

Yarra River Blitz

Project Report



The Yarra Riverkeeper Association

The Yarra Riverkeeper Association (YRKA) is the credible and authoritative voice for the Yarra, Melbourne's own beautiful, resilient, iconic river. The Association is an independent community of citizen advocates that works solely in the interest of the river with the advocacy strategy built around the motto: 'Our Yarra, healthy, protected and loved'. The Yarra Riverkeeper team monitor the river by boat and on foot, by bike and by canoe. That enables the Association to build a detailed understanding of the complex interactions of the ecology of river and its role in the City of Melbourne. This understanding is shared with the community through the Association's educational programs, website, and social media. YRKA's aims are to protect the Yarra from mouth to source, to revitalise the river and to foster love for the river by current and future generations.



Figure 1
Blitz 5 - The Yarra River
Anton Tejada



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Figure 2
Blitz 5 - The Yarra River
Anton Tejada



1.0 Where the Yarra meets Port Phillip Bay

The Yarra River traverses an enormous range of habitats from pristine forested catchments through a range of agricultural lands and then through dense urban areas. The Yarra flows 242 kilometres from headwaters to sea – from its source on the flanks of Mt Baw Baw in the Yarra Ranges National Park, north-east of Melbourne, through the Yarra Valley and greater Melbourne into Port Phillip Bay at Newport. More than one-third of Victoria’s population lives in the Yarra catchment, which spans about 4000 square kilometres. The catchment includes 50 rivers and creeks.

The Yarra River corridor is 22% urbanised, 21% natural vegetation and 57% agricultural (Melbourne Water Corporation, 2018). Historically the Yarra River was treated as a large open sewer and is still suffering. In 2018, the State of the Yarra and its Parklands investigation reported 18 of the 25 environmental health indicators were ‘poor’. Only 1 of the overall 36 indicators scored in the ‘good’ category, which was the indicator for “post settlement colonial heritage” (Victoria, 2018). The three main issues facing the Yarra today are overdevelopment, nature under stress from invasive species and habitat loss, and poor water quality. Water quality has been adversely affected by litter, pollution incidents, sewerage, stormwater quality, and climate change.

This is of concern given the wildlife living in and around the Yarra River is diverse with one-third of Victoria’s animal species found in the Yarra catchment. The river and local surrounds are home to 22 species of fish, 190 bird species, 10 frog species, 16 reptile species and 38 species of mammals (Melbourne Water Corporation, 2009).

In terms of vegetation, more than 25 unique vegetation communities make their home along the Yarra River, its tributaries, and within the catchment billabongs, wetlands and swamps. Reeds are a common vegetation community along the Yarra, particularly in the Yarra River estuary which extends 22km from Dights Falls to the river mouth at Port Phillip Bay. The Yarra estuary is a salt-wedge estuary, where the heavier salt water from the bay sits under the less dense freshwater on top, providing suitable conditions for many reed species particularly *Phragmites australis*, the common reed (Melbourne Water Corporation, 2009).

The term reedbeds encompasses all stands of tall grasses and grass-like emergent vegetation occurring wherever the water table is at or above ground level for most of the year. The common reed is highly adaptive resulting in its broad distribution along the Yarra. The species is tolerant of a range of water



regimes, including fluctuating water levels, nutrient regimes, and even salt levels, making them a resilient vegetation community (Kiviat, 2013).

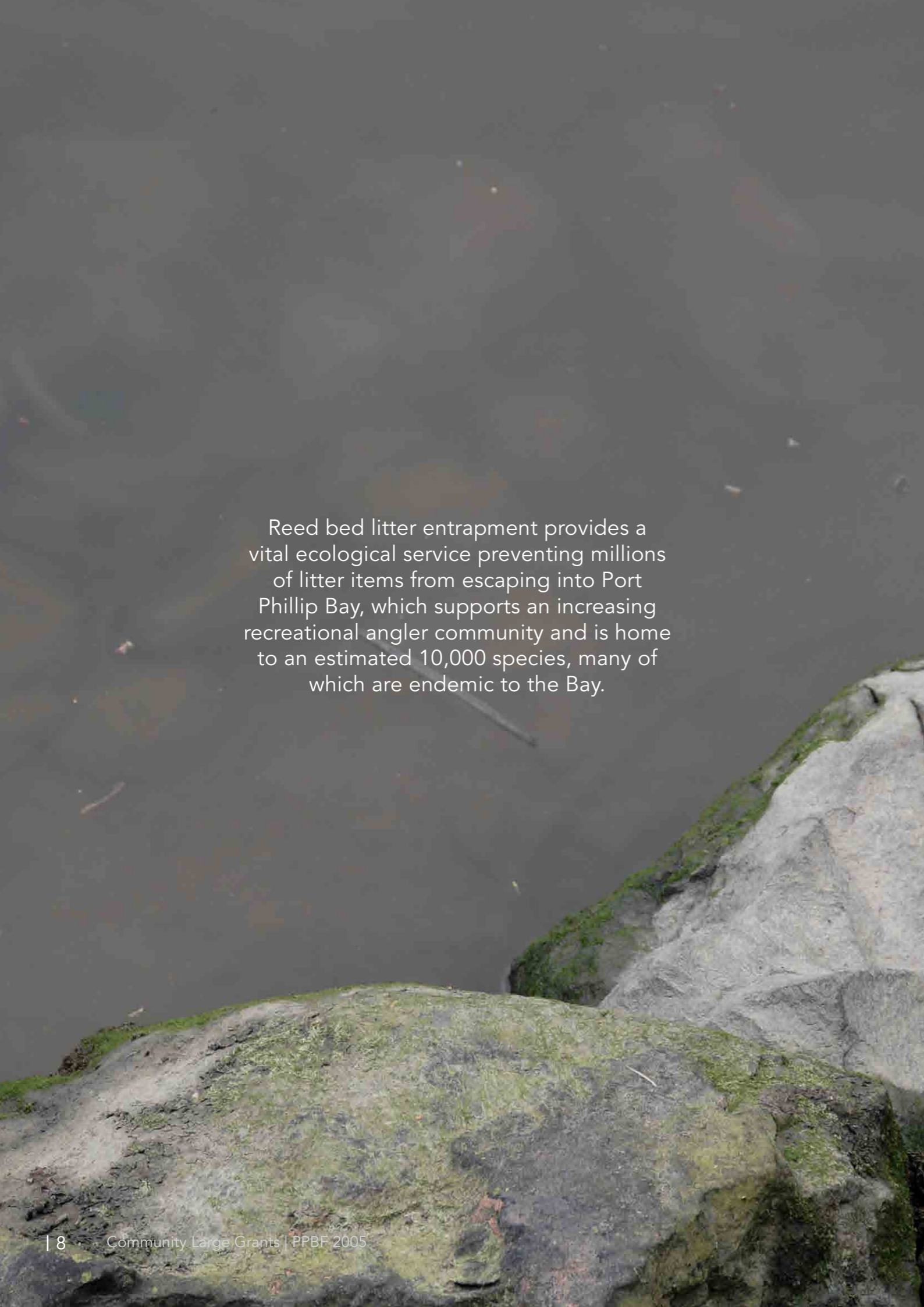
Reed beds provide a number of ecological services including controlling nutrient inputs to rivers and provide important habitats, particularly for a range of bird species (Kiviat, 2013). They also act as effective litter traps capturing micro and macroplastics in waterways and prevent these pollutants from discharging into Port Phillip Bay, the largest marine embayment in Victoria.

