



# Chesapeake Bay Program Scientific & Technical Advisory Committee “Workshop on Microplastics in the Chesapeake Bay and its Watershed”

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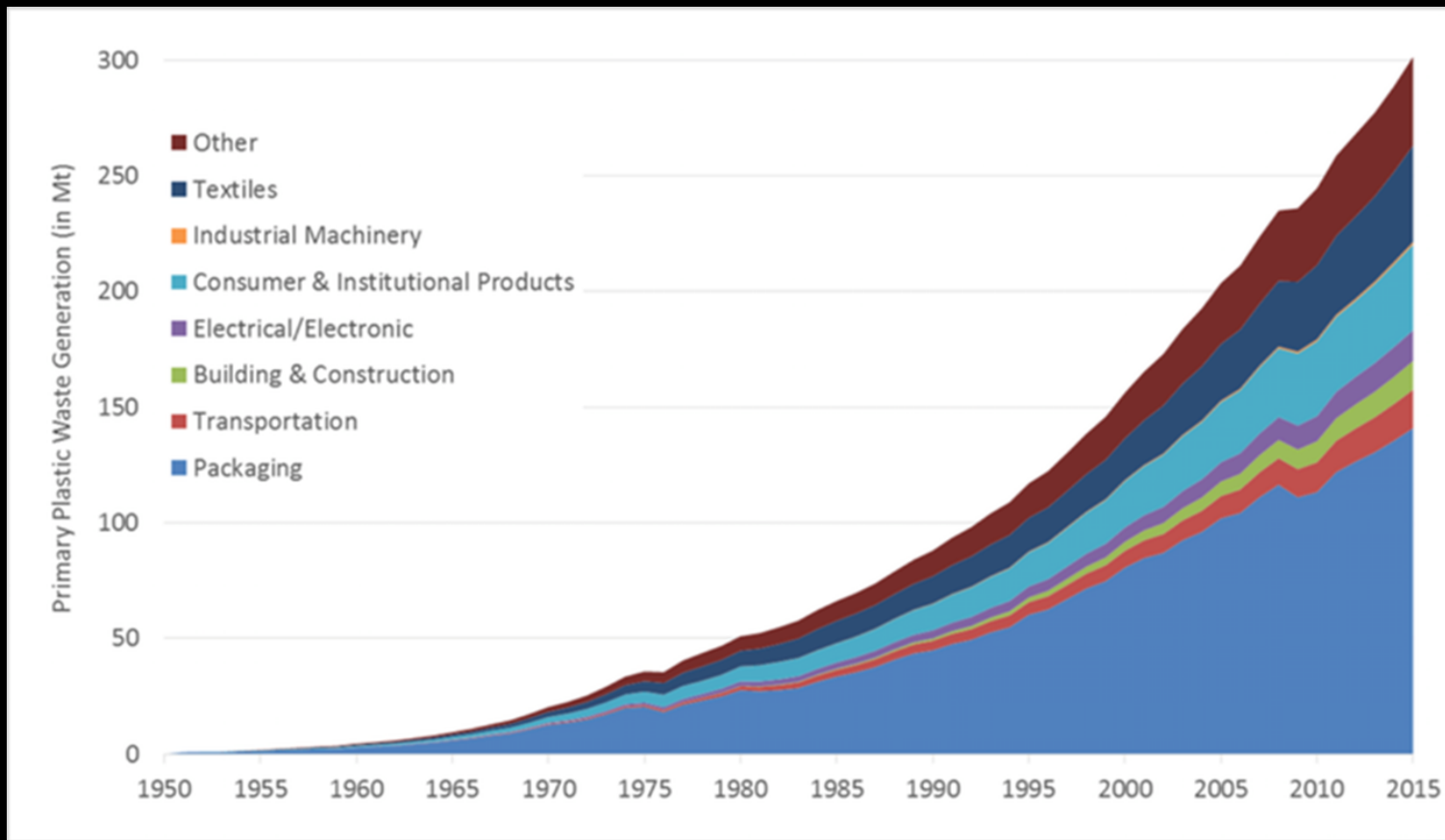
PARTNERING AND ENVIRONMENTAL  
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MD DEPT OF NATURAL RESOURCES  
CHAIR, CBP's SAV WORKGROUP

