Platypus Watch – *Putting Perridak Back on Track*

Our Story of Platypus Decline & A Path Forward

John Forrester. 16 August 2023

Werribee River Association is a registered charity and has been working for the Werribee River since 1981.

The Werribee River Association staff and board acknowledge and respect the Traditional Owners of the land and waterways upon which we work, live and play, in particular the Wadawurrung, Bunurong and Wurundjeri people of the Kulin Nation.

We acknowledge and respect Elders past, present and emerging and that sovereignty was never ceded.

Perridak = Platypus http://www.djillong.net.au/wadawurrung-country/wadawurrung-language.html
Cover Photo: Forrester, J. Monday 13 August 2023

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About Us

The Werribee River Association Inc. (WRA) was established in 1981 and is a not-for-profit waterway protector whose purpose is to work with the community to protect the natural environment and promote sustainable living practices.

The history of the organisation is rooted in advocacy and volunteerism for the environment and human health within the Werribee River catchment.

The former Committee of Management is now a Board of Management with paid staff leading the work, actively supported by volunteers.

The organisation is guided by a Strategic Plan 2019 – 2024, a Business Plan 2021-2025 and has completed a Concept Proposal for a Community Enviro-Hub.

We work with land and water managers, and the local community, to help build the biodiversity of the waterway ecosystem, and to support the iconic platypus.

We also invest in programs that build community connection and strength as we believe that healthy communities and healthy waterways go hand in hand.

Our Strategic Directions focus on:

- Community Engagement
- Education
- Organisational development
- Partnerships, and
- Science

Our Vision

A healthy Werribee River and catchment waterways by 2070, giving life to a modern, sustainable and culturally rich community.

Why this Report

We seek to secure the future of the platypus in the Werribee River for future human generations to enjoy and for the right of the species to continue to live in a healthy waterway.

How Can You Help?

Read our recommendations and if you can help us by partnership or funding, then reach out to us as we would be pleased to talk with you.

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Executive Summary

We have discussed all the information we and others have gathered over the past 25 years, in an effort to understand it all, and to imagine a future with platypus continuing to live on in the river.

It is established that the river has been shackled by regulation and affected by land-use change whereby it is concluded that platypus as a species have declined in number in common with waterways elsewhere as human population and urban development have grown.

Various live-trapping and eDNA surveys in Werribee and Bacchus Marsh are reviewed briefly and some of their methods and findings summarised.

Observations and deaths of platypus in the lower Werribee are included too as they add another layer of information which not only adds to our knowledge but highlights the emotional attachment humans have to this delightful animal, providing a powerful reason to ensure its future.

Vegetation, stormwater and flows are discussed as three of the major factors which many authors agree provide fertile ground for improvement and protection of the species. Then, it is concluded that the way in which we can guarantee the future of the species is to implement collaborative programs of monitoring, research and action.

Recommendations

Carry out a program to assess and improve quality, connectivity, the buffers for and the width of riparian zones in urban areas and from the Werribee Diversion Weir to Melton Reservoir.

Carry out a program of assessment of in-stream vegetation from Shaw's Bridge in Heaths Rd Werribee to the Melton reservoir, to determine any gaps and the need for revegetation, and design a program of improvement.

Carry out a program of assessment of irrigation flows to suggest improvement, minimising sudden change in flows, very low flows or cease-to-flow events in the river, from Melton Reservoir to the Werribee Diversion Weir, as well as work with Melbourne Water and others on increasing environmental flows in all of the river system.

Carry out a program of assessment of microfauna and invertebrates in the river, and their requirements for a healthy life, in urban areas and from the Werribee Diversion Weir to Melton Reservoir.

Carry out a program of mapping stormwater outlets releasing water into the river in Wyndham, and design a program of improvement for stormwater, litter and other negative impacts of the river

Work with others to implement a holistic litter reduction strategy to include a combination of auditing and installing gross pollutant traps, working with industry to reduce packaging and waste, community engagement and education.

Work with others to minimise the impacts of increasing urbanisation of flow variability through water sensitive urban designs, and by educating others about the merits of a higher order platypus sensitive urban development.

Work with others to continue live-trapping, eDNA and use other technology to remain up-to-date with platypus numbers on the Werribee and Lerderderg Rivers.

Work with others to determine the level of connectivity and gene flow across Melton Reservoir through population genetic analyses.

Develop a longer-term strategy to re-connect platypus populations in the lower and middle Werribee River (pending outcomes of the population genetic analyses).

Harnessed for a Century

The Werribee River has been completely regulated and crippled as a natural entity for over one hundred years. Initially Pyke's Creek reservoir was completed in 1911, Melton reservoir in 1916, and Merrimu in 1967. Some upgrades have occurred since then at all three reservoirs to meet increased demand, siltation and maintenance concerns. An article from the Werribee Banner September 1932 uses language which while somewhat flowery and nostalgic, could be interpreted as the community voicing regret for the river being restrained. [1]

1 September 1932

[from *Werribee Shire Banner*]:

Since the Werribee River has been saddled with storages at Melton and Pyke's Creek, local opinion has held that the river had lost its youthful dash and that it would never again cavort gaily along its rocky bed or overflow its banks as in the days when we were young. However, after a rest of fifteen years, it showed on Tuesday that its former sprightliness had been regained and we were treated to the nearest, approach to an old time flood for quite a long while.

Photo 1: *1 September 1 1932 (from Werribee Shire Banner)* Hocking, G. Wyndham City 2013

Growing Concerns

Then, in a 1972 report by the Werribee Jaycees into the state and future of the Werribee River, readers were reminded of;

"… pleasant days spent wandering along the river with water hens, platypus, rabbits scampering for cover on human approach." [2]

But it was later in their report the Jaycees spoke of the reality which had come about;

"Water hen have managed to retain a foothold in the reedy banks, but platypus, kookaburra, swans and cranes have either been destroyed or forced to move elsewhere." [3]


ACTION URGED TO SAVE WERRIBEE RIVER

Jaycees complete two-year report

This photo shows rubbish dumping over the river less than 50 yards from the Watton-Wedge Street

Photo 2: *Action urged to save Werribee River* Werribee Banner, September 13 1972

As a result of the Jaycees concerns and that of other interested people with the state and future of the river, the Werribee River Association was formed in 1981, and was soon on the front foot, as can be seen from their letter to the Minister for Conservation in 1981, noting that there was:

"No provision for any of the water from the catchment area for environmental purposes; also noting that the Werribee River between Melton Reservoir and the diversion weir is essentially for irrigation purposes that would presumably have effects on the breeding and lifecycles of the local flora and fauna; the river below the diversion weir is virtually a drain (for stormwater and other approved and non-approved discharges)." [4]

All flows in the Werribee River were diverted to irrigation at Bacchus Marsh and Werribee. In the lower reach of the Werribee River at the Werribee diversion weir, all water went to Werribee South, and the only flows which went downstream through Werribee were releases from the reservoirs when at capacity or flooding.

