Supplementary Information

Microplastics and PMT plastic-associated chemicals as co-contaminants in ice shaving waste from an urban ice arena

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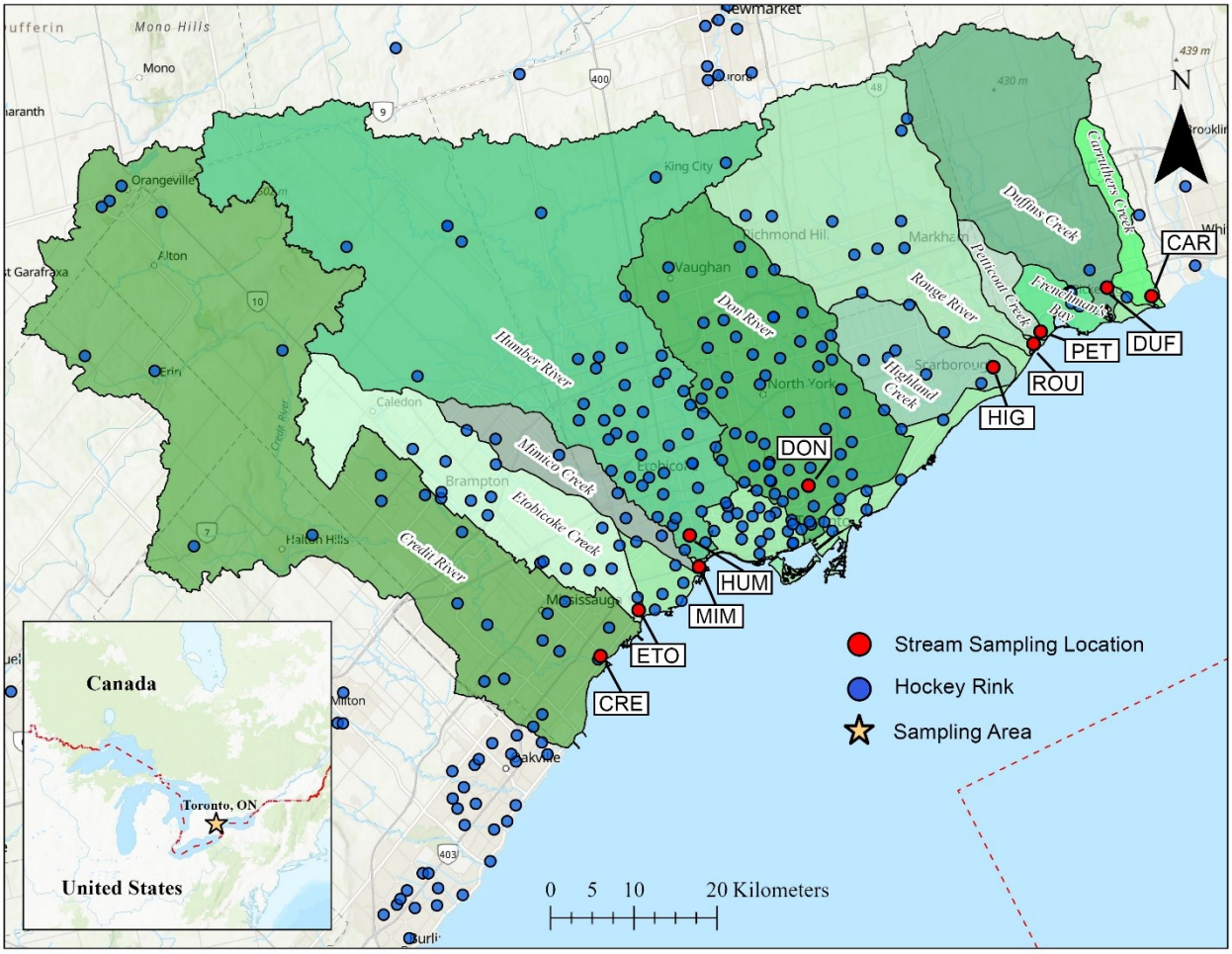

Fig. SA1. Sampling location map for environmental surface water sites across southern Ontario, Cananda covering ten watersheds.

