

# Water for the Environment

## Speakers:

**Beth Ashworth, Co-CEO (VEWH)**

**Keith Chalmers, Team Leader Environmental  
Water Delivery (VEWH)**

**Susan Watson, North Central CMA**

**Dr Mark Bailey, Manager Water Resources  
(GMW)**



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The VEWH, Goulburn-Murray Water and North Central Catchment Management Authority proudly acknowledge Victoria's Aboriginal communities and their rich culture and pay respect to their Elders past and present.

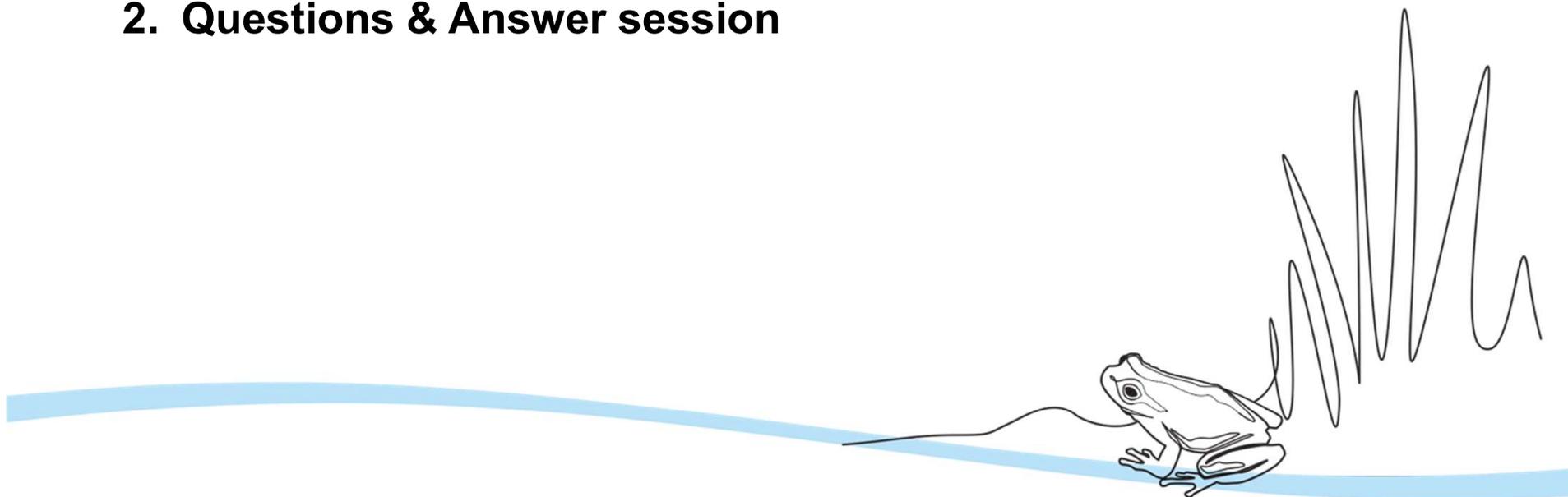
We acknowledge Aboriginal people as Australia's first peoples and as Traditional Owners and custodians of the land and water on which we rely. We recognise the intrinsic connection of Traditional Owners to Country, and we value their ongoing contribution that Aboriginal people are making to planning and managing water for the environment and the benefits that result from these partnerships. We also recognise and value the contribution of Aboriginal people and communities to Victorian life and how this enriches us.



*Water for the environment*

# Overview

1. Top 10 questions about Water for the Environment
2. Questions & Answer session



# 1. Who's involved in environmental watering?



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# It's a team effort...

## Waterway managers



## Traditional Owners



## Land managers

## River operators



## Environmental water holders



## Scientists



## Communities

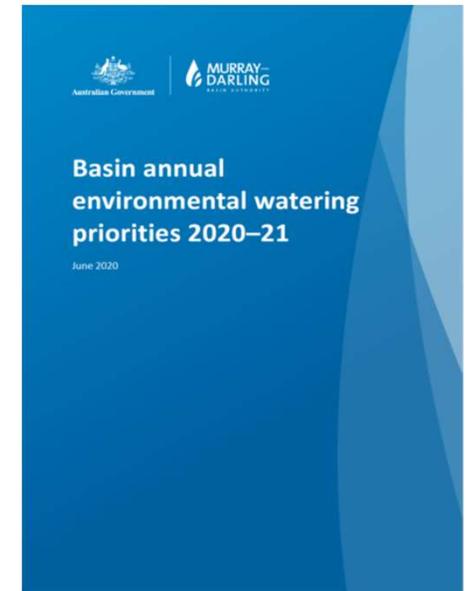
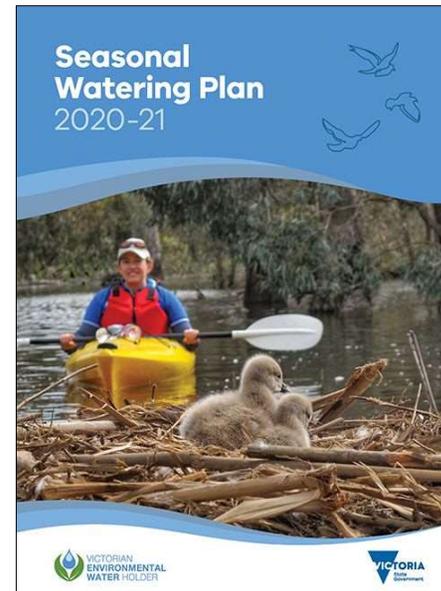
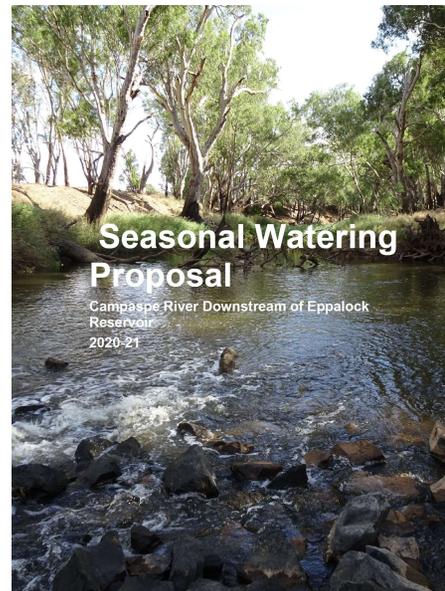


## **Each organisation brings essential skills and expertise to the program:**

- **Waterway managers** are responsible for local planning, consultation, monitoring and reporting.
- **Traditional Owners** are consulted by, and work with, waterway managers on environmental water planning, delivery and monitoring
- **River and storage operators** (including GMW) provide input to water planning and physically deliver water to the site where the flow will take place
- **Environmental water holders** make decisions about committing water to sites, and about carryover and trade.
  - The MDBA does not actually hold any environmental water itself, however it does have a coordination role on behalf of all the states involved in and holding water for The Living Murray program.
  - The Victorian Environmental Water Holder (VEWH) has a close working relationship with the Commonwealth Environmental Water Holder (CEWH) and the MDBA. Any environmental water that is being delivered to Victorian sites is transferred to the VEWH, who coordinate the delivery and avoid the risk of conflicting targets in different sites.
- **Infrastructure operators** physically deliver water to particular wetlands
- **Land managers** provide input to planning and consent to public land being inundated.
- **Scientists** and **communities** provide critical knowledge that informs our planning and reporting.

## All of these partners provide input to a well-structured planning process

- Catchment Management Authorities (CMAs) coordinate local planning through seasonal watering proposals
- The VEWH integrates these proposals into state-wide planning through the seasonal watering plan
- VEWH then feeds this into Basin-wide planning.



