Gathering evidence to reduce plastic pollution

’Street to Bay’ litter audit methods are designed to track progress on reducing plastic pollution across Melbourne. This booklet provides an overview of the methods for schools, community and corporate groups to choose which one they can conduct in their local area.

Contents

Port Philip EcoCentre
actively cultivating environmental well-being.

Background & need

Numerous international studies confirm the threat of plastic pollution to marine waters. Consumption of plastics is increasing rapidly; and millions of litter items flow to Port Phillip Bay each year.

The **Port Phillip Baykeeper 'Street to Bay' litter audits** are designed to track plastic pollutants commonly found in Port Phillip Bay to their major source - urban streets connected to the Bay by stormwater drains and waterways.

Engaging communities in 'Street to Bay' citizen science methods will gather essential evidence to inform local plans to ***reduce plastic pollution at the source***.

Consistent data collection will:

- record microplastics that may be missed in large scale clean-ups;
- identify the typical sites common plastic pollutants come from;
- provide evidence for legislative change and local litter strategies.
- confirm if specific litter types have increased or decreased over time.

Enquiries about the Street to Bay audit methods can be directed to:

Neil Blake, Port Phillip Baykeeper **baykeeper@ecocentre.com**

Fam Charko, Marine Biologist **fam@ecocentre.com**

Schools and corporate groups can arrange for EcoCentre to support their involvement.

Port Phillip EcoCentre

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Purpose and key principles

Effective reduction of plastic pollution requires sound government policy and investment; and public commitment to responsible use and disposal.

Clear evidence is needed to make a compelling case for change. The first finding of the Federal Government's Enquiry into the Threat of Marine Plastic Pollution in Australia (2017) is:

"The committee recommends that any future Australian Government policies on mitigating the threat from marine plastic be underpinned by sound, peer-reviewed research."

"Sound peer reviewed research" requires careful attention to audit method design, data collection and storage.

Audit design

- **Easily accessible audit locations;**
- **Short time to complete each audit;**
- **Trained data collectors with clear understanding and commitment ;**
- **Data collection terminology consistent with other studies.**
- **Regular audits at the same place across all seasonal conditions**

Data collection & storage

- **Single page datasheet;**
- **All site details completed on datasheets (location, date etc);**
- **Thorough 'search effort';**
- **Consistent collection method at all sites;**
- **Completed data sheets digitally copied for filing and emailed to project manager.**

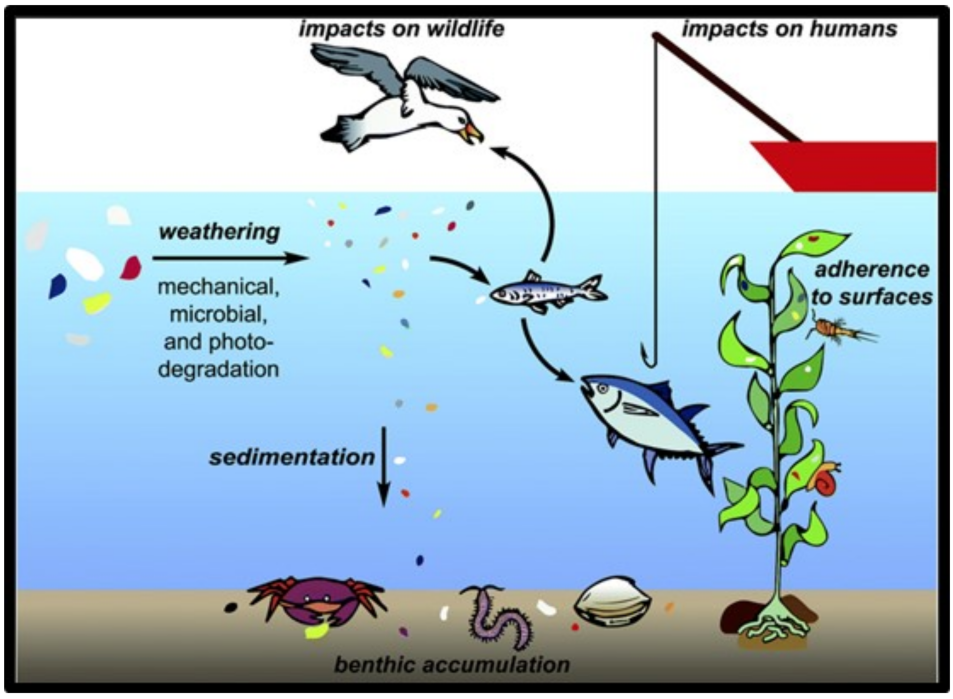
Statistical rigour is essential to ensure the study justifies and stimulates:

- government policy initiatives to reduce plastic pollution, eg. ***legislative change*** and ***investment in local source reduction plans***; and
- community behaviour change (waste avoidance and responsible disposal).

