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

MATT ROBINSON
DC DOEE

BOB MURPHY
TETRA TECH

J. BROOKE LANDRY
MD DNR
SAV Workgroup Chair

stac

SAV Workgroup Chesapeake Bay Program

TETRA TECH

DEPARTMENT OF ENERGY & ENVIRONMENT

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

- 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

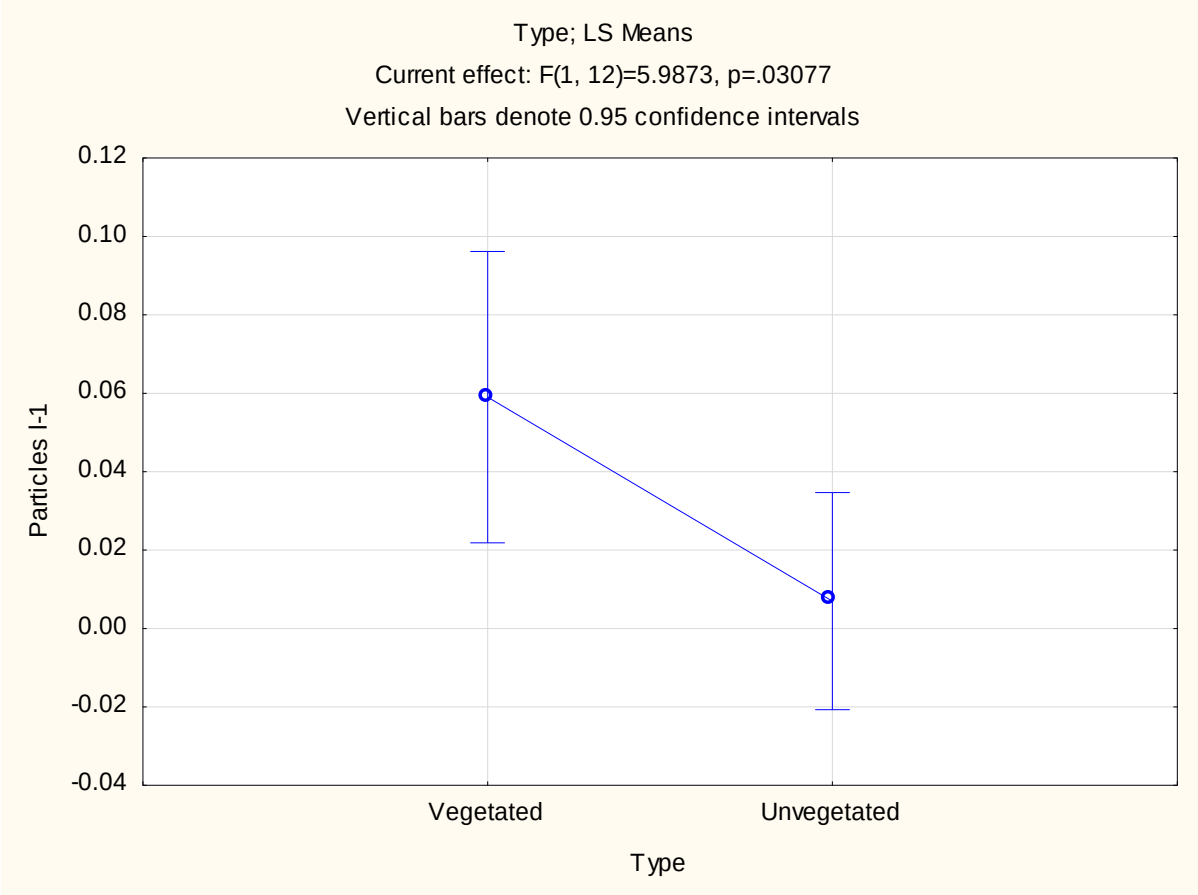


Figure 1 – Mean microplastic particle concentration (#of particles/volume of sample) in vegetated beds vs. unvegetated beds (n=14, 5 vegetated, 9 unvegetated)

