

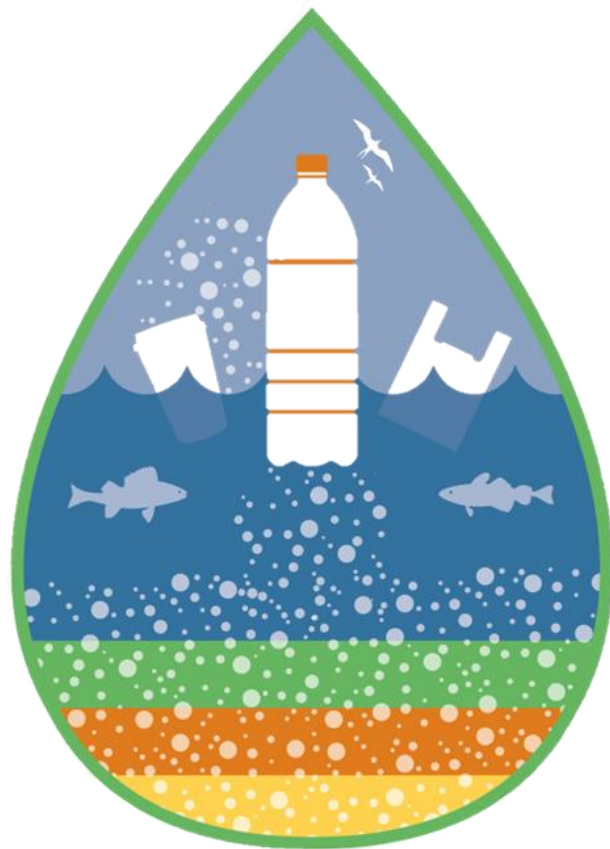
Microplastics (MP)

This presentation has been developed by the Interstate Technology and Regulatory Council (ITRC) Microplastics Outreach Team. You may modify the slide deck as appropriate for your audience. We ask that you acknowledge the products of ITRC in your presentation. Thank you!

What's the Big Deal with Small Plastic?



Microplastics (MP)



What are they?

Plastic particles ranging in size from 1 nanometer to 5 millimeters that contain chemical and/or other additives

Where do they come from?

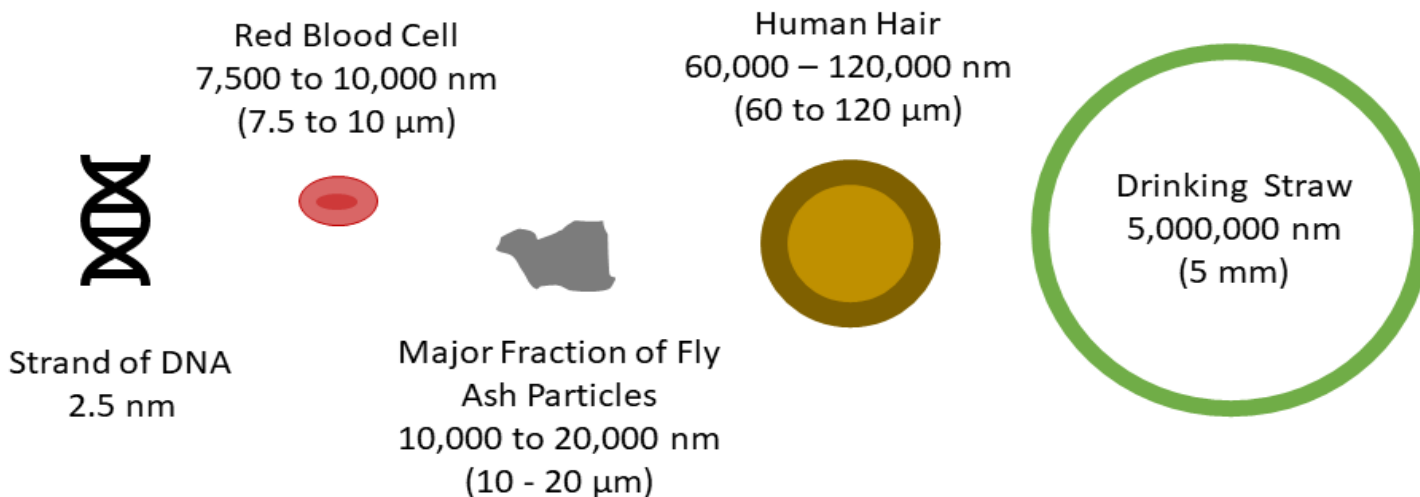
Consumer products (primary and/or direct point source) and/or the breakdown of larger plastics (secondary and/or nondirect point source)

Where are they found?

