



Micro-Plastic Contamination

The New Modality of Pollution

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Micro-Plastic Defined

A plastic the size of 5mm or less in any dimension.

- Could likely pose an environmental and human health risk when they enter our waterways.
- Micro-plastics have several sources: They're laundered from nylon clothing; they wash down the drain with many cosmetics and toothpastes; and primarily fragmented from debris like bottles and bags. (Adventure Science)
- Toxins including DDT and BPA adhere to the particles, and then enter the food chain when ingested by aquatic life, accumulating in birds, fish, marine mammals and potentially humans. (Adventure Science)

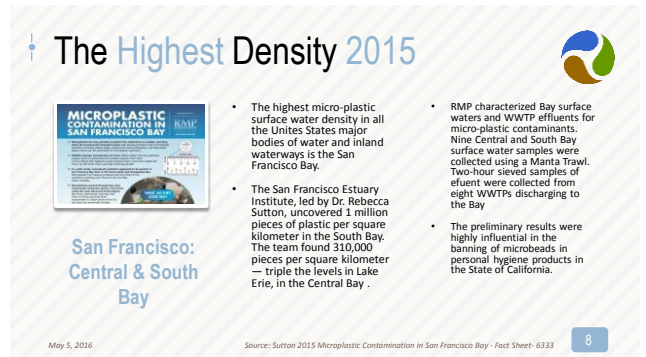
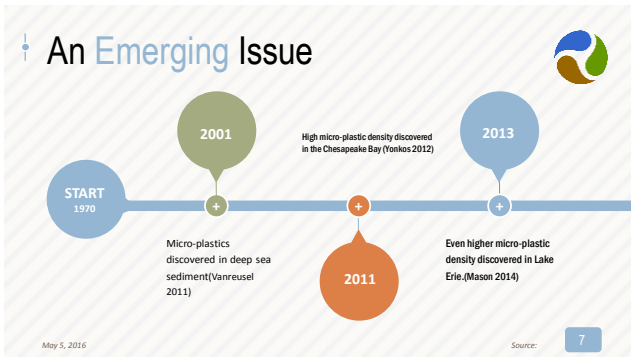
May 5, 2016 Source: <http://www.adventurescience.org/micropastics.html>

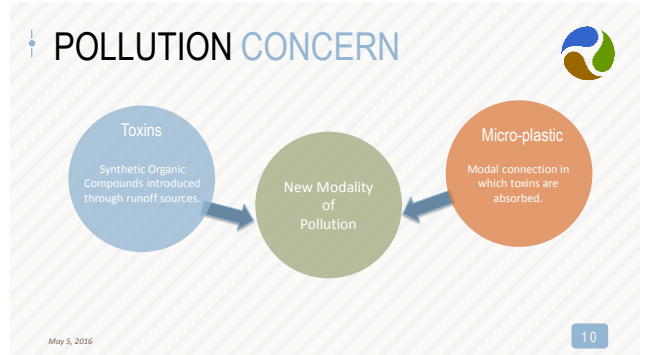
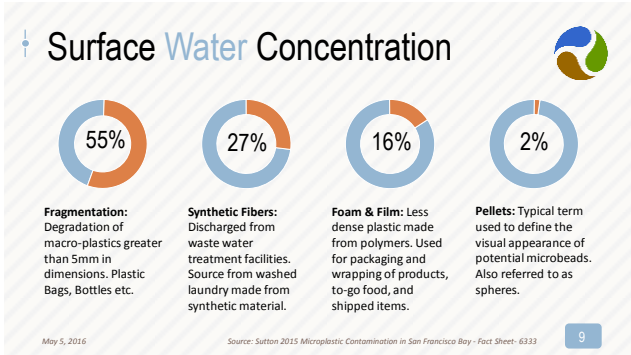


An Emerging Issue



A world map showing the global distribution of microplastics. The map is overlaid with a grid and features numerous orange dots of varying sizes, representing the concentration of microplastics in different regions. The dots are most densely clustered in the North Atlantic, the Mediterranean Sea, and the North Pacific, with smaller clusters in the Indian Ocean and the Southern Ocean. The map also shows major cities and geographical features like Antarctica.