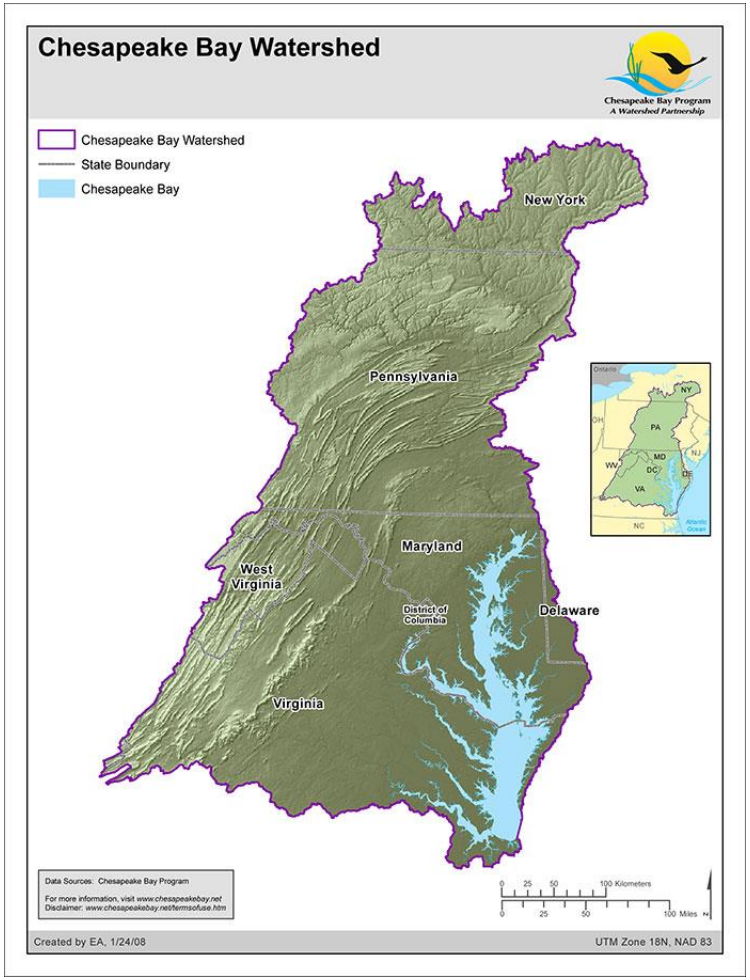
Evidence of Microplastics in the Chesapeake Bay Watershed

Photo by Masaya Maeda, Anacostia Watershed Society

MICROPLASTICS IN THE CHESAPEAKE BAY AND 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

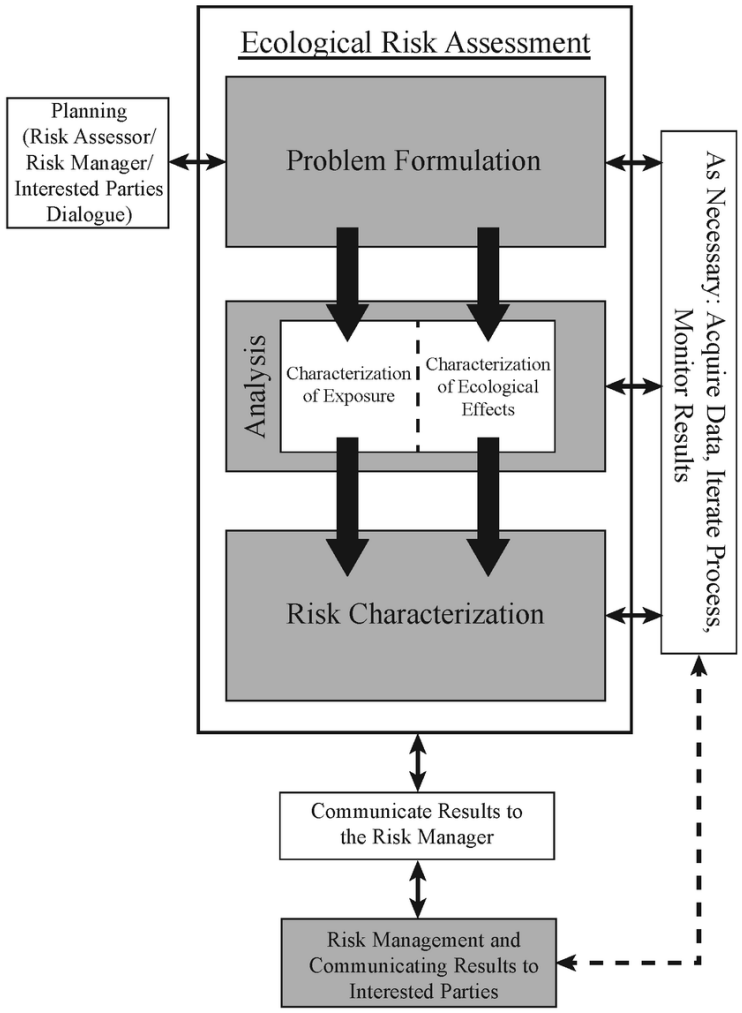
Steering committee decided early on that the workshop should be formatted around conducting an **ecological risk assessment (ERA)**

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



Highlights

•Yonkos et al. (2014) found microplastics in 59 out of 60 samples in four tidal tributaries to the upper Chesapeake Bay. Concentrations highly correlated with urban/suburban landuse.

•USGS has found microplastics in every sample taken at five non-tidal stations in the Chesapeake Bay watershed (Fisher, 2019).

•In 2018, 95% of smallmouth bass (*M. dolomieu*) sampled in the central Susquehanna River had microplastics in their guts (Parks, 2019).

•Brander (2019) found that juvenile Black Seabass (*Centropristis striata*) fed with fish fed with pre-cleaned microplastics displayed increased oxygen consumption. Juveniles exposed to microfibers in the water column displayed increased oxygen consumption.

•Knauss (2019) found that Eastern Oyster (*C. virginica*) larvae that ingested polystyrene microbeads displayed a significant increase in algal clearance and an increase in carbon –assimilation in a dose dependent manner.

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 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.

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

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 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.

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

URGENT

REQUESTED ACTION:

1. Create an action team or workgroup focused on plastic pollution.

2. Give permission from the plastic pollution “group” to work with STAC and STAR to work on implementing the recommendations in the workshop report.