What is a Watershed

5 Gyres Trash Academy
IS this a Watershed?
Oh, So That’s a Watershed!
Natural Water Cycle

- Evaporation from Oceans, Lakes & Streams
- Transpiration from Plants
- Condensation
- Precipitation
- Groundwater
- Surface Runoff
Urban Watershed Cycle
How do Storm Drains Work

Stormwater Runoff

Runoff from Roof Surfaces
Roof/Gutter Downspouts
Yard Runoff

Storm Drain Inlet
Gutter and Street Runoff
Storm Drain System

Storm Drain Outlet
Water Body
Stormwater runoff ends up in local creeks, streams, lakes, rivers, and/or the ocean.

5 GYRES
SCIENCE TO SOLUTIONS
Let's Talk About Stormwater

Rainwater washes pollutants from the surface into storm drains, which dump the water into streams.

Storm water is not only polluted, it is unnaturally warm -- and there's too much!
Sewage System

Primary

Secondary

Tertiary

Wastewater

Solids

Sludge

Coarse Debris Screen

Sand and Grit Removal

Primary Clarification

Aeration Clarification

Disinfection

Chlorine (Cl₂) or Ultraviolet Light (UV)

Activated Sludge

Nutrient Removal

Effluent

Solids Disposal

Sludge Digesters
What Are Microfibers?

Microfibers

Microplastics: Nurdles

Microplastics: Ø 2mm

Microfibers: 0.335 micron

Microplastics: Ø 1mm

5 Gyres
Science to Solutions

Seabin Project
For Cleaner Oceans
THE STORY OF MICROFIBERS
We found microplastic pollution in every part of the Bay, at some of the highest levels measured anywhere to date.

**STORMWATER**
Urban stormwater run off 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
San Francisco Bay Microplastics Study

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
A wetland absorbs excess nutrients, sediment and pollutants before they reach larger bodies of water.
SOLUTION! - GREEN STORMWATER INFRASTRUCTURE
Solution! - Filtration on Washing Machines
Solution! - Support Policies That Phase Out SUPs
CHALLENGE:
Tell us what watershed do you live in?