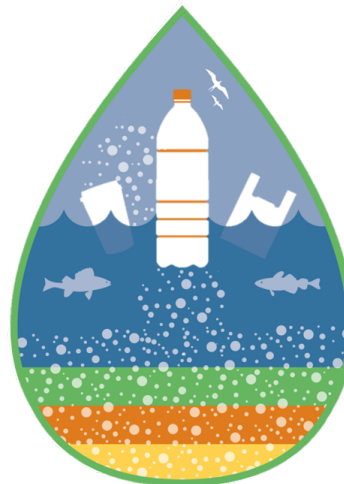


Microplastics: What, Where, and Why do we Care?

Valerie Mitchell Hanley, Ph.D.
Senior Toxicologist

CA Department of Toxic Substances Control (DTSC)
ITRC Microplastics Team Co-Lead



Department of
Toxic Substances
Control



Who is ITRC?

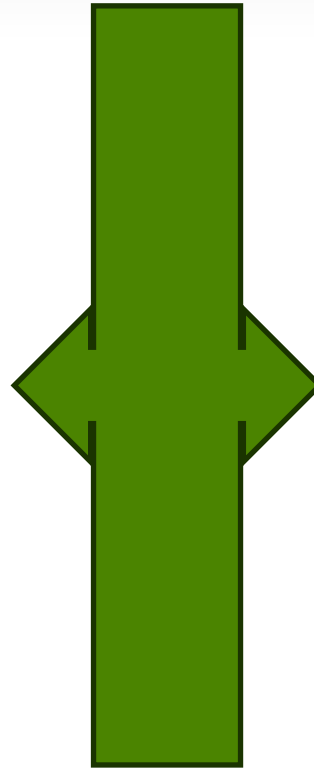
- State led coalition
- State, Federal, Stakeholder, Industry Members
- Funded through Federal Grants/ Industry Membership Fees
- Consensus Driven Process to develop Guidance Documents & Products <https://itrcweb.org/guidance>

ITRC Microplastics Team

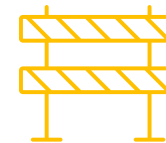
Technical
Guidance



Co-Lead by Kim Nimmer,
City of Raleigh, NC



Outreach
Toolkit



Co-Lead by Grace Anne Martin,
SC Department of Health &
Environmental Control

Technical Guidance:

Web-based Document: <https://mp-1.itrcweb.org>

Microplastics ENHANCED BY Google

INTERSTATE TECHNOLOGY COUNCIL ITRC REGULATORY

- Introduction >
- Environmental distribution, fate, and transport >
- Sampling and analysis >
- Human Health and Ecological Effects >
- Regulatory Context >
- Mitigation and Abatement >
- Data Gaps and Future Research Needs >
- References
- Appendix A. Microplastics Case Studies
- Appendix B. Microplastics State

Welcome Microplastics

Plastics have become pervasive in modern life and are now used in a wide range of commercial and industrial applications. **Microplastics (MP)** are one of the biggest emerging threats to the global environmental community. Recognizing the importance of tackling the global plastics problem, the United Nations convened the **UN** Plastics Summit in Uruguay in 2022 to develop a legally binding instrument on plastic pollution. The Environment Assembly of the United Nations Environment Programme resolution recognizes that plastic pollution includes MP (**United Nations Environment Assembly 2022** ^[634]). Microplastics may be intentionally produced for specific applications and products or may result from the degradation and fragmentation of larger plastics. Regardless of their origin, MP are now ubiquitous in our environment—they have been found on the top of the highest mountain peaks, at the bottom of the Marianas trench, and everywhere in between.

Because of their small size and pervasiveness in the environment, MP, along with any other contaminants that are adsorbed to the MP or intentionally added through the manufacturing process, may be consumed by humans and other organisms. Microplastics have been reported in human blood, in the deep lung, and in placenta, meconium, and human excrement (**Braun et al. 2021** ^[84], **Zhang, Wang, et al. 2021** ^[386]). The science surrounding MP, their potential health effects, and knowledge of their fate and transport is very new and ongoing, with research articles being published at a rapidly accelerating rate. Even techniques and best practices for sample collection and analysis of these tiny particles and fibers are still very much evolving.

Training: <https://www.clu-in.org/conf/itrc/Microplastics/>

What are Microplastics?

