: **5-7pm**

Place: **Box Hill Institute Lakeside Campus**

Register here for free:

campfires-future-forests.eventbrite.com.au



Contact details:
info@scienceforall.world
[campfiresandscience](https://www.facebook.com/campfiresandscience)



[campfiresandscience](https://www.instagram.com/campfiresandscience)



[@campfirescience](https://twitter.com/campfirescience)



[ScienceforAll.World](https://www.scienceforall.world)



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SCIENCE FOR ALL
[ScienceforAll.World](https://www.scienceforall.world)

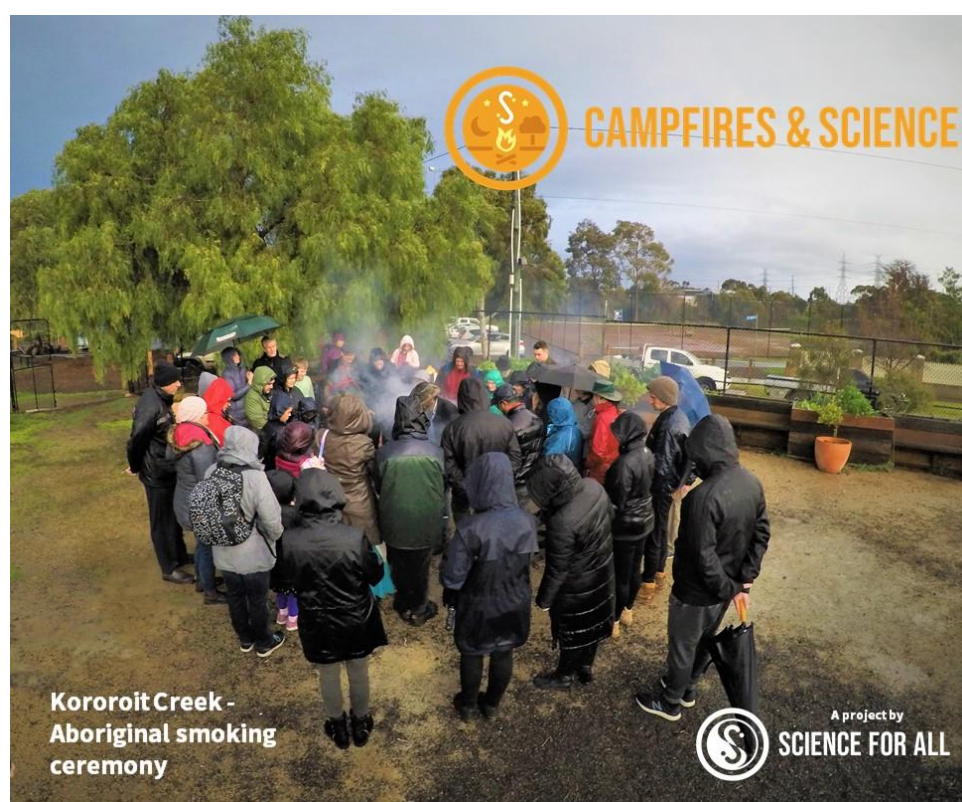
Advert for the 'Future Forests' event

Campfires and Science: Kororoit Creek – 29th June 2019

At this special ‘Campfires and Science’ event along Kororoit Creek on the 29th June we had a great day – in spite of the heavy rain! The event was very popular, with over 100 people registering in under 24 hours, with ‘Science for All’ having to close registrations for the first time ever!

At the event, people learned how to plant trees, do water testing, use environmental DNA and microscopes to see what’s in the creek and heard from Wurundjeri Elder Uncle Dave about Aboriginal knowledge. There was also a sale of cakes and drinks with native ingredients to support the local community house.

This event was run in partnership with [Friends of Kororoit Creek](#), and was supported by the Royal Society of Victoria, and partly funded by public donations and grants from the State Government of Victoria.



Campfires and Science: Wild DNA & restoration – 27th July 2019

At this special ‘Campfires and Science’ event we showed people how to look for critically-endangered animals using DNA and led trips to plant trees and restore critically-endangered plant species. We were also joined by Taungurung man, Shane Monk, who gave a Welcome to Country and a ‘walk and talk’ education session in the forest. We also heard from Chris Taylor, and expert in evidence-informed forest management in Australia. Our final session was run by Andrew Gray from Bioquisitive, giving a demonstration of how to gather DNA samples in the wild and analyse them in the forest with a portable ‘lab’. We had a drone selfie and did some surveying of an area of forest burned around the time of a previous ‘Campfires and Science’ event. We also heard from Steve Meacher from ‘Friends of Leadbeater’s Possum’ who told us about the land we were on and led restoration of native vegetation.