## 2. Why do we need environmental water?



# Environmental watering: A short history

- Many of our rivers and wetlands have been modified as the population has grown to provide water for towns, industry and food production.
- As a result, these waterways are not able to function as they would naturally. This means it is necessary to actively manage how water flows through them

## The government responded to the decline in river and wetland health...



They first capped water entitlements (All water is now fully allocated)

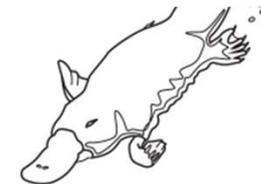


They then progressively invested money to recover water for the environment



**Environmental watering** is a public policy response because:

- Most people value healthy waterways, for a variety of reasons
- The need to meet Victorian, national and international legal obligations



# Why do we need environmental water?

- Environmental watering is a critical component of healthy waterways, which native plants and animals depend on.



# In planning for environmental flows, the primary purpose is to optimise environmental benefits, but by improving the health of rivers, wetlands and floodplains environmental flows also provide benefits to communities

Examples of shared benefits include:

- Healthy Country for Aboriginal Victorians
- Giving anglers access to more fish
- Supporting migratory species that are valued by bird watchers
- Supporting healthy forests, which support healthy bee populations which support crop pollination
- Improving amenity, tourism and community mental health and wellbeing
- Mitigating climate change by supporting healthy floodplains that store carbon

All of this has significant economic benefits for regional communities.



### 3. Does environmental watering work?



# Does environmental watering work?

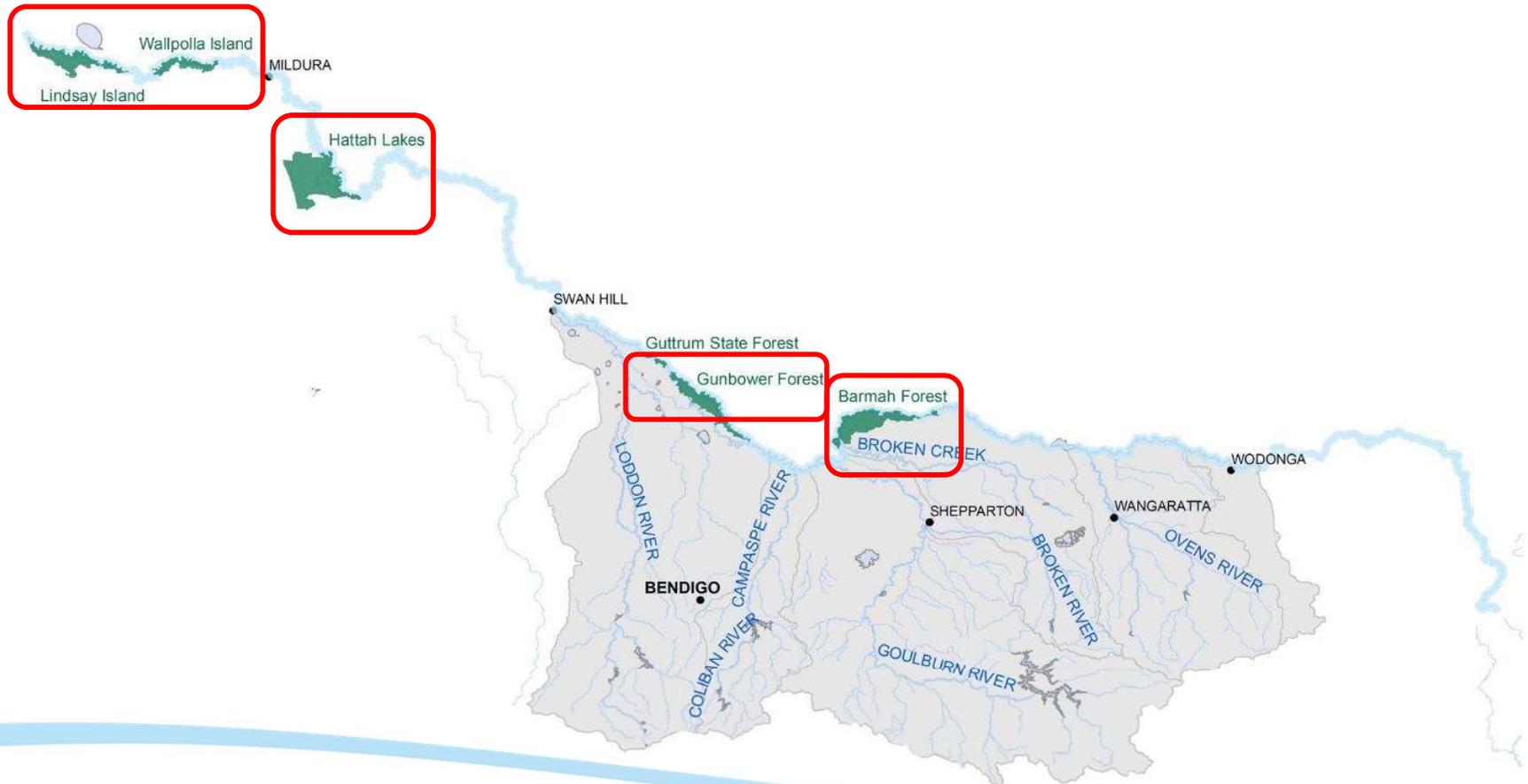
**Yes, it does! Key achievements so far include...**

- Preventing the extinction of species at the local, regional and state level
- Sustaining hundreds of critical drought refuges
- Helping rivers and wetlands recover from droughts and bushfires
- Safeguarding internationally-recognised habitats for migratory birds
- At least 70 species benefited from environmental watering in 2019-20, including 28 threatened species.



# Case study: the Living Murray program

- Part of four out of six Living Murray Icon sites are in Victoria
- We have over 10 years of long-term monitoring data from these icon sites



- This table summarises the results of this monitoring in a report card style
- While there is variation from year to year, overall condition is improving at the sites where we are able to regularly provide water for the environment.

	Barmah-Millewa	Gunbower Forest	Koondrook-Perricoota Forest	Hattah Lakes	Lindsay, Mulcra and Wallpolla Islands	Chowilla Floodplain	Lower Lakes, Coorong and Murray Mouth
2016/17	A	B	C	A	B	B	B
2015/16	B	B	D	A	B	C	C
2014/15	B	B	D	A	-	C	B
2013/14	C	B	D	B	C	C	B
2012/13	C	B	D	C	D	C	B
2011/12	C	C	D	B	C	C	B
2010/11	B	B	D	C	C	C	D
2009/10	C	C	D	D	D	C	D
2008/09	D	C	D	D	D	C	D
2007/08	D	D	D	D	D	N/A	D
2006/07	D	-	N/A	-	-	N/A	C



**A**

Most (75 -100%) of ecological objectives have been met



**B**

More than half (50 -74%) of ecological objectives have been met



**C**

Fewer than half (25 -49%) of ecological objectives have been met



**D**

Few (0 -24%) ecological objectives have been met



Data not available

- Gunbower Forest is a good example of the benefits of environmental flows.
- Before environmental watering the condition fluctuated between a B and a D-grade.
- Since strategic watering began in 2014 we have achieved a consistent B-grade

	Barmah-Millewa	Gunbower Forest	Koondrook-Perricoota Forest	Hattah Lakes	Lindsay, Mulcra and Wallpolla Islands	Chowilla Floodplain	Lower Lakes, Coorong and Murray Mouth
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2014/15	B	B	D	A	-	C	B
2013/14	C	B	D	B	C	C	B
2012/13	C	B	D	C	D	C	B
2011/12	C	C	D	B	C	C	B
2010/11	B	B	D	C	C	C	D
2009/10	C	C	D	D	D	C	D
2008/09	D	C	D	D	D	C	D
2007/08	D	D	D	D	D	N/A	D
2006/07	D	-	N/A	-	-	N/A	C



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-

Data not available

- Koondrook – Pericoota Forest is just across the Murray from Gunbower.
- It was not able to receive environmental water during the monitoring period, and as a result its environmental condition did not improve.

