

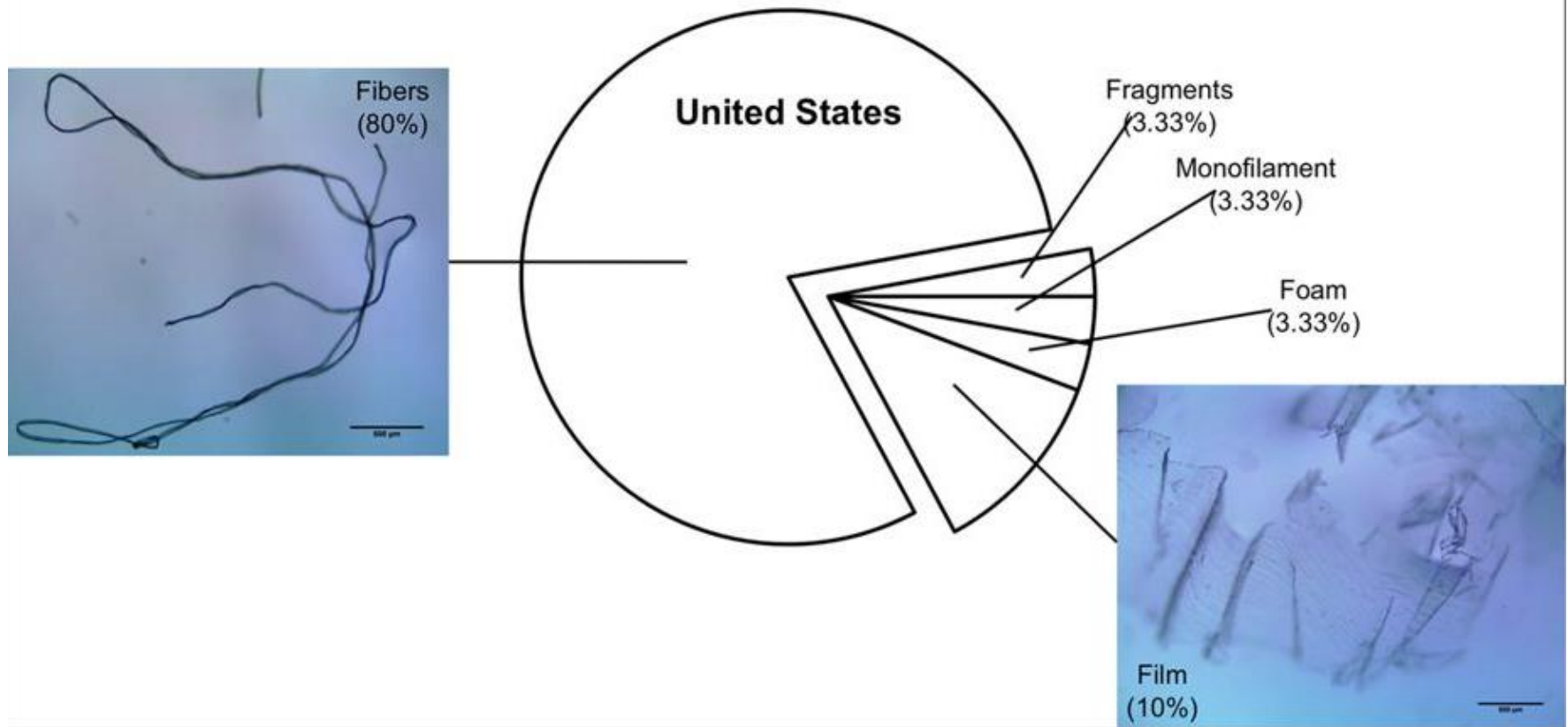


# Divert and Capture: The Fight to Keep Microplastics Out of Our Water





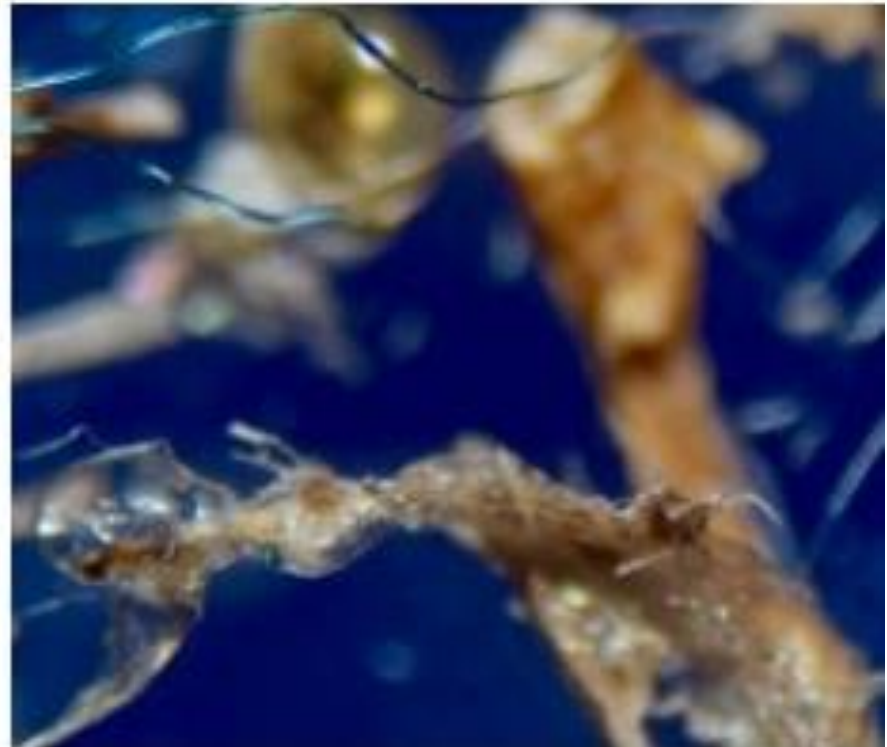
# Microplastic contamination

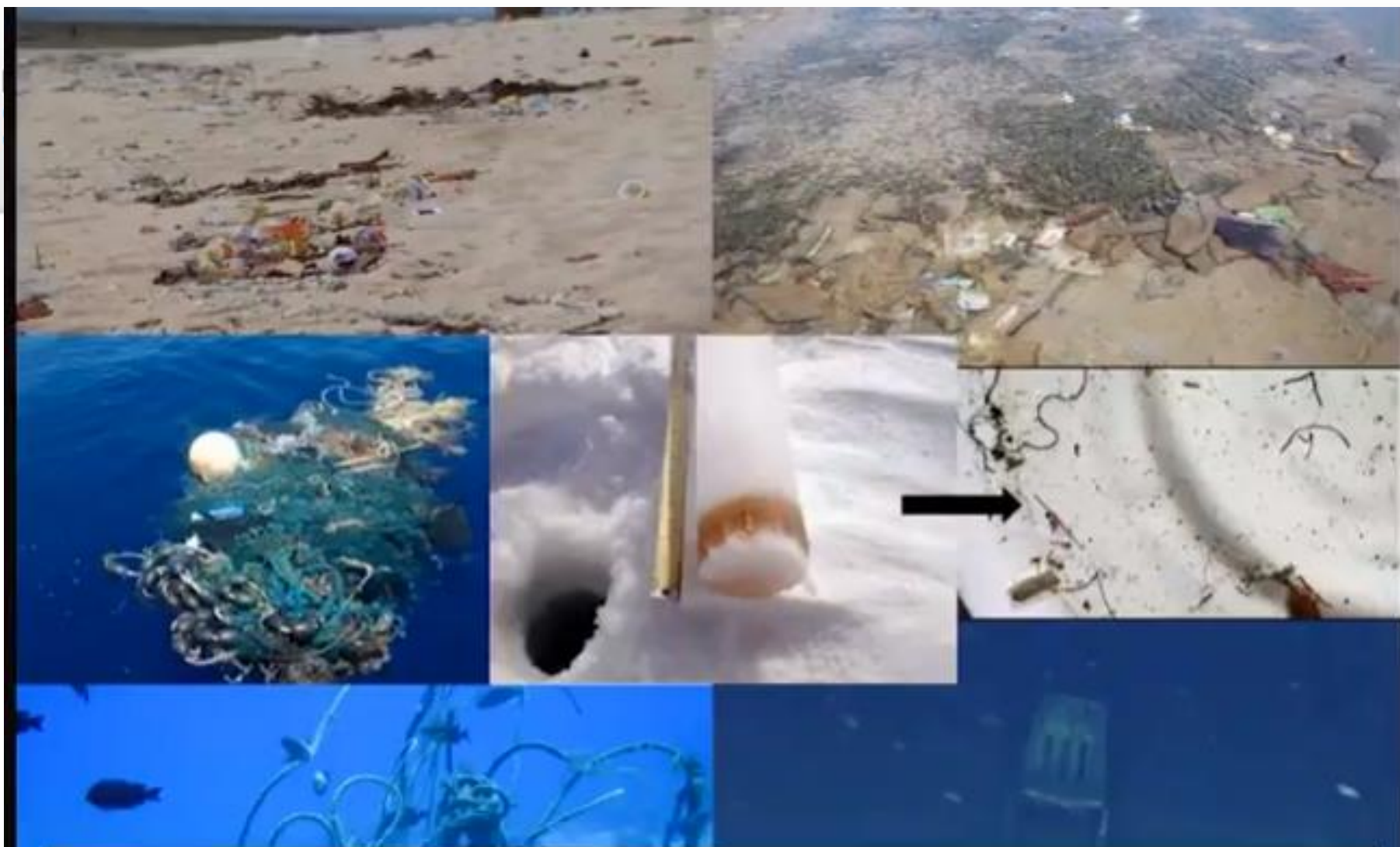




Microfibers  
as small as 3  
microns

Human hair  
50-100 microns





**Microfibers are among the most common plastic debris found in a diversity of habitats globally.**

(Woodall et al., 2014; Mathalon and Hill, 2014; Frias et al., 2016)

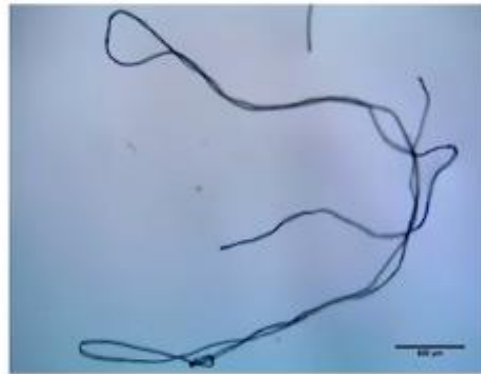




**Microfibers are among the most common plastic debris found in a diversity of fish and invertebrates globally.**

(Steer et al., 2017; Van Cauwenberghe and Janssen, 2014; Taylor et al., 2016)

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**Anthropogenic debris was found in 1 in 4 fish purchased from fish markets and 80% of this debris was microfibers.**

