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THE HEALTH OF Werribee River

OCTOBER 2015

Adopted by Wyndham City Council on 26 October 2015.

SUMMARY

Indicators suggest that the health of the Werribee River is poor, particularly in its lower reaches. This is primarily due to low flow rates downstream of the Werribee Diversion Weir and large amounts of litter entering the River from stormwater drains between Shaws Roads and the Maltby Bypass.

Although some research is occurring at the river estuary, there is currently no water quality monitoring points downstream of the Werribee Diversion Weir. This is a concern as the lower reaches of river are in the worst condition and suffer from blue-green algal blooms due to high nutrients and low water flow.

Council is not directly responsible for the health of the river. This responsibility lies with the Department of Environment, Land, Water and Planning (DELWP), Melbourne Water and regional water utility companies. There are however still opportunities for Council to promote and address some of the health challenges facing the river. Recommendations to Council made in this report include:

1. Advocate to the Minister for Environment, Climate Change and Water, and/or the Victorian Environmental Water Holder to increase environmental flows using yet-to-be-allocated water at Lake Merrimu.
2. Advocate to the Minister for Environment, Climate Change and Water, DELWP, the Victoria Environmental Water Holder and Melbourne Water to increase the percentage of water allocations for environmental flows and/or fund water recovery purchases.
3. Advocate to Melbourne Water to create additional water quality monitoring points downstream of the Werribee Diversion Weir.
4. Advocate to DELWP and the relevant waterway management authorities to facilitate a forum focusing on the future of the Werribee River with the aim of enhancing partnerships and identifying opportunities to work together to improve the health of the River.
5. Investigate the suitability and use of floating litter traps in the Werribee River.
6. Continue to review and evaluate the performance of Council's existing gross pollutant traps along the River corridor with a view to upgrading and/or amending maintenance regimes to further reduce litter and sediment entering the waterway. Council will also advocate to Melbourne Water to do likewise for their litter abatement assets.
7. Undertake an audit of storm water drains along the Werribee River to identify which drain outlets do not have a gross pollutant trap to inform the preparation and implementation of Council's new Storm Water Management Plan and Waste and Litter Strategy and, advocate to Melbourne Water to do likewise.
8. Ensure waterways and community education, remain an area of focus in Council's new Waste and Litter Strategy (currently in preparation).
9. Advocate to DELWP and the relevant water management authorities to investigate alternative water sources for irrigation purposes.
10. Advocate to Melbourne Water to undertake an ecological assessment of water quality, quantity and discharge options for the Werribee River including the risks (and benefits) of delivered treated wastewater to the system and, determine if such water complies with the State Environment Protection Policy (Waters of Victoria) and if this regulation needs review and/or further strengthening.
11. Encourage Melbourne Water to develop a strategy targeting the health of the entire Werribee River system.

BACKGROUND

In recent months the health of the Werribee River has been a cause of concern for Council and the Wyndham community. Environmental groups have reported greater than usual quantities of litter collecting at drain outfalls and amongst aquatic vegetation around the Werribee Town Centre. In addition, floating mats of aquatic plants can be seen covering sections of river downstream from the diversion weir. Blue green algal blooms, a natural occurrence often seen in summer not winter, have also been recorded in the river's lower reaches.

The poor visual state of the river has caused many to question if the river is as sick as it looks, why it is in its current condition and what could be done to improve its health in the future.

This report focuses on the current state of health of the Werribee River's lower reaches, (downstream of the Division Weir at River Bend Park Werribee to the river estuary), but also discusses some upstream factors which may be contributing to the River's condition.

THE WERRIBEE RIVER

The Werribee River originates in the Wombat State Forest on the Great Dividing Range, and flows for about 110 kilometres south-east via Ballan, Bacchus March and Werribee before directly flowing into Port Phillip Bay at Werribee South. The River transposes four municipal regions – Hepburn Shire, Moorabool Shire, City of Melton and Wyndham City.

The majority of water is taken out of the system as it moves downstream from its headwaters in the Wombat State Forest, where most of the water is collected, down to the Werribee Diversion Weir which redirects water purchased by the irrigators at Werribee South. In recent years, only around 10% of the water volume that enters the Werribee River actually flows into Port Phillip Bay.

Water from the Werribee River is used to supply urban and rural centres including Melton. The River also supports hundreds of landholdings that rely on it to water livestock and crops. The Werribee River provides water for irrigation districts at Bacchus Marsh and Werribee, as well as private diverters west of Werribee. The river is also enjoyed by recreational fishers, nature lovers and those who partake in water sport activities.

Intensive agriculture dominates much of the 2,700 square kilometre Werribee catchment. Water storages such as Merrimu and Melton Reservoirs provide water for drinking and irrigation, which alters the flow of water through the Werribee River.

The upper catchment contains areas of relatively intact streamside vegetation and is an important habitat for native fish, platypus and macro invertebrates. The middle reaches of the Werribee River provide good habitat for fish and a significant platypus population. The lower reaches of the River are home to migratory wading birds and numerous fish species including black bream, and are lined with highly-valued river red gums. Native grasslands, which once covered much of the catchment, have given way to farming and urban activity.

Whilst there are numerous technical studies and reports for the Werribee River, an overall management plan that provides strategic direction for the waterway does not exist. Melbourne Water's Healthy Waterways Strategy outlines some long term ecological objectives, but it's commitments are limited to activities close to the waterway.

Through Wyndham 2040, a Council project to create a Community Plan for what community members would like Wyndham to be in the year 2040, the community shared stories about the value of the Werribee River. Specifically, the community shared stories about the benefits of this natural asset (e.g. natural environment, biodiversity, open space, recreation and social connection). Supporting it's protection, preservation and improvements in its quality is in line with community aspirations for Wyndham's future.