Reed bed litter entrapment provides a vital ecological service preventing millions of litter items from escaping into Port Phillip Bay, which supports an increasing recreational angler community and is home to an estimated 10,000 species, many of which are endemic to the Bay (Bray & Gomon, 2012). However, their trapping effectiveness has caused many of these vegetation communities to become

severely contaminated with litter. The Yarra River Blitz was hence designed to: 1). reduce litter loads in the reed beds to improve the overall condition of these vegetation communities. 2). prevent litter from escaping into the Yarra and Bay preventing potential downstream damaging ecological impacts.

There is now irrefutable evidence that litter particularly plastics and microplastics have severe negative impacts on the environment (Dris et al., 2015, Gall and Thompson, 2015). Many governments have now accepted the recommendation from the science community that society should not wait until there is more quantified evidence of the degree of damage before acting to reduce plastic pollution impacts. In their report ‘Marine Plastic Debris and Microplastics’ the United Nations stated that there is a moral argument that we should not allow the ocean to become further polluted with plastic waste, and that marine littering should be considered a ‘common concern of humankind’ (UNEP, 2016).

Figure 3 - Above Litter on Yarra River bank Anthony Despotellis



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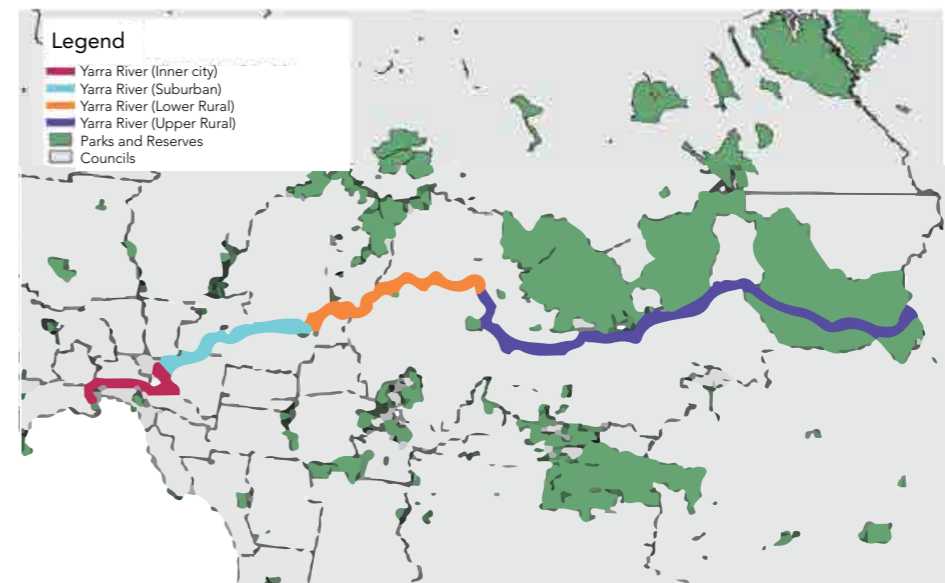


Figure 5 - Top
Map of the sections
of the Yarra

Figure 6 - Bottom
Litter on Yarra River bank
Cleanwater Group

Figure 4 - Left
Yarra River bank rocks
Anthony Despotellis

2.0 Yarra River Reed Blitz: Project Background and Rational

Wide use of single-use plastics, improper waste management practices, inadequate wastewater treatment, and littering have led to large volumes of plastic pollution entering the Yarra and Port Phillip Bay. Litter enters our waterways through wind transport, surface runoff and via storm water drains. There is increasing public concern about large amounts of litter in the Yarra River and Port Phillip Bay. This is illustrated in the 'State of the Bays, 2016' and 'State of the Yarra, 2018', developed by the Commissioner for Environment and Sustainability.

Litter has been reported to:

- ❑ Be unattractive
- ❑ Disturb physical habitats
- ❑ Degrade water quality
- ❑ Attract pests and vermin
- ❑ Cause animal illness, injury and death
- ❑ Reduce amenity values
- ❑ Reduce tourism
- ❑ Be costly to clean

The Yarra River is the largest contributor of litter into the Bay. Much of the litter entering the Bay is trapped in reed beds in the lower Yarra. These areas are extremely difficult to access. Furthermore, the small size of litter in these areas make litter collection time consuming and expensive. The Yarra River Blitz aimed to remove accumulated waste from reed beds in the lower Yarra and Maribyrnong Rivers using a unique approach which incorporates a boat mounted vacuum system with traditional waterway cleaning techniques. Crew targeted litter seasonally over eight days at strategic locations along the rivers to maximise litter removal, culminating in a community event on the final day of the Yarra River Blitz. Yarra Riverkeeper members and the community were invited to clean the river on a kayak/canoe or on land and give back to the river.