Campfires and Science: Wild DNA & restoration – 27th July

This event was being in partnership with Deakin University Enviro Club, partly funded by a grant from the State Government of Victoria and public donations. ‘Science for All’ is supported by the Royal Society of Victoria.

Saving species with Citizen Science – August 2019

Using DNA from wild animals is an increasingly important way to reliably assess biodiversity in an ethical and cost-effective way. 'Science for All' is working to make sure that knowledge of how to do this is available for free, to as many people as possible.

We've run 4 free courses between the 11th – 22nd August 2019, where over 30 people learned how to use environmental DNA to detect species. The sessions were in a lab where people learned practical skills they can use in the forest and beyond.

A more detailed evaluation report about these events can be found [here](#).



Some of the participants from the 4 lab-based events in August 2019.

Campfires and Science: Future Knowledge and Wikipedia – 24th August 2019

In our first partnership with the Wikimedia Foundation, we hosted a discussion with people to explore the future of knowledge creation and how projects like Wikipedia can support free knowledge, for everyone. We also learned about Australian plants and fungi from expert Sapphire McMullan-Fisher, who led a discussion about how knowledge of fungi can inform restoration of biodiversity. A full report about this event can be found [here](#).



Mudshakes and meetups – 15th September 2019

We ran a free course on extracting DNA from soil samples with Bioquizitive on the 15th September.

Our public advert read ‘Using DNA from wild animals is an increasingly important way to reliably assess biodiversity in an ethical and cost-effective way. ‘Science for All’ is working to make sure that knowledge of how to do this is available for free, to as many people as possible.

This lab event was the first of what have now become regular weekly meet-ups of ‘Science for All’ volunteers at the Bioquisitive lab-space, working in partnership to research, refine, use and share new techniques to find critically-endangered animals and support evidence informed management of our forests.

MUDSHAKES AND MEETUPS

We're running a free course on extracting DNA from soil samples

Join us Sunday 15th September in Brunswick

- 1pm - a meet up for volunteers and supporters
- 2pm - 4pm - hands on DNA extraction in the lab

Register: [ScienceForAll.World/Events](https://www.scienceforall.world/events)

*mudshakes are what we call soil samples mixed with water. Do not drink.

 **SCIENCE FOR ALL**

Campfires and Science – 23rd November 2019 -Yellingbo



This final 'Campfires and Science' event of 2019 was packed full!

- We successfully planted 1,300 trees and plants with the 'Friends of the Helmeted Honeyeater' helping restore vital habitat for the critically endangered Helmeted Honeyeater.
- We tested new ways of collecting environmental DNA soil samples in an attempt to locate the habitat of the critically endangered Leadbeater's Possum with Andrew, the founder of BioQuisitive.
- We listened to some amazing speakers around the campfire who shared what they've been up to. This included learning about a community led project to look for platypus and learning about how to share data about species in the public domain. Thank you to our speakers Mariea, Jodie and Elaine!.
- We went spotlighting with local experts Nat, Chris and Beth – and were lucky enough to witness a yellow-bellied glider in action as well as some platypus!
- We started our Sunday morning with yoga in the forest led by Freddie, and a walking meditation 'forest bathing' session led by Marissa and Lara.

This event is partly funded by a grant from the State Government of Victoria and public donations. 'Science for All' is supported by the Royal Society of Victoria.

Event evaluation

All of our events are evaluated, with data collected including:

- **Registration data** - and establishing what people would like to learn and get out of events
- **Evaluation immediately after** – the data sources at this stage are a mixture of paper feedback forms, online surveys, informal verbal feedback, social media comments and reviews and other communications.
- **Long-term follow up** – people are contacted a number of months after events and asked to complete further evaluation data, as well as ‘impact data’ – asking people how they have applied learning

Data from all our events is being collated and **a formal evaluation will be published separately to this report** and used to inform future learning and development events run by ‘Science for All’. In addition, a peer-reviewed article will be created about this project which will also appraise the ‘citizen science’ element of this project.

