



Microplastics and You- What We Can Do About It

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**Michigan Sierra Club
Michigan Microplastics Coalition**

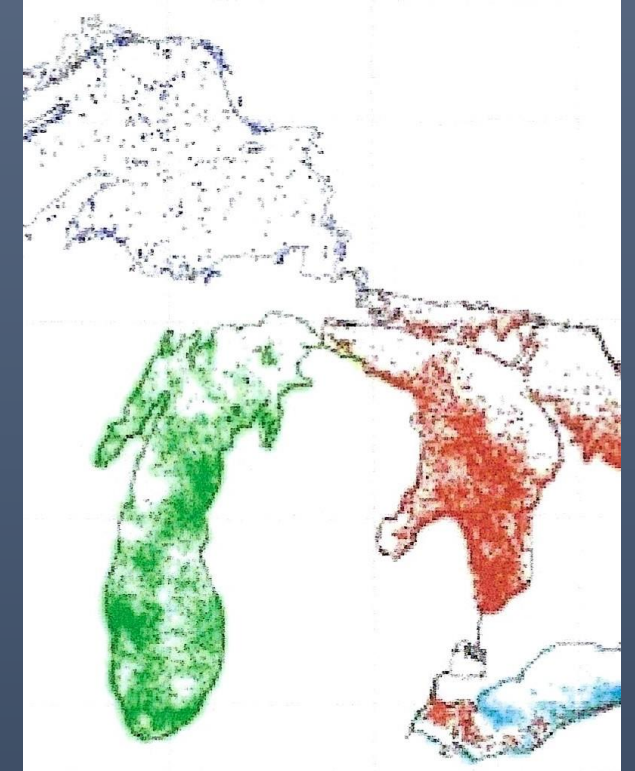


Microplastics Presentation

- Overview of the microplastics problem in the Great Lakes
 - What are microplastics
 - Extent
 - Sources/pathways
 - Controls
 - Regulations
 - What you can do
- Complex-Complex issue that needs your support
- Recycling will not solve the plastic/microplastic problem
- The problem is going to get worse if we do nothing

Plastic Loading into Great Lakes

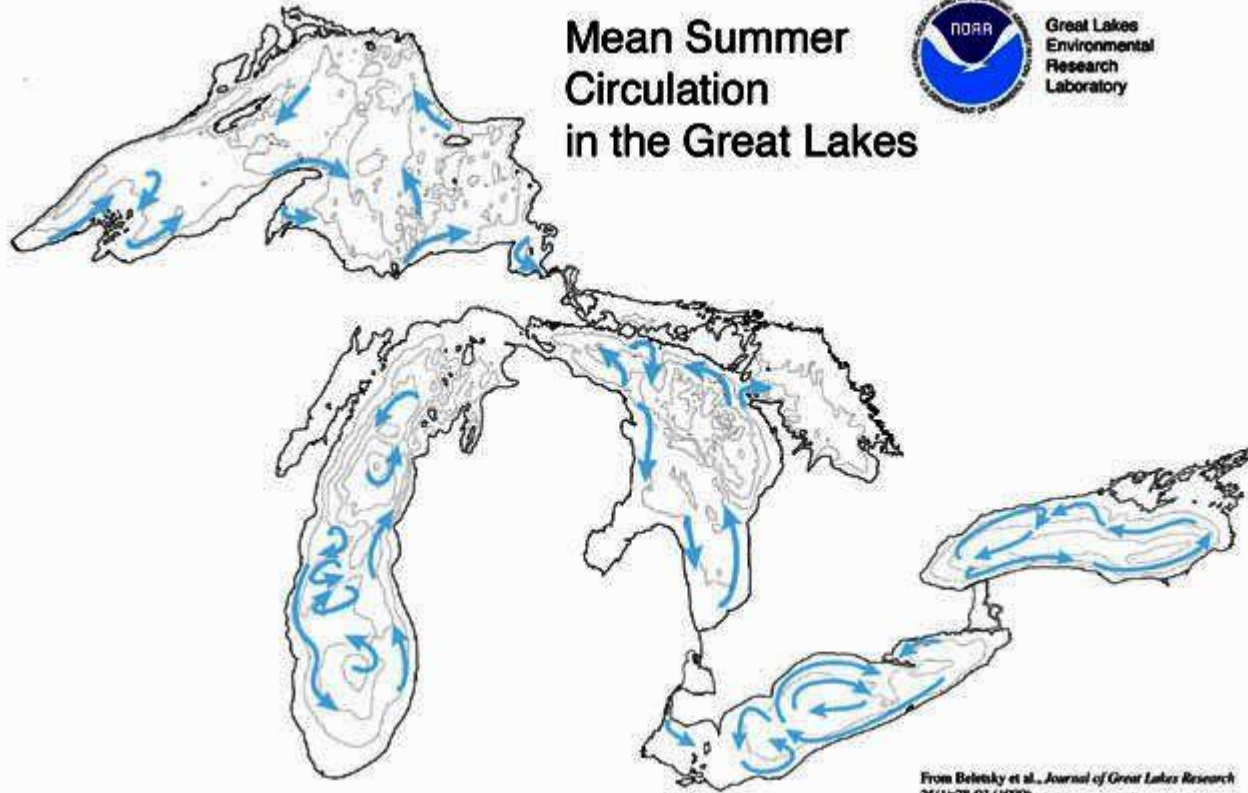
- *22,000,000 pounds of plastic into Great Lakes/year (yr)
- Lake Michigan- 11,000,000 (11M) pounds/yr
- Lake Erie- 5.5 M pounds/yr
- Lake Ontario-3 M pounds/yr
- Lake Huron-1.3 M pounds/yr
- Superior- 0.7M pounds/yr
- 80 percent of the litter found on beaches is plastic
- Chicago, Toronto, Cleveland, and Detroit are the worst contributors to plastic pollution in Great Lakes



Mean Summer Circulation in the Great Lakes

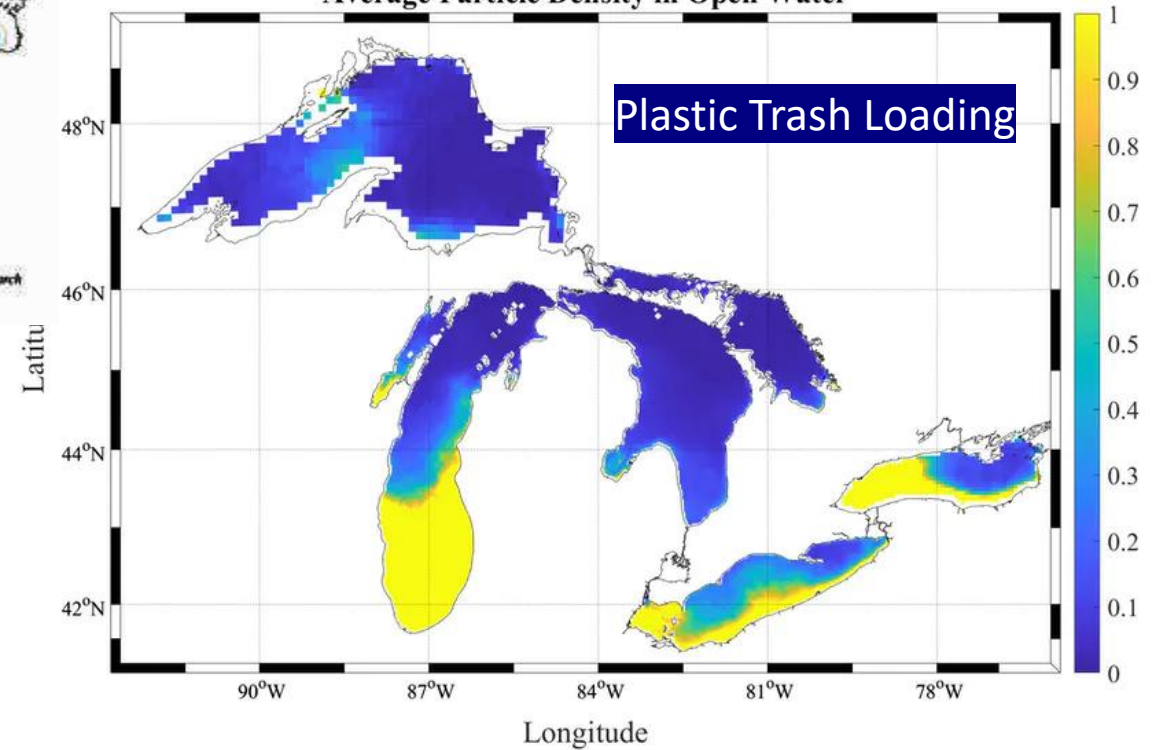


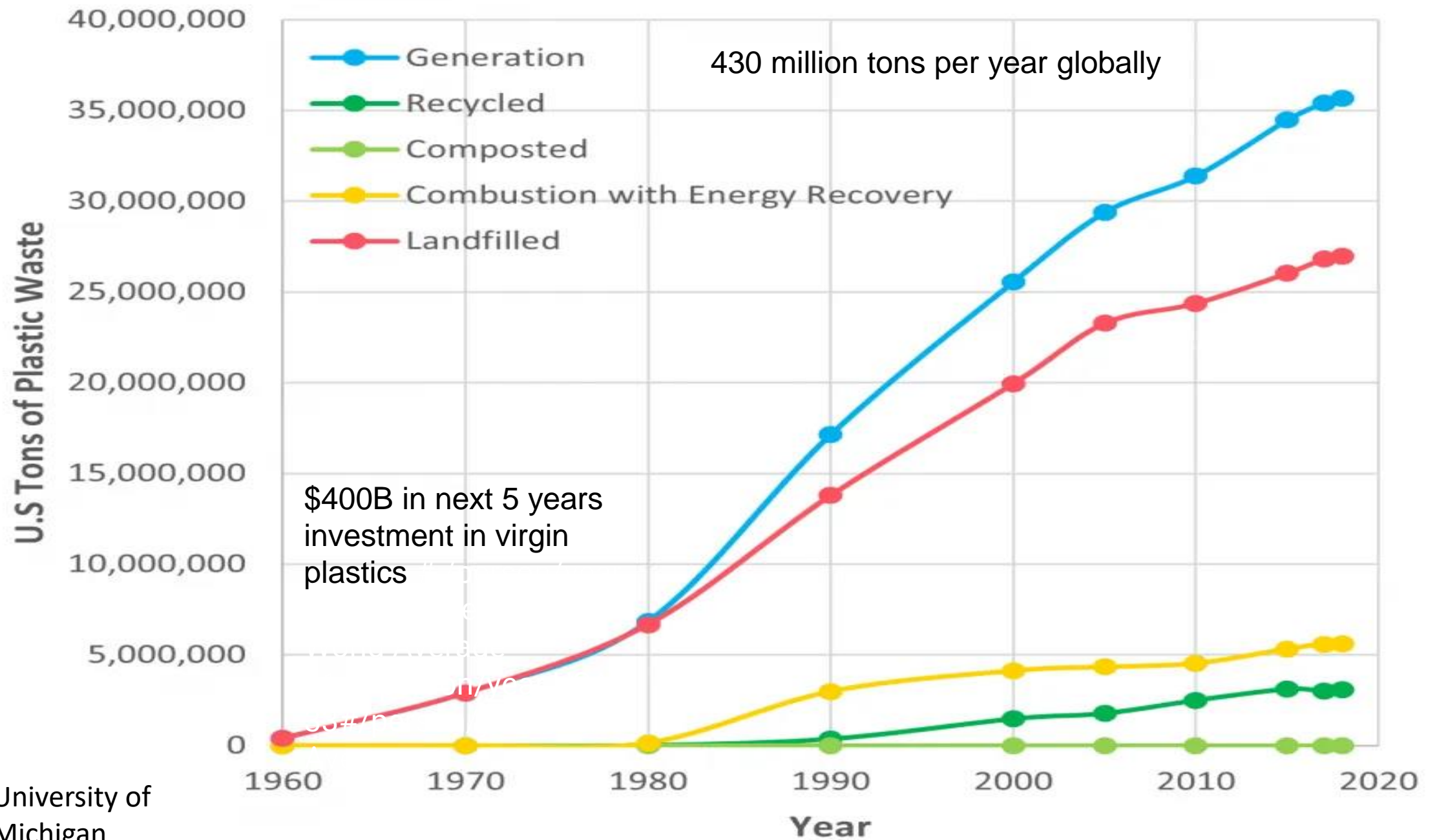
Great Lakes
Environmental
Research
Laboratory



From Beletsky et al., *Journal of Great Lakes Research*
25(1):78-93 (1999)

Average Particle Density in Open Water



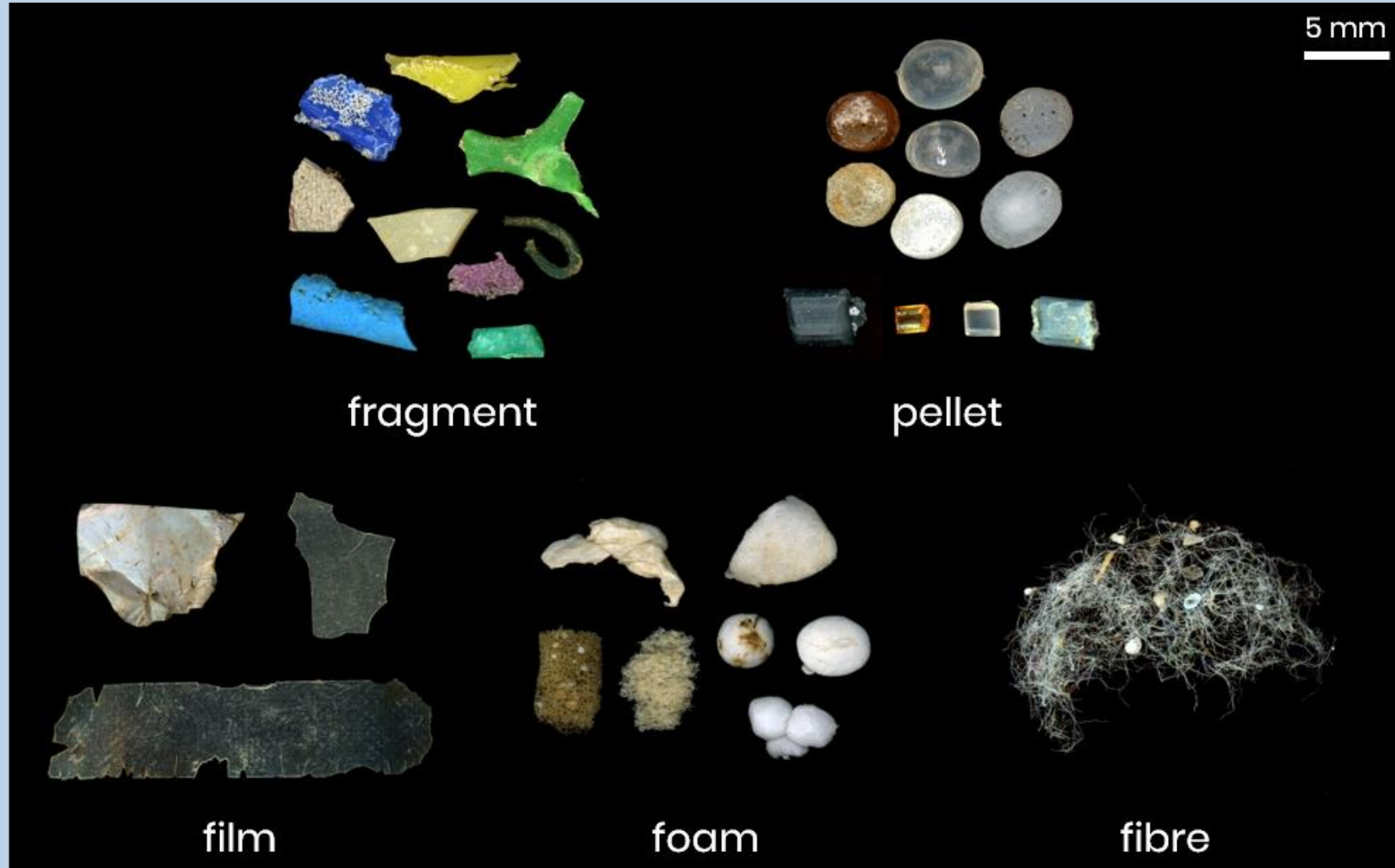


What Are Microplastics?

- Plastics that are <5mm in size (3/16 in)
- Microplastics (Primary)
 - Produced/manufactured as products
 - Plastic pellets called nurdles
 - Microbeads in cosmetics
 - Industrial paint/rust removal (microbeads)
- Microplastics (Secondary)
 - Degraded from large pieces of plastic
 - UV sun, weathering, wave erosion and abrasion into micro sizes
 - Microfibers from synthetic clothes
- Microplastics (Nano Plastics)
 - Plastic size equal to or less than 0.001mm (1 μ m)



Types of microplastic



Sources-Tires

1.5M tons tire-microplastics
released per year in US



N-(1,3-Dimethylbutyl)-*N'*-phenyl-*p*-phenylenediamine –quinone

6PPD-quinone

0.1 ppb toxic level to salmon

Tires 20 percent natural rubber
and 24 percent synthetic rubber



Sources-Textiles

Microfibers from Washing
Synthetic and Non Synthetic
Clothes

Clothes Washer-est 700,000
fibers/load



178,000 microbeads in one milliliter of detergent



Clothes dryers est 433,128–561,810
microfibers/load

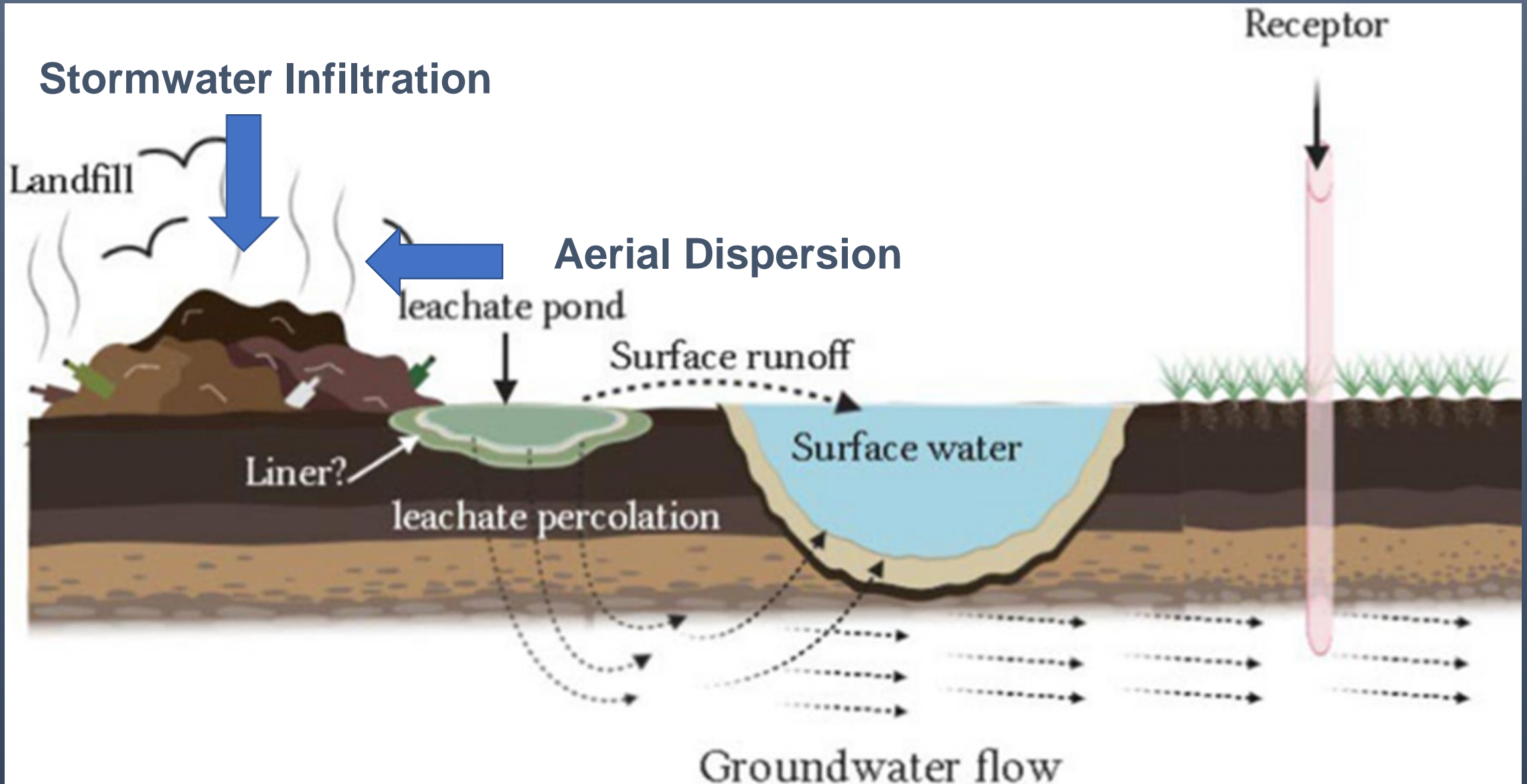
Sources-Single Use Packaging



#1 Use of Plastics



Source-Landfills



Sources-Microbeads



Cosmetics



Highway Reflective Paint



Industrial Cleaning Operations-
Jet Blasting Paint and Rust
Removal

Source-Agriculture

Biosolids for fertilizer
20 million acres/yr USA

286 MP/gram-biosolid



Source-Agriculture



Plastic Mulch

230#/acre
10,000 acres/yr
Michigan



Encapsulated fertilizers,
pesticides and seeds



Plastic Industry- Nurdles

Sources-Industrial Plastic- Nurdle Production



- Pre-production plastics are the raw material used to make most plastic products.
- End product of petrochemical manufacturing to plastic molding
- The pellets are manufactured by petrochemical companies and transported by train, ship, or truck to plastic facilities
- Spillage from transport, storage and production handling
- Found on 70% beaches on all five Great Lakes



Pathway- Municipal- Industrial



Wastewater Treatment Systems

Pathway-Stormwater



Pathway- Tributaries



EarthJustice

Pathway-Agriculture Non Point Source



Pathway-Beach Litter

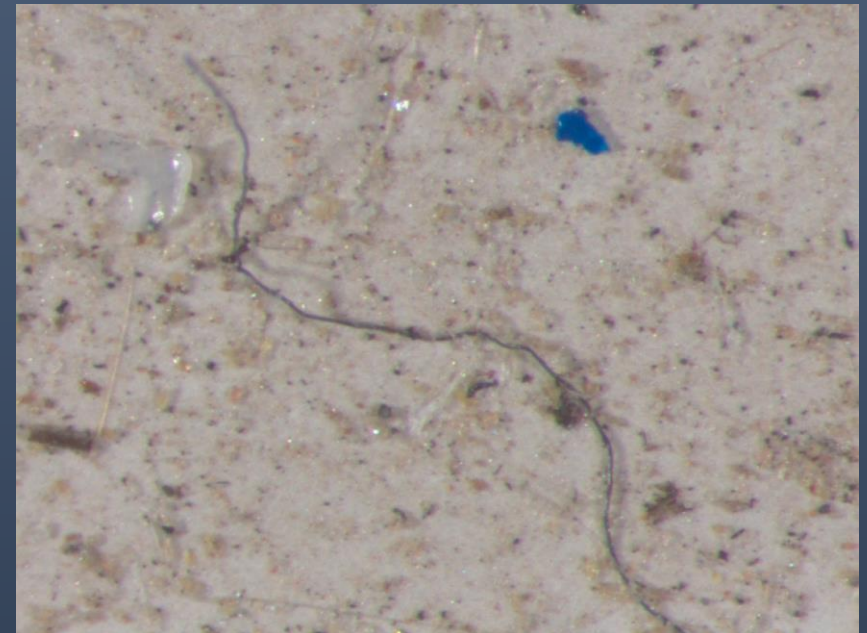


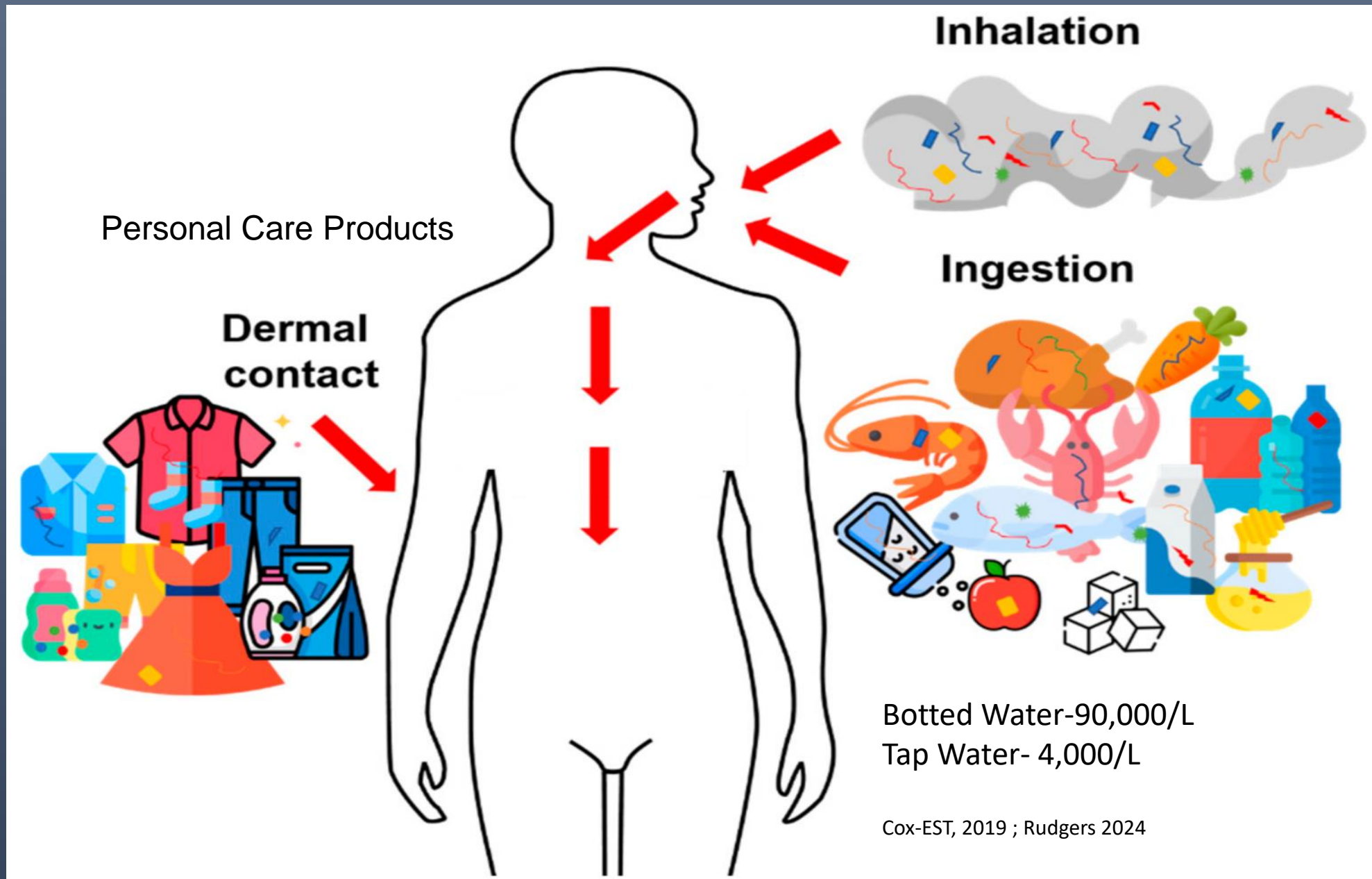


Aerial Deposition

1000 tons of microplastics, the equivalent of 300 million plastic bottles, settle on 11 western national parks and wilderness areas (approx. 100 million acres)

Utah State University/USGS
Brahney, 2021





Potential Microplastic Human Impacts

Human System

- Endocrine System
- Circulatory System
- Reproduction System



The Planet Voice

Potential Health Impacts

- Placentas/infant meconium
- Infant fecal concentrations > adult
- Blood system
- Found in lungs
- Immune system
- Endocrine disruption
- Artery plaque *
- Brain deposition
- Sperm concentration/mobility
- Cell inflammation

CALspec 2023 *New England Journal of Medicine

Potential Microplastic Ecological Impacts

- Zooplankton
 - Base of food chain
 - Reproduction/development
 - Plastosis
 - Starvation/reduced nutrient uptake
 - Behavioral changes
 - Viability
 - Bioaccumulation
- Avian
- Fish



More Research is Needed



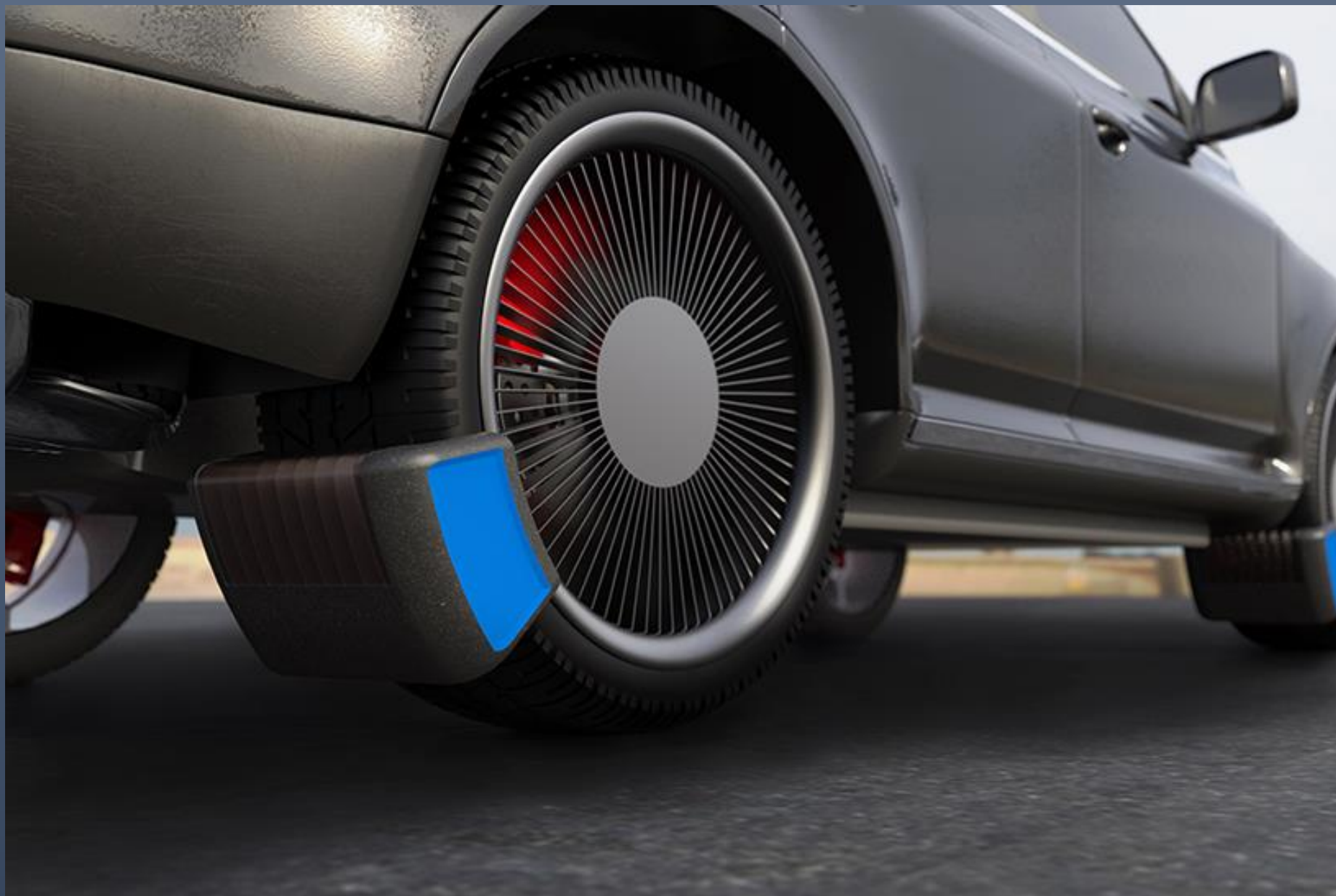


Drop Inlet for Stormwater and Nurdle Control

Waste Treatment Systems

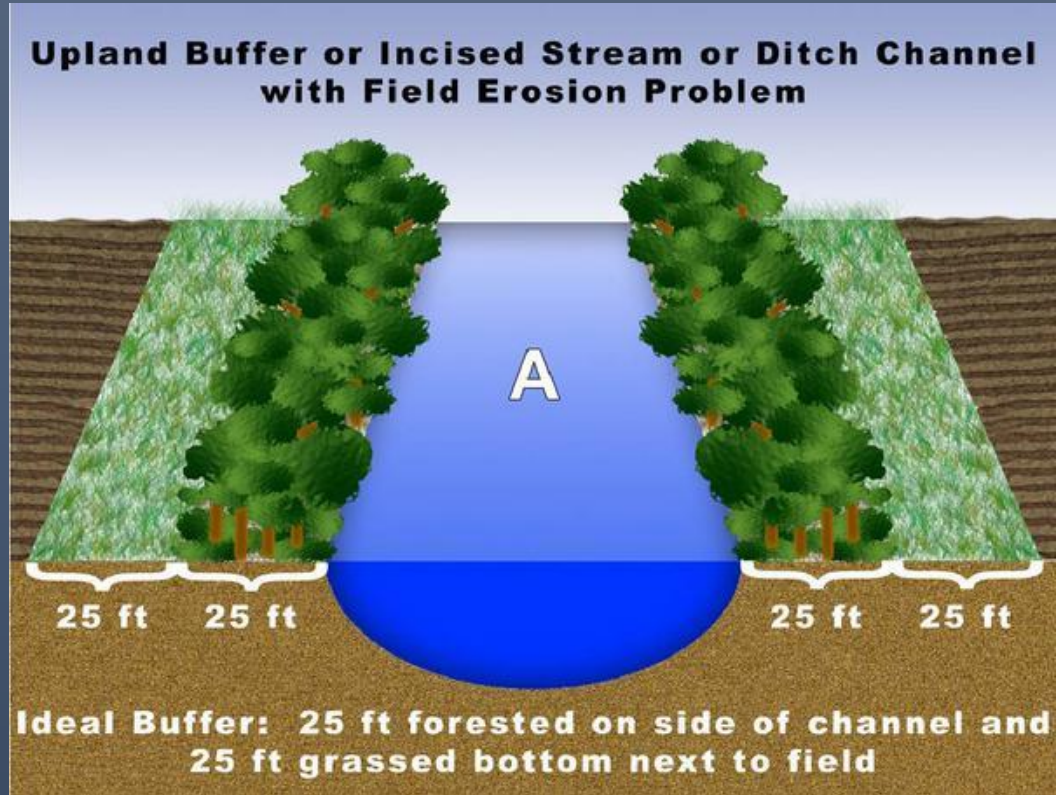
- 90-95% removal
- Expensive treatment
- Not designed for microplastics





Electrostatic
Microfiber Tire
Collectors
Under
Development

Agricultural Controls



Land and Water Magazine

Municipal Stormwater Controls Rain Gardens



Microfiber Upstream Controls

- Synthetic Material Substitution
 - Natural fibers (cotton/wool)
 - Biodegradable (kelp, proteins)
 - Graphene non shedding fabric
 - Patagonia research
- Washing Machine Filters
 - Grundig integrated filter system (90% removal)
 - PlanetCare Filter (90% removal)
 - Lint LUV-R (87% removal)
 - Guppyfriend (54% removal)
 - Cora Balls (26% removal)



Federal Microplastic Legislation

- Microbead-Free Waters Act 2015
 - Frank Joseph Pallone
 - Signed by President Obama
- Plastic Pellet Free Waters Act (Pending)
 - Senator Durbin
 - Senate Bill 2337 (July 2023)
 - Michigan Rep Thanedar co-sponsor
- Break Free From Plastics (Pending)
 - Senator Merkey/Representative Huffman
 - Break Free from Plastic Pollution Act of 2023
- HR 3871 Research for Health Soils Act (Pending)
 - Senators Merkey/Van Hollen/Booker/Whitehouse
 - Representatives Gluesenkamp/Kim
- Fighting Fibers Act of 2024 (Pending)
 - Submitted July 31, 2024



Proposed State of Michigan Legislation

Michigan Microplastics Coalition

Lobbying Michigan State Representatives and Senators

Microplastic Legislation 2024

- Statewide Microplastics Monitoring Strategy Plan
 - House Sponsor- Representative Hood
- Microplastic Drinking Water Monitoring
 - House Sponsor- Representative Piaz

Future Microplastic Legislation 2025

- Microbead Ban
- Microfiber Filtration
- Nurdle Stormwater Management Regulations





What Organizations Can Do

- Join the Michigan Microplastic Coalition (www.michiganmicroplastics.org)
- Initiate your own microplastic program
- Promote Education and Outreach among chapters and public
- Contact Legislators to Support Microplastic Legislation
 - Statewide Microplastics Strategy Plan
 - Microplastic Drinking Water Monitoring
 - Microbead Ban
 - Microfiber Filtration
 - Nurdle Stormwater Management Regulations
- Support Future Plastic Source Control Legislation
 - Extended Producer Responsibility
 - Ban the Ban/Allow local control to ban plastics
 - Stop Single Use Plastics
 - Support stopping Styrofoam Use

What the public can do to stop plastics-microplastics

1. Use canvas bags and reusable drinking containers
2. Promote local bans of single use plastic
3. Modify personal decisions to not buy certain plastic packaging
4. Purchase microfiber filters on washing machines
5. Select natural fiber clothes; more biodegradable than synthetic
6. Use microplastic free laundry, cleaning detergents, cosmetics
7. Reduce clothes washing frequency
8. Avoid fast fashion
9. Teach your kids and friends about plastics/microplastics
10. **Recognize we cannot recycle our way out of this plastic problem**

“Unless Someone Like You Cares A Whole Awful
Lot Nothing Is Going To Get Better. Its Not”

Doctor Seuss (The Lorax)



Please Visit the Michigan Microplastics Website
<https://michiganmicroplastics.org>

Contact Me If You Want to Get Involved

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