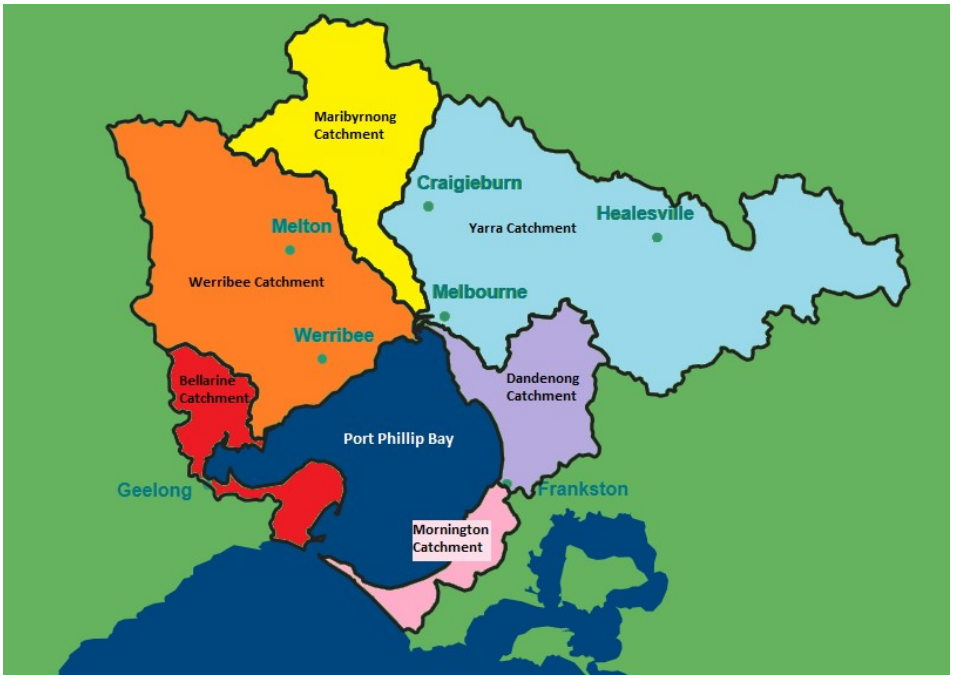
Longer term datasets (2+ years) are needed to compensate for occasional inconsistency of data collection that may occur in studies involving multiple groups, people of different abilities and motivations, and variable local site conditions. However, no groups need commit to that time frame!

From the ‘burbs to the Bay

Although most media attention is on the impacts of plastics in oceans, most plastic in Port Phillip Bay comes from the streets!!!



When plastics reach our waterways they’re almost impossible to retrieve. Small fragments are easier for wildlife to swallow.

