

## River Detectives Story of Change

Daylesford Dharma School, North Central CMA region, 2023



River Detectives is a cross-curricular citizen-science program connecting teachers and young people with their local waterway. Through water-quality testing, macroinvertebrate sampling, and habitat surveys students learn about the importance of catchment health and their role in caring for it.

The program is available to schools and youth groups in five regions across Victoria.

Tanya Wiggins is the Learning Manager at Daylesford Dharma School, a small primary school of 34 students near Daylesford in Central Victoria. The school is non-denominational, welcoming all students, but is unique in its Buddhist philosophical approach to teaching and learning with two key principles; interdependence and universal responsibility.

The school aims to foster a strong understanding of how students are connected to the web of life and their responsibility of non-harm to that web. They have been involved in River Detectives since 2014. Tanya explains that when she heard about the program she could see the benefits straight away;

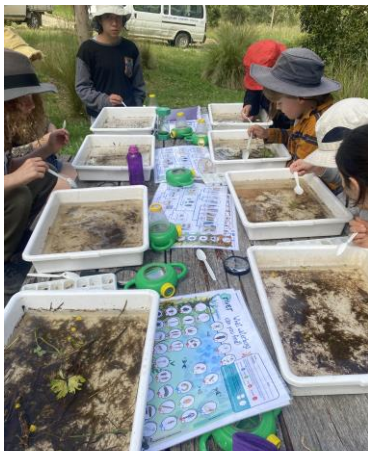


*Creek bed developed within the school grounds.*

*“We were going to Tipperary Springs regularly to learn about habitat, flora, fauna, and water bugs so I saw the program as a great opportunity for students to build that element of universal responsibility. Citizen-science gives them a great chance to contribute their observations while learning amazing skills which sit so beautifully within the Science and Humanities curriculum. It also allows students to explore the chemical science aspect which schools can find a little more difficult to cover.”*

The school’s decade-long River Detectives journey revolves around their adopted site on Smiths Creek in Daylesford’s Cornish Hill Reserve where Grade Three to Six students have been involved. Junior students look forward to being a senior student, with River Detectives a highly anticipated rite of passage.

Small class sizes and mini busses owned by the school means teachers can connect with their community



*Students enjoy a River Detectives excursion at Smiths Creek.*

regularly. On a whim, teachers can take their class to Smiths Creek and see first-hand what they are learning about. This means the learning is rich, meaningful, and can be continued back in the classroom.

Cornish Hill Reserve, an 1850s goldmining zone, is being rehabilitated by the Friends of Cornish Hill. Former staff member Emily Wilden has developed a close relationship with the Friends of Cornish Hill Landcare Group and, in particular, group member Margie Thomas.



*“The school has been involved in many initiatives and events with the Landcare Group over the years from Kids Teaching Kids events to cultural and environmental school field days with neighbouring schools. Parents are invited to come along and see the children’s learning in action with families visiting the reserve on weekends and holidays to see how the site is healing and changing.”*

At the Dharma School, immersion in subject matter leads to interests that children have autonomy to follow.

*“After a Landcare field day about frogs, the children kept talking about frogs, so staff harnessed this interest. Students from P-6 looked at frog distribution maps, identified the frogs of Cornish Hill, researched them, and created signs that were placed throughout the reserve.”*

In 2022, teacher Mandy DeLacy and students refurbished the signs.

*“If we’re interacting with a space then we have responsibilities to that space to ensure it is looked after. River Detectives has created a real care of Cornish Hill by students.”*



Dharma students teaching their peers.



Frog signs made by Daylesford Dharma School students

Students are currently propagating plants for revegetation in 2024 that will involve designing and making signage from recycled timber.