Despite the lack of water below the diversion weir in Werribee, WRA recorded in 1982 that platypus could be seen within the town's limits *"…if you know where to look."* [5]

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1. Hocking, G *Wyndham Our Story*, Wyndham City 2013 p.98
2. Doolan L., Sammartino J., and Smith B. *Light and Darkness* Werribee Jaycees 1972 p.5
3. Doolan L., Sammartino J., and Smith B. *Light and Darkness* Werribee Jaycees 1972 p.26
4. Hodge, J.M. *Correspondence from WRA to Minister for Conservation*, 14th September 1982
5. Hodge, J.M. *Werribee River: Give it a Go Correspondence to Community Groups* from WRA Secretary 6th July 1982

It was not surprising to see that interest led to a suggested activity to look at platypus habitat in 1988. [6]

This continuing interest created an initiative seen in a 1997 report to the management committee, stating that:

"… it's been a matter of debate that the river does or doesn't have an active population of platypus. Members have reported that they have seen what could have been platypus in the Chirnside Park area, and in the vicinity of Presidents Park, in the last two years. It is fairly safe to assume that platypus probably live in the upper reaches of the river, but no such assumption should remain untested in the lower reaches of the river." [7]

Consequently, WRA set about testing that assumption in 1997-1998 by conducting what are now considered possibly the first community-initiated live-trapping surveys for platypus in Victoria. [8]

External Factors

Werribee township was a country town in a shire in 1972 with a population of around 25,000 people, but by 1997 it had become the City of Wyndham with 75,000 residents. Local residents watched many impacts on the land and waterways, and so a major community initiative began. **See Box:** *Uncovering, Discovering & Recovering the Werribee River*. [9]

Most of the metropolis of Melbourne had Melbourne Water as a waterway manager, the Werribee River and other waterways out west of Melbourne did not, enduring negative impacts and no improvements despite calls for change over many years. Long-awaited passing flows through the Werribee diversion weir did not begin until 1997 when valves were installed by Southern Rural Water to permit a ten-megalitre flow daily.

So, after eighty years the neglected stretch of river downstream of the Werribee diversion weir, which was still home to a surviving platypus population, received a regular flow. But it wasn't until the 2000s that regular environmental flows were planned and organised.

In 2005, Melbourne Water was finally given responsibility for the Werribee River, and more broadly for all the waterways and drainage systems in the Port Phillip and Western Port Region.[10]

While those changes were occurring the sleeping giant of climate change had awakened and rainfall had been dropping across Melbourne catchments from the 1980s, and then with vengeance in the millennium drought of 1998-2009. In particular, reductions in cool season rainfall have now been noted over thirty years.[11]

All the while, the City of Wyndham was growing rapidly, with a population in 2023 at around 325,000 and to grow to 501,634 by 2041. [12]

Uncovering, Discovering & Recovering the Werribee River

A joint Wyndham City/WRA initiative in 1998-2000, called the River Recovery Project *Uncovering, Discovering & Recovering the Werribee River,* set out to improve the environmental and aesthetic conditions of the Werribee River.

The project gained its impetus from consultation with the community in the development of the Wyndham City Quality Community Plan (QCP).

Among its many activities:

- Harnessing community groups and volunteers
- Carrying out weeding, tree & rubbish removal and replanting.
- Creating rock drains for stormwater and
- Improving facilities such as footpaths, seating and lookouts
- Encouraging litter control and awareness

This collaborative project yielded great outcomes for the river, and it could happen again with a new collaborative venture of willing stakeholders.

6. Mein, G *WRA Minutes*. 4th February 1988
7. Forrester, J. *Report to WRA, WRA Minutes* 15th May 1997
8. Williams, G. *Personal communication*, Tuesday 28th June 2022
9. River Recovery *River News* Vol 1 Issue No.1 June 1998 p.2
10. WRA 2021 *Forty Years of Waterway Protection* 1981-2021 p.25
11. State Government Victoria 2019 *Long Term Water Resource Assessment for Southern Victoria* p.42
12. https://forecast.id.com.au/wyndham

Live Trapping Surveys in the Werribee River

1997-1998 WRA Live-Trapping Survey

In 1997 WRA was successful in their grant application from Wyndham City to undertake a live-trapping platypus survey in the local area, and engaged the Australian Platypus Conservancy (APC) which;

"… embarked on a 3-month survey of the River from Dec. 1997-Mar 1998. This project proved definitively what we all knew- that there were platypus in the river. The surprise was that there were at least 16 between Shaw's Bridge and the Maltby Bypass and that the population is relatively healthy. This project has provided valuable data to the APC and much material for talks to local schools and groups." [13]

Photo 3: *Werribee Venturers assisting APC set nets for a survey*. Noble, H 1998.

In their report to WRA, the Australian Platypus Conservancy (APC) summarised the findings;

"A total of 16 platypus were captured and released, including 5 adult males, 6 adult or subadult females and 5 juveniles. While all of the animals were in fair to good physical condition, three platypus had pieces of litter wrapped around their neck or torso, and three other animals had scars suggesting previous entanglement in fishing line." [14]

A total of 18 individual animals were captured according to the raw data from this report, but it appears that two platypus were captured twice each. See **Figure 1**.

From those results, the APC reported the river as supporting a sizeable platypus population, and encouraged every effort to be made to preserve and enhance the habitat qualities of that section of waterway in order to ensure the long-term protection of the platypus population, and went on to outline recommendations for management action.