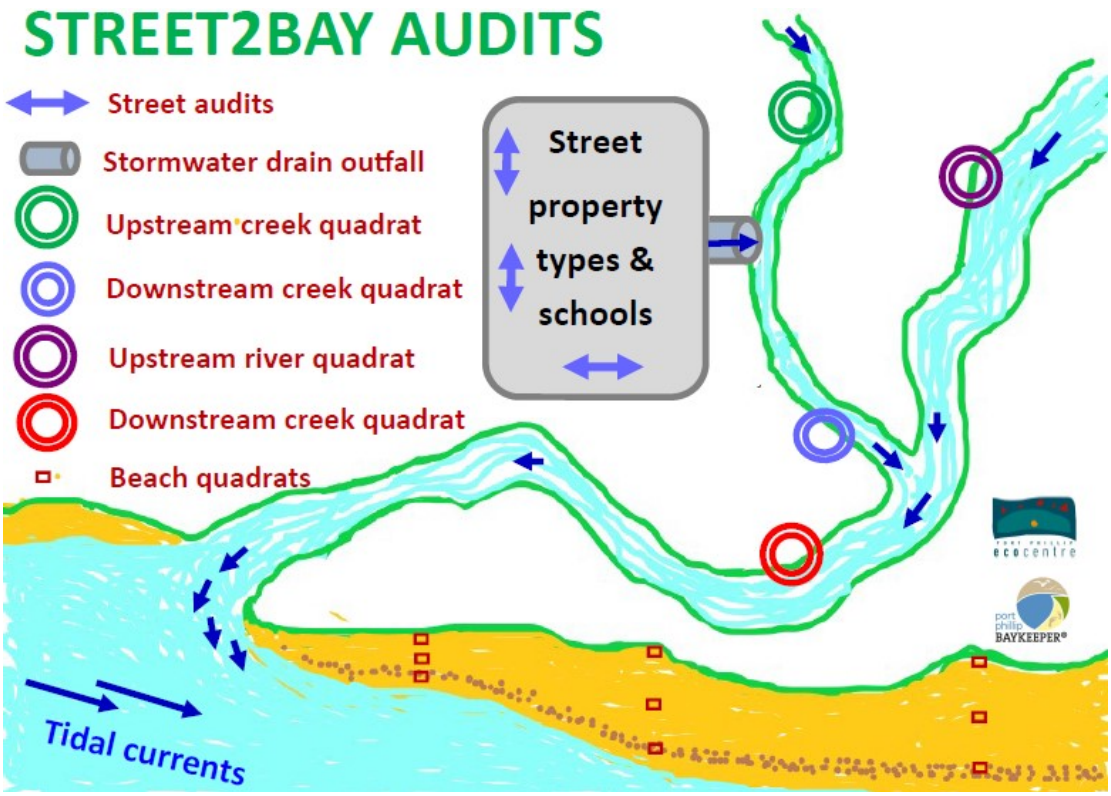


Around 20% of Australians live in catchments around Port Phillip Bay; and many are unaware of the threat of plastics or the stormwater connection to the Bay.

Involving local communities in the ‘Street to Bay’ audits provides a way to raise awareness of the need to stop plastic before it reaches waterways.

Street to Bay audits overview

Our urban streets have historically been built to allow rainfall to escape rapidly via stormwater drains. 'Street to Bay' aims to identify which street usages generate most litter and which drains carry most litter.



The above diagram shows ideal audit locations to track the path of plastic pollution to the Bay.

'Street to Bay' audit methods include: school grounds, streets (6 usage types)', river/creek bank, river trawls, and beach audits.

The data collection methods differ to address practical issues relating to the physical nature of the different audit locations, the data fields listed on the site-specific datasheets are essentially the same.

More information on each location is provided in following pages.

The 6 **'street usage' types** to be audited in all Port Phillip Bay catchments over the next 2 years:

- Residential;
- Retail;
- Industrial;
- Parkland;
- Sports grounds; and
- public buildings.

Items listed on datasheets

'Street to Bay' datasheets focus on items that harm wildlife, cause ecological harm, or risk to human safety.

MATERIAL TYPE		Total	MATERIAL TYPE	
Plastics			-sauce sachets	
Bags			-smoothie cups / lids	
-ice			-soy sauce fish / caps	
-retail store			-takeaway tubs / lids	
-shopping (grey)			**USER ITEMS**	
-shopping (white)			-bubble wrap	
-zip lock			-dental floss	
Bottles			-pens / markers	
-bleach/cleaner			-syringes	
-caps			**PLASTIC PIECES**	
-fruit juice / milk			-nurdles	
-softdrink			-hard pieces <5mm	
-water			-hard pieces 5mm +	
Cigarettes			-soft pieces <5mm	
-butts			-soft pieces 5mm +	
-cellophane wrap			**POLYSTYRENE**	
-lighters			-beads	
Drink cartons			-cups	
-fruit juice / milk			-food boxes / trays	
-straws			-pieces < 5mm	
Fasteners			-pieces 5mm +	
-cable ties			-packaging	
-rope / twine			**Glass**	
-strapping (scrap)			-bottles (beer)	
-strapping (whole)			-bottles (soft drink)	
-tile spacers			-broken pieces	
Food packaging			-jars	
-clingwrap/film			-wine bottle	
-confectionary wraps			**Metal**	
-coffee cups / lids			-aluminium foil	
-food (soft)			-bottle tops/ ring pulls	
-forks/knives/spoons			-cans (aerosol)	
-jars / lids			-cans (beer/ spirits)	
-lollypop sticks			-cans (soft drink)	
-6 pack can-holders			**RUBBER/ELASTIC**	
-sauce sachets			-balloons and/or ties	
-sauce sachets			-hair ties	
-6 pack can-holders			-foam rubber pieces	

