



Smart Management of Microplastic Pollution in the Great Lakes



5th Advisory Board Meeting Notes Wednesday, November 1st, 2023 At Clinton River Watershed Council Offices

The objectives for our fifth advisory board meeting included:

1. Review and summarize project outputs and lessons learned 2018-2023

- Community Engagement – Reached 108,880 individuals (contact) and engaged 15,996; completed 235 activities including 69 meetings, events and presentations; posted ready-to-use outreach materials at <https://microplastics.wayne.edu/> (infographics, school curricula, community action ideas);
- Green Stormwater Infrastructure (GSI) – Tested capture of plastics and microplastics; analysis showed 3000-4500 microplastics particles per dry kg soil in GSI (vs. 390 background) largely from weathering of plastic packaging and tires; results show GSI has potential to keep micro plastics out of waterways;
- Protocols for microplastics sampling and analysis from different environmental samples including water, wastewater, water filter bed, sludge, and soil – Sample pre-processing requirements constrain detection (must minimize organic matter and non-plastic particles).;

2. Learn about the current uses of the project products: sensor technology, data tool, and community outreach and public education materials

- Microplastics Sensor – Fits in a small cabinet transportable via cart (weighs 30 lbs), produced using commercially-available parts costing about \$30,000 (flow pump, filtration, Arduino, LED light, camera, Raman device) + labor, 98% accurate for detection of plastic type from the environment; ongoing testing and improvements for identifying smaller microplastics;
- Microplastics Data Tool – Online tool for uploading Raman spectra; machine learning algorithms identify post-consumer and environmentally-weathered plastic types with 99 % accuracy (for most types); adding more environmental plastics now;



Data Tool User Interface Examples:

Data entry/upload inputs

A description of your sample

When and where did you collect the sample

If you have Raman Spectrum of the sample, you could upload it.

 1-pbtl-cn-1-b-cr-ud-1-1.txt

You can submit your sample for us to analyze. Please email to [Prof. Zhang](mailto:Prof.Zhang)

Raman spectrum data example

Wavenumber	Intensity
250.0	0.0
251.0	682.0
252.0	682.0
253.0	682.0
...	...
2336.0	245.0
2337.0	245.0
2338.0	245.0
2339.0	244.0

Outputs of analysis

1. Typical Raman Spectra of identified plastic type:

2. Common product examples for analyzed type:

Common products

- soda and water bottles
- Clam
- pens
- trays
- standards

- Outreach Materials – For communities and teachers/students at <https://microplastics.wayne.edu/>

3. Develop collaboration framework: Advisory Board discussion and suggestions –

- GSI – document co-benefits of microplastics reductions in stormwater for municipalities/regulators;
- Sensor – Field test increasing the flow rate and adapting sensor use in surface waters that contain algae and sediment; develop solar power and reduce battery weight for easier use by all; confirm vortex removal rate and stratification within water column by plastic type (high and low density) and ecosystem; confirm uses for groundwater, drinking water and wastewater testing; add flow rate meter; document extent of advantages over grab sampling (weight, volume, representativeness, real-time);
- Data Tool – Enhance user interface to include metadata (sample morphology, collection location, user-defined analytic fields); consider EPA need for Area of Concern monitoring relating to legacy contamination and clean-up.