Text SA1.Instrumental details of PMT suspect screening

The separation method used to analyse PMT leachates was previously reported. Briefly, the gradient began with 90% ultrapure water (with 0.1% formic acid) (A), and 10% acetonitrile (B). The organic content was increased to 40% B over five minutes, then to 100% B from five to twelve minutes, where this was held until 21.5 minutes. Finally, initial conditions were restored at 21.51 minutes, and allowed to equilibrate over seven minutes. A flow rate of 0.2 ml·min^{-1} was used with a 50 µL injection volume. The ion source parameters are: 1500 V of nozzle voltage, 275 °C sheath gas temperature at 12 L min^{-1},

150 °C drying gas temperature at 10 L min^{-1}, nebulizer pressure at 35 psi, 3500 V capillary voltage, and 75 V fragmentator voltage. Acquisition rate was kept at 1.5 Hz (667 ms/scan).

Text SA2. PMT suspect screening workflow details

The leachate samples were analysed for PMTs using the *Target/Suspect Screening* workflow and *Find by Formula* algorithm within the Agilent Qualitative Analysis 10.0 software. The workflow used a library of 124 PMT plastic-associated compounds previously reported in Fries et al. (2022)[1] to tentatively identify these substances in the leachate samples. Leachate blanks were analysed along with the samples to allow for blank-subtraction of the data. Additionally, all samples were spiked with a mixture of internal standards to account for variations in volume and instrument performance. Suspect hits were only taken if they had a matching score >80%, were measured in both sample replicates, were measured at more than one time point, and had a signal-to-noise ratio >3 (or, when measured in the blank, a signal > three-times the standard deviation of the blank signal). Further details and specific suspect screening parameters are also described in a previous work[2].

Table SA1 Common use and functions of the detected PMT plastic associated chemicals in ice shaving waste with significant difference comparing to source water

Name	Also known as	CAS	Functions and Applications[a]
1,1'-Oxybis[2-methoxu-ethane]	Diglyme	111-96-6	Lubricant, other processing aids, solvent
1,4-Diazabicyclo [2, 2, 2] octane	DABCO	280-57-9	Catalyst, colorant, crosslinking agent, filler, initiator, intermediates, other processing aids
1,3-Diphenylguanidine	DPG	102-06-7	Catalyst, crosslinking agent, filler, initiator, light stabilizer, other processing aids, plasticizer
1-Methyl-4-nitro-benzene	4-nitrotoluene	99-99-0	Other processing aids
Diphenyl-methanone	Benzophenone	119-61-9	Antioxidant, Biocide, Catalyst, Colorant, Crosslinking Agent, Filler, Initiator, Intermediates, Light Stabilizer, Odor Agent, Other Processing Aids
Nitrobenzene	-	98-95-3	Other processing aids
Tris(2-butoxyethyl) phosphate	TBEP	78-51-3	Colorant, flame retardant, intermediates, lubricant, other processing aids, plasticizer
Tri-(2-chloroisopropyl) phosphate	TCPP	13674-84-5	Blowing agent, colorant, filler, flame retardant, intermediates, other processing aids, plasticizer

[a] Adapted from Fries et al. (2022)

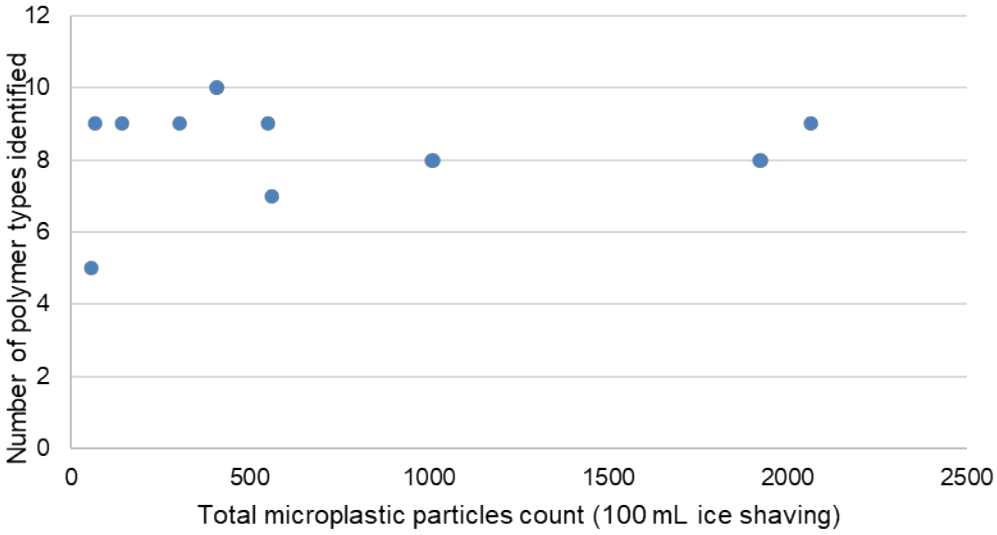

Fig. SA2. Scatter plot of total microplastic particles per 100 mL of ice shaving (x-axis) versus the number of polymer types identified (y-axis) across 13 sampling weeks.