STEWARDSHIP

The health of the Werribee River is ultimately the responsibility of Department of Environment, Land, Water and Planning (DELWP) in conjunction with their waterway management arm - Melbourne Water. However there are other water managers who also have a stake in the water which flows down the River including Southern Rural Water, Western Water, adjacent landowners holding water extraction rights and irrigators in the Bacchus Marsh Irrigation District and the Werribee Irrigation District.

Wyndham City Council has no authority over how water within the Werribee River is allocated or any direct influence over its health. However Council does manage sections of riparian land bordering the river in the Werribee township and at Cobbledicks Ford Reserve, Mount Cottrell. Council is also responsible for the maintenance of a number of storm water drains that empty into the river from urban areas.

The number of stakeholders who have an interest in the Werribee River are too numerous to count and won't all be discussed here, however during the compilation of this report, a number of relevant parties were consulted, some of whom were able to provide input for drafting this report.

Agencies that provided background information for this report include DELWP, Melbourne Water, Southern Rural Water, Arthur Rylah Institute, Monash University and the Werribee River Association.

CONDITION

Biodiversity

The Werribee River serves many purposes in sustaining the human population of Melbourne and beyond. However the River also sustains other life forms such as animals, plants and macro invertebrates. Aquatic and terrestrial conditions within the Werribee River Valley determine what life forms are able to inhabit the ecosystem. Negative factors such as low flow rates, poor water quality, nutrient imbalances, litter and vegetation removal can result in the decline, and even the loss, of species diversity within the river system.

The Werribee River supports a number of fish species, including migratory short-finned eels, pygmy perch, black bream, river blackfish, flathead gudgeon, tupong, galaxias and Australian smelt[1]. Melbourne Water's Fish Monitoring report in the lower Werribee River (dated July 2015) concludes that the removal of fish

[1] Melbourne Water, *Werribee River - Seasonal Watering Proposal 2015-16*, page 1.

barriers and reducing inputs of nutrients coupled with the implementing appropriate environmental flow regimes would benefit fish and their interaction as whole in the Werribee River that migrate between fresh and salt water. Such fish need to migrate between these waters to complete their lifecycle.

A diverse community of macro invertebrates and a significant platypus population occur in the lower reaches of the system[1]. The Werribee River estuary is a regionally significant ecosystem and a priority due to its freshwater-saltwater interface[1].

The estuary section of the river adjoins the Werribee River Park and the internationally significant Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Wetland. The wetland is habitat to vulnerable and endangered species including Orange-bellied Parrot, Australian Painted Snipe, Fairy Tern and Growling Grass Frog. It also supports more than 20,000 shorebirds and up to 100,000 waterfowl.

A section of the Werribee River is a dedicated Growling Grass Frog Conservation Area. Like all amphibians, this endangered species is vulnerable to poor water quality.

Platypuses are an extremely vulnerable species and their presence is a vital indicator of waterway health[2]. Platypus surveys in the Werribee River have been undertaken since the 1990s. During 2014-2015, Melbourne Water undertook platypus surveys across 34 nights during spring and autumn[3]. The surveys targeted the lower Werribee River and resulted in the capture of two platypuses. Both of these were juvenile males who were captured during the autumn survey. A floating fern called Azolla (*Azolla* spp.) was covering large stretches of the river during spring which may have contributed to the lack of captures. The juvenile males were captured downstream, near the Werribee Zoo, where less Azolla was present[3].

Platypus survey data can be analysed to provide a Catch Per Unit Effort (CPUE) rate. The CPUE is an indirect measure of the abundance of a target species. If the CPUE is declining then it suggests there has been a decline in the abundance of the species. The CPUE for platypus in the lower reaches of the Werribee River has been declining since the end of the drought in 2010. There has also been a significant decline evident across the 18 years since surveying began[3]. The graph below plots this decline. Melbourne Water scientists are of the opinion that the lower Werribee River requires additional water flows to improve conditions for platypus and other aquatic species[3].

[2] Melbourne Water, Press Release, *Werribee survey highlights challenge in tracking platypus*. 2 April 2014
[3] Eddie Tsyrin, Senior Aquatic Scientist, Melbourne Water. Personal communication. 24 August 2015

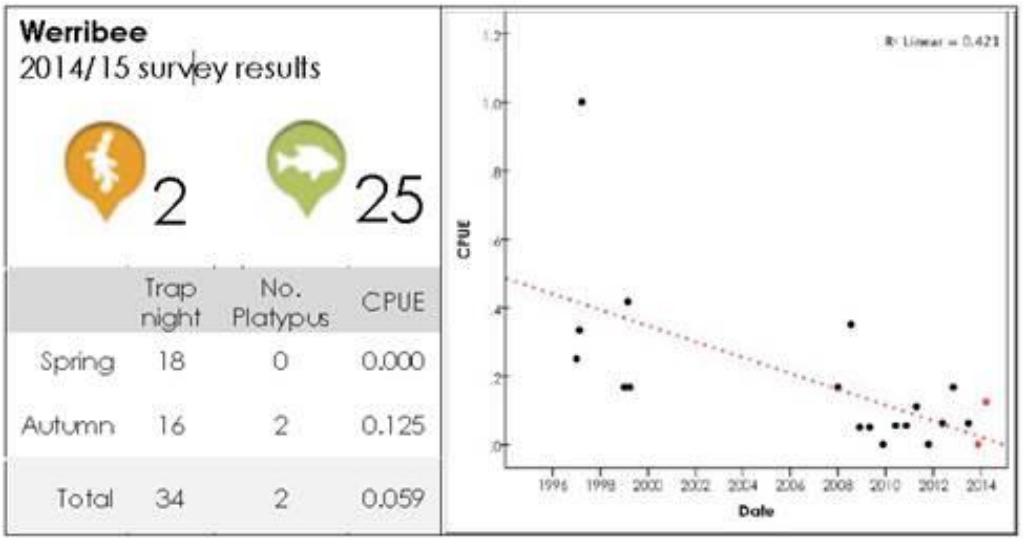

Figure 1. Summary of 2014/15 survey results for Werribee. The table includes seasonal and overall survey effort, number of individuals captured, and CPUE. The graph displays all available CPUE data for all historic (black) and current (red) surveys. All data prior to mid-2007 were derived from reports by the Australian Platypus Conservancy for Melbourne Water and other organisations. The regression line indicates a significant trend in CPUE. Modified and updated from Griffiths and Weeks (2011).

