

Victoria's Basin Plan Report Card 2020

Water for the environment is working



Summary

This report card describes real benefits for fish, waterbirds and vegetation from environmental watering in northern Victoria.

It shows that significant progress has occurred since the Murray-Darling Basin Plan was established in 2012.

Victoria invests heavily in monitoring the outcomes from environmental watering through various programs. These show positive outcomes in many rivers and wetlands, including:

- Native fish are doing well, with increases in abundance for many species and waterways
- Waterbirds are responding, with their habitat protected for improved breeding

- Vegetation is responding, with better condition and increases in some threatened species
- Early indications that frogs are responding well
- Complementary measures like control of stock grazing, feral animals and weeds, as well as fishways, are working and are critical to realise the full benefits of environmental watering.

Environmental watering is delivering other important social, economic and environmental benefits, including water to sustain Country and support cultural uses for Traditional Owners.

As development has occurred across Victoria many areas have been disconnected from their natural watering regime to prevent flooding and regulate supply. These areas now cannot be actively watered to support their ecological condition. Continuing to invest in environmental works to reconnect targeted areas is critical to achieving the Basin Plan's objectives and to enable environmental watering across a larger area of our important environmental assets. This will also help nearby areas to recover when large floods occur.



Acknowledgment

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it. We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Victoria's Traditional Owners and Aboriginal communities to support the protection of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.

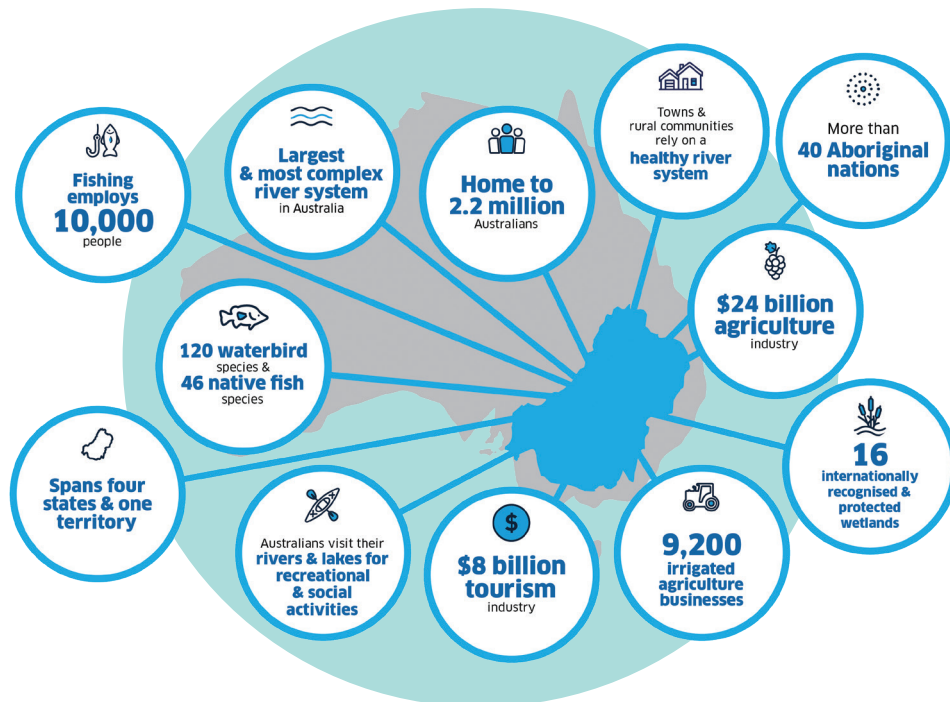
ISBN 978-1-76105-338-2 (pdf/online/MS word)

What is the Basin Plan?

The Murray Darling Basin supports a vibrant and unique environment, as well as significant social, economic and cultural values. The Murray-Darling Basin Plan was established in 2012 to improve the health of the Basin and address decades of overuse of water and the impacts of drought.

The Basin Plan limits the amount of water that can be used for irrigation, industry, towns or other purposes, through Sustainable Diversion Limits (SDLs), which came into effect in mid-2019. The water remaining in the system is intended to benefit fish, birds, vegetation and other aspects of the Basin's environment.

Figure 1: Murray-Darling Basin. Credit: © Murray-Darling Basin Authority



ABOVE: Pelicans at Barmah Lake, by Keith Ward, Goulburn Broken CMA

BELOW RIGHT: Golden perch, by Zeb Tonkin, Arthur Rylah Institute

BELOW FAR RIGHT: Australasian bittern at Lake Cullen, by Damien Cook, Rakali Ecological Consulting



The health of the Basin's rivers, lakes, wetlands and floodplains is essential for the region's long-term prosperity. These waterways are recognised for their environmental values regionally and nationally, and some internationally.

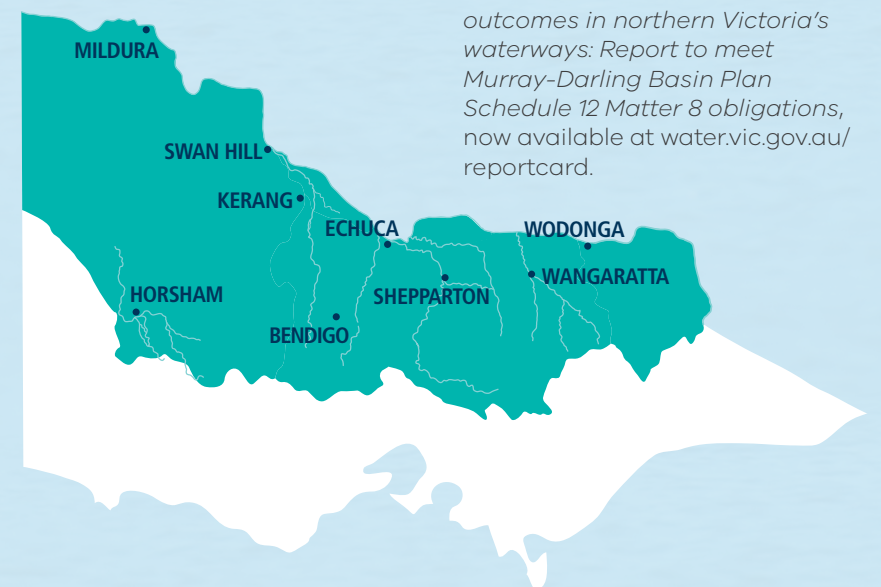
Regional communities especially value the Basin's many iconic and sometimes threatened native

plants and wildlife, including Murray cod, golden and silver perch, brolga, Australasian bittern, platypus and river red gums.

