Waterwatch & EstuaryWatch
Citizen science in Victoria's waterways

Annual Achievements Report
2019-2020

EstuaryWatch

WATERWATCH Victoria

VICTORIA State Government | Environment, Land, Water and Planning

Contents

Please note all images in this publication were taken pre-coronavirus, before social distancing was required. All images are approved with credit.

Front cover: Waterbug Blitz! event to discover macroinvertebrates and to monitor the health of the waterways at Hattah-Kulkyne National Park. Credit MCMA.

Introduction

Victoria sustains a vibrant history of community-based environmental monitoring and citizen science programs, including the Waterwatch and EstuaryWatch programs. These programs are instrumental in informing waterway management decisions while strengthening community engagement and fostering environmental stewardship and advocacy. Catchment management authorities (CMAs), water authorities, local government and other delivery partners play a crucial role in facilitating the programs.

This EstuaryWatch and Waterwatch Annual Achievements Report 2019-20 describes how citizen science data has informed waterway management decisions, and how community awareness, engagement and knowledge of waterways has strengthened over the year. We thank the thousands of dedicated Waterwatch and EstuaryWatch volunteers who visit local waterways to monitor water quality and collect valuable environmental information.

Water for Victoria, the Victorian Government's plan for managing our current and future water resources, prioritises active community involvement in waterway and catchment health management.

The Victorian Waterway Management Strategy fosters strong community partnerships and participation in planning, implementation and monitoring activities, including the community engagement and citizen science endeavours of Waterwatch and EstuaryWatch.

Funding for these programs in regional Victoria is part of the Victorian Government's $222 million investment from 2016 to 2020 through the fourth tranche of the Environmental Contribution (EC4) to improve the health of waterways and catchments. Funding for these programs in the Greater Melbourne region is through Melbourne Water and other local partners.

Aboriginal Acknowledgment

EstuaryWatch and Waterwatch proudly acknowledge Victoria's Aboriginal community and their rich culture and pays respect to their Elders past, present and emerging. We acknowledge Aboriginal people as Australia's first peoples and as the Traditional Owners and custodians of the land and water on which we rely. We recognise and value the ongoing contribution of Aboriginal people and communities to Victorian life and how this enriches us. We embrace the spirit of reconciliation, working towards the equality of outcomes and ensuring an equal voice.

Local Aboriginal elders have reconnected to Country while monitoring the health of the waterways at Hattah-Kulkyne National Park. Credit MCMA.

The 2019-20 year brought unprecedented challenges to Victorian communities and waterways.

In early 2020 many regions were devastated by bushfires that degraded water quality and changed the dynamics of stream ecosystems in complex ways. Loss of vegetation and altered soil structure made fire-affected soils more erodible with heavy rain. Also, runoff carried sediments and pollutants that affected aquatic environments, drinking water quality and agricultural industries.

Then the world was hit with the Coronavirus disease (COVID-19) pandemic. This situation challenged us all to navigate our daily lives differently. Environmental volunteering adapted or halted to protect our health and the health of our communities, especially the most vulnerable.

For many who have modified or ceased regular volunteering activities, these changes may be disruptive and disappointing. Yet, there are many ways citizen science has continued through COVID-19, such as a shift to technology-based and singular volunteering opportunities. For instance, Fluker Post and frog monitoring are easily accessible and can be included as exercise in local parks and reserves or volunteer's own backyards. This time has also presented an excellent opportunity to review monitoring results, spend time navigating the data portals and pursue knowledge development.

Our volunteers have shown extraordinary patience and respect this year, especially in modifying their activities to reduce the spread of COVID-19. Their contribution and commitment to citizen science in Victoria's waterways is vital, admirable and appreciated.

Traditional owner engagement and direction

"Going forward we must heed the wisdom of Aboriginal and Torres Strait Islander peoples. Our knowledge and cultures must be viewed as integral to improving not only the health and wellbeing of our people but of our nation."
Ms June Oscar AO & Mr Karl Briscoe, Close the Gap Report 2020.

Taking a moment out from citizen science frog monitoring activities to connect with and appreciate the environment. Credit MCMA.

Citizen Science Snapshot

Citizen scientists involved in the 2019-2020 programs contributed a total of 232,580 hours to care for our waterways, equivalent to 31,011 volunteer days.

This contribution provides an economic value of the 2019-2020 volunteer effort of $9,707,889.

July

- ***Platypus and rakali rejoice*** as enclosed yabby nets, including opera house nets, are banned from all Victorian waterways!
- ***Fifty people attend a community forum*** hosted by Corangamite CMA to hear from scientists and government agencies about the importance of managing, protecting, monitoring and appreciating the Thompson Creek estuary.

August

- ***Litter Trackers launched in Bendigo Creek*** by River Detectives students to investigate where litter ends up and learn why litter is a serious environmental issue. **Read the full story on page 31.**
- ***Quality Assurance Quality Control (QAQC) events puts skills and equipment to the test*** as Waterwatch and EstuaryWatch citizen scientists hone their data collection proficiencies. **Read more on page 12.**
- ***Melbourne Water Urban Platypus Program*** involved Year 9 students in tracking platypus by collecting environmental DNA (eDNA) samples from the Werribee River.

September

- ***Mallee Waterbug Blitz!*** held with local Aboriginal elders to help gauge the health of Hattah-Kulkyne National Park's waterways. **Read the full story on page 26.**
- ***National Threatened Species Day*** along Melbourne's Merri Creek to raise awareness of vulnerable animals and plants at risk of extinction.
- ***The Great Barwon Platypus Search,*** with Upper Barwon Landcare Network, Corangamite CMA engaged 25 community members to collect eDNA samples, survey habitat and learn about aquatic macroinvertebrates – the tasty diet of platypus.

October

- ***Mallee Waterbug Blitz!*** with Aboriginal elders continues in caring for waterways in Hattah-Kulkyne National Park. **Read the full story on page 26.**
- ***Twenty-five GPS-tracked 'Litter Tracker' bottles released*** into Melbourne's waterways by students and community members. **Read the full story on page 27.**
- ***High-tech frog count at Webster's Lagoon,*** a Murray River wetland, undertaken by more than 30 keen bushwalkers and campers to measure the health of this changing habitat.
- ***National Waterbug Blitz!*** assessed the condition of the Moorabool and Barham Rivers through aquatic macroinvertebrate surveys with enthusiastic volunteers.

November

- ***The River Detectives program celebrates three years,*** completing its third successful year as a statewide educational program. **Read more on page 13.**
- ***Sixty primary school students relish learning about macroinvertebrates*** in Heyfield's amazing restored wetlands. The Water for Environment Team WGCMA and Waterwatch Coordinator Matt Khoury delivered an environment-themed day of hands-on activities and education.
- ***Seventy community members learn 'How to Spot a Platypus'*** with a new citizen science app, presented by the Australian Platypus Conservancy and the Upper Barwon and Geelong Landcare Networks, to record platypus sightings at Birregurra and Geelong.
- ***The Great Curdies Perch Search inspired over 30 volunteers*** and staff to collect eDNA samples from the Curdies River and tributaries to detect the presence of the endangered Yarra Pygmy Perch. **Read the full story on page 17.**

December

- ***North East National Waterbug Blitz!*** at Bright to determine the health of the Ovens and other waterways in the catchment.
- ***End of Year Report Card:*** Celebrating a year of monitoring with Corangamite citizen scientists and publishing the EstuaryWatch and Waterwatch Annual Achievements Report 2018-19.

Citizen Science Snapshot

January

- ***Waterwatch volunteers respond to Victorian bushfires*** with increased waterway monitoring to support waterway impact assessments and management decisions. **Read the full story on page 33.**
- ***Oxygen monitoring to save endangered Macquarie perch*** in King Parrot Creek within the Goulburn Broken catchment. **Read the full story on page 23.**

February

- ***Merri Creek Management Committee (MCMC*** joined forces with the Friends of Merri Park for a wetland walk, talk and litter clean up to celebrate World Wetlands Day.
- ***Pesticide Detectives sampling event*** for citizen scientists to find out if pesticides are present at regular Waterwatch monitoring sites. **Read the full story on page 18.**

March

- ***Bendigo Creek improvements*** as volunteers and partner agencies work together to enhance the health of, and connection to, this waterway.
- ***Ballarat Begonia Festival engages 2,500 people*** about the health of Lake Wendouree through waterbug surveys, the Yarrowee story and presentations, supporting City of Ballarat and Central Highlands Water.

April

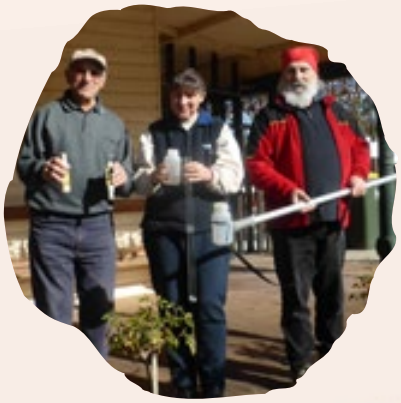
- ***River Detectives at a Distance*** to support remote teaching and learning about monitoring waterway health during COVID-19 restrictions.
- ***Citizen Science in Your Backyard*** encourages participation from home via citizen science apps, while COVID-19 prevents water quality testing by volunteers.

May

- ***National Volunteer Week*** 'Changing Communities, Changing Lives' was acknowledged.
- ***Jeparit Waterwatch celebrates 25 years*** of continuous monthly monitoring of the Wimmera River at Jeparit, thanks to one dedicated volunteer who conducted COVID-safe monitoring.

June

- ***Merri Creek Waterwatch celebrated World Environment Day*** with 50 participants discovering frogs of Darebin via an online webinar to learn about local frog species and how to use technology to collect citizen science data.



225 Active Groups

1,019 Active Sites

6,922 Active Volunteers

Where and what we are monitoring

Type of Monitoring Sites

 Birds

 Waterbugs

 Water Quality

 Litter

 Fish

 Frog

 Platypus

 Bat

To find out more, visit Waterwatch Victoria or EstuaryWatch Victoria.

