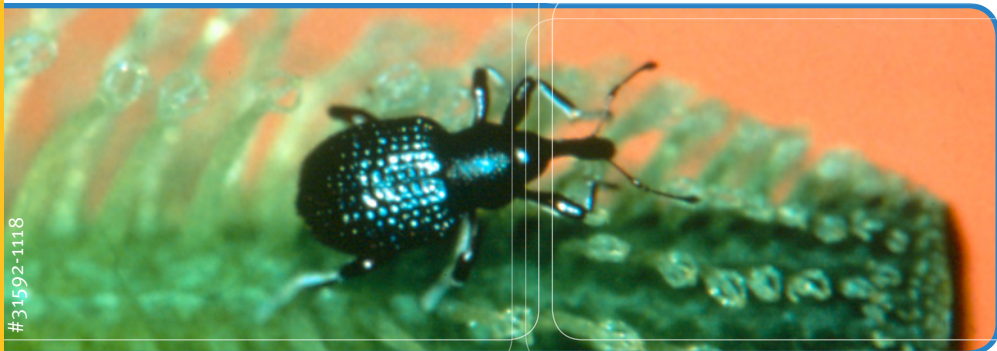




Queensland Citizen Science strategy



#31592-1118



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Engage with science

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Published January 2019

Message from the Minister

Queensland is home to so many great scientists who are at the forefront of many breakthroughs and discoveries, and are tackling important issues across the state.

Citizen science provides a way for Queenslanders from all walks of life to get involved in Queensland science—helping to contribute to the research our scientists do, increasing our scientific knowledge, while at the same time having fun learning about the world with families and friends. The benefits of involving more Queenslanders in science are enormous.

Thanks to modern technology, people can easily get involved and feel empowered to contribute to a greater understanding of society and the natural environment. From collecting biodiversity data to transcribing historical weather records and contributing to changes in policy, citizen science can make a real difference, helping to address some of Queensland's big challenges.

Given this, I believe that it is important for Queensland to have a strategy for citizen science. The purpose of the strategy is to set a vision for citizen science in Queensland—to understand how we can more effectively work together to create Queensland communities that are informed about, and engaged in, citizen science. It is our mission to encourage Queenslanders to be aware of and participate in citizen science and to support our

scientists to seek ways to involve local communities in their research projects.

From our homes, schools and hospitals to our reef, rainforest and desert there are so many opportunities for people to become involved in science and contribute to scientific knowledge. Understanding more about science can help us make better decisions in our day-to-day lives, treat our environment responsibly and generally keep up with the rapid progress of modern technology.

This strategy demonstrates the Queensland Government's commitment to supporting and enhancing the practice of citizen science across Queensland.

We will continue to investigate ways in which government can use data and information collected by citizen science projects to make informed decisions, and support all parties to get involved in science.

Let's work together to make Queensland a leader in citizen science.

Leeanne Enoch MP

Minister for the Environment and the Great Barrier Reef, Minister for Science and Minister for the Arts





Through the [Advance Queensland Engaging Queenslanders in Science strategy](#), the Queensland Government has a vision for a Queensland population that engages in, and recognises, supports and advocates for science. To achieve this, we have set ourselves four goals:



To increase the number of students participating in school STEM (science, technology, engineering and maths) subjects.



To increase engagement and participation of the Queensland community in science-based activities.



To increase the number of scientists directly engaging with the Queensland community.



To increase awareness and understanding of the great science taking place in Queensland.

Citizen science is an important mechanism by which these goals can be addressed. A recent survey across Queensland found only three per cent of people have heard of 'citizen science'. When prompted with a description, this awareness increased to 18 per cent—which is still less than one in five people. For those aware of citizen science, almost one quarter (24 per cent) had participated in a citizen science project. This emphasises the opportunity to increase the awareness and participation in citizen science across Queensland.

The Queensland vision for citizen science

Queensland communities that are informed about, and engaged in, citizen science.

It is our vision to:

- encourage Queenslanders to be aware of and participate in citizen science projects
- support scientists to seek ways of involving the community in their research projects.

What is citizen science?