Daylesford Dharma School is committed to nature-based, environmental learning but Tanya explains the key impact of River Detectives;

*“River Detectives keeps the momentum up. There is so much curriculum to consider in schools, but River Detectives keeps environmental learning front and centre in staff and children’s minds throughout the year and over the years. Bush School has been another spinoff. We run Bush School at three sites; Cornish Hill, Tipperary Springs, and Merin Merin Swamp near Clunes. Students spend the bulk of their learning day on a Monday during terms two and three at one of the three sites focusing on experiential learning.”*

Tanya shares other benefits the program has had on students, staff, and the school community;

*“For students, River Detectives is powerful as a multi-generational program. Older students mentor younger students and students relate skills with the science and biology they engage in at high school.”*





*For staff, the River Detectives program gives us confidence to really think about how we want learning to look and the equipment, training, and support to make it happen. It has given our environmental curriculum form.*

*When we do lots of excursions around the community, there can at times be questions about whether this is time well spent for educational outcomes. The River Detectives program has helped us communicate the wonderful science learning that is happening when we visit environmental sites. The learning then flows back into our literacy and numeracy programs with the application of meaningful data we have collected,”*

In 2023, Daylesford Dharma School received a Regional Recognition Award by the North Central CMA highlighting the contribution they’ve made to the goals of the Regional Catchment Strategy.



*Proud recipients of the award for their commitment to River Detectives, their partnership with Landcare and on-ground achievements at both Cornish Hill and at their school site*

From a curriculum development perspective, Tanya’s highlight is the power of ongoing data collection that provides meaningful information across the seasons and years for use by students;

*River Detectives has been embedded into many other curriculum areas. Rather than using arbitrary data, water quality results have been used in graphing activities in Maths.”*

Tanya is confident the school will be involved in the River Detectives program for years to come with Junior Landcare grant funding enabling another exciting project for 2024. Colleague, Rachel Taylor explains;

*“For this project, aligned with our Compassionate Citizenship program, we plan to build nature observation boxes with the local Men’s Shed and place them along tracks in the Cornish Hill Reserve. They will house journals and observational tools for people to record what they notice over different times of the year.*

*“The hope is these installations create greater community connection to the reserve and more awareness of the biodiversity in the waterway. Ultimately, the project will see the students use the data they gather from the observation boxes, and knowledge they glean from the excursions, to run another Kids Teaching Kids Day. Stepping up into the role of community educators, our students will run workshops about biodiversity.”*

## For more information about River Detectives:

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*Photos provided by Nicole Howie and Tanya Wiggins*

## River Detectives Story of Change

Timboon P-12 School, Corangamite CMA region, 2023



River Detectives is a cross-curricular citizen-science program connecting teachers and young people with their local waterway. Through water-quality testing, macroinvertebrate sampling, and habitat surveys students learn about the importance of catchment health and their role in caring for it.

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Timboon P-12 school, comprising of 470 students, is in a farming, artisan food, and tourism region of Victoria. It receives high rainfall feeding many small tributaries of the Curdies River that winds its way south west to the sea at Peterborough. It's also home to the Timboon Agriculture Project (TAP) coordinated by Andrea Vallance.

TAP has been described by the Minister of Education as “a best-practice example of what can be achieved with a strong partnership between schools, industry, and the community.” Classrooms extend into the community with contributions by those with work or life knowledge and skills that align with curriculum. The Curdies River and its tributaries touch all parts of our community; geographically, but also through leisure activities and as a resource for the dairy, food, and fibre producers in the area. The school's strong affiliation with the Curdies River meant that when the estuary experienced blue-green algal blooms and fish deaths in April 2022, community concern was heightened, and a natural teaching moment arose.

Andrea explains, *“I spoke with Corangamite CMA about becoming a River Detectives school but it was too late to sign up that year, so we accessed the online resources and put ourselves on the waiting list for 2023.”*

Keen to get started, TAP prowess came to the fore and they immediately began integrating the Curdies River into the curriculum in anticipation of becoming official River Detectives the following year;

*“Year 7/8 Community Projects elective students linked up with Power Creek Reserve Committee and Heytesbury and District Landcare Network to plan and begin rejuvenation of the reserve over two school terms. The students' work in cleaning up this stretch of the creek prompted a session with local shire staff on rubbish and waste management.”*



CCMA project officer Gene demonstrates water quality testing.