There are extensive checks and measures in the Basin Plan, including a review of progress in 2020 to confirm that we are starting to see benefits from water for the environment.

This Report Card is based on a related state-level assessment presented in the technical report *Achievement of environmental outcomes in northern Victoria's waterways: Report to meet Murray-Darling Basin Plan Schedule 12 Matter 8 obligations*, now available at water.vic.gov.au/reportcard.

Figure 2: Area of Murray-Darling Basin within Victoria



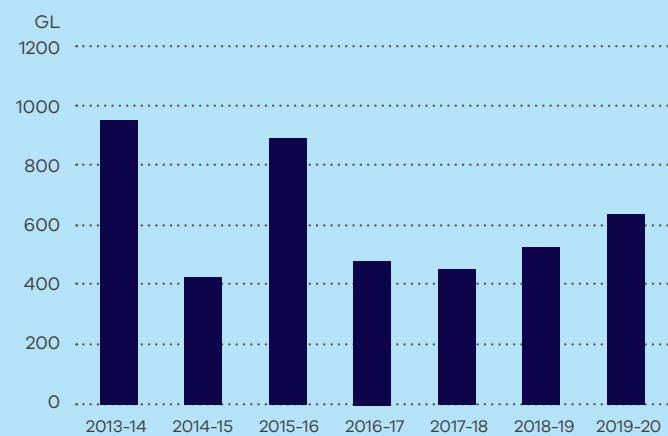
Basin Plan implementation in Victoria

Victoria's substantial progress since 2012 includes:

- Completing all three long-term watering plans in 2015 to show how Victoria's management of water for the environment meets Basin Plan requirements. These long-term plans are continually refined and updated to reflect new knowledge and information.
- Recovering 826 gigalitres of our 1,075 GL long-term water recovery target, with the remainder to be off-set through environmental projects that deliver equivalent benefits.
- Delivering four major works projects under The Living Murray to water 12,000 ha of high value Murray River floodplain in Victoria.
- Securing funding of \$29 million for the design of nine more major environmental works projects worth \$300 million that will allow the watering of an additional 14,000 ha, protecting these areas under drought and climate change.
- Delivering water to more than 120 waterways to benefit fish, waterbirds, vegetation and many other aspects of the environment.
- Delivering more than 4,300 GL of environmental water to priority sites (Figure 3). The volume delivered each year varies with seasonal conditions and environmental requirements. For example, there was a large natural flood in late 2016 which met the water requirements of most sites, resulting in relatively low environmental water use for 2016-17.

- Ongoing monitoring of dozens of priority sites where water for the environment is being delivered and managed to guide adaptive management and improve environmental water outcomes.
- Victoria's Water Resource Plans demonstrating how Victoria will manage water to meet the key outcomes of the Basin Plan are accredited and operational.

Figure 3: Volumes of environmental water* delivered across northern Victoria since 2013-14



* The total amount delivered each year varies depending on how much water is available, how much water different waterways need in any year, and the natural rainfall occurring at those waterways.

How water for the environment is working

Since 2012, Basin states have been working to recover water for the environment. This additional water, combined with infrastructure to deliver water to high-value sites and changing the way dams and rivers are managed, is providing new opportunities to preserve, restore and maintain high-value ecosystems across the Basin.

However, it takes time to improve the health of waterways that have been stressed for many decades. Over more than 120 years, the health of the Basin's waterways has been affected by increasing extraction of water to

