Project Report

Let's Strain the Drains

Monitoring Land-Based Sources of Marine Debris in Port Phillip Bay

The Victorian State Government describes Port Phillip Bay as "arguably the single most important environmental, social and economic asset in the region; possibly in all of Victoria (Port Phillip and Westernport Catchment Management Authority, 2019)." However, litter and other pollutants continue to plague the shoreline of Port Phillip Bay, with significant risk to the health of the Bay's habitat, marine life, tourism and economy.

While data from community-led beach and river clean-up initiatives has provided important information on types and quantities of human-made pollutants reaching Port Phillip Bay, there remains an information gap around the specific land-based sources of these materials.

A Victorian first, the Let's Strain the Drains project targeted upstream sources of pollutants by installing and monitoring 120 at-source litter traps in stormwater infrastructure of six metropolitan councils around the Bay. Being a significant transport pathway for pollutants, stormwater is a key piece of the marine debris puzzle as it acts as an outflow point for litter in urban runoff. Monitoring work took place from November 2019 to May 2020 and involved community audit events that sorted and counted captured pollutants according to Tangaroa Blue Foundation's Australian Marine Debris Initiative (AMDI) Database methodology.

The project was funded by the Victorian State Government and was delivered by Tangaroa Blue Foundation, Cleanwater Group and Sustainability Victoria with support from the Cities of Wyndham, Hobsons Bay, Moreland, Maribyrnong, Kingston and Greater Dandenong, and data analysis support from the University of NSW.

Image 1: Litter captured in an at-source litter trap installed in a stormwater drain

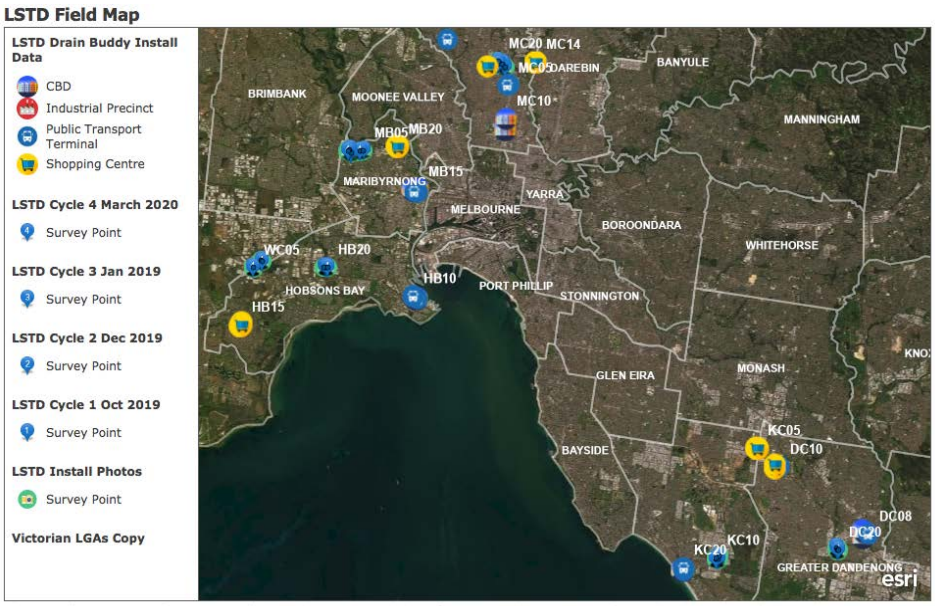
Map 1: Participating Councils included Wyndham City; Hobsons Bay City, Moreland City, Kingston City, Maribyrnong City and Greater Dandenong City

In order to obtain land-use relevant data and compare evenly across multiple Councils, five traps were placed in each of four different land-use types selected on the basis that they typically generate the highest concentrations of litter:

- Central Business Districts (CBDs)
- Industrial Precincts
- Shopping Centres
- Public Transport Terminals

In total, each Council had 20 traps within their local government area, making for a total of 120 traps distributed around Port Phillip Bay.