Water Quality

Melbourne Water conducts water quality monitoring at four sites along the Werribee River:

- Old Melbourne Road, Ballan
- McGregor Court (Lions Club Reserve), Maddingley
- Cobbledicks Ford Road, Mt Cottrell
- Upstream weir at Riversdale Drive, Werribee

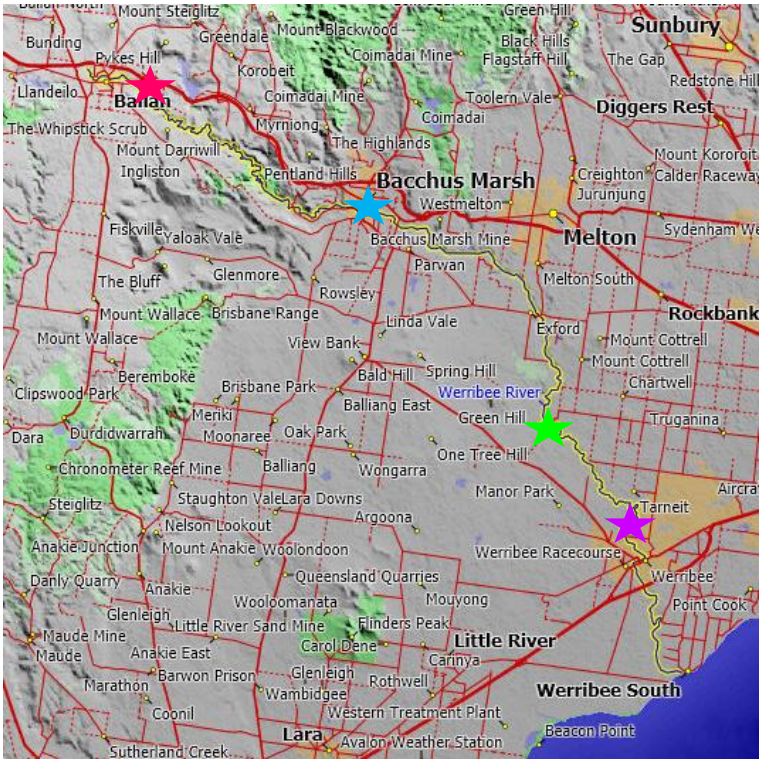

Figure 2. Location of Melbourne Water's water quality monitoring sites along the Werribee River.
Base map source: www.bonzle.com

The water quality monitoring program is designed to assess broad-scale, long-term trends in water quality (typically over eight to ten years). Sites are sampled monthly.

The water quality within the Werribee River varies across the different reaches of the River and is affected by flow rates, nutrient loads from agricultural run-off and polluted stormwater from urban areas. The upper reaches, which begin in the Wombat State Forest, are in better condition than the lower reaches. This is because there is more water flowing through these sections and there isn't the extent of urban and agriculture impacts as there are downstream.

The Werribee River catchment's report card (www.cleaneryarrabay.vic.gov.au/report-card) shows that the catchment currently has a Water Quality Index of poor (although the data displayed only extends to 2012-2013). The parameters of which are monitored to gain the Water Quality Index are: nutrients, water clarity, dissolved oxygen, salinity, pH and metals.

In the Werribee River catchment there have been water quality improvements since the break of the drought in 2010 due to increased flows in waterways (Figure 3). The amount of nutrients initially decreased with the breaking of the drought but has since gone back to pre-drought levels, possibly as a result of irrigation and agricultural practices returning to normal as well as recycled water discharges.

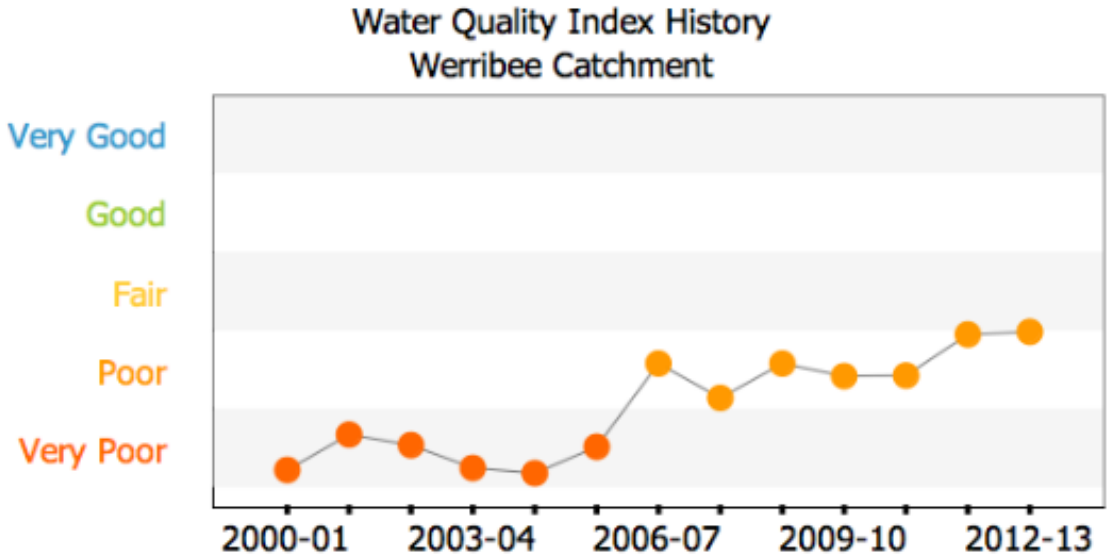

Figure 3. Plot of Water Quality Index history for Werribee catchment

Salinity and dissolved oxygen have also improved post-drought due to increased flows in streams. Increased flows dilute salinity and improve dissolved oxygen by creating volume and turbulence. Even though the poor water quality in the Werribee River is concerning, it is on par with other waterways around Melbourne (Figure 4).