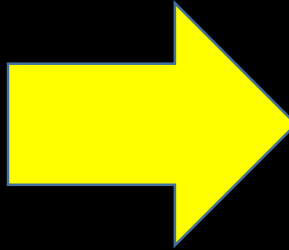


# Plastics are a Global Problem



J. Geyer in Science Advances. 2017

Foam and other plastics start out as this.....



...but turn into this

# Microplastics



## Small plastic fragments, fibers, and granules

How small? Usage of the term “microplastic” in the literature varies from 0.1  $\mu\text{m}$  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 Organisation (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 the Bay



Photos by Masaya Maeda, Anacostia Watershed Society, 2017

# Where are those microplastics likely to accumulate?

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Logical  
response:  
SAV beds





# Where are those Microplastics likely to accumulate?

- 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?

Logical  
response:  
SAV beds



# Study of Microplastics in SAV Beds in DC

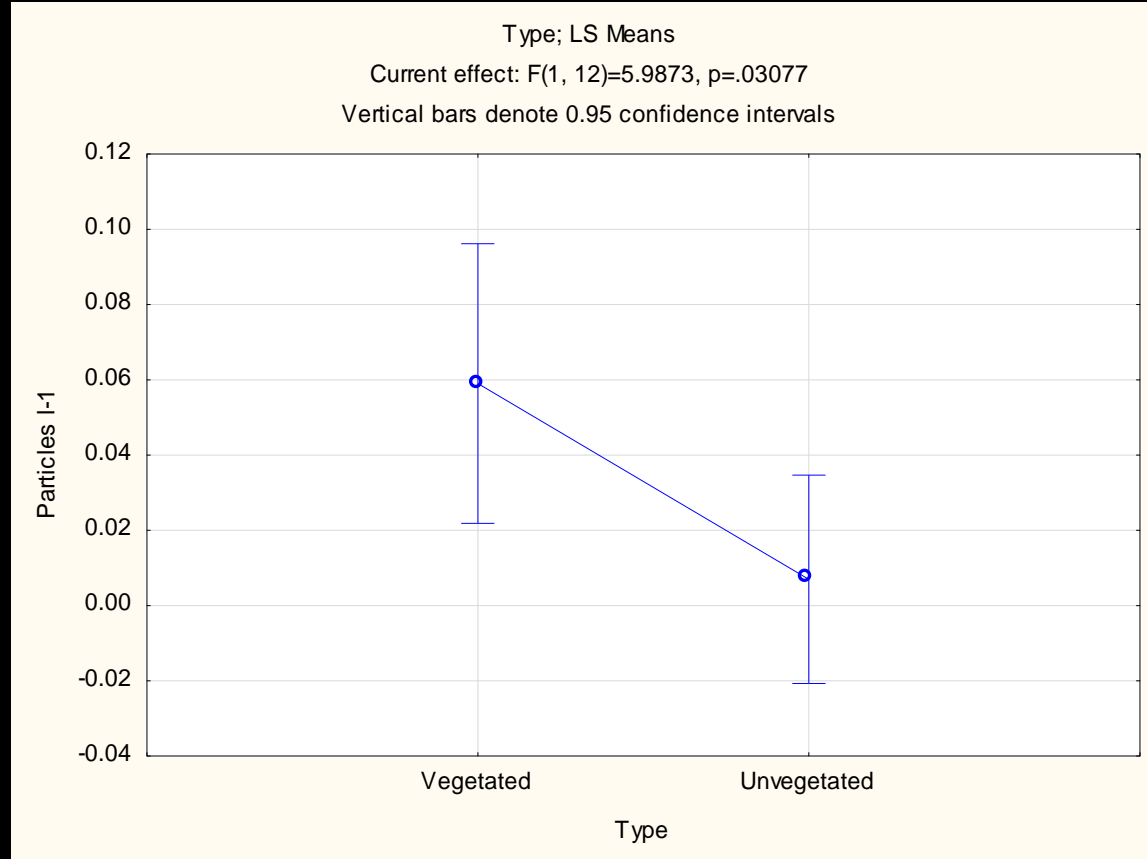
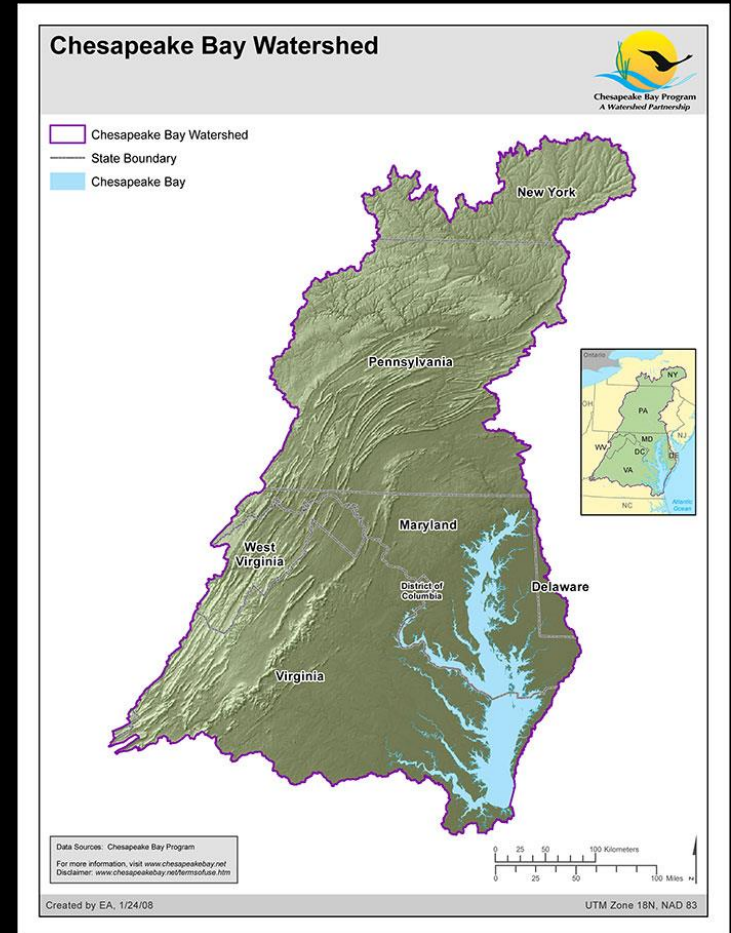


Figure 1 – Mean microplastic particle concentration (#of particles/volume of sample) in SAV beds vs. unvegetated bottom (n=14, 5 vegetated, 9 unvegetated)

# Bringing the Issue to Light

How can we bring more attention to this issue regionally?

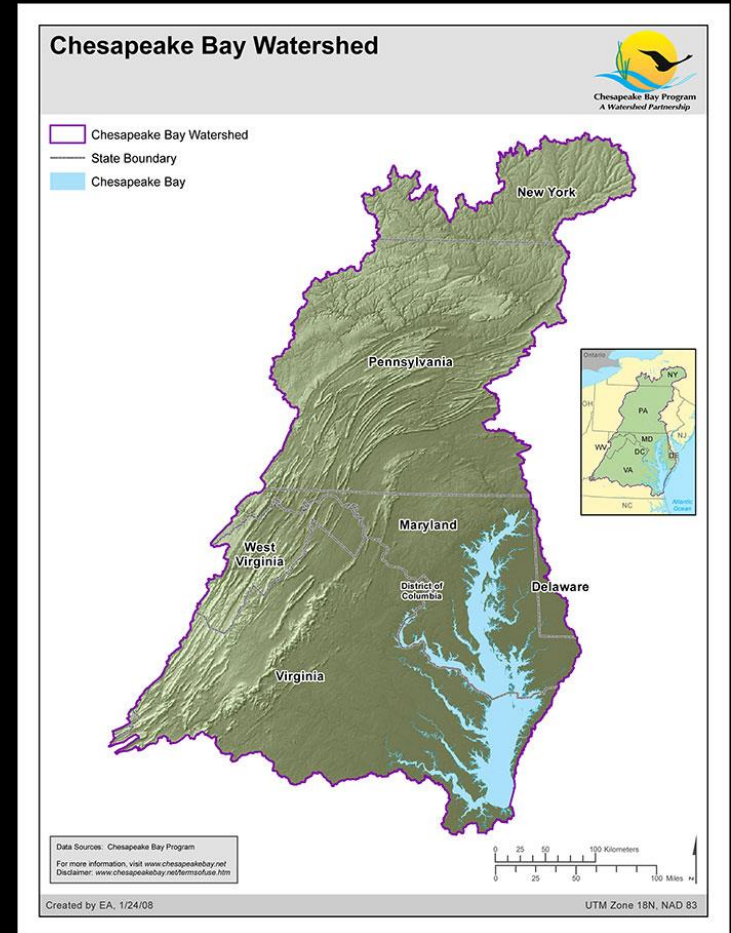




# Bringing the Issue to Light

How can we bring more attention to this issue regionally?

The CBP's SAV Workgroup applied for a Scientific & Technical Advisory Committee (STAC) grant to hold a workshop in 2019 about microplastics in the Bay and watershed



# Scientific & Technical Advisory Committee Workshop



Chesapeake Bay Program's

*Scientific and Technical Advisory Committee*

## *“Microplastics in the Chesapeake Bay: State of the Knowledge, Data Gaps, and Relationship to Management”*

- SAV Workgroup Sponsored
  - ❖ Brooke Landry (MD DNR, SAV WG Chair)
  - ❖ Bob Murphy (TetraTech, SAV Workgroup; Workshop Co-Chair)
  - ❖ Matt Robinson (DC DOEE, SAV Workgroup; Workshop Co-Chair)
- **Emerging Issues of Concern**

# Workshop Goals

1. Assess the state of the knowledge on microplastic pollution in the Chesapeake Bay and its tributaries
2. Assess possible effects of microplastics on various habitats and associated living resources
3. Identify existing policy and management tools being used to address plastic pollution in the watershed and beyond, and their effectiveness
4. Identify research gaps moving forward, and develop recommendations for future studies or new tools

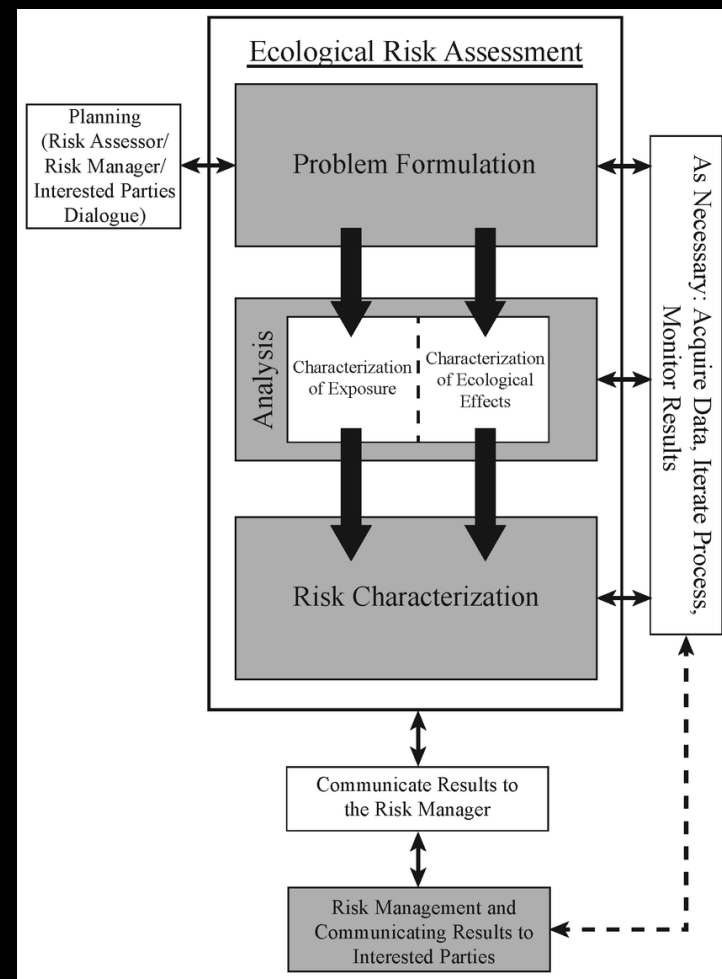


# Workshop Format

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

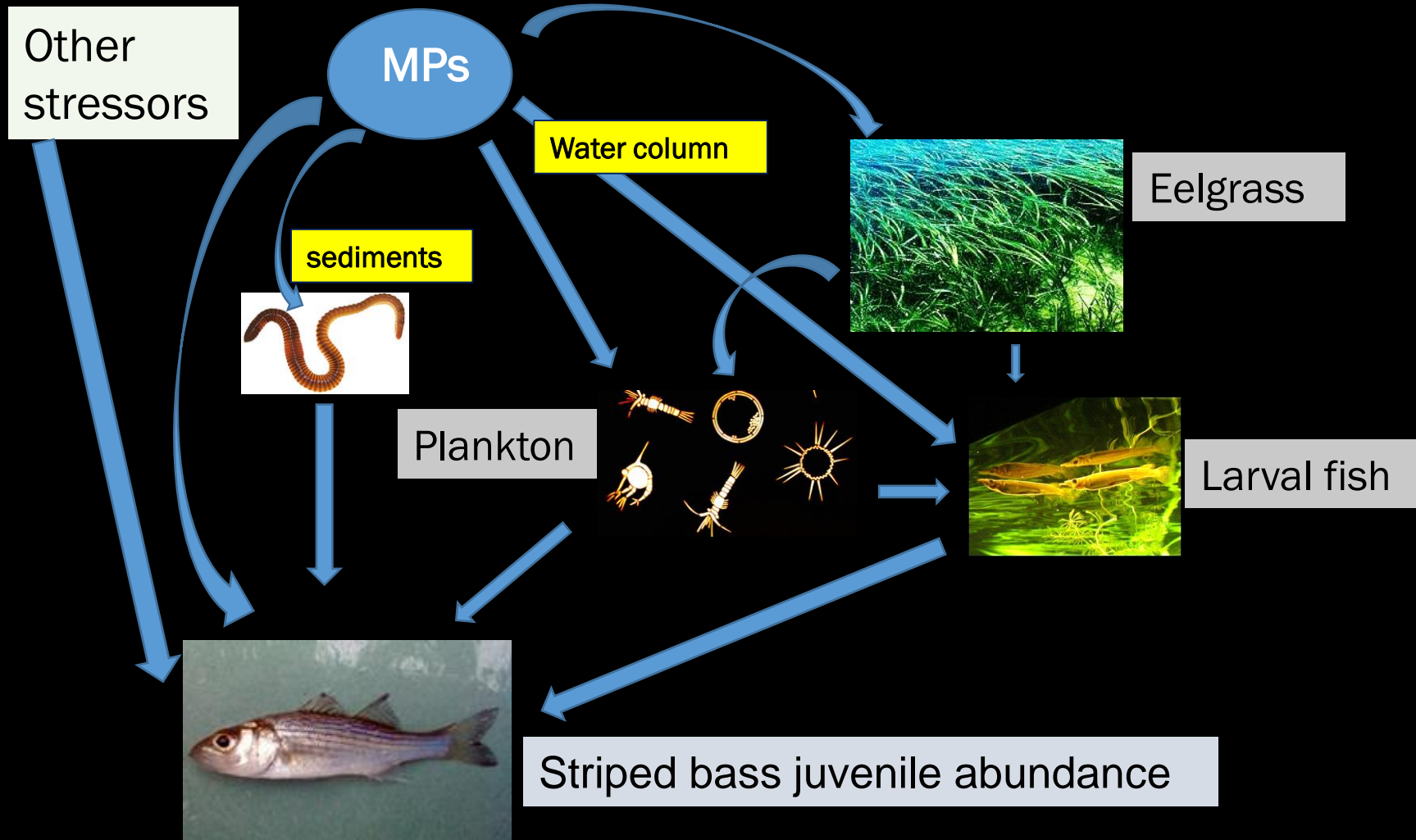
The Ecological Risk Framework consists of the following components:

- 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



Ecological Risk Framework (EPA, 1992)

# Ecological Risk Assessment



# Presentations

**Introduction to Ecological Risk Frameworks** – Jerry Diamond, Tetra Tech

## Sources

**Wastewater** – Chris Burbage, Hampton Roads Sanitation District

**Stormwater** – Phong Trieu, Metropolitan Washington Council of Governments

## Presence in the Bay and Watershed

**Tidal waters** – Lance Yonkos, University of Maryland

**Non-tidal waters** – Shawn Fisher, USGS

## Effects on Living Resources

**Black seabass** – Susanne Brander, Oregon State University

**Oysters** – Christine Knauss, University of Maryland

## Policy & Management Tools

**VA Marine Debris Plan** – Katie Register, Clean VA Waterways

**Anacostia River Trash TMDL** – Matt Robinson, DC DOEE



# Presentations clarified the urgent need to address both the macro- and microplastic pollution problem



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For in-depth information given during the workshop presentations, see the workshop report

**Microplastics in the Chesapeake Bay and its Watershed: State of the Knowledge, Data Gaps, and Relationship to Management Goals**



STAC Workshop Report  
April 24-25, 2019  
Woodbridge, VA



STAC Publication 19-00X

# 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



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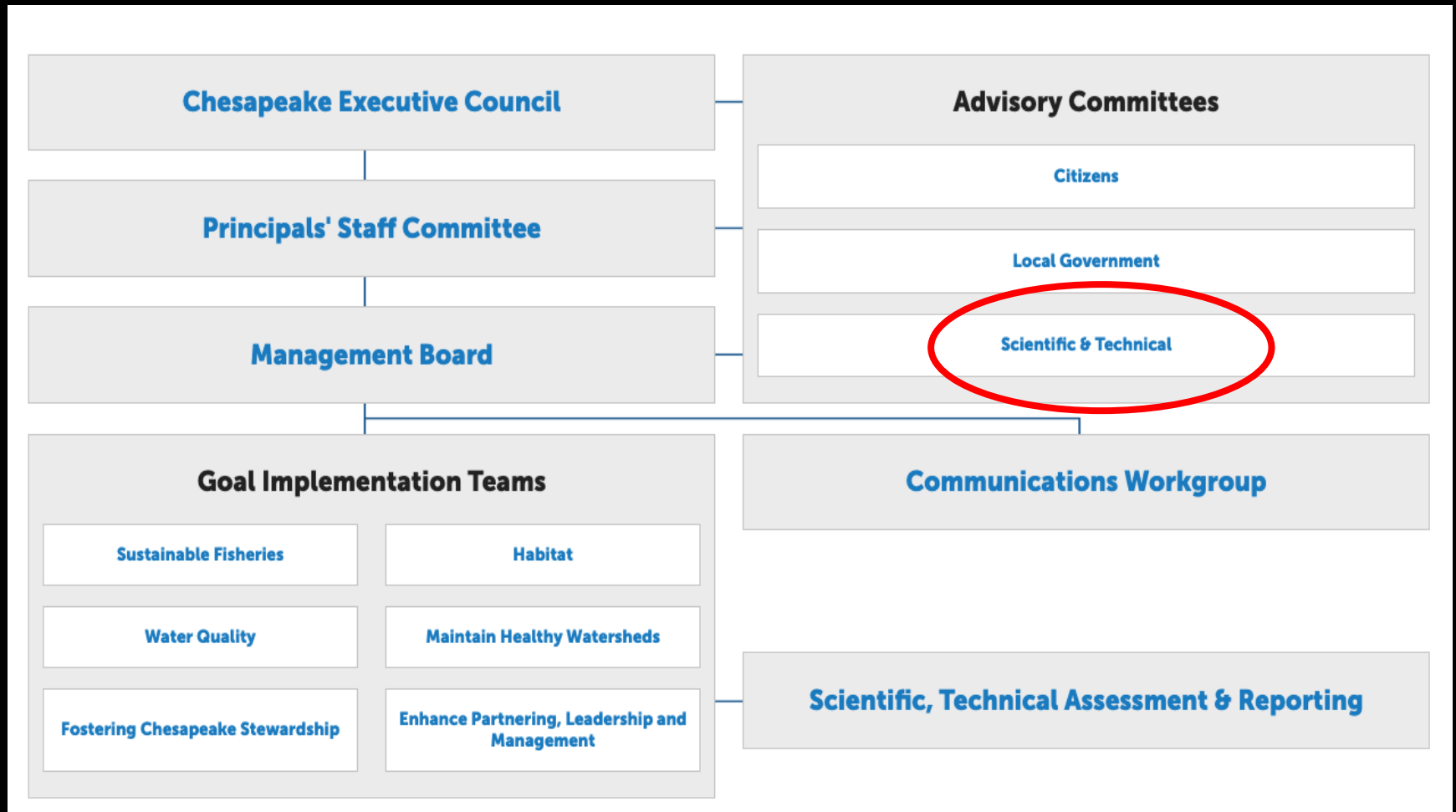
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4. The CBP should develop a source reduction strategy to assess and address plastic pollution emanating from point sources, non-point sources, and human behavior.
5. The CBP should direct the Plastic Pollution Action Team and STAR Team to collaborate on utilizing the existing bay and watershed monitoring networks to monitor for microplastic pollution.

# The Chesapeake Bay Program



# Next Steps

- Draft report in final review; published by end of September
- 30-day review at the Chesapeake Bay Program before public dissemination
- Presentation to the Chesapeake Bay Program Management Board later this Fall
- Upcoming Fall 2019 study in DC: Microplastic abundance in SAV benthic sediments vs. adjacent bare bottom (Funding from EPA Trash Free Waters and Chesapeake Bay Program)

# Special Thanks

Matt Robinson, DC DOEE, Workshop co-chair

Brooke Landry (MD DNR), CBP SAV Workgroup Chair and workshop sponsor.

Rachel Dixon, former STAC Coordinator

Annabelle Harvey, STAC Coordinator

Our Host: Dann Sklarew, George Mason University Department of Environmental Science & Policy

## Workshop Steering Committee:

Mark Luckenbach, Virginia Institute of Marine Science

Denice Wardrop, Penn State

Lance Yonkos, University of Maryland

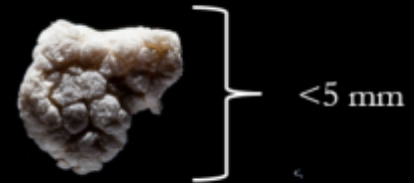
Jason Rolfe, NOAA Marine Debris Program

Kelly Somers, EPA Region III

Greg Allen, EPA Chesapeake Bay Program Office

Kim Grubert, MD DNR

Phong Trieu, Metropolitan Washington Council of Governments





# Questions?



*Microplastics from the Magothy River at the laboratory of Dr. Lance Yonkos, University of Maryland, College Park*