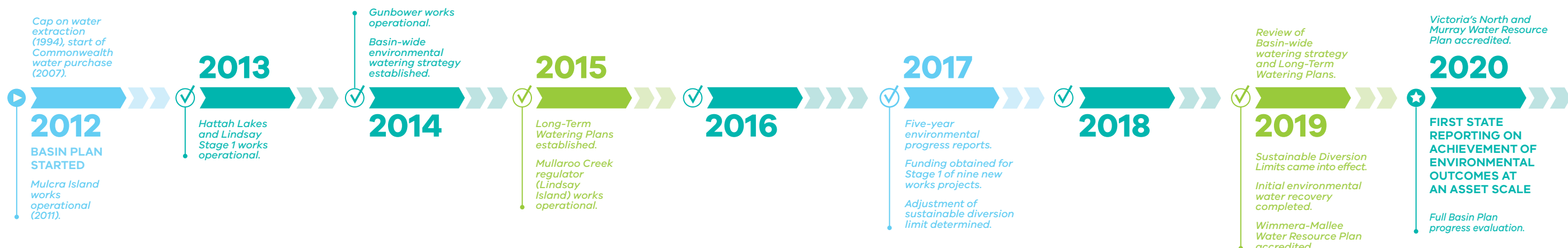
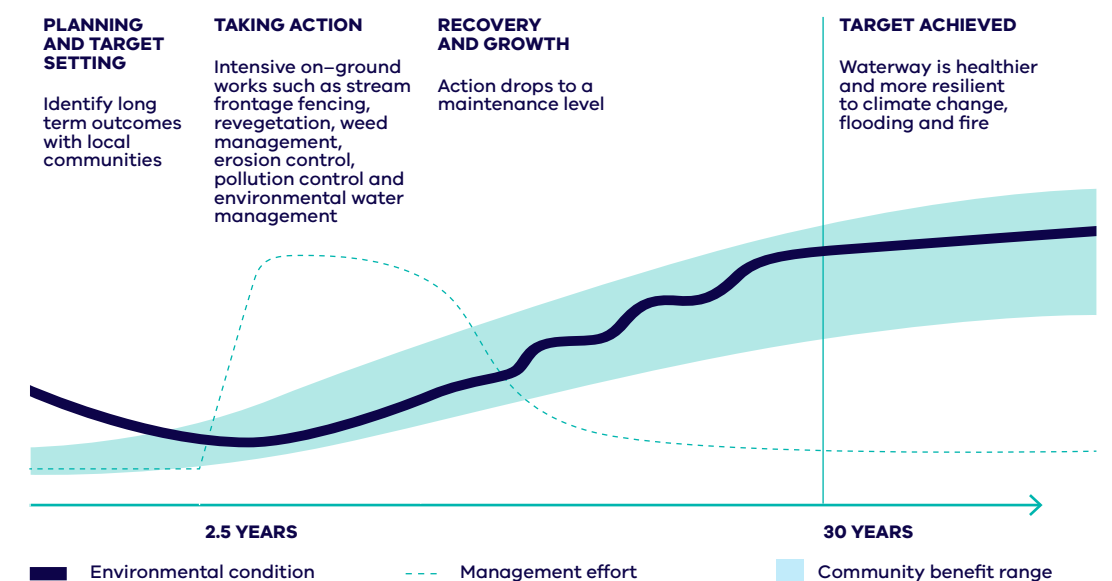
supply agriculture, stock and domestic use, industry and growing communities, as well as by drought.

We are already seeing improvements in vegetation health, waterbird abundance and increases in fish populations.

Further environmental outcomes will be delivered with less water when projects currently underway are completed. There is more work to be done, but we are on the right track (Figure 4).

TOP: Barmah Lake, by Keith Ward, Goulburn Broken CMA

Figure 4: Four phases of waterway health programs



How we deliver water for the environment

Victoria's catchment management authorities (CMAs) in partnership with local communities, Traditional Owners, the Victorian Environmental Water Holder (VEWH), land managers and other stakeholders work together to develop:

Environmental Water Management Plans (EWMPs)

- Developed for waterways that receive environmental water
- Describe the long-term ecological objectives for priority rivers and wetlands and the watering regime that is needed to achieve them

Seasonal Watering Proposals

- Developed annually based on information from the long-term EWMPs and the results from monitoring, such as from Victoria's environmental flows monitoring and assessment programs (VEFMAP for rivers and WetMAP for wetlands)
- Set out the priority watering actions across the region for the coming year under different seasonal conditions
- Consider additional opportunities for social, recreational, and cultural benefits from the delivery of water for the environment, when possible

Seasonal Watering Plans

- Developed annually by the VEWH based on the Seasonal Watering Proposals
- Shows the potential environmental watering that could occur during the year in each waterway system using water available under all environmental water entitlements held in Victoria
- Objectives for watering are flexible depending on seasonal conditions – drought, dry, average or wet conditions

The VEWH, CMAs and Water Corporations work together to deliver priority watering actions each year



Why we deliver water for the environment

Many of our waterways have been substantially modified as Victoria has developed and the population has grown. Large amounts of water are extracted and stored for important water supplies to towns, industry and food production – but this leaves only half the water that would naturally flow in many systems.

The timing of flows has also changed, interrupting many of the natural processes that native plants and animals need to survive, feed and breed.

Rivers now run lower in winter when water is collected in reservoirs and storages, and higher in summer when water is delivered through rivers and creeks to farms and towns for irrigation and urban use.

Managing water for the environment helps return some of this water to the right time and place.

Environmental water is the vital ingredient to making sure the places we love and that make our towns and communities special will be here for a long time to come:

- it supports the growth of aquatic plants and fringing vegetation such as native grasses, river red gums and black box
- these plants support and stabilise the banks of rivers and creeks to prevent damage in floods and provide food and shelter for native insects, fish, frogs, reptiles, birds and mammals
- these rivers, creeks and wetlands in turn support tourism and cultural and recreational activities like fishing, picnics, boating, walking, and bird watching.

As part of the Basin Plan, water for the environment is used to benefit:



Fish



Birds



Frogs and other fauna



Vegetation

FAR LEFT: Works at Hattah Boat Launch, by Mallee CMA

LEFT: Birdwatching, as part of the Citizen Scientist Program, by Glenelg Hopkins CMA