North East

42  1 

East Gippsland

30  11  11 

West Gippsland

30 

15,260 

Event Participants

EstuaryWatch & Waterwatch

The Statewide EstuaryWatch and Waterwatch Program is achieving the vision of engaging, activating and empowering communities to care for and improve the health of Victoria's waterways.

The program supports CMAs and Melbourne Water in developing and delivering diverse opportunities for volunteer citizen scientists to connect and learn about Victoria's rivers, wetlands and estuaries, and contribute to waterway stewardship.

Volunteers celebrate World Wetlands Day with a wetland walk, talk and litter clean at Merri Park Wetlands. Credit MCMC.

Victoria's Waterwatch and EstuaryWatch programs, having successfully built on community monitoring and engagement for 27 and 13 years, respectively, leverage the community goodwill instilled in these and other citizen science programs. Every CMA in regional Victoria delivers waterway health monitoring to their region through volunteer citizen science initiatives. There are also highly active programs in the Port Phillip and Westernport region, led by Melbourne Water and other local partners. Citizen scientists assess aquatic habitats, capture photo-point observations and monitor water quality, frogs, platypus, fish, macroinvertebrates, waterbirds and litter. In fact, between 2016 and 2019 more than 15,000 Victorians were engaged to record observations and collect important ecological data.

Citizen science is valuable

The Australian Citizen Science Association describes citizen science as public participation and collaboration in scientific research to increase scientific knowledge. It's a great way to harness community skills and passion for fuelling the capacity of science to answer our questions about the world and how it works.

Through the EstuaryWatch and Waterwatch programs, citizen scientists are supported and encouraged to become actively involved in local waterway monitoring and on-ground activities. Every year thousands of dedicated volunteers head out to their local waterways to monitor water quality and collect valuable environmental information.

Volunteers are vital

An online survey of our EstuaryWatch and Waterwatch volunteers was undertaken in early 2020 to:

- understand what volunteer monitors expect and value concerning the current citizen science programs,
- identify issues, challenges and opportunities that exist to broaden the reach of the programs, and
- identify recommendations for future improvements to integrate community engagement with waterway management outcomes.

The responses provided program managers with valuable information about our cohort of amazing volunteers. We discovered most citizen science volunteers are motivated by a desire to improve waterway management and waterway health. We also learnt that volunteer monitors are interested in aligning monitoring programs with specific animal groups and species, and in partnering with Traditional Owners.

Volunteers believe that volunteering should maximise learning opportunities and be fun and enjoyable. They reported substantial development in skills and knowledge across all relevant content areas since starting with Waterwatch and EstuaryWatch.

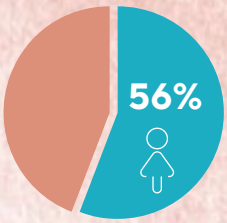
Survey respondents had increased feelings of responsibility and concern for rivers, wetlands and estuaries; demonstrating a rise in volunteer stewardship for waterways across all regions. Volunteers have taken action to promote waterway and estuary health, such as talking to friends, family and acquaintances, as well as joining other environmental groups and lobbying to relevant ministers.

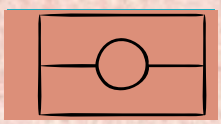
Merri Creek Waterwatch group members, Toni, and her daughter Willow, Fionnuala and Evelyn, conduct monthly water quality testing of Merri Creek, Coburg. Credit MCMC.

Who are our volunteers?

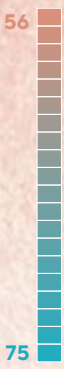
The characteristics of the volunteer monitors who completed the survey were diverse; however, there were some notable trends.

Half the volunteers surveyed identified as **female**





78% indicated interest in partnering with **Traditional Owners & Aboriginal Communities** to monitor for cultural values of waterways



60% volunteers surveyed were between **56 and 75** years old

61% were **retirees**

80% held a **tertiary qualification**

40% held a **postgraduate degree**

Waterwatch 'macroinvertebrate master', Trevor Hausler, conducting a spring waterbug census with volunteers at Darebin Creek, Alphington. Credit: MCMC.

Program progress

In 2019-2020, a survey of citizen science volunteers and program delivery partners provided insights to DELWP on how Victoria's waterway health initiatives are perceived, how well they align with waterway priorities and what benefits are being delivered.

With a firm aim to understand and address the current issues, barriers and opportunities, the survey informed DELWP's strategic planning and communications on a statewide level, to strengthen citizen science programs in the future.

Importantly, the survey highlighted that supporting community members to actively participate in monitoring waterway health fortified the success of the programs.

Data portals and public access

Since 1993, Waterwatch Victoria, and more recently EstuaryWatch, have engaged local communities on waterway health and sustainable water management issues. The Waterwatch program continues to build on its established and valued role as a key community engagement program, connecting local communities with waterway managers and fostering waterway stewardship.

The **Waterwatch Data Portal** and the Waterwatch Victoria Data Confidence framework informs data users of the full range of monitoring purposes across the program. In short, river health data collected under various Waterwatch programs can be recognised and valued for its contribution to education as well as natural resource management.

Furthermore, in partnership with the Centre for eResearch and Digital Innovation (CeRDI – Federation University), the Waterwatch database continues to provide essential resources for all members to access current information and data, as well as providing the public, full access to data and knowledge generated by the programs. The Waterwatch Data Portal had a total of 23,853 users in the past year. The average number of portal users has grown over 40 per cent year-on-year since 2017 and the average number of new users increased by over 30 per cent within the last year. Also, the average number of portal sessions per month grew by over 20 per cent in the last year.

The EstuaryWatch Victoria program stays focussed on supporting community volunteers as citizen scientists to actively participate in the monitoring of estuary health. The **EstuaryWatch Data Portal** provides valuable data and images of all monitored estuary sites in the state.

QAQC puts skills and equipment to the test

Every great citizen science program needs rigorous quality control to ensure the integrity of the community data collected. For that reason, prepared 'mystery' samples of known values are vital to check the collection methods and testing equipment of both the Waterwatch and EstuaryWatch monitoring programs.

Bringing together our regional program coordinators and volunteers, this year's Quality Assurance Quality Control (QAQC) events were held across Victoria during August and early September.

Because every volunteer's time and effort is valuable, and the important scientific data they collect informs waterway management decisions, all water monitoring results need to be accurate and reliable. Many thanks to the dedicated Waterwatch and EstuaryWatch citizen scientists and coordinators for making time for this important event. Your commitment is appreciated and makes for a robust citizen science program!

For many years, EstuaryWatch and Waterwatch have invested considerable resources to support and promote the strength and significance of community collected water quality data. Looking forward, the program is working on sharing citizen science data and information more effectively.

To learn more about how volunteers are making a difference in Victoria's waterways, visit **Waterwatch** & **EstuaryWatch** websites.

To view Waterwatch and EstuaryWatch data, visit the **Waterwatch Data Portal** & the **EstuaryWatch Data Portal.**

Volunteers come together every year to test their skills and equipment for QAQC. Credit Waterwatch Victoria.

Corangamite CMA Waterwatch volunteers, Stuart McCallum and Helen Schofield, testing mystery water samples as part of the QAQC program. Credit Waterwatch Victoria.

River Detectives

Congratulations to students at St Patrick's Primary School in Wangaratta for your excellent water quality reports.

Thank you for sharing your results. This is a great example of how reliable interpretation of water quality results delivers valuable knowledge that can be shared with your peers and the wider community.

Students at St Theresa's Primary School in Albion, one of Melbourne Water's sponsored River Detective schools, have been investigating Kororoit Creek in Melbourne's west. With support from the River Detectives program, the students tested the creek's water quality and discovered a diversity of waterbugs (macroinvertebrates) living in the stream. They also explored the history of the watercourse, from its formation over basalt plains to its use as a swimming pool until the 1940s.

For more reports from the region, go to the latest post on Billabong Banter on the River Detectives website.

With 69 Victorian schools participating in the 2019 River Detectives program, around 2,600 young people were engaged as citizen scientists, inspiring a new legion of future stewards of the environment.

Since 2017, the River Detectives program has targeted schools across the state, including in the North Central, Wimmera, North East and Corangamite CMA regions and through Melbourne Water. The River Detectives program continues to strive to offer professional learning opportunities, water science and macroinvertebrate monitoring kits, and an online platform for classroom resources and data capture.

Teachers and volunteer educators are trained to become River Detectives Educators by Waterwatch program facilitators. In turn, River Detectives Educators support school students to observe and learn about catchment and waterway health, and to actively monitor the habitat, water quality and macroinvertebrates of their local waterway.

Importantly, the data collected by student citizen scientists is entered into the River Detectives portal and contributes to the Victorian Waterwatch database. Programs that include hands-on, real-life science activities undoubtedly connect students to nature and help to pique their interest in environmental conservation.

Learn more here:
www.riverdetectives.net.au

Students from St Theresa's Primary School identifying waterbug from their creek. Credit: Melbourne Water.

For the 2019 school year

1725 students were **citizen scientists**

69 schools were involved

29 training events were delivered

99 teachers were trained

200 water quality data records were entered into databases

National Waterbug Blitz!

With the completion of the second National Waterbug Blitz in 2019, the program reflects on key achievements and the future for waterbug citizen science.

Each year, Australians are encouraged to become 'citizen scientists' and investigate how healthy their local waterways and wetlands are, simply by exploring and identifying what macroinvertebrates they contain. The type and number of macroinvertebrates found in a waterway can tell us a lot about how healthy that waterway is.

The National Waterbug Blitz began in 2017 with funding from the Inspiring Australia Citizen Science Grants scheme. The program succeeded in engaging a wide range of novice and experienced participants, of which Waterwatchers were essential contributors.

Waterbug experts John Gooderham and Cecil Ellis imparted their knowledge in 60 Waterbug Blitz training sessions run across the country, involving over 750 participants with 500 being Agreed Level Taxonomy (ALT) accredited. In developing a valuable set of training and education resources, the National Waterbug Blitz approach is now part of the national school curriculum with all resources available on the National Waterbug Blitz website.