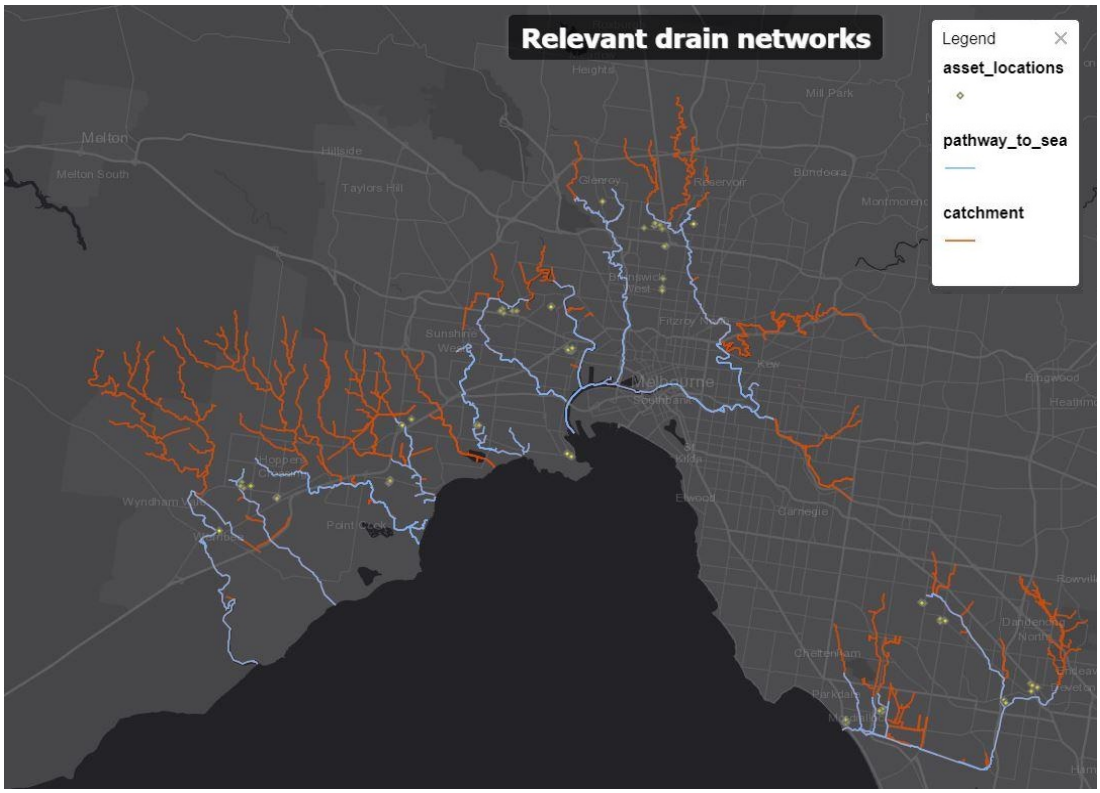
Image 2: Example of an at-source litter trap that is installed in stormwater drains



This map illustrates asset locations, installation and servicing cycle data for at-source litter traps used across 6 LGAs in the Let's Strain the Drains Project.

Earthstar Geographics

Map 2: A sample of the interactive field map used during the project and illustrating the traps according to land-use type.



Map 3: This map shows the drainage network that links the stormwater drain locations where traps were installed to Port Phillip Bay.

Monitoring work took place from November 2019 to May 2020 and involved community audit events with the help of 94 volunteers that sorted and counted captured pollutants according to Tangaroa Blue Foundation's Australian Marine Debris Initiative (AMDI) Database methodology.

The Let's Strain the Drain project included six cycles of asset servicing, data collection, and community engagement. The fifth and sixth cycles occurred after social and economic restrictions were put in place due to the coronavirus (COVID-19) pandemic. The project concluded in June 2020 and culminated with an online showcase event that shared the results with the broader litter prevention and management community of practice and included presentations from all partners including councils and community groups.