	Barmah-Millewa	Gunbower Forest	Koondrook-Perricoota Forest	Hattah Lakes	Lindsay, Mulcra and Wallpolla Islands	Chowilla Floodplain	Lower Lakes, Coorong and Murray Mouth
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2010/11	B	B	D	C	C	C	D
2009/10	C	C	D	D	D	C	D
2008/09	D	C	D	D	D	C	D
2007/08	D	D	D	D	D	N/A	D
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-

Data not available

## 4. How do we *know* environmental watering works?



# How do we know environmental watering works?



**Environmental water planning and decision making is based on the best available science, complimented by local knowledge.**

- Before any environmental water is delivered, North Central CMA learns as much about the site as possible. This includes the vegetation types, the animals that use the site and the local hydrology.
- Plants and animals also have different needs at different times of year – and watering plans also take account of these requirements.
- The CMA uses use this knowledge to identify WHEN water should be delivered and WHAT we they are hoping to achieve with each specific flow.



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# How do we know environmental watering works?



**North Central CMA uses a range of techniques to monitor the response of plants, animals and ecosystems to environmental flows.**

- We don't just walk away once we have delivered water to a site – we carefully monitor the outcomes of the actions we have taken.
- We adapt our planning and delivery methods based on what we'd learned.
- We acknowledge that we have only been delivering water at this scale for a decade, so there is still much to learn



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# How do we know environmental watering works?



Methods and programs used to monitor and evaluate the outcomes from flows include:

- The Victorian Environmental Flows Monitoring Assessment Program (VEFMAP) and the Wetland Monitoring Assessment Program (WetMAP)
- Monitoring undertaken through the Living Murray program.
- Undertaking small scale, site-specific monitoring



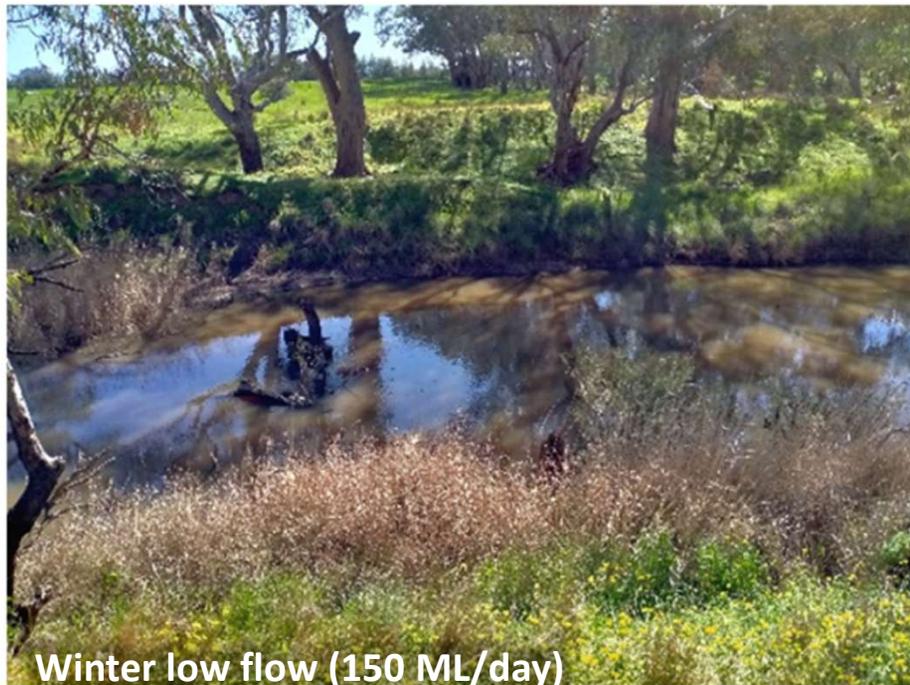
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## Case study: Vegetation monitoring in the Campaspe River



In September 2020 North Central CMA delivered a high flow in the Campaspe River. The objectives of this flow were to:

- Reduce the amount of terrestrial vegetation on the river bank
- Assist fish movement
- Water streamside and in-stream vegetation and
- Flush organic material from the lower bank to reduce water quality risk in summer.



Winter low flow (150 ML/day)



Peak winter/spring high flow (1400 ML/day )

## Case study: Vegetation monitoring in the Campaspe River

- This photo illustrates the outcomes following the environmental flow. Below the high water mark the weedy terrestrial vegetation has been replaced by healthier streamside vegetation.
- Since 2011 baseflows and freshes in the Campaspe River have led to increases in the amount of native vegetation in the river and on its banks, as well as on bars in the river channel.



## Case study: River red gums in Gunbower Forest

In areas that receive environmental water (as well as natural flooding) we are seeing an improvement in the condition of River Red Gums:

- Tree canopy condition has been improving in Gunbower Forest, especially in the river red gum areas that receive environmental water.
- The two images below are ‘hemispherical photos’, which were taken using a specialised camera that points upwards to capture the fullness or extent of the canopy. These photos are then put through a software program that looks at how much black there is compared to white, to give a score for each site.



E-watered site

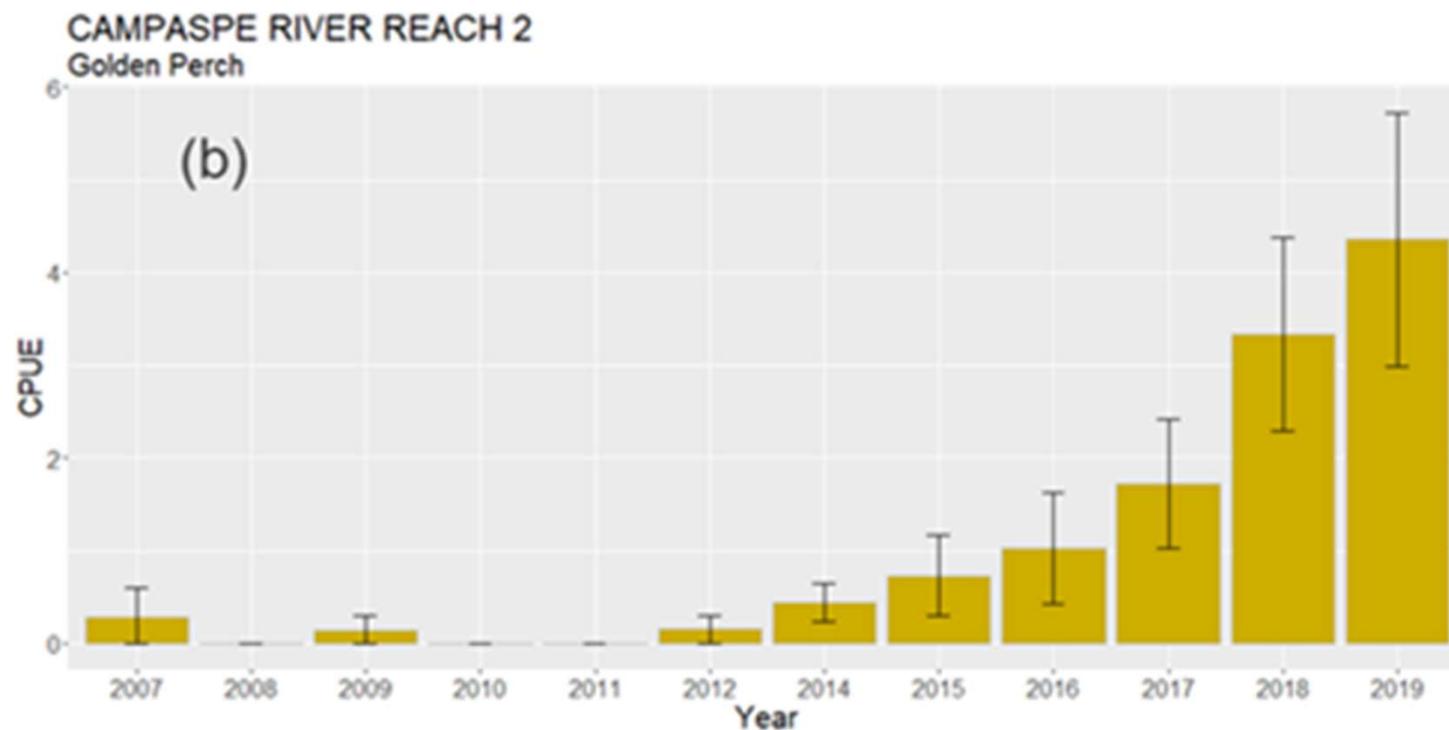


Non e-watered site

## Case study: Golden perch and Murray cod in the Campaspe

We are recording increases in native fish numbers, and age classes, in rivers we provide water for the environment

