



2018-2023 MICROFIBRE FILTER REPORT

Georgian Bay Forever
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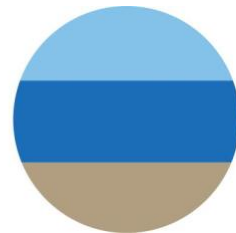
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About Us

Georgian Bay Forever (GBF) was founded in 1995 to address the growing need for major research and education projects to sustain the Georgian Bay aquatic ecosystem and the quality of life its communities and visitors enjoy. As a registered Canadian charity, it is our responsibility to educate residents of the Georgian Bay area and the public on issues of environmental protection, conservation, safety and preservation of the water and natural features in the Georgian Bay area of Ontario. GBF convenes conferences, workshops and seminars and conducts research, in conjunction with qualified educational institutions and others, into water and shoreline quality matters.

GBF works to bring innovative science and new technologies to help protect these natural treasures known as the Great Lakes and move beyond traditional approaches by embracing new partnerships, initiatives, and approaches. GBF will earn the right to participate in official processes through a continued focus on thoughtful, multidisciplinary, integrated thinking and scientific excellence in our work.

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Overview – What Are Microplastics?

Microplastics are small pieces of plastic, less than 5mm in size, which come from a variety of sources. When large plastic debris such as a single-use coffee cup is thrown away, that cup exists forever. Plastic waste never fully biodegrades. Instead, it breaks down into smaller and smaller pieces that accumulate in our environment. Once microplastics are in our environment, they are nearly impossible to remove because of their size.

Concentrations of microplastics in the Great Lakes have reached an estimated 1.25 million particles/km², which is equal and/or greater than the concentrations of microplastics found in the Great Pacific Garbage patch. Given their size, microplastics can easily enter the food web, impacting all living beings.

Research demonstrates that microplastics are found in our fish, beer, table salt, drinking water, and most recently, in our own bodies.

KNOW YOUR MICROPLASTICS

MICROPLASTICS ARE PIECES OF PLASTIC 5 MILLIMETRES OR SMALLER.

5 mm scale

COMMON MICROPLASTICS:

- FRAGMENTS**
Small pieces of a larger plastic object.
- FIBRES**
The most common type of microplastic. Plastic strands from clothing.
- FOAM**
Pieces of food containers and coffee cups.
- NURDLES**
Plastic pellets usually used in manufacturing.
- MICROBEADS**
Beads used in soaps and cosmetics. Now labelled "toxic" in Canada, soon to be banned in personal care products. Look for "poly" on the label.

MACROPLASTICS ARE ANY PLASTICS LARGER THAN 5 MILLIMETRES.
Examples: plastics bags, bottle lids, bottles, food wrappers, etc.

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History of Plastics

In the early 1950s we began to see a rise in plastic dependency due to the convenience, availability, low cost, and durability of plastic products. This 1950s image from Life Magazine reads, “The objects flying through the air in this picture would take 40 hours to clean, except no household wife needs to bother.”

With the widespread use of plastic, we started living in a convenience culture, where ease and instant gratification are prized above long-term benefits and sustainability. Although we have come a long way and are making strides towards a less plastic-centric environment, we still have significant work ahead of us.

Since the 1950s, humans have produced over 8 billion tons of plastic, most of which have already been disposed of and therefore still circulates in our environment today. When it comes to plastic pollution, out of sight is not the same as truly gone.



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The Textile Industry

The most common type of plastics we dispose of are single-use food containers and textiles. The textile industry is the second most polluting industry in the world. Globally, there are 80 million new garments of clothing produced per year. Fast fashion and our overconsumption have drastically changed the way we view and purchase clothing, resulting in the average person buying more clothes and using them for less time.

One of the most common ways microplastics are entering our environment is through our washing machines. The clothing we wear is composed of synthetic, mixed, or natural fibres. Synthetics are chemically treated, human made fibres such as nylon, spandex, and polyester – all of which contain plastic. Natural fibres such as wool, cotton, and bamboo do biodegrade; however, these products are also sometimes treated with dyes and chemicals to give them a desired look and feel.



These chemicals slow the degrading process of natural fibres, allowing them to accumulate in our waters for years. Cotton blue jeans are a great example of this process. Our jeans are synthetically dyed blue and are treated with chemicals to produce a soft or textured feeling. In addition, the jeans are composed of mixed fibres, allowing synthetic fibres to give our jeans that stretchy comfort. The cotton in the jeans will break down more quickly, leaving the synthetic stretchy fibres behind.

Microfibre Filters – A Simple Solution

Microfibre filters are an effective, simple solution to divert microfibres away from our water. GBF and The Rochman Lab tested numerous after-market filters in lab to determine microfibre catch rate. Based on our findings, we chose to utilize the Filtrol160 (Wexco Environmental, United States), which contains a 100um polyester mesh bag, and a microfibre capture rate of 89%.

PARRY SOUND – PILOT STUDY

A total of 97 households in Parry Sound, Ontario added an after-market washing machine filter to their washing machines, representing nearly 10% of the population connected to the Municipal Wastewater Treatment Plant.

Filters were installed in June and July 2019, and officially turned on, by connecting their filter to their washing machine, on August 1, 2019.

During this study, the treated effluent at the wastewater treatment plant was tested before and after the filters were installed. Volunteers were asked to collect and store their lint sample in the freezer, which were collected for analysis every 3-6 months. Three types of sampling analysis were conducted including mass, microfibre count, and wastewater effluent.

Lint Capture by Mass

Volunteers were instructed to empty their filter every 1-2 weeks using a metal spoon and to store their collection in a pre-labelled Ziplock bag in their freezer. We weighed each sample's wet weight in the bag and subtracted the weight of the empty bag. Due to COVID-19 concerns, the third and fourth collection sampled remained sealed in bags, and the average bag weight was used for subtraction.