There are nearly 2000 active Waterbug App users in many geographical areas, from Western Australia to urban Melbourne to Tasmania's Tarkine wilderness. Importantly, the waterbug data generated by the app incorporates 60 per cent of Australia's Natural Resource Management regions.

The National Waterbug Blitz has effectively combined waterbug data from all states and territories, making it the first nationwide freshwater reporting system based on both community and professional data.

Despite one of the worst droughts on record, the program engaged a broad range of organisations including Melbourne Water, Waterwatch Victoria and other states, local councils, Landcare groups, and the Science Pathways for Aboriginal Communities in Western Australia via CSIRO.

Next, National Waterbug Blitz! will be implementing updates from recent Waterbug App evaluation and producing tailored reports for local areas to explain the findings and identify priority areas for further monitoring.

The National Waterbug Blitz thanks all the Waterwatch Victoria volunteers involved in each part of the program, particularly those who attended workshops and contributed their data. The future of the program relies on the continued involvement of our citizen scientists to monitor our precious waterways.

Volunteers participating in the National Waterbug Blitz! in the Mallee. Credit: MCMA.

Stories from across the state

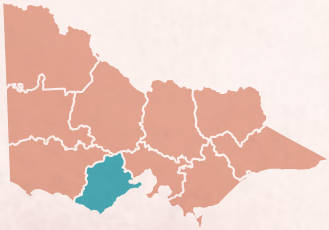
Waterwatch Volunteer Rosie Wiseman and CCMA Project Officer Anthony Byrne collecting eDNA samples. Credit CCMA.

Delivery Partners

CMAs, water corporations, local government and other delivery partners play a crucial role in successfully facilitating on-ground citizen science programs across Victoria. There continues to be strong community support for getting involved in caring for our waterways and catchments across the State, through citizen science activities. By working in partnership with individuals and community-based natural resource management groups, we can achieve better, more lasting change.

- *Corangamite CMA*
- *East Gippsland CMA*
- *Glenelg Hopkins CMA*
- *Goulburn Broken CMA*
- *Mallee CMA*
- *Manningham Council*
- *Melbourne Water*
- *Merri Creek Management Committee*
- *North Central CMA*
- *North East CMA*
- *Petaurus Education Group*
- *Rural City of Wangaratta*
- *West Gippsland CMA*
- *Wimmera CMA*

Regional coordinators at the Statewide EstuaryWatch Waterwatch Conference 2020, a 2-day event to bring together coordinators from across the state to share, collaborate, inspire, and reimagine the future of Waterwatch, EstuaryWatch and citizen science in Victoria's waterways.



Corangamite

Volunteers Track Vulnerable Fish Species: The Great Curdies Perch Search

The Yarra Pygmy Perch (Nannoperca obscura) is a small-bodied, native fish species found in the Curdies River catchment in south-western Victoria.

This species is under threat of extinction due to the degradation of aquatic environments, invasive fish species and reduced flows in our rivers.

Historical survey records indicated that the species was confined to the middle reaches of the Curdies River and the lower reaches of the Scotts-Cooriemungle Creek systems, the two major tributaries of the Curdies. Suitable habitat for this threatened species was known to exist throughout much of the catchment. Therefore, to find out if the Yarra Pygmy Perch existed more broadly in the catchment, and to protect its key drought refuge habitats, 'The Great Curdies Perch Search' began.

The Corangamite CMA (CCMA) hosted The Great Curdies Perch Search in November last year. Over 30 volunteers and staff collected river water samples along the Curdies River and its tributaries. The samples were sent to an environmental DNA (eDNA) testing lab to detect the presence of Yarra Pygmy Perch. Citizen scientists added to the search data by conducting habitat and macroinvertebrate surveys, as well as assisting with the eDNA sample collection at 31 sites across the Curdies catchment.

The lab results showed this threatened species to be in the Curdies River, specifically from upstream of the estuary to the Lavers-Hill Cobden Road and in the Cooriemungle Creek to the Port Campbell-Cobden Road. Unfortunately, no Yarra Pygmy Perch DNA was detected in any of the minor tributaries. These results indicate that Yarra Pygmy Perch are present in around 65 kilometres of waterways in the Curdies catchment. This new information dramatically improves our understanding of the distribution of this vulnerable species.

"The data collected from The Great Curdies Perch Search will enable the Corangamite CMA to map refuge sites for Yarra Pygmy Perch and improve species protection through targeted waterway restoration. We appreciate greatly our citizen science volunteers' contribution in helping us understand the current status of this important threatened species in our catchments."

Anthony Byrne,
Corangamite CMA Project Officer

Waterbug Blitz added to the knowledge collected at the Great Curdies Perch Search. Credit CCMA.

32 *Active Groups*

197 *Active Sites*

123 *Active Volunteers*

4,305 *Event Participants*

Pesticide Detectives in Corangamite CMA

Corangamite Catchment Management Authority (CCMA) welcomed citizen scientists and community members from the region to join Dr Kavitha Chinathamby, an aquatic scientist at RMIT, to find out more about pesticides in local waterways.

With strong community interest in the monitoring sessions, sediment and water samples were collected at eleven sites including Lake Colac, Barongarook Creek, Deans Creek, Pirron Yallock Creek, Boundary Creek and Dewing Creek.

As citizen scientists, participants were keen to find out whether pesticides were present at sites where they conduct regular Waterwatch tests. Of the 79 samples collected across the nation in this round of testing, only eight sites showed the presence of pesticides, of which two sites were in Victoria. This data is now available on the Pesticide Detectives website to help improve awareness and management of pesticides in local areas.

This was the third time citizen scientists in the Corangamite region sampled waterways to evaluate pesticide load in the sediments of estuaries, freshwater streams and wetlands. Through the Pesticide Detectives program, Waterwatch and EstuaryWatch citizen scientists monitored ten estuaries in the pilot program in May 2019. Later in October 2019, ten more waterways across the catchment were visited including Barwon River, Moorabool River, Waurn Ponds Creek and Cuthbertson Creek in Geelong, Yarrowee River in Ballarat, and the Gellibrand River.

The Pesticide Detectives sampling event also provided samples for the EPA's zinc mapping citizen science program. The EPA required water and sediment samples from the cities of Geelong, Ballarat and Colac to determine the impact of stormwater on the level of metal concentrations in urban waterways.

To dive into the analysis, key findings and view maps where pesticides were sampled, visit the Pesticide Detectives website. It also features results from an online survey that will help inform pesticide use in Australian homes and gardens.

The assistance and participation of citizen scientists has made this project possible and ensured important data is publicly available.

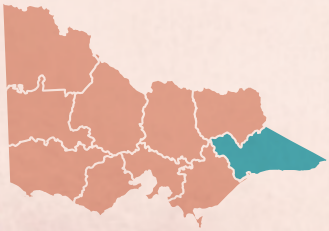
For more information visit **pesticidedetectives.com.au**

"It was great to be involved with like-minded community members and CCMA staff to help Dr Chinathamby test our waterways to measure the presence of pesticides. It was also nice to see the results of our testing on the Pesticide Detectives website."

Wendy Noble, Waterwatch volunteer.

Matt Daniels, Kavitha Chinathamby and Wendy Noble preparing sediment samples for analysis. Credit: CCMA.

East Gippsland



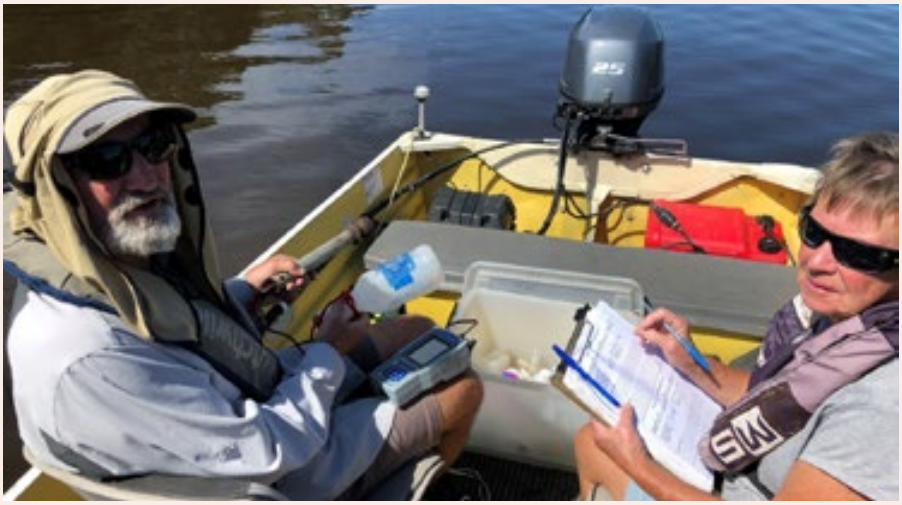
A River of Knowledge Retires

As keen fishers, it makes sense that Ken and Marg Bradley take an interest in the health of their beloved Nicholson River.

In collaboration with the East Gippsland Catchment Management Authority (EGCMA), the couple has spent twenty years monitoring the water quality of the river through the Waterwatch program but have recently decided to retire from their duties and pass the baton on.

"It's something we fell into as members of the Nicholson Angling Club," said Marg Bradley. "Back when we started, we didn't know much about what was happening in the river. I'm not sure it helped us catch more fish, but Waterwatch is a great way to make people more aware of what goes on in our waterways."

In the early 2000s, the Bradleys would set out on their wooden cruiser with fellow anglers Ray Fields, Doug Clarke and Kevin Buchanan to monitor conditions as they travelled upstream. "Back then we did everything manually, so it would take a few hours, but morning tea was always involved, so it was a social outing," said Ken Bradley.



Phil Schneider is keen to learn the Waterwatch ropes from Marg Bradley on the Nicholson River.

Nowadays the equipment is more advanced, with a single probe delivering results in minutes. Testing is conducted at four locations, measuring pH levels, turbidity, salinity, and dissolved oxygen, among other things. Once uploaded, the data is publicly available on the Waterwatch website and used by the EGCMA and other government agencies to better understand of the health of the river.