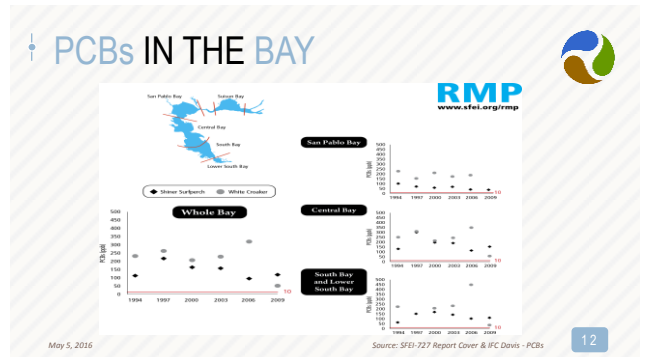


TOXIN HEALTH RISKS

COMMON SYNTHETICS

Name	Major Health Effects
Aldicarb (Temik)	High toxicity to the nervous system
Benzene	Chromosomal damage, anemia, blood disorders, and leukemia
Carbon tetrachloride	Cancer, liver, kidney, lung, and central nervous system damage
Chloroform	Liver and kidney damage, suspected cancer
Dioxin	Skin disorders, cancer, and genetic mutations
Ethylene dibromide (EDB)	Cancer and male sterility
Polychlorinated biphenyls (PCBs)	Liver, kidney, and lung damage
Trichloroethylene (TCE)	In high concentrations, liver and kidney damage, central nervous system depression, skin problems, and suspected cancer and mutations
Vinyl chloride	Liver, kidney, and lung damage, lung, cardiovascular, and gastrointestinal problems; cancer and suspected mutations

May 5, 2016 Source: <https://en.wikipedia.org/wiki/Microplastics> 11



OEHHA FISH CHART



MEN OVER 17 AND WOMEN OVER 45		
Chinook (king) salmon Brown rockfish Red rock crab	California halibut Jacksmelt Striped bass	Surperches Sharks White croaker White sturgeon
Salmon 7 servings per week Chin 6 servings per week Salmon rockfish or red rock crab 8 servings per week	2 servings per week	1 serving per week

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Source: http://oehha.ca.gov/fish/qa_csl/

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THE MICROBEAD



WHAT ARE THEY?

- Microbeads are minute plastic particles smaller than two millimeters.
- Composition of microbeads can vary and often include polyethylene (PE) or polypropylene (PP), polyethylene terephthalate (PET), polymethyl methacrylate (PMMA) or nylon.



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Source: <http://response.restoration.noaa.gov/about/media/what-do-we-know-today-about-microbeads-and-microplastics-ocean.html>

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MICROBEAD PRODUCTS



TOOTH PASTES



BODY WASH

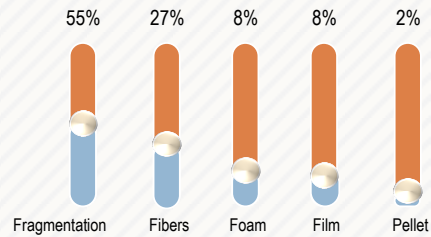


FACIAL SCRUBS

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Surface Water Concentration



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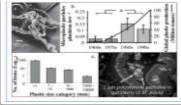
Source: Sutton 2015 Microplastic Contamination in San Francisco Bay - Fact Sheet- 6333

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FISH WORLDWIDE


Tamar Estuary 2012

Blue Mussels were discovered to have synthetic fibers in the gut cavity of their digestive system. (Wegner 2012)




Half Moon Bay 2014

Of all species purchased, anthropogenic debris was present in the gut content of eight (67%) of all fish species sampled. (Rochman 2014)



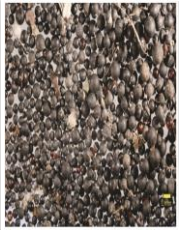
English Channel 2013

Researchers examined the gut contents of ten different species of fish found in UK waters and showed that micro-plastics were found in all species. (Lusher 2013)



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ST. LAWRENCE RIVER



- The accumulation of microplastics in the digestive tract may satiate the consumer and result in lower energy acquisition (Wright et al. 2013a).
- Persistent and highly toxic organic contaminants readily adsorb to the surface of microplastics (Riosetal.2007) and can be transferred to sediments (Teuten et al. 2007) and consumers (Rochman et al. 2013).
- Results suggest that microplastics are ubiquitous and locally abundant in the sediments of the St. Lawrence River.
- Their patchy distribution and abundance, including their apparent absence from two sites, might be explained by environmental factors that affect sediment deposition (e.g., water currents, shoreline topography)

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LEGISLATIVE ACTIONS

AB-888 Plastic Microbeads

"This bill will prohibit, on and after January 1, 2020, a person, as defined, from selling or offering for promotional purposes in this state a personal care product containing plastic microbeads that are used to exfoliate or cleanse in a rinse-off product, as specified."

Microbead-Free Waters Act of 2015

28 December 2016, President Obama signed the bill, a ban on manufacturing products with microbeads. The first step will begin on July 1, 2017, followed by product-specific manufacturing and sales bans in 2018 and 2019.

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Recommendations

REDUCTION

Trash Capture Devices used to trap trash and other particles down to 5mm in size. Not on all storm drains, but it is essential to fragmentation reduction	Mud to Study To be able to quantify microplastic contamination in benthic mud will indicate potential food web and dredging impacts.	"Clean Vessels" Clean Vessel Act Grant can provide funding for marinas to renovate, public or private important good faith measure to reduce marina pollution.	Conscientia To be aware of personal impact and implement own reduction methods in every day life, as we are all stewards of the SF Bay.
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