Early themes from the ‘**Campfires and Science**’ events are:

- **People enjoy and value having Aboriginal knowledge incorporated** into events, and many report that this is a highlight of events. Recognising Aboriginal knowledge as an important form of ‘science’ was welcomed by event participants
- **People enjoy learning new skills and knowledge** – and enjoy a chance to share them with others
- People like to feel that by ‘doing’ research or restoration, they are contributing to improving things (rather than passively ‘raising awareness’) – and this gives people a sense of purpose
- Many people report enjoying the informal, friendly and welcoming nature of the campfire events, while commenting that they are well organised
- People stated that event organisation, logistics and food is well organised and free food is much appreciated
- **Transport and travel to the forest remains a barrier to some people** (for financial or practical reasons) and future funding needs to address this issue to ensure events are more inclusive

Early themes from the lab events (run in partnership with Bioquisitive) are that:

- The event was well-evaluated with attendees reporting they are ‘fun’, ‘useful’ and a good opportunity to meet other volunteers.
- Many people who attended lab sessions went on to attend future lab sessions, apply their skills in the forest and train others in the sampling techniques.
- The lab events were well attended – and we’ve successfully run ‘mobile’ lab events where we take the equipment to remote locations to train people on site

Reflections and Learning Points

Project planning and partnership working

The entire project was run by 'Science for All' in an open and transparent way. Communication tools included:

- **Loomio – an online discussion platform.** This is the main discussion area and is used for planning, sharing research, designing research and collective decision making
- **Messaging** – using emails and WhatsApp, people involved communicated informally and formally
- **Share online documents** – platforms like 'Google Docs' were used to co-create collaborative documents in the public domain

What worked well

- **Public, online communication meant that anyone, anywhere could be involved.** At the time of writing, the 'Wild DNA project - expert advice discussion group', nearly 50 people are members of the group, including from universities and institutions around the world with relevant expertise. Similarly, a considerable number of people involved are students or recent graduates seeking to apply and develop their experience.
- **The project developed people's skills and knowledge** - A number of students and recent graduates involved in the project reported that involvement with 'Science for All' directly contributed to them gaining employment. 'Science for All' has been asked to provide over 10 professional references for volunteers during this project and a number have now entered full-time employment.
- **Novel methods of detection developed for 'citizen scientists'** – the ability to share knowledge and research – and to bring people with skills and time together both online, face to face both in the forest and the lab has meant that unique and invaluable connections have been made. These have meant that the focus of the research has been developing useful, accessible (affordable and simple!) techniques that can be used by many people around the world for years to come.

Areas for improvement

- **Accountability for completing tasks** – while the project was highly successful at attracting volunteers with expertise of all kinds, the nature of volunteering is that people's ability to commit time fluctuates, often unpredictably. As a result, sometimes complex tasks were left incomplete or partially handed over as individuals temporarily paused their contribution to the project. Clearer assigning of tasks and more formal ways of 'handing-over' tasks should be agreed.
- **Ways of working to be established sooner** - This was also the first large project of this kind managed by 'Science for All', so as an organisation, we were learning as we went by experimenting with communication tools and co-creating our ways of working. While this is certainly a good way to work in principle (rather than imposing ways of working on people that are inappropriate) future projects will likely benefit from the experience of running this one. For example, rather than a 'co-create everything' attitude, a more practicable method might be a smaller working group co-creating fixed aspects of the project and aspects of the project which will be open to 'co-creation'.
- **Incompatible values or ways of working** – as well as relying on volunteers, this project also regularly paid experts for their time (in a process overseen by the 'Royal Society of

Victoria', requiring collective approval of the Board of 'Science for All'). This included individual 'sole traders', charities and for-profit companies. Some for people working in for-profit companies felt that certain aspects of the work should be confidential or were covered by what they considered 'intellectual property' (IP). For example, the DNA primers used to detect some species were considered the IP of that company. This issue was discussed using the public online forums and meetings, and the outcome was discussed using private forums at a Board level. The decision made collectively by 'Science for All' (with the support of the Royal Society of Victoria) was that IP of this sort was incompatible with the Science for All 'Values' statement and not in the spirit of open science, which is how 'Science for All' wished to work, leading by example. For example, all aspects of the project will be published open access. By having to omit essential details such as primers from the paper would significantly limit the usefulness of any research output and go against the principles of public involvement and community empowerment. As a result it was decided to partner with not-for-profit organisations and universities to provide similar services. A successful learning outcome of this process was that the process for being 'guided transparently and collectively when navigating any conflicts or competing interests' outlined in the 'Values' statement was effective, although not simple.

Partner organisations

This project has seen 'Science for All' partner with a number of organisations and community groups, including (but not limited to):

- Royal Society of Victoria
- Australian National University
- Monash University
- Whittlesea Tech School
- Box Hill Technical School
- Monash Tech School
- Wurundjeri Woi wurrung Cultural Heritage Aboriginal Corporation
- Taungurung Land and Waters Council
- BioQusitive
- EnviroDNA
- Melbourne Water
- Wildlife of the Central Highlands (WOTCH)
- Friends of the Leadbeater Possum
- Friends of Kororoit Creek
- Deakin Enviro Club

Here, 'partnering' means formally working together on events or tasks to achieve specific outcomes. Many other organisations have promoted and supported the events in more informal ways.