Everywhere. MP have been found in drinking water, the human body, food, air, soil, and in water, to name a few places

Microplastic Size

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



1,000 nm = 1 μm
1,000,000 nm = 1 mm
1,000 μm = 1 mm

ITRC MP Figure 1-2
Source: V. Hanley

What We Know about Microplastics

- Ubiquitous in the environment
- Accumulate & persist in the environment
- Can contain harmful chemical contaminants & additives
- Consumed by humans and other organisms
- Cause adverse health impacts in 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/)

Where Are Microplastics Found?

- ITRC MP conceptual site model
- Multifunctional tool
 - Overview information
 - Document navigation



Conceptual Site Model - Point Sources

Marine point sources:
Materials lost or discarded from vessels



Stormwater outfalls

Wastewater outfalls

Industrial smokestacks

Conceptual Site Model - Nonpoint Sources

Microplastics transported through atmosphere and deposited far away from the source

(Macro)plastic trash washes into the ocean, then breaks down into smaller pieces, eventually becoming microplastics

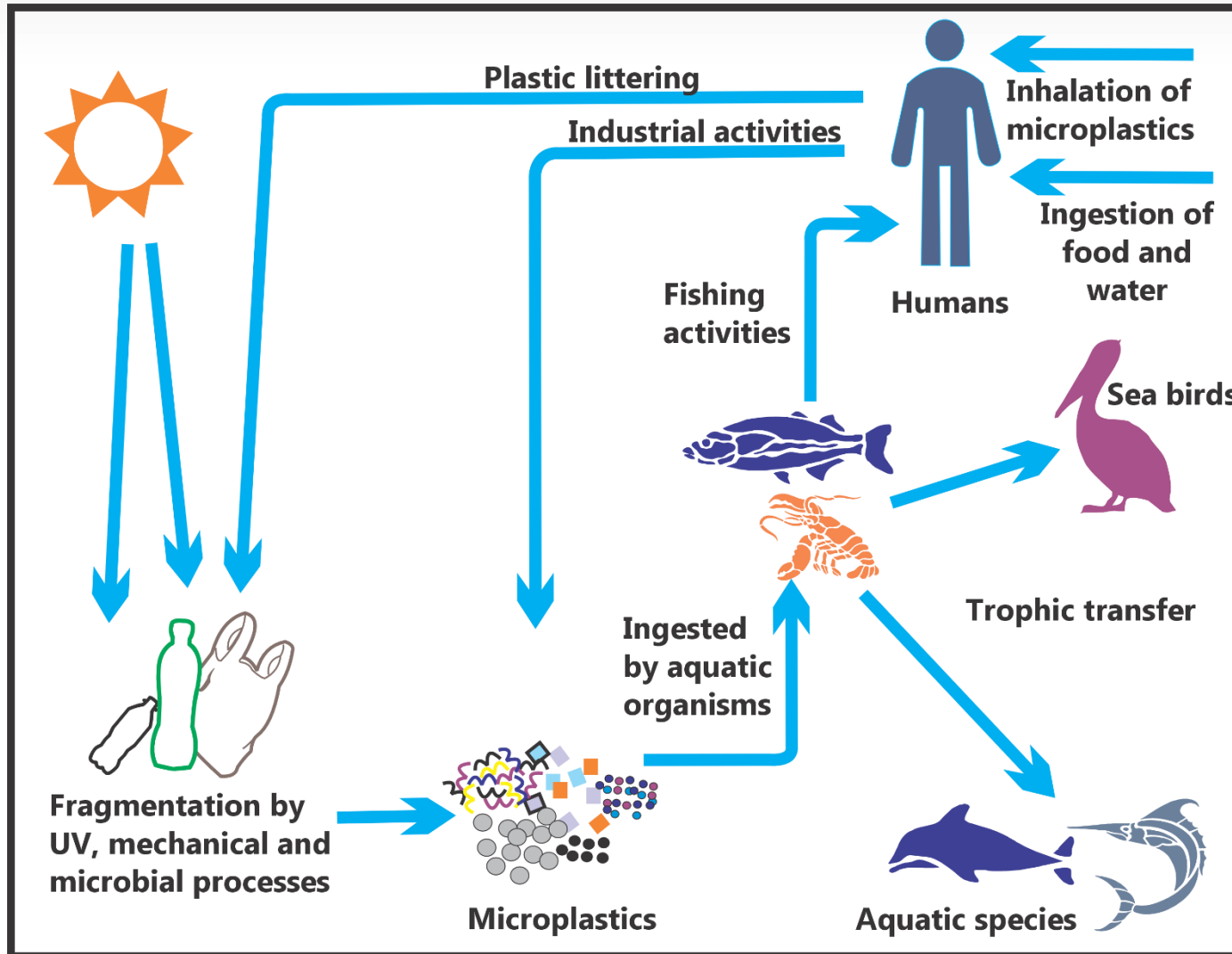
Microplastics generated through typical tire wear and breakdown of roadway materials