*“The Year 7 Geography study of water and catchments was enriched by the deep knowledge held by Debbie of Curdies Valley Landcare Group (CVLG), and Gene, a Land and Catchment Project Officer from CCMA. Year 7 students, supported by Gene and Debbie, shared what they had learned with school visitors and younger students at the school's annual curriculum expo, TAP's On!, later that year.”*

Andrea explains even though Timboon P-12 School only joined the River Detectives program in 2023, its story is powerful because TAP was an established vehicle for the program to seamlessly integrate with;

*“As a result, our engagement with the river and the school's capacity to capitalise on the River Detectives program was immediately realised. We haven't created something new with River Detectives, but using it we have been able to super-charge a new focus within the TAP, across year levels and curriculum areas.”*

This has proven to be a highly successful delivery model.



The chosen monitoring site was on the Curdies River at the tourist icon of Trestle Bridge. In Term One, 2023, the program was used to add value to a Year 10 study of the Curdies estuary. Debbie of CVLG and CCMA River Detectives Coordinator Deirdre, trained students in water-quality testing and water bug identification.

*“Students learnt a lot about the causes and impacts of water quality changes and how land use upstream can affect water quality all the way down to the estuary.”*



Deirdre works with students at Trestle bridge



During April, Year 5/6 drew on real data and the lived flooding experience of a local farmer to predict the on-farm damage and repair costs following a 30 per cent higher-than-average forecast rainfall event.

*“Although not strictly part of River Detectives, learning can be successfully built upon because of links across the curriculum and between year level. The Curdies River is now one of those links.”*



Dean from CRCA with Year 9 's

In May, Year 9 students visited the estuary to contextualise a writing project, 'Curdies Stories; Tales of the People and River'.

*“They interviewed locals for their memories of the Curdies catchment. Members of the Curdies River Catchment Alliance group, formed after the fish deaths, along with Landcare and CCMA representatives spoke to students about the river’s use, history, ecology, and management. Stories the students wrote are being published thanks to a grant from our local op-shop.”*

In June, Year 3/4 students learnt about waste management which tied nicely to the Story Of A River session River Detectives Coordinator Deirdre delivered in November at the annual TAP's On! event. Students grew to understand the impact of litter and pollution on our waterways.

Even Year 1/2 students are involved. In May, they investigated the water cycle and visited Power Creek to make scientific observations and collect a water sample for testing.



Year 1/2 students at Curdies River tributary, Power Creek





*“In June, Debbie of CVLG used apples, ink, crumpled paper and water to explore how much water is on the planet, how the water cycle works, how a catchment works and our responsibilities in protecting waterways.”*

And after enjoying a retelling of the rainbow serpent Dreamtime story, Prep/1/2 students arrived at school one morning after a rainfall event to find an outline of a serpent on the path.

*“Under guidance from the art teacher they brought the Rainbow Serpent to life, just like the Curdies River after a good soak.”*



Year 1/2 students learn how catchments work.



*The rainbow serpent arrives one morning after a big rainfall event and gradually comes to life.*

Andrea knows from her decade-plus of delivering the TAP that cultural change about community and environmental issues takes many years but is helped along by young people developing and sharing their enthusiasm and understanding with their families.

*“As more teachers access the training and resources on offer from River Detectives in coming years, and as students move through year levels engaging with the river in different ways, we expect the interest and enthusiasm for the Curdies River, its catchment, and estuary will flow strongly through the district.”*

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*Photos provided by Andrea Vallance*



## River Detectives Story of belonging

Jeparit Primary School, Wimmera CMA region, 2023



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The program is available to schools and youth groups in five regions across Victoria.

Craig Donahoo is the Principal of Jeparit Primary School, a small rural school on the Wimmera River in the state's west that has been involved in the River Detectives program since 2017. Students monitor their adopted site on the Wimmera River nearby. The river terminates six kilometres north of the town at Lake Hindmarsh and this year a fantastic opportunity arose to connect with this ancient lake.

Lake Hindmarsh has been dry since 2013, but in December 2022 received water after three years of La Nina conditions. In 2023, as water receded from the lake bed, distinct vegetation zones became obvious and this was identified as an ideal investigation to complement the school's term four theme of Belongings.



