

ADDRESSING MICROPLASTIC POLLUTION IN URBAN WATERSHEDS

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NY/NJ Baykeeper



"NY/NJ Baykeeper's mission is to protect, preserve, and restore the ecological integrity and productivity of the NY-NJ Harbor Estuary"





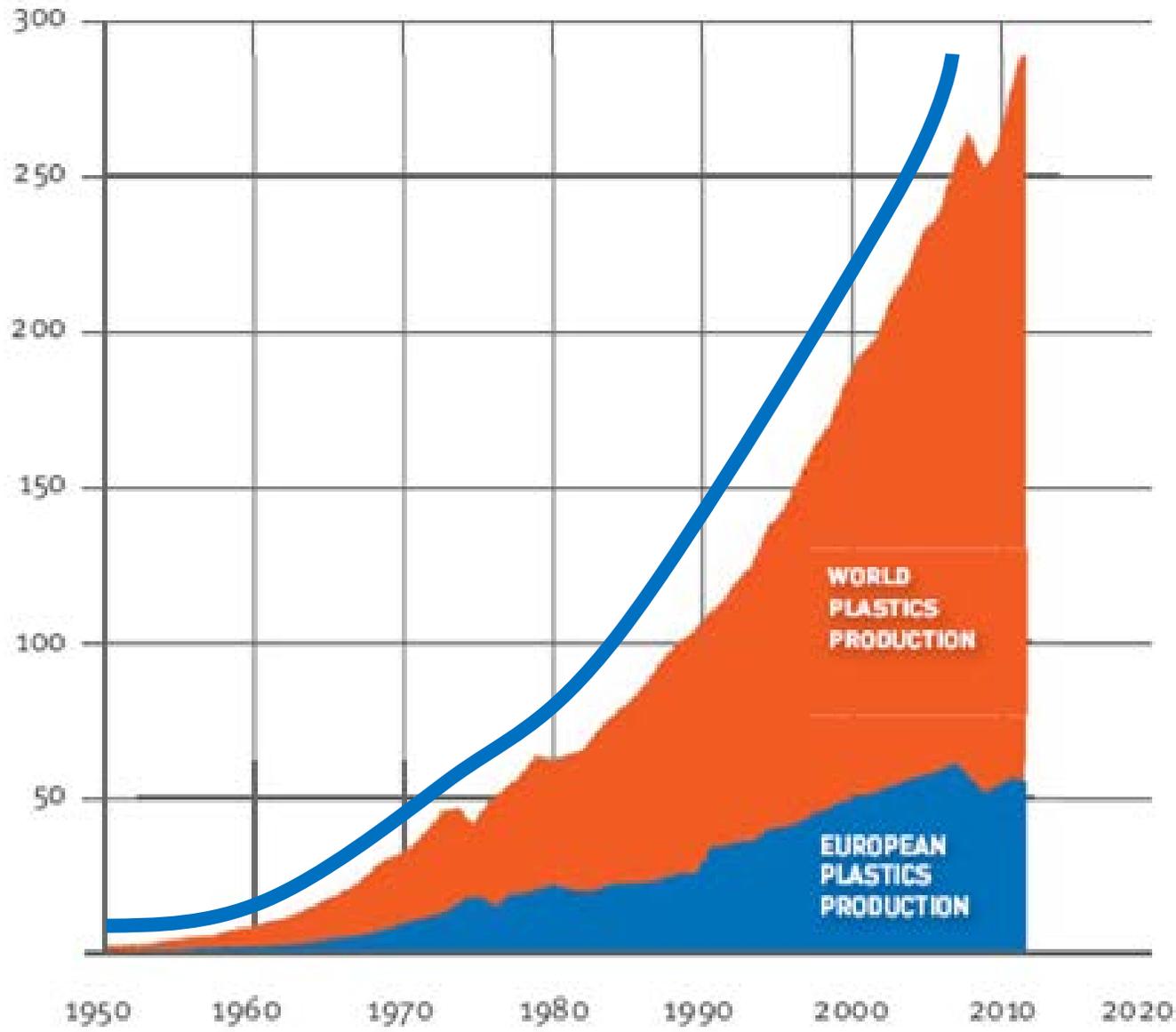
Throwaway Living

DISPOSABLE ITEMS CUT DOWN HOUSEHOLD CHORES

World plastics production grows



Mtonne



Where does it go?

- ~50% landfill
- <10% recycled
- “unaccounted for”

Source: PlasticsEurope, *Plastics – The Facts 2013*



**Good things are
twice as good in Cellophane**



You see what
you buy ... no
guesswork.



Foods come fresh—
stay fresh longer,
less waste.



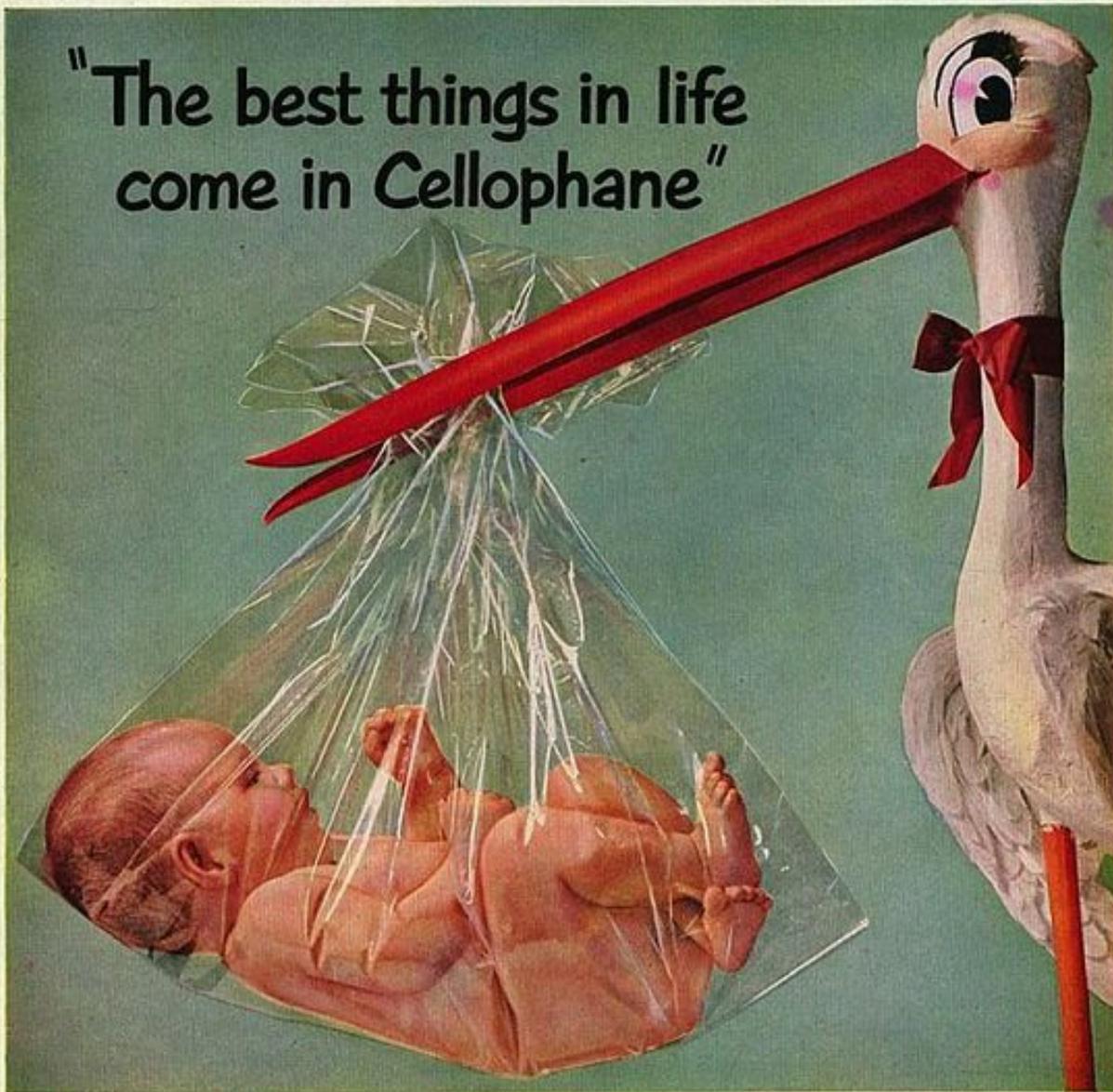
And things in
Cellophane are
clean and sanitary.

