

SAN FRANCISCO BAY MICROPLASTICS PROJECT

We found microplastic pollution in every part of the Bay, at some of the highest levels measured anywhere to date.

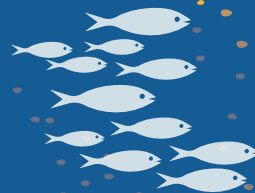
What are microplastics?

▶ Microplastics are plastic particles smaller than 5 mm (the size of a popcorn kernel).

▶ Plastic trash never goes away, it just breaks up into smaller pieces.



▶ When wildlife eat microplastics, these tiny plastic bits can block and damage organs and leach potentially harmful chemicals. Microplastics and chemicals can transfer up the food chain.



How do microplastics get into the Bay?

STORMWATER

Urban stormwater runoff carries microplastics, trash, and other pollutants down storm drains and into creeks and rivers that flow into the Bay.

LIKELY SOURCES: tires, textiles, single-use plastic items, cigarette filters, construction and roadway debris

SURFACE WATER

More buoyant microplastics float on the surface of the Bay and are transported into the ocean and nearby National Marine Sanctuaries.

LIKELY SOURCES: textiles, single-use plastic items, fishing and marine debris, pre-production plastic pellets

WASTEWATER

Microplastics that go down residential and industrial drains and toilets are too small to be easily filtered by wastewater treatment plants. Many flow directly into the Bay.

LIKELY SOURCES: textiles, microbeads in personal care and cleaning products, baby wipes

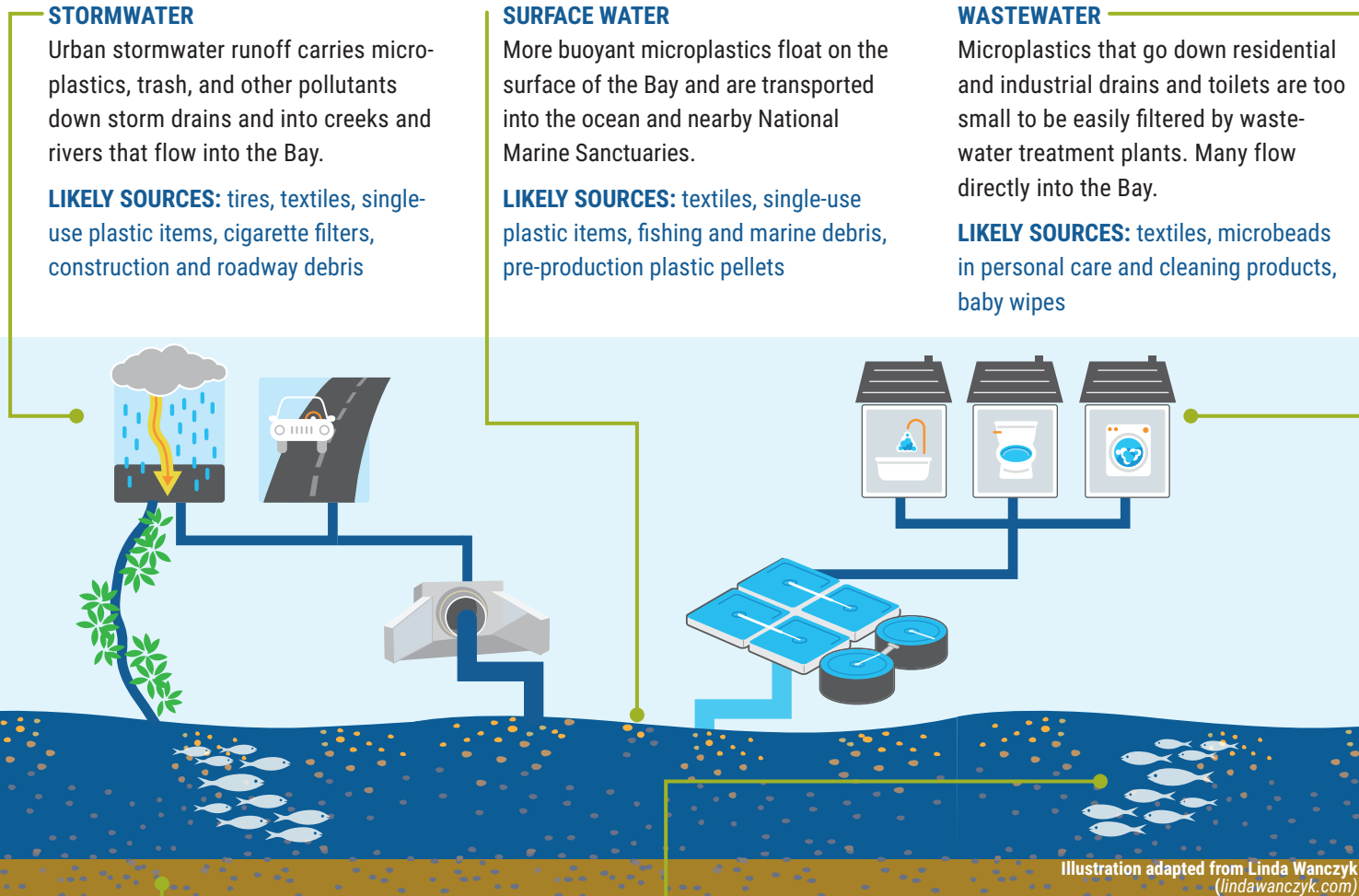


Illustration adapted from Linda Wanczyk
(lindawanczyk.com)

SEDIMENT

Denser microplastics sink and accumulate in the sediment on the bottom of the Bay.