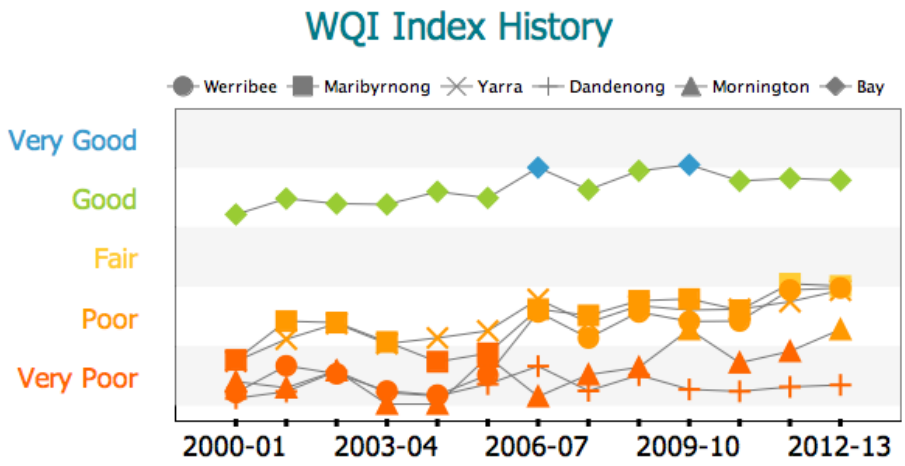

Figure 4. Plot of Water Quality Index for waterways around Melbourne.

Water quality below the Werribee Diversion Weir appears to be very poor at present, however there are no water quality monitoring sites below the weir to confirm or deny this observation. The following paragraphs look at the health of the lower reaches in greater detail.

Azolla

Sections of river downstream of the Werribee Diversion Weir are currently covered in thick blankets of a free floating fern called Azolla (*Azolla pinnata*) as shown in Figure 5. The Azolla coverage was at its worst over the summer months when it was estimated to cover up to 6 kilometres of river. The presence of Azolla in the river tells us that the water is shallow, warm and has a high nutrient concentration. The Azolla itself isn't a health risk to humans but the fern does negatively affect the river ecosystem by shading out aquatic plants and reducing concentrations of dissolved oxygen[4]. The loss of aquatic plants has the flow on effect of reducing habitat for invertebrates which in turn affects available food levels for organisms higher up the food chain like fish and platypus.

Figure 5. Azolla covering the Werribee River at Mambourin Street, Werribee. Photo courtesy John Forrester

[4] Morris, K., Bailey, P., Boon, P. & Hughes, L. Alternate stable states in the aquatic vegetation of shallow urban lakes. II. Catastrophic loss of aquatic plants consequent to nutrient enrichment. *Marine and Freshwater Research,* 2003, **54**, 201-215.

Algal Blooms

Blue-green algae is more of a direct threat to humans, livstock and wildlife than Azolla if conditions are conducive for algal 'blooms'. The main factors controlling algal blooms are water time residence, nutrients and light[5]. Australia's climatic conditions mean that light is rarely a limiting factor in algal growth, therefore if a water body has high nutrients and inadequate water inflow to circulate and/or displace stagnant water, there is a high risk of algal blooms.

Increased water flow is the most effective way to prevent algal blooms in the Werribee River. Water sampling taken by Southern Rural Water upstream of the Werribee Diversion Weir, where water flows are constant, especially during the warmer months, has shown levels of blue-green algae over the last 12 months to have been below levels to trigger action from Southern Rural Water[6].

Downstream of the Werribee Diversion Weir there has been at least one outbreak of blue-green algae this year, which occurred in February[7] (Figure 6). The bloom triggered Melbourne Water to begin testing the water downstream of the Maltby Bypass. This testing found the bloom to have dissipated by mid-March due to timely rainfall, cooler weather and a water release from the Melton Reservoir[8]. Further testing in May found the River to be clear of blue-green algae and it was expected to remain this way throughout the winter months[9].

Figure 6. Blue-green algal bloom in the Werribee River beneath Maltby Bypass. Photo courtesy John Forrester

[5] Melbourne Water, *Constructed Shallow Lake Systems Design Guidelines for Developers*, Version 2, November 2005, pages 7-8.
[6] Wilson, Ryan. Environmental Advisor, Southern Rural Water. *Personal communication.* 17 August 2015.
[7] Melbourne Water, Press Release, 9 February 2015. http://www.melbournewater.com.au/aboutus/news/pages/blue-green-algae-warning-at-werribee-river.aspx
[8] Melbourne Water, Press Release, 11 March 2015. http://www.melbournewater.com.au/aboutus/news/pages/blue-green-algae-warning-removed-from-werribee-river.aspx
[9] Melbourne Water, Press Release, 15 May 2015. http://www.melbournewater.com.au/aboutus/news/pages/blue-green-algae-warning-removed-for-werribee-river.aspx

Litter

Litter in the Werribee River is not only visually damaging for the area but can also be detrimental to the health of the river ecosystem. Litter can cause significant harm to wildlife, especially if animals become entangled or ingest it, (wildlife often mistake inedible plastic objects as prey or food). Decaying rubbish also releases toxic chemicals which contaminate the waterway, making it uninhabitable.