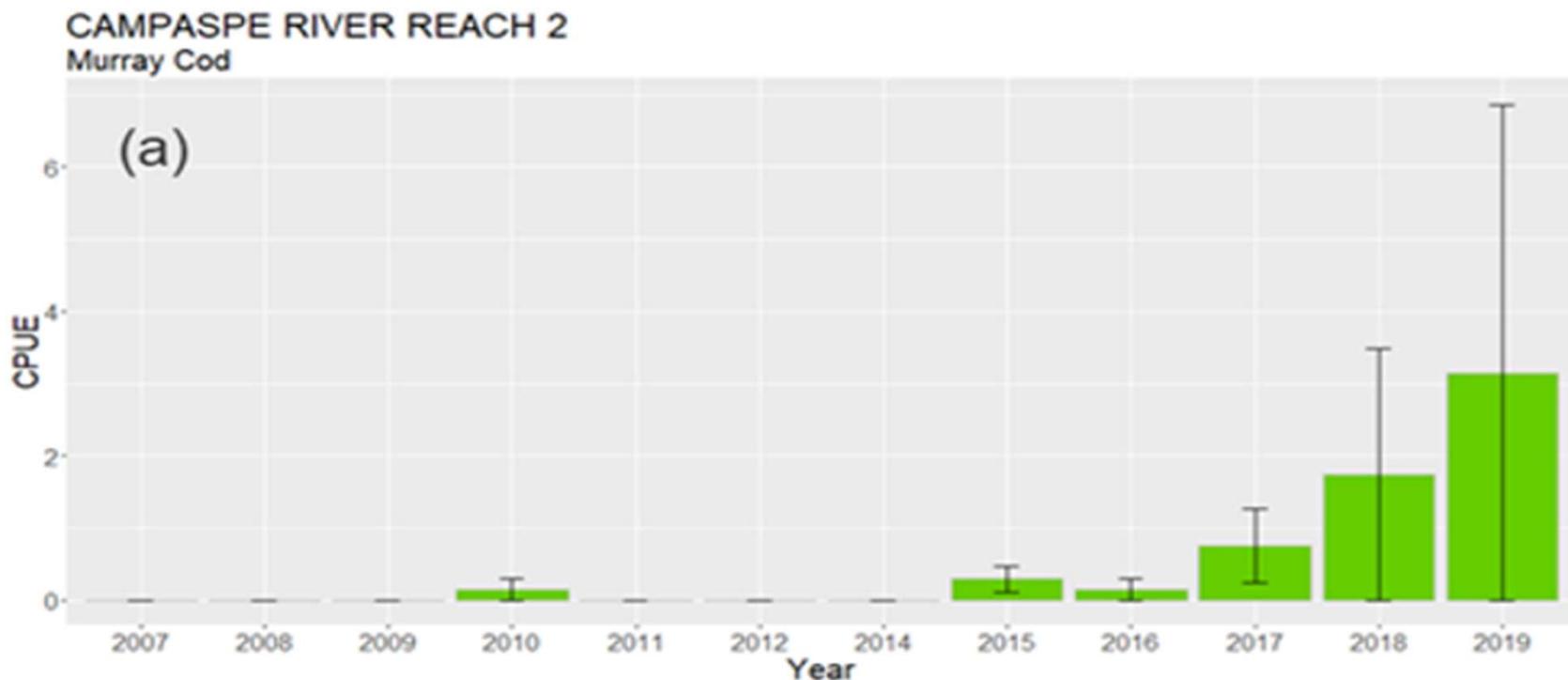
- There is a general increasing trend in golden perch populations in all reaches of the Campaspe River since monitoring began in 2007. The healthy population resulting from flow management has led to some of the highest growth rates in the northern rivers.



## Case study: Golden perch and Murray cod in the Campaspe

We are recording increases in native fish numbers, and age classes, in rivers we provide water for the environment

- There has been a general increase in Murray cod since the Millennium drought in 2010 and environmental flows commenced in 2013. The VEFMAP program predicts a 7% increase in the number of adult Murray cod if the current environmental water regime continues.



## Case study: Golden perch and Murray cod in the Loddon system

We are recording increases in native fish numbers, and age classes, in rivers we provide water for the environment

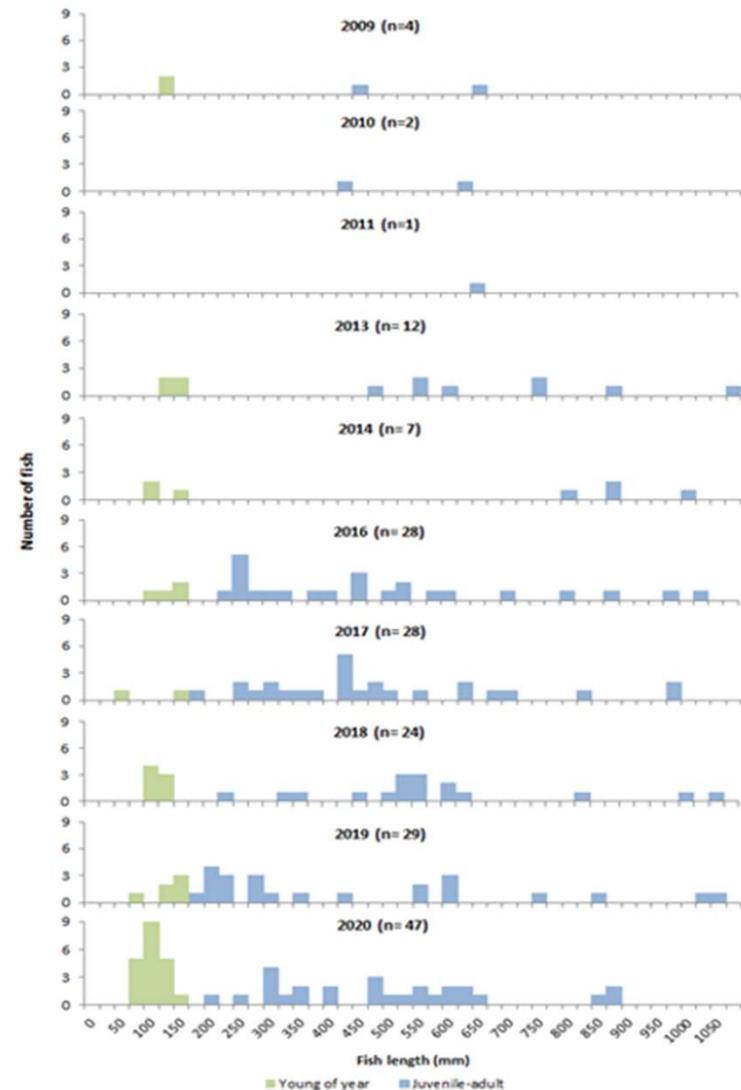
- Examples of fish species that have seen improving numbers include golden perch, silver perch and Murray Darling rainbowfish. Large mature cod are often found in Pyramid Creek .
- Acoustic recorders are being used to track the movement of tagged golden perch through a series of fishways in the lower Loddon River and Pyramid Creek, allowing access to nursery habitat in Kow Swamp.



## Case study: Golden perch and Murray cod in Gunbower Creek

We are recording increases in native fish numbers, and age classes, in rivers we provide water for the environment

- Since environmental water deliveries began in 2013 there has been an increase in the number of native fish, especially Murray cod.
- These results are due to a combination of stocking and natural recruitment – around 50,000 cod and 75,000 golden perch are stocked each year
- Murray Cod juveniles have been detected each year since 2013
- There is also a growing freshwater catfish population in the creek
- This shows that fish are now able to survive in Gunbower Creek, with a range of ages and size classes now present.



