RESULTS FROM THE CHESAPEAKE BAY PROGRAM SCIENTIFIC & TECHNICAL ADVISORY COMMITTEE WORKSHOP ON MICROPLASTICS IN THE CHESAPEAKE BAY AND ITS WATERSHED

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WE ARE WASHINGTON DC GOVERNMENT OF THE DISTRICT OF COLUMBIA
MURIEL BOWSER, MAYOR

ANACOSTIA RIVER TRASH TMDL

- Established in 2010 and shared with DC and Maryland
- Assigns loads to local MS4, Combined Sewer Systems, and Non-Point Source (illegal dumping).
- District's total annual reduction obligation = 217,048 lbs
- Addresses trash ≥ 1 inch in length or diameter

IMPLEMENTATION OF THE TMDL

- Use a variety of structural and non-structural controls
- Examples of Structural Controls:
  - Trash Traps
  - Skimmer Boats
- Examples of non-structural controls:
  - Innovative Policies (e.g. Bag Law)
  - Enforcement
  - Clean Teams
  - Trash Free Potomac Watershed Anti- Littering Campaign
  - Street sweeping environmental hotspots

WHAT ABOUT THE SMALL STUFF?
EVIDENCE OF MICROPLASTICS IN THE ANACOSTIA RIVER

Photos by Masaya Maeda, Anacostia Watershed Society, 2017

- 2000% increase in SAV in DC between 2009 and 2017
- Surpassed Chesapeake Bay Program goals for SAV restoration
- SAV also habitat for larvae of DC state fish, American Shad (*A. sapidissima*)
- Question: could SAV beds be capturing microplastics?