DU PONT
Cellophane



BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY
Look at "Cavalcade of America" on Television

"The best things in life
come in Cellophane"



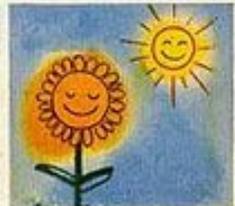
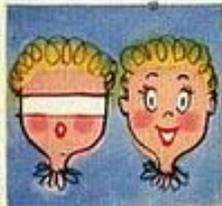
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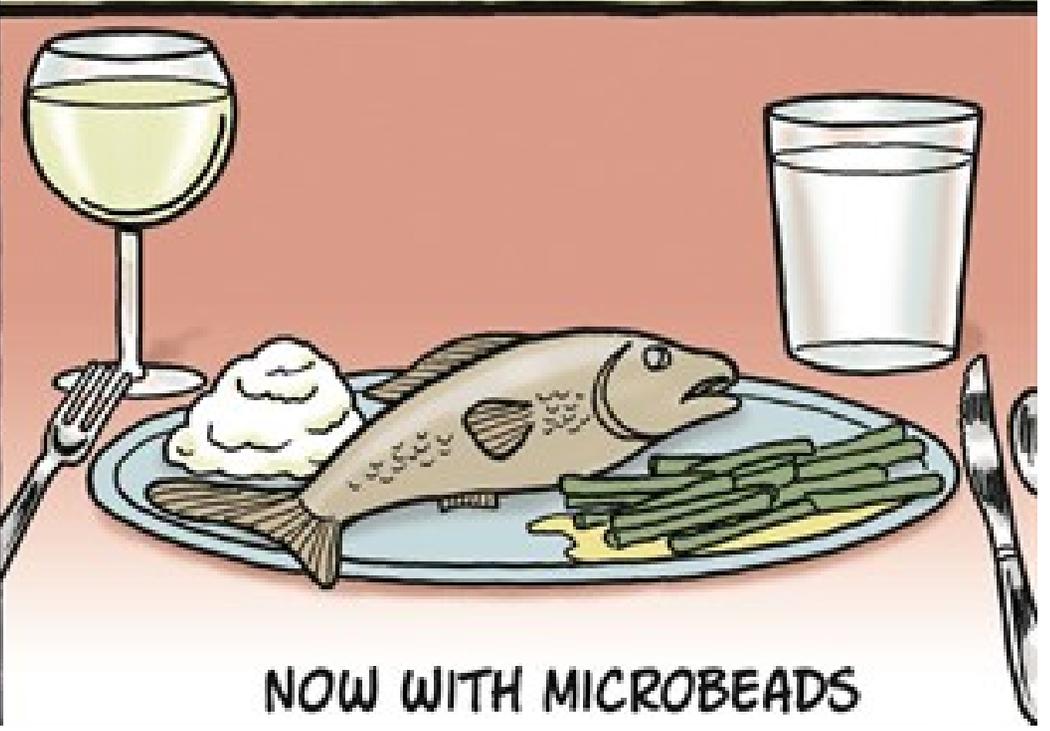
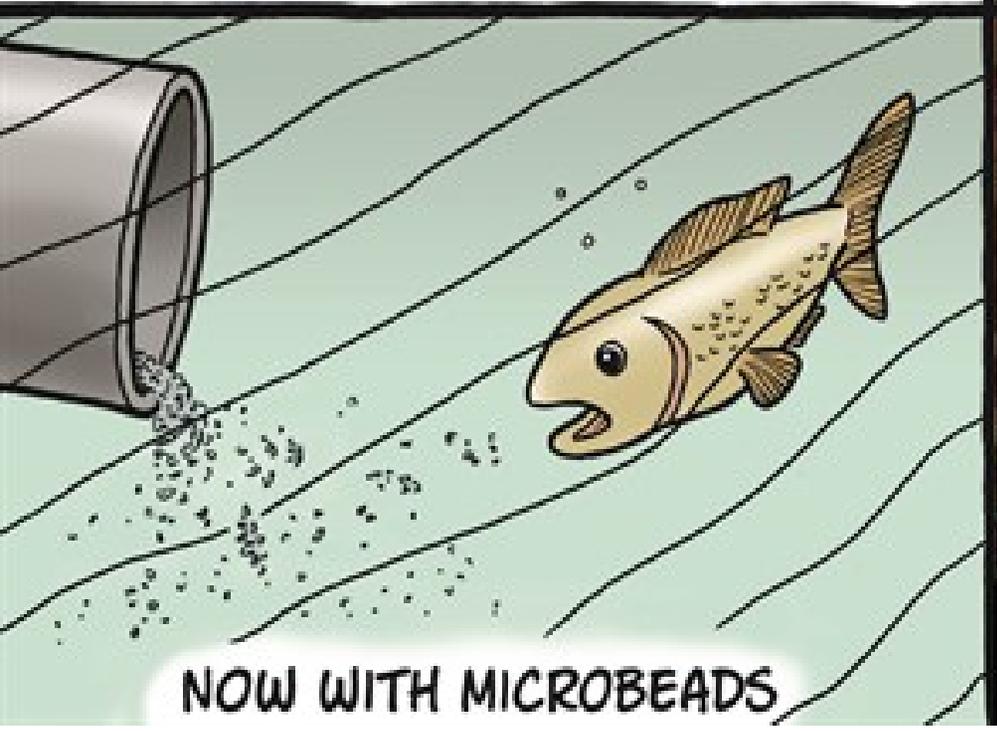
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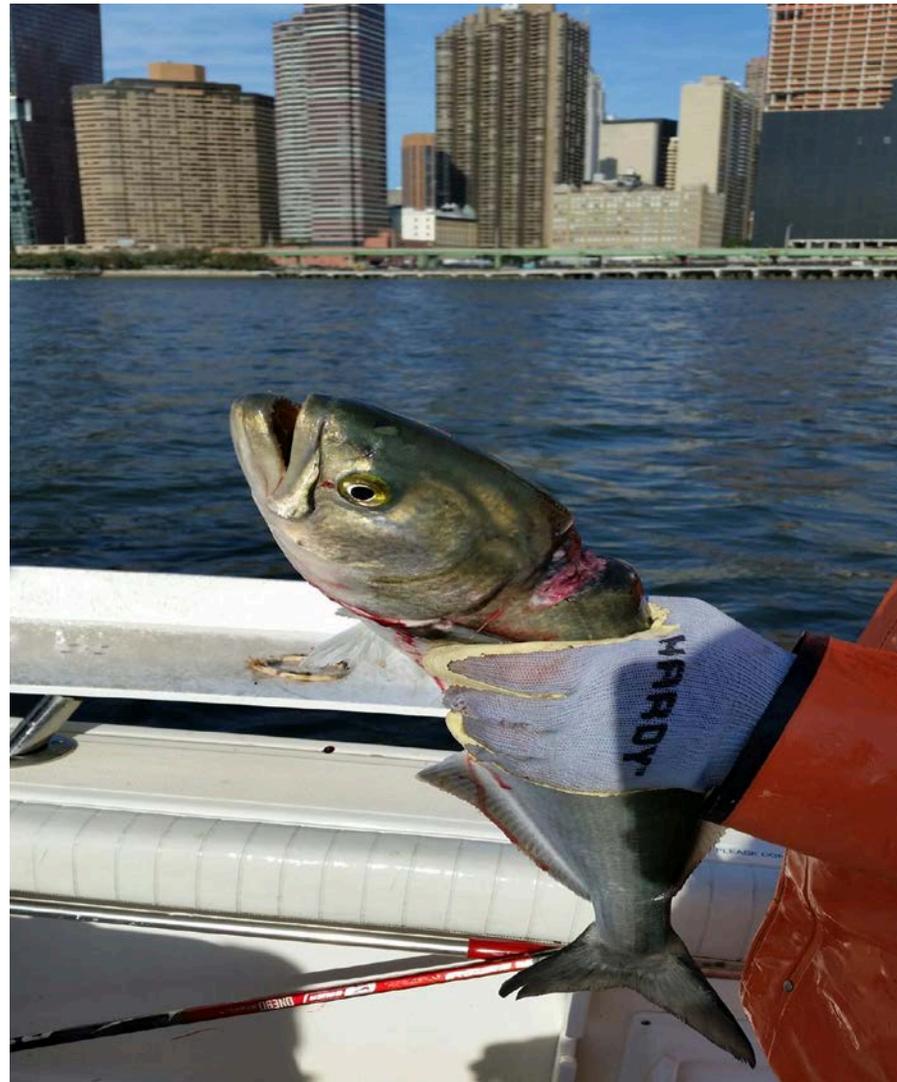
BETTER THINGS FOR BETTER LIVING... THROUGH CHEMISTRY
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The small jar = 1 week's worth of microbeads (12g). There is a total of 360,000 microbeads in this scrub.