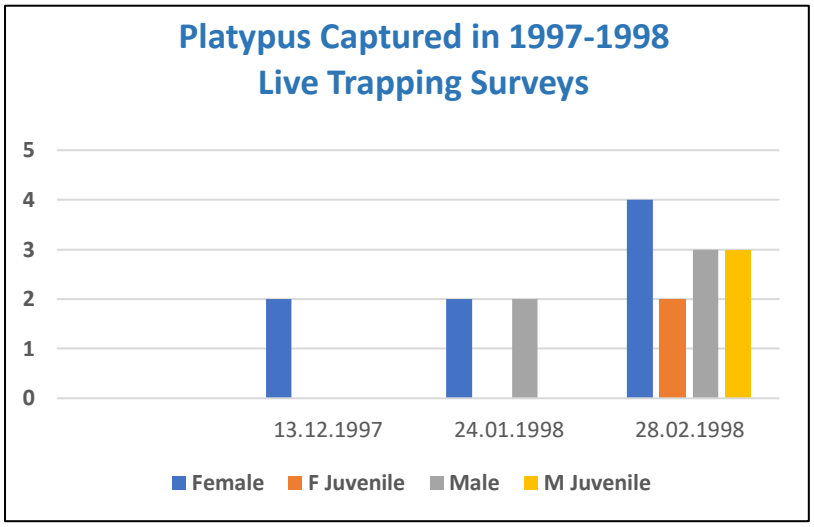

Figure 1: *Platypus Captured 1997-1998 Live Trapping Surveys*

1. Conduct a public education program on disposal and collection of litter, provision and clearing of rubbish bins near fast-food outlets, and awareness raising about the dangers of recreational fishing line.
2. Manage access to the river through a management plan which identifies a detailed habitat strategy to protect existing native vegetation, strengthen and wider riparian corridors, replant modified creekside areas, formalise tracks and access points for conservation requirements, identify exclusion zones, control recreational practices and establish a litter reduction policy.
3. Maintain a continuous environmental flow in the river to produce feeding habitat, and provide corridors for movement by platypus between foraging areas.

13. Noble, H. 2006 *The First 25 Years 1981-2006 A Brief History Werribee River Association* p.25
14. Williams, G.A and Serena, *Distribution and population density of platypus in the Werribee River near Werribee township* Australian Platypus Conservancy M 1998 p.1

1999-2000 WRA Live-Trapping Survey

The catch of platypus in the 1999-2000 survey report by the Australian Platypus Conservancy comprised;
"....4 adult males, one sub-adult male adult, 2 adult females and one juvenile male. While all of the animals were in fair to good physical condition, one platypus had a piece of litter wrapped around its neck and three other animals had scars suggesting previous entanglement in fishing line or other debris."

It was noted in the second survey, that results on the third night, when juveniles were likely to be captured,
"... were potentially compromised by the very low rate of flow in the river."

In this survey one platypus was captured twice.

In addition, in the same report, a recently deceased juvenile female carcass was found on land at Bungey's Hole in mid-March, possibly killed by a dog.

Table 1 List of platypus trapping sites along the Werribee River, December 1999 – March 2000. Sites WE1-WE4 and WE9 are located upstream of the Werribee railway line, while sites WE5-WE8 are located downstream of the railway line.

Site	Location
WE1	0.15 km downstream of Southern Water Weir (Melways 205, E2)
WE2	at riffle, end of Redgum Avenue (Melways 205, E3)
WE3	at riffle, 0.3 km downstream of Shaws Road bridge (Melways 205, E4)
WE4	below small rock bar, opposite Anembo Court (Melways 205. G7)
WE9	just upstream of end of Stawell Street (Melways 205, H7)
WE7	0.1 km upstream of Princes Highway bridge (Melways 205, H9)
WE10	at outflow from pool behind Angling Club (Melways 205 G10)
WE6	near riffle, corner/end of Synott Street (Melways 205, H10)
WE8	just upstream of Maltby Bypass bridge (Melways 205 H12)

Table 1: *List of Trapping Sites 1999-2000* [15]

In their summing up, the APC reaffirmed their conclusion from 1997-1998 that the river supported a sizeable population of platypus, 3 per kilometre of channel in the Werribee township area.

Again, they recommended very similar management actions, but added control of foxes and domestic pets:

1. An on-going public education campaign to encourage disposal of rubbish in an appropriate manner, and an awareness campaign about the dangers to platypus of fishing line
2. Control of public access and disturbance from foxes, dogs and cats
3. Ensuring the river channel does not have dry flows especially between the Werribee diversion weir and Maltby Bypass, by reviewing environmental releases
4. Ensure appropriate planning measures protect platypus habitat values, and that developers might consider funding future live-trapping surveys

Melbourne Water Live Trapping Surveys Post 2008-2015

Melbourne Water were the instigators of the next series of surveys in the middle of the millennium drought, after becoming the waterway manager for the Werribee catchment, engaging various experts to complete the surveys for them.

Cesar Australia carried out surveys for Melbourne Water in 2008-2009 and 2009-2010. Results showed 9 platypus were trapped in 2008-2009, while only 2 were trapped in 2009-2010. There were also numbers of dead platypus reported to Cesar at that time, and litter was again a serious issue with many animals showing signs of litter injury.

By the end of the millennium drought in 2012, a significant decline in numbers had been confirmed;

"The results of live-trapping session conducted since 1997 indicate a significant decline in abundance during the Millennium Drought with no evidence of recovery in recent years (Griffiths et al. 2015)." [16]

WRA took part in eDNA testing in 2015-2019 and did not instigate any live-trapping surveys for some time.

15. Williams, G.A *Distribution and Population Density of Platypus in The Werribee River Near Werribee Township December 1999 – March 2000*
16. Jacobs, APC, Cesar 2016 *Understanding the environmental water requirements of platypus*. p.32

eDNA Surveys 2015-2019

In eDNA or environmental DNA studies, a sample of water is taken from the waterway, compressed through a filter and the resultant particles left in the filter after the water has been passed through is sent to a laboratory where DNA is extracted and evidence or not of platypus and other species can be obtained.

See **Photos 4 & 5:** *eDNA sampling on the Werribee River*

Since 2015, surveys for platypus using eDNA have been undertaken in the lower Werribee River by both trained ecologists (Griffiths et al. 2017, 2018) and citizen scientists (Melbourne Water unpublished data). The number of sites sampled during each survey is relatively low and location of sites variable between surveys, meaning rigorous comparisons between survey periods are not possible.[17]

Table 2: *Citizen Science eDNA Results Werribee River* [18], results from middle and upper reaches of the Werribee River are also recorded. It can be seen that the lower Werribee results – in blue – are more positive but may have been more regularly sampled than other sites.