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

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

Why Should We care?



ITRC MP Figure 4-2

Challenges in Toxicity Research

- Exposure ≠ Adverse health effect
- Numerous nonhuman mammalian studies available but methodologies vary
- Uncertainties due to study design, exposure concentration, data quality, reporting, data gaps
- Not enough information to establish toxicity criteria to use in environmental or human health risk assessment



Source: Thornton Hampton et al. 2022

What Is Being Done?

- Local actions
- State actions
- Federal actions
- International actions

Local Actions

Single-Use Plastic Bans



Photo credit: Rob Barnes, Grid Arendal

State Actions

California Safe Drinking Water Act: Microplastics

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

[CA Health and Safety Code 116376](#)

State Actions

Statewide Microplastics Strategy - 2 Track Approach

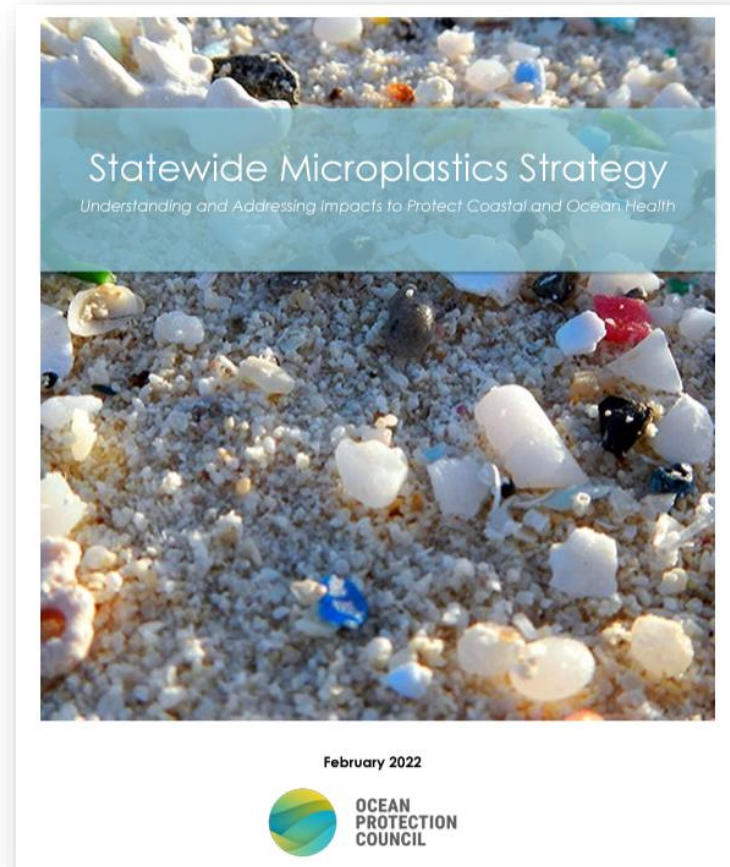
Track 1: Solutions

- **Pollution prevention**
- **Pathway interventions**
- **Outreach & education**