*Lake Hindmarsh, the first of a series of terminal lakes.*

In October, 15 Prep to Year Six students travelled by bus to the lake. Students worked in groups of three to identify plants in thirteen 10-metre transects along Picnic Point Track from the lake edge to the lunettes.



*Senior students measure the 200m transect over the big lunette sandhill with a trundle wheel.*

Principal Craig Donahoo explains, *"Leading up to the field work, we instructed students on plant identification using phone apps and introduced them to the concept of using transects to describe changes that occur in landscapes. In the field, River Detectives Coordinator Jeanie had pre-prepared booklets with 20 photos of plants to be found. Using the visual aids, students were able to identify a range of species in the field and to draw and photograph ones which were not in the booklets."*

Parks Victoria officer Jeremy Downes attended the excursion and helped students identify plants as well as facilitating the removal of three bags of cape weed, ice plant, and gazania with permission from Barengi Gadjin Land Council.

*"Students were given agency to remove weeds. Students reported they enjoyed removing weeds as they felt they were doing something positive for the environment."*

As a natural example of Belongings, the very visible zonation of plants was discussed: from reeds to herbs and grasses; from wattles to gums and pines. Students came to understand that each plant family belonged to different parts of the lake environment according to their habitat needs.

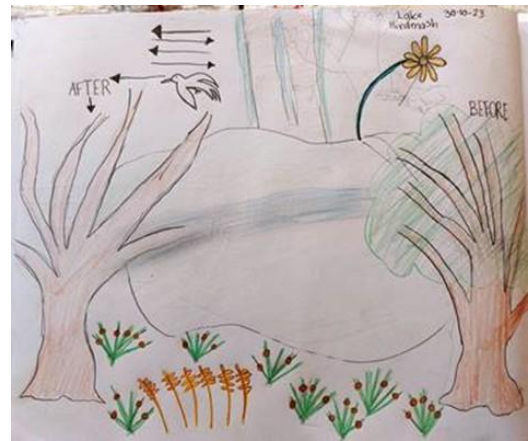




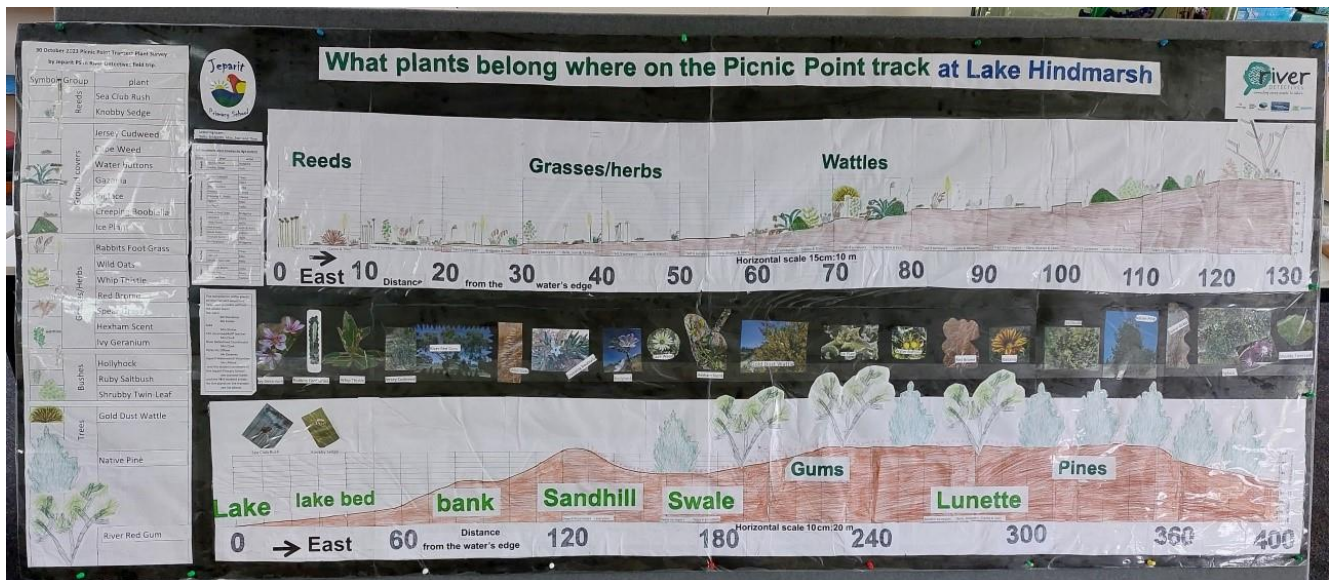
Students hear from Jeanie, Jeremy, and Sue on site at the lake.