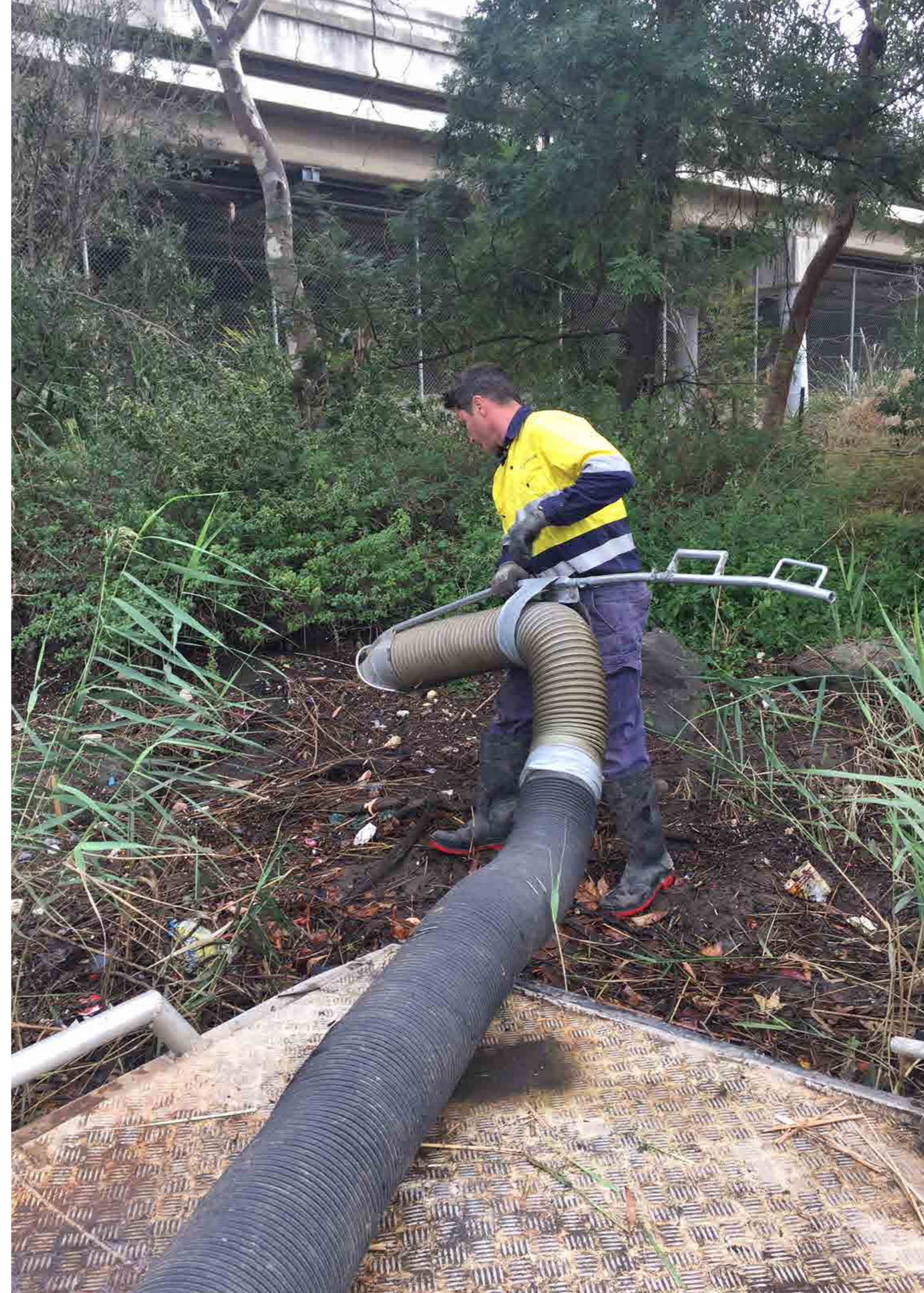


Figure 7
Cleanwater Group vacuuming
the river banks of the Yarra
Cleanwater Group



3.0 Outcomes from the Yarra River Blitz

The Blitz program has many environmental, social, cultural and economic benefits by reducing the threat of plastic entanglement and ingestion by wildlife, increasing community participation and satisfaction with our rivers, raising awareness of the public's role in appropriate reduction, disposal and recycling of litter, revitalising areas of cultural significance and reducing waste removal and infrastructure maintenance costs.

Vaccum Works

The Yarra River Blitz program has greatly reduced the amount of litter, particularly microplastics, within the Yarra and Maribyrnong Rivers and has prevented millions of litter items from escaping into the Bay. Between April 2018 and February 2020, using the innovative boat mounted vacuum system, approximately 38,000 kg of waste were removed from the reed beds, rock walls and riverbanks of the lower Yarra and Maribyrnong Rivers. Over 30 litter hotspot sites were identified with expanded polystyrene, plastic food packaging and plastic bottles consistently comprising the bulk of captured litter.

Highest litter loads were found upstream of the city, particularly between Punt Rd Bridge and Macroberston Bridge. This stretch of the river has the highest concentration of reedbeds in the lower Yarra and hence captures vast quantities of litter, especially expanded polystyrene. Over the course of the Blitz project certain sections of reedbeds were vacuumed repeatedly. For example, an area adjacent to Herring Island was vacuumed at all seven Blitz events. At each event the patch of reedbeds was inundated with litter, particularly expanded polystyrene, despite the presence of nearby Bandalong litter traps, frequently emptied by Parks Victoria. These findings highlight the constant stream of litter discharging into the Yarra and the need for a permanent reedbed cleaning crew.

The Blitz program also identified the need to collect data on the potential sources and distribution of expanded polystyrene along the Yarra River leading to the project 'Polystyrene Pollution: Sources and Solutions'. The overall intention of the polystyrene project was to gain a better understanding of the sources

