

PORT PHILLIP BAY ISSUES PAPER : MICROPLASTICS



Overview of Microplastic Pollution in Port Phillip Bay

This paper outlines Port Phillip EcoCentre and collaborators' perspectives on microplastic pollution affecting Port Phillip Bay and its water catchments and the regulation of plastic products.

Background

Microplastics are tiny pieces of plastic that are smaller than 5 mm.¹ Nurdles, plastic beads that are melted down for use in injection molding, are one example. But microplastics can also come from larger pieces of plastic that break up into smaller and smaller pieces over time. Most microplastics in Port Phillip Bay, upwards of 95% according to a study by Sustainability Victoria, began as plastic litter on the streets that was washed into urban stormwater systems, and then into creeks and rivers running into the bay.² Along the way this litter break up into smaller and smaller pieces until it is eventually reduced to microplastics. An estimated 2.5 billion pieces of microplastics are brought into the bay in this manner every year.³ Microplastics are extremely harmful to marine life and are difficult to remove from bodies of water because many cannot be seen by the naked eye, and the fine mesh filters required to capture them impede stream flows, potentially causing floods upstream.

Probable Threats to the Waterways and Bay Health

Microplastics are particularly dangerous to Port Phillip's diverse marine ecosystem, as their small size makes them more easily ingested by a range of wildlife. The process in manufacturing plastic requires the use of numerous chemicals, including but not limited to phthalates, organotin and BPA.⁴ The types of chemical residue found on these particles may vary greatly, but many are known carcinogens, endocrine disruptors, and neurotoxins.⁵ As described in Barboza, L., et al.'s 2018 article, many microplastic particles contain chemical residue on them. When ingested, the chemical residue can be absorbed through the gut and enter into the circulatory system of the organism, from which it is carried to tissue throughout the body.⁶ This is dangerous for not only the fish eating the plastic but could potentially be a health concern for any other creature or human that eats these fish later.

Microplastic pollution is not an issue specific to Port Phillip Bay. However, as explained by the Baykeeper Neil Blake, Port Phillip Bay is unique, as it is essentially a closed system. Unlike other places where microplastics can flow out into the open ocean, in Port Phillip Bay they are trapped and could build up within the Bay.

Responsible Management Agencies

There are many stakeholders working on managing this and related issues, across several different sectors. These include non-profit environmental organizations, research organizations, and government agencies, as well as some local entrepreneurs.

State government agencies have the responsibility of policy setting and major waste management infrastructure. Local governments are responsible for day-to-day street cleaning and waste collections. Local community volunteer groups conduct clean-up activities and data collection and advocacy. Non-profits conduct education and citizen science programs, as well as advocacy. A lot of data has been collected in this area for either operational or advocacy purposes, but various projects groups studying this topic use different data collection methods that aren't necessarily compatible.

Existing Policy Framework

There are two major pieces of legislation that relate to marine plastic pollution in Australia. The *Environment Protection and Biodiversity Conservation Act 1999* provides a general framework for dealing with threats to the ecosystem. It contains a list of key threats and threat abatement recovery plans.⁷ The second is the *Threat Abatement Plan for the Impacts of Marine Debris on Vertebrate Marine Life*, or TAP, which was released in 2009. It outlines several measures on how to prevent harmful impacts of marine debris, including microplastics.⁸

The first recommendation of the Federal Government Inquiry Toxic Tide: the threat of Marine Plastic Pollution Australia (2016) is:

*The committee recommends that any future Australian Government policies on mitigating the threat from marine plastic be underpinned by sound, peer-reviewed research.*⁹

In Victoria, a statewide ban on single-use plastic bags has recently been implemented. As single-use plastic products are a huge source of microplastics

in the environment, this is a large step in the right direction.

Additionally, recently a container deposit scheme has been implemented, encouraging people to properly dispose of plastic bottles and similar products.

Existing Knowledge

Several projects in recent years have focused on collecting data on litter and microplastics in Port Phillip Bay and its catchments. Beach Patrol – Love Our Streets have used the Litterstopper app to record the different types of litter collected in regular clean-ups on streets and beaches. The EcoCentre recently finished a three-year project called Clean Bay Blueprint in which they collected extensive data on microplastic pollution in the Yarra and Maribyrnong rivers and on seven reference beaches around Port Phillip Bay.² Street2Bay was a similar project conducted as a collaboration between the Port Phillip EcoCentre and Scouts Victoria, which focused on documenting the types of litter generated by six different street usage types.⁸

Common Forms of Litter

According to Love our Street founder Jill Sokol, cigarette butts are the most common item found during litter audits. The filters in these butts are made of plastic and will in time become microplastics.