Results

During the project period a total of 75,931 macro-litter items and 677,114 micro-litter items were captured with the top two macro-litter items being cigarette butts and miscellaneous paper (Fig 2). Hard & soft plastics were the dominant material category found across all sites and were noticeably highest in the CBD (Fig 3).

This unique dataset provides valuable insights that can be used at both local and state government levels to inform strategic plans that tackle litter at the source and prevent further pollution around Port Phillip Bay beaches and waterways. One insight from the Dandenong and Maribyrnong council areas was the particularly high occurrence of litter from bubble tea stores, which has inspired a project volunteer to undertake a source reduction plan for this litter type (Fig 7).

Council	Macro Items >5mm Collected	Micro Items <5mm Collected	Weight Collected kgs*
Dandenong	16,709	422,677	710.3
Hobsons Bay	8,699	132,445	595.6
Kingston	10,247	22,099	588.77
Maribyrnong	15,899	41,778	525.87
Moreland	15,342	9,995	533.58
Wyndham	9,035	48,120	514.4
Project Totals	**75,931**	**677,114**	**3,468.52**

Table 1: A summary of statistics of the recovered non-organic litter items
***Weight includes both organic and non-organic material**

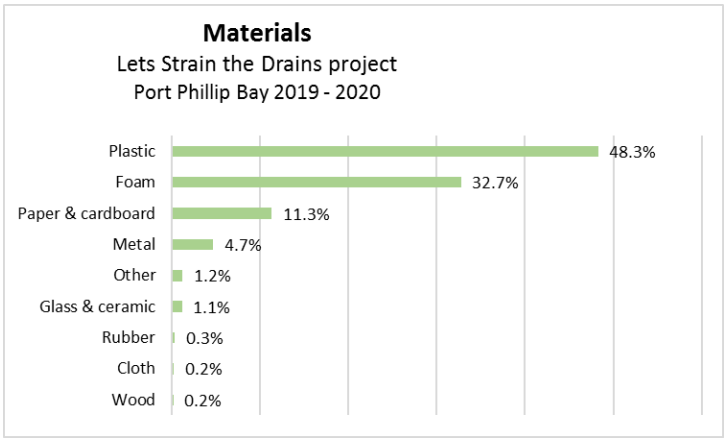


Figure 1: Breakdown of items collected by material type

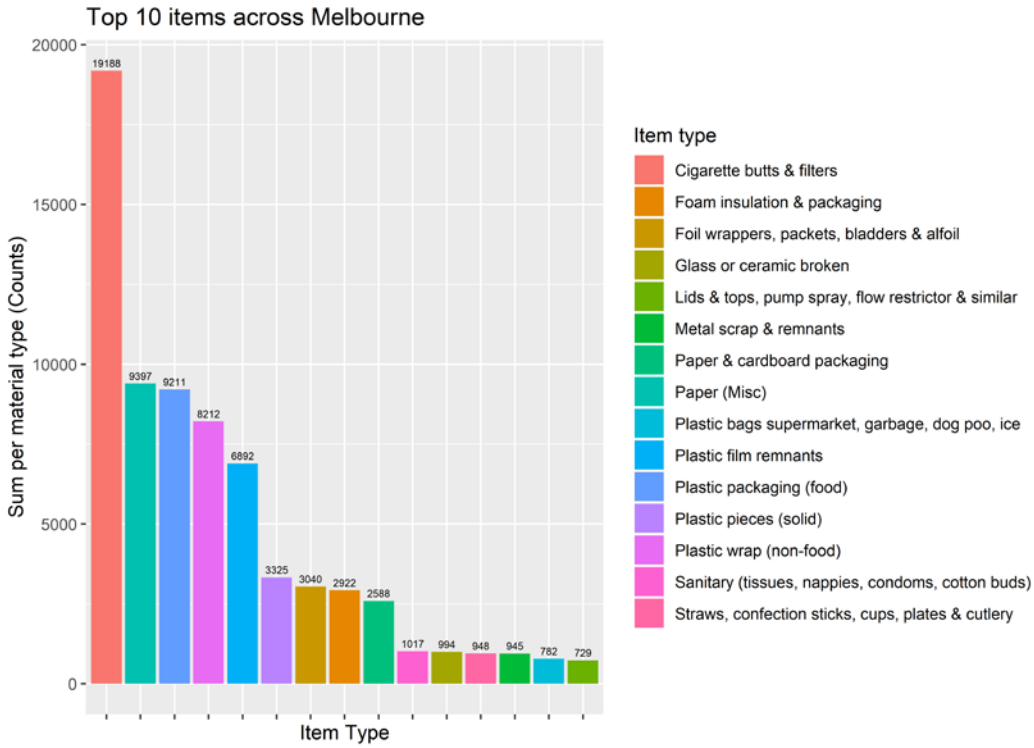


Figure 2: Top 10 items collected. Cigarette butts were the most recovered item with a count of 19,188, which was more than 9,500 items higher than the next most common item, miscellaneous paper (including paper remnants) at 9,397.

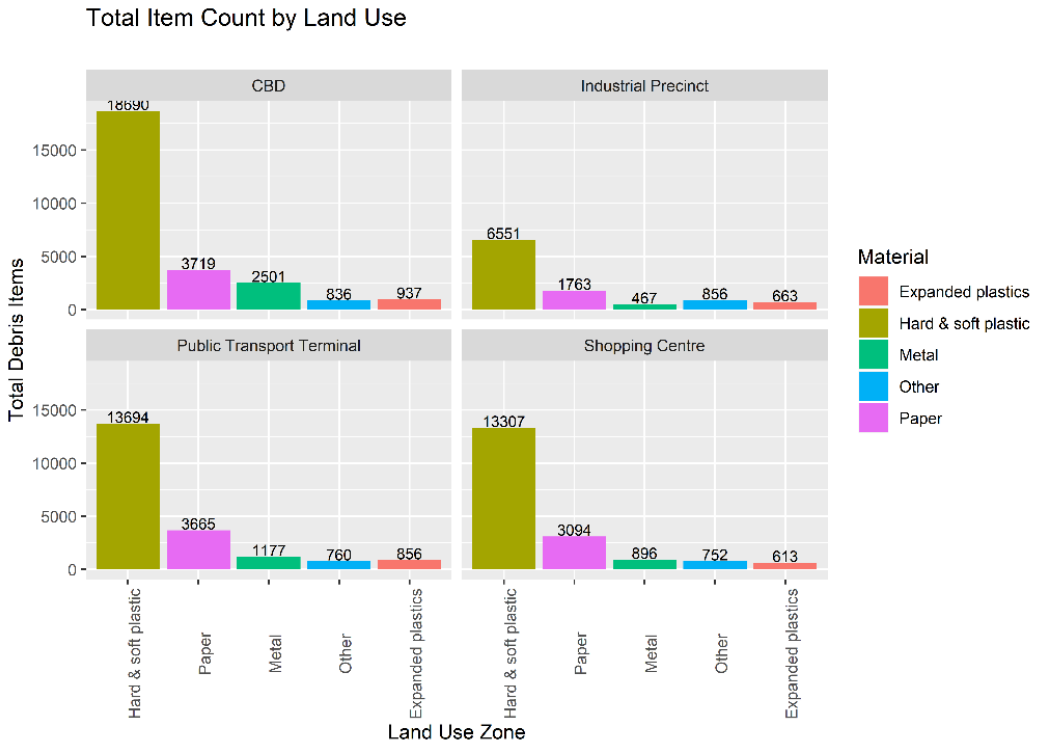


Figure 3: The total item count (material) by land use type across all survey rounds/sites