*Rochman et al., 2015 Sci Reports*

You  
consume  
5800  
plastic  
particles  
annually

# Microfibers in nearshore fish from Lake Ontario



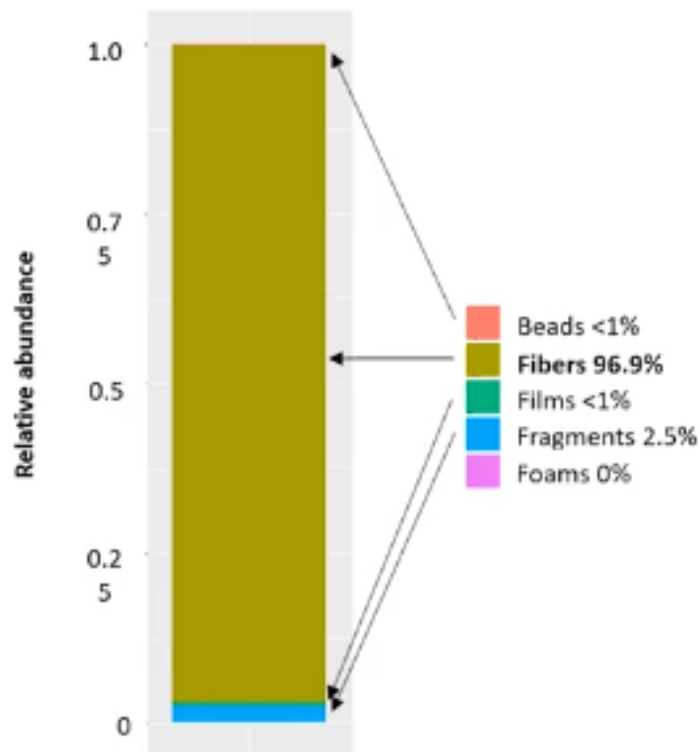
Keenan Munno

Species	Number of Fish	Bead	Fragment	Fiber	Foam	Film	Total
White Sucker	2	0	5	27	0	0	32
Brown Bullhead	11	3	43	238	1	1	286
Round Goby	38	2	57	410	10	1	480
Yellow Perch	13	0	27	206	0	0	233
Shiner	8	0	18	103	0	1	122
Sum	72	5	150	984	11	3	1153

Preliminary data from fish sampled in Hamilton Harbor, ON

# Microfibers in offshore fish from L Huron and Ontario

- In 100% of fish sampled
- 96.9% of microplastics in fish are fibers



Rainbow smelt  
(*Osmerus mordax*)



Lake trout  
(*Salvelinus namaycush*)



"Preliminary Results"