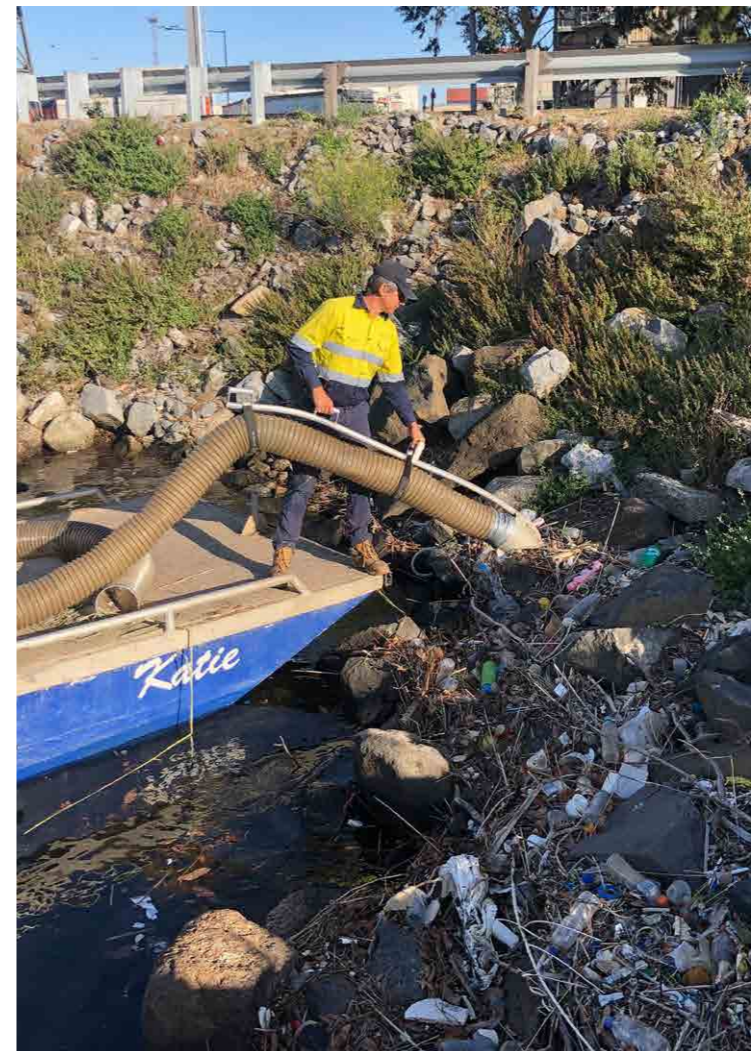


Figure 8
Cleanwater Group vacuuming
the river banks of the Yarra
Cleanwater Group

efforts to reduce future pollution. Results from the polystyrene project suggest that there are not a high number of major point sources of polystyrene pollution, but rather a very high number of smaller point sources with widespread distribution around Melbourne and only a handful of extremely significant sources (e.g. Category 5 rating). Further, the results suggest that the residential building industry is, collectively, likely to be a significant source, and likely an easy target for simple mitigative measures. The polystyrene report is available on the Yarra Riverkeeper website.

The large volumes of litter in the Yarra and Maribyrnong Rivers highlight the large contribution of these rivers to plastic pollution in Port Phillip Bay. Hence, immediate measures to manage plastic pollution at all stages of its 'life-cycle', particularly at the early stages where plastic sources are known and can be more easily contained, need to be addressed.



Figure 9
Green circles represent areas that were vacuumed during Yarra Blitz events

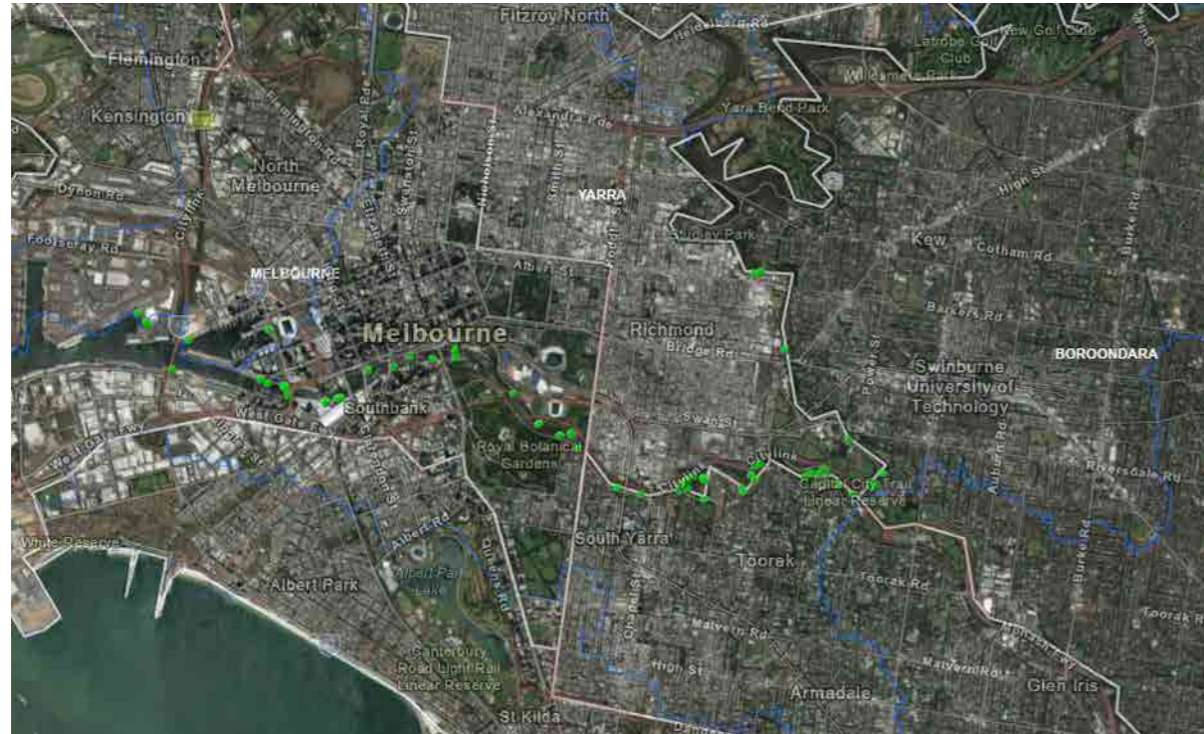


Figure 12
Polystyrene hotspots along the lower Yarra with larger circles representing larger volumes of litter

