ACADEMIC POSTER

SAMPLE

Microplastics in an Urban Australian Estuary: Distribution and Likely Sources

Postgraduate sample · Australian academic standard

Background

Microplastics, plastic particles smaller than five millimetres, are now a recognised contaminant in Australian waterways. Estuaries are of particular concern because they receive stormwater, treated effluent and litter from densely populated catchments before discharging to the coast. The CSIRO and several state environment protection authorities have documented microplastic accumulation along the Australian coastline, yet fine-scale data on distribution within individual urban estuaries remain limited. Understanding where particles concentrate, and which land uses they track, is necessary for targeted source control.

Aim and Research Question

The study aimed to quantify the abundance and spatial distribution of microplastics in surface water across an urban estuary in south-eastern Australia and to infer their likely sources. The research question asked whether microplastic concentration varies with proximity to stormwater outfalls, and whether particle type points to catchment or marine origins.

Methods

Surface water was sampled at twelve sites spanning the upper, middle and lower estuary during two seasons, in late summer and again in winter.

- Samples were collected with a 100 micron plankton net towed for a fixed distance and volume.
- Organic material was digested using hydrogen peroxide, and particles were separated by density in a saline solution.
- Particles were counted and classified by shape under a stereomicroscope, and a subset was confirmed by Fourier transform infrared spectroscopy.
- Concentrations were expressed as particles per cubic metre and compared using a Kruskal-Wallis test.

Field blanks and cotton laboratory coats were used to limit airborne contamination, and glassware was rinsed with filtered water before each run.

Results

Microplastics were detected at every site, with the highest concentrations near upper-estuary stormwater outfalls.

Estuary zone	Mean particles per cubic metre	Dominant type
Upper (near outfalls)	2.9	Fibres
Middle	1.6	Fragments
Lower (near mouth)	0.8	Fragments and film

- Fibres made up 61% of particles in the upper estuary, consistent with laundry effluent and stormwater.
- Polyethylene and polypropylene dominated the confirmed spectra.
- Concentrations were higher in summer, following lower rainfall and reduced flushing.

Discussion

The upstream gradient indicates that the catchment, rather than the ocean, is the main source for this estuary. The predominance of fibres near outfalls is consistent with textile shedding entering the system through stormwater and treated wastewater, while buoyant polyethylene and polypropylene fragments reflect general packaging litter. The seasonal pattern suggests that residence time, governed by rainfall and tidal flushing, strongly modulates observed concentrations. Net sampling under-represents particles smaller than 100 microns, so total abundance is likely to be underestimated.

Conclusion

Microplastic contamination in this urban estuary is patchy and source-linked, concentrating near stormwater outfalls and dominated by catchment-derived fibres and fragments. Source control focused on stormwater treatment and textile fibre capture would target the largest contributors. Repeat sampling across more seasons and finer particle sizes would refine the load estimate and support catchment management.

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