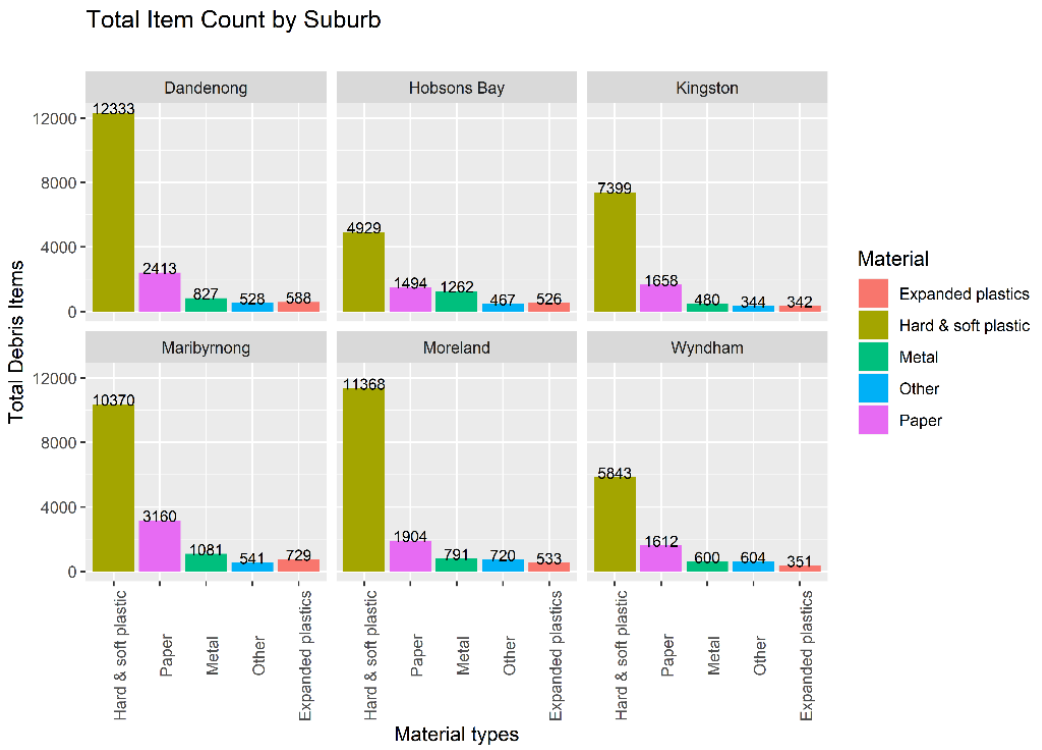


Figure 4: The total debris items by material type, separated by local government area