Over the last two decades, Marg and Ken have been involved in many changes to the Nicholson River. The couple helped the EGCMA place wooden logs in the river to provide habitat for fish. Marg and Ken, together with the Nicholson Angling Club and Nicholson Landcare Group, also planted countless native plants along the river and watched them grow.

"By volunteering, you form lovely friendships and hopefully make a difference," said Marg.

"We're so pleased that fellow angling club member Phil Schneider has put up his hand to take over as there's always more to do."

Bec Hemming, Delivery Manager at the EGCMA, agrees, "The Waterwatch program is a fantastic opportunity to work with community groups and individuals who share a commitment to learning about and improving water quality and river health in East Gippsland."

> ***"It takes passion and perseverance to continue a project for this long, and the EGCMA greatly appreciates the dedication Marg and Ken have shown to improving the health of the Nicholson River."***
>
> **Bec Hemming,**
> **EGCMA Delivery Manager**

The Nicholson River – its health is a priority for Nicholson River Angling Club members.

7 *Active Groups*

30 *Active Sites*

7 *Active Volunteers*

3 *Event Participants*

Waterwatch Data Sparks Collaboration and Change

Romawi Landcare Group's Waterwatch monitoring provides a current and ongoing understanding of the health of Forge Creek; an ephemeral chain of ponds near Bairnsdale in East Gippsland.

Extending eastward for ten kilometres from its source, south of the Bairnsdale aerodrome, Forge Creek flows to Newlands Arm in the Ramsar-listed Gippsland Lakes. The creek and surrounding reserve provide habitat and a water source for many species of fauna including kangaroos, wallabies and many bird species such as the Azure Kingfisher (Ceyx azurea).

For more than a decade, Romawi Landcare Group has made significant efforts to fence off and revegetate the reserve, as well as construct two rock chutes to stabilise the creek's ponds and prevent floodwater erosion.

Since September 2011, the group has steadily monitored Forge Creek's water quality; keen to examine the health of the waterway, alongside bird and frog surveys, to see improvements from the rehabilitation works.

With monthly measurements of air and water temperature, electrical conductivity, turbidity, pH and reactive phosphorus, Romawi Landcare Group's Waterwatch monitoring found the creek had high phosphorus, pH and turbidity levels at times.

The high phosphate levels were the trigger for Romawi Landcare Group to collaborate with the Department of Environment, Land, Water and Planning (DELWP), East Gippsland Catchment Management Authority (EGCMA), East Gippsland Water (EGW) and the Environment Protection Authority (EPA) Victoria to investigate the source.

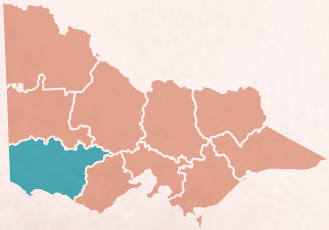
The elevated readings in the creek were due to several sources including surrounding agricultural land runoff, septic tank runoff and overflow, as well as a significant waterbird roosting site. Working alongside the partner agencies on this issue led to the elimination of direct water discharges, improved water management practices, and further revegetation of the reserve.

"Waterwatch monitoring is an important tool in tackling the problem of nutrient input into the Gippsland Lakes. It provides an ongoing picture of the health of Forge Creek and assists other groups and organisations in understanding where issues are and where improvements are needed."

Alistair Mailer,
Romawi Landcare Group's member and Waterwatch monitor

Alistair Mailer, Romawi Landcare Group and Forge Creek Waterwatch volunteer. Credit EGCMA.

Glenelg Hopkins



A Decade Devoted to the Hopkins

Back in 2010, Dina Selman and Ashley Zanker joined 25 other people on a boat cruise along the Hopkins River to enjoy the local sights and learn about a new 'water monitoring' opportunity.

This occasion marked the formation of the Hopkins EstuaryWatch team, followed by ten amazing years of dedicated data collection and new friendships.

Today, as founding members and stalwarts of the Hopkins EstuaryWatch team, Dina and Ash have an appreciation of the estuary system well beyond the 2010 sight-seeing tour. They've observed and recorded physical and chemical changes in the recreationally popular waterway throughout the seasons including floods and storm surges.

As a newcomer to Warrnambool in 2010, and with a keen interest in science, Dina was motivated to get involved with EstuaryWatch. She recalls, "It was a great way to learn more about Warrnambool and its habitats and meet people from different backgrounds."

Since then, practical observations and training opportunities have broadened Dina's knowledge of estuary processes and functions; something she happily shares with friends and acquaintances in casual conversations. "I'm now much more familiar with the river and its habitats. I enjoy seeing the changes with the seasons and different weather events, and how that impacts river mouth changes and the water. If I'm aware that there may be a mouth opening, I'll visit regularly," Dina said.

Ash also clearly recalls jumping on-board the river boat in 2010, with his wife Dianne and children, to find out more about EstuaryWatch and the significant role it offered the river they loved. "We live near the Hopkins and just love the water, whether it's the river or the ocean. We were keen to take part in ongoing monitoring for the enjoyment, the opportunity to learn and to contribute to public knowledge." Ash has a lead role in recording the Hopkins River mouth status each month. "I've loved watching the ever-changing conditions and how the mouth evolves, as well as learning about the berms and chemistry changes. It's given me a really good insight into how estuaries work."

Dina and Ash both recognise the significant land use changes that have occurred along the Hopkins River since they began collecting information and data, particularly the growth in new housing developments. "There was so much vacant land in the area when we first started; paddocks on sandstone beds. Now a lot of this area has been replaced with bitumen and rooves," Ash said. "It will be interesting to see any trends or changes in the data over time."

> ***"I'm now much more familiar with the river and its habitats. I enjoy seeing the changes with the seasons and different weather events, and how that impacts river mouth changes and the water. If I'm aware that there may be a mouth opening, I'll visit regularly."***
>
> **Dina Selman ,**
> **Founding member and stalwart of the Hopkins EstuaryWatch team**

Dina Selman has been keeping a close eye on water chemistry conditions in the Hopkins estuary for a decade. Credit GHCMA.

2 Active Groups

9 Active Sites

13 Active Volunteers

31 Event Participants

For the Love of Nature

To James and Eleanor Cowell, the natural world is remarkable and provides an ever-changing source of fascination. This lifelong passion for nature has led the couple to pursue various ways to support and protect natural habitats and animals in their local area.

Naturally, the Cowells are passionate bird watchers and wildlife photographers. They have also devoted much of their time to native revegetation and Landcare projects and supported numerous conservation organisations over the years.

Since retiring, the active pair found room for one more environment protection quest and joined the Merri EstuaryWatch team in July 2019.

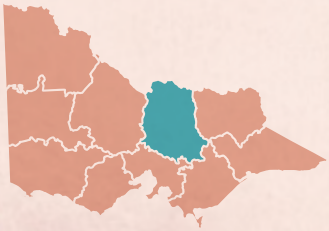
Their enthusiasm for bird watching and photography promises to elevate the data portal with valuable site observations of birdlife along the Merri River and its wetlands, in addition to the standardised EstuaryWatch measurements.

With a rural property along the Merri River, James and Eleanor have long been aware of the important connection between the land and waterways, and the need to protect these natural ecosystems. They look forward to witnessing the changes within the Merri estuary through monitoring events. "Estuaries are interesting, dynamic places with a lot going on," James said. "Joining EstuaryWatch coincides with our interest in the natural world."

> ***"Estuaries are interesting, dynamic places with a lot going on."***
>
> **James Cowell , Merri EstuaryWatch**

EstuaryWatch team members Tom Sheehan, James Cowell and Eleanor Cowell monitoring Merri River mouth conditions as well as identifying and recording bird species at monitoring sites. Credit GHCMA.

Goulburn Broken



Oxygen Monitoring to Save Endangered Perch

The Goulburn Broken catchment is home to seven of the 11 known populations of the endangered Macquarie Perch (Macquaria australasica) in Victoria. King Parrot Creek has one of the strongest populations of the fish.

For the third year running, King Parrot Creek, below the township of Strath Creek, stopped flowing during summer. As the frequency, magnitude and duration of these cease-to-flow events becomes more evident, the integration of the Goulburn Broken Waterwatch program has become vital in collecting data and monitoring dissolved oxygen (DO) levels in isolated pools along King Parrot Creek.

When waterways cease to flow, DO can rapidly deteriorate and lead to fish deaths. Algal growth in the warmer waters is another consequence of cease-to-flow events and can further deplete DO levels. Therefore, monitoring the creek's DO levels has become crucial. If DO levels drop below 3 mg/L further action would be required, including possible translocation of part of the fish population to more secure refuge pools within the creek for safekeeping.

The ability to draw on local knowledge and work collaboratively with a community demonstrates the importance of the Waterwatch program. Once again, Goulburn Broken CMA rallied their local King Parrot Creek Waterwatch monitors to help monitor DO levels in several refuge pools. Volunteers visited the creek two or three times a week to test the pools' oxygen levels. Their help in this project was critical to keeping an eye on the health and resilience of this important King Parrot Creek Macquarie perch population.

Fortunately, the Goulburn Broken region received some vital summer rains and the Macquarie perch made it through the long hot summer. Due to the success of the King Parrot Creek monitoring, the Goulburn Broken CMA is looking to widen the program to other areas of the catchment to ensure all refuge pools are monitored.

Committed Waterwatch volunteers, David Wakefield and Laurie McMillan, sadly passed away in 2020. We thank them for their immense contribution to the Waterwatch program over their 25 years of water quality monitoring in the Goulburn Broken region.

Waterwatch volunteer, David Wakefield, testing DO levels along the King Parrot Creek over summer.
Credit GBCMA.

1 Active Groups

177 Active Sites

63 Active Volunteers

186 Event Participants

Macroinvertebrates, Wetlands and Citizen Science!

A small group of eager volunteers arrived armed with gumboots and smartphones for our 2019 National Waterbug Blitz training day at the Yea River Wetlands.