Table 2: Citizen Science eDNA Results Werribee River
Adapted from Melbourne Water. Fisher, A. 2019 (unpublished) **Green Mt Cottrell Reach Blue Lower Werribee Reach**

Location on Werribee River	Spring 2015	Autumn 2016	Spring 2016	Autumn 2017	Spring 2017	Autumn 2018	Spring 2018	Autumn 2019
Werribee Gorge State Park								positive
Surbiton Park, Melton	positive	negative	NS	positive	equivocal	negative	NA	positive
Cobbledick's Ford, Mt Cottrell	negative	equivocal	negative	equivocal	negative	positive	NA	equivocal
Shanahan's Rd, Mt Cottrell	NS	equivocal	negative	positive	negative	NS	NS	NS
Riversdale Dr, Tarneit (Diversion Weir Pool)	negative	positive	equivocal	equivocal	negative	positive	negative	negative
Bungey's Hole, Werribee	positive	positive	positive	positive	positive	positive	negative	positive
Bluestone Ford, Werribee South	positive	NS	positive	NS	positive	NS	positive	positive

Photo 4: *Forcing water through filter for eDNA Werribee River Regional Park*. Forrester, J October 2015

Photo 5: *eDNA Werribee Mansion Park Fishway* Forrester, J February 2017

Melbourne Water ceased live-trapping surveys during this period for some time.

17. Griffiths, J, *Status of platypus populations in the lower Werribee River 2022/23*. Cesar May 2023
18. Fisher, A Citizen Science eDNA Results Werribee River Unpublished 2019

WRA '*Progressing Platypus Project'* Live Trapping Surveys 2022 and 2023

In 2022 WRA's initiative '*Progressing Platypus Project',* funded by Greater Western Water, engaged Australian Platypus Conservancy (APC) and Ecology Australia (EA) who collaborated on two platypus surveys for WRA in Bacchus Marsh and in Werribee, while Cesar Australia worked on surveys in Werribee and in the Mt Cottrell reach of the river.

The project set out to provide WRA with up-to-date local information on platypus and their isolated populations in the Werribee River, in Werribee and Bacchus Marsh.

Three platypus including an adult male, a juvenile male and an adult (or possibly subadult) female were recorded in February 2022 at Werribee township. This was the highest number of animals captured in a given survey session at Werribee township since July 2009. The juvenile male and adult/subadult female were captured in nets set below the Princes Freeway bridge, confirming that platypus continue to breed successfully only a short distance upstream of where the Werribee River becomes brackish as it approaches Port Phillip Bay. [19]

Four platypus (2 adult males, 1 subadult male, 1 adult/possibly subadult female) were recorded in or near Bacchus Marsh (near Halletts Way and farther upstream on the property 'Redborough').

The distribution of recent platypus sightings, pattern of positive platypus eDNA records and recent live-trapping results indicate that a widespread and reasonably abundant platypus population currently inhabits the Werribee River between Ballan and Melton Reservoir, including within and immediately upstream of Bacchus Marsh township.

Serena et al nominated the single biggest threat to the survival of a viable platypus population in the Werribee River as the rapid urban development occurring at Bacchus Marsh and Werribee townships, and had two major recommendations;

a. Urgently establish a set of guidelines for platypus-sensitive urban development to establish a clear decision-making framework that ensures platypus and their environment are protected
b. Improve the knowledge of the distribution of platypus, their abundance and demographics by recording sightings, mapping positive eDNA results and conducting targeted live-trapping surveys

Following this report, WRA and APC conducted a joint online presentation on 28 June 2022, entitled 'Planning for Platypus', aiming to promote more focused outcomes from water sensitive urban design.

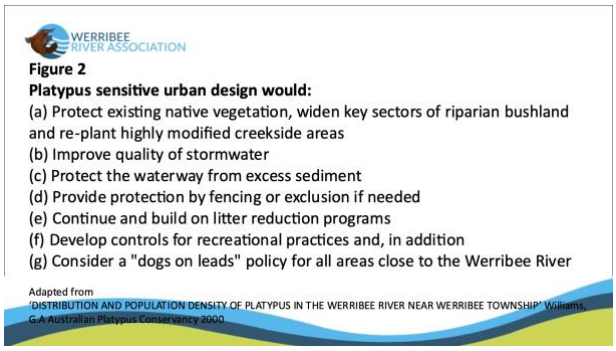

Figure 2: *Platypus Sensitive Urban PPT Slide*
Forrester, J. WRA 28th June 2023

As a second component of WRA's '*Progressing Platypus Project',* Cesar Australia carried out a live trapping survey in Werribee township and in the reach of the river adjacent to Mt Cottrell, in the Werribee River during February 2022 and March 2023 respectively. Cesar said of the Mt Cottrell area;
"There is very little empirical data on platypuses in this area due to limited access, lack of suitable sites to deploy nets, and highly variable flows due to water releases from the Melton Reservoir for irrigation." [20]

No platypuses were captured during either survey, highlighting the low abundance throughout the area, but eDNA results indicate hope for the future.
"Data from the eDNA surveys support the trapping data with low site occupancy, proportion of sites where platypuses were detected, indicating a low-density population." [20]

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19. Serena M, Bloink C, and Williams G (2022). *Werribee River platypus surveys at Bacchus Marsh and Werribee township: summer 2022. Report to Bacchus Marsh Platypus Alliance and Werribee River Association*, Ecology Australia Pty. Ltd., Fairfield, Victoria
20. Griffiths, J, Cesar May 2023 *Status of platypus populations in the lower Werribee River 2022/23*.

Deaths

WRA has noted a number of deaths of platypus over the last 25 years in the lower Werribee, and has recorded these in **Figure 3**. The deaths were recorded by WRA, Cesar Australia and Australian Platypus Conservancy.

These deaths were mainly individual losses to the population of platypus in the river, including a death recorded in the Manorvale area of Werribee, but one tragic incident in 2018 resulted in the drowning of seven platypus in one enclosed net 1.5 kilometres upstream of the Werribee Diversion Weir at the confluence with Davis Creek.

WRA was engaged in a community-wide campaign with other parties at that time to bring about the banning of enclosed nets in Victoria, which was ultimately successful [21] but too late to save seven platypus at Davis Creek. These deaths will have compounded the dearth of data on platypus in that area for some years.