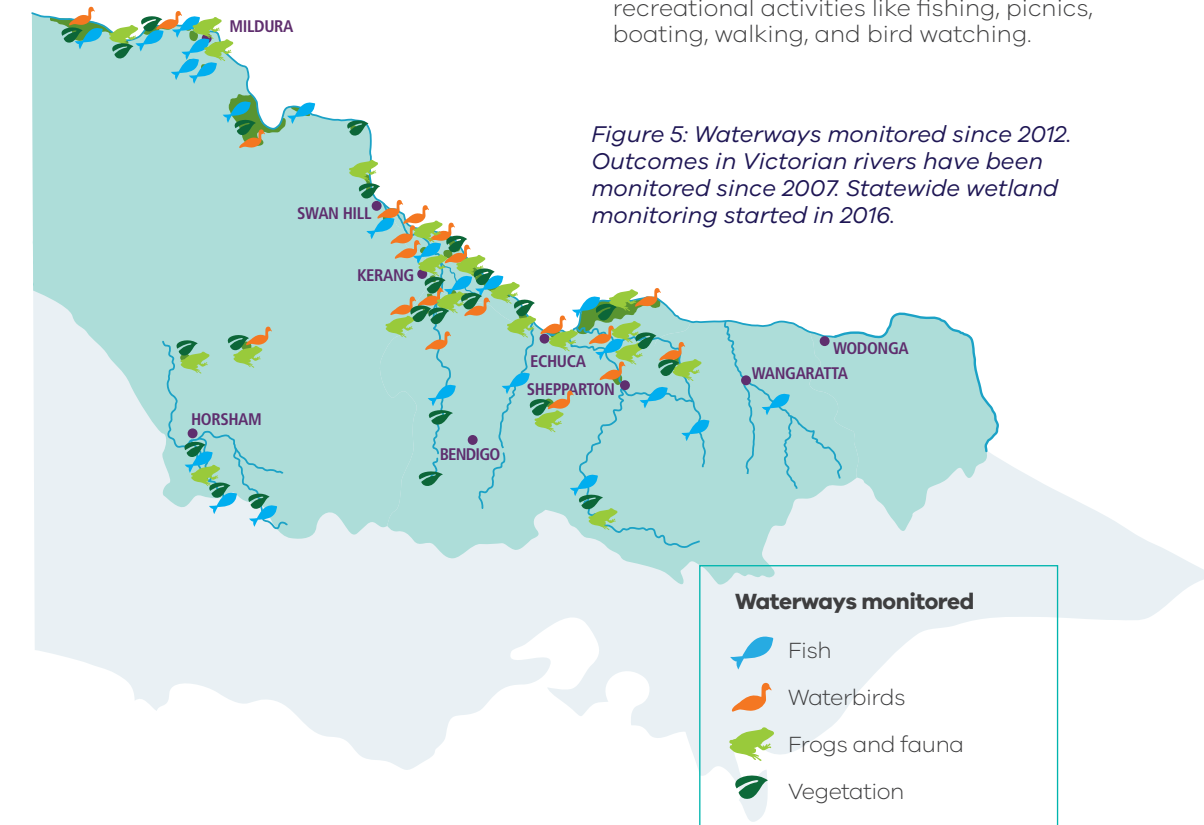


Figure 5: Waterways monitored since 2012. Outcomes in Victorian rivers have been monitored since 2007. Statewide wetland monitoring started in 2016.



Fish Report Card

Native fish in the Murray-Darling Basin's waterways are benefitting from water for the environment.

The 46 species of native fish in the Basin include threatened species such as Murray cod and Macquarie perch, Murray-Darling rainbowfish, Murray hardyhead, southern pygmy perch, trout cod and silver perch.

In 2003, native fish populations were estimated to be only 10% of their pre-European-settlement numbers. Some native fish populations were increasing before the Basin Plan, thanks to environmental flows, habitat restoration and improved connectivity provided by building fishways, but there was still room for improvement.

We are now seeing the additional benefits for our native fish from much greater volumes of water for the environment. Further work on complementary measures such as fishways will be essential to ensure native fish continue to thrive (see page 15).

Since the Basin Plan came into effect, native fish at almost all monitored sites are responding positively to water for the environment:

✓ Improved abundance of native fish

- ▶ Increased abundance and distribution at 90% of sites monitored, including Murray cod, golden and silver perch, trout cod, Australian smelt, southern pygmy perch, river blackfish and Murray-Darling rainbowfish.

✓ Enhanced fish species richness

- ▶ We have maintained or improved the number of native fish species in all systems monitored.
- ▶ The numbers and distribution of rare and threatened fish species including trout cod and southern pygmy perch have increased.

✓ Enable fish movement

- ▶ Fish movement has improved at all monitored sites, although removing instream barriers would help in some places.
- ▶ CMAs, VEWH and the Victorian Government are working together to support fish movement in priority waterways, like the Ovens River and Gunbower Creek, where fishways will soon be built to allow fish to access hundreds of kilometres of prime habitat.

✓ Improved spawning and recruitment of native fish

- ▶ Improvements in native fish recruitment at 90% of sites monitored (i.e. new fish are being added to the existing population), including at Broken, Campaspe, Goulburn and MacKenzie Rivers and Barmah Forest.
- ▶ Significant breeding responses successfully triggered in native fish nursery habitat at Lindsay-Mulcra-Wallpolla, Margooya Lagoon and Hattah Lakes, including spawning of golden perch, recruitment of Murray cod and migration of silver and golden perch.
- ▶ Suitable conditions for the successful reproduction and survival of the critically endangered Murray hardyhead at Round Lake, Brickworks Billabong, Lake Koorlong and Lake Elizabeth.



- Objective protected or restored
- Mixed results
- Objective not yet achieved
- More information needed

Environmental water has been used in **Gunbower Creek** since 2013 to restore native fish populations, with North Central CMA and fish biologists designing a special flow pattern to support native fish and improving on this design and delivery every year. Evidence of recruitment of five native species with this approach: Murray cod, Australian smelt, carp gudgeon, Murray-Darling rainbow fish and un-specked hardyhead.

The **Goulburn River** supports a diverse native fish fauna, with high conservation and recreational angling value. While data (2012-2020) shows an overall improvement in spawning and recruitment of native fish, recent surveys (2017-2020) have detected lower than expected numbers of threatened species including Murray River rainbowfish. Scientists believe that high summer flows in recent years, which have caused bank erosion and vegetation loss, might be the reason for this result.



Cardross Lake is an artificial wetland while **Lake Hawthorn** is a wetland that became saline after being used for irrigation and urban drainage for some years. Both wetlands were colonised by Murray hardyhead prior to the Millennium Drought but none have been captured in recent sampling.

The **Campaspe River** was severely impacted by the Millennium Drought. Environmental water has been used to improve native fish abundance and recruitment of large-bodied native fish such as Murray cod, Macquarie perch, trout cod and golden perch - as well as supporting native vegetation, platypus, rakali, turtles and frogs. Long-term monitoring has been instrumental in informing environmental water delivery to improve fish habitat.