But with plastics integrating themselves in every aspect of our lives, there are significant environmental impacts...











Why Plastic Pollution is Harmful

- Plastic adsorbs contaminants
- Non-biodegradable.
- Fish and birds mistake plastic for food and can choke/starve
- Food chain bioaccumulation

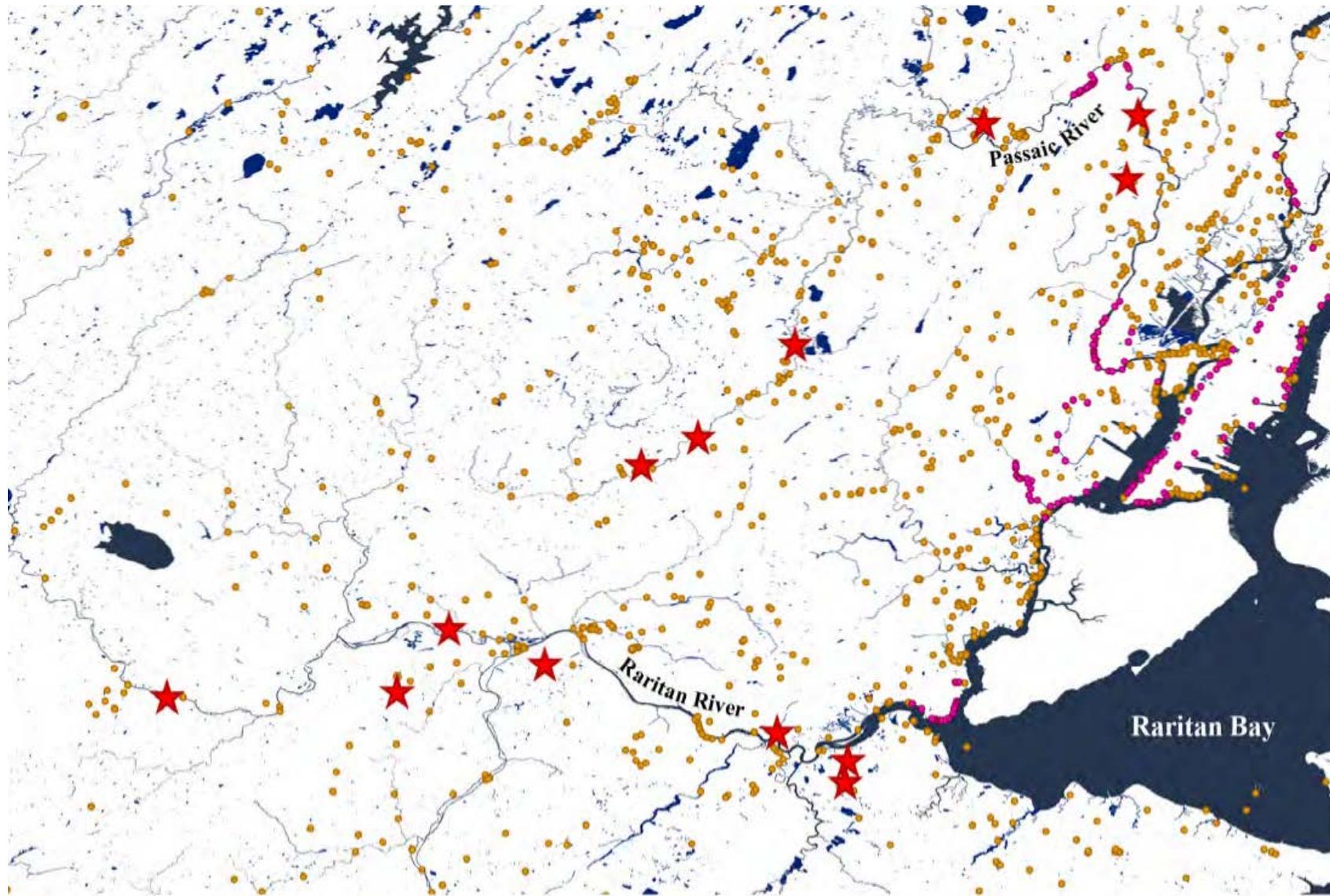


NY/NJ Baykeeper's Project Goals

- Prevent plastic from reaching environmental justice communities
- Influence behavioral and policy changes



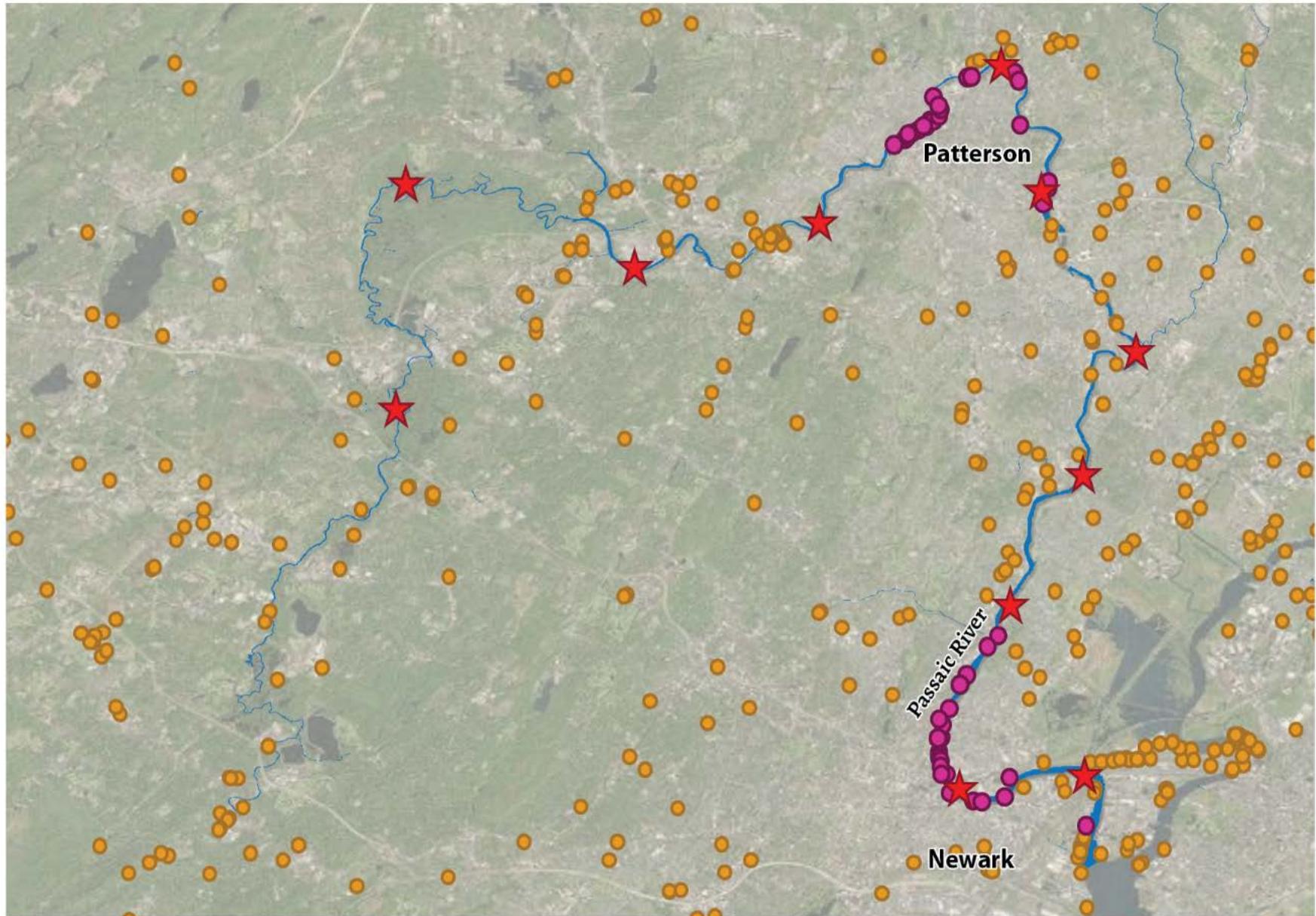
2016 Raritan and Passaic River Freshwater Samples