STUDY OF MICROPLASTICS IN SAV BEDS IN DC

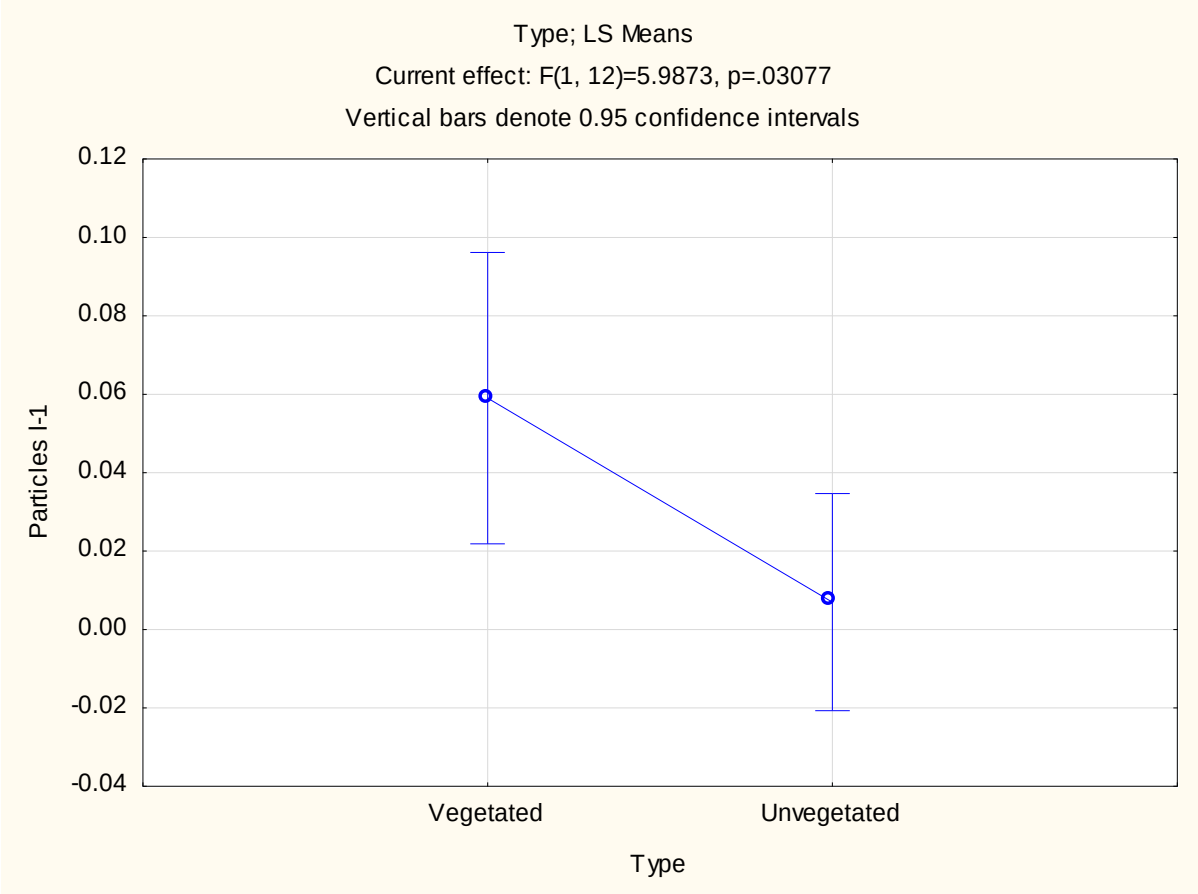


Figure 1 – Mean microplastic particle concentration (#of particles/volume of sample) in vegetated beds vs. unvegetated beds (n=14, 5 vegetated, 9 unvegetated)

MICROPLASTICS

Small plastic fragments, fibers, and granules

How small? Usage of the term "microplastic" in the literature varies from 0.1 um to 10mm – a size range of five orders of magnitude!

- **Primary Microplastics** – manufactured products used in:
  -Facial cleansers and cosmetics (microbeads)
  -As vectors for drugs
  -As air-blasting media for removing rust (often contaminated with heavy metals, e.g. cadmium, chromium, lead)
  -Virgin plastic production pellets – Pellets are convenient to ship and are eventually melted down and molded into manufactured products

- **Secondary Microplastics** – pieces that have broken off larger plastic objects through physical, biological, or chemical processes

WHY DO WE CARE ABOUT PLASTICS AND MICROPLASTICS IN CHESAPEAKE BAY?

In March 2019, Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) estimated 95% of all seabird species will ingest some form of plastic by 2050