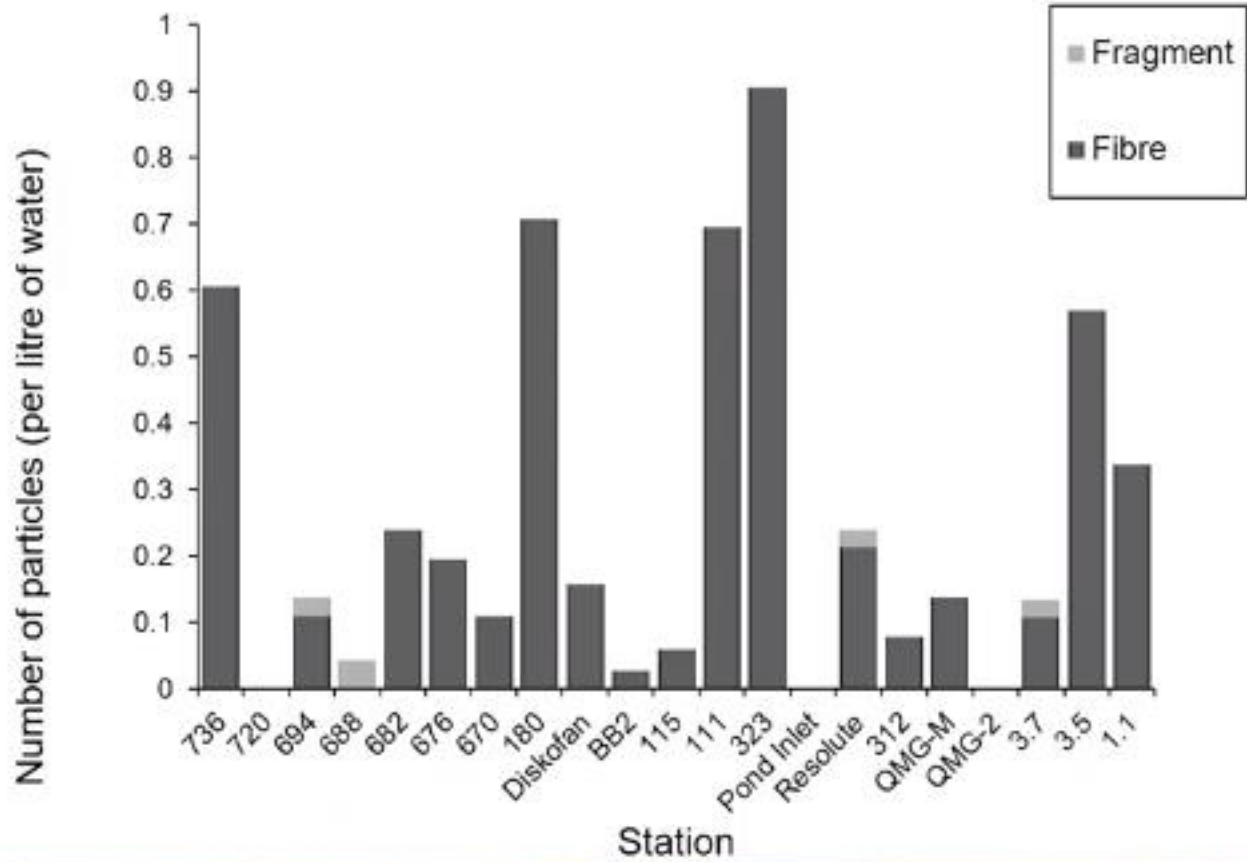
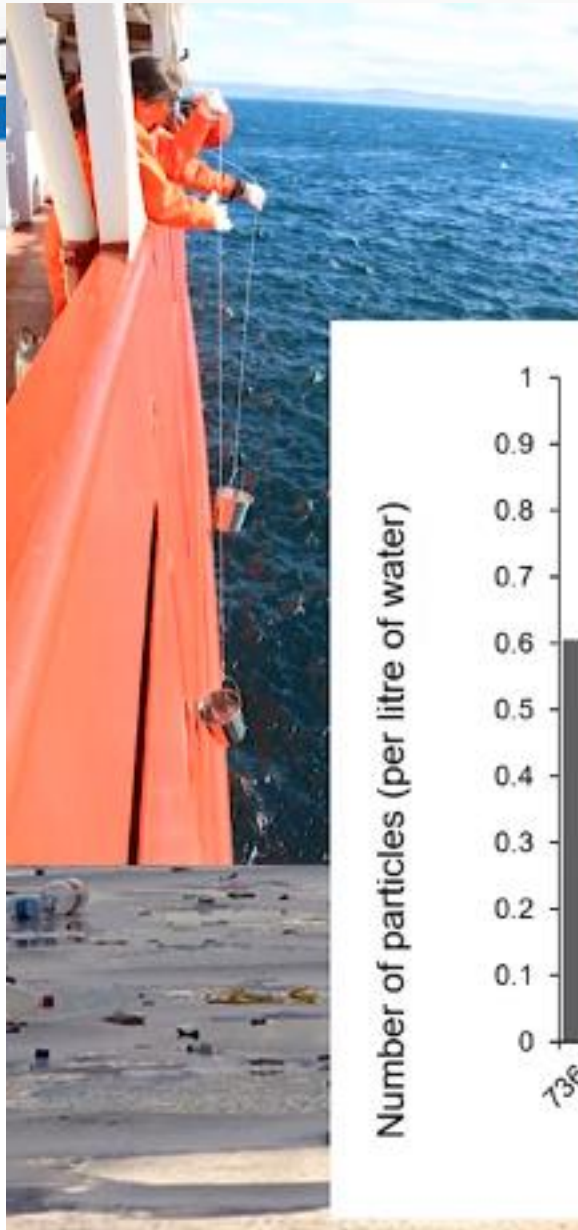
Erdle et al., unpublished data