For the purpose of this strategy, the Australian Citizen Science Association (ACSA) definition is used:

‘Citizen science involves public participation and collaboration in scientific research with the aim to increase scientific knowledge.’ (citizenscience.org.au)

Types of citizen science

Today, most citizen scientists are contributing ongoing observations of plants, animals and their habitats, but it’s important to recognise that citizen scientists can be involved in and make valuable contributions to a wide variety of scientific disciplines.

Globally, citizen scientists can participate in projects focused on ecology, the environment, biology, astronomy, biochemistry, health, social science and archaeology—to name just a few!

Citizen scientists can contribute to all aspects of the scientific process including project development and planning, collection or classification of data, data analysis, report writing and ultimately informing policy or practice. Additionally, citizen science projects can be led by research scientists, by the citizen scientists, or a combination of the two.

Using apps and mobile devices enables observations to be easily recorded, submitted and verified.

Citizen scientist data revises the age of the cosmos

The power of citizen science enabled the discovery of two new exploding stars.

Over **6000** citizen scientists participated in a live stargazing event—lining up their telescopes across all parts of Australia.

With the vast amount of data collected, scientists were able to revise the age of the cosmos.



Who can be a citizen scientist?

Anyone!

Citizen scientists can come from any geographic region or culture, be any age, have any educational or professional background, and draw from a wide variety of life experiences.

Citizen scientists need not have any scientific training; there are projects that align with a whole range of skillsets, abilities and passions. Whether you enjoy getting outside or doing online activities; participating in a one-off or long-term project; there is a project for everyone. It's just a matter of finding a project that gets you contributing—in a group or by yourself.

Benefits of citizen science

Scientific research is often limited by how much work a small team of scientists can complete. A well-designed citizen science project can often speed up the research process as (in many cases) there are numerous citizen scientists contributing.

Citizen scientists may also be able to cover large geographic areas not accessible to scientists and over long periods of time. The vast amount of information collected for such projects can then be used for a range of activities which includes informing scientists, decision makers and communities. As a consequence, citizen science provides benefits to the participants, the scientific community and society as a whole.

Being a citizen scientist enables participants to learn new skills as well as collaborate with a range of groups including scientists leading a project, government, not-for-profit organisations, community organisations and tertiary institutions. These opportunities provide inspirational, immersive experiences that challenge individuals, advance scientific knowledge, enhance critical thinking and transform mindsets.

‘Citizen science is a great way to harness community skills and passion to fuel the capacity of science to answer our questions about the world and how it works. To be involved in citizen science you don't need a science degree. Citizen scientists work with scientists or the scientific framework to achieve scientific goals.’ (ACSA 2017)

There are numerous motivations for people wanting to participate in citizen science such as scientific experience, the opportunity to network and collaborate, to ‘make a difference’ or inform change.

For the scientific community, citizen scientists provide valuable data, skills, knowledge and advice for scientific research that may not otherwise have been available, helping to maximise the amount and scope of scientific information.





Far Eastern curlew (Numenius madagascariensis)

Photo by Dean Ingwersen

Citizen science data contributes to policy change to save shorebirds

Citizen scientists have provided their data to researchers at The University of Queensland (UQ) who used the data in combination with their own research to inform policy changes.

Each year, birders across Australia eagerly await the arrival of several migratory shorebird species making the journey from their Arctic breeding grounds. Birders from the Queensland Wader Study Group have recorded these birds for decades and noticed that fewer birds were returning to Australia than in the past.

The group worked with researchers at UQ to analyse the data, revealing population declines for shorebird species in Moreton Bay and throughout Australia including loss of critical habitat across the birds' migratory route. Subsequently, the Far Eastern curlew (*Numenius madagascariensis*) and curlew sandpiper (*Calidris ferruginea*) were listed in 2015 as critically endangered under the *Environment Protection and Biodiversity Conservation Act 1999*, and an international action plan for the Far Eastern curlew was ratified by 22 countries.

The citizen science data provided a cornerstone that led to deeper investigation into the plight of shorebirds, and subsequent efforts to save the species through a number of local, national and international initiatives.

