

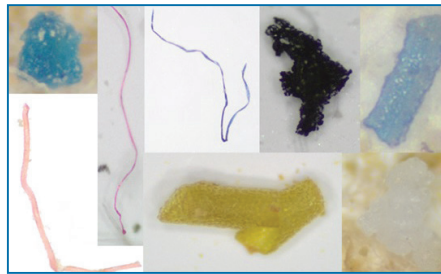
MICROPLASTICS FACT SHEET

Microplastics, which are plastic particles less than 5 mm in size, are found in many water bodies world-wide and are viewed as a contaminant of emerging concern (CEC) in San Francisco Bay. The San Francisco Estuary Institute (SFEI), partnered with the 5 Gyres Institute, are the lead scientific bodies investigating microplastic contamination in the San Francisco Bay. The two entities are collaborating with several other scientific and academic institutions in furthering science knowledge about analytical methods, sources, and effects of microplastics on the environment. The San Francisco Bay Regional Water Board is engaged in these scientific investigations, but is not currently proposing regulatory actions, pending the availability of more scientific information as to whether microplastics pose a threat to aquatic life and water quality.

METHODS OF DETECTION

Development of standard methods will allow comparison among studies to identify areas of concern and trends that can inform policy and management actions. The analytical methods used in early work studying microplastics in the San Francisco Bay did not differentiate plastics from naturally derived microparticles. As scientists began to use spectroscopy to identify the composition of individual particles, it became clear that accurately identifying a microparticle as a microplastic was going to be very challenging, expensive and time consuming.

- Method standardization is a high priority, and is underway. Recent legislation, SB1263, requires the Ocean Protection Council to develop methods as part of a Statewide Microplastics Strategy. The Southern California Coast Water Research Project (SCCWRP) is recruiting Publicly Owned Treatment Works (POTW) labs for method development assistance.



Particles cannot be identified as plastic by visual inspection.

- Because the extraction and identification of microplastics is labor-intensive, only a small subset of the total microparticles collected in recent studies have been analyzed.
- Standard spectroscopy techniques such as Fourier Transform-Infrared (FTIR) and Raman must be used in tandem with microscopy in order to tackle microparticles with a size of less than 1 mm. Micro-FTIR and Micro-Raman instruments are significantly more expensive than traditional spectrometers and require special training.
- Even with spectroscopy, in many cases it continues to be practically impossible to differentiate between natural and plastic fibers, especially if they are dyed.



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IMPORTANCE OF DIFFERENT SOURCES

Building on the scientific efforts to accurately identify microplastics and their potential negative impacts on the environment, it will be essential to identify the sources of microplastics. Accurate source apportionment will inform the most cost-effective means for reducing microplastics.

- Results of 24-hour composite sampling at eight Publicly Owned Treatment Works (POTWs) in 2017 showed that advanced secondary wastewater treatment plants had lower microparticle counts than plants without filtration. However, the total counts in effluent are still millions per day. In aggregate, it is estimated that approximately 47 billion microparticles are discharged annually to the San Francisco Bay by POTWs, of which 17 billion are estimated to be plastic.
- It is estimated that stormwater contributes approximately 300 times more microplastics to the San Francisco Bay than POTWs. Tire fragments are a large component of the stormwater microparticle load.
- Atmospheric deposition is a potential source, but is poorly understood.

TYPES OF MICROPARTICLES IN POTW EFFLUENT

It is important to understand the types of microplastics found in POTW effluent to better characterize and address their sources.

- The majority of microparticles discharged by POTWs are fibers, followed by fragments, then foam.
- Most fibers could not be identified as either natural or synthetic because the dyes mask the signal of the material.
- Of the fragments, 54% were positively identified as plastic.

POLICY ISSUES

As the science matures on identification of microplastics and their impact on the environment, policies will need to be developed that address the issue. Current policy thinking focuses on pollution prevention rather than end of pipe treatment at POTWs.

- Due to persistence, increasing use, and lack of known toxicity thresholds, the Regional Monitoring Program, through SFEI, is following a proposed European Union classification, and placing microplastics in the “moderate concern” tier within the Tiered Risk-Based Framework for CECs in San Francisco Bay.
- Recommendations for reducing microfibers in POTW effluent do not focus on end-of-pipe treatment. Instead they include regulatory and legislative advocacy to address sources, public education to reduce the introduction of plastic material into the environment, the development of clothing sheddability standards, as well as more study of washing machine filtration alternatives.



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