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Citizen science

Have fun in the field – no lab coats or degrees required! **Tanya Ha** gets the scoop.



It's a dark, humid, still night along the creek: the perfect conditions for amphibian love. A male common froglet (*Crinia signifera*) with a twinkle in his eye is about to make some noises that are both frisky and risky. His mating calls advertise his location to every female common froglet in the area... and every predator.

Terry Lane, a truck driver by trade, is eavesdropping on the froggy love songs and recording every croak on a digital audio recorder, all in the name of science. Lane is a 'citizen scientist', making a contribution to Melbourne Water's Frog Census.

Lane is delighted to be able to play a part in the research "without having to do all the schooling and hard work that goes with a science career," as he puts it. "Not coming from a science background, it feels good to contribute. I just

gather the information, punch it into a computer and send it off to Melbourne Water."

Lane's data and recordings end up with freshwater ecologist Rhys Coleman, who manages the Waterways and Wetlands Research Program at Melbourne Water. Coleman has been involved in the Frog Census since it began in 2001. "At the time we were using cassette recorders," he says. "Nowadays, it's mobile phones and digital recorders."

Lane is just one of an army of backyard scientists who, through organised programs, help professional scientists with valid and important research. Without them, much research would not happen because of the resources required. Citizen scientists, as they're called, can help with tasks ranging from collecting data and taking photos to making measurements and recording observations.

Philip Roetman, an urban ecology researcher at the University of South Australia, looks after the Barbara Hardy Centre for Sustainable Urban Environments' Citizen Science program. Under the direction of Professor Chris Daniels, and in partnership with ABC Adelaide, the centre has conducted a series of annual citizen science projects – Operations Bluetongue (2007), Possum (2008) and Magpie (2009) – that have collected sightings, photographs, observations and stories of animal behaviour from South Australians from all walks of life.

At the same time as studying urban ecology, scientists from the centre are looking at the process of citizen science itself. The use of trained citizens has proven to be a powerful tool for rapidly collecting information from all over South Australia. Operation Possum alone collected a total of 2,276 completed surveys over the three-month survey period – much quicker than normal.

"There's no way we could, as a small team of people, cover such a broad area," says Roetman. "We wouldn't have the time. The costs would be too high."

There are less obvious benefits, too, like access to private property, something important when studying urban areas.

"You can't have a group of people in white coats entering people's backyards saying: 'Oh don't mind us, we're just looking at your possums,'" says Roetman with a chuckle.

Like Roetman, Gretta Pecl has a lot of ground to cover in her research, though in her case it's Tasmania's 4,882 kilometres of coastline. Pecl is a marine biologist at the Tasmanian Aquaculture and Fisheries Institute studying the affects of climate change. The waters off the east coast of Tasmania in particular are a hot spot. Over the last 50 years these waters have warmed 3.8 times faster than the global average, resulting in shifts in the ranges of some marine species.

"We've got a lot of coastline, but we don't have a lot of survey programs," says Pecl. "But we do have 120,000 Tasmanians who go fishing. And they often go to the same place at the same time each year to catch the same types of fish." This makes recreational fishers ideal participants in the Coastal Climate Change Range Extension Database and Mapping

Project (REDMAP), a recently launched web-based citizen science project that Pecl has created.

"Recreational fishers and commercial fishers in particular have a wealth of untapped information about the marine environment and REDMAP is a way of valuing, acknowledging and using that information," she says.

Pecl's earlier research into the vulnerability of lobster fisheries to climate change impacts included the perceptions of commercial fishers. Of those interviewed, about 40 per cent didn't perceive climate change to be a problem at all and another 30 to 40 per cent felt there was currently no consensus about the reality of climate change. "Yet if you ask them if they've noticed any changes in the industry or the areas they fish, they'll say 'Oh, yeah!' and you can't stop them talking," says Pecl. She hopes that by engaging these folks in the process of science, they might gain a better understanding and these attitudes might change.

To be out there in the wild and spend your time giving something back is incredibly rewarding.

The whole mission of the non-profit Earthwatch Institute is to engage people in scientific research and education. Andy Donnelly, Earthwatch Australia's director of science partnerships, says that the best examples of citizen science are when the results are being used, contributing to publications and informing policy.

Donnelly tells the story of Nature's Calendar, an annual UK survey of phenology (the study of timing and seasonality in plant and animal life cycles), run by conservation charity The Woodland Trust. People would record the timing of natural events, such as when the first leaf of a particular tree species fell or when the first flower appeared. The Woodland Trust had a few hundred members involved, but when the BBC ran its related *Springwatch* and *Autumnwatch* documentaries and supported the survey, the website really took off. »

Left: Eager citizen scientist Deirdre Farrell listens in to frog mating calls as part of the Frog Census. Below left: Participants in an Earthwatch expedition collect data in a Sydney National Park. Below right: Those so inclined can travel further afield, like these two checking water quality in the Bahamas.



» “They were getting about 600,000 records per annum,” says Donnelly. “There’s a string of papers that have used this data and contributed to the IPCC reports. So you have one of the biggest reports produced to inform policy using this data.”

Earthwatch Australia hopes to create something similar to contribute to our understanding of how climate change is affecting plants and animals in Australia. The ClimateWatch website was launched late last year with funding support from the ClimateWorks Action Fund. Citizen scientists can work casually and independently, choosing the time and place, and log onto a website when they want to record an observation.

“One of the drivers of ClimateWatch is that it brings the science to your own backyard. It makes these things tangible,” says Donnelly. “With ClimateWatch anyone can get involved. You don’t need to be an expert because the right training is there online.”