## 5. How does the community input to these decisions?



# How does the community input to these decisions?



Catchment Management Authorities work with their local communities each year when developing watering proposals, and again when watering takes place to ensure that local knowledge is incorporated into our decision making.

- Before any environmental water is delivered to a site, an Environmental Water Management Plan is developed .This involves a significant amount of investigation and includes consultation with local community and landholders to ensure local knowledge is incorporated into the plan.
- North Central CMA has five Environmental Water Advisory Groups (EWAGs) and one Community Reference Group which are consulted during the development of annual process to develop seasonal watering proposals. Each group is made up of landholders and representatives from organisations such as local environmental groups, VRFish and other peak representative bodies.



# How does the community input to these decisions?



- The CMA also holds or participates in a number of community events such as Catch a Carp days, the River Tour with Traditional Owners, educational days with school or university students and River Detectives.



## 6. How do we make sure that every drop counts?



# How do we make sure that every drop counts?

- One release of water can contribute to or achieve several environmental targets in different locations
- 82% of environmental water used multiple times in 2019-20



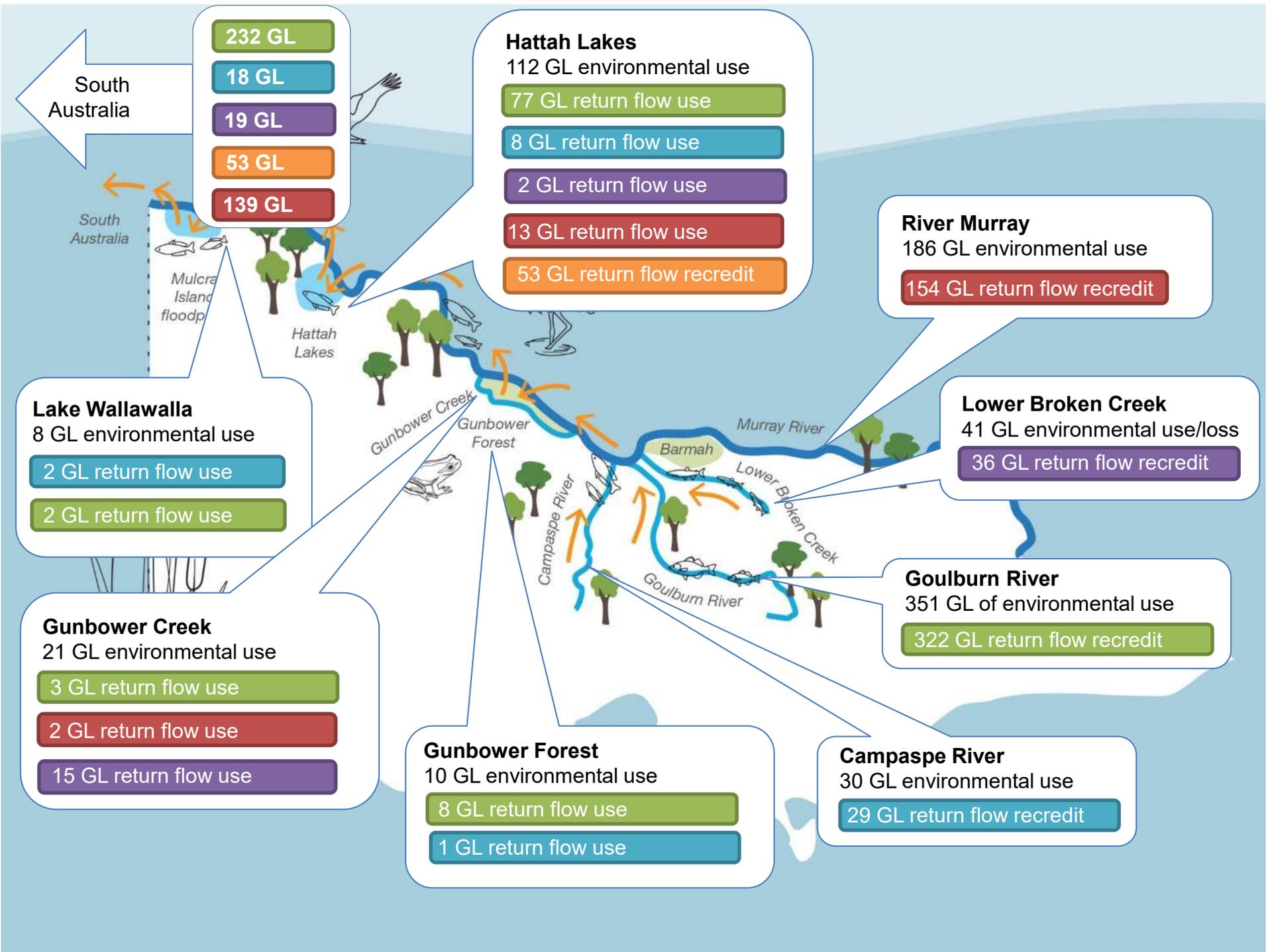
*Goulburn River at Hurricane Bend,  
Photo: Keith Ward*



*Hattah Lakes, Photo Mallee CMA*

*Lower Lakes, Coorong and  
Murray Mouth*





South Australia

- 232 GL
- 18 GL
- 19 GL
- 53 GL
- 139 GL

**Hattah Lakes**  
 112 GL environmental use

- 77 GL return flow use
- 8 GL return flow use
- 2 GL return flow use
- 13 GL return flow use
- 53 GL return flow recredit

