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Microplastics Data Gaps & Future Research Needs

The topic of microplastics as emerging contaminants is evolving quickly. As such, it is helpful to keep in mind the areas where additional information is needed to inform potential regulatory initiatives and to provide approaches to mitigation. The ITRC Microplastics Guidance document, published in February 2023, identified future research needs related to fate and transport, sampling and analysis, potential health risks, trophic transfer, and ecological exposure and effects. Potential research areas are listed below and in [Section 7 of ITRC’s Microplastics Guidance](#).

Fate and Transport

- Microplastics in groundwater: occurrence, types, concentrations
- Degradation characteristics: What constitutes *fully degraded* microplastics?
- Modeling to include environmental variables, physical and chemical characteristics
- Microplastics in sediment and in relation to aquatic systems
- Occurrence and characteristics of transport in the atmosphere

Sampling and Analysis

- Standardized microplastics reference materials to improve accuracy of extraction and identification methods
- Acceptable blank and reference recovery ranges; replicate numbers and variability
- Affordable instruments for identification/quantification and automated systems, such as use of machine learning
- Develop methods for nanoplastics detection. Nanoplastics may be the most numerous in the environment, and current approaches are not effective for this size range.

Potential Health Risks

- Develop basis for evaluation of effects on humans and assess effects of environmentally relevant concentrations
- Effects with variation in properties (size, morphology), biofilm presence, chemical additives
- Potential for accumulation in body tissues

Trophic Transfer & Ecological Exposure

- Bioaccumulation/biomagnification risks for ecological receptors
- Ecological risks for varying particle characteristics
- Ecological effects of weathered vs. nonweathered particles
- Microplastics as vectors for other pollutants in sediment/water

Mitigation, Abatement, & Management

- Low-cost, sustainable alternatives to plastic
- Economic studies to determine value of plastic waste
- Infrastructure and programs for sustainable plastic waste management (stormwater systems, wastewater treatment, etc.)
- Enhance public education and engagement with disproportionately affected communities

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