Good news in recent years with an increase in the Murray cod population and re-establishment of threatened trout cod and Macquarie perch in the **Ovens River**. New fishways have benefitted fish along the Ovens and Mitta Mitta Rivers.

TOP LEFT: Murray cod, by Paul Thomas
 TOP CENTRE: Murray hardyhead at Lake Elizabeth by Amy Russell, North Central CMA
 TOP RIGHT: Torrumbarry fishway by Ivor Stuart, Arthur Rylah Institute
 LEFT: Murray hardyhead at Round Lake by Daniel Stoessel, Arthur Rylah Institute



Waterbird Report Card



Waterbirds have declined in abundance by over 70% across the Murray-Darling Basin in recent decades. The causes include drought, habitat loss, feral animals and development impacting the habitats of migratory species.

Evidence shows that environmental watering is supporting bird numbers and diversity and providing habitat and breeding opportunities to protect waterbirds and help them recover.

The results of our watering in wetlands along the Murray River show a high diversity and abundance of waterbirds moving into watered sites, then wading birds arriving as the wetlands dry.

✓ Increasing waterbird abundance, diversity, habitat and breeding

- ▶ Environmental watering has protected, maintained or restored the number and variety of waterbirds at almost 90% of sites monitored. We need more data to determine how birds are tracking at the remaining sites that have been monitored for only one or two years.
- ▶ Habitat for waterbirds has been protected or restored at more than 80% of sites monitored.
- ▶ Opportunities for breeding have been maintained or increased at more than 70% of sites monitored. However, although breeding has been recorded in response to environmental water at sites such as Hattah Lakes, other sites show little evidence of breeding. Many other factors influence breeding success, for example some birds need large nearby foraging areas in good condition to encourage them to nest, and this is difficult to improve when only a limited area is able to be watered.

✓ Internationally important wetlands and migratory birds

- ▶ All Ramsar sites, including Kerang Wetlands, Barmah and Gunbower Forests and Hattah Lakes, have shown abundance and diversity of waterbirds being protected or restored. There is evidence at Hattah Lakes that breeding is directly linked to environmental watering.
- ▶ We have safeguarded the habitat of migratory waterbird species protected under international treaties at almost all sites, except at Lindsay-Mulcra-Wallpolla – see explanation on map.

TOP LEFT: Red-necked avocets at Lake Wandella

TOP RIGHT: Dancing brolga by Chris Tzaros, Birdlife Australia

BELOW: Black swans by Amy Russell, North Central CMA

Waterbird habitat is being protected and restored



North Central and Goulburn Broken CMAs hold popular 'Breakfast with the Birds' events for community members to spot and count birds and learn from experts.

Lake Elizabeth – Large numbers and diversity of waterbirds were observed after environmental watering, but no evidence of breeding.

Birdlife Australia has been working with North Central CMA and WetMAP to monitor waterbirds. More than 20,000 individual birds have been recorded on many occasions after watering at **Lake Cullen**, part of the Kerang Wetlands Ramsar site, and over 32,000 birds were recorded in just one month of November 2019. Freckled duck, little curlew, royal spoonbill, sandpiper, great egret, white-bellied sea eagle, brolga and Australasian bittern were all observed at Lake Cullen in 2019-20.

McDonalds Swamp – Although there is high waterbird abundance and diversity here, waterbird habitat is not in the best condition. Tall marsh vegetation has been outpacing other plants, lowering the variety of waterbird habitat available. In future the swamp will be allowed to dry out between watering to manage this.

Breeding has improved at the Ramsar-listed **Hattah Lakes**, which support colonial nesting waterbirds and diverse waterbirds and woodland birds in its wooded floodplain, including the threatened regent parrot.

Barmah Forest is important for colonial nesting waterbirds and supports a substantial proportion (> 10 %) of the south eastern Australian population of the endangered Australasian bittern. There has been a notable increase in cormorants breeding.



Lindsay-Mulcra-Wallpolla – Although overall diversity is stable, the numbers of migratory shorebirds at the site is declining as only 6% of the site can be actively watered. The rest relies on medium to large floods in the Murray River to be watered.

Other good results include **Gaynor Swamp**, in the Goulburn River system, that is important for brolga. Although this site has only been watered once, in 2017-18, this resulted in an abundance of waterbirds, with further large numbers of shorebirds, such as red-necked avocet, foraging as the water receded.

- Objective protected or restored
- Mixed results
- Objective not yet achieved
- More information needed



Vegetation Report Card



The Murray-Darling Basin supports many valued native plant species that also provide important food and habitat for waterbirds, native fish, frogs, turtles and mammals.

Vegetation condition has declined in the past because of historical land use, river regulation and low rainfall. Restoring the health of trees and floodplains will take time. Distressed trees naturally recover more slowly than faster growing species such as grasses, and sometimes replanting is required to re-establish trees and their associated vegetation community. We monitor vegetation at 26 rivers and wetlands across the Basin, and have a good picture of how vegetation is responding to environmental watering.

Waterways in northern Victoria support extensive black box, lignum and river red gum vegetation communities. There have been positive responses in wetland vegetation cover, diversity and condition at most sites, where water has been delivered. Threatened species such as rigid water-milfoil (nationally vulnerable) and slender water-milfoil (threatened in Victoria) have also responded.

✓ Wetland vegetation condition

- ▶ Improved or maintained vegetation condition at more than 90% of monitored wetlands.
- ▶ Marked improvement in vegetation condition at some wetlands, such as Hattah Lakes.
- ▶ Reduced cover of weeds and other invasive plants at many places, such as Heywoods Lake and Ned's Corner.
- ▶ Increased diversity after introducing a more natural wetting and drying cycle in many wetlands, such as Moodies Swamp and Hattah Lakes.