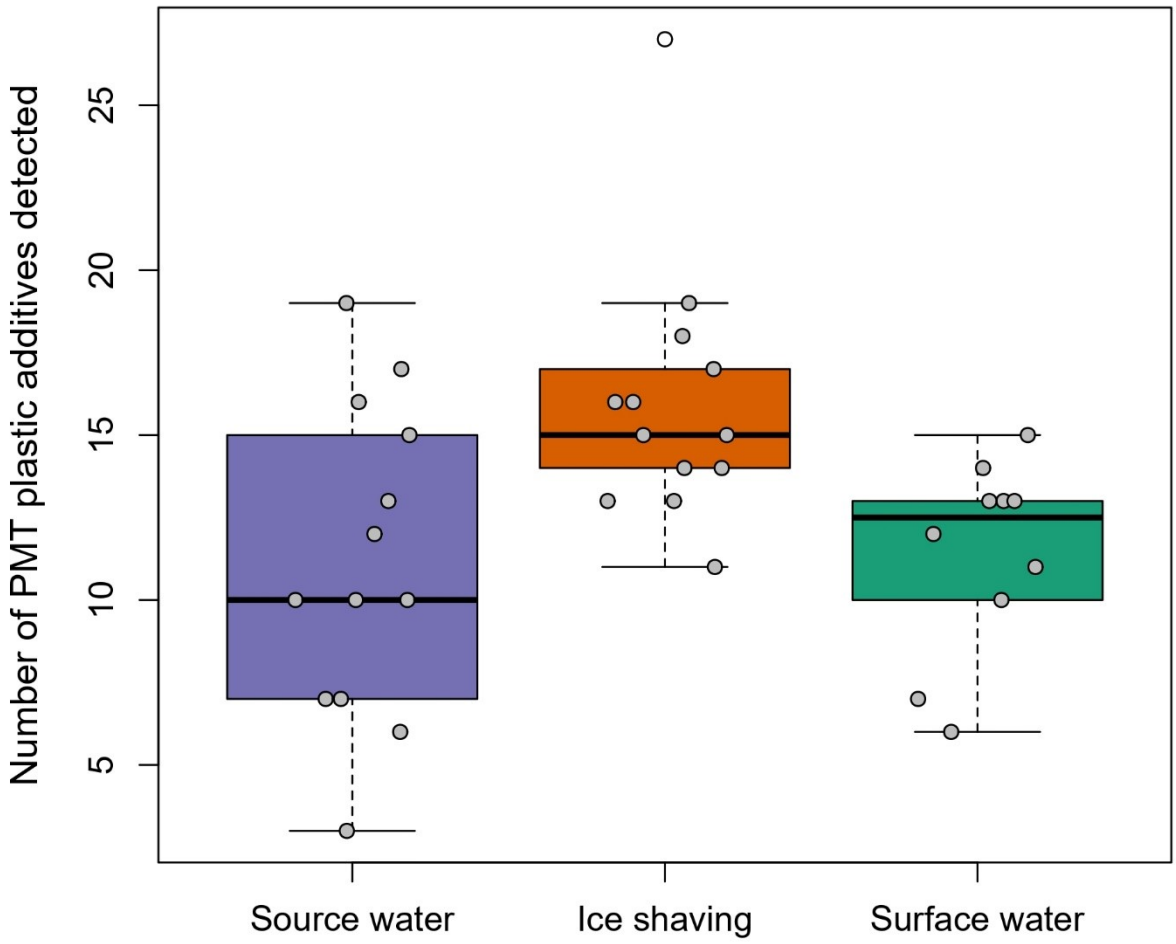

Fig. SA3. The number of total PMT plastic-associated chemicals detected in the source water, ice shaving and surface water samples.

References:

1. E. Fries, T. Grewal and R. Sühring, Persistent, mobile, and toxic plastic additives in Canada: properties and prioritization, *Environ. Sci.: Process. Impacts*., 2022, 24, 1945-1956, https://doi.org/10.1039/D2EM00097K

2. E. Fries and R. Sühring, The unusual suspects: Screening for persistent, mobile, and toxic plastic additives in plastic leachates, *Environ. Pollut*., 2023, 335, 122263, https://doi.org/10.1016/j.envpol.2023.122263