Guided by freshwater ecologist, John Gooderham, volunteers were taken through sampling techniques, bug identification, and how to use the Waterbug App to replicate this information at their own local waterways.

There were many possible sample sites in the area, including the Yea River, but for ease of access, the wetland was chosen. Volunteers enjoyed taking samples among the ribbon weeds, fallen timber and deeper pools.

Volunteers were also enthusiastic and willing to learn about the importance of macroinvertebrate populations in a waterway and wetland system. And while the group wasn't lucky enough to come across the endangered Ancient Greenling Damselfly (Hemiphlebia mirabilis), it was great to learn all about them!

Participants had the opportunity to identify over 15 different species of macroinvertebrates, using the app that easily takes the user through an identification key.

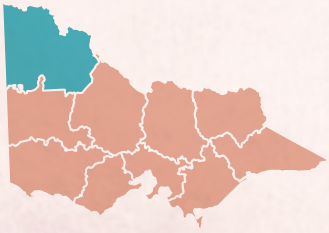
The Goulburn Broken Waterwatch program is looking forward to offering more of these days in the future for more of our citizen scientists to attend.

Volunteers identifying macroinvertebrates collected in the Yea Wetlands with help from John Gooderham. Credit GBCMA.

> ***"It was a great day, and I can't wait to see what macroinvertebrates I can find in my local creek."***
>
> **John,**
> **volunteer, Kilmore Creek.**

Volunteers practicing their sampling techniques in the Yea Wetlands. Credit GBCMA.

Mallee



Watching Wetland Birds to Give Back

Retired flora and fauna consultant and Maryborough local, Garry Cheers, frequented the Victorian Mallee for much of his professional career. Now he's joining other like-minded people as a citizen scientist, to volunteer and give back.

Earlier this year, Garry took part in the Mallee Catchment Management Authority's (MCMA) Water for Birds workshop at Birchip. Armed with new bird spotting scopes, tripods and birding field guide books, the volunteers learnt bird monitoring methods sourced from BirdLife Australia's Atlas and Birdata.

The Water for Birds project aims to harness the power of citizen scientists to collect data on the presence of birds at various water bodies in the Mallee catchment.

"I saw the workshop advertised and I thought perhaps it's time I gave something back. The day was to show people how to do the monitoring, which is really good." Garry said.

Garry praised the MCMA workshop, which he said helped engage people with an interest in the environment to put their birdwatching experience to good use. "Even though I've done this sort of thing a lot before, I needed to see how the partner agencies wanted me to monitor birds."

Workshop participants decided what wetland or waterbody they would monitor and where there are gaps. Garry, who has always loved being out in the bush and wetlands, now drives to an area each month to conduct monitoring. "I've made a good living out of doing that sort of thing for 35 years. I feel it's time to put something back in. And I need something to do now I'm retired," he said.

The data collected from the Water for Birds project will increase local understanding of the benefits of environmental watering for the Mallee and Wimmera waterbodies. The MCMA will also leverage the bird data to report on the outcomes of specific environmental watering events. "I do it already now, and I do a bit of photography. I go away for three or four days, but this will be going to a project, which is really interesting." Garry expects to see a variety of birds that rely on wetlands in the Mallee catchments to appear in the monitoring data. "Without the water, they won't be there," he said.

> ***"I've made a good living out of doing that sort of thing for 35 years. I feel it's time to put something back in."***
>
> **Garry Cheers, volunteer.**

Garry Cheers at Cronomby Tanks. Credit MCMA.

4 Active Groups

50 Active Sites

42 Active Volunteers

8 Event Participants

Elders Reconnect with Country in the Name of Science

For Robinvale Aboriginal elder, Aunty Rose Kirby, the National Waterbug Blitz was an opportunity to reconnect with Country while learning about the world of aquatic macroinvertebrates.

Aunty Rose joined other elders, freshwater ecologist John Gooderham and the Mallee Catchment Management Authority (MCMA) at Hattah-Kulkyne National Park to take part in the national program.

The program mobilises citizen scientists to take an active role in netting, identifying and recording macroinvertebrates in their local waterways to paint a clear picture of the health of aquatic ecosystems across the country. "You see those things about, in the water, but you don't think about them, you don't know what they do or how they survive," Aunty Rose said. "They're good for the environment, but I didn't realise how important they were."

Aunty Rose, who's been involved in Aboriginal education for much of her life, said having young Aboriginal students join the field trip helped pass the knowledge to the next generation. "They've already asked me when they can do this again," she said. "It was fantastic, just being out bush. I felt like taking off my shoes and paddling out there!"

Euston elder, Aunty Margaret Hannah, said the Waterbug Blitz reinforced the importance of all living creatures in an ecosystem and caring for places like Hattah-Kulkyne National Park. "If we didn't have these places, where would we go? It's a food chain for all our other little animals," she said. "I'll take away a lot of knowledge."

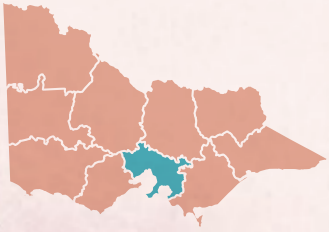
The National Waterbug Blitz helps the MCMA understand how environmental flows influence the range of species present in Mallee waterways. The data collected at Hattah-Kulkyne National Park, and other sites across the region, contributes to the site's environmental water management plan, which builds a picture of how the wetlands respond over time to environmental water activities.

Aunty Margaret Hannah discovering macroinvertebrates. "It's a food chain for all our other little animals." Credit MCMA.

> ***"If we didn't have these places, where would we go? I'll take away a lot of knowledge."***
>
> **Aunty Margaret Hannah.**

Aunty Rose and John Gooderham at Hattah-Kulkyne National Park. Credit MCMA

Melbourne



Litter Trackers: Chasing Bottles to Bays and Beaches

Ninety-five per cent of litter that washes up on Port Phillip Bay beaches starts by being dropped onto suburban streets.

From cigarette butts to plastic bottles, most litter from our streets is washed into the stormwater system by rainfall. Subsequently, it gets caught in waterways or travels to our bays and washes onto our beaches.

To discover exactly how rubbish makes its way from suburban streets through stormwater drains and to our waterways and beaches, Melbourne Water partnered with the AQUEST Research Group at RMIT University to carry out a ground-breaking Litter Trackers project.

Launched in May, GPS-tracked bottles were tossed into creeks and rivers all over Melbourne, from Werribee to Gisborne to Healesville to Frankston. The project was the first of its kind for Victoria, and only the second time that litter has been GPS-tracked in Australian waterways.

RMIT University scientists worked in collaboration with Melbourne Water, local primary and high schools and community groups to deploy 100 GPS-tracked bottles in 20 locations across Melbourne's catchments.

Online interactive maps allowed anyone to follow the bottles and discover how litter travels through our waterways. The results showed that some litter makes it all the way to the bay whilst other times it gets caught and remains very close to where it was dropped.

Project leader Dr Kavitha Chinathamby said Litter Trackers gives all of Melbourne the chance to see the true environmental scale of our litter problem and shows how we can all be part of the solution. "Litter reduces water quality, harms fish and animals, and ruins our city's natural beauty," said Dr Chinathamby.

"To build a more sustainable and liveable future for Melbourne, we need healthy waterways – and that means we need to tackle our litter problem at the source. Through Litter Trackers, everyone can get on board with driving this change and create a cleaner, healthier future for our waterways and bays," Dr Chinathamby said.

Melbourne Water's Waterwatch Lead Yvonne Cabuang says Litter Trackers is a terrific learning tool. "Melbourne Water spends millions of dollars a year removing litter from our waterways. This project is an important reminder for everyone to bin their litter," Ms Cabuang said.

Throughout 2019-20, data was collected from 20 rivers and creeks and attracted more than 400 participants including 18 schools and 20 community groups. As part of the project, classroom materials and teacher resources have been developed to educate school children about littering and its environmental impacts. These education resources are available at Melbourne Water - Litter Trackers project.

You can see how far the litter travelled by heading to the RMIT Litter Tracker website to view tracking data and videos of the litter's journey.

"Litter reduces water quality, harms fish and animals, and ruins our city's natural beauty."

"To build a more sustainable and liveable future for Melbourne, we need healthy waterways – and that means we need to tackle our litter problem at the source."

"Through Litter Trackers, everyone can get on board with driving this change and create a cleaner, healthier future for our waterways and bays."

Dr Kavitha Chinathamby, Litter Trackers Project leader

164 *Active Groups*

397 *Active Sites*

6,548 *Active Volunteers*

8,225 *Event Participants*

RMIT's Dr Kavitha Chinathamby (right) and Moreland City Council Mayor, Cr Natalie Abboud, watch as Antonine College student Jude Elkadi tosses a GPS-tracked bottle into the Merri Creek at Coburg as part of the Litter Trackers project. Credit Melbourne Water.

New Frog Monitoring Method for Billabongs Environmental Watering

Billabongs of the Lower Yarra River are watered as part of the Yarra River environmental entitlement. One of the key values of these billabongs are frogs, with ten species recorded historically for the area.

Up until now, frog monitoring has largely relied on frog call recognition to determine which species are present. These data have usually been obtained from song recorders, which record calls for set periods and are then analysed by an ecologist. Some citizen science data has been recorded and as Waterwatch Coordinator James Frazer tells us, "Citizen scientists have supported the billabong program for the past three years, with some volunteers monitoring sites for over 20 years. That said, coverage of reports has been low at some sites, so there has been a need to formalise and scale-up".

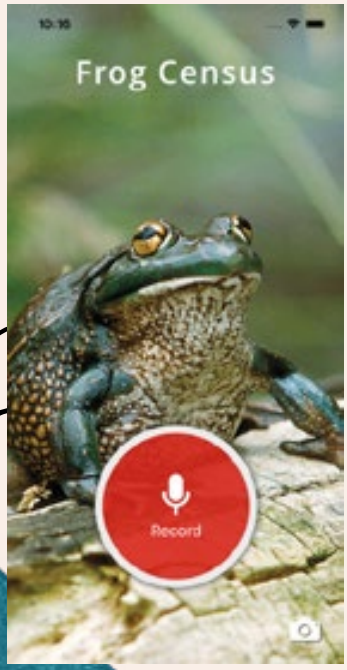
In addition to species presence, the success of the billabong watering program for frogs is determined by watering at the right time with the right amount to ensure frogs can complete lifecycle stages and reproduce. The timing and duration of watering required for breeding vary between species, and the water holding capacity also differs between billabongs.