**River Murray**  
 186 GL environmental use

- 154 GL return flow recredit

**Lake Wallawalla**  
 8 GL environmental use

- 2 GL return flow use
- 2 GL return flow use

**Lower Broken Creek**  
 41 GL environmental use/loss

- 36 GL return flow recredit

**Gunbower Creek**  
 21 GL environmental use

- 3 GL return flow use
- 2 GL return flow use
- 15 GL return flow use

**Goulburn River**  
 351 GL of environmental use

- 322 GL return flow recredit

**Gunbower Forest**  
 10 GL environmental use

- 8 GL return flow use
- 1 GL return flow use

**Campaspe River**  
 30 GL environmental use

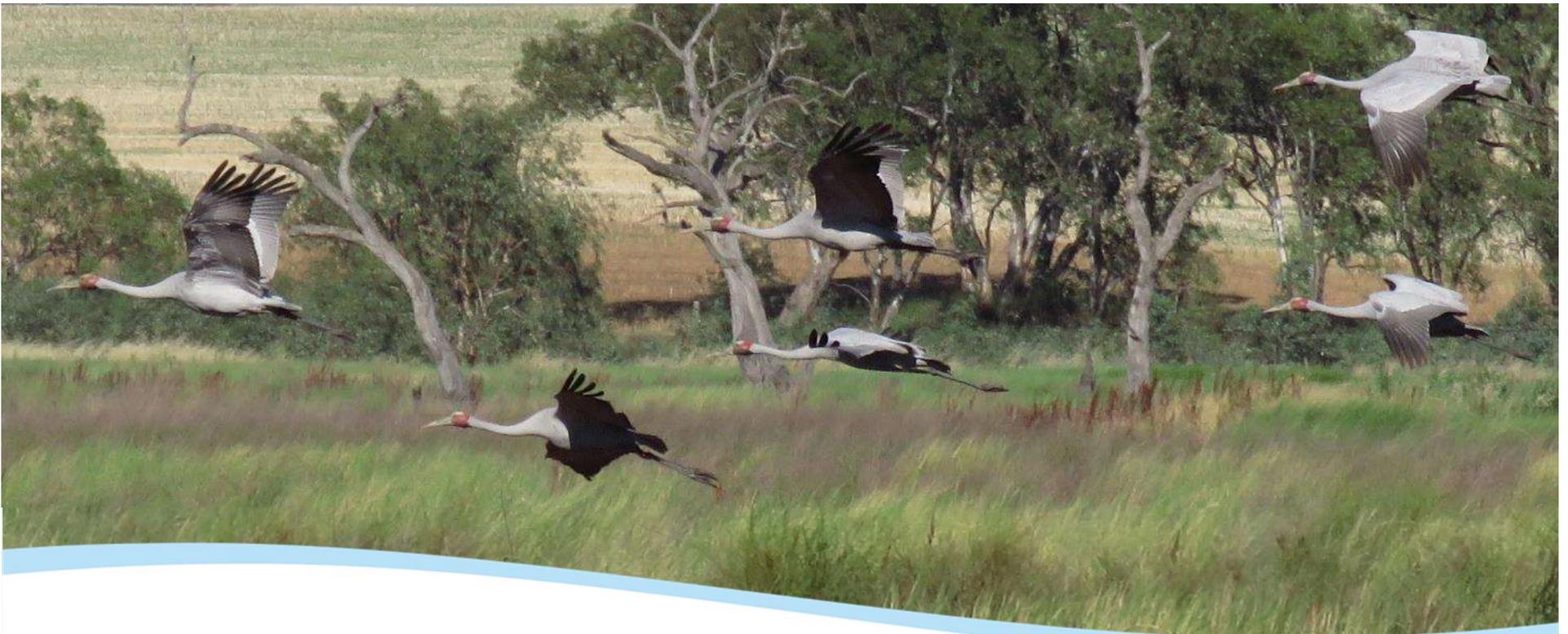
- 29 GL return flow recredit

## 7. How and why do we carryover environmental water?



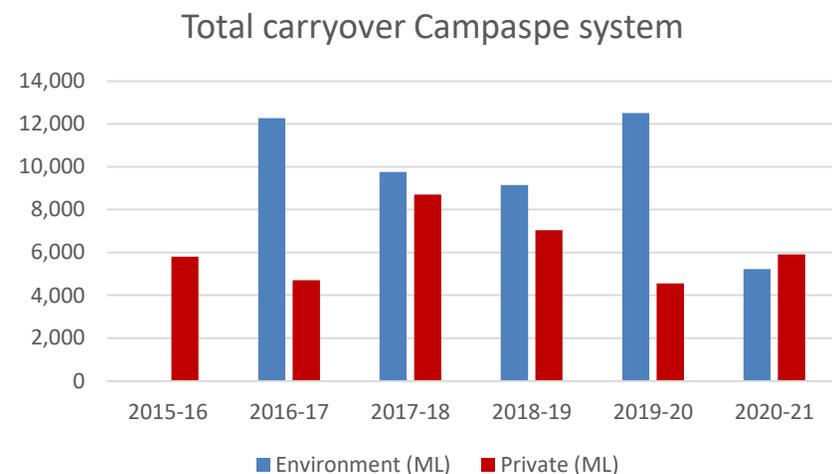
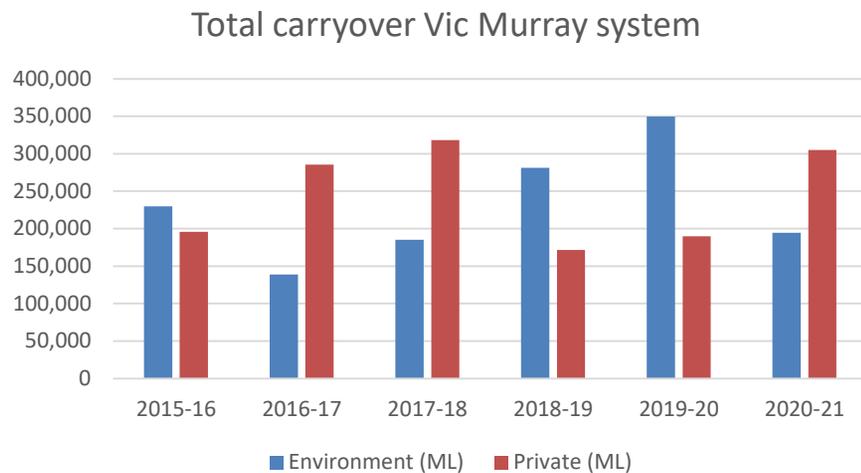
# Why do environmental water holders carry over?

- To manage water availability risks - much like irrigators do
- Carryover can help meet critical needs in drought
- Our highest demands are in winter and spring – different to irrigators



# How much do environmental water holders carry over?

- Carryover is highly variable – both for environmental water holders and for private water users (mainly irrigators).



## 8. Do we pay charges for environmental water?



# Do environmental water holders pay charges?

- **Yes, we do.**
- In 2019-20, VEWH alone paid about **\$3 million** on headworks, carryover and delivery charges in northern Victoria
- In 2019-20, environmental water holders (VEWH, CEWO, MDBA) collectively paid **about \$12 million**



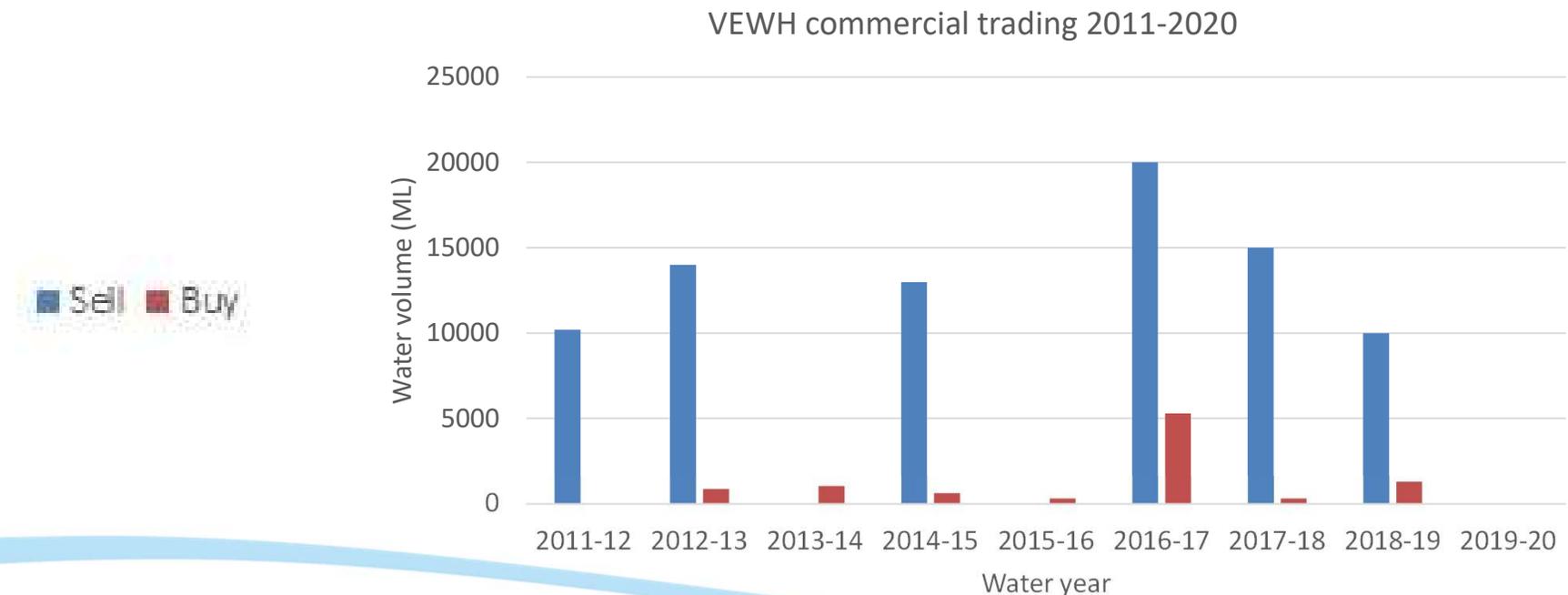
## 9. How do we use trade?



# How does the VEWH trade allocation?

This graph shows VEWH's state-wide commercial allocation trading in Victoria.

- We sell more allocation than we buy.
- We've only sold allocation in northern Victoria to date
- Most of our purchases are in western and southern Victoria . We have only purchased water once in northern Victoria.