★ Potential Sampling Sites ● NJPDES Surface Water Discharges ● Combined Sewer Overflows

Source: NJDEP

The Passaic River – Summer 2016



Sources: NJDEP, ESRI

- ★ Potential Sampling Sites
- Combined Sewer Overflow Outfalls
- NJPDES Surface Water Discharges

Research Initiative – Manta Trawl Net





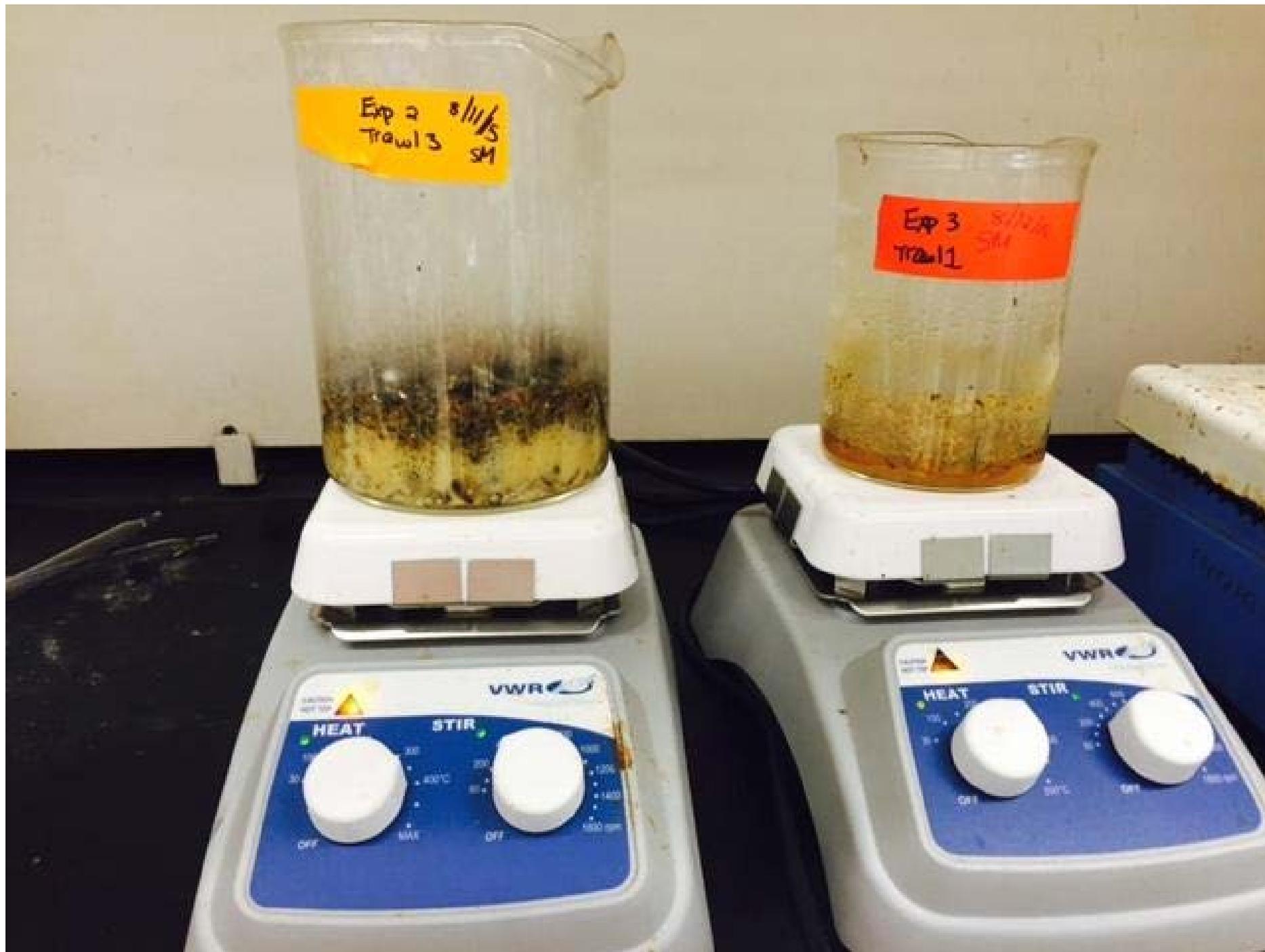
Passaic River Above Dundee Dam

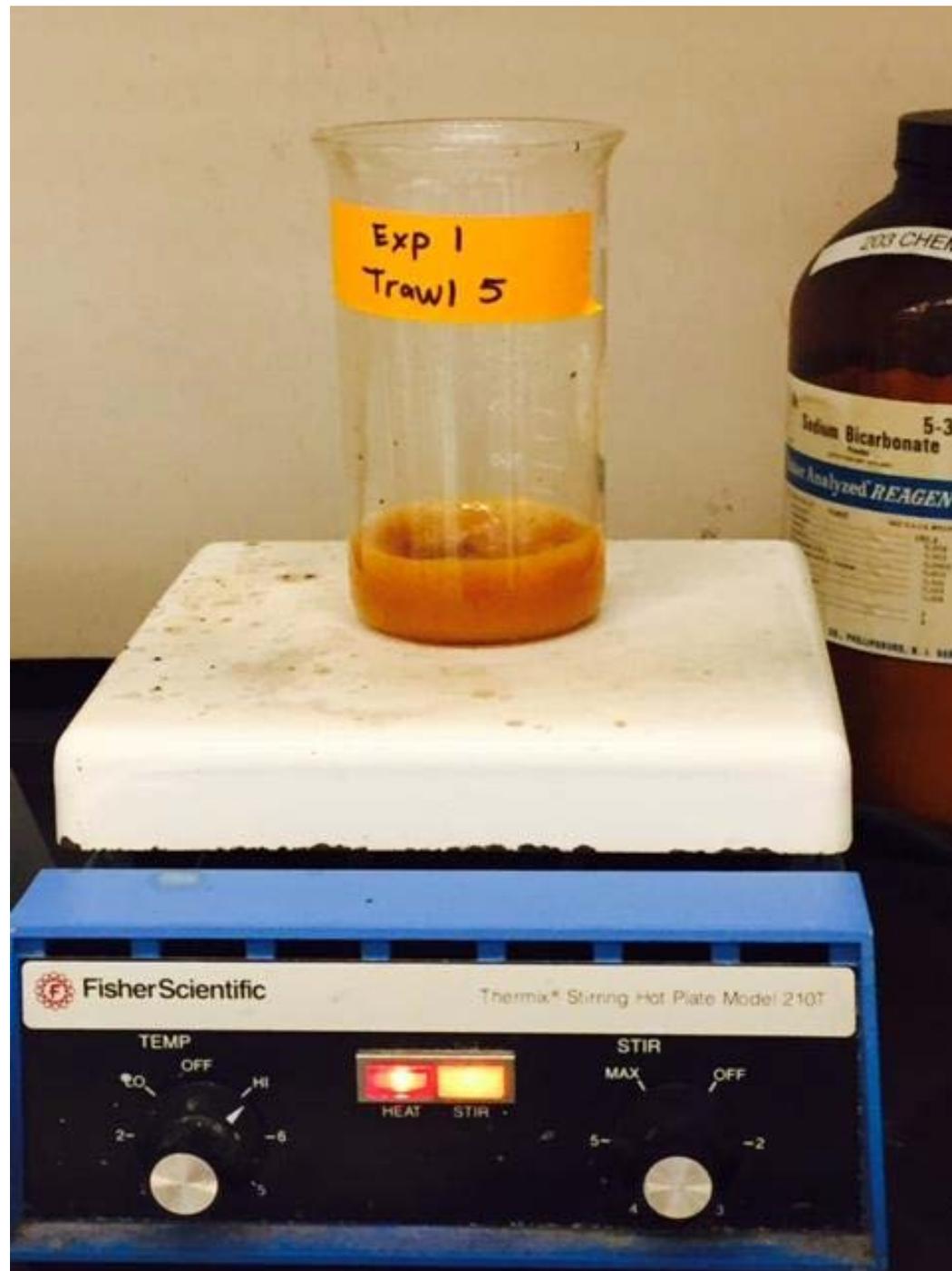




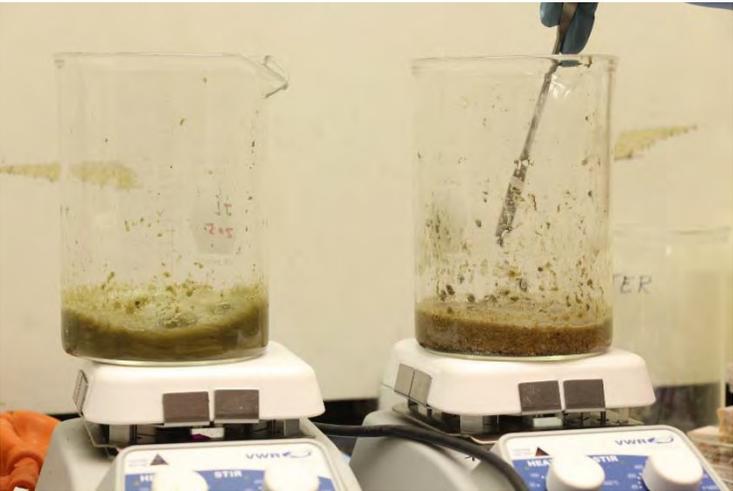