Photo 5: *Wildlife officers & Cesar inspecting dead carcasses from Davis Creek Tragedy.* Wallis, M October 2018

Sightings

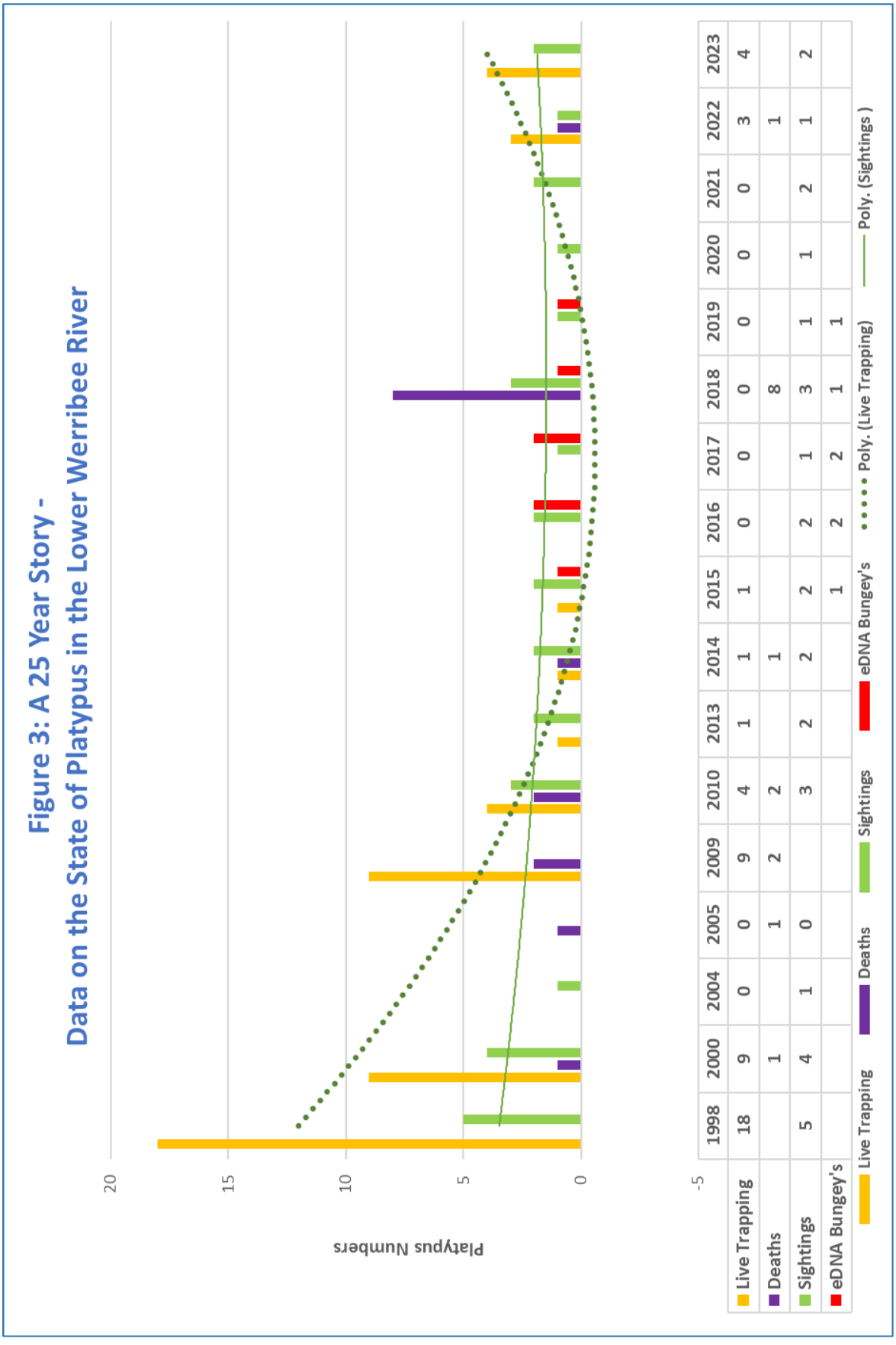
Observations of platypus downstream of the Werribee diversion weir down to Cottrell St, have declined since 2018. [22]

WRA has noted sightings in **Figure 3**. The sightings were entered as reported by Cesar and APC in reports as cited, or by reported sightings to WRA.

Photo 6: *Platypus photographed Werribee River at Werribee Open Range Zoo* McRae, M 10 June 2023

21. Hon Lily D'Ambrosio 10 January 2021 *PROTECTING OUR ICONIC PLATYPUS* Media Release
22. Forrester, J. *Personal communication*, July 2023

Figure 3: *State of Platypus in the Lower Werribee River*



Note: A numeric interpretation has been given to eDNA data.
One positive reading per year = 1. Two positive readings per year = 2.

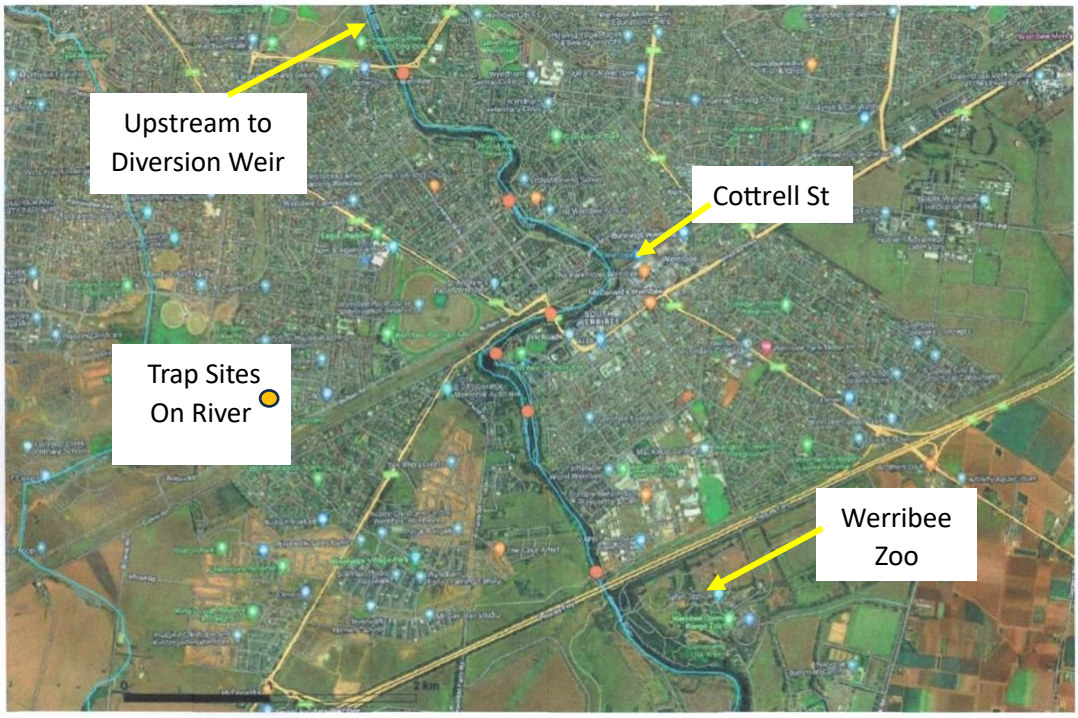


Figure 1. Location of platypus live-trapping survey sites at Werribee.