Students were able to show their understanding of each layer of native vegetation, weeds, changes over time around the lake, and the animals that call it home (right).

Over the following six weeks, students continued their learning, transforming their field trip experiences and their observations into an incredibly detailed two-metre poster. They made scaled plant diagrams and used their transect survey data to place species in the correct section of the poster.



The visual cross-section of Lake Hindmarsh vegetation is a great example of student inquiry at a place of importance in the local environment, and of the way River Detectives can integrate with many curriculum areas. Field work and class work can go hand in hand.



The poster will be on display in the window of the local supermarket over the summer holidays.

Craig reflects on the impact of this activity and the River Detectives program,

*"I was really pleased to see the high level of enthusiasm and engagement of all students during this activity."*



Students were able to:

- increase their plant identification skills
- understand the relationship between site geomorphology and species locations
- gain knowledge of why scientists use transects to describe changes that occur in landscape
- complete a table to describe species in a section of the transect
- use scale to represent species in a transect
- feel satisfaction and purpose when removing weeds
- gain knowledge of the Lake's past social and commercial history

*"It was great to see students learning in real life situations. I think we need to do more of this."*

A copy of the booklet featuring plants of Lake Hindmarsh that Jeanie prepared was given to each family of the school.

Jeanie reflects,

*"None of us had realised how much variety there was in the plants at this part of the lake, much further around from the main tourist site. The weeds there were also a surprise. We hope our transect poster will not only reinforce what we found out about native and weed plants but also be able to be used to inform others."*

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Sea club rush  
(water's edge).



Jersey cudweed  
(dry lake bed)



Ivy geranium  
(lake edge)



Cypress pine  
(lunette sandhill)

Photos by Jeanie Clark (cc, 2023)



## River Detectives Story of Change

Rutherglen Primary School, North East CMA region, 2023



**NORTH EAST  
CATCHMENT  
MANAGEMENT  
AUTHORITY**

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A relatively small school of 170 students, Rutherglen Primary in north-east Victoria is nestled within a strong farming community known as one of Australia's best wine regions. Brimming with arts and culture, this thriving family-friendly community is only a stone's throw from the beautiful Murray River.

A new River Detectives school in 2023, Rutherglen middle-years students were introduced to the program in term three. When teacher Tash Middlin first heard about the program, she saw it as a fantastic opportunity for her students to engage in meaningful and relevant learning opportunities about their local environment, while covering several concepts across the curriculum.

*"We hope that student's knowledge of the water, plants, and animals will lead to them developing a greater understanding of their local environment and our communities' responsibility in helping to take care of it."*



Getting ready for water testing at Lake King.

*"We test our local water body, Lake King, a five-minute walk from our school. Every second Thursday afternoon, our 3/4C class of 25 kids sets off with Education Support staff, and Principal Karryn Williams. The class has set groups to perform each of the tests in rotation so each student has an opportunity to experience and experiment all the equipment and processes. We recently received a water bug testing kit which we are excited to start using this month!"*



Students explore Lake King.

In a fantastic partnership extension, the school has contacted its local Landcare group to explore joint ventures that could benefit the health of the lake and the surrounds, such as weeding and planting. Tash reflects how this has brought the community further into the school learning journey;

*"It's sparked conversation about the history of the lake, rekindled past relationships with local groups who care for the lake, and helped us to remodel the science program."*

Tash also notes how her students have become more aware and appreciative of Lake King and the plants and animals that call it home;



*“They’re more aware of events that can affect the water quality and have also been able to put their scientific knowledge and understanding into practice in a real-world setting.*



*Habitat values at Lake King, Rutherglen.*

*“They take notice of rubbish in the area and are more willing to clean it up; they are more aware of the fauna they see, from the birds on the lake to the ants moving around the dirt on the banks; they are more interested in thunderstorm events that frequent the area, and what happens when a deluge of water flows into the lake”.*

Local families are being brought along for the journey too, with updates and findings being shared on the school Facebook page and excited students discussing their activities at home.