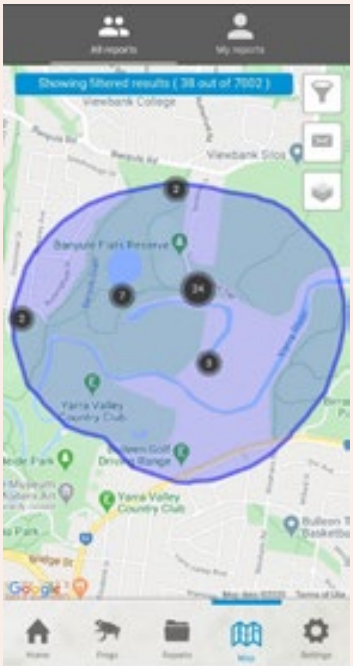
Effective monitoring of frogs was identified as a gap in the Environmental Water Resources Strategy, with the Lower Yarra Billabongs identified as the ideal location for a pilot study.

To obtain more data on species presence, Waterwatch worked with the Melbourne Water Environmental Water team to enhance the existing Melbourne Water Frog Census app to geo-fence the Lower Yarra Billabongs. This allowed the team to highlight billabongs of interest (such as those about to receive water) within the app and recruit volunteer effort to these sites. A geo-fence is a virtual boundary for a geographical area, in this case a billabong.

The collaboration between Waterwatch and the Environmental Water team has two main benefits; allowing the effective collection of data on the billabongs and communicating the environmental watering program to over 1,800 Frog Census volunteers. All citizen science data collected by volunteers is analysed by ecologists to ensure correct frog species identification.

> ***"Citizen scientists have supported the billabong program for the past three years, with some volunteers monitoring sites for over 20 years."***
>
> **James Frazer,**
> **Waterwatch Coordinator**





With the Frog Census app for Apple or Android, you can record frog calls at any river, creek, wetland or other type of waterway. Credit Melbourne Water.

In addition, Ecology Australia has been engaged to develop a conceptual model and monitoring protocol of frog responses to watering. This involves a combination of call identification, tadpole monitoring, nocturnal surveys, and water level and quality monitoring.

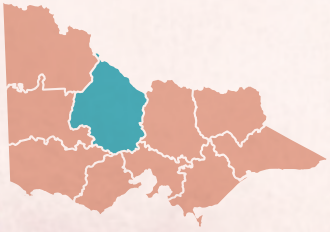
The conceptual model will guide the appropriate watering regime for each billabong, depending on what species are present, and the monitoring program will allow us to determine whether the watering has resulted in successful frog reproduction in each of the billabongs.

The monitoring protocol will allow us to add water when the frogs need it. This is important for the stages in a frog's lifecycle, such as if tadpole metamorphosis is incomplete and the billabong is drying out. Further refinement of watering recommendations to specific billabongs is another benefit. As each billabong has different conditions, it is necessary to monitor during watering events, until we have a greater understanding of how each billabong and their frog communities respond to the watering.

Along with geo-fencing of the app, other app upgrades include a reporting function that will allow users to download frog data sets direct from the app; frog report verification - this will confirm species ID and include assessor comments; and other bug fixes. The upgrade will be launched in Spring 2020.

Willsmere Billabong after receiving a much-needed drink of environmental water. Credit Melbourne Water.

North Central



Bendigo Creek Litter Trackers: An Important Message in a Bottle

On a winter's day in June 2019, 20 Northern Bendigo Landcare Group volunteers spent three hours picking up rubbish along a 3.5 kilometre stretch of the Bendigo Creek.

The group collected 440 kilograms of plastic, glass and aluminium drink containers - enough rubbish to fill three trailers and a ute.

"Given the type of rubbish collected, it was clear most of it had washed down the creek from Bendigo's streets," North Central Catchment Management Authority (NCCMA) Chair Julie Miller Markoff said.

"Bendigo Creek is a waterway that supplies water to irrigators further downstream and is an important cultural and environmental asset for the region. We have an obligation to our neighbours downstream, as well as ourselves, to keep Bendigo Creek clean and ensure the water in it remains healthy."

North Central Waterwatch and River Detectives program is partnering with the City of Greater Bendigo (CoGB) and RMIT to raise awareness about litter, how it enters the creek and where it goes. In August 2019, Ms Miller Markoff and CoGB Mayor Margaret O'Rourke joined students at Golden Square to launch five special trackers into the creek.

"Inside the bottles are GPS trackers, and the students are able to map exactly where they end up. They will be able to see what happens to rubbish when it enters the creek," said Cr. O'Rourke.

Cr. O'Rourke said such projects were an important part of the Reimagining Bendigo Creek project.

"The City of Greater Bendigo is working closely with the Dja Dja Wurrung Clans Aboriginal Corporation, the NCCMA, Coliban Water, state government departments and community representatives to create a shared vision and plan for the creek over the coming year," she said.

"Projects such as these create awareness about the creek and remind us how important it is to the city and to those who live downstream."

For the first few days the trackers travelled easily along the concrete stretch of the creek to just below Lake Weeroona. Here the creek changes dramatically; dense vegetation grows in the silted-up channel. Unable to move through the thick reeds, most litter finds its resting place here, as did the trackers.

The extent of litter among the dense tangle of vegetation and silt was unexpected. Three of the five trackers were lost among the layers of litter that has accumulated in the creek over decades.

"It was like looking for a needle in a haystack and reminds us about the importance of disposing litter correctly," said Britt Gregory, NCCMA Project Officer.

"We plan to work with River Detectives students to further help them understand why litter is an important environmental issue, how it remains trapped in our waterways, the impact it has on the aquatic environment and what can be done about it. We'll share this knowledge with the broader community too.

We live in a beautiful city and need to manage the waste we produce to ensure that our waterways remain clean and free of litter for everyone to enjoy, and to keep ourselves and local wildlife safe," she said.

"Quite clearly, stopping litter at the source is the best option. Everyone needs to be part of the solution by being actively responsible for their own litter," said Ms Gregory.

The Litter Trackers project is a collaborative project between NCCMA, the CoGB, RMIT University and Melbourne Water. The project is funded by the CoGB and the Victorian Government.

> ***"Ordinarily, throwing plastic bottles into the creek is not recommended, but these ones will tell an important story."***
>
> **Julie Miller Markoff, NCCMA Chair.**

Students send the first of five Litter Trackers down the Bendigo Creek. Credit: NCCMA

4 Active Groups

77 Active Sites

56 Active Volunteers

1,243 Event Participants

Reconciliation at the Heart of Waterway Health

Waterwatch and River Detectives staff have relished the opportunity to work closely with Dja Dja Wurrung Clans Aboriginal Corporation and Taungurung Clans Aboriginal Corporation to share knowledge and understanding of waterway health in the North Central region.

The opportunity to learn from each other and incorporate Traditional Knowledge and Aboriginal Perspectives into the Waterwatch program has been invaluable. Furthermore, developing future engagement activities and deepening our collaboration efforts is a significant step towards reconciliation.

Aunty Marilyne Nicholls is a descendant of the Dja Dja Wurrung Clans people of the central Bendigo region and has multi-clan connections to the Ngarrindjeri Nation in South Australia of the Coorong Coast and the Murray River, Swan Hill area. Aunty Marilyne is helping us create culturally appropriate and safe resources for North Central Waterwatch.

She is also guiding our future project development ideas to ensure we are working towards reconciliation by acknowledging First Nations people in all the work the North Central Catchment CMA do.

Additionally, Aunty Marilyne is playing a lead role in developing an annual Kia Dhelk Gatjin (Speaking Healthy Water – Dja Dja Wurrung language) major school event. Through her involvement, North Central CMA are partnering with Djandak, Parks Victoria and the City of Greater Bendigo to plan and deliver this exciting full-day event. Kia Dhelk Gatjin will celebrate Dja Dja Wurrung Culture and the fantastic work of our River Detectives students.

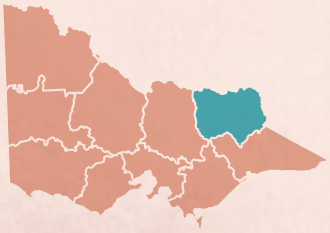
A highlight of the day will be a 'kids teaching kids' activity, where students will present their results and water monitoring programs to students from other schools. The afternoon will also include round-robin style activities led by Dja Dja Wurrung Traditional Owners. Postponed from April 2020 due to COVID-19 restrictions, the upcoming Kia Dhelk Gatjin event will ultimately be held at the Wanyarram Dhelk Frog Ponds, a wonderful site developed by Djandak.

The North Central CMA are proud to partner with the region's Traditional Owners in planning this event and other work being undertaken. "Creating further opportunities for engagement and collaboration is a key priority. By working together with our Traditional Owners and First Nations people, we're working towards reconciliation," said Britt Gregory, acting Regional Waterwatch Coordinator, North Central CMA.

Aunty Marilyne Nicholls.

Aunty Marilyne Nicholls during a Waterwatch tour of the Avoca River. Credit: Fern Millen Photography.

North East



Waterwatch Volunteers Respond to Bushfire Call

From January through March 2020, bushfires ripped through the Victorian Alps, causing a lot of destruction and pain in remote communities. The most affected areas were the Upper Murray region (Corryong-Cudgewa-Walwa), the Buckland and Buffalo sub-catchments of the Ovens River, and the Cobungra-Bundara reaches of Upper Mitta Mitta.

Despite the disruptions, some Waterwatch volunteers answered the call for increased vigilance by checking water quality in affected waterways.

Monitoring intensity increased markedly with the volunteers visiting and monitoring more sites each week rather than the previous monthly visits, even while their communities were severely impacted by the fires.