Project number: CE2207CR1 8

Figure 4:
Location of platypus live-trapping survey sites at Werribee, Cesar 2023 [23]

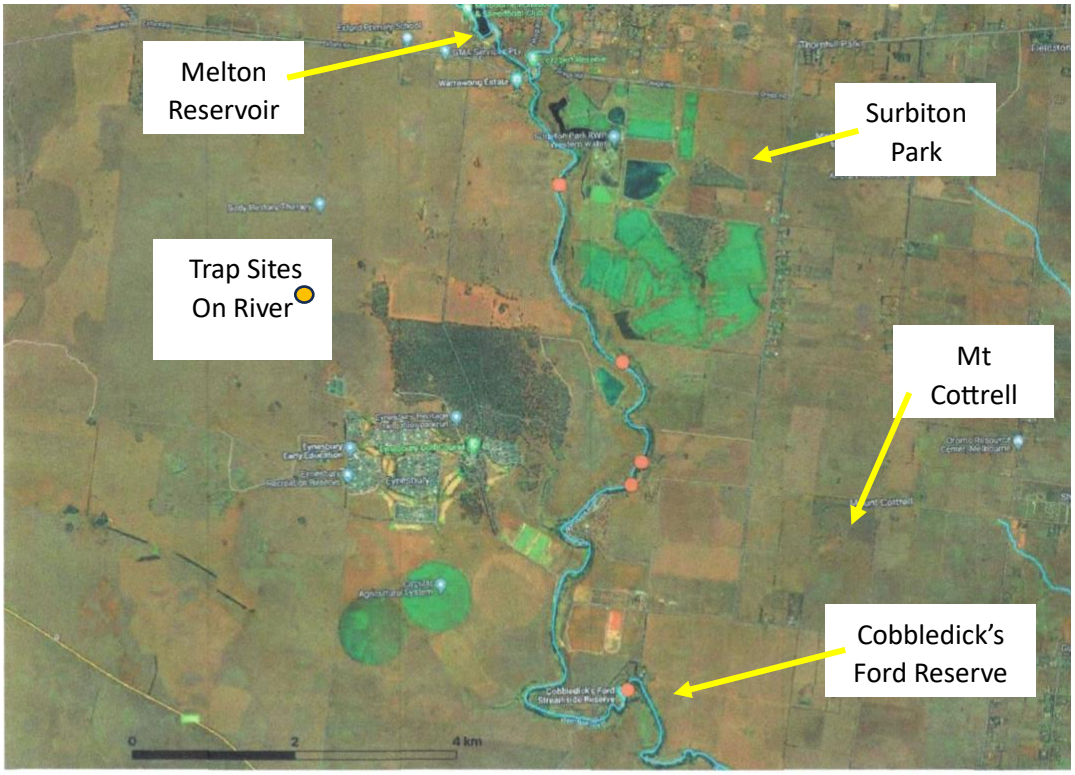


Figure 2. Location of platypus live-trapping survey sites at Mt Cottrell.

Project number: CE2207CR1 9

Figure 5:
Location of platypus live-trapping survey sites at Mt Cottrell, Cesar 2023 [23]

23. Cesar Australia 2023 *Status of platypus populations in the lower Werribee River 2022/23*.

Vegetation

In their study, *Understanding the Environmental Water Requirements of Platypus*, [24] Jacobs and others said that: *"…a dense, continuous band of low-growing shrubby cover should be actively encouraged to grow in the following places:*

- *Along the length (on both banks) of channels linking off-stream drought refuges to natural water bodies or each other;*
- *At any other places near an on-stream or off-stream drought refuge where a platypus is likely to move frequently across land to access other foraging areas;*
- *Around at least half (and ideally more) of the perimeter of both on-stream and off-stream drought refuges, particularly in places where the bank is relatively low and flat and little or no littoral vegetation."*

With that advice in mind WRA carried out an inspection of some of the vegetation along the Werribee River in Wyndham in July and August 2023.

There were stretches of the river which had quite sparse vegetation possibly due to the flooding of spring 2022, but there were also bare areas which had obviously been bare for some time. See **Photos 7 & 8:** *Steep bare banks opposite Wedge St North, Werribee August 2023.*

Other areas where bare banks with little overhanging vegetation featured were Chirnside Park, where mowing left only 5 metres of sparse riparian vegetation for over 100 metres with sparse vegetation on the opposite bank also. See **Photo 9**.

Moving upstream there are sections of concern below the Werribee River Railway bridge on both sides, and near Mortimer Street Werribee where there's narrow riparian vegetation and a concrete path close to the river, wide mown areas and some quite bare banks, and the same at Shaw's Bridge in Heath's Rd Werribee.

Photo 7: *Aerial View – Green riparian strip but with hidden bare banks opposite Wedge St North, Werribee* Forrester, J August 2023.

24. Jacobs, APC, Cesar 2016 *Understanding the environmental water requirements of platypus.* p.32

Photo 8: *Ground View - Bare banks below green overstory opposite Wedge St North, Werribee* Forrester, J August 2023.

The carcass of WRA's taxidermied platypus was found beside the river at the site of Photo 8 in 2005. When found, the platypus had a thick rubber band around its neck and left front leg, and bite marks in its upper and lower throat area, which, according to the taxidermist was inflicted by a cat. [25]
See **Photo 13**.

Photo 9: *Bare banks opposite Tennis Club, Chirnside Park Werribee* Forrester, J August 2023

The Wyndam City 2040 Vision noted that:
"The Werribee River is one of only three river systems within the Melbourne Metropolitan area. It has been identified as the highest priority by our community for protection and improvement of its natural values (Wyndham City 2040 Vision)." [26]

It was noted at Shaw's Bridge Heath's Road Werribee, immediately adjacent to the Werribee River, that some plantings had taken place in the river vicinity, but quite a distance off the waterway, and that the plantings were clumped very close together. See **Photo 10**. In one bed of 3m x 30 m there were 245 gums, casuarina and banksias, planted in an isolated position approximately 50 metres from the narrow riparian strip.

It would seem then that the planting location and style of similar beds could be amended to offer more protection in edge effects and lift the possibility of habitat improvement and protection of the natural values of the waterway into the future.

25. Forrester, J. *Personal communication*, July 2023
26. Wyndham City *Wyndham's City Forest & Habitat Strategy 2017-2040*

In fact, the Wyndham's City Forest & Habitat Strategy 2017-2040 speaks of a catchment-wide approach along the river from Tarneit to the river mouth.
"Our focus is to improve the health of the river through protection and improvement of riparian habitat along the river margins, building on the Werribee River Biolink Action Plan (2012)." [27]

Photo 10: Planting by *Shaw's Bridge, Heath's Rd Werribee* Forrester, J August 2023.