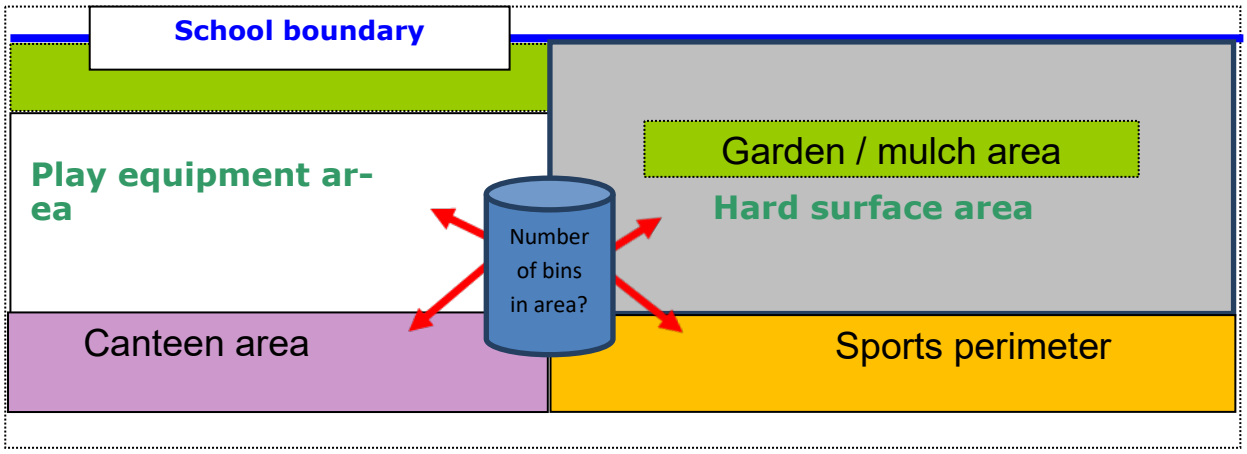
Note number and type of bins in zone.	Number of people using zone?	Recent weather?
	Main activities?	eg light wind

School ground audit method

Results of school audits will provide a basis for a local litter source reduction plan for your school.

SCHOOL AUDIT ZONES: Four different school activity zones have been identified by the main activity that occurs in them. The area in square metres of each zone is calculated to assist analysis and reporting of the survey results. How many items per 9 square metres?

The number and type of bins in each zone should also be recorded.



EQUIPMENT:

Tape measure, clipboard, datasheet, pen or pencil, gloves, collection buckets, separate bags for recyclables and hard waste.

Note: use a separate datasheet for each of the 4 zones.

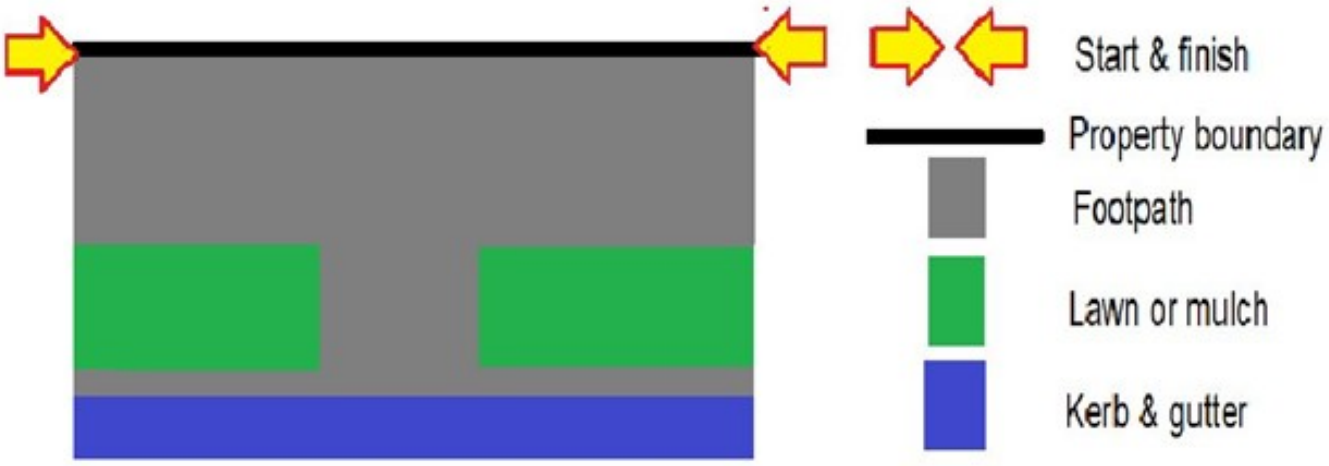
METHOD:

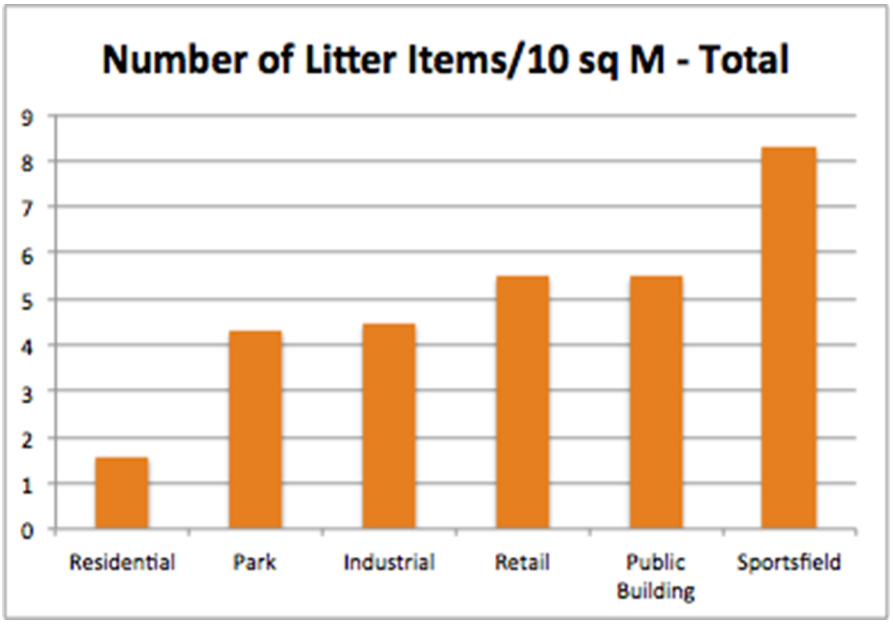
1. Divide the schoolground into 4 different audit zones: playground, sports, canteen and assembly areas.
2. Write the school name and suburb on datasheet.
3. Measure the length and width of each zone and record on the datasheet.
4. To save time: collect all items into bucket before sorting, counting and data recording. Count all of a particular litter type, eg 'lollypop sticks' before telling the data recorder how many were found.
5. Collect and record data in one zone at a time until all 4 are completed.

Street audit method

Each street audit collects data from in front of just one property so a small team can complete an audit in around half an hour. This will enable regular audits to show litter increase or decrease over time.

To track the mobility of different litter types, data is gathered from 3 zones: the footpath, lawn or mulch areas, and the kerb and gutter.





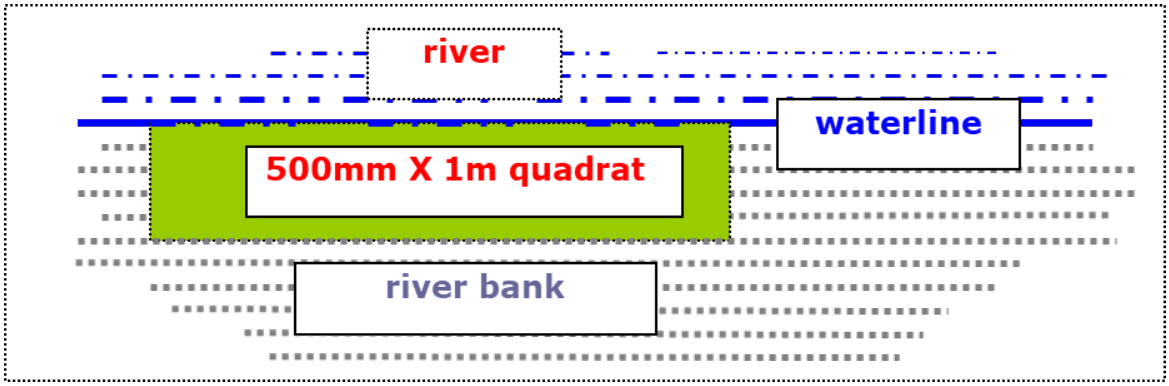
As shown on the left, repeat audits of the six different ‘street usages’ across the catchments will identify which usage generate the most pollution to inform local source reduction plans.