Density Analysis



Samples are oxidized so organics break down, leaving just the plastic.

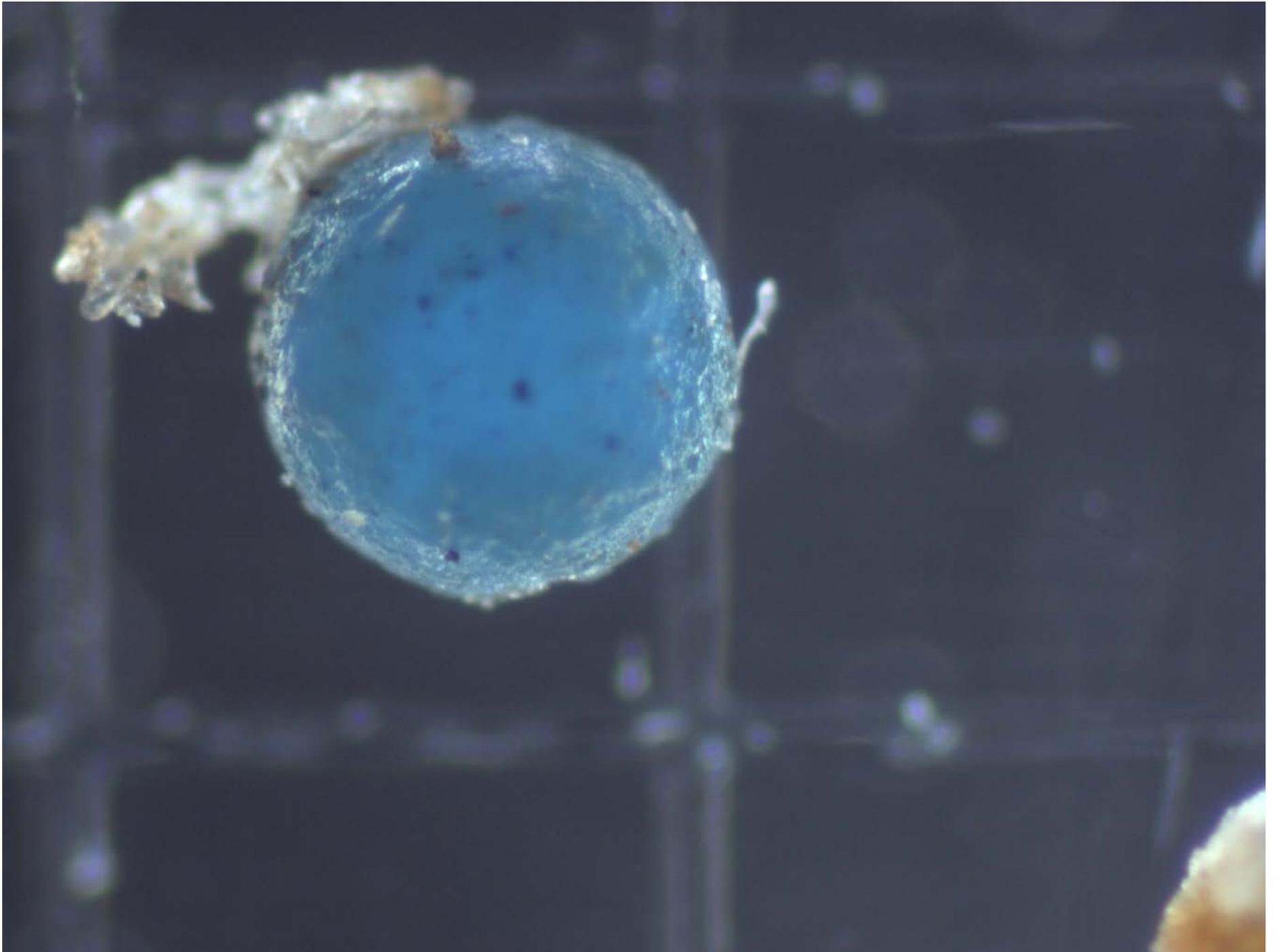


Then plastics are categorized by size and type and counted.

Types of plastics found

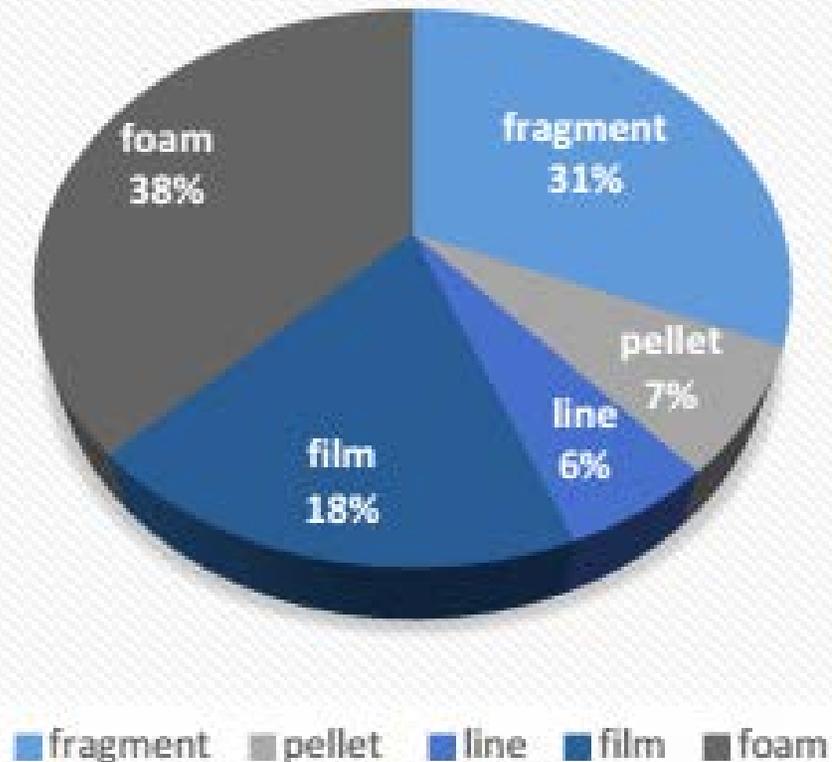
- Film: from plastic bags, cling wrap
- Foam: from coffee cups and restaurant to-go boxes
- Pellets: microbeads and “nurdles”
- Line: fishing line and clothing fibers
- Fragment: unidentified hard piece of plastic