Cigarette butts

Existing Management Responsibilities

Day-to-day litter and waste management operations are generally delivered in accordance with service contracts managed by local government agencies. Melbourne Water are responsible for maintaining healthy waterways that feed into the Bay. The Department of Environment Land Water and Planning have administered the Port Phillip Bay Fund which since 2017 has enabled many community-based litter projects.¹⁰

DELWP has also recently established a LitterWatch web platform for various organizations to publish litter data. Along with other responsibilities relating to regulation of waste, Environment Protection Agency Victoria is responsible for litter enforcement. Sustainability Victoria engages with all sectors to support policy development and education.¹¹

Non-profit & Community Initiatives

There are several groups dedicated to cleaning microplastics from the water and beaches. While working on Clean Bay Blueprint, the EcoCentre worked with the Yarra Riverkeeper Association to conduct monthly trawls of the Yarra and Maribyrnong rivers in order to measure amounts of microplastics carried by the rivers to the bay. Yarra Riverkeeper and Clean Water Group compiled a major report on polystyrene pollution in waters.¹² Werribee Riverkeeper Association conducts regular community clean-ups in collaboration with the local Beach Patrol – Love Our Streets. Tangaroa Blue has delivered several projects relating to microplastics across the greater Melbourne area. These include liaising with industry to adopt practices that prevent nurdles escaping to the environment; and the Let's Strain the Drains project which audited contents of filters installed in stormwater pits (more than 20 filters installed in 4 different street usage types).¹³

RMIT Plastics Lab has analyzed microplastics collected from different locations on eastern Port Phillip Bay to identify polymer types and any chemical contaminants they may be carrying.

In addition to the extensive activities of Beach Patrol – Love Our Streets there are numerous community groups dedicated to cleaning-up plastic and microplastic litter off the beaches.¹⁴

Source Reduction Discussion

Plastic is a material that is inexpensive and easy to work with, which has led it to be widely used in manufacturing and packaging. There are other environmentally friendly alternatives for many products made with plastic, but they are often more expensive. To stop the production of microplastics,

some form of legislation that either directly limits the use of plastic in manufacturing and/or incentivizes companies to produce environmentally friendly alternatives is necessary.

In order to get these types of legislation passed, stakeholders agree that there needs to be a unified approach and extensive data is needed to validate the severity of the issue to lawmakers. However, most of the stakeholders involved in this issue are non-profit, and therefore do not have the resources to organize a collaboration of this magnitude.

Case Study: Oxo-Degradable Plastic



Oxo-degradable plastic is a type of plastic containing small amounts of metal additives that makes the plastic more brittle, causing it to break apart faster.¹⁵ This type of plastic *Oxo-degradable Bag* is commonly promoted as environmentally friendly thought to be biodegradable. However, contrary to the name, oxo-degradable plastics are not biodegradable, as they are not broken *down* into their base natural components by bacteria and fungi over time. Instead, they simply break up into smaller and smaller plastic pieces until they become microplastics, but never fully decompose.¹⁶ In this regard, oxo-degradable plastics can be more dangerous, as they simply break up into microplastics faster. However, the distinction between oxo-degradable and biodegradable is not well defined in advertising, which means companies can often legally label their products as biodegradable, when they are oxo-degradable.¹⁷ Common examples of oxo-degradable products include cutlery and shopping bags.

Gaps and Barriers

While there are already several groups dedicated to collecting microplastics from the bay, rivers, and beaches, along with plastic litter on the streets, this is not enough to control the microplastic problem.

More research is needed to quantify the negative impacts that this type of plastic has on the ecosystem. However, with the current technology, identifying oxo-degradable microplastic samples is challenging, as doing so often requires breaking the sample down to the molecular level, making the process of analyzing oxo-degradable plastic very time consuming.

Recommendations to the area surrounding the Port Phillip Bay

A group of stakeholders working on these issue recently came up with some goals and next steps towards addressing the issue

A short-term goal is to organize an event where different projects studying litter and microplastics can present their findings. The presentations would be followed by a workshop of all participating groups to discuss where to from here. This would help to move towards a more united and strategic approach to advocacy; and raise awareness of the issue among the general public.

A more long-term goal would be to form an umbrella group to lobby for new legislation. As mentioned, this would be a challenge for any one organization, but if the group consisted of delegates from various organizations, it would spread the burden of organizing it among several different stakeholders; and increase confidence of potential funding sources. It would be a challenge to get this started, but in the end could prove essential to effectively addressing this pervasive issue of microplastic pollution.

Other links and information

This paper will be reviewed every 2 years and published by the Port Phillip EcoCentre. If you have a correction or further information, contact the Port Phillip Baykeeper at baykeeper@ecocentre.com

Endnotes

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