World Economic Forum projects more plastic in the ocean than fish by 2050

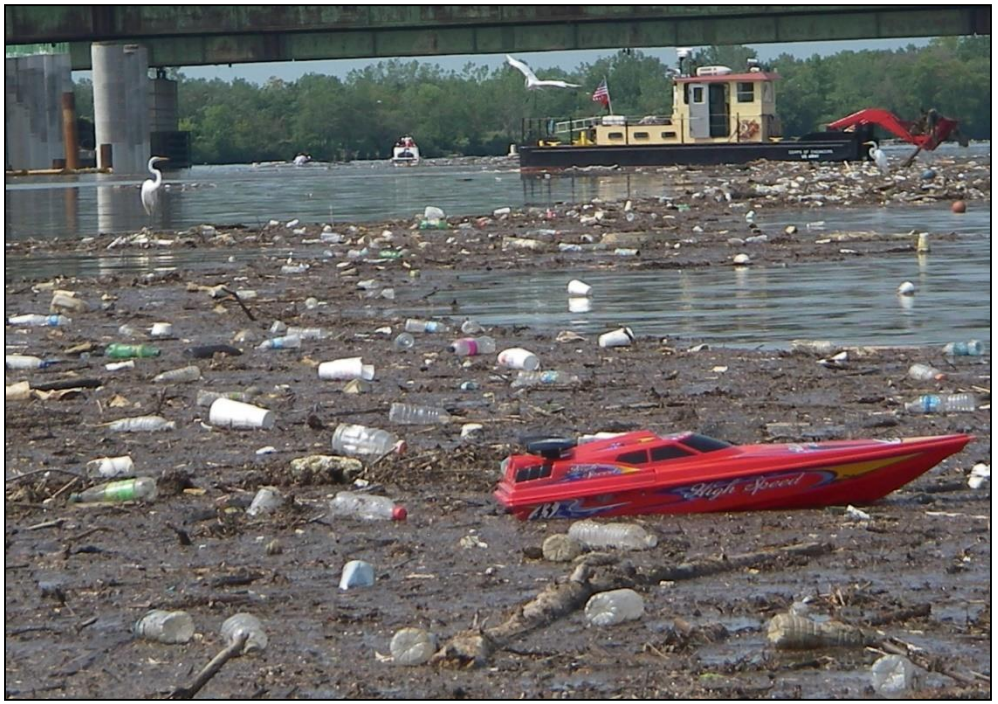
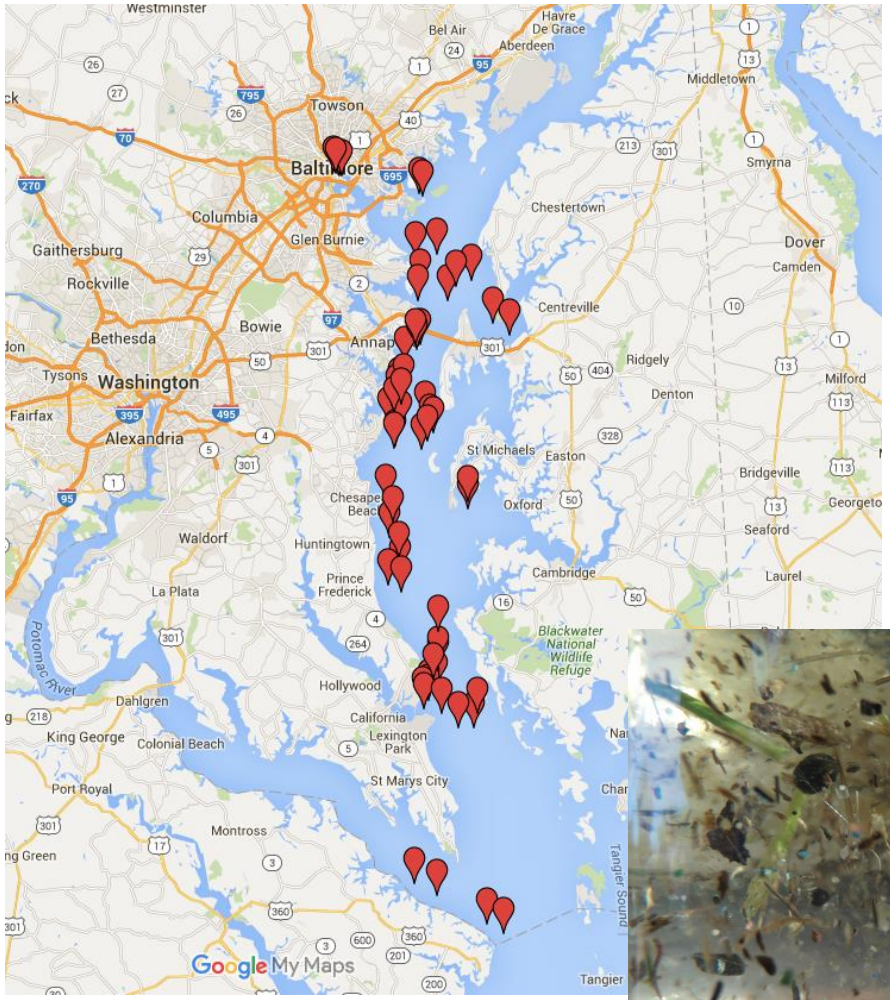
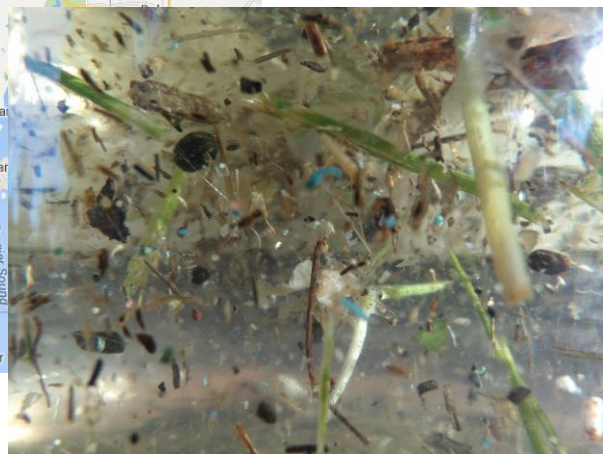


Photo by Masaya Maeda, Anacostia Watershed Society

EVIDENCE OF MICROPLASTICS IN CHESAPEAKE BAY



- 2014-2015 Bay Trash Trawl conducted by Trash Free Maryland surveyed 30 sites for microplastics in the Chesapeake Bay mainstem and tidal tributaries.
- 100% of samples contained microplastics.
- Highest concentrations found in urban and suburban tributaries.