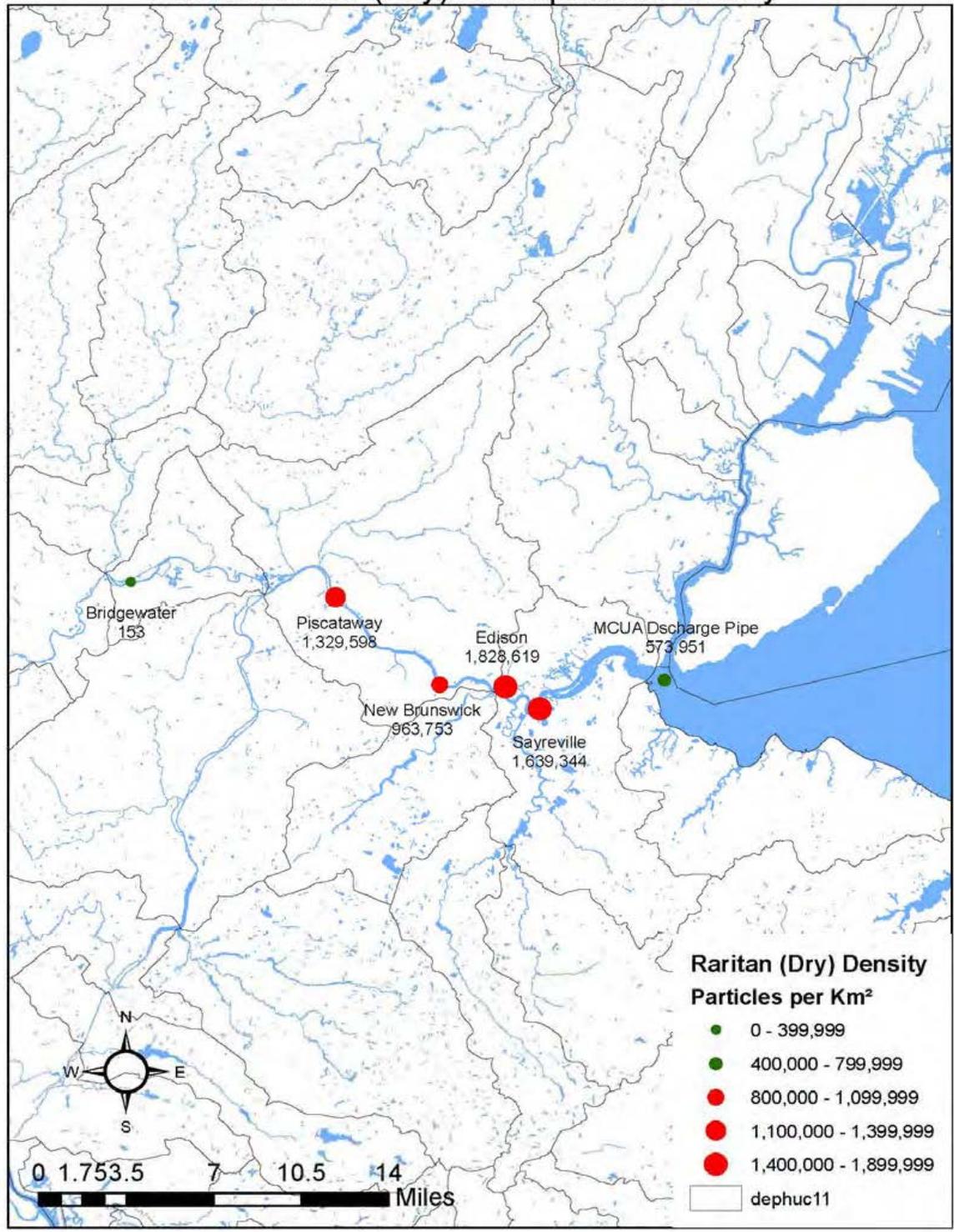
2015 NY-NJ Harbor Results

Comparative Abundance of Plastic Categories



- 165 million plastic particles are floating within the NY-NJ Harbor at any given time
- 85% of particles counted were microplastics (smaller than 5mm)
- The most abundant type of plastic present within samples was foam (38%)

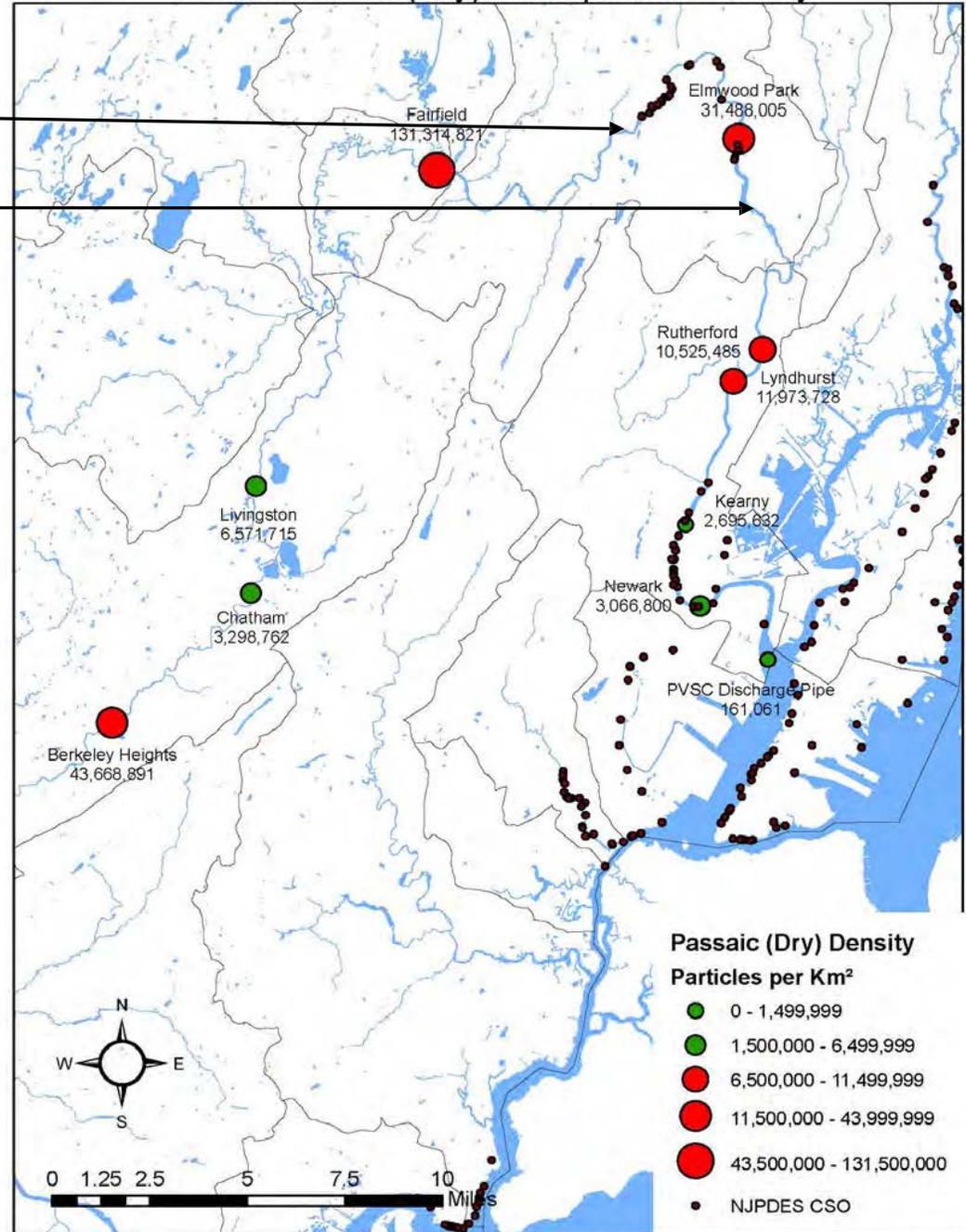
Raritan River (Dry) Microplastic Density