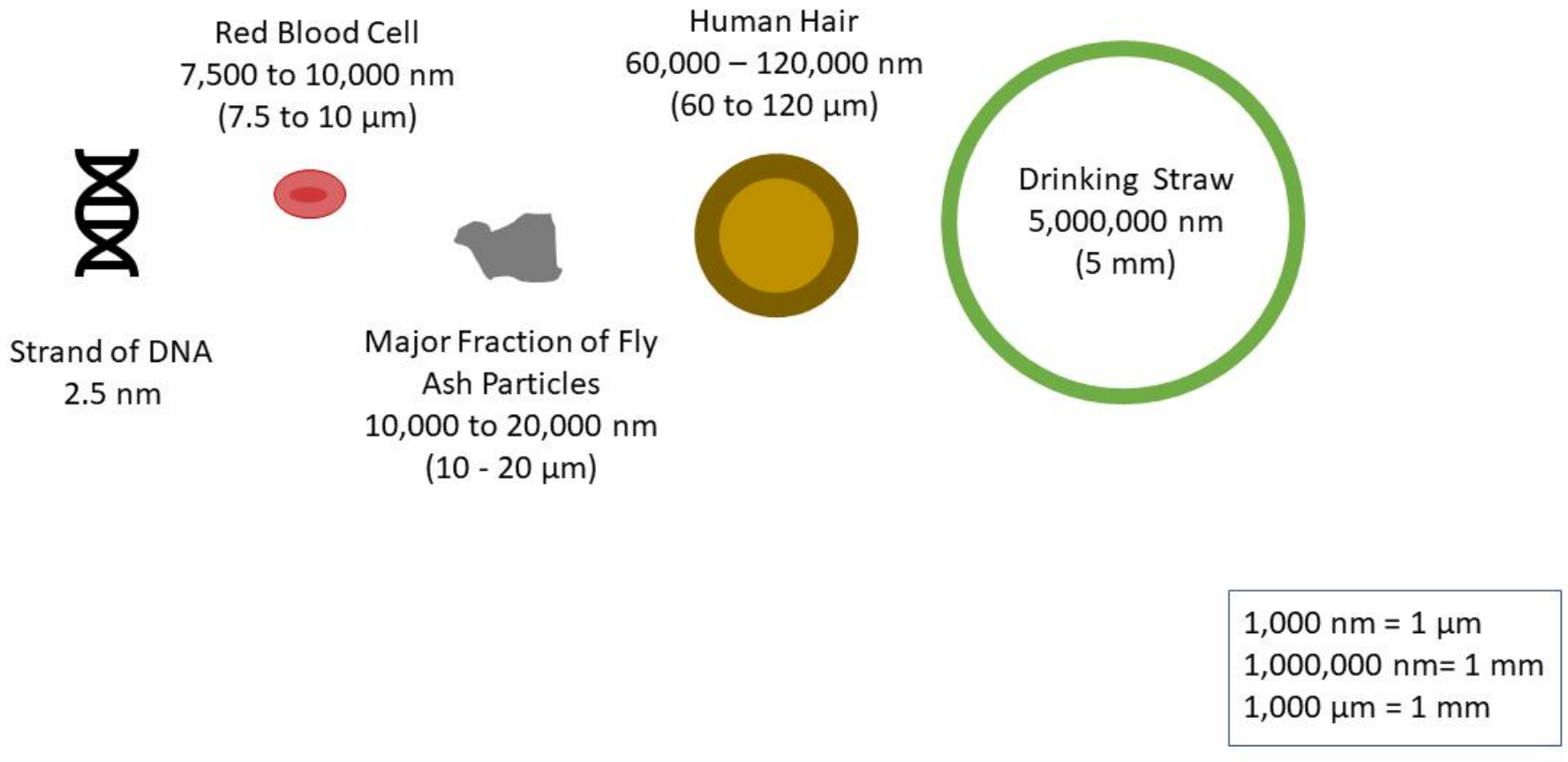
ITRC's Microplastics Definition

Particles that are ***greater than 1 nanometer (nm)*** and ***less than 5 millimeters (mm)*** in their longest dimension and comprised of solid polymeric materials to which chemical additives or other substances may have been added.