Vast amounts of litter can be seen as you walk along the River downstream of the Werribee Diversion Weir (Figure 7). The litter accumulates at the base of stormwater drains and river bottle-necks; and is often trapped by reed beds and even by the floating mats of Azolla. In a recent survey undertaken by the Werribee Riverkeeper in conjunction with Deakin University, there was estimated to be up to 50,000 pieces of litter in the stretch of river between the Werribee Diversion Weir and the Werribee Park Historical Ford[10]. The litter consisted primarily of floating bottles, plastic containers and general litter.

There are at least 40 stormwater drains that empty into the River between the Werribee Diversion Weir and the Maltby Bypass[10]. Twenty-six of these drains have gross pollutant traps which Council services twice yearly on average, preventing approximately 30m^3 to 40m^3 of litter from entering the River. Council has been installing gross pollutant traps since the 1990s.

Figure 7. Floating litter at Guyra Court, Werribee. Photo courtesy of John Forrester.

[10] Werribee River Association & Deakin Univsersity, *Litter Research – Werribee Diversion Weir to Werribee Park Historical Ford*. *A Werribee Riverkeeper/Deakin Uni Project April-May 2015*. John Forrester and Lachlan Sipthorp.

Nutrients

Although it was prepared over 10 years ago, the Werribee River Catchment Nutrient Management Plan makes reference to the Werribee River contributing major amounts of oxidized Nitrogen to the Port Phillip Bay. Nitrogen and phosphorous are the two plant nutrients that play a key role in algal blooms.

Sources of Nitrogen and other nutrients in the Werribee River come from natural forests and forestry operations, agricultural run-off, irrigation drainage, riverbank erosion, stormwater run-off and potentially groundwater.

Significant residential development will continue to occur in Wyndham over the next 20 years. This growth will increase the pressures on waterways including the Werribee River.

Climate change

Wyndham has received approximately 450mm of rainfall per annum over the last two decades which is much below the 550mm per annum prior to that based on Bureau of Meteorology data. It is likely Wyndham will continue to experience lower rainfall and western parts of the municipality could become a semi-arid environment. Wyndham's annual rainfall could drop to below 300mm by 2100. Like other catchments in western Victoria, streamflow in the Werribee catchment has been severely impacted by reduced rainfall over the previous decade and this trend is expected to continue as the climate changes further.

Wyndham's future climate may also result in intense rainfall events that result in flooding. This could result in erosion, turbid water, and water pollution where nitrogen pollution in the Port Phillip Bay could increase substantially.

Increased temperatures are highly likely, which not only would increase evaporation levels but also provide favourable water temperatures for algal blooms.

DISCUSSION

Environmental Flows

The simplest way to improve the health of the Werribee River would be to increase flows to its lower reaches. Increased flows would go a long way to prevent outbreaks of blue-green algae and Azolla, and improve conditions for fish and platypus. However, due to the high demand for water in the Werribee Catchment (the bulk of which is reserved for city and town water supplies, irrigation and treatment of sewerage), increasing environmental flows means water will need to be taken from one of its other uses, most of which have significant economic benefit.

Ten per cent of flows into Lake Merrimu are reserved for environment flows known as the Werribee River Environmental Entitlement. These flows are released into the Werribee River system from Lake Merrimu and the Melton Reservoir[11]. Melbourne Water also has access to 740 mega litres (ML) of water shares in Melton Reservoir, although the actual allocation against these shares depends on streamflow, which has been low in recent years.

When and why Environment Entitlement flows are released is determined by Melbourne Water who submits an annual Seasonal Watering Proposal to the Victorian Environmental Water Holder (an independent body) for approval[12]. The *Seasonal Watering Proposal 2015-2016* provides a fantastic overview of the key environmental objectives for water flows down the Werribee River. The Proposal outlines different environmental objectives for the different reaches of the River and discusses whether objectives from previous years have been achieved.

The *Seasonal Watering Proposal for 2015-2016* shows that six out of the seven objectives for environmental flows to the river's lower reaches were not met in 2014 (the one objective that was achieved was the long term goal of an overbank flow every five years, which occurred back in 2011)[13]. This is primarily due to the low availability of water in the Werribee River system arising from consecutive years of below average rainfall. Consequently water has been delivered according to a 'protect' planning mode since August 2014[14]. In this mode, water is provided to protect critical habitat only and releases that promote breeding and expansion of aquatic fauna are limited.

The following graph (Figure 8) presents monthly water volumes flowing through the mouth of the Werribee River. It shows a spike in flow around August 2012, but since then, an overall trend of declining monthly flow.