Great Falls, Paterson
 Dundee Dam, Garfield, NJ

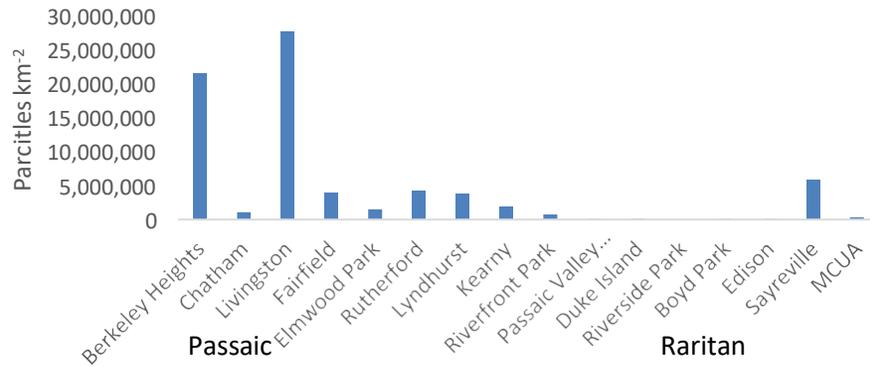


Passaic River (Dry) Microplastic Density

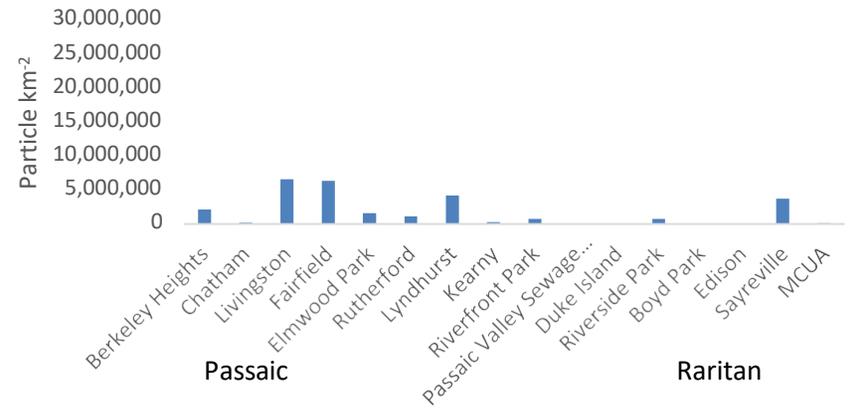


- Passaic (Dry) Density**
 Particles per Km²
- 0 - 1,499,999
 - 1,500,000 - 6,499,999
 - 6,500,000 - 11,499,999
 - 11,500,000 - 43,999,999
 - 43,500,000 - 131,500,000
 - NJPDES CSO