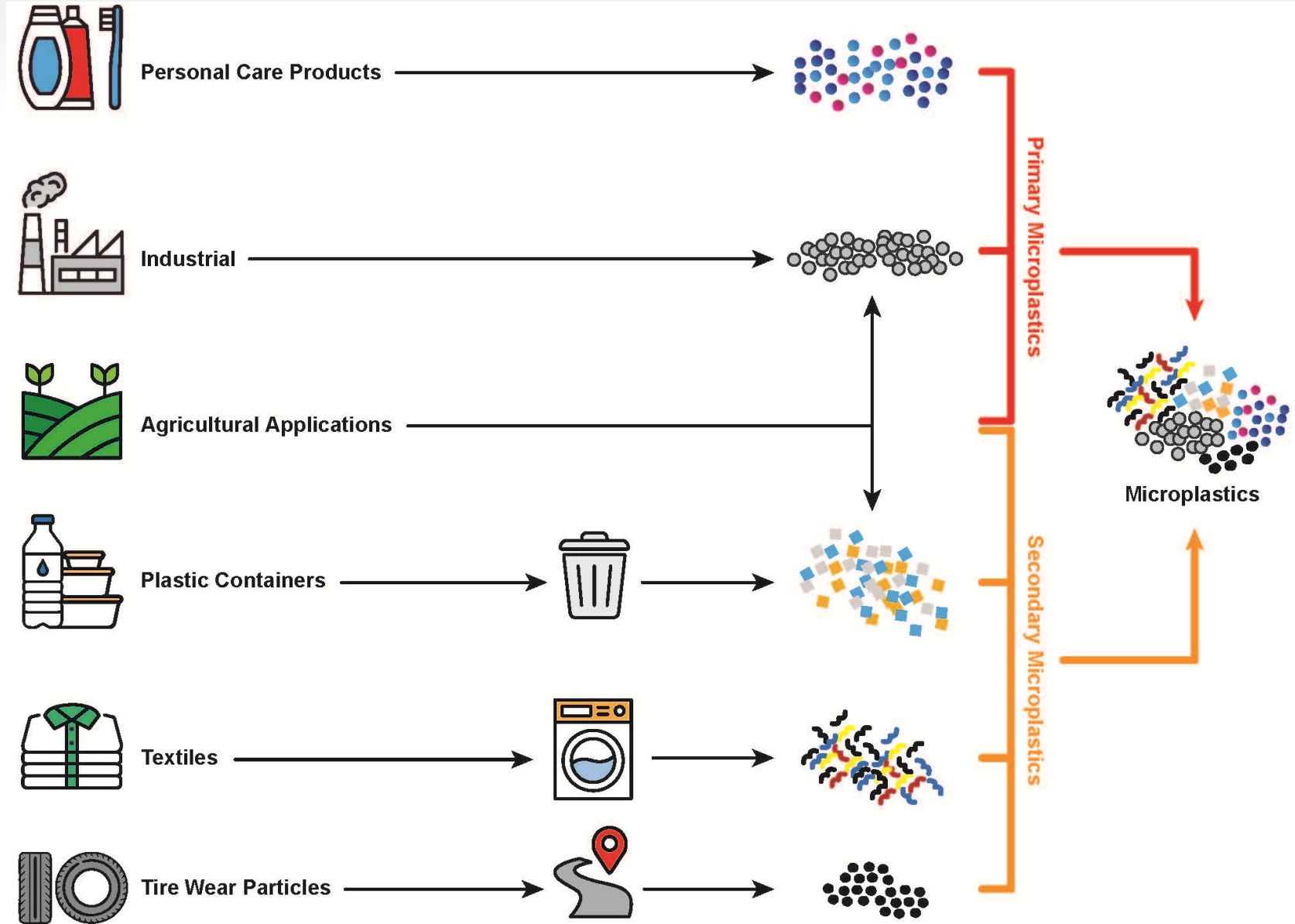
Polymers that are derived in nature that have not been chemically modified (other than by hydrolysis) are excluded

Microplastic Size

Items Comparable in Size to Microplastics (between 1 nm and 5 mm)



Primary vs. Secondary Microplastics



ITRC MP Figure 2-1
Source: J. McDonald

Where are Microplastics Found?

ITRC Microplastics Conceptual Site Model (CSM)

► Multifunctional Tool

- Overview Information
- Document Navigation



Conceptual Site Model: Point Sources

Marine Point Sources:
Materials lost or discarded from vessels

Stormwater Outfalls

Industrial Smokestacks

Wastewater Outfalls



Conceptual Site Model: Non-Point Sources

Microplastics can be transported through the atmosphere and deposited far away from the source



Microplastics may be present in household products such as toothpaste or facial cleaners. Microplastics can be generated through household activities such as laundering of clothing

Plastic trash washes into the ocean, then breaks down into smaller and smaller pieces, eventually becoming microplastics

Microplastics generated through typical tire wear and breakdown of roadway materials

Microplastics may be present in agricultural lands due to direct application of fertilizer pellets, biosolids from wastewater treatment plants, or due to breakdown of plastic sheeting

Why Do We Care About Microplastics?

Why Do We Care About Microplastics?