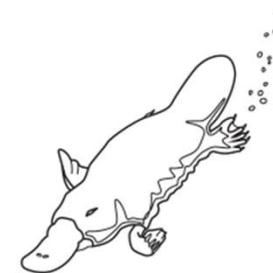
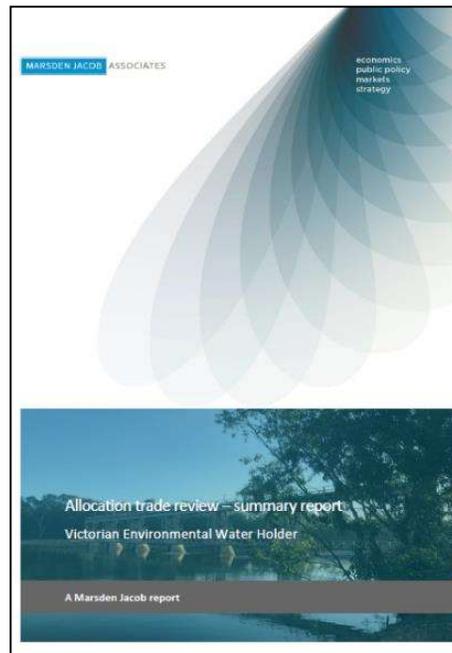
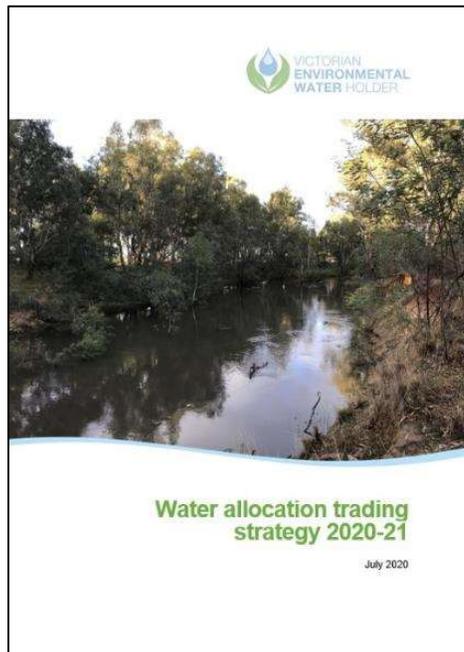
# How does the VEWH trade?

- Any funds we raise are used to support environmental watering outcomes
- This can include:
  - Purchasing water where it is needed
  - Investing in adaptive management
  - Funding structural works



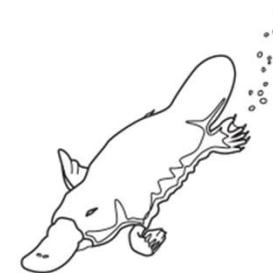
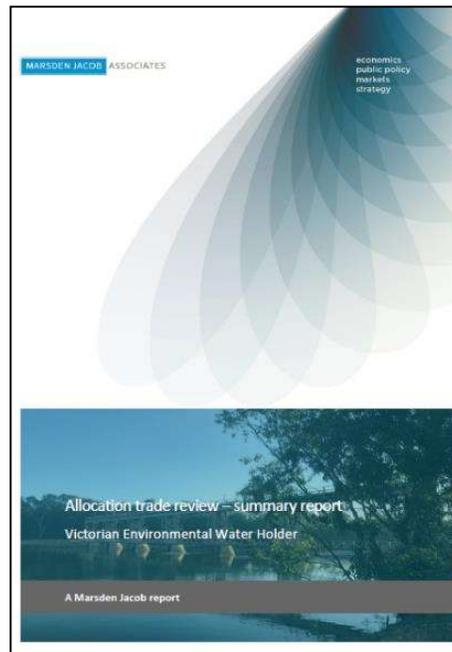
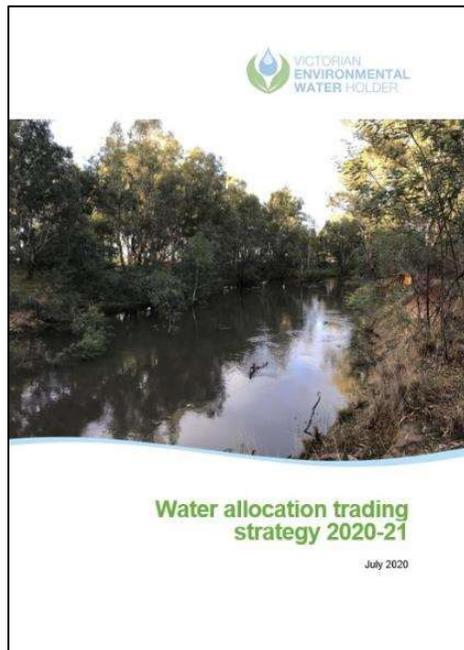
# How does the VEWH use trade?

- The VEWH has used a mixture of brokers and web-based water exchanges.
- We only use brokers who are members of the Australian Water Brokers Association.
- The VEWH always seeks to ensure it is operating in the public interest and is not causing impacts to market participants.



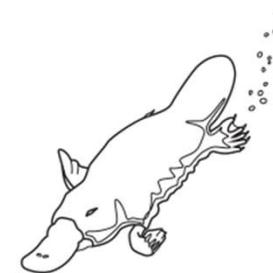
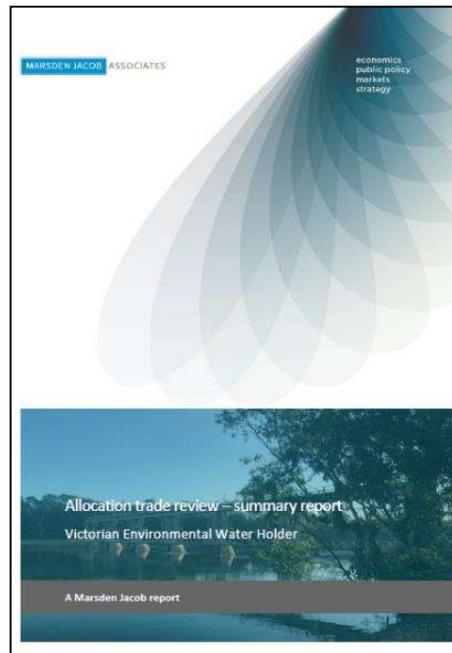
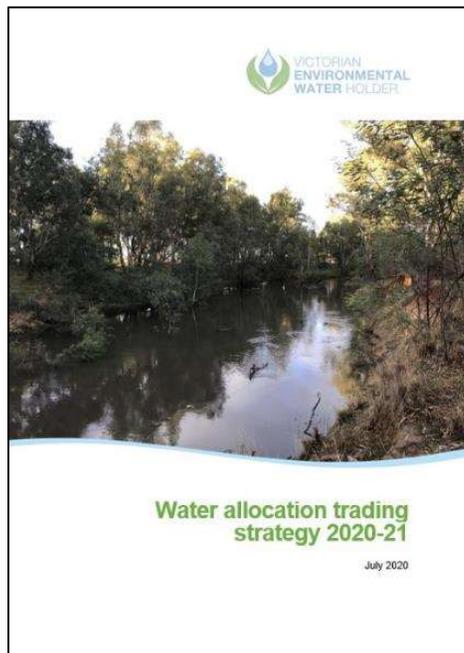
# How does the VEWH use trade?

- Each year the VEWH prepares a water allocation trading strategy (see picture on the left below).
- This publicly advises on the VEWH's trading plans for the year ahead, both for administrative and commercial trades..



# How does the VEWH use trade?

- In 2019 independent auditors, Marsden Jacobs, conducted a review of the VEWH's trading practices (see picture on the right below)
- This found the VEWH has not impacted water market prices, transparently signals its trading intentions to market participants, and effectively avoids market distortion and adverse impacts on other parties.



## 10. What might we expect in the next few months?



# Low oxygen blackwater?

- There is a high chance of a blackwater event this summer if natural flooding occurs
- Environmental watering has been helping to reduce this risk by gradually flushing leaf litter from the floodplain into the river over time, but the risk is still there as large areas of the floodplain are outside the reach of environmental flows



# Low oxygen blackwater?

- Environmental flows can also assist species that are impacted by blackwater events
- The image below shows the confluence of the Murray and Goulburn Rivers in 2016, when the Murray was experiencing a blackwater event. Native fish such as Murray cod were able to use the Goulburn as a refuge, and return to the Murray once the event had finished.