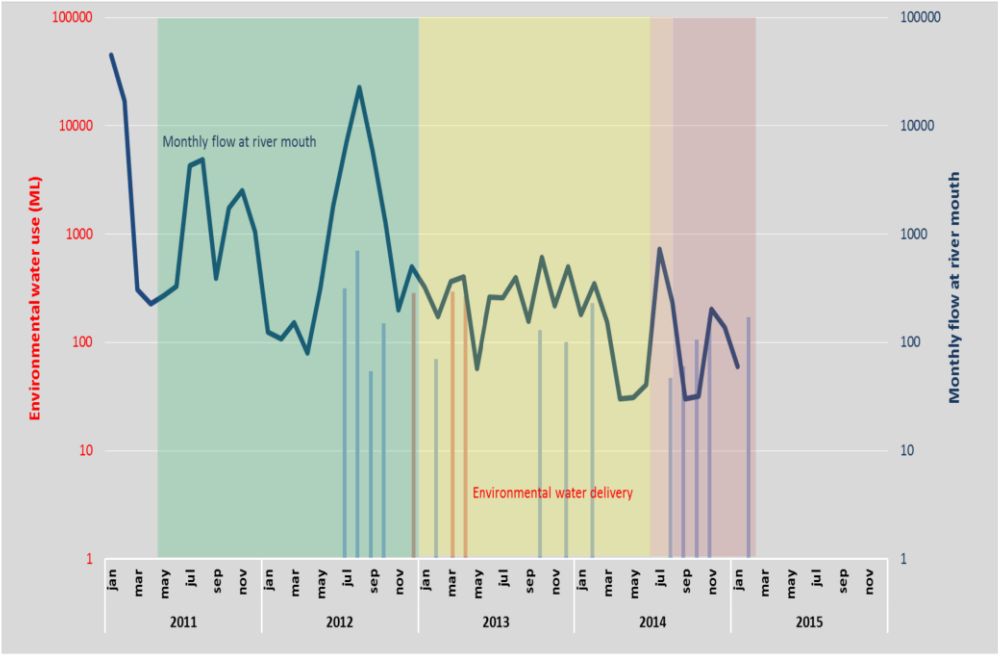

Figure 8. Monthly water volumes flowing through the mouth of the Werribee River.

[11] Melbourne Water, *Werribee River - Seasonal Watering Proposal 2015-16,* page 1.
[12] Bill Moulden, Environmental Water Planner, Melbourne Water. *Personal communication.* 13 August and 25 September 2015
[13] Melbourne Water, *Werribee River - Seasonal Watering Proposal 2015-16,* page 16.
[14] Melbourne Water, *Werribee River - Seasonal Watering Proposal 2015-16,* page 2

2015-2016 Environmental Entitlement

There is a total of less than 800 ML of water available for the environment this year, and some will be held as drought reserve in the event of further low flows in coming years. Approximately 400 ML will probably be released over summer to maintain critical habitat and flush Blue-Green algae from the system[15]. The flows will not be sufficient to move the Azolla. Bill Moulden, Melbourne Water's Environmental Water Planner, estimates it would take a flow of between 500 and 1,000 ML over a couple of days to flush the Azolla.

In early August 2015 an 'emergency' flow, 200 ML of Grade C treated water, was released from the Melton Recycled Water Plant[16]. This flow moved small sections of Azolla downstream, but failed to flush the fern mats completely. Although this release provided some much needed water to the lower reaches, the high nutrients in the recycled water will most likely facilitate further Azolla and algal growth.

Possibility of Additional Flows

It is possible that by advocating for additional environmental flows, Council might succeed in attaining greater flow allocations for the River both in the short and long term.

In the short term, there is currently a quantity of yet-to-be-allocated water at Lake Merrimu. Even though this water has been earmarked for use by Western Water, requests could be made to the Minister for Environment, Climate Change and Water, and/or the Victorian Environmental Water Holder to allocate it for much needed environmental flows in the Werribee River.

In the longer term, there are numerous ways that increases in environmental flows could be attained:

- Firstly, it is possible for governments to make water recovery purchases for the health of a river system. This is currently happening in the Murray Darling Basin through the Federal Government's *Restoring the Balance in the Murray-Darling Basin* program[17]. The question in this instance would be where the finance to fund the purchase would come from. Currently water credits in the Werribee River market cost around $200 per mega litre, but this figure fluctuates depending on the availability of water in the system.
- Secondly, the Central Region Sustainable Water Strategy is due for review in 2016. (It is a legislative requirement outlined in the Water Act for the State to review Regional Sustainable Water Strategies for Victoria[18]). Given that the water recovery targets identified in the 2006 strategy were not met for the Werribee River, there could be a strong case for increasing the percentage of water allocation for environmental flows.
- Thirdly, there are opportunities to create water savings through upgrades to irrigation infrastructure and by increasing the use of recycled and storm water in rural and urban areas. These opportunities are currently being explored by stakeholders through the Integrated Water Management (IWM) Analysis which is currently taking place.

[15] Bill Moulden, Environmental Water Planner, Melbourne Water. Personal communication. 25 September 2015

[16] Western Water, Press Release, 4 August 2015 http://www.westernwater.com.au/Newsroom/Recycled-water-release-4-August-2015

[17] Department of the Environment 2015, *Progress of water recovery under the Restoring the Balance in the Murray-Darling Basin program*. http://www.environment.gov.au/water/rural-water/restoring-balance-murray-darling-basin/progress-water-recovery Accessed 28 August 2015

[18] Water Act 1989, www.legislation.vic.gov.au/domino/web_notes/.../89-80a099B.pdf

Werribee River Integrated Water Management (IWM) Analysis Stage 1 and 2

The Werribee River IWM Analysis is a collaborative project to sure up the region's future water security by identifying how water savings could be made in the Werribee River Catchment through improvements to infrastructure and increased use of recycled water. Project partners include Southern Rural Water, Western Water, Melbourne Water, City West Water, DELWP, Melton City Council, Wyndham City Council, Moorabool Shire Council and the Metropolitan Planning Authority.

The key objectives of the project are:

- To improve resilience of water supply to irrigation districts
- To increase and appropriately manage waterway flow regimes for the environment, and
- To save high quality water (potable and river water) by identifying opportunities where low quality stormwater or wastewater could be used in its place.

The IWM Analysis project has been implemented in two stages. The first stage identified and ranked opportunities to improve management of water within the Werribee River Catchment. The second stage, which is currently underway, involves the review of four shortlisted opportunities from Stage 1, and the development of an Ecological Risk Assessment to identify the ecological capacity of the River.

The shortlisted opportunities carried from the first stage into the second stage include:

- Provision of recycled water to Bacchus Marsh Irrigation District (BMID)
- Modernising the Bacchus Marsh Irrigation District (BMID)
- Supply of recycled water from the Melton Recycled Water Plant or stormwater to Werribee River, and
- Piping the Werribee Irrigation District (WID).

