PollutionTracker Fact Sheet
Microplastics

What are they?

Microplastics are defined as plastic particles smaller than 5 mm in size. They are considered structural pollutants that do not readily biodegrade and are highly persistent in the marine environment. These plastic particles are categorized as either primary or secondary microplastics.

Microplastics

Primary microplastics are produced to be small and are the raw material used by the plastic industry. Primary microplastics come in the form of pellets (called nurdles) or are manufactured for use in pharmaceutical and cosmetic products (called microbeads). Primary microplastics are also used as the abrasive components in air blasting to clean industrial machinery.

FACT: It has been suggested that all plastic that has ever been released into the

environment still exists today.

Secondary microplastics result from the fragmentation of larger plastic products. Beach litter contributes to microplastic production as larger plastic pieces break down in the sun and waves. Laundry also produces microplastics when synthetic clothing sheds tiny fibers (called microfibers). Microfibers end up at the waste water treatment plant and reach the ocean if the facility is not capable of filtering these tiny particles out of the effluent.

The most common microplastics, also called synthetic polymers, found in the marine environment are polyethylene (PE), polypropylene (PP), polystyrene (PS), polyamide (PA, e.g., nylon), polyester (PES) and acrylic (AC).[1]

How do they get into the ocean?

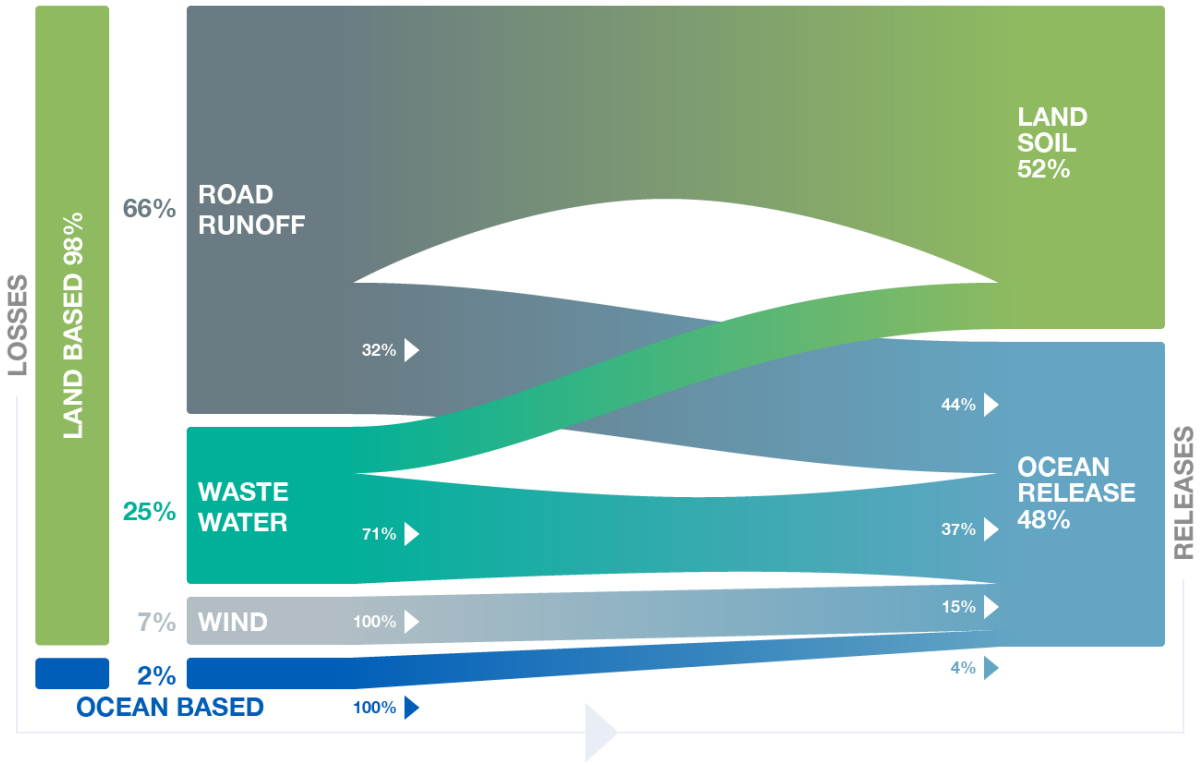
Land-based sources are believed to contribute the largest proportion of microplastics to the marine environment. Additional sources include marine litter and shipping and fishing activities. Microplastic particles can arise from the following processes:

- Deterioration of larger plastic fragments over time, with or without assistance from UV radiation, mechanical processes (e.g., wave action, grinding on shoreline sediments), or biological activity (e.g., boring, shredding by marine organisms)
- Direct release into waterways and the ocean via urban wastewater treatment as part of the effluent
- Accidental loss of industrial raw materials during transport
- Discharge of plastic-containing wastes (e.g., sewage sludge)
- Atmospheric particle shedding (e.g., fibres from textiles)

FACT: Washing synthetic clothing is thought to contribute large quantities of plastic fibers to the marine environment. A single washing cycle can release up to 700,000 microfibers.[2]

Global Releases to the World Oceans

Contribution of different pathways to the release of microplastics



Source: Boucher and Friot[3]

Are they a problem?

Microplastics are found globally in the marine environment at all depths, in coastal areas and remote locations such as Arctic sea ice. Microplastics can float in the water column, settle into marine sediments, or be consumed by organisms and enter the marine food web. In British Columbia, a recent study showed that microplastic levels can reach up to 9,200 particles/m^3 in seawater.[4]

Some effects of microplastics on marine organisms include nutritional stress, digestive system blockage, and entanglement. Microplastics can transport plastic-derived chemicals long distances. Contaminants already present in the marine environment can also bind to these matrices. Once ingested, plastic particles can release these chemicals into the organism with the potential to cause adverse toxicological effects.

Several studies have highlighted the presence of microplastics in seafood; however, few studies have fully investigated the potential effects of microplastics

on human health. One study in Europe showed that a consumer can ingest up to 11,000 microplastics per year based on shellfish consumption alone. [5]

What is being done?

With increasing awareness of the negative impact of microplastics on the marine environment, efforts to reduce microplastic use are being made. In 2016, the Canadian government classified plastic microbeads as toxic substances under the *Canadian Environmental Protection Act* (CEPA). This order aims to develop microbead regulations and prohibit use in Canadian personal care products.

Several cities across Canada such as Victoria, Vancouver, Montreal, Fort McMurray, and Toronto are taking steps to reduce plastic use by banning or considering banning single-use plastic bags. In addition, as part of its 2040 Zero Waste Goal, the city of Vancouver is considering banning other single-use plastics such as disposable cups, foam packaging and take out containers. [6]

Reducing our consumption of plastic products and promoting the use of ecofriendly products is an important step to moving away from our dependency on plastic materials. Improving the biodegradability of manufactured polymers will likely foster the development of alternative solutions.

What can you do?

Individuals and organizations can:

- Learn more about microplastics using the resource links below
- Avoid or reduce use of single-use plastic products
- Recycle plastic waste (don’t put it in the landfill)
- Choose consumer products that minimize plastics use
- Support companies that use recyclable materials and that are conscious of reducing plastic waste

More Information:

[1] GESAMP, 2015. Sources, fate and effects of microplastics in the marine environment: a global assessment. Kershaw, P. J., ed. (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). Rep. Stud. GESAMP No. 90, 96 p.

[2] Napper IE, Thompson RC. 2016. Release of synthetic microplastic plastic fibres from domestic washing machines: Effects of fabric type and washing conditions. *Marine Pollution Bulletin* 112 (1-2): 39-45).

[3] Boucher J, Friot D. 2017. Primary Microplastics in the Oceans: A Global Evaluation of Sources. Gland, Switzerland: IUCN. 43pp.

[4] Desforges JP, Galbraith M, Dangerfield N, Ross P. 2014.Widespread distribution of microplastics in subsurface seawater in the NE Pacific Ocean. *Marine Pollution Bulletin* 79: 94-99.

[5] Van Cauwenberghe L, Janssen CR. 2014. Microplastics in bivalves cultured for human consumption. *Environmental Pollution* 193: 65-70.

[6] City of Vancouver. Zero Waste 2040. Available at: http://vancouver.ca/green-vancouver/zero-waste-2040.aspx