✓ Condition of black box, river red gum, shrub and lignum communities

- ▶ Lignum condition has improved across the region, such as at Gaynor Swamp, Lake Yando, Lake Murphy and McDonalds Swamp.
- ▶ Improvements in black box woodland at Hattah Lakes.

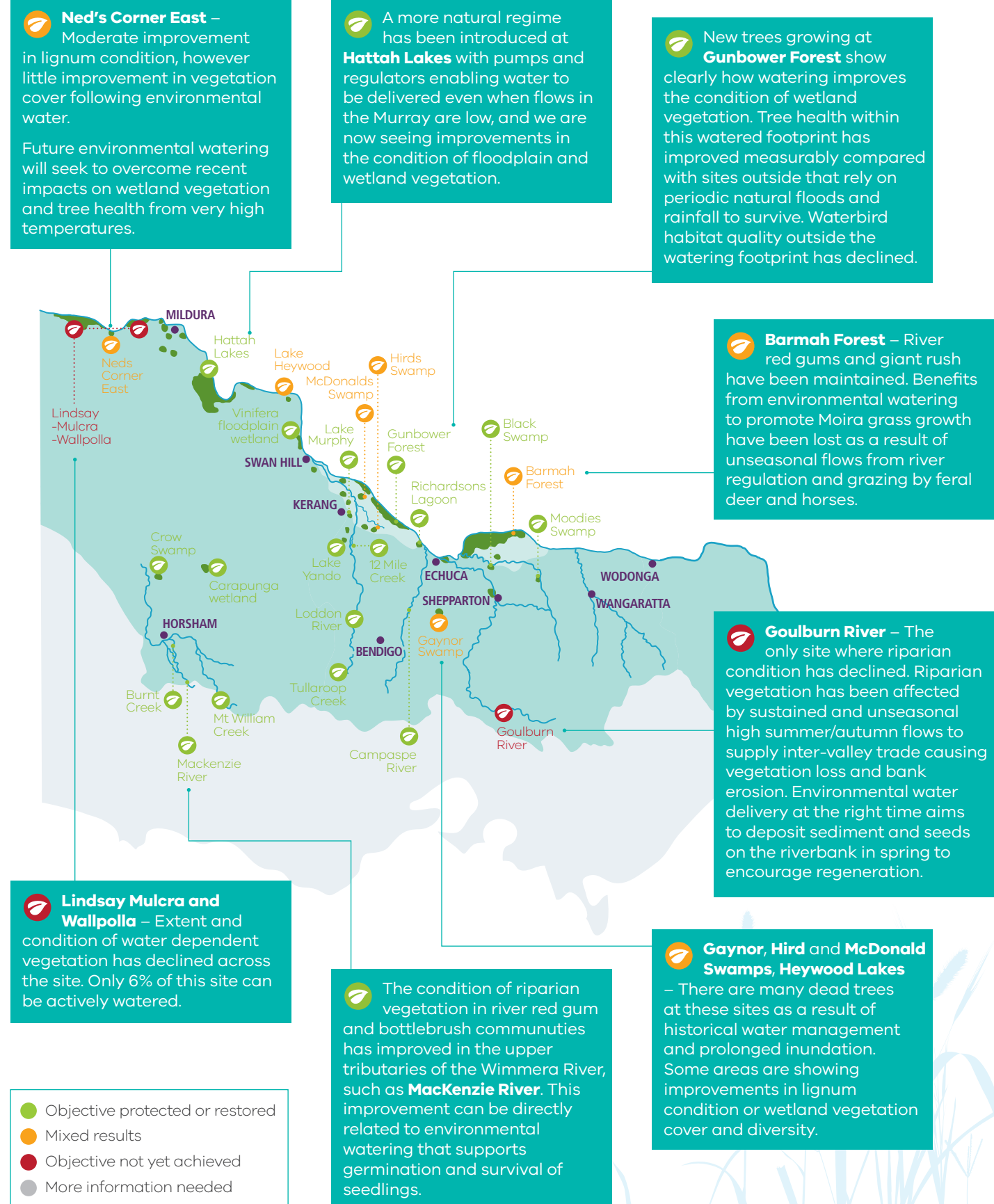
TOP: Ridged water-milfoil at Moodies Swamp, by Jo Wood, Goulburn Broken CMA

BELOW LEFT: River red gums, by North Central CMA

BELOW RIGHT: Waxy marshwort at Moodie Swamp, by Jo Wood, Goulburn Broken CMA

✓ Riparian vegetation condition

- ▶ Improved or maintained riparian vegetation condition at almost 90% of monitored rivers.
- ▶ Data in places like the Campaspe River are showing how environmental water is increasing resilience to drought and flood.
- ▶ Recent fencing at Barmah Forest shows what can be achieved when grazing by feral horses and deer is stopped, showing recovery of vegetation in the area. This is still an issue in many places.





Frogs and other fauna

There are a range of other animals that depend on water for reproduction and survival, such as frogs, turtles and waterbugs. Although we cannot collect data on all water dependent animals, we can report on a few of these at specific sites.

Frogs are of particular interest, given the widespread declines over the past two decades across the globe, due to habitat loss, altered hydrological regimes, diseases and climate change's effects such as altered temperature and rainfall. Inclusion of frogs in Victoria's state-wide environmental water monitoring program is relatively recent, compared to fish and waterbirds. However, we are now collecting consistent information and initial data provides a good baseline for future monitoring.

✓ Frog abundance and diversity

- ▶ Frog abundance and diversity is being maintained or even recovering at 80 to 90% of environmental watering sites where there are enough data to draw conclusions. However, we need more data at one third of sites to determine how frogs are tracking.
- ▶ Many of the Murray floodplain wetlands provide habitat for several frog species, including the nationally threatened growling grass frog. Places like Kinnairds Swamp, Horseshoe Lagoon, McDonalds Swamp, Johnsons Swamp, Wirra-Lo Wetland Complex and Kings Billabong recorded high abundance and diversity in frog species. Other sites, such as Black Swamp, Lake Little Meran, Cowanna Billabong, Ned's Corner East and Gunbower Forest show that water for the environment contributes to maintaining frog diversity.