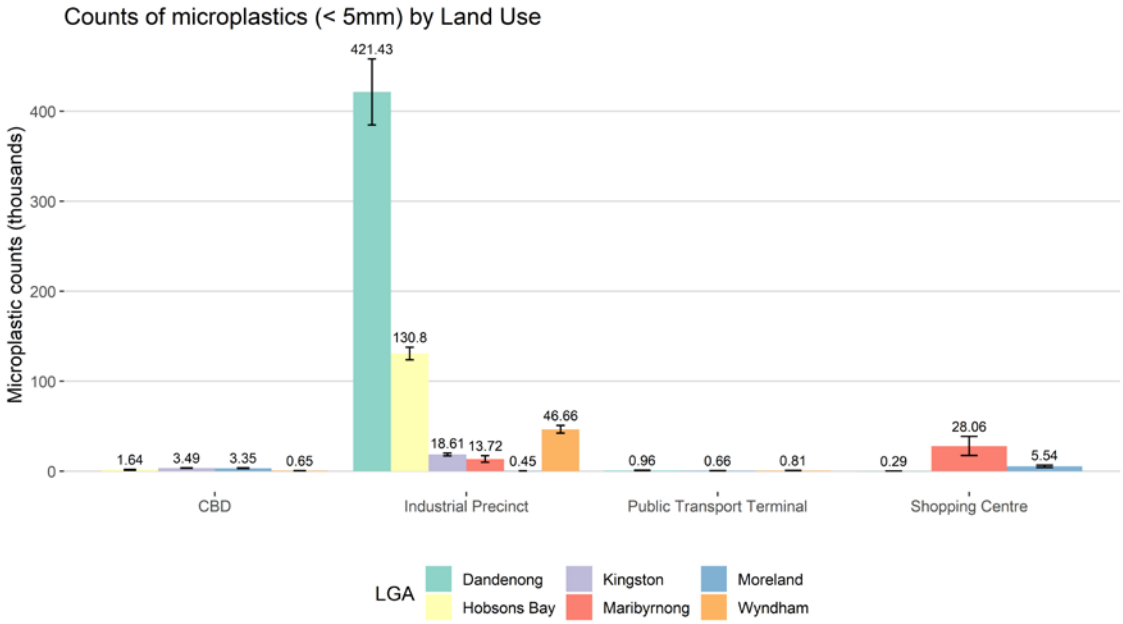


Figure 5: Microplastic data by local government area separated by land use type, including plastic resin pellets, plastic chips/shards from the plastic recycling industry, glass balls used in road marking and polystyrene balls.

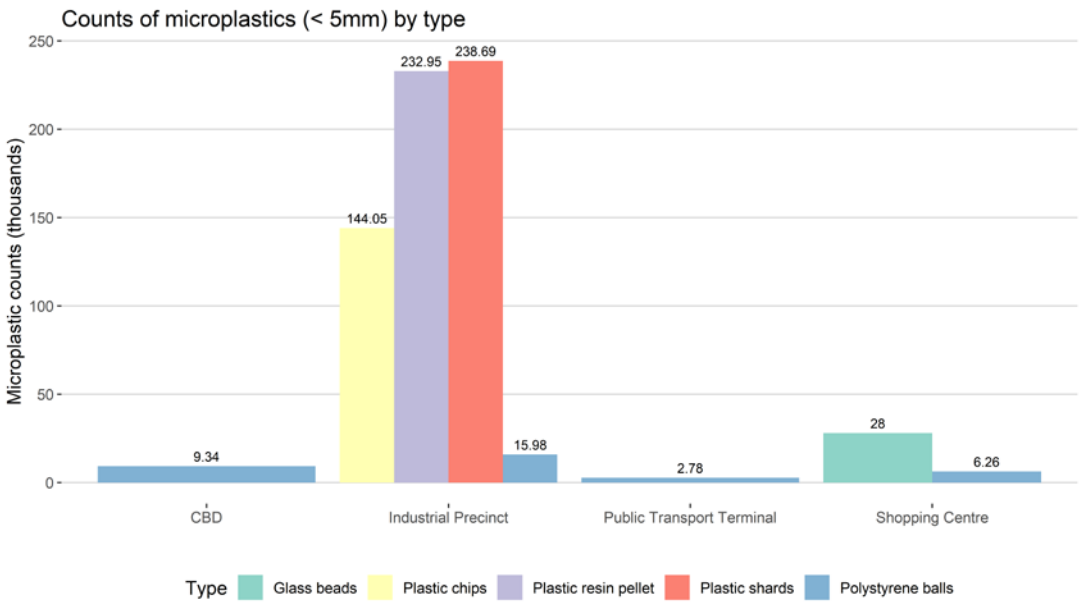


Figure 6: Microplastic data by land use type separated into microplastic type.