Outcomes of citizen science

With the emergence of new technologies, data can be rapidly collected, verified and collated to answer large-scale questions that would often be unachievable without the community's help. As a result of citizen science, projects often have more data and subsequently more informed results. In some cases this information is then able to be used to inform changes to policy and practice.

Citizen science also provides opportunities for scientists to mentor and coach science enthusiasts and possibly our next generation of a STEM-skilled workforce.

The potential global impacts of citizen science are phenomenal. Citizen science can increase our scientific knowledge, and when applied, this has the potential to improve human health, our environment and society as a whole. Citizen science also has the benefit of empowering communities to change their social, behavioural and natural environments through the provision of information that may not be readily sourced through other means. Ultimately, community participation can help address an issue with the added benefit of empowering the community.

Data collected in a citizen science project is increasingly open and available for anyone to use including other researchers, policy makers and the local community. With recent advances in digital and communication technologies, sharing of citizen science data, knowledge and resources has become much easier. This has enabled some projects that once were regional to become global. However, the impact of citizen science projects (and even how the data is being used) is not often recorded or even articulated to participants. As part of this strategy, Queensland citizen science project leaders should consider ways in which they can share their data and their research findings, not only with the participating citizen scientists, but with the Queensland community.

Purpose of this strategy

The purpose of the strategy is to set a vision for citizen science in Queensland and to understand how we can more effectively work together as a community involved in, and passionate about science.

Queensland case studies


Biodiversity: ReefBlitz

ReefBlitz is an annual reef citizen science event. Communities along the Queensland coast can contribute to a snapshot of catchment and reef health, and get involved in practical actions to protect the reef. Activities include surveys of reefs, mangroves, coastal birdlife and large marine animals, as well as recording and reducing impacts such as coastal marine debris.

Outcome of the project: ReefBlitz has helped to document unusual species, catalyse new collaborative projects and highlight the incredible efforts of how the community contributes to reef stewardship.

Why involve citizen scientists? Queensland's reefs and closely linked habitats represent a HUGE area to monitor and protect. Many citizen scientists are keeping an eye on the health of the reef and contributing invaluable information on a scale across the state not possible for scientists alone.

In 2018
1643
participants
collected
37,769 data
points*


51% of participants
indicated they were likely to
adopt a new environmental
behaviour after the event
(Dean et al. 2018)

* Data points (or observations) can include a set of measurements regarding reef health or even photographs.



Get involved: www.reefblitz.com



Get involved: register online

Health: Zika Mozzie Seeker

The Zika Mozzie Seeker project is one of Australia's first health-based citizen science projects. Participating citizen scientists are provided with a kit and instructions to collect mosquito eggs from their backyards (over a few weeks), which they then return to scientists who test the DNA. In a world-first method, scientists are able to rapidly screen thousands of batches of eggs for the *Aedes aegypti* mosquito that has the potential to spread both Zika and Dengue viruses.

Outcome of the project: To increase confidence that 'Zika mosquitoes' are not in the sampling area. The project is an improved, early warning system for invasions of the 'Zika mosquitoes'.


Why involve citizen scientists? Citizen scientists enable unprecedented mass data collection of urban mosquitoes over large areas at the same time. This can help increase community awareness of invasive mosquitoes and exotic diseases and educate the community of the risk. This then empowers individuals to mitigate risk by adopting preventative behaviours by removing breeding sites in the backyard, e.g. free standing water in old tyres or pots.

To date:
1106
participants

1638
mosquito egg
traps set


169,000+
eggs
collected and
analysed

Sampling
area in
south east
Queensland



The project was a finalist in the 2018 Eureka Prize for Innovation in Citizen Science.

Climate: UQ hail

Conducted by The University of Queensland (UQ), the UQ Hail Research program worked with the Bureau of Meteorology to develop a system that will help weather forecasters and scientists to better understand hail events. Some of the data used to develop this system is collected by citizen scientists in south east Queensland and the eastern Darling Downs.

Following a hail event, citizen scientists are asked to go outside (when it's safe) with a ruler and measure the hail, take a photo and send their reports to the research team.