? Frog breeding

- ▶ In the years to come, we will have collected sufficient data to assess the impact of water for the environment on frog breeding. Where there is enough data from sites like Wirra-Lo Wetlands, and Barmah and Gunbower Forests, breeding is being maintained.

✓ Other indicators

- ▶ Habitat for turtles at Barmah Forest has been maintained and monitoring shows that breeding has been stimulated by water for the environment.
- ▶ The abundance of invertebrates in the Goulburn River, including crustaceans like freshwater crayfish, is showing the beneficial effects of spring environmental watering. Invertebrates are an essential part of healthy, functioning aquatic ecosystems, providing essential ecosystem services that range from nutrient cycling to provision of food for larger aquatic organisms like fish.



Carapunga Wetland is an intermittent wetland that received environmental water in spring 2018 and 2019. However inundation was of insufficient duration to support large numbers or a diversity of frogs. Many frog species abandon drying waterbodies in favour of permanent waterbodies.

Barmah Forest provides high quality feeding, breeding and nursery habitat for three turtle species, the broad-shelled turtle, common long-necked turtle and the Murray River turtle. Turtles have special significance for the Yorta Yorta People, as they refer to the broad-shelled turtle as Bayadherra. This is an animal totem associated with Yorta Yorta creation stories. A turtle monitoring program was initiated in response to concerns that Yorta Yorta elders raised about not seeing the turtle as much as they used to. The program is led in partnership by Yorta Yorta Nation Aboriginal Corporation with scientists from the Arthur Rylah Institute for Environmental Research. This research highlighted the Yorta Yorta concern about the high numbers of dead and dying turtles they were seeing in the forest, and they wanted to know the reason behind it. Goulburn Broken CMA also work with Yorta Yorta Nation Aboriginal Corporation and the VEWH to plan watering actions to support turtle habitat and survival. In recent years, there has been a recorded increase in the turtle population with good numbers of sub-adult turtles, demonstrating that these actions have succeeded due to the program.



- Objective protected or restored
- Mixed results
- Objective not yet achieved
- More information needed

Platypus were once widespread throughout the Wimmera River system, but their population drastically declined in the region because of land clearing, water extraction and a drying climate. After the Millennium Drought, platypus were reduced on the **Mackenzie River**. The use of environmental water and management activities, including building a fish ladder (that also allows easier and safer movement along the river for platypus), have resulted in the platypus expanding its habitat to downstream regions of the river. These promising results show that continued effective management, informed by monitoring, can increase platypus distribution in the system. We hope to eventually bring platypus back to the main channel of the Wimmera River.

TOP LEFT: Platypus Maddie, by Paul Carracher, Wimmera CMA
 TOP RIGHT: Spadefoot frog at Hattah Lakes, by Mallee CMA
 FAR LEFT: Smiling turtle by Goulburn Broken CMA
 LEFT: Turtle at Moodie Swamp, by Jo Wood, Goulburn Broken CMA

Achieving environmental outcomes isn't only about adding water...

We need to be smart about how we get the maximum benefit from environmental water.

Making every drop count

Water for the environment is vitally important but is not enough on its own to restore and improve waterway health across the Murray–Darling Basin.

Environmental water recovery, planning and delivery is part of Victoria's broader, long-term effort that includes a lasting investment in environmental works and complementary measures.

Environmental works like channels, regulators, levee banks and pumps can be used to:

- deliver water to wetlands and floodplains that are now isolated from rivers under modern water extraction and management practices
- allow delivery of the right timing, frequency and length of inundation needed by water-dependent native plants and wildlife.

Complementary measures address other issues to make sure that environmental benefits can be achieved, including:

- building fishways to help fish move past barriers such as weirs, or removing these barriers
- in-stream habitat restoration like returning logs and woody debris to rivers for fish habitat
- revegetation along the waterways to improve riparian land

- pest control such as keeping feral pigs out of wetlands and removing weeds
- fencing to exclude livestock from waterways and banks
- stocking native fish
- sustainable irrigation programs to help maintain healthy catchments.



We know Victoria's approach works

Environmental works at four Victorian sites along the River Murray – Gunbower Forest, Hattah Lakes, Lindsay Island and Mulcra Island – were constructed under The Living Murray program.

They are delivering great outcomes without allowing flood events that could impact regional communities and landholders.

Other successes include installing fishways at Kow Swamp and Kerang Weir which have:

- improved feeding and breeding opportunities for golden and silver perch and other species
- restored aquatic habitat in Pyramid Creek and Goulburn River to benefit native fish, turtles, crayfish and other aquatic animals.

New environmental works are being designed at nine sites in Victoria to:

- allow more efficient use of water at an additional 14,000 ha of wetlands and floodplains in the absence of natural flooding
- deliver available water directly to high value sites to improve the condition of vegetation and provide habitat for native fish, birds, frogs and turtles
- increase the resilience of these sites to drought and dry conditions
- support tourism and community recreation opportunities.

The Victorian Government has recently committed \$17 million to new environmental works in northern Victoria to improve waterway health, boost local economies and create regional jobs.

TOP LEFT: Common spadefoot at Moodie Swamp, by Jo Wood, Goulburn Broken CMA

BELOW: Golden perch release, by Paul Thomas

BELOW RIGHT: Hipwell Road Channel works for watering Gunbower Forest, by North Central CMA

Much more than just the environment

The ecological benefits of water for the environment are clear but these are only part of the story. There are many broader benefits that support the social and economic fabric of our communities. Water for the environment is certainly too important to our communities to lose.

