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A Survey of Microplastics in Wastewater Treatment Plant Effluent in the Lake Champlain Basin

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Microplastic Pollution: A Survey of Wastewater Effluent in the Lake Champlain Basin

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Abstract

Microplastic pollution in freshwater ecosystems is an emerging topic in aquatic pollution science. Origin of microplastics are often associated with consumer use of personal care products (e.g., facial cleansers, beauty products) and innovative students/faculty to develop more/effective filters for current appliances. Washing machine manufacturers, engineers, and innovative students/faculty to develop more/effective filters for current appliances. Some conclusions about the study are as follows:

1. Microplastics are characterized as films (A), pellets/blocks (B), fibers (C), fragments (D), and microbeads (E).
2. Microplastics are ubiquitous and perhaps pose an even more significant threat to marine life. An increasing concern is the potential for microplastics to be ingested by marine organisms, particularly because of the increasing anthropogenic plastic production.
3. Microplastics are often associated with consumer use of personal care products (e.g., facial cleansers, beauty products) and innovative students/faculty to develop more/effective filters for current appliances. Washing machine manufacturers, engineers, and innovative students/faculty to develop more/effective filters for current appliances.

Wastewater Treatment Plant (WWTP)

Table 1: Wastewater Treatment Plant (WWTP) characteristics based on type. Across the four WWTPs the majority of plastics found were microbeads (Figs. 1A, B).

<table>
<thead>
<tr>
<th>WWTP Size</th>
<th>Plattsburgh</th>
<th>Ticonderoga</th>
<th>St. Albans</th>
<th>Burlington</th>
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<tbody>
<tr>
<td>Max MDGQ</td>
<td>76</td>
<td>8</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>POPulation</td>
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<td>22,600</td>
<td>28,000</td>
<td>29,833</td>
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<td>2105</td>
<td>2104</td>
<td>2304</td>
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<tr>
<td>BD</td>
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<td>N Last Updated</td>
<td>2014</td>
<td>2014</td>
<td>2014</td>
<td>2014</td>
</tr>
<tr>
<td>N Treatments</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
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<tr>
<td>Wastewater</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Processing</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Methods

**WWTP Sample Collection:**

- Flow rates were assessed at the pump before and after collection.
- A pump and hose were used to divert water from the open tank for sample collection.
- The hose collects post-treatment effluent over a 355 m length for 24 hours (Figs. 4A, B).
- Samples were collected using wet peroxide digestion to remove organic material (Fig. 4C).

**Laboratory analysis of samples:**

- Contents of sewage were placed in three 125 cm3 deionized rinse with DI water and stored in shell vials (Fig. 4E).
- Microplastics underwent wet peroxide digestion (Figs. 4A, C).

**Microplastic Particulate:**

- Fourier transform infrared microscopy (FTIR) was used for further characterization (Fig. 7).

Discussion

- Microplastics are associated with consumer use of personal care products (e.g., facial cleansers, beauty products) and innovative students/faculty to develop more/effective filters for current appliances. Washing machine manufacturers, engineers, and innovative students/faculty to develop more/effective filters for current appliances.

Conservation Implications and Suggestions

- Encourage washing machine manufacturers, engineers, and innovative students/faculty to develop more/effective filters for current appliances.

Acknowledgements

We wish to thank our expert microplastic mentor Dr. Sherri Mason (SUNY Fredonia) for encouragement and supplies and allowing us to use the Water Quality Laboratory, Dr. Tim Mihuc and the LCRI team safe practices in the inaugural run of the acid-peroxide digestion, as well as providing laboratory equipment.

References

- Browne et al. (2011) noted > 1900 fibers can be emitted from washing a synthetic garment.
- Epps et al. (2014) found that 500 microplastics were contributed annually to waterbodies associated with local washing machine manufacturers, engineers, and innovative students/faculty to develop more/effective filters for current appliances.
- Browne et al. (2016) reported that 1900 fibers can be emitted from washing a synthetic garment.

Literature Cited