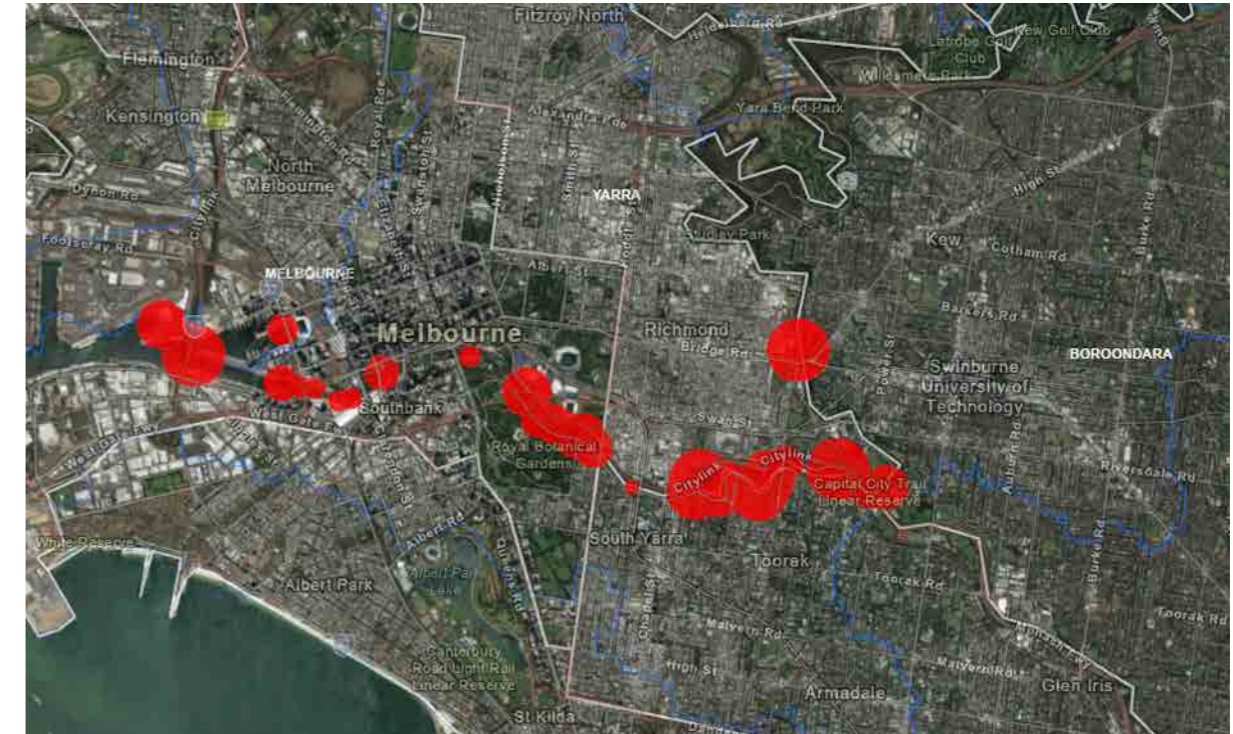


Figure 10
Before vacuuming and after, vacuum photos at reedbed along the Yarra River Cleanwater Group



Figure 11
Level of polystyrene and PET bottles in the riverbeds Cleanwater Group

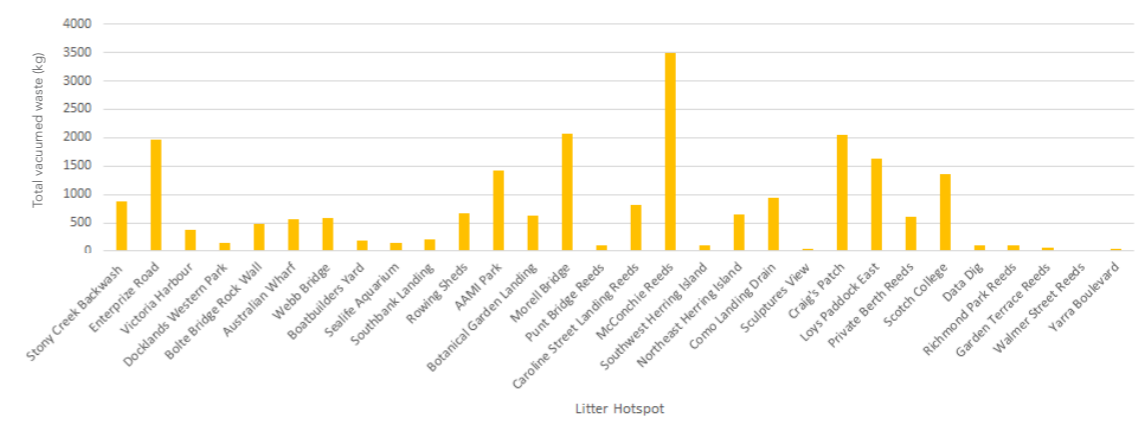


Figure 13
Total amounts of litter vacuumed YRKA



4.0 Community Events

River Clean-ups

Human behaviour is the sole source of litter and changing perceptions and behaviour is key to tackling litter escaping into the natural environment. The community plays an important role in addressing litter through their lifestyles and consumption patterns, waste management practices, and other engagement in the implementation of policies aiming to address the litter issue such as 'ban the bag' and container deposit initiatives. The Yarra River Blitz program provided opportunities for the community to engage with our waterways recreationally and to act as stewards for its protection. Melbourne Water have played an instrumental role in supporting community events acting in-line with the Healthy Waterways Strategy and fostering opportunity for the realisation of the Yarra River Community Vision.



Figure 14
Maribryong River Blitz
YRKA



Yarra River 50 Year Community Vision:

Our Yarra River, Birrarung, is recognised around the world as an iconic example of a nurturing relationship between a river and its community. Flowing from source to sea, it is the resilient lifeblood of past, present and future generations of Victorians. It connects and enriches our flourishing city, suburbs, regions and beyond. Our Yarra River, Birrarung, its essential role in our lives and its rich history are respected, understood and protected. It has cared for us for thousands of years and will for thousands to come. The vital and continued role of Traditional Owners as custodians of the River, and its role in their culture, is recognised and celebrated. Our Yarra River, Birrarung, and its diverse surrounding landscapes provide a place of refuge, recreation, learning and livelihood. It brings communities together and supports sustainable local economies. Its clean waters and connected network of thriving green spaces nurture biodiversity, and deepen the relationship between people and nature. Our Yarra River, Birrarung, is respected as a sacred natural living entity and everyone takes responsibility for its care. Its health and integrity are paramount and uncompromised.

What is good for the Yarra is good for all.

Figure 15 - Above
Maribryong River Blitz
YRKA



Over the course of the Blitz project project over 700 volunteers have participated in the community clean-ups events and have shown great enthusiasm in rolling up their sleeves, jumping on board kayaks and canoes and revitalising our rivers. Community have collected over 1,500 KG of rubbish with a sample of this rubbish audited to provide a greater understanding of sources of litter in the Yarra and Maribyrnong. Community have contributed approximately \$80,000 of in-kind support assisting with many aspects of the project including litter collection, litter audits, event management, and event promotion. The events have seen over 30 organisations come together for the positive cause of protecting our waterways and wildlife.

One of the benefits of monitoring litter in river systems is the relatively intact structure of litter items, making them identifiable. This is in contrast with marine litter which is often degraded making it near impossible to track the sources of the litter. The Blitz project highlighted the main litter types found along and within the Yarra River. Litter composition was relatively consistent along the lower Yarra and Maribyrnong Rivers, apart from Herring Island which had a significantly higher proportion of foam load than all other locations. Higher foam loads are likely due to the wide distribution of reeds in the area which are notorious for trapping polystyrene. The buoyant, lightweight nature of polystyrene likely enables this item to remain trapped in reedbeds for extended periods of time, thereby accumulating at a greater rate compared to other surfaces (e.g. sand banks) along the Yarra.