Outcome of the project: This project has been completed. Data and project learnings have contributed to the development of a new Australia-wide reporting app—called WeatheX app. This app, funded by Monash University, allows people to report flood, hail, wind and tornadoes.



120 mm diameter
(grapefruit size)
largest hail reported
near Dalby (Queensland) on
Boxing Day 2017

Photo: Measuring hailstones will help researchers improve weather warnings.



Get involved: WeatheX.app



Get involved:
www.qld.gov.au/weedspotterapp

Invasive species: Weed Spotters Network Queensland

The Weed Spotters Network Queensland is the largest biosecurity citizen science project in the state. By collecting and identifying weeds, the weed spotters help improve understanding of the distribution of invasive plants across Queensland.

Outcome of the project: The specimens and data collected are used to detect new species of weeds and to support weed eradication and management across Queensland. The data collected is available to the community via applications including the Australasian Virtual Herbarium and the Atlas of Living Australia.

Why involve citizen scientists? Queensland is a large state (1.7 million km²) with a significant weed problem, costing the economy in excess of \$600 million a year in control and lost productivity costs (Biosecurity Queensland 2016).

Addressing new weed threats quickly ensures that the control and management of weeds is targeted and cost effective. Plant scientists, botanists and biosecurity staff need the help of the community to spot and identify new and emerging weeds.



As at 2018:
**1400 weed
spotters**

**731 weed
incursions**
reported to Biosecurity
Queensland

Goals

Raise awareness

Let's work together to ensure the Queensland community has an understanding of citizen science and the projects which are relevant to Queensland.

Make it easy

Let's make it easier for our community to find and participate in projects and for scientists to recruit and train citizen scientists. Let's also make it easy to upload, find and use the data.

Grow the community

Let's grow our community of citizen scientists and scientists working together to make scientific discoveries.

Actions

1. Benchmark understanding of citizen science
2. 'Map' projects relevant to Queensland
3. Detailed analysis of gaps and opportunities for collaboration
4. Build a citizen science community in Queensland—a Queensland Chapter of ACSA

1. Encourage listing of projects all in one location
2. Develop a set of best-practice citizen science principles
3. Encourage and publicise open data
4. Ensure participants are aware of project aims and expected outcomes

1. Communication campaign to increase awareness and encourage participation
2. Develop a school program/toolkit
3. Make use of social media
4. Celebrate and acknowledge existing efforts and outcomes

Responsibility

1. Queensland Government
2. Queensland Government—working with ACSA and Queensland citizen science community
3. Queensland Government
4. ACSA

1. Queensland citizen science community (scientists and project leaders)
2. ACSA
3. Queensland citizen science community
4. Citizen science project leaders

1. Queensland citizen science community facilitated by Queensland Government
2. Inspiring Australia in collaboration with the Department of Education Queensland and other educational providers
3. ACSA, Queensland Government, individual project leaders
4. Project leaders with support from Queensland Government

Outcomes of the actions and goals in this strategy

1. Increased community awareness of and participation in citizen science across Queensland.
2. Queenslanders trained and upskilled to effectively participate in citizen science.
3. Increased citizen science contributions to scientific studies and important issues for Queensland.

Evaluation of strategy

After 24 months, the Office of the Queensland Chief Scientist will evaluate this strategy against the goals and actions in both this citizen science strategy and the [Advance Queensland Engaging Queenslanders in Science strategy](#). We will be looking for outcomes from the Queensland citizen science community and how effective this strategy has been in working towards our vision of Queensland communities that are informed about, and engaged in, citizen science.

This document is intended to be an evolving strategy which is expected to change over time to support the expanding scope, participation and positive impacts from citizen science in society.

Acknowledgements

The Office of the Queensland Chief Scientist acknowledges the Queensland citizen science community for their passionate and informative feedback in the development of this strategy—in particular, the Australian Citizen Science Association including member Ms Jessie Oliver.

We also acknowledge Dr Christine Williams, former Queensland Chief Scientist, for her work in driving this strategy forward. In her words, ‘Citizen science is a way in which we can engage young people with practical science—making science real for them’.

Reference

1. Kantar Public Consultants (2018) *Queenslanders’ Perceptions and Attitudes to Science Research Report*.



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