# Surface Water

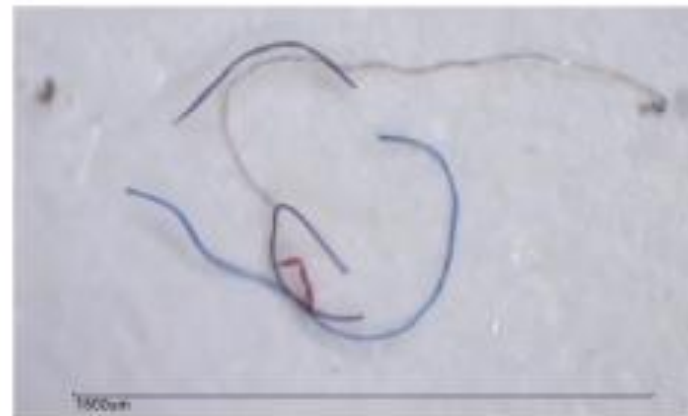






Up to 40%  
enter  
aquatic  
habitats

*Hartline et al., 2016 ES&T; UCSB Bren School*



On average wastewater treatment facilities release >4 million microplastic particles per facility per day. Fibers and fragments are the most common type of particle.

--Mason et al., 2016



# Microfibers in the Great Lakes Basin

## City of Toronto example



90,700 – 138,000  
microfibers per  
wash load (UofT)

X



219 wash loads  
per household  
per year (NRC,  
2011)

X



1,179,057  
households Stats  
Can, 2017)

=



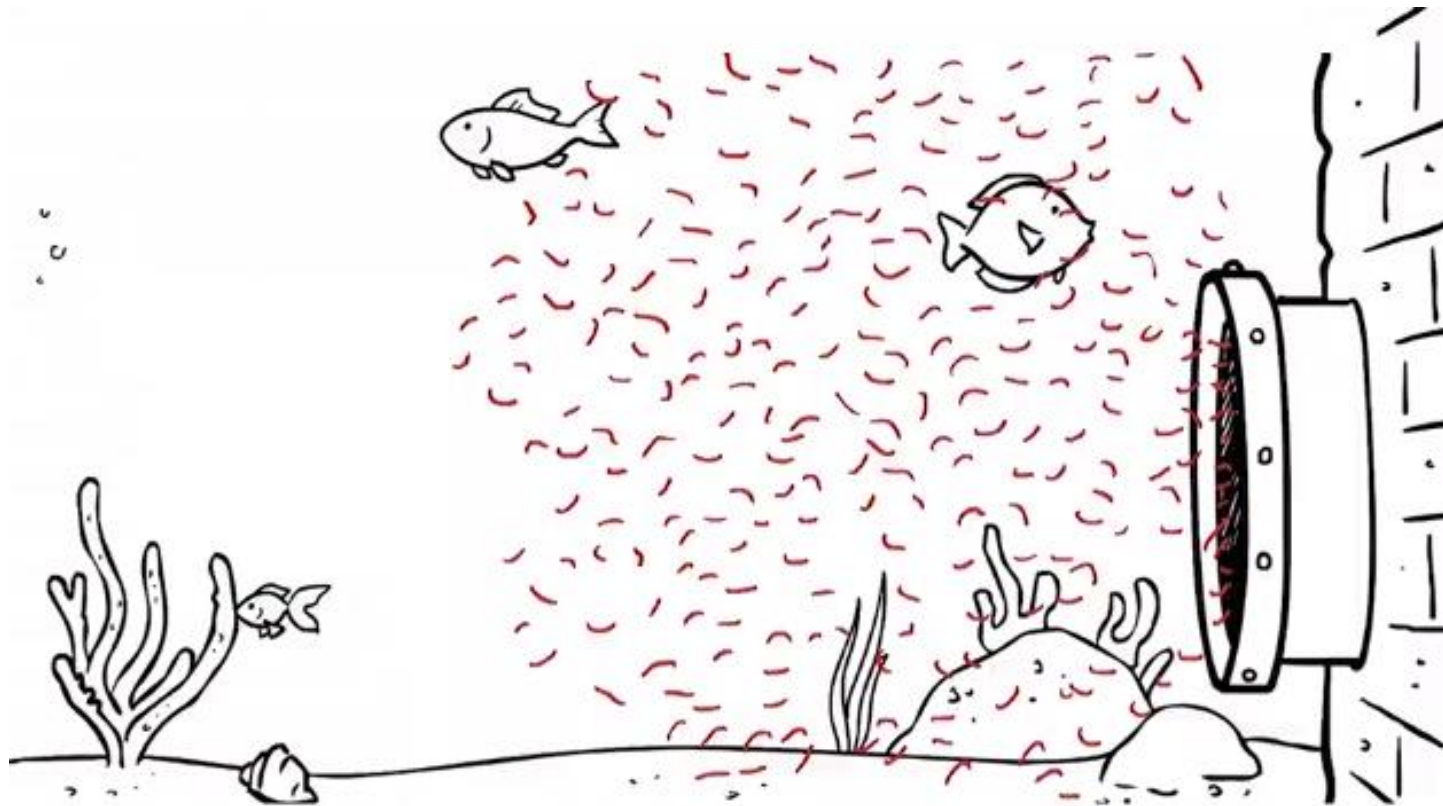
**23-36 trillion  
microfibers  
emitted per year**