LIKELY SOURCES: tires, textiles, single-use plastic items

SMALL FISH

Aquatic life in the Bay can ingest microplastics in water and sediment, or eat organisms that have already consumed microplastics.

LIKELY SOURCES: textiles, single-use plastic items

Read the full report:

sfei.org/projects/microplastics

Learn about all of the proposed solutions:

5gyres.org/sfbay-microplastics

Science-informed solutions

1

Support comprehensive state and local policies that phase out single-use plastics and packaging.

San Francisco and other cities are working to reduce single-use plastics such as cups and to-go containers. Berkeley's disposable-free dining ordinance is a model for other communities.

California's Circular Economy Bill proposes to reduce waste from single-use packaging and products by 75% by 2030.

The science behind this recommendation:

Microplastics are present in every part of the Bay, including water, fish, and sediment.

The Bay contains especially high levels of microplastics. Levels in Bay surface waters are some of the highest recorded globally.

Computer modeling indicates that buoyant particles can flow to the ocean, while heavier particles concentrate in Bay sediment.

2

Use rain gardens and landscape design to reduce microplastics in creeks.

Green stormwater infrastructure, such as rain gardens, permeable paving, and other nature based stormwater filtration solutions have been successfully used to clean runoff.

The science behind this recommendation:

Urban stormwater runoff transports over 300 times more microplastics to the Bay than wastewater.

Each year, stormwater transports an estimated 7 trillion microplastics through creeks and streams to the Bay. Nearly half are black rubbery fragments, which may be tire particles washed from roads.

A related study by SFEI showed that a rain garden removed 90% of microplastics from urban stormwater runoff.

Below, rain garden in El Cerrito by BART tracks



3

Explore filtration on washing machines to prevent fibers from entering wastewater.

Design a study to evaluate the effectiveness of filters on residential, industrial, and commercial washing machines.

At the same time, educate people about ways to prevent fibers from entering the Bay: wash clothing less frequently, use a front-loading washing machine, and consider installing a filter.

The science behind this recommendation:

Fibers were the most common microplastics found in this study. One way fibers enter wastewater is through laundering of clothing and textiles.

Approximately 17 billion microplastics enter the Bay from wastewater treatment plants annually, including many fibers.

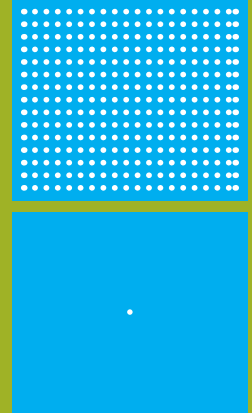
Fibers appear to be the main microplastics eaten by fish, making them a focus for future studies on toxic impacts.

HIGHLIGHTS FROM THE STUDY

STORMWATER HAS

300

TIMES MORE MICROPLASTICS THAN WASTEWATER



SURFACE WATER SAMPLES HAVE **DIVERSE** MICROPLASTICS

POLYSTYRENE FOAM
POLYETHYLENE FILM
POLYPROPYLENE AND POLYETHYLENE FRAGMENTS
POLYETHYLENE MICROBEADS

FOAM CUPS & FOOD CONTAINERS

SINGLE-USE FOODWARE

PLASTIC CARRYOUT **BAGS**

NURDLES & CIGARETTE BUTTS

PERSONAL **CARE** PRODUCTS

Types of microplastics



Fiber • thin, straight, or fibrous particle from textiles, fishing gear, cigarette filters



Fragment • irregularly shaped particle often associated with the breakdown of single-use plastic items and tires



Foam • lightweight sponge-like particle often used in food packaging and shipping material



Film • thin plane of flimsy material often from plastic bags and plastic packaging



Sphere or Pellet • hard, round particle including microbeads in consumer and personal care products and nurdles (pre-production pellets)

Photo by Carolynn Box, 5 Gyres



Using science to inform action

Ask your representatives to support comprehensive local and statewide policies to reduce single-use plastics and packaging.

Share our project results and recommendations.

Reduce single-use plastics and encourage others to do the same.

Why is this important?

Plastic is a persistent pollutant, meaning it never goes away, and companies are making more each year.

Scientists are still learning how microplastics can harm humans and aquatic life.

Get the latest information at www.5gyres.org

What is California doing now?

California is leading the nation in plastic pollution reduction efforts, with other communities looking to us for guidance.

California's Trash Amendments set the bar high with a goal of zero trash (debris larger than 5 mm) in any ocean waters, bays, or rivers by 2030, **but this does not include microplastics.**

California is developing the first ever statewide **Microplastics Strategy** that will set research goals and identify policy options to reduce microplastic pollution.

Need more data to support your plastic reduction campaign? Use the TrashBlitz app to identify top trash items and share them with city officials.

www.trashblitz.org

trashblitz
POWERED BY 5GYRES



Photo by Carolyn Box, 5 Gyres



About the project and the minds behind it

The San Francisco Bay Microplastics Project

generated comprehensive data on microplastics, leading to scientifically supported recommendations for solutions to plastic pollution in California.

The **5 Gyres Institute** empowers action against the global health crisis of plastic pollution through science, education, and adventure.

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The **San Francisco Estuary Institute** provides independent science to assess and improve the health of the waters, wetlands, wildlife, and landscapes of San Francisco Bay, the California Delta and beyond.

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