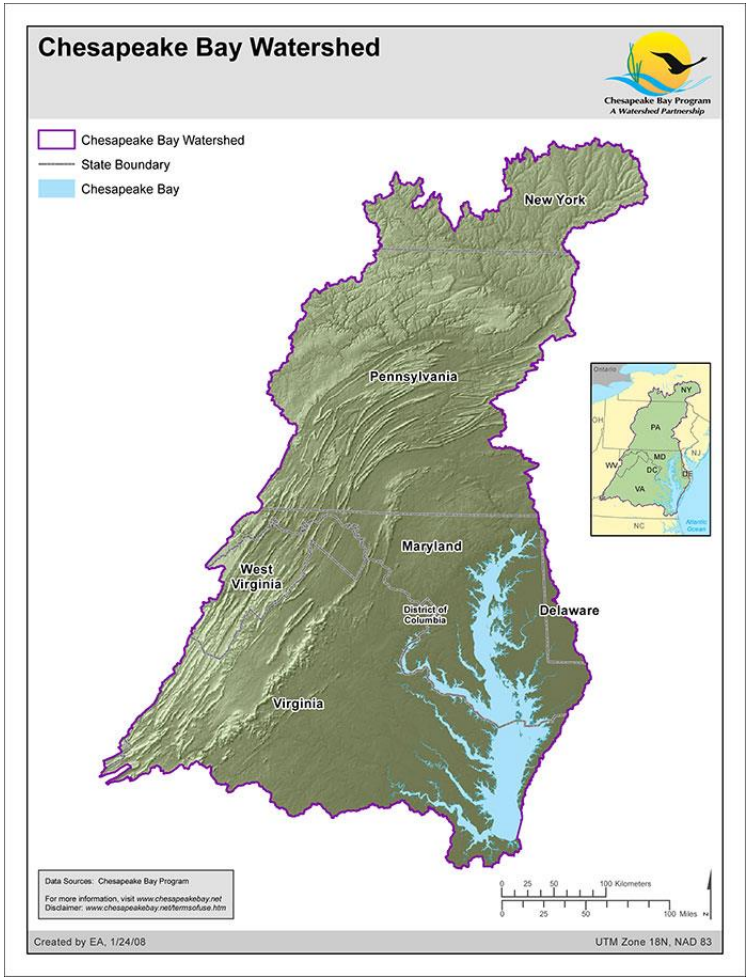


Photos courtesy of Julie Lawson and Trash Free Maryland, 2015

Microplastics in the Chesapeake Bay and its watershed

- How can we bring more attention to this issue regionally?

- SAV Workgroup at the Chesapeake Bay Program applied for Scientific & Technical Advisory Committee (STAC) funding to hold a workshop in 2019 about microplastics in the bay and watershed.



WORKSHOP FORMAT

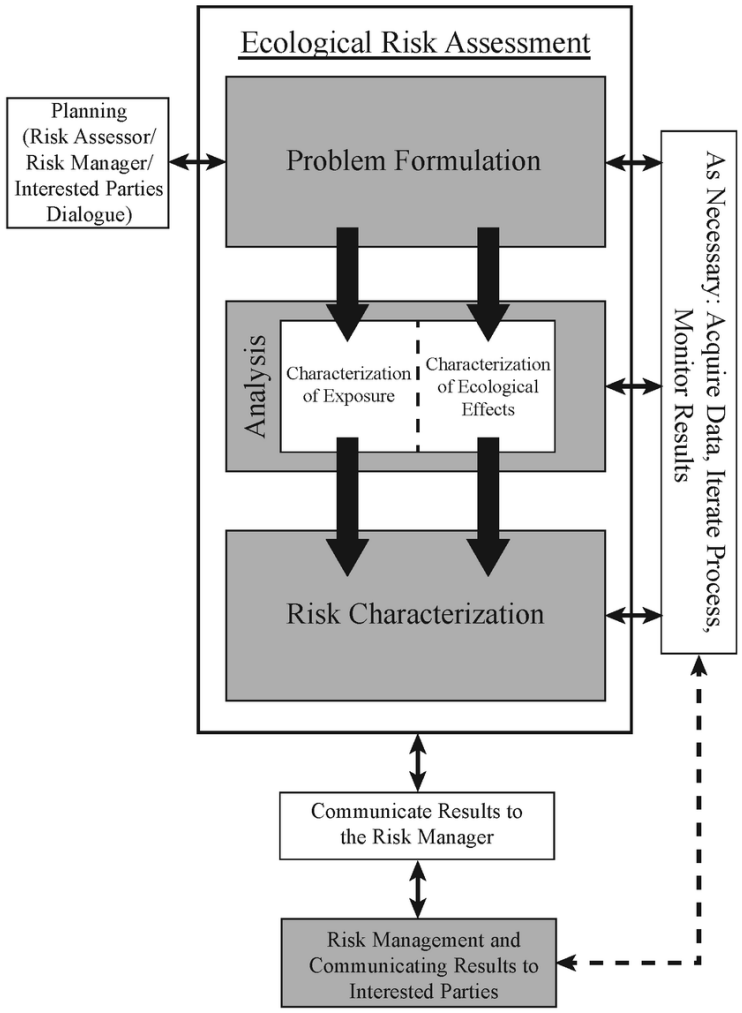
Steering committee decided early on that the workshop should be formatted around conducting an **ecological risk assessment (ERA)**