At all other locations, expanded polystyrene (EPS), plastic food packaging, cigarette butts, plastic drink bottles and plastic film remnants (hard and soft) featured heavily. According to our results, plastic pollution in the Yarra River is associated to domestic solid wastes (e.g. food wrappers, plastic bottles, expanded polystyrene). The predominance of food wrappers/containers is likely due to littering activities, with direct or indirect dumping into the Yarra in addition to runoff and storm water drain discharges. Our research shows that people are the greatest contributor to riverine pollution meaning that to make a real difference, people must be part of the solution.

It is worth noting that in some instances we observed temporal differences in litter composition. To demonstrate, at FCRC, at the first clean-up, plastic food packaging, expanded polystyrene, plastic bags and drink bottles were found in similar quantities. Six months later, cigarette butts significantly dominated the litter count. It is not clear whether the difference in litter composition reflects litter loads in the environment or whether the discrepancies are related to clean-up bias (e.g. a group of clean-up volunteers may have targeted cigarette butts at the second event) or varying auditing styles. Going forward, the only way to gain a representative sample of litter would be to use a standardised method for clean-ups and audits.

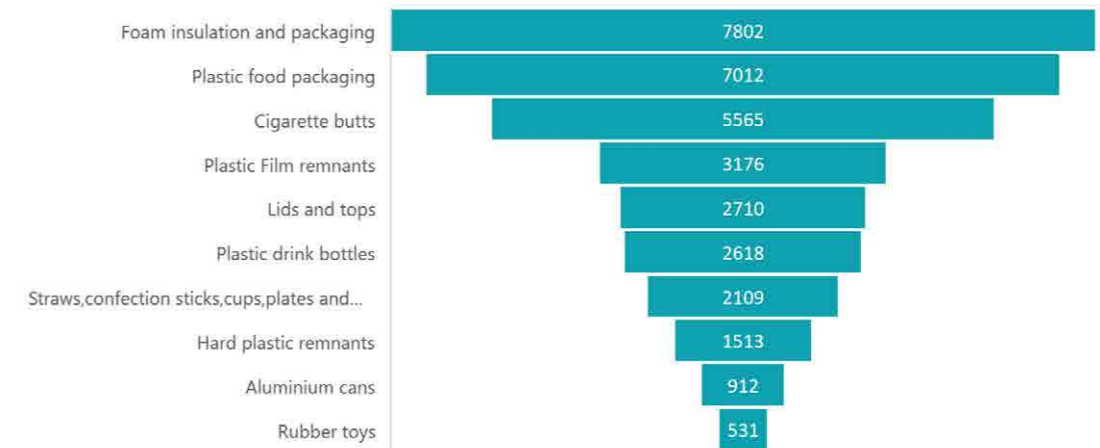


Figure 17
Collective litter audit results detailing the type and quantity of dominant litter items collected at Blitz community events between April 2018 and February 2020

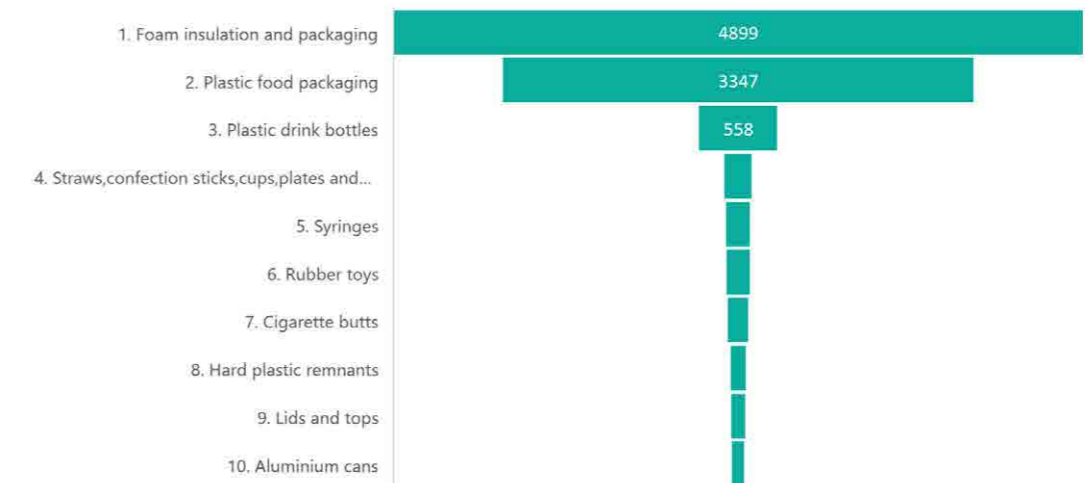


Figure 18
Litter audit results from 1st Blitz (Pilot event) based at Wesley College Boat Shed on 22 April 2018

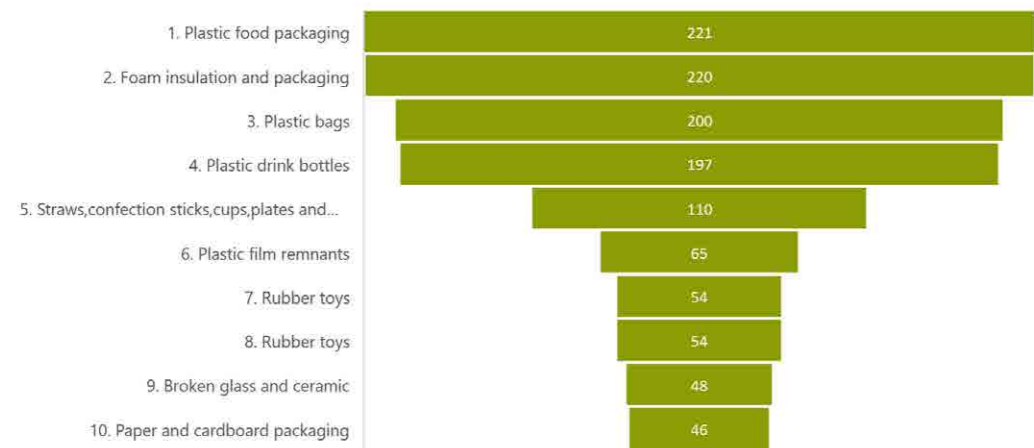


Figure 19
Litter audit results from 3rd Blitz
based at Footscray City Rowing
Club on 3 March 2019