✓ Well-being of our communities

- ▶ It supports and keeps alive valuable places for our communities, including providing lifeblood to Country for which Traditional Owners have cared for countless generations.
- ▶ It contributes to a range of active and passive nature-based recreation activities, like fishing, swimming, camping, bushwalking, boating and kayaking, relaxing and contemplation.
- ▶ These activities generate important health, enjoyment and recuperation benefits for local communities.

✓ Supporting our economy

- ▶ It provides substantial benefits to the agriculture sector by helping increase the output of many crops and improving water quality in our rivers.
- ▶ It boosts northern Victoria's income from recreation by millions of dollars each year, and this is expected to continue to increase over the next decade.
- ▶ That's great news for the hundreds of small businesses that rely on recreation and tourism for their income.



✓ Resilience to climate change

- ▶ It supports healthy floodplains and wetlands that mitigate against the increasing frequency and intensity of drought, heatwaves and floods.
- ▶ This means it helps our communities cope with climate change.
- ▶ Its climate change mitigation benefits are expected to triple over the next 10 years, showing how important water for the environment is.



Sharing benefits in the Basin – just a few examples...

✓ Traditional Owners

Taungurung Traditional Owners and North East CMA worked with the VEWH and Goulburn-Murray Water to release water for the environment down the King River in 2019. This boosted river health and productivity, inundating new habitat for waterbugs and fish and allowing them to move more freely and find new sources of food.

The environmental water delivery was managed to coincide with a visit by the Taungurung Water Group scoping out sites for an Aboriginal Waterway Assessment of the river. Taungurung man Shane Monk said "The rivers are the veins of the Country, if you take too much water from them Country would get sick. Taungurung has a responsibility and we are only doing the right thing for Country by bringing water back to the river".

✓ Recreational fishing

At Kings Billabong, the future looks rosy for both the native fish population and local anglers. Sunraysia OzFish volunteers worked with Mallee CMA on a habitat mapping project in 2018 and installing logs for extra fish habitat. The Victorian Fisheries Authority is stocking thousands of native fish and Mallee CMA is managing the water regime and helping to build fishing platforms.

✓ Local economies

The benefits generated from watering Gunbower Forest are conservatively estimated at between \$1 million and \$4 million each year, increasing to between \$3 million and \$8 million yearly by 2030. When we consider other ecosystem assets such as the other Living Murray icon sites, environmental water is contributing immense value to the region's income.

✓ Resilience to climate change

Riparian vegetation is critical to the health of our waterways, as it helps to mitigate climate change's effects. It improves water quality, reduces erosion and enhances habitat for animals both on land and in the waterway, allowing social, recreational and economic activities (e.g. fishing, picnics, walking and agriculture). Revegetation activities also bring local community closer to our waterways, as occurs on the Campaspe River. Traditional Owners, landholders and community groups such as Landcare, angling and school groups, are working together to improve riparian vegetation along the Campaspe. The vegetation complements environmental watering, with monitoring showing improvements in vegetation diversity and extent, as well as native fish abundance and recruitment.

FAR LEFT: Tree Planting Day, by Alison Hoelzer

LEFT: Birdwatching as part of the Citizen Scientist Program, by Mallee CMA

BELOW: Murray cod, by Mark Turner, Goulburn-Broken CMA

BELOW RIGHT: Night frog monitoring, Mallee CMA



Waterways monitored



COVER IMAGES

LEFT: *Litoria peroni* group at Gunbower, by D Cook

CENTRE: Darter with chicks, by Keith Ward, Goulburn Broken CMA

RIGHT: Barmah Forest, by Keith Ward, Goulburn Broken CMA

- | | | | |
|----------------------|--------------------|-----------------------------|------------------------|
| 1 Black Swamp | 14 Lake Yando | 27 Wirra-Lo Wetland Complex | 38 Margooya Lagoon |
| 2 Broken River | 15 Tullaroop Creek | 28 Lindsay-Mulcra Wallpolla | 39 Nyah Floodplain |
| 3 Broken Creek | 16 Pyramid Creek | 29 Horseshoe Lagoon | 40 Ned's Corner East |
| 4 Kinnairds Swamp | 17 12 Mile Creek | 30 Brickworks Billabong | 41 Vinifera Floodplain |
| 5 Moodies Swamp | 18 Ovens River | 31 Cowanna Billabong | 42 Hattah Lakes |
| 6 Campaspe River | 19 Barmah Forest | 32 Cardross Lake | 43 Burnt Creek |
| 7 Richardsons Lagoon | 20 Gunbower Forest | 33 Kings Billabong | 44 Mackenzie River |
| 8 Round Lake | 21 Hird Swamp | 34 Ducksfoot Lagoon | 45 Mt William Creek |
| 9 Gaynor Swamp | 22 Johnsons Swamp | 35 Lake Hawthorn | 46 Carapugna Wetland |
| 10 Goulburn River | 23 Lake Cullen | 36 Lake Heywood | 47 Crow Swamp |
| 11 Reedy Swamp | 24 Lake Elizabeth | 37 Lake Koorlong | |
| 12 Loddon River | 25 Lake Murphy | | |
| 13 Lake Little Meran | 26 McDonalds Swamp | | |

© The State of Victoria Department of Environment, Land, Water and Planning 2021



This work is licensed under a Creative Commons Attribution 4.0 International licence. You are free to re-use the work under that licence, on the condition that you credit the State of Victoria as author. The licence does not apply to any images, photographs or branding, including the Victorian Coat of Arms, the Victorian Government logo and the Department of Environment, Land, Water and Planning (DELWP) logo. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>

Disclaimer

This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Accessibility

If you would like to receive this publication in an alternative format, please telephone the DELWP Customer Service Centre on 136186, email customer.service@delwp.vic.gov.au, or via the National Relay Service on 133 677 www.relayservice.com.au. This document is also available on the internet at www.delwp.vic.gov.au.