Further to this, the City Forest & Habitat Strategy talks of enhancement:
"Enhancement: Preserve resilience and long-term viability of riparian areas by strengthening and expanding habitat corridor widths. Reduce edge effects through appropriate planting in riparian and buffer zones… "[27]

The plantings as described above then can be enhanced by the addition of further plantings between the riparian strip and the narrow beds, giving a buffer to slow wind, capture litter, and offer habitat and shade.

As WRA has noted, since 2018 higher numbers of platypus have been captured or observed in the lower Werribee River from the Werribee Zoo area and up into the Werribee central area, while above those areas, from Cottrell St upstream including to above the Werribee diversion weir pool, low scores are evident in eDNA and trapping, and following the tragic incident in 2018, the numbers appear to have declined.

"Platypuses appear to be at lower abundance in the Melton Reservoir to Werribee Diversion Weir reaches although data is limited." [29]

Cesar notes a need for improvement in the quality, connectivity, and width of riparian zone, further upstream in the Werribee Diversion Weir to Melton Reservoir reaches, by stock exclusion, weed removal, and revegetation. [28]

Jacobs quotes research which underscores that point:
"A significant positive relationship has been identified between the distribution of platypus foraging activity and the amount of bank vegetation overhanging the water (Ellem et al. 1998) and the number of medium and large native trees growing on the banks (Serena et al. 2001)." [29]

If vegetation is an issue in lower evidence of platypus, then it would appear to be wise to conduct a vegetation survey from the areas of near certainty to those areas where platypus seem to not exist in any sustainable way, and if conditions don't meet that relationship, then a program of work should begin to remedy the situation.

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27. Wyndham City *Wyndham's City Forest & Habitat Strategy 2017-2040* p.20
28. Cesar Australia 2023 *Status of platypus populations in the lower Werribee River 2022/23.*
29. Jacobs, APC, Cesar 2023 *Understanding the environmental water requirements of platypus.*

Stormwater, Invertebrates and Microfauna

While some facts are known about invertebrates in the Werribee River, some knowledge gaps exist, microfauna for example.[30]

Previous work has shown invertebrate counts have been moderate upstream while lower in the downstream reaches. See **Figure 6** *Figure Diversity and SIGNAL score* [31]

In general, SIGNAL scores ('Stream Invertebrate Grade Number – Average Level.') were consistently below State Environmental Protection guideline thresholds. Based on both SIGNAL and diversity scores, Cobbledick's Ford was the healthiest site in the catchment, followed by the reference site in the Wombat State Forest.[31]

Platypus are heavily reliant on a healthy variety and quantity of these fauna in order to survive.

Stormwater impacts on the range of microfauna are well known, and there are merits in investigating the status of microfauna in a largely stormwater drain free stretch of the river, which could act as a refuge for platypus, and assisting better management of the waterway.[31]

"…Water Sensitive Urban Design (WSUD) forms the basis of most stormwater strategies across Australia. There are many benefits of incorporating WSUD into urban landscapes, including enhanced aesthetics, reduced erosion from peak flows, reductions in nutrients reaching the bay and enhanced natural environments that the community can enjoy." [31]

Our future generations would expect to see platypus into the future, and so they might reasonably expect that WSUD be upgraded to a platypus sensitive urban design standard.

"Students of the west would like waterways to be places of natural beauty, with plenty of native wildlife, living in excellent habitat and clean flowing healthy water." [32]

Figure 6: *Figure Diversity and SIGNAL score*

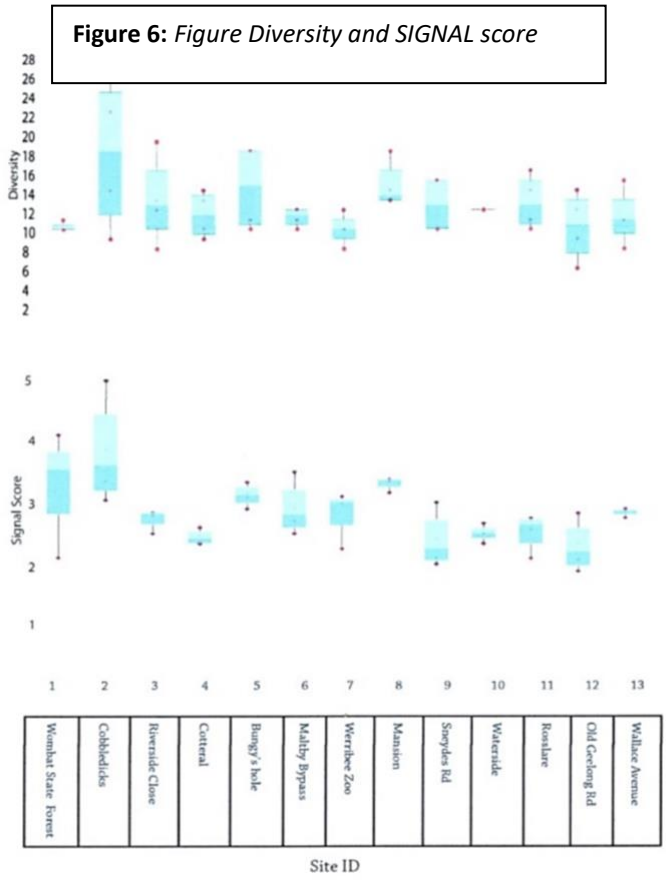

Photo 11: School students investigating collected invertebrates as part of a River Detectives session with WRA educators 2023

30. Walsh, R. *personal communication* April 2021
31. Sharley, D. J., Marshall, S., Mackintosh, T. Coombes, L and Forrester, J. (2020) Reducing stormwater Pollution in the Werribee Catchment: Sources, impacts and solution, Werribee River Association
32. Forrester, J. Lycke, B. *Student Vision to Waterways of the West* WRA 13 Jun 2019

Environmental Flows

The Wirribi Yaluk (Werribee River) system is highly regulated, and stream flows have been significantly altered from the natural flow regime, impacting ecological values and processes. [33]

The Werribee catchment is the driest in southern Victoria, and likely to become drier due to climate change, with comprehensive studies finding that the river has an environmental water deficit of 12 gigalitres per year. Melbourne Water currently manages environmental flows to improve water quality, support native fish populations, including galaxiids (small native fish), and provide habitat for the regionally significant platypus population. Proof of the success of these flows is that another scarce fish, the Australian Grayling are now in the Werribee River after some years missing. See **Photo 12.** Southern Rural Water release water for that purpose in partnership with Melbourne Water who monitor the results. See **Figure 7**.