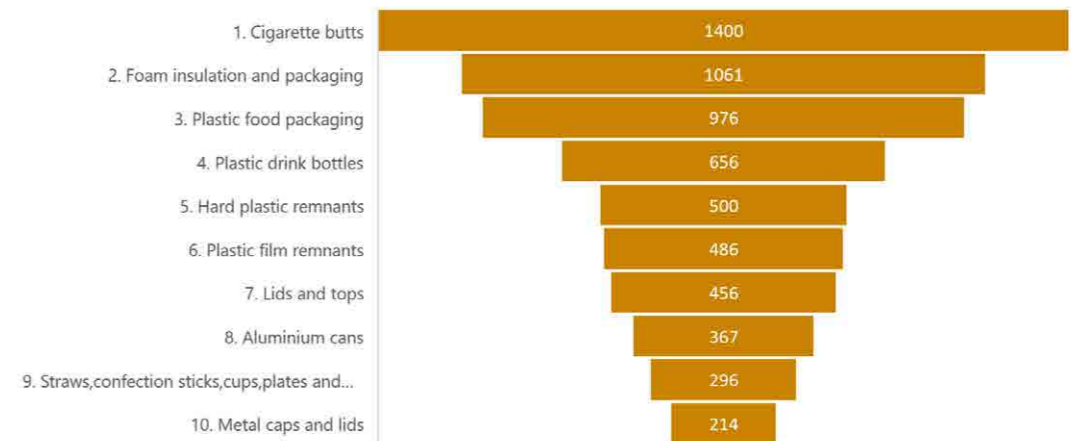


Figure 21
Litter audit results from 5th Blitz
based at Richmond Rowing Club
on 25 August 2019

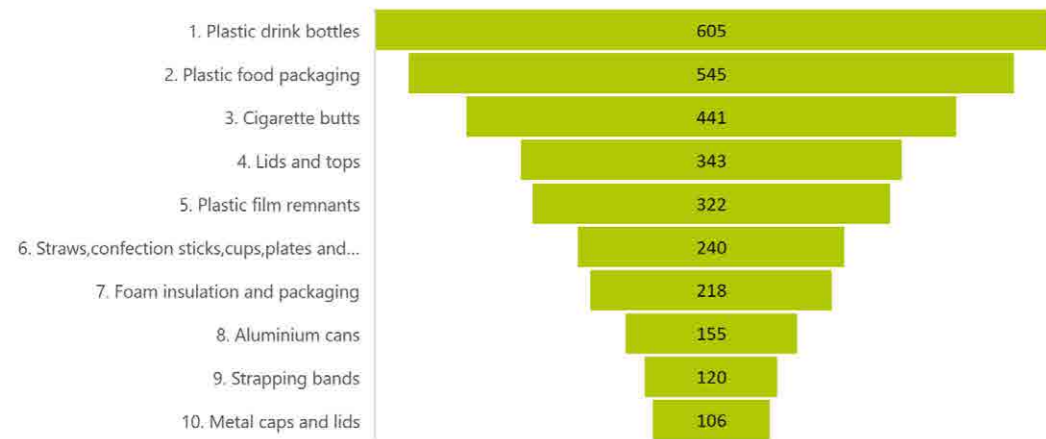


Figure 20
Litter audit results from 4th Blitz
based at Melbourne University
Boat Club on 26 May 2019

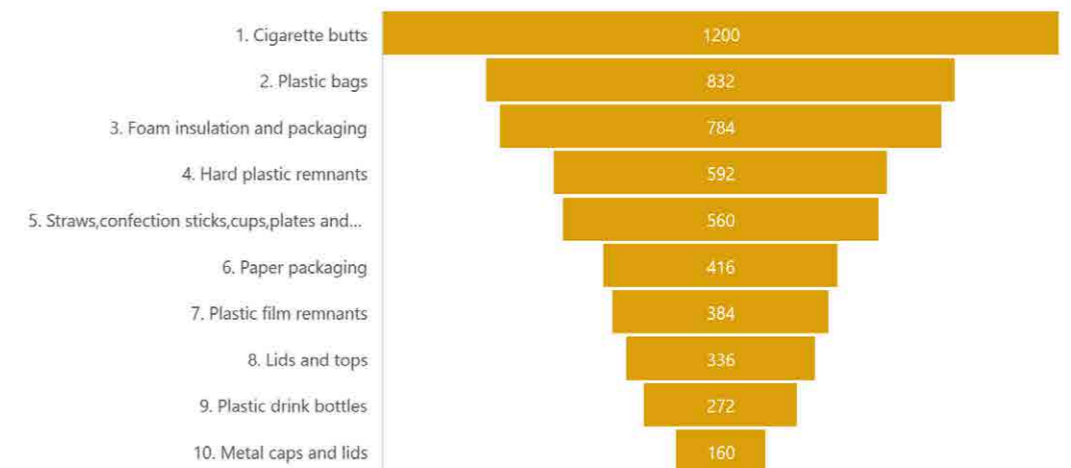


Figure 22
Litter audit results from 6th Blitz
based at Footscray City Rowing
Club on 24 November 2019

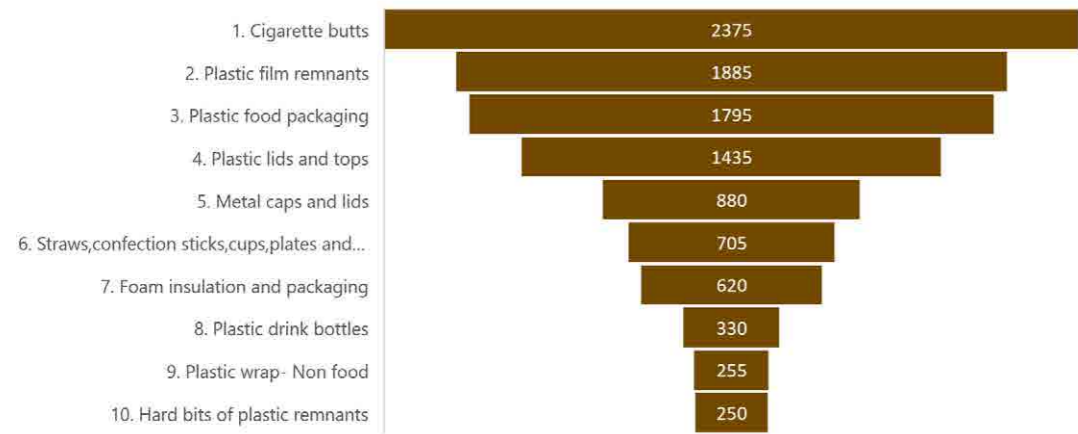


Figure 23
Litter audit results from 7th Blitz
based at Richmond Rowing Club
on 2 February 2020