Students also complete theory projects to complement the practical component, which have included a deep-dive presentation on each of the water testing elements, and a research project into the fish, birds, and macroinvertebrates that call Lake King home.

*“The overall enthusiasm of the students has been the catalyst of all these changes - they constantly ask me, ‘are we going to the lake today?’ and if not, they are still eager to complete any of the theory as they see the relevance of it.”*

Tash enjoys engaging with the kids outside in a real-life setting where science is being performed right before their eyes in a way students can understand and relate to.

*“The return for the love of science that this program has brought back into this school has been my highlight. It’s sparked a push within our science teachers to promote and engage in more practical science programs for our students so they can learn the relevant curriculum topics in a more meaningful context. Oh, and of course another highlight was when NECMA came in to do a macroinvertebrate session with the kids – they still talk about it!”*



*North East CMA River Detectives incursion.*

*“My favourite activity was looking at the bugs. It was fascinating to see how certain things can make the water change and see what water bugs live in different areas.” - Ella*

*“Testing water is my favourite thing. The activities are really fun and also the equipment. Yes!” - Paige*

*“I loved that we went down to the lake and tested the water and made sure that fish can live in our waterway. I love finding out how clean the waterway is.” - Alexi*

**WHAT IS SALINITY?**

Salinity refers to the movement and concentration of salt through the land scape and it is also called electrical conductivity

**HOW TO MEASURE SALINITY**

Salty water conducts electricity and is measured using an e.c meter which measures electricity flow between two electrodes. many different units can be used to report salinity

Salinity Level	Salinity (‰)	Salinity (ppt)	Use
Fresh	< 0.05	< 0.5	Drinking and all irrigation
Marginal	0.05 - 0.1	0.5 - 1	Most irrigation, adverse effects on ecosystems become apparent
Brackish	0.1 - 0.2	1 - 2	Irrigation certain crops only, useful for most stock
Saline	0.2 - 1.0	2 - 10	Useful for most livestock
Highly Saline	1.0 - 3.5	10 - 35	Very saline groundwater, limited use for certain livestock
Bitter	> 3.5	> 35	Seawater; some mining and industrial uses exist

Source: Department of Water Government of Western Australia.

*Excerpt of student slideshow about salinity.*







Students on site doing a habitat survey of Lake King

*"I loved that every second week we got to go down and test how fresh and clean our waterway is and we got to test using the different materials to check the waterway and tell it back to the River Detectives. I also loved how we got to do projects and experiments with the water." – Poppy*

*"I really liked how we go to know more about river testing and how to use all the tools." – Will*

*"I liked how you had to keep the water clean while you tested. With the salinity test, you get all the cool gadget things and with phosphorous you get to spin the wheel and see what the colour is." - Stella*

After their introduction to the program in 2023, Tash says they will definitely continue with River Detectives;

*"This program will now be integrated into our science program for the middle and senior years and will be embedded from the very beginning of the year. I feel excited and privileged to be given the opportunity to involve more students into real-life science, and to be a part of an ongoing community project that aims to monitor and protect such an integral landmark within Rutherglen".*

Rutherglen Primary School also plans to collaborate more with their local Landcare group, with planting and weeding working bees already planned, as well as exploring other opportunities;

*"A goal is to apply for a Junior Landcare grant so we can continue to care for Lake King, and to connect with Indigo Shire and its Environment and Sustainability team to get the word out into the community about the importance of caring for our waterbodies!"*

Well done Rutherglen Primary School, we can't wait to hear all about your achievements in future years.



Students enjoying their regular visits to their adopted waterway.

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Photos supplied by Tash Middlin