In the latest Central and Gippsland Region Sustainable Water Strategy (CGRSWS), [32] the Victorian Government has set a policy of returning approximately 2 gigalitres of water for the environment into the Wirribi Yaluk (Werribee River) to improve waterway health by maintaining water quality and providing refuges for fish, by 2024. In addition, they will return up to an additional 10 gigalitres of water to the environment in the Wirribi Yaluk (Werribee River) to improve waterway health by maintaining water quality and providing refuges for fish by 2032.

Photo 12: Grayling, Werribee River Maltby Bypass Werribee August 2023

These policy initiatives are welcomed in the Werribee River, with its environmental flow deficit, and the impact that has made on invertebrates.

"Macroinvertebrate productivity per m2 of channel has also been found to be much greater when flow is moderate as opposed to low flow associated with drought (Marchant and Grant 2015)." [34]

Sudden changes in flows can occur when water is released for irrigation. That can be illustrated with environmental flows as recorded in Figure 7.

An ideal flow regime would enable varying flows all year round, with no sudden changes:
"The ideal platypus flow regime entails plenty of surface water being available throughout the year in every year. Adult females in particular require access to abundant food resources both in the lead-up to the breeding season and during lactation (effectively from March through the following February) for reproduction to reliably succeed." [34]

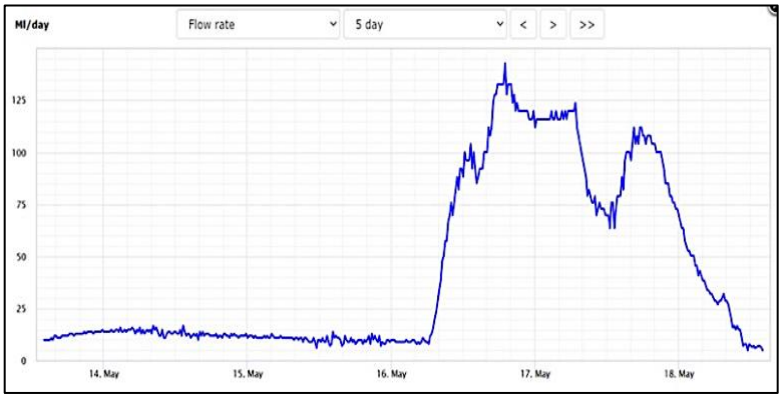

Figure 7: Werribee Diversion Weir Tail Gauge (flows ML/day) environmental flow on 18 May 2022

"Melbourne Water commented on the flow (in Figure 7) …for several water quality parameters (dissolved oxygen, EC, temp, chlorophyll and blue green algae) at several depths (0.5m, 1m, 2m and 4m). Our flow targets were met for the release and we have seen some good water quality outcomes." [35]

WRA supports Melbourne Water's current work and looks forward to the CGRSWS policies being put into action.

33. State Government of Victoria *Central and Gippsland Region Sustainable Water Strategy* DELWP 2022
34. Jacobs Upper Werribee Environmental Flows Study - Recommendations Report 2022
35. Fraser, J. *Werribee Diversion Weir Tail Gauge (flows ML/day)* Melbourne Water 18 May 2022

Discussion

Platypus require a management approach that aims to improve their flow requirements, habitat, food supply, and reduce threats from feral or domestic or animals, human activity and litter.

In the lower Werribee there are excellent strategies employed by Wyndham City which would add great value to the habitat needs of platypus. In fact, the Wyndham community created a vision as early as 2002 in their 2002 Quality Community Plan (QCP) which amongst other things, set a guiding principle around the fact that Wyndham's biodiversity be maintained. Today's Wyndham 2040 Vision wants *"…the unique natural environments of the municipality and the environment as something that needs to be safeguarded and protected."* [36]

It is now almost 20 years since the catchment secured a waterway manager and there have been efforts to improve matters for platypus and the general community since that time. Melbourne Water's Healthy Waterway Strategy explains that it is not sufficient to just manage the river with business as usual, as with current levels of policy and investment there will be declines in environmental and social values over the next 50 years. In fact, they say, it demands collective action, which will realise the full environmental, social, cultural and economic values of the region's waterways. [37]

Recommendations

- Carry out a program to assess and improve quality, connectivity, the buffers for and the width of riparian zones in urban areas and from the Werribee Diversion Weir to Melton Reservoir.
- Carry out a program of assessment of in-stream vegetation from Shaw's Bridge in Heaths Rd Werribee to the Melton reservoir, to determine any gaps and the need for revegetation, and design a program of improvement.
- Carry out a program of assessment of irrigation flows to suggest improvement, minimising sudden change in flows, very low flows or cease-to-flow events in the river, from Melton Reservoir to the Werribee Diversion Weir, as well as work with Melbourne Water and others on increasing environmental flows in all of the river system.
- Carry out a program of assessment of microfauna and invertebrates in the river, and their requirements for a healthy life, in urban areas and from the Werribee Diversion Weir to Melton Reservoir.
- Carry out a program of mapping stormwater outlets releasing water into the river in Wyndham, and design a program of improvement for stormwater, litter and other negative impacts of the river
- Work with others to implement a holistic litter reduction strategy to include a combination of auditing and installing gross pollutant traps, working with industry to reduce packaging and waste, community engagement and education.
- Work with others to minimise the impacts of increasing urbanisation of flow variability through water sensitive urban designs, and by educating others about the merits of a higher order platypus sensitive urban development.
- Work with others to continue live-trapping, eDNA and use other technology to remain up-to-date with platypus numbers on the Werribee and Lerderderg Rivers.
- Work with others to determine the level of connectivity and gene flow across Melton Reservoir through population genetic analyses.
- Develop a longer-term strategy to re-connect platypus populations in the lower and middle Werribee River (pending outcomes of the population genetic analyses).

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36. Wyndham City Council *Wyndham 2040 Community Vision A Place for People*. 2021
37. Melbourne Water Corporation *Co-Designed Catchment Program for the Werribee Catchment Region Working Together for Healthy Waterways* 2018

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Wyndham City Council *Wyndham 2040 Community Vision A Place for People 2021*

Photo 13: *Perri, our taxidermied platypus. His carcass was found in 2005 at the site of Photo 8, and was mounted for educational purposes soon after, and now has been shown to more than 10,000 people.*

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