Blitz Date	Blitz Location	Vacuumed Waste (Kg)	Number of Participants	Community Collected Waste (Kg)	Cumulative Total
16-22 April 2018	Wesley College Boat Shed	±5,000	172	476.5	5,476.5
16-26 Nov 2018	Herring Island	±10,000	55	267	15,743.5
1-10 March 2019	Footscray City Rowing Club	±4,500	65	282	20,525.5
21-28 May 2019	Melbourne University Boat Club	±5,000	100	126	25,651.5
19-27 Aug 2019	Richmond Rowing Club	±4,000	v80	163	29,814.5
18-25 Nov 2019	Footscray City Rowing Club	±4,000	120	94	33,908.5
28 Jan- 4 Feb 2020	Richmond Rowing Club	±4,000	120	172	38,080.5
Total		36,500	712	1,580.5	38,080.5

Table 1
Total waste collected from Blitz's



Figure 24
Vacuuming Litter from river bank
Cleanwater Group



Recycled Park Benches

Hundreds of kilos of plastic bottles were collected, washed, bailed and transported to Moama, NSW, to be recycled into park benches using PolyWaste Technology™. A key differential between traditional plastic melting technology and PolyWaste Technology™ is that it can recycle a wide variety and combination of contaminated film, semi-rigid and rigid plastics from multiple commercial, industrial, agricultural and/or domestic waste streams into value-added plastic products. Critically, much of the input stock is plastic that would otherwise be destined for landfill or incinerated.

Written by Yr 9 Urban Challenge Program Student Chyann Fann

Recently as part of our Urban Challenge program, groups of Year 9 Korowa Anglican Girls' students participated in the Yarra River Blitz, where we were tasked to sort and tally the collected trash from the Yarra. The day began with a tour of the reedbeds on the banks of the Yarra. The amount of microplastics strewn across the reeds were astounding - it was almost as if it had snowed, with the lining of garish white Styrofoam beads amongst

the healthy brown reeds. However, the surprises didn't end there. Our next assignment was to sort and audit the waste gathered from the Yarra. The waste had been placed in approximately 20 full industrial-sized bags; the amount accumulated was blatant proof that this problem had persisted for far too long. What struck me most was the sheer amount - because you'd never see this amount of waste floating in the Yarra. It just goes to show the immense work of others who maintain the Yarra. In the end, working hard as a group for the better part of the morning and afternoon, we managed to sort four big bags of waste. Plastics seemed to make up the bulk of waste - my friend and I counted over 1100 pieces. Furthermore, the breadth of variety in the trash we'd found was, frankly, baffling. We'd even discovered a fully intact vacuum cleaner! As I reflect on the week, giving back to the community, and to the Yarra which had sustained us for so many years was a heart-warming experience. It opened many eyes in my group to the importance of maintaining our waterways and the vital role we can continue to have as community members.



Figure 25
Creator of Newtechpoly
YRKA



Figure 26 - Top
Figure 27 - Bottom
Korowa students assisting with
auditing collected during the Yarra
River Blitz



Plastic is cleaned from the banks

The Plastic is bagged up



Bags are piled for transport



Bags are collected for processing



Plastic is sorted into categories

From bank to bench



Products are designed and built



Plastic is melted and moulded

5.0 Yarra River Blitz Vision

The Yarra River has an important role in the daily lives of Melbournians. The river and surrounding parklands is associated with our sense of health and wellbeing, providing space for cultural gatherings, recreation and contemplation. Traditional Owner communities have a deep cultural and spiritual connection to the Birrarung. Residents and tourists are drawn to the Yarra's natural beauty and the opportunities it provides to connect with nature. The Yarra and surrounding parklands provide a suite of ecological services including providing 70% of Melbourne's drinking water, food from agricultural production and offers numerous recreational opportunities. The river and parklands are home to a third of Victoria's biodiversity including several threatened species.

The Yarra Riverkeeper Associations would like to see an integrated river waste management strategy rolled out in the lower Yarra catchment targeting both macro and microplastics. A greater quantity of passive litter removal technologies (e.g. Bandalong Litter Traps, Gross Pollutant Traps) need to be inserted and frequently maintained across the entire catchment. Active cleaning methods including river bank vacuuming are required to improve the condition of vegetation communities along the river and to prevent litter from escaping into waterways.



Figure 28
Merri creek entrance
to the Yarra River
Anthony Despotellis



6.0 Acknowledgments

This work has been supported by the Victorian Government through Round 2 of the Port Phillip Bay Fund. We acknowledge the critical participation of all stakeholders who engaged with the Yarra Riverkeeper Association particularly our partners in this project including the Cleanwater Group, Parks Victoria, Melbourne Water, and Cleanaway. We thank Council support particularly the City of Melbourne, and Melbourne City Marina, Yarra City Council, Stonnington City Council, Boroondara City Council and Maribyrnong City Council. In-kind support was also provided by Newtecpoly, Serco, Tangaroa Blue, Yarra River Dragons, Sea Kayak Australia, Aquayak Kayaks, Kayak Melbourne, Paddle Victoria, The Plastic Runner, Beach Patrol, Love Our Street, Abbotsford Riverbankers, Campos Coffee, Genovese Coffee, Bean to Coffee, Dish and Spoon, Sea Life Aquarium, Sea Life Trust, Inflatable Regatta, Sound Warehouse, Practical Ecology Ltd,

Werribee Riverkeeper Association, the Port Phillip Baykeeper, and the Wurundjeri Tribe Council. We thank the teams at Wesley College Boat Shed, Richmond Rowing Club, Melbourne University Boat House, Footscray City Rowing Club for access to their venues. Event prizes were generously provided by Sealife Aquarium, Arbory Bar and Eatery, The Riverland Group, Ludlow Bar, Strike Bowling Club, The Boathouse, LilyBee Wraps, Reusable, We would also like to acknowledge students and staff from Wesley College, Strathcona Girls Grammar School, Korowa Anglican Girls School, Victoria University and Monash University for participating in the Blitz litter audits. Finally, and most importantly we thank the support of the Yarra Riverkeeper members, committee members, and community members for assisting with revitalising the Yarra and Maribyrnong Rivers.

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