The aim was to fast-track waterway monitoring soon after the bushfires to assess the impacts and continue the accelerated (weekly) monitoring over a few months to understand how the waterways were recovering. Priority sites were selected on the following waterways: Cudgewa and Nariel Creeks in Upper Murray, Bundara River in Upper Mitta, the Ovens River at Mullinmur, Hurdle Creek (King Catchment), and the Buffalo and Buckland Rivers. In total, 58 weekly site assessments were conducted over this period.

New Waterwatch volunteers in the region, Gavin Melgaard and Jane Bateson, gladly offered to conduct accelerated monitoring on two priority sites on the Buckland and Buffalo Rivers. Corryong teacher and Waterwatch volunteer, Vicki Kane, involved her chemistry students from Corryong College in her water monitoring activities. The changing results in water quality provided her students with valuable, real-life learning experiences in chemistry.

"The students could see the water wasn't in great condition, but by undertaking tests they could see how measures like turbidity could go from very poor, improve, then - after heavy rains washed ash into the creeks - very poor again," Vicki said. "With weekly monitoring they could observe and confirm that overall water quality in Cudgewa and Nariel Creeks slowly improved after the fires."

The Waterwatch monitoring, coordinated by the North East CMA, not only complemented the formal monitoring conducted by agencies, it supported crucial decisions by local water and land management agencies after the bushfires. It was vital in helping waterway managers understand the impacts of the fires on aquatic habitats, particularly the effects of low dissolved oxygen and high turbidity on fish. The data will be essential for informing and monitoring the recovery of waterways across North East Victoria and provides important baseline information to plan for and respond to future fires.

Still, the bushfires significantly disrupted the Waterwatch program as some of the volunteers were unable to continue with their monthly site monitoring between March and May. It also meant Waterwatch staff could not provide face-to-face support to volunteers. Nevertheless, the enthusiasm of our volunteers and the value of the Waterwatch program in monitoring bushfire-affected waterway health and recovery has been well demonstrated during this challenging period.

> ***"While the farmers were busy rebuilding homes and fences, my monitoring activities with Waterwatch gave me something I could do to contribute and help farmers by giving them feedback about their water quality."***
>
> **Vicki Kane,**
> **Waterwatch Volunteer and Chemistry Teacher, Corryong College.**

Corryong College students conduct water quality tests on bushfire-affected Nariel Creek. Credit: Vicki Kane.

Waterwatch volunteer Gavin Melgaard undertaking water quality testing near the Porepunkah Jetty. Credit: Kathie Le Busque.

5 Active Groups

42 Active Sites

33 Active Volunteers

1,086 Event Participants

Waterwatch Helping to Transform Mullinmur Wetland

Mullinmur Wetland is situated on the Ovens River floodplain just north of Wangaratta City. Located on private land belonging to Catholic Education Victoria (CEV), the wetland is managed and protected by Wangaratta Landcare & Sustainability Inc (WLS) in partnership with the CEV's Borinya Wangaratta Community Partnership (Borinya), whose centre is nearby the wetland.

Borinya is an alternative learning program, spearheaded by CEV, for young people at risk of disengaging from mainstream education. Aptly, Borinya is a local Bpangerang word to describe a river that parts from its main course for a short time, then later re-joins it.

Over the last three years, North East CMA (NECMA) has supported the WLS to rehabilitate and improve the Mullinmur billabong. Funding was provided to develop a wetland demonstration site and management plan, enrich the aquatic habitat through constructed wetlands, carry out weed control and revegetation, raise community awareness, and remove feral carp.

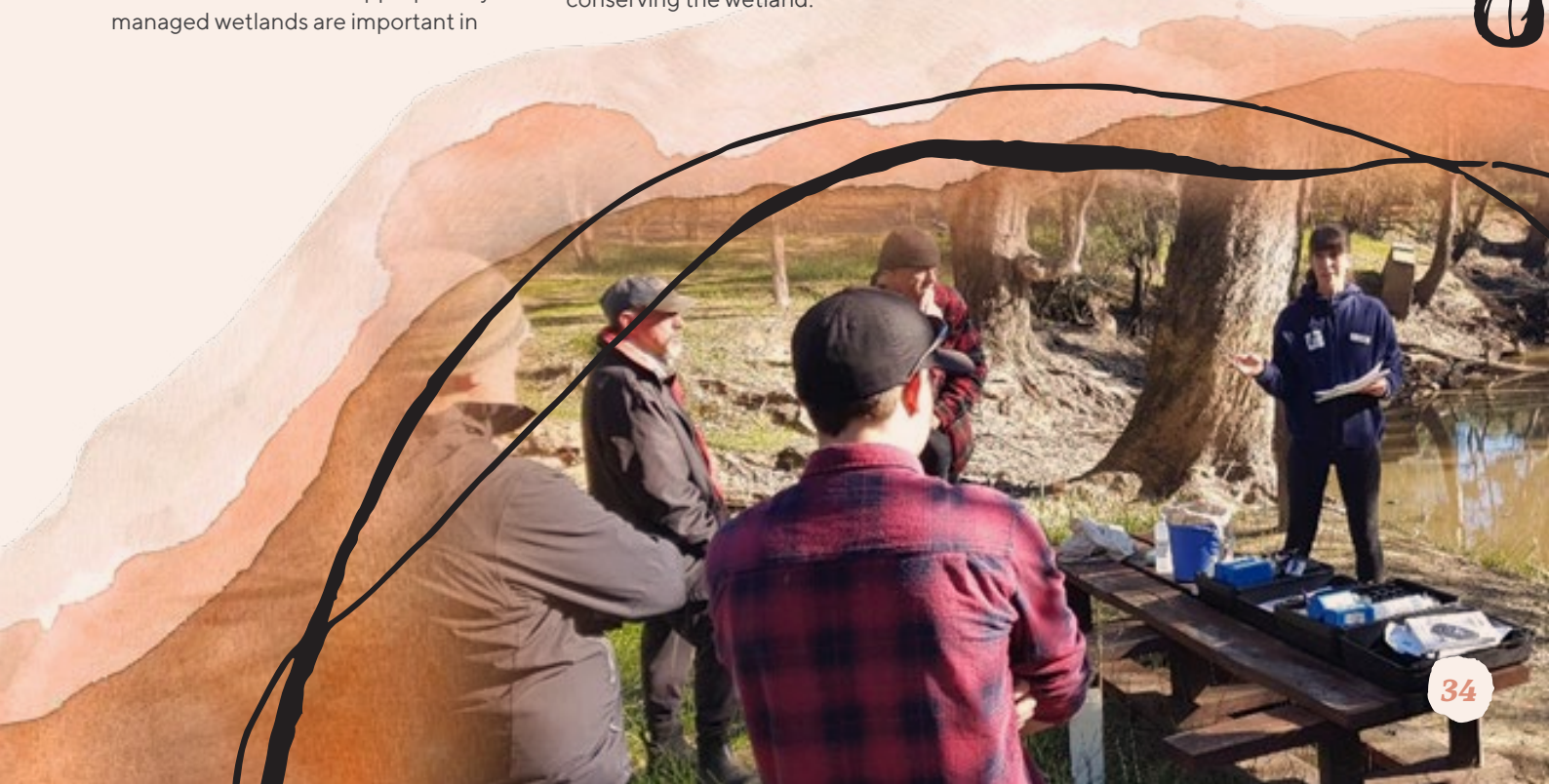
The project has transformed the billabong into a valuable wetland and demonstrates that appropriately managed wetlands are important in the regional landscape. An allocation of environmental water through the Victorian Environmental Water Holder ensures the billabong is refreshed during the dry summer months and supports the translocation of native catfish back into Mullinmur Wetland.

The site is a major drawcard for the local community and is used for outdoor learning by Borinya, Galen Catholic College and other local schools. Further partnerships with Arthur Rylah Institute, Rural City of Wangaratta and other organisations have also been established.

In July 2019, the North East Waterwatch program partnered with WLS and Borinya to introduce water quality monitoring at Mullinmur as part of the site's management. Waterwatch trained six WLS volunteers and over 100 Borinya students to conduct testing of the billabong and nearby Ovens River at four new monitoring sites. By monitoring baseline and seasonal trends in Mullinmur's water quality, the community gains an understanding of how management interventions are improving the habitat for the catfish and other fauna. Thus, the new water quality monitoring has a vital role to play in conserving the wetland.

Delivery of Waterwatch activities at Mullinmur has been led by the Rural City of Wangaratta, following a partnership agreement with NECMA in July 2019. Concurrently, NECMA also partnered with Petaurus Education Group to expand the Waterwatch program across Victoria's entire north east region.

> *"It's really exciting to provide a healthy habitat for the translocated freshwater catfish.*
>
> **Kelvin Berry**
> **volunteer Wangaratta Landcare & Sustainability Inc.**



Waterwatch training at Mullinmur

West Gippsland

Waterwatch at Heart Morass with Field & Game

The rehabilitation of Heart Morass from a dry dustbowl continues since the 1,300-hectare wetlands changed ownership in 2006.

Saltwater intrusion from Lake Wellington threatens the Heart Morass' freshwater and brackish wetlands. The site's acid sulphate soils also endanger the habitat of animals and up to 30,000 waterbirds that visit Heart Morass at any one time, including Latham's Snipe, a migratory snipe of the East Asian-Australasian flyway.

Since 2006, dedicated volunteers from the Sale branch of Field & Game Australia have planted over 60,000 trees and for the last two years have also monitored the water quality at Heart Morass. Initially proposing six sites across Heart Morass, Waterwatch volunteer, Gary Howard, and other Field & Game volunteers opted to monitor an incredible 12 sites! Taking around four hours to monitor all the sites each month, the volunteers enjoy a social day out; measuring the water's electrical conductivity (EC), pH, dissolved oxygen, turbidity and temperature. Importantly, the EC and pH levels indicate to the volunteers how Lake Wellington's salty water is impacting the wetlands and how the acid sulphate soils are tracking.