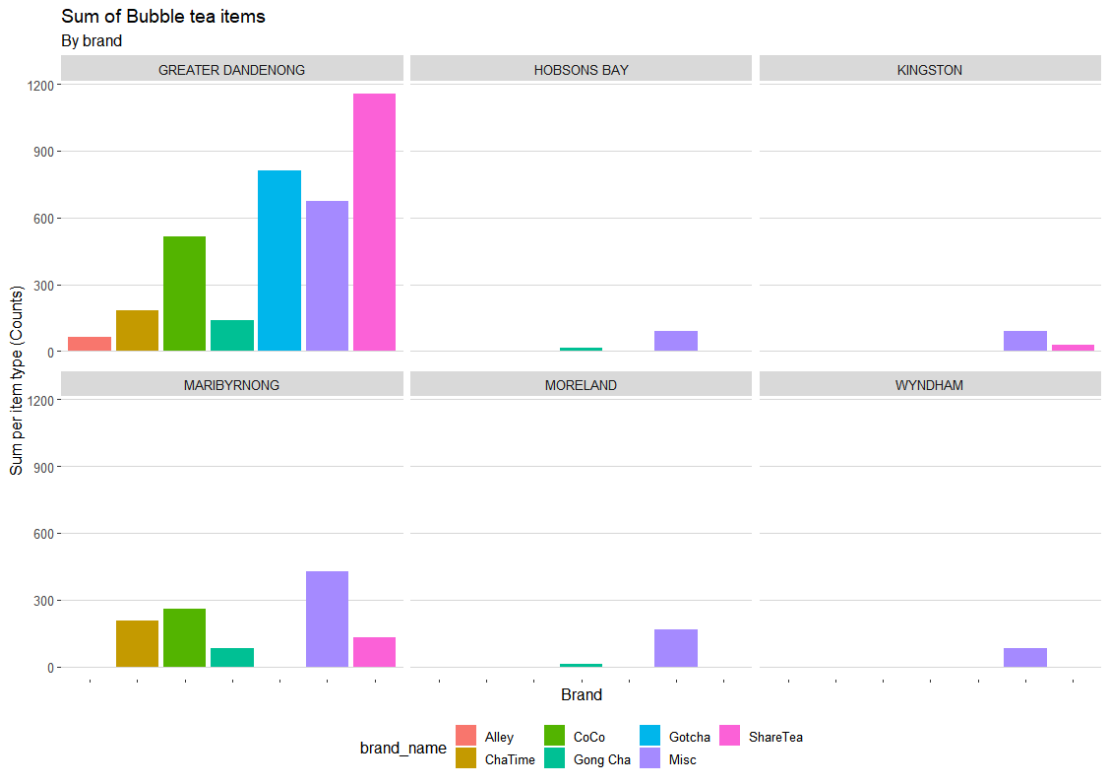


Figure 7: Sum of bubble tea items by brand, misc. category includes all non-branded items

This unique citizen science project provided a partnership platform between community, not-for-profits, local governments, state government and industry – key stakeholders that play a vital part in improving Port Phillip Bay's litter levels.

The project highlighted that whilst stormwater drain assets may be 'out of sight, out of mind', they are valuable in reducing litter flowing to the Bay or blocking stormwater pipes. The robust and reliable dataset and methodology of this project provided a more accurate understanding of litter and waste entering Port Phillip Bay, and solutions that assist in mitigating this flow into the future. It is intended that the at-source litter traps installed for the project continue to be monitored and serviced as valued prevention and diagnostic tools for the individual Councils participating in this project.

Finally, the engagement of community volunteers has also provided an opportunity for upskilling and a greater understanding of the litter problem and how individuals can contribute to solutions that address this pressing social and environmental issue across the Bay. The 94 volunteers who supported this project were integral to its success. This project recognises the invaluable contributions of Victoria's volunteer networks and harnesses their commitment to improving the environment at each of the auditing events.

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Image 3: Volunteers and project partners auditing litter during cycle one of the project

References

Port Phillip and Westernport Catchment Management Authority. (2019a). Port Phillip Bay. Available Online: https://www.ppwrcs.vic.gov.au/assets-areas/port-phillip-bay/

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