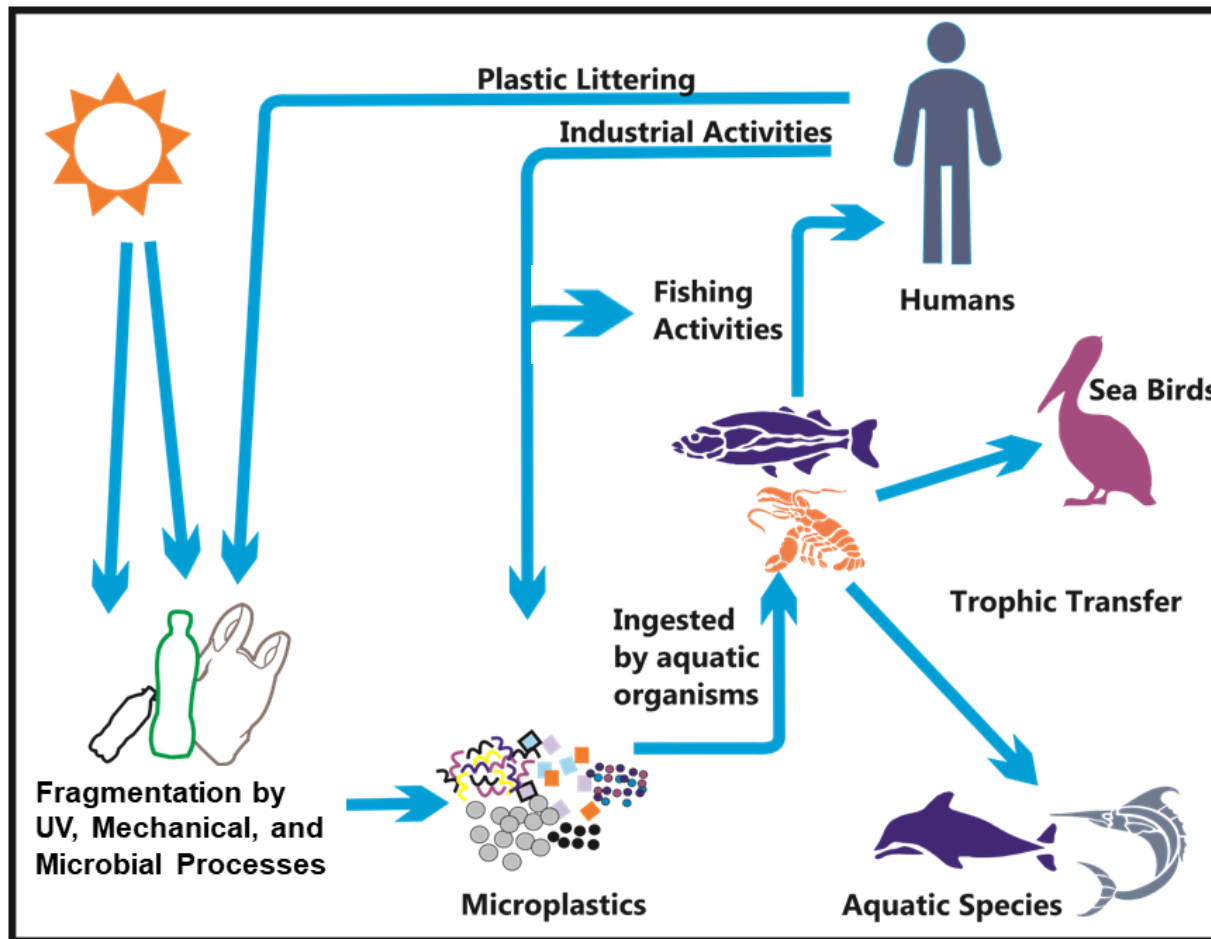
- Ubiquitous in the environment
- Accumulate and persist long time in the environment
- Contain harmful chemical contaminants and additives
- Consumed by humans and other organisms
- Cause adverse health impacts on humans and other organisms



Source Top: Flickr, Global Water Forum

Source Bottom: Oregon State University, : [CC-BY-SA-2.0](https://creativecommons.org/licenses/by-sa/2.0/)

Human Exposures

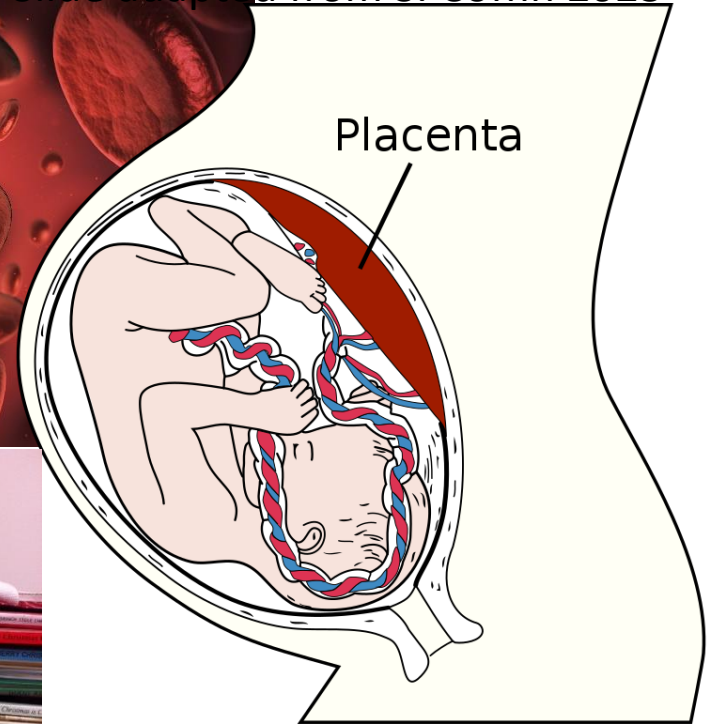
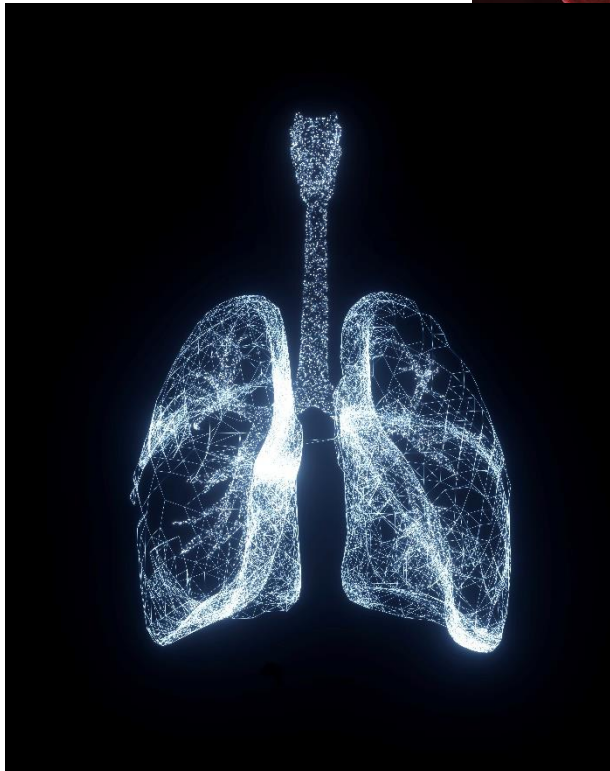