As the wetland receives environmental water flows, water quality monitoring was a natural next step for Field & Game as wetland conservationists. Conserving the Morass is more than just for hunting, Gary emphasises, "There was a view that 'wetlands were wastelands', that they could be drained. We're there fighting to save, protect and enhance them."

By uploading the water monitoring results onto the Waterwatch data portal, this valuable information is shared with the West Gippsland Catchment Management Authority (WGCMA), and other stakeholders, so better water delivery and management decisions can be made to help the Morass. WGCMA's Water for the Environment team member Dr Adrian Clements says, "It's great having the Field & Game crew out there collecting data regularly. It gives me a sense of what's going on across the wetland and informs my water planning. Gary also notes other significant happenings. Earlier this year the crew observed over 40 Glossy Ibis at one of the sites, a bird not often seen at the Morass."

> ***"Field & Game certainly want to improve the site, but we want members of the public to come and enjoy it too. We're building new walking tracks, maintaining other tracks and encourage people to come for a walk or bike ride. We might be the key manager now, but it's a community asset we want people to enjoy,"***
>
> **Gary Howard,**
> **Waterwatch volunteer.**

Field & Game volunteers ready to go Waterwatch monitoring. Credit: Gerard Callinan.

5 Active Groups

30 Active Sites

30 Active Volunteers

73 Event Participants

From Waterwatch Volunteer to Water Career

For Jem Stirling, landing a job at the West Gippsland Catchment Management Authority (WGCMA) two years ago was a dream come true. "I've always been passionate about the environment but ended up in a completely different field. Eventually the stars aligned, the opportunity came by and graciously, the WGCMA gave me a go," said Jem.

Since taking the job, Jem has been learning to manage Water for the Environment and delivering groundworks, but in 2020 a full-circle came to pass.

"When Matt Khoury, the Waterwatch and EstuaryWatch co-ordinator, announced he was leaving, I was pretty quick to put my hand up and say I'd like to give his role a go," Jem said. The WGCMA agreed, and Jem now also manages WGCMA's citizen science program, including coordinating and supporting volunteers.

A Waterwatch volunteer for seven years, Jem considers her new responsibilities as pretty special; "I monitored the Tarwin River at Mossvale Park and really enjoyed the opportunity. It was a great way to gain skills and get to know a waterway."

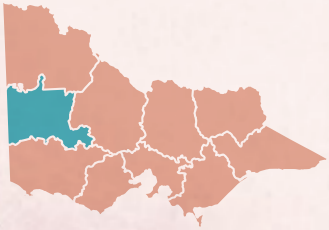
Jem was also an EstuaryWatch volunteer, at times collecting data with the Powlett River EstuaryWatch group. Jem feels these opportunities were instrumental in turning her volunteering into a professional opportunity; "I really valued the people I met along the way, especially the other volunteers. It was great to meet people who shared similar passions and to broaden my environmental networks."

So far, Jem is enjoying the new responsibilities of co-ordinating WGCMA's Waterwatch and EstuaryWatch volunteers. "All the volunteers have been really lovely and accepting. I'm looking forward to getting to know them better and learning more about their stories. It's also interesting to learn more of how it works from the 'other side'; there's great work out there and people have gathered incredible datasets that will remain useful for years to come," she said.

Jem would recommend anyone keen to pursue water management as a career to give Waterwatch or EstuaryWatch volunteering a go: "It's an easy way to learn more about the industry, learn some new things and get to know your local waterways better."

> ***"From a CMA perspective, I appreciate being able to look at datasets other volunteers have gathered – they do come in handy!"***
>
> **Jem Stirling, ex-Waterwatch volunteer.**

Jem Stirling, monitoring Thomson River in 2019 for the WGCMA. Credit Elsa Burnell.



Wimmera

Escaping the Classroom to Make A Difference

At Stawell Primary School, a new environment and sustainability program has initiated two citizen science opportunities for Year 5 students to experience real-life, hands-on learning activities.

Blake Hyslop prepares to measure reactive phosphorus. Credit WCMA

First, the River Detectives program provides students with equipment and learning materials to measure the water quality, habitat, and aquatic macroinvertebrates of a local waterway. An education initiative of Victorian CMAs, River Detectives supports teachers to connect young people to their local waterway.

Through the program, participating schools and teachers receive river health training, a water quality monitoring kit, and additional support from a local facilitator. Plus, the River Detectives website provides teaching resources and a host of educational activities designed to maximise student involvement and make participation easy for teachers.

Lead teacher Ms Toni Stewart said, "When we think about the devastating impacts of climate change, and the continued destruction of our natural environment, it can be overwhelming. Many of us are left wondering what we can do in an educational setting to make a difference. One fantastic way we can make meaningful change is through participation in citizen science programs."

Second, the ClimateWatch in Parks program, an initiative of the Earthwatch Institute, facilitates students collecting valuable data on local plant and animal species. This data is interpreted by Earthwatch to monitor changes and understand the impacts of climate change on the plants and animals over time.

A ClimateWatch trail was already established at Venus Baths in Halls Gap; therefore, the school located their River Detectives site at Venus Baths to collect a wider spread of comprehensive data from one monitoring site.

When asked about the school's motivation to participate in both citizen science programs, Ms Stewart highlighted the proven benefits of bringing young students into contact with nature and contributing important data to a greater cause.

"Connecting kids with positive experiences in nature leads to positive environmental behaviours, so we know we're providing long-term benefits for the planet. The students are always enthusiastic about heading outdoors; they think they're escaping the classroom, when in fact they're growing a host of scientific and mathematical skills such as scientific methodology, ecology, freshwater science, as well as measurement and data," she said.

Ebony Hall grabs a water sample. Credit WCMA

1 Active Groups

10 Active Sites

7 Active Volunteers

100 Event Participants

Twenty-five Years of Monitoring the Wimmera River: A Milestone Effort

Jeparit Waterwatch through the years; ten years in 2005, 15 years in 2010. Credit Jeparit Waterwatch.

The Jeparit Waterwatch group marked an impressive milestone this year, achieving 25 years of monthly water quality monitoring of more than six sites along the lower Wimmera River.

Established in 1995 by retired farmers, the group has seen many changes in the river's water quality including the Millennium Drought, 2011 floods and various environmental flows. Volunteer and former coordinator, Jeanie Clark recalls, "The group thought monitoring the Wimmera River stretch at Jeparit would be worth doing for their own knowledge, and the community, and so formed Jeparit Waterwatch. Since this time, the dedicated Jeparit Waterwatch volunteers have undertaken monthly monitoring from six to twelve sites between Antwerp to Lake Hindmarsh."

Jeanie has been involved from the beginning, supporting the interest of the group, originally led by Alan McKenzie (dec.) and enlisting the local primary school to participate, whilst supporting and encouraging quality water monitoring, educational activities and community advocacy. "If you want to know your local water place and how healthy it is, then Waterwatch is a great place to do some citizen science," she said.

Founding member, David Livingstone, lived on the banks of the Wimmera River all his life, and sadly passed away not long after his 25 year monitoring milestone.

A great source of first-hand information about the river, David had been the voice of the Jeparit Waterwatch for many years, sharing his knowledge with the community and as the group's spokesman.

David Livingstone will be sadly missed by the Jeparit Waterwatch group, and by the broader Wimmera community. We thank him for his immense contribution.

Frank Pitt, another local farmer, now in his 80's, echoed the motivation to know about the salinity in the community, "The most important test we do is salinity," Frank says. He began as a volunteer with Waterwatch during the Millennium Drought, in 2002. Puzzled by why the sheep in his paddock beside the river were refusing to drink from it and losing condition, he soon learnt about the salinity levels being too high for sheep to safely drink.

"It's inspiring and a privilege to be part of this Jeparit community for over a quarter-century and to share this way of caring for the Wimmera River and its environment."

Jeanie Clark,
Jeparit Waterwatch.

Another member, who started with Jeparit Waterwatch in 2000 at the age of five, is Jeanie's son, Michael Clark. After many years involved in Waterwatch activities, the ideal training ground for his future career, Michael left the Wimmera to complete honours in ecotoxicology at RMIT University. "Over a decade, I gained practical water quality monitoring experience which set me in good stead for the career path I later chose, now as an environmental scientist with RMIT University's Aquatic Environmental Stress research group," explained Michael.

"Waterwatch is an excellent citizen science program to learn the basics of water quality monitoring and the nature of the local environment," Michael said.

The group's quarter-century of dedication and achievements calls for a celebration; however, the coronavirus pandemic halted these festivities. At the time of the milestone anniversary, environmental volunteering activities across the state changed to protect volunteers and the broader community from COVID-19. However, dedicated volunteer, Martin Stone, navigated the COVID-19 restrictions and performed solo tasks, so Jeparit Waterwatch could reach their 25 years of continuous monthly monitoring.

Waterwatch Victoria would like to wholeheartedly thank you all for your commitment to citizen science and acknowledge your contributions to the environment and the community over the years.

20 years in 2015, and 24 years in 2019. Credit Jeparit Waterwatch

Waterwatch Victoria
www.vic.waterwatch.org.au
EstuaryWatch
www.estuarywatch.org.au
River Detectives
www.riverdetectives.net.au
National Waterbug Blitz!
www.waterbugblitz.org.au
Litter Trackers
https://www.rmit.edu.au/about/our-values/sustainable-development-goals/goal-3/the-litter-trackers
Saltwatch
http://www.vic.waterwatch.org.au/salt_data_portal.php
Fluker Post Project
www.flukerpost.com

Contact
Sasha Wells
Statewide Citizen Science Facilitator
sasha.wells@ccma.vic.gov.au
or vicwaterwatchestuarywatch@ccma.vic.gov.au
0459 835 628.

Waterwatch Victoria
EstuaryWatch Victoria

Vale

David George Livingston
10.09.1931 - 01.10.2020

Thank you for your dedication and for all you have shared with, and taught to, those who have been part of Jeparit Waterwatch and the Wimmera community, over the last quarter-century.

EstuaryWatch
WATERWATCH Victoria
VICTORIA State Government
Environment, Land, Water and Planning