# Environmental flows mitigating erosion

- Over the past few years the Goulburn River has been used for large inter-valley transfers (IVTs), to provide water for consumptive demands in the Murray.
- These stable high summer-autumn flows cause erosion and notching of the river banks, as well as the drowning of bank vegetation which is adapted to low flows during this time of year.
- Bank erosion is a significant concern in places such as the Barmah choke, Edward-Wakool system and in the lower Goulburn River.
- Environmental water authorities and river operators are working together to address these issues.



# Environmental flows mitigating erosion

- Environmental flows are helping to address these impacts by delivering environmental flows in winter and spring to create variable levels in the river.
- These flows bring sediment and seed that are draped on the bank, ready for germination and growth. This bank vegetation has an important role in preventing erosion as it stabilises the bank, making it less susceptible to erosion, and also helps catch more sediment and seeds.
- Environmental water managers and river operators are also working together to make operational water deliveries more environmentally friendly. This includes making the IVTs more variable, to more closely mimic natural flows and help counter the drowning of native vegetation.



# Environmental watering update: Gunbower Forest and Gunbower Creek



- Water has now been delivered into Reedy Lagoon and Black swamp.
- Monitoring by North Central CMA has found that aquatic vegetation and waterbirds have responded well.
- These wetlands will now slowly drawdown providing habitat refuge for animals over the summer months.
- Over spring and early summer we have set a flow target at Cohuna Weir of 400 ML/day to maintain stable water levels during the Murray cod nesting season.
- Most of this is met with irrigation water in transit, with environmental water making up the difference only when required.
- From early January the flow target will reduce back to 300 ML/d to maintain water levels over the warmer months to support juvenile fish.

# Environmental watering update: Kerang Wetlands



- Over spring and summer water will be delivered to Round Lake, Lake Elizabeth, Hird Swamp, McDonalds Swamp, Richardsons Lagoon, Lake Yando and Wirra-Lo wetland complex
- Top-ups for Third Reedy Lake, Wirra Lo Wetland Complex and Lake Meran are expected over summer
- A through flow of 300 ML (30 ML/day) is planned at Hird Swamp in early December to provide carbon-rich water into Pyramid Creek. This will provide a food source for native fish that may be cued to move and spawn as the weather warms up. A top up will be delivered during this through flow to maintain the water level in Hird Swamp.



# Environmental watering update: Loddon system

- A recently completed combined flow in the Loddon River and Pyramid Creek focused on fish movement.
- Freshes are planned for the summer/autumn period in the Loddon and Serpentine Creek. Loddon and Pyramid water is recredited to the Kerang Lakes and Murray River.
- A spring fresh has been completed in Serpentine Creek, with more freshes planned throughout summer to maintain water quality.



# Environmental watering update: Loddon system

- Summer freshes focus on minimising black water risks, maintaining pool water quality and habitat, and movement between pools for fish and other aquatic species
- Black water is a risk in Serpentine Creek and the Loddon River at Canary Island during hot weather and low flows. We are looking to increase the variability of flows in Serpentine Creek during summer to minimise this black water risk
- Good flushes that took place in both the Loddon River and Serpentine Creek autumn rains have helped clear the river banks of leaf litter, further reducing black water risk if high flows occur over summer.



# Environmental watering update: Boort Wetlands



- Lake Yando received a fill during spring which has just been completed. In the following months it will be topped up where necessary to maintain levels for bird breeding and rearing, bringing the total usage to 1,200 ML.
- Lake Meran will be topped up in the next few weeks to maintain water in the critical range of 77.3 – 77.8m above sea level to increase the extent of lakebed herb land and provide refuge for freshwater turtles, waterbirds and fish. This will bring the total usage up to 2,200 ML.



Sea Eagle, Lake Meran

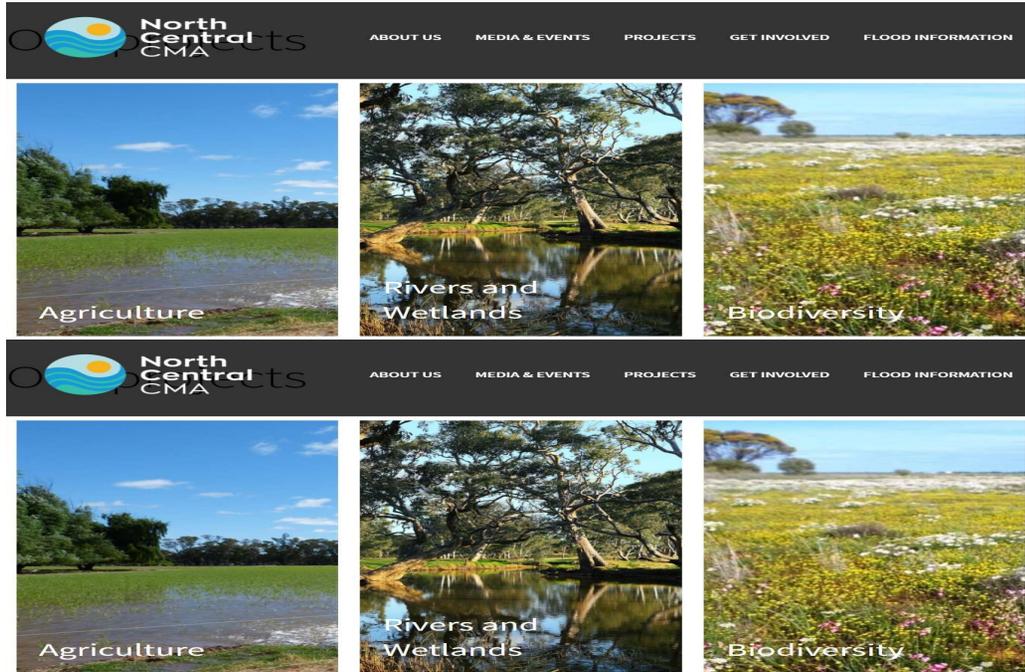
Lake Yando, Nov 2020

# Summary

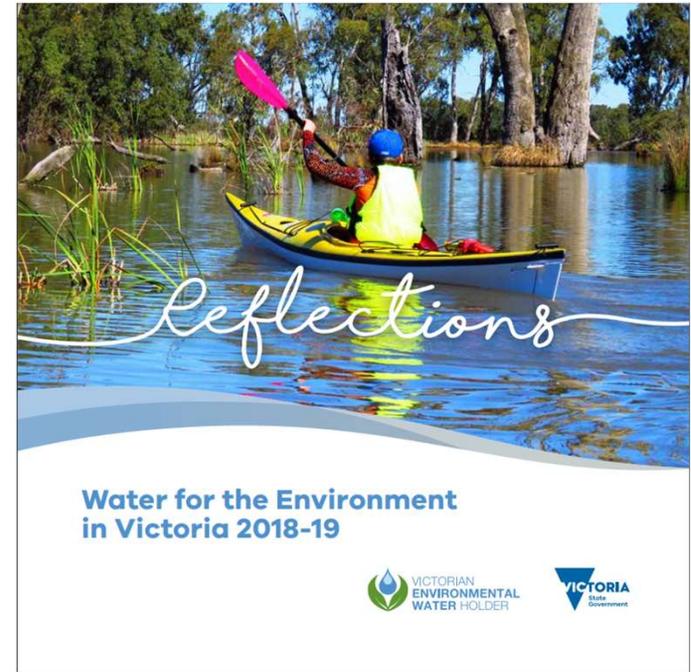
- The environmental watering program strives to:
  - be as efficient as possible, based on evolving best available science
  - continuously improve
  - listen and adapt to community input



# Q&As and links for more information



[www.nccma.vic.gov.au](http://www.nccma.vic.gov.au)



[www.vewh.vic.gov.au](http://www.vewh.vic.gov.au)



*Water for the environment*