- Multiple media and pathways for human exposure to MP
- Includes both plastics and associated chemicals (MP focus)
- Magnitude of pathways varies by population and locality
- Current estimates: inhalation > dietary ingestion > incidental ingestion > dermal

ITRC MP Figure 4-2
Source: A. MacDonald

Microplastics Detected in Human Lungs¹, Blood², Placenta³ and Breast Milk⁴

Slide adapted from S. Coffin 2023



1. Jenner et al. (2022), *Science of the Total Environment*
2. Lesie et al. (2022), *Environment International*

3. Ragusa et al. (2021). *Environment International*
4. Ragusa et al. (2022). *Polymers*.

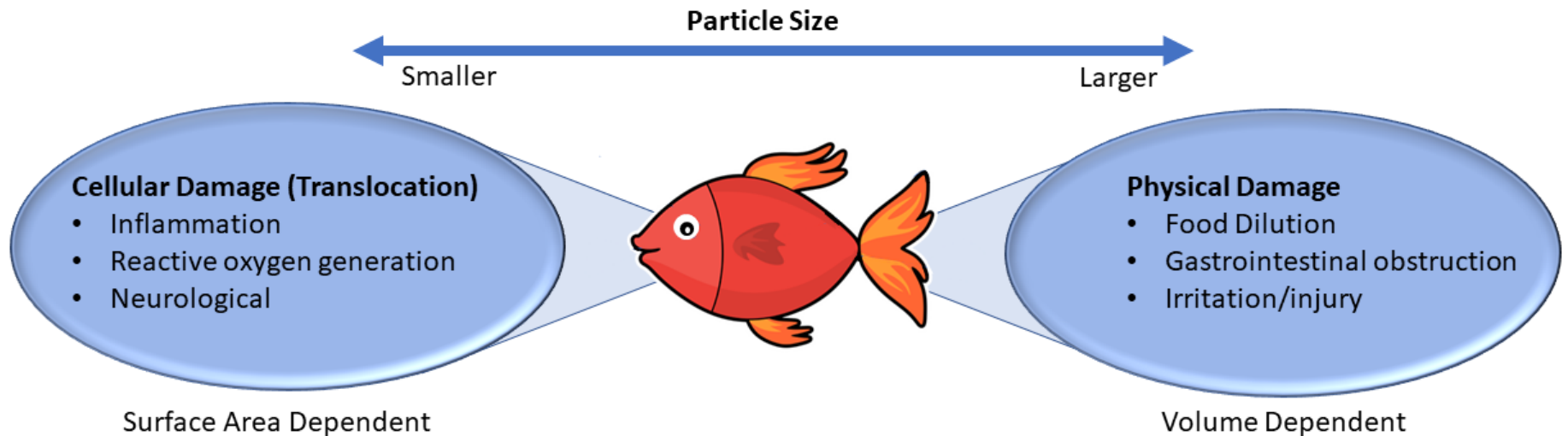
Challenges in Toxicity Research

- Exposure \neq Adverse health effect
- Numerous non-human mammalian studies available but usability varies
- Uncertainties due to study design, exposure concentration, data quality, reporting, data gaps
- Not Enough Information to Establish Toxicity Criteria to use in human health risk assessment.



