

# Microplastics in the Milwaukee Area:

Microplastics – What's below the surface?

Pete Lenaker, Steve Corsi – USGS Wisconsin Water Science Center

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Austin Baldwin – USGS Idaho Water Science Center



# Outline

- Microplastics?
- Motivation?
- Sampling locations
- Methods
- Results

# Microplastics

plastic particles less than 5mm in diameter

*More than just microbeads!*

*Foam, Film, Fiber/Line, Fragment*