The Victorian Government’s Port Phillip Bay Fund is supporting Scouts Victoria’s ‘Street2Bay’ project complete 500 audits of the abovementioned property types by June 2020. The value of this project would be significantly supplemented by local schools submitting data from school ground audits.

River and creek bank audit method

Creek/river bank audits compare contents of quadrats located upstream and downstream of a stormwater outlet. More of a particular litter type in the downstream quadrat indicates the outlet is the probable source.

The biggest challenge in conducting this audit method is finding suitably accessible and safe river/creek bank location. BEFORE YOU START: Have First Aid Kit and gloves on-site. Check entire site to note possible hazards, eg SNAKES! Each quadrat (500mm x 1m) is located on and above the existing waterline at an accessible point on the shoreline where litter is seen to be accumulating.



GUIDE TO AUDIT SET-UP :

1. Note a permanent landmark at the top of the streambank. To ensure future audits are conducted in the same place, clearly describe the permanent landmark in the "Start landmark" field at top left side of the datasheet.
2. Quadrats can be moved up or down the bank to capture litter accumulated on the most recent high streamflow strandline. As you walk from the 'start landmark' to the waterline look for the most recent high flow strandline (usually a trail of leaf litter) along the bank).
3. If weather conditions are poor, eg. windy or wet, litter items can be collected in a bucket to count later (under shelter).

TIPS ON DATA RECORDING:

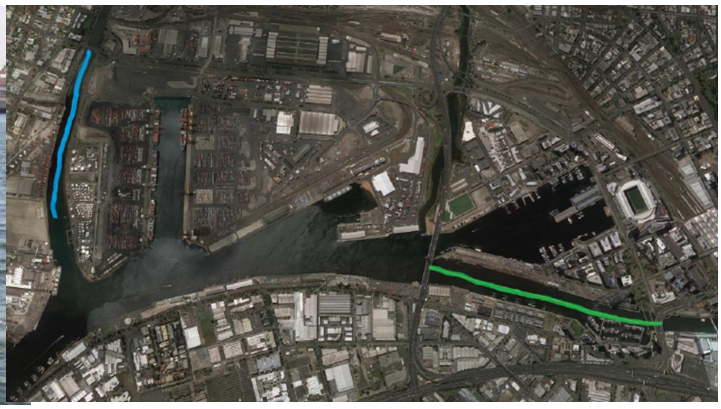
1. Complete all details at the top of datasheet!
2. Be sure to record the number of each item found in the correct quadrat column.

   Quadrat 1 column is for data collected ***UPSTREAM*** of the stormwater outlet.

   Quadrat 2 column for data collected ***DOWNSTREAM*** of the stormwater outlet.
3. Blank fields under each MATERIAL TYPE column are for recording harmful litter items found that are not listed on the sheet.
4. Any additional unlisted items are to be recorded in the appropriate column under NOTES FOR EACH QUADRAT.

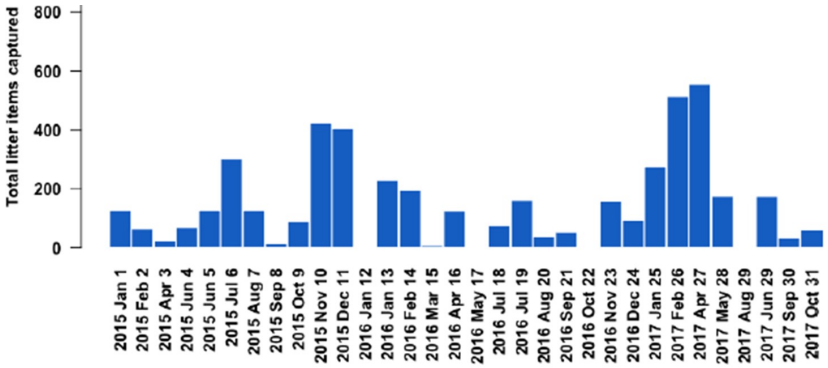
Manta-net trawls in rivers & Port Phillip Bay

Since January 2015 Port Phillip Baykeeper and the Yarra Riverkeeper have conducted half hour trawls each month in the Yarra and Maribyrnong Rivers. Also, in 2018 regular trawls have been initiated at Port Phillip Heads to monitor plastics entering the bay from Bass Strait.