Source: Thornton Hampton et al. 2022

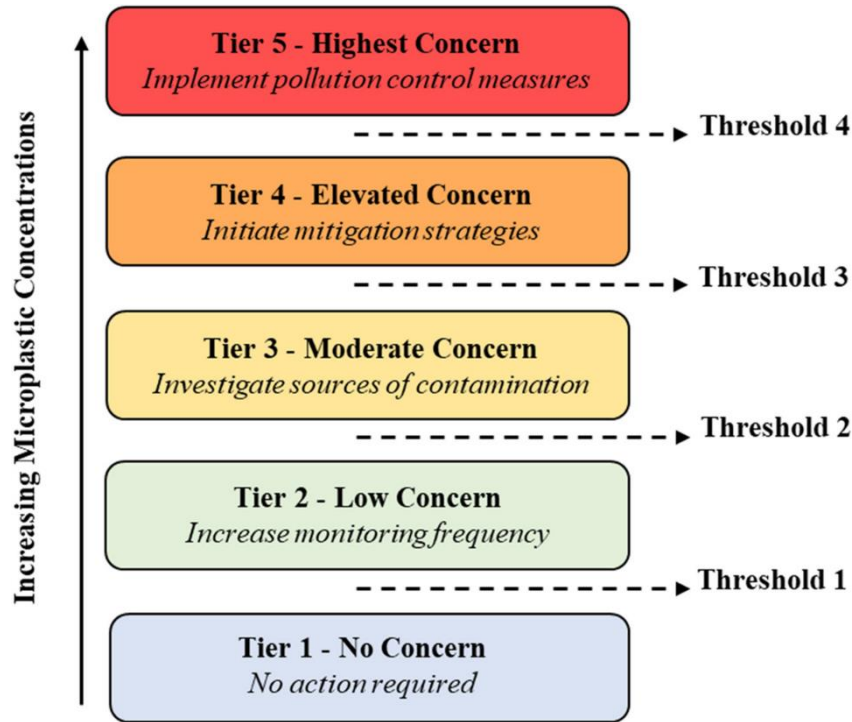
Factors Affecting Aquatic Toxicity



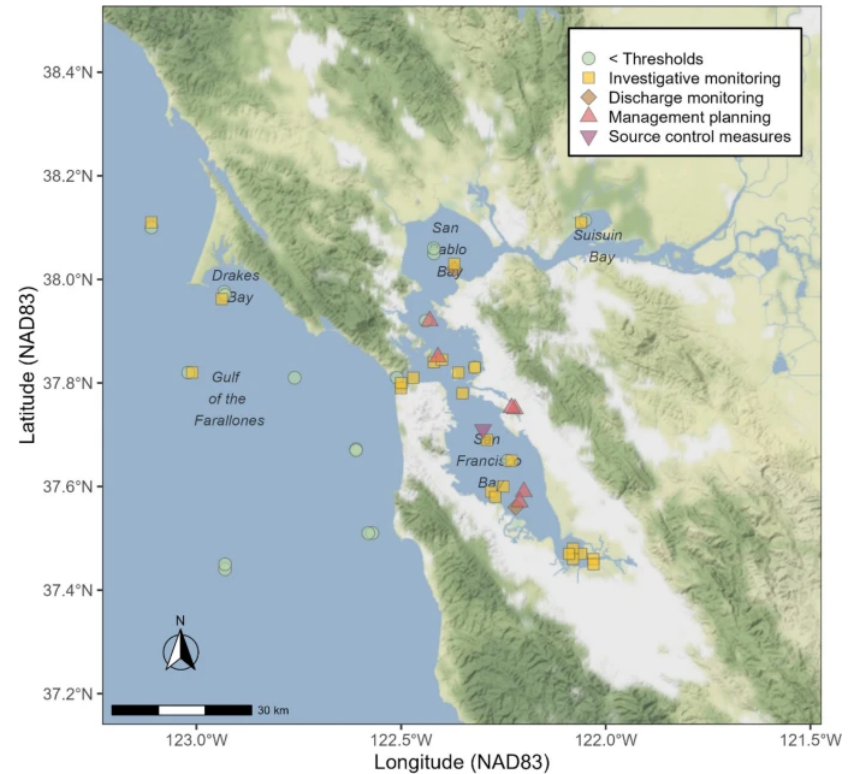
ITRC MP Figure 4-3

Source: Microplastics Team, created using concepts described in Mehinto et al. (2022)