Great Lakes Basin population: 34 million





# What are the effects?



**Effects may be physical and/or chemical**



Saini et al., 2016

The composite image illustrates the application of phosphonate esters in textile technology. On the left, a person in a white lab coat is shown in a laboratory setting. The central part features a chemical structure of a phosphonate ester,  $\text{RO-P(=O)(OR)OR'}$ , and a scanning electron micrograph (SEM) of a fibrous material. On the right, a schematic of a washing machine drum shows the phosphonate ester and a phenolic compound,  $\text{C}_6\text{H}_4(\text{OH})_2$ , being used in a washing process.



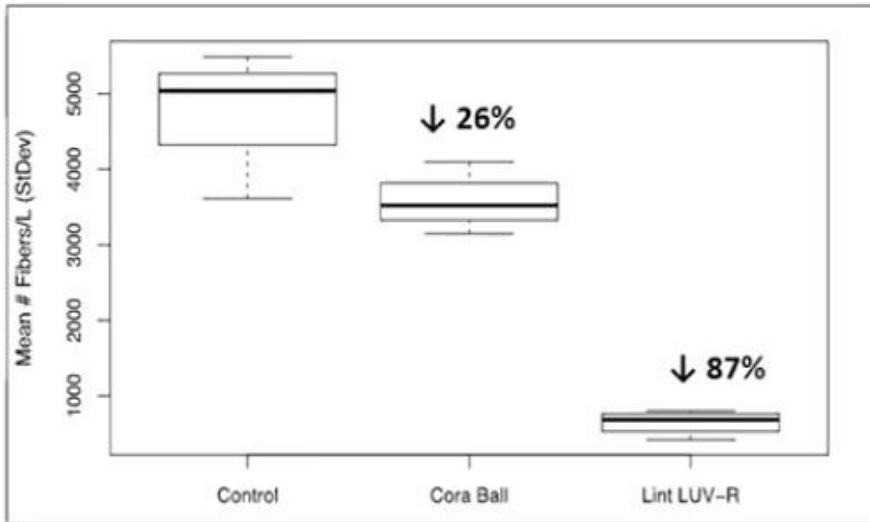


# What are the effects?

- Far reaching effects
  - Over 220 species have been recorded as ingesting microfibers
    - From zooplankton to humpback whales
    - Accumulate in food chains and reach humans through seafood consumption
  - Decrease feeding, growth, fertility



# Too good to be true



Cora ball



Lint LUV-R



Photos: coraball.com / www.environmentalenhancements.com



Hayley  
McIlwraith



Jack Lin

McIlwraith, et al. *in review*



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# Divert & Capture Pilot Project

- The first study of its kind in Canada
- Utilize 100 resident volunteers in Town to install a filter on their washing machine which would catch the fibers before they are washed down the drain
- GBF to collect and weigh the amount of fibers that was successfully diverted

Contact me!

[cassie.weston@gbf.org](mailto:cassie.weston@gbf.org)

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# Thank you!

Saving the Great Lakes, one load of  
laundry at a time