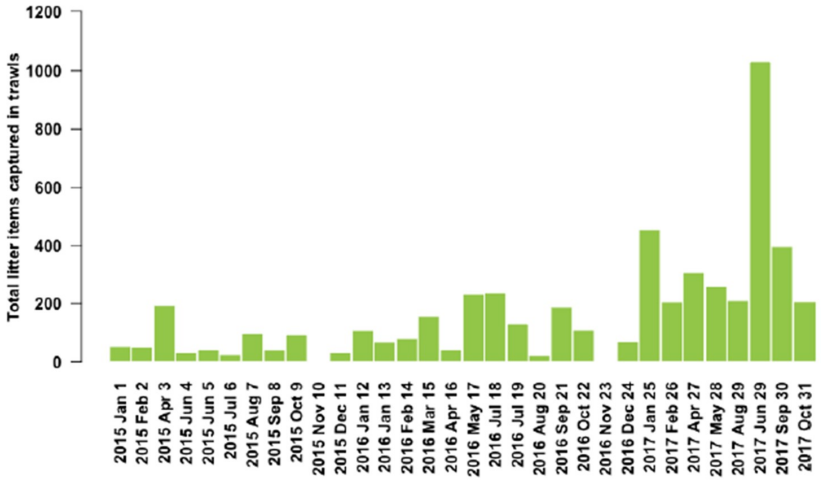


The manta-net (with 1/3rd mm mesh) skims the top 20cm of water column. The trawl locations (above) are at the lower reaches of the rivers to provide a measure of the total litter load from their whole catchment. EcoCentre's report on this study (July 2018) estimated the combined litter load of the rivers is 828 million items annually, 74% of which are microplastics.(5mm or less).

Maribyrnong trawl results averaged 122 items per trawl with a high variability between months with least and most items collected. The results show notable peaks in summer months.



Yarra trawls averaged 204 items per trawl with notably higher counts recorded since January 2017. Significantly greater amounts of polystyrene were recorded in the Yarra than the Maribyrnong.



The Victorian Government's Port Phillip Bay Fund enables the river trawls to continue until June 2020 to provide a clear indication if pollution is increasing or decreasing.

Beach audit method

Five beach audit sites around Port Phillip Bay are associated with a river or a creek flowing to the Bay from an urban catchment; and 2 are located to provide insights on the mobility of litter carried by tides and winds.

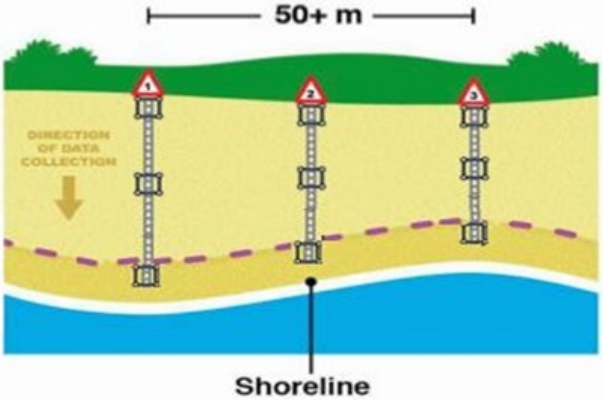
The program offers scope for schools and other groups to conduct litter audits and other Baykeeper citizen science activities at these sites and other Port Phillip Bay beaches.

1.St Kilda West beach (Yarra).
2.. Keast Park, Seaford (Patterson River).
3. Frankston beach (Kananook Crk).
4.Mt Martha Sth beach (Balcombe Crk).
5. Rye beach
6.Geelong Eastern beach
7.Werribee south beach (Werribee River)

Sampling the 'whole-of-beach' condition

To provide a representative sample of all beach conditions, litter is recorded and removed from 9 quadrats (each X 1m2) in 3 transects at different sections of the beach: (the widest, mid and narrowest sections of the beach).

Only litter visible on the surface in each quadrat is recorded to ensure audits are completed in reasonable time; and a ***consistent 'search effort'*** is applied by the different groups involved in data collection across all sites. Digging for buried litter could result in ***highly varied 'search efforts' by different data collectors*** and compromise the statistical rigour required.



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