ADDRESSING MICROPLASTIC POLLUTION IN URBAN WATERSHEDS

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Urban Extension Conference

Rutgers Newark

November 29, 2016
Rutgers CUES
Data Collection & Analysis

Ironbound Community Corporation
Public Engagement & Environmental Justice

NY/NJ Baykeeper
Data Collection & Public Education

Funders: NJ Water Resources Research Institute; US EPA
“US plastics industry growth setting records, Society of Plastic Industry Inc. says”

PLASTIC is UBIQUITOUS - FAST FACTS
• $427.3 billion in shipments (2014)
• 11.5 percent growth since 2012
• No. 3 U.S. manufacturing industry
• 85% of U.S. polymer feedstock comes from natural gas

Photo courtesy of Chem_Info
Soap, shampoo, deodorant, toothpaste, wrinkle creams, moisturizers, shaving cream, sunscreen, facial masks, makeup (e.g. lipstick or eye shadow), and children’s bubble bath.

“microbeads in the effluent samples from 25 of 34 treatment plants participating in this study, suggesting that microbeads are being discharged at the majority of treatment plants operating across New York State” ..... Office of the Attorney General, New York State. 2015
Raritan Bay Water Column Sample (2015)
Study Area Freshwater to Tidal Transect

Source: NJDEP
Manta Trawl
Eutrophication
Passaic River Above Dundee Dam
Density Analysis
Some *Caveats* – A snapshot in Time

- One dry weather sampling event per location
- One wet weather sampling event in 5 locations
- Difficulty separating samples manually
- Possible breakdown of original plastic materials into new shapes/configurations
Great Falls, Paterson
Dundee Dam, Garfield, NJ

Passaic River (Dry) Microplastic Density

Passaic (Dry) Density
Particles per Km²
- 0 - 1,499,999
- 1,500,000 - 6,499,999
- 6,500,000 - 11,499,999
- 11,500,000 - 43,999,999
- 43,500,000 - 131,500,000

NJPDES CSO
Dry vs. Wet Sampling Conditions

Passaic River Sampling Location

- BERKELEY HEIGHTS
- CHATHAM
- KEARNY
- LIVINGSTON
- LYNDHURST

Particles km⁻²

Dry

Wet
Zebrafish Exposure Protocol

Exposure To Plastic Particulates

<table>
<thead>
<tr>
<th>ENDPOINTS</th>
<th>TIME EVALUATED</th>
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<tbody>
<tr>
<td></td>
<td>(3-78 hpf)</td>
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<tr>
<td>Developmental Stage</td>
<td>YES</td>
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<tr>
<td>Survival</td>
<td>YES</td>
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<tr>
<td>Lesions</td>
<td>YES</td>
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<tr>
<td>Growth</td>
<td>YES</td>
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<td>Gene Expression</td>
<td>YES</td>
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<tr>
<td>Histopathology</td>
<td>YES</td>
</tr>
</tbody>
</table>

hours post fertilization – hpf; days post fertilization -dpf
Modified Experimental GC/ITMS Method for Water

GC/ITMS
Pre scan for target ions and interferences

GC\ITMS using SIS mode
(1st Purification in the Ion Trap Cavity)
Removes background ions from matrices(soil or fish tissue)
and Column Bleeding using Single Ion Storage mode

GC/IT MS or MS²
for sample analysis of PAHs PCBs and other Targets (standards)
Engaging the City of Newark and Upstream Communities

Next Steps
Questions?

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