Track 2: Science to inform future action

- **Monitoring**
- **Risk thresholds & assessments**
- **Sources & pathways prioritization**
- **Evaluating new solutions**

[CA Public Resources Code, Division 26.5, Chapter 3.2](#)



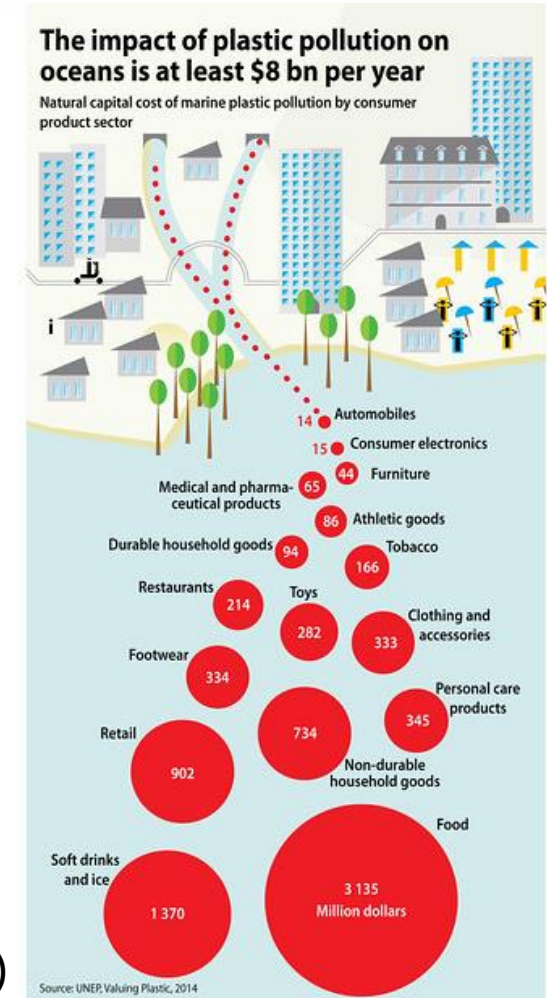
Federal Actions

Save Our Seas 2.0 Act

(Public Law 116-224)

Three main goals of Act

- Combat marine debris
- Enhance global engagement
- Improve domestic infrastructure



Source: <https://www.grida.no/resources/6912> (Maphoto/Riccardo Pravettoni)

International Actions: European Union

European Chemicals Agency proposes restriction on intentionally added microplastics to consumer and professional products

2019



Approved by European Parliament and the Council

2023

International Actions- UN Plastics Report

Purpose of report:

- Designed for decision-makers & stakeholders
- Explains the changes surrounding plastics
 - Market shifts
 - Policies
- Goal is to end plastic pollution



Today's Plastics Are Tomorrow's Microplastics – How Do We Manage Them?

- Identify & remediate point sources of pollution
- Understand fate & transport of microplastics
- Establish thresholds for toxicity for human health and the environment
- Responsible:
 - Governing bodies
 - Consumerism
 - Manufacturing
 - Recycling

Technical Guidance:

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

The screenshot shows the ITRC Microplastics web-based document interface. The top navigation bar includes the ITRC logo, the title "Microplastics", "ENHANCED BY Google", a search icon, and a "HOME" button. A left-hand navigation menu lists various sections: 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, and Appendix B. Microplastics State. The main content area features a large graphic with the text "Welcome Microplastics" and an illustration of a water drop containing a plastic bottle, with various environmental elements like birds, fish, and a landscape. Below the graphic, there are two paragraphs of text discussing the pervasiveness of plastics and the specific threats of microplastics (MP), including their environmental distribution and potential health effects.

Microplastics ENHANCED BY Google HOME

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.