The Ecological Risk Framework consists of the following components:

1. **Problem Formulation**: Determine assessment endpoints and measurement endpoints

2. **Risk Analysis**: Identify testable linkages between sources, stressors and assessment endpoints

3. **Risk Characterization**: What are the risk and effects? Ex. LC50 – Lethal concentration to kill 50% of a population



CONCLUSIONS

- Studies have shown microplastics are fairly ubiquitous throughout the bay and its tributaries. They have been found in both tidal (Yonkos, 2014; Rochman, 2019) and non-tidal waters (Fisher, 2019).
- There is general agreement that plastics represent a widespread, but largely unquantified, threat to the Chesapeake Bay ecosystem.
- Need standardization of terminology
- There are a number of piecemeal efforts to monitor plastics in the Bay, but no systematic effort and no organized effort directed at micro- and nano-plastics.
- **The MOST URGENT need is to identify assessment endpoints that represent areas of environmental and human health concern and to characterize the severity of those risks.**

RECOMMENDATIONS

1. The CBP should create a cross-GIT Plastic Pollution Action Team to address the growing threat of plastic pollution to the bay and watershed.

2. The Scientific, Technical Assessment and Reporting Team should incorporate development of ERAs of microplastics into the CBP strategic science and research framework, and the Plastic Pollution Action Team should oversee the development of the ERAs focused on assessment of microplastic pollution on multiple living resource endpoints.

3. STAC should undertake a technical review of terminology used in microplastic research, specifically size classification and concentration units, and recommend uniform terminology for the CBP partners to utilize in monitoring and studies focused on plastic pollution in the bay and watershed.

4. The CBP should develop a source reduction strategy to assess and address plastic pollution emanating from point sources, non-point sources, and human behavior.

5. The CBP should direct the Plastic Pollution Action Team and STAR Team to collaborate on utilizing the existing bay and watershed monitoring networks to monitor for microplastic pollution.

MANAGEMENT BOARD ACTION – November 2019:

The Management Board sanctioned creation of a Plastic Pollution Action Team (PPAT) that will be discussed at a STAR meeting in early 2020.

Available staff time to contribute to the action team should also be discussed at a future CBP GIT coordinators and staffers meeting.

The action team will determine the scope of the microplastics ecological risk assessment

ACTION FOR TODAY:

1) Discuss and Approve the Draft Charge for the PPAT

2) Discuss appointing PPAT participants

Draft Charge:

The PPAT seeks to reduce the presence and impacts of plastic pollution on the Chesapeake Bay and its watershed. The PPAT will begin to address this issue by overseeing research that will help to determine the effects plastics have on the Chesapeake Bay ecosystem. This will be accomplished through the following actions:

1) Oversight of the development of preliminary ecological risk assessments for one or more subwatersheds to the Chesapeake Bay (e.g. Potomac) undertaken by EPA, its contractors, or grantees. For example, this oversight will include advising researchers on assessment endpoints for the ERA, such as restoration goals for species already being addressed by the CBP, and advising on the development of conceptual models in the ERA.

2) Using the components and results of the preliminary ERAs to develop a strategy that identifies gaps in information concerning the effects of plastic pollution on the Chesapeake Bay ecosystem, and highlighting future research questions that need to be answered.

3) Presenting results from ecological risk assessments to the Management Board in order to guide future action on addressing plastic pollution.

The PPAT will meet periodically to:

- Discuss updates on ecological risk research being conducted by EPA, its contractor, or grantees.
- Provide guidance to EPA on conducting ecological risk research.
- Formulate a science strategy to address questions and research gaps discovered during execution of ecological risk research.
- Report out to STAR for feedback on scientific results from the ERA and updates on the science strategy.

PPAT Participation:

1) How many participants? (e.g. ≤ 15 people)

2) What categories of representation should we engage?
   - Academia
     - Discipline specific
     - Trophic ecology, fisheries, water quality, monitoring, etc
   - Federal/State Representation
   - GIT representation
   - Crossover (multiple experience from same member)