The data collected will be increasingly important as the climate changes. Mismatches in the timing of natural cycles can have serious consequences. Migrating animals that time their migration based on the length of the day might arrive to find they’ve missed the season for a particular food source. And in agriculture, if the fruit arrives before the fruit pickers, there can be serious economic losses.

Donnelly says the key to good citizen science is good experimental design that ensures the data is robust while making it easy for non-experts to get involved. “If you get these things right, you get access to a labour force of people who are able to generate data. The benefits of that to a scientist are huge, particularly with something on such a large scale that there is no way climate scientists could study it on their own. They have to get help from the general public.”

Earthwatch also organises research expeditions that team professionals with groups of fee-paying citizen scientists to do field work. Volunteers act as technicians, allowing scientists to process more data. This work can be more intense and involves more training, but participants say it is life-changing.

Leisa Dombrowski and Greg Benardos have both participated in Turtles in Trouble, a Scientist for a Day expedition that joins University of Queensland marine researcher Kathy Townsend in studying the links between sea turtle deaths and marine debris.

Benardos joined an expedition as part of a group from one of Earthwatch Australia’s corporate partners, Brother International, where he works in sales and marketing. For him, it was an eye-opening experience.

“I’m the guy who’s changed his light bulbs and has an energy monitor. I thought I was doing a good job,” says Benardos. “The impact we made on Kathy’s research was three months of work being done in an afternoon by a group doing different supporting jobs while Kathy did the ‘dirty’ work. It makes you feel like you’re achieving so much.”

“I probably wouldn’t have done it if it hadn’t been a work event. However, having done it now, I’d do it again. It wakes you up to what’s really going on.”

For Dombrowski, her passion for sea turtles and the rewards and satisfaction of the experience were more than enough to convince her to fork out the \$149 cost from her own purse, and this wasn’t her first time.



“To be out there in the wild and spend your time giving something back is incredibly rewarding,” says Dombrowski, who normally works in corporate reception and events management for a major investment bank. “I’d recommend it to anyone. It’s one of the best things I’ve done.”

Dombrowski says there are social benefits, too. “When you become involved in something like an Earthwatch project, you’re joining a community,” she says. “You make friends and you make connections.”

Benardos describes such projects as a good middle ground for people who want to actively do something for the environment – it’s not as extreme as protesting, he says, but it’s more than “just doing everyday things around the home”. He also values the impact it has locally. “There’s not much I can do in Australia – apart from donating money – to save the panda or to stop the trade in elephant tusks, but there’s a huge amount



Above left: Earthwatch scientist Nancy Fitzsimmons releases a turtle while out on a 'Freshwater Turtles of the Kimberley' citizen science expedition. Below left and above: Earthwatch participants collect all kinds of data while observing the effect of marine pollution on turtles on QLD's North Stradbroke Island. Below right: Earthwatch volunteers look for the elusive rakali, a mammal found in Sydney.

I can do in my own backyard with waste, litter and what I consume that will make a huge difference to local species.”

The Frog Census is now a sizeable database with more than 3,000 submissions and counting. Coleman is excited by the potential for scientists to use this data in ways that he and his team haven't yet envisaged. “There might be benefits for researching the effects of urbanisation, climate change and bushfires.”

“All our results go into the Victorian Wildlife Atlas,” says Coleman. “This allows those species to be considered in development plans for example. We want to protect these species, but we don't know where they are, so finding new locations for threatened species is important.”

In this year's Frog Census, Melbourne Water is particularly eager for observations in areas that were affected by the Black Saturday bushfires so they can better understand the impact fires have on wildlife.

With 2009's International Year of Astronomy injecting huge interest into citizen astronomy projects, such as light pollution surveys, this year – The International Year of Biodiversity – should be a big year for Earthwatch, REDMAP, the Frog Census and other similar initiatives.

Back in Adelaide, Roetman is hoping to kick off Operation Spider later this year. “Mobile phones have GPS, can email and go on the internet. There's huge potential for citizen science. It's a really exciting field and technology is only going to take it further.” **G**

TANYA HA is a writer, presenter and advocate for sustainable living who also writes a regular column for *G Magazine*.

CITIZEN SCIENTIST OPPORTUNITIES

- **ClimateWatch**
www.climatewatch.org.au
- **Birds in Backyards**
www.birdsinbackyards.net/surveys
- **Waterwatch**
www.waterwatch.org.au
- **RabbitScan**
www.rabbitscan.net.au
- **Reef Life Survey**
Volunteer scuba divers wanted www.reeflifesurvey.com
- **Earthwatch Australia** (international and 'Scientist For a Day' one-day expeditions in major capital cities)
www.earthwatch.org/australia/expeditions
- **Barbara Hardy Centre for Sustainable Urban Environments** (Adelaide) www.unisa.edu.au/barbarahardy/research/citizen-science.asp
- **Melbourne Water's Frog Census** (Melbourne region)
www.frogs.melbournewater.com.au. For other frog surveys, see www.frogatlas.com.au
- **Sea Search** (Victoria)
www.peopleandparks.org/programs/marine-connections/sea-search.html
- **REDMAP** (Tasmania)
Looking for input from scuba divers, recreational and commercial fishers www.redmap.org.au
- **ECOCEAN Whale Shark Photo-ID Library** (international)
www.whaleshark.org
- **Earthtrek's Gravestone Project** (international)
www.goearthtrek.com
- **Globe at Night** (international)
www.globeatnight.org