Lint Capture By Count

10 households were randomly selected to estimate microfibre counts. For each household, three 5mg wet weight sub-samples were taken to determine a representative. Using a solution of 10% Alcojet and Reverse Osmosis water, individual particles were separated within each subsample. In the first collection of samples, microfibres in each subsample were counted under the microscope and categorized by particle colour and shape. In the second collection of samples, we also quantified the number of suspected anthropogenic fragments. With this information, we estimated a count of 28-423 microfibres per mg of lint.

Wastewater Effluent

Effluent from the Parry Sound WWTP was collected in 4 sample periods, March and July 2019 and August 2019 and March 2020. Sampling was performed at the UV-treatment stage. Three 24-h composite samples were collected on 3 consecutive days at each sampling event using a pre-programmed ISCO 3710 sampler, set to collect 150 mL per hour. 5 sieves with mesh sizes ranging from 1 mm to 45 µm, were stacked in decreasing mesh size. Once samples were extracted through sieve stacks, they were measured, rinsed, and separated for analysis under the microscope. Particles were placed on double sided tape for measurements and Raman Spectroscopy.

SOUTHERN GEORGIAN BAY COASTAL COMMUNITIES

A total of 304 volunteers from Southern Georgian Bay Coastal Communities were equipped with a Filtrol160 washing machine filter for the study from March 2021-2023.

For the sake of this study, we focused on Lint Capture by Mass as our form of analysis, followed by the estimated Lint Capture by Count developed by Lisa Erdle. Volunteers were added onto the program's roster list on a rolling basis, until 304 volunteers were reached by October 6, 2022.

Volunteers were instructed to empty their filter every 2-4 weeks, and to store their collection in a Ziplock bag in their freezer. We weighed each samples' wet weight in the bag and the average bag weight was used for subtraction.

Summary of Results

Throughout these studies, we diverted a grand total of 80.5kg of lint; with 22.8kg measured by 63% of households that provided samples in Parry Sound; and 57.7kg measured by 72% of households that provides samples in Southern Georgian Bay Coastal Communities.

Based on the range of 28–423 microfibers per mg of lint, this equates to 2,254,000,000 to 34,051,500,000 microfibers.

Scaling up to a large city like Toronto, the annual microfibre capture could be in the range of 12-166 trillion microfibres. In the Parry Sound study, final observations in WWTP effluent were reduced by an average of 41%. This significant difference in microfiber count pre- and post- filter deployment suggests that adding filters to washing machines reduces microfiber emissions to water bodies via treated wastewater. A possible explanation for a more substantial decrease than what we expected could be related to behavioral change because of behavioral awareness campaigns during the study.

LEGISLATIVE ACTION

On March 21, 2023, MPP Jessica Bell reintroduced Bill 83, Environmental Protection Amendment Act (Microfibres Filters for Washing Machines). The Bill's status is currently in the first reading vote and amends the Environmental Protection Act to prohibit the sale of washing machines that are not equipped with a 100 micrometer microfibre filter.

If you would like to support the Bill, please visit our website <https://www.georgianbayforever.org/divert-and-capture>

REDUCING YOUR PLASTIC FOOTPRINT

As you partake in beach activities in 2023, we encourage you to be mindful of your impact. An easy way to tackle this task is ensuring you pack in and pack out all your garbage. Leaving waste behind can cause it to end up in the water, or lodged under rocks for nearly 50 years, as we saw with the Valley Foods bag.

When you visit a beach, park, or cottage, please consider:

- Packing a picnic from home with reusable containers and beeswax wraps.
- Reuse items. Yogurt containers and other recyclables can make great tools for building sandcastles on the beach.
- Pack in and pack out all your garbage. Do not leave items behind.
- Carry a small container to collect visible litter on shorelines and trails while spending time outside.
- Clean up after your pets and children. Dog poop and diapers are common beach finds. Ensure they are placed in garbage bins!
- Ensure any garbage left is placed in a secure bin to avoid wildlife scavenging.

NEXT STEPS: SUMMER 2023

Summer 2023 will mark the fifth year for shoreline cleanups hosted by Georgian Bay Forever. Our goal is to increase recruitment of volunteers, expand waste diversion strategies to protect Georgian Bay and its shorelines, and support local community groups.

In summer 2023, you can expect to see bi-weekly to monthly raffle draws for local vendor prize packs, cigarette waste receptacles in the Town of Blue Mountains, and on-going support for those interested in hosting their own shoreline cleanups.

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Georgian Bay Forever Programs

Georgian Bay Forever has several programs to mitigate waste and plastic pollution in the environment. Join us by registering, volunteering, or attending our hosted events.

For more information on the following programs, please contact ashley.morrison@gbf.org:

- Organize and host a shoreline cleanup in your community.
- Tagging Trash Trips is a new initiative where we track how trash is dispersed in our waters, giving us the data, we need to divert it.
- The Critical Catch aims to reduce abandoned fishing gear polluting the shores of Georgian Bay.

For more information on the following programs, please contact sean.mullin@gbf.org:

- Participate in Sea and Gutterbin deep dive.
- Join Plastic Free Georgian Bay to support your business or school in creating an action plan to eliminate, reduce and replace plastics.
- Request a youth education program that focuses on clean water.

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Acknowledgements

THANK YOU, VOLUNTEERS!

Thank you to the volunteers from Parry Sound and Southern Georgian Bay Coastal Communities for your work in this project.

Through your efforts, you have demonstrated the impact that each one of us can make. We thank you for creating a lasting impact alongside us. Your support greatly enables our work.

THANK YOU, PARTNERS!

This project and many others are made possible by our wonderful partners, who continue to support and fund Georgian Bay Forever's research and outreach.

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