Application of Aquatic Risk Threshold to San Francisco Bay, California



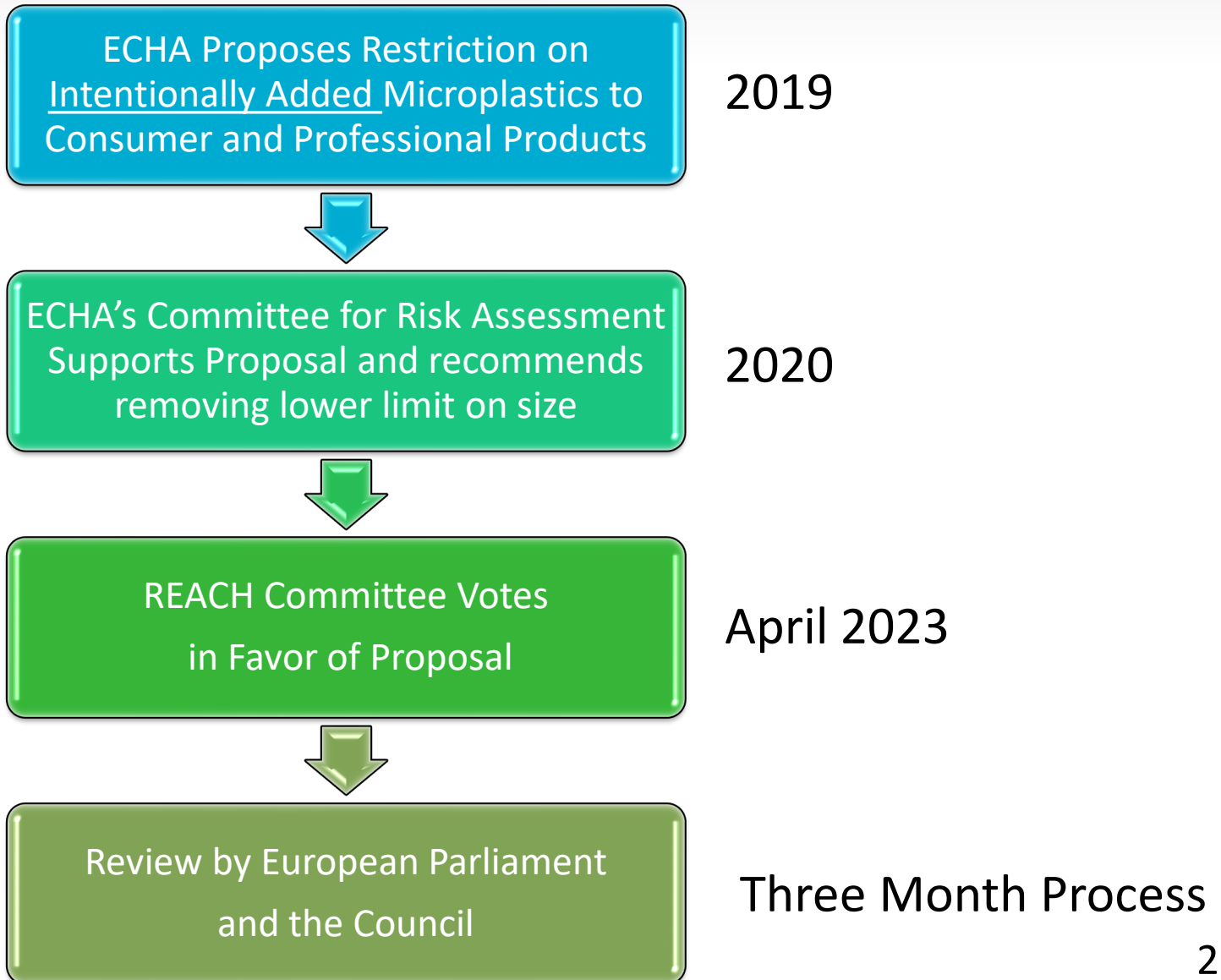
ITRC MP Figure A.1- 5 Source: Mehinto et al. 2022



ITRC MP Figure A.1- 6 Source: Coffin et al. 2022

What is Being Done?

International Actions: European Union



International Actions- UN Plastics Treaty

“Microplastics, mostly from tyres, pellets, textiles, and personal care products, can be addressed by reducing automotive mileage, redesigning tyres and behavioural change, improved design and production of garments, introducing filters on washing machines, improved production and value chains of plastic pellets and facilitating their safe transport, and banning the use of intentionally added microplastics to personal care products.”



California Actions- SB 1422

Senate Bill 1422: Adopt a definition of microplastics in drinking water



Adopt a standard methodology to test drinking water for microplastics



Establish requirements for four years of testing and reporting microplastics in water