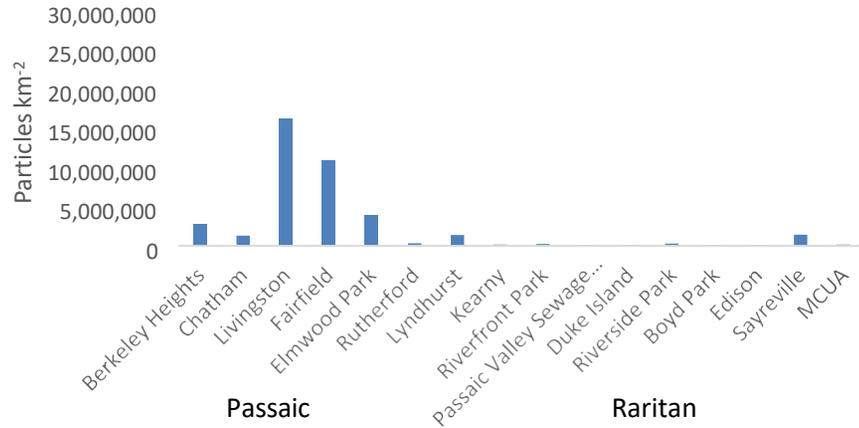
Plastic Fragments



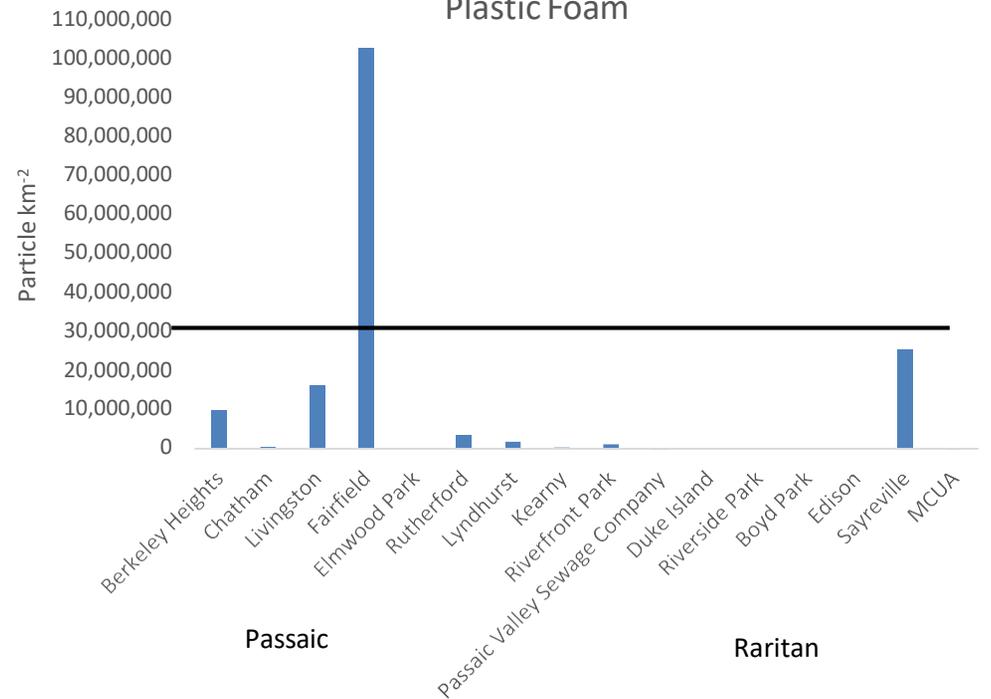
Plastic Films



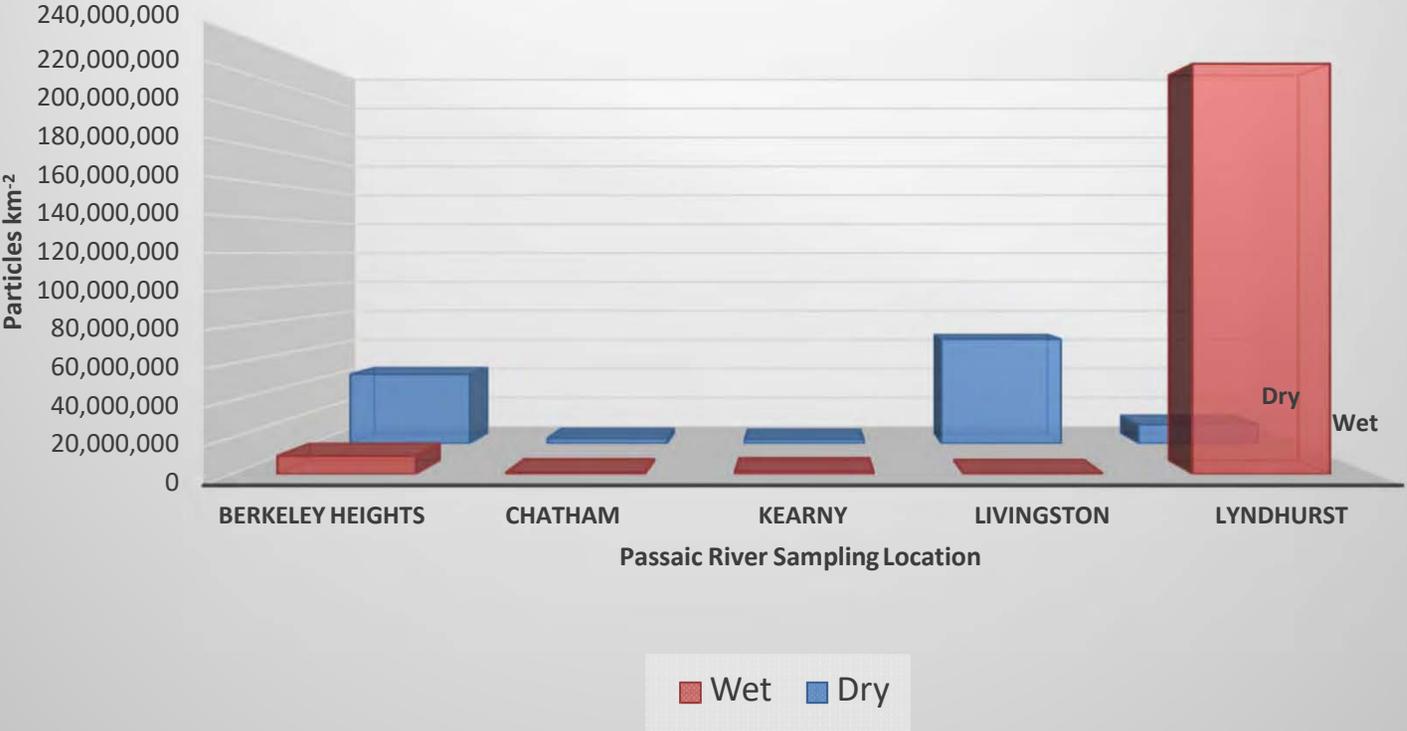
Plastic Line



Plastic Foam

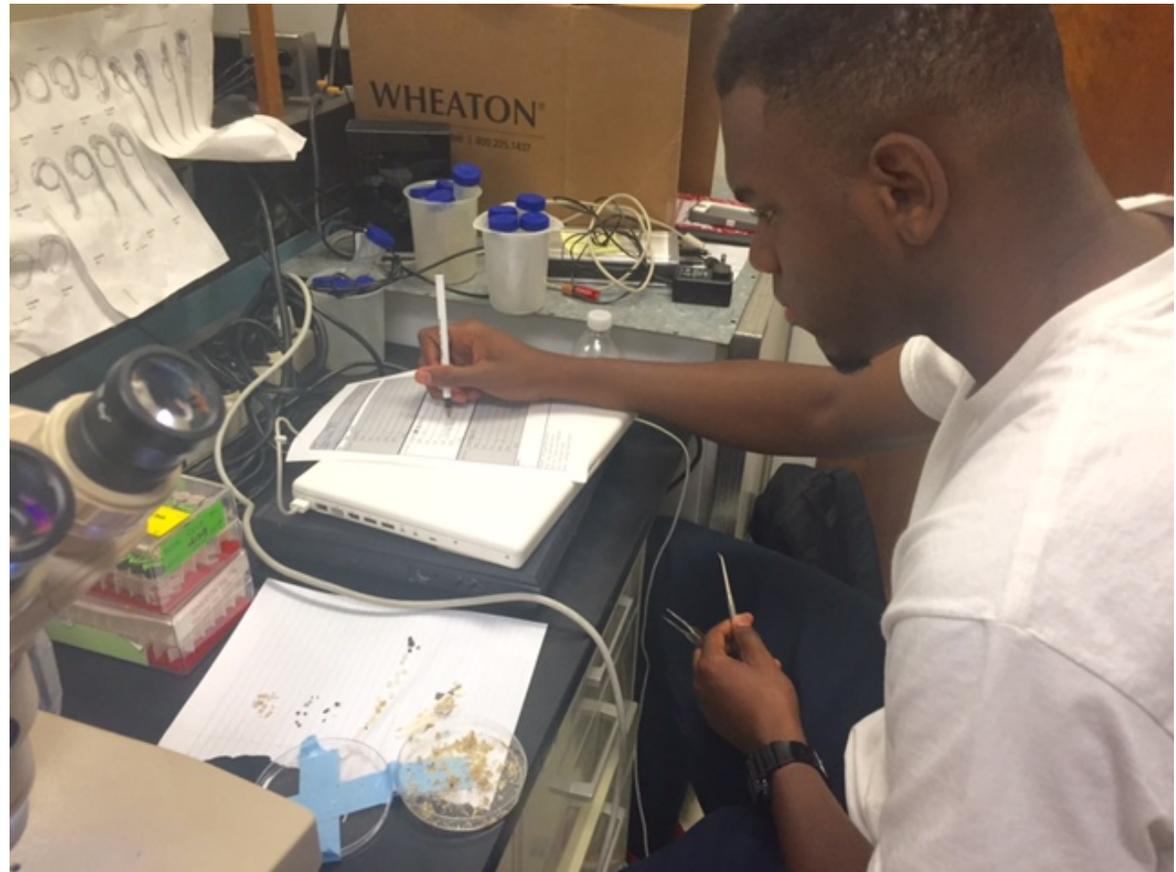


Dry vs. Wet Sampling Conditions



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



Engaging the City of Newark and Upstream Communities



East Side High School, Newark, NJ



Questions?

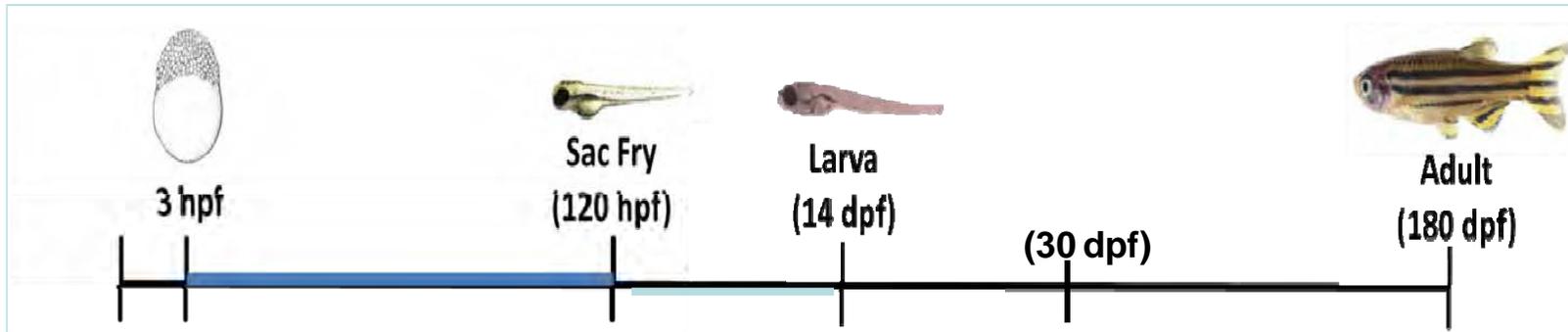


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Zebrafish Exposure Protocol



Exposure To Plastic Particulates

ENDPOINTS

TIME EVALUATED

	(3-78 hpf)	(120 hpf)	(14 dpf)	(30 dpf)
Developmental Stage	YES			
Survival	YES	YES	YES	YES
Lesions	YES	YES		
Growth		YES	YES	YES
Gene Expression		YES	YES	YES
Histopathology			YES	YES

hours post fertilization – hpf; days post fertilization -dpf