The opportunities analysis and Ecological Risk Assessment are yet to be finalised, however they are due for completion in late 2015.

Prior to the implementation of any water saving opportunities identified in the Analysis, a strategic engagement program targeting urban, rural and river stakeholders will be undertaken. Changes to government policy may also be required to facilitate implementation of the opportunities if they prove viable and acceptable.

Litter

In response to the risk that litter is posing to the Werribee River, 'Waterways Litter' has been identified as a key theme in Council's Litter Prevention and Reduction Strategy 2014 – 2016. In order to tackle this issue Council has committed to a number of infrastructure, education and ongoing enforcement measures along the Werribee River and other key waterways within the municipality. Some of these measures include:

- Increasing the number of bins and signage in streamside parks and foreshore where high litter levels indicate a need to do so.
- Targeted education campaigns along the River and Werribee South foreshore teaching about the impacts of litter and promoting the 'Take 3' message.
- Blitz of the River and foreshore to monitor compliance and enforce Local Laws relating to waterway litter.

Melbourne Water and Council's Conservation and Litter Crews have already identified some litter "hotspots" along the Werribee River; two of which are Bungies Hole and the Leigh Street Drain. Further work will be done in coming months to locate additional hotspots.

Council has recently submitted a grant application for funding to reduce the amount of fishing related litter along both the River and foreshore. If funding is attained, this program will be undertaken in partnership with Melbourne Water and the Werribee River Association. Wyndham has also recently been successful in securing grant funding from the Keep Australia Beautiful National Association to install 5 public place recycling bins at Station Place in Werribee; to help capture bottles, cans and containers that potentially could have ended up as litter in or around the Werribee River.

Other potential funding projects include installing more gross pollutant traps, purchasing/hiring floating litter traps and expanding current education programs. Council estimates the cost of installing one litter trap to be between $100,000 and $150,000.

Nutrients

Council is currently developing its new Storm Water Management Plan. Actions in the Plan will align with Best Practice Guidelines and when implemented will contribute to reducing nutrients and sediment entering waterways from urban runoff.

As a direction under its Water Action Plan 2015-2020, Council will undertake a feasibility study into stormwater harvesting and water sensitive urban design opportunities for upcoming open space sports reserve and landscape projects. The aim is twofold:

- To reduce reliance on potable water, and
- Harvesting stormwater for reuse to assist in reducing nutrients entering waterways including capturing first flush of rainfall which is often high in nutrients.

Maintaining or improving water quality is a key objective for Melbourne Water and is an outcome it is working on in the Werribee River Integrated Water Management Analysis Stage 1 and 2.

Monitoring

There are no permanent water quality monitoring points downstream of the Werribee Diversion Weir. However, Melbourne Water does undertake periodical monitoring of blue-green algae outbreaks when a bloom is reported. Melbourne Water has acknowledged that monitoring points downstream of the Werribee Diversion Weir would be beneficial, but new monitoring points cannot be established useless there are specific scientific questions that need to be answered at a location. For example, assessing changes to E.coli levels in places where people swim such as Bungies Hole or Werribee South Foreshore.

Monash University is currently researching water quality in the Werribee River estuary, where groundwater inputs from the Western Treatment Plant and the Werribee Irrigation District add nutrients to the system[19]. This work is focussed on tracing the sources of the nutrients; and also following how they contribute to

[19] Perran Cook, Associate Professor, Monash University. *Personal communication*. 13 August 2015

estuarine productivity (i.e. looking at how nutrient levels are affecting the feeding behaviour of fish such as Black Bream).

Melbourne Water, in conjunction with the Arthur Rylah Institute, is also undertaking research on fish species within the river estuary. One project is looking into changes in Black Bream recruitment in response to environmental flows released during the summer months. Another is researching Mulloway in the Werribee River estuary, focusing on the lower section of river as it meanders around the golf course.

Melbourne Water has also been undertaking projects to increase fish passage through the lower reaches of the River. Impediments to fish movement include the weir at Werribee Park and Bungies Hole. Recent works at Werribee Park have successfully increased water levels at the ford and so have enabled greater fish passage.

Advocacy

If the health of the Werribee River were to be included in Wyndham City's Advocacy Strategy as an issue requiring attention, then the following objectives could be pursued:

1. Advocate to Minister for Environment, Climate Change and Water, DELWP and the Victoria Environmental Water Holder to see if unallocated water in Lake Merrimu could be used for environmental flows.
2. Advocate to the Minister for Environment, Climate Change and Water, DELWP, the Victoria Environmental Water Holder and Melbourne Water to increase the percentage of water allocations for environmental flows and/or fund water recovery purchases.
3. Advocate to Melbourne Water to create additional water quality monitoring points downstream of the Werribee Diversion Weir.
4. Advocate to DELWP and the relevant waterway management authorities to facilitate a forum focusing on the future of the Werribee River with the aim of enhancing partnerships and identifying opportunities to work together to improve the health of the River.
5. Advocate to Melbourne Water to investigate review and evaluate the performance of its existing gross pollutant traps along the River corridor with a view of upgrading and/or amend maintenance regimes to further reduce litter and sediment entering the waterway.
6. Advocate to Melbourne Water to undertake an audit of its storm water drains along the Werribee River to identify which drain outlets do not have a gross pollutant trap to inform its future waterway management decisions and actions.
7. Advocate to DELWP and the relevant water management authorities to investigate alternative water sources for irrigation purposes.
8. Advocate to Melbourne Water to undertake an ecological assessment of water quality, quantity and discharge options for the Werribee River including the risks (and benefits) of delivered treated wastewater to the system and, determine if such water complies with the State Environment Protection Policy (Waters of Victoria) and if this regulation needs review and/or further strengthening.
9. Encourage Melbourne Water to develop a strategy targeting the health of the entire Werribee River system.

Stakeholders

Improved collaboration between stakeholders could result in large scale projects to improve litter capture infrastructure, targeted education campaigns and scientific monitoring programs. By clarifying roles and responsibilities there will be greater accountability for agencies in charge of managing the River.

Collaboration is already occurring through the IWM Analysis, however there are still further opportunities to enhance partnerships which may result in improvements to the Werribee River's water quality and amenity.

Council will be aiming to do this by encouraging DELWP and the relevant water management authorities to facilitate a forum in the coming months. Stakeholders from a range of agencies and community groups will be invited to attend including:

- **Melbourne Water** - Responsibility of supplying water to metropolitan Melbourne, owner of land along the River and manager of water body
- **Melton City** – Municipality that Werribee River flows through and owner of land along the River
- **Moorabool Shire** - Municipality that Werribee River flows through and owner of land along the River
- **Southern Rural Water** – Responsible for regulating environmental flows (as determined by DELWP) and the Werribee and Bacchus Marsh irrigation supply systems. Operates Pykes Creek Reservoir, Melton Reservoir and Merrimu Reservoir
- **Werribee Bacchus Marsh Customer Consultative Committee** - Southern Rural Water's customer advisory group for the Werribee and Bacchus Marsh Irrigation Districts[20]
- **Western Water** - Responsible for supplying urban demands in the north of the basin, including Melton and Bacchus Marsh. Owner of land and the Melton Recycled Water Plant, operates Djerriwarrh Reservoir
- **Victorian Environmental Water Holder** – Independent body responsible for making decisions on the use of Victoria's environmental water entitlements
- **Environmental Protection Agency** - Regulator and an influential authority on environmental impacts
- **Department of Environment, Land, Water and Planning** – Determines the environmental flows, owner of land along the River
- **City West Water** – Responsible for supplying urban demands in the south of the catchment, including Werribee, Hoppers Crossing and Point Cook
- **Werribee River Association** – volunteer organisation concerned with the River
- **Victorian Recreational Fishers, Fisheries Victoria**
- **Deakin University, Monash University and University of Melbourne and Arthur Rylah Institute** – Academic institutions who undertake research projects along the River
- **Western Melbourne Catchment Network**
- **Landcare and 'Friends of' Groups**
- **Central Highlands Water**, and
- **Wyndham City Council**

[20]Southern Rural Water, *Werribee Bacchus Marsh* webpage, Accessed 26/08/2015 http://www.srw.com.au/page/Page.asp?Page_Id=270&h=-1

A Step Already Taken

Council officers have already met with Melbourne Water (MW), the Werribee River Association (WRA) and a representative from the office of local Member for Werribee, Tim Pallas MP on 24 July 2015 to discuss solutions to the most immediate issues such as litter and Azolla. Key actions that arose from the meeting and their current status are provided in Table 1.

Table 1. Status of action from a joint meeting between Council, Melbourne Water, the Werribee River Association and the office of Tim Pallas MP.

No.	Action	Responsible authority	Current status (as of 13/10/2015)
1	Melbourne Water (MW) to organise a crew to conduct a litter sweep on affected parts of the Werribee River. MW to confirm approximate dates and location.	MW	MW's contractors have removed litter from Azolla effected areas and larger debris from the banks of the River. The works addressed areas not currently covered by MWs programmed maintenance activities. Litter material removed from the Werribee River: • Total of 19 rubbish bags of litter removed from Azolla effected zones (80 litre rubbish bags) consisting of: o 70% plastic drink bottles (water, soft drink, sports drinks) o 20% alcoholic drinks (beer bottles/stubbies, spirit bottles & cans) o 5% deodorant & paint spray cans o 5% plastic bags, chip packets etc. • Breakdown of hard rubbish removed from Werribee River, Heaths Rd to Princes Freeway, Werribee. Total of 2 work utes and 1 tandem trailer loads removed consisting of: o 15 supermarket trolleys o 1 large tractor tyre o 2 small car tyres o 3 roadside bollards o 1 wheelie bin o 1 couch o 1 bowling ball o Sheets of corrugated iron o Old timber planks o Timber signs o Rotten house doors o Backpacks, shoes and handbags o Plastic containers
2	Werribee River Association (WRA) to confirm via Camperdown Compost whether the Azolla is suitable for compost material.	WRA	WRA has obtained advice from Geelong Compost (a part of the Camperdown Compost Company) which confirms Azolla is suitable for compost and should break down easily.

3	MW to investigate on-water trial of Azolla removal and advise Wyndham City Council and WRA.	MW	MW has engaged a contractor to investigate and submit a proposal for Azolla removal from the River. The observations, suggestions and recommendations are yet to be received by MW.
4	Wyndham City Council (WCC) and WRA to investigate Litter Hotspots grant currently on offer from State government.	WCC & WRA	Funding to reduce litter (particularly fishing related litter) along the Werribee River has been applied for through the Metropolitan Waste & Resource Recovery Group's Litter Hotspots Grant. Successful applications will not be known mid to late October.
5	MW to investigate an adjustment to the existing river health monitoring regime to include freshwater section upstream of Maltby Bypass. MW to discuss with relevant partners including University of Melbourne.	MW	MW is providing water quality monitoring data input to Wyndham's Health and State of the Werribee River report. MW monitoring points will be again reviewed once this report has been completed.

Past, ongoing and future advocacy, planning and on-ground actions/commitments by Council, the State Government, waterway management authorities, landholders and the community including the Werribee River Association and the Western Melbourne Catchments Network, need to be acknowledged. The combined actions by these bodies are contributing to an improved condition of the Werribee River now and for future generations.