POLICY HANDBOOK ESTABLISHING A STANDARD METHOD OF TESTING AND REPORTING OF MICROPLASTICS IN DRINKING WATER

August 9, 2022

Prepared by:
THE DIVISION OF DRINKING WATER
STATE WATER RESOURCES CONTROL BOARD
STATE OF CALIFORNIA

California Actions- SB 1263

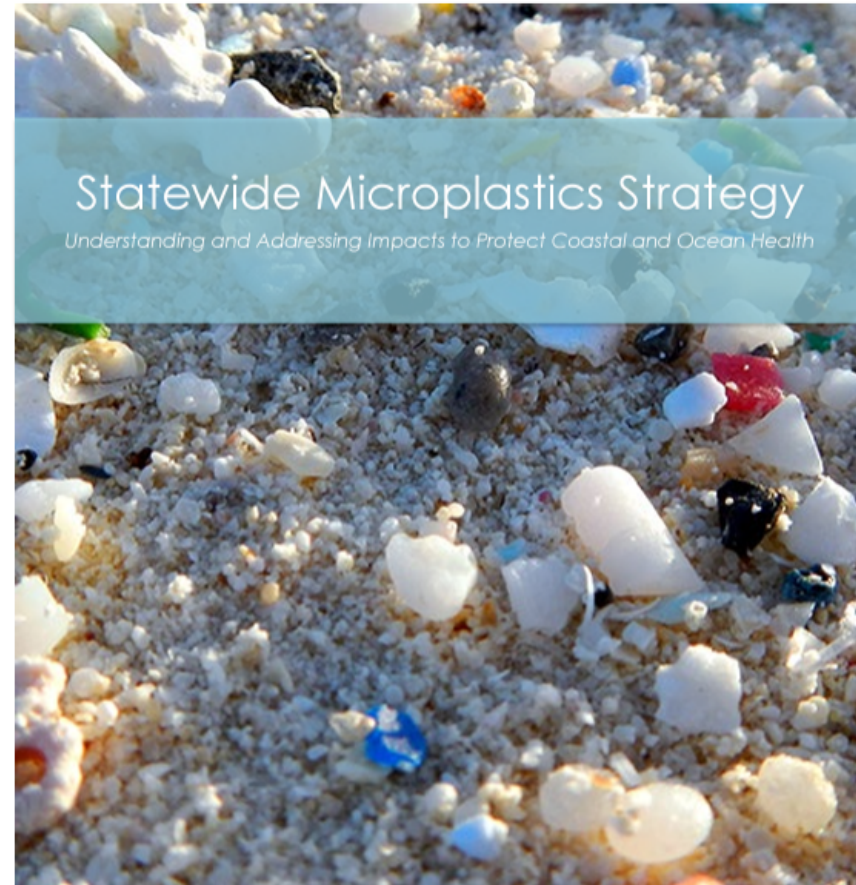
Statewide Microplastics Strategy: 2 Track Approach

Track 1: Solutions

- **Pollution Prevention** ←
- **Pathway Interventions**
- **Outreach & Education**

Track 2: Science to Inform Future Action

- **Monitoring**
- **Risk Thresholds & Assessments**
- **Sources & Pathways Prioritization**
- **Evaluating New Solutions** ←



February 2022



ITRC Outreach Toolkit: Coming June 2024

General information on outreach and what makes it work



General Public

- Fact sheets
- Social media materials
- Videos, etc.

Includes K-12
outreach materials



Scientific Community

- Fact sheets
- Social media
- Presentations, etc.

Environmental
Agencies/ Academics



Decision makers

- Fact sheets
- Presentations
- Elevator speeches, etc.

Upper Management
and Lawmakers

<https://itrcweb.org/teams/active>

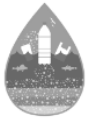
Want to get Involved with ITRC?

2023 ITRC Teams

The ITRC Teams create innovative approaches to environmental challenges. For information about a Team or Project, click on the name below.

REGISTER FOR A
2023 TEAM

2023 TEAM
DESCRIPTIONS



Microplastics Outreach
Toolkit



Tire Anti-Degradants
(6PPD)



Passive Sampling
Technology Update



Reuse of Solid Mining
Waste



Contaminants of
Emerging Concern



PFAS



Managed Aquifer
Recharge



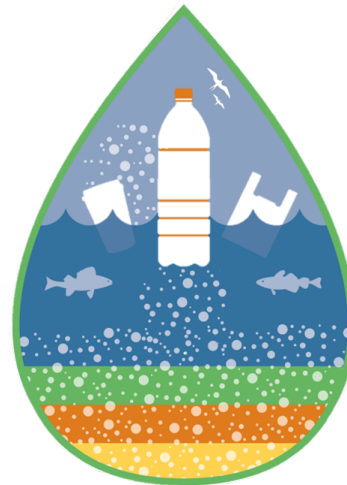
Ethylene Oxide
Emissions

<https://itrcweb.org/teams/active>

Thank You!



Department of
Toxic Substances
Control



Public Input

Questions can be submitted two ways:

- ✓ Question & Answer (Q&A) function
 - ✓ Raise hand function
- ❖ For those calling in, dial *9 to raise your hand and dial *6 to unmute.



Closing Comments

Karl Palmer, Deputy Director



Department of Toxic Substances Control



CalEPA

Stay in touch

- [The public comment website](#) for this proposal is live, and will close at 11:59 PM PDT on July 27, 2023.
- The background document and other information for this workshop can be accessed at our [Proposed Addition to the Candidate Chemicals List](#) web page.
- A video of the workshop will be available on our [Workshops and Upcoming Events](#) web page.
- A draft of our new 2024-2027 Priority Product Workplan will be released later this summer. Please sign up for our electronic mailing list to get announcements about this, and other events and workshops at: [Safer Consumer Products E-List](#).
- SaferConsumerProducts@dtsc.ca.gov

SCP is hiring!

- Scientists, engineers, toxicologists, and more...
- [Safer Consumer Products Recruitment E-List](#)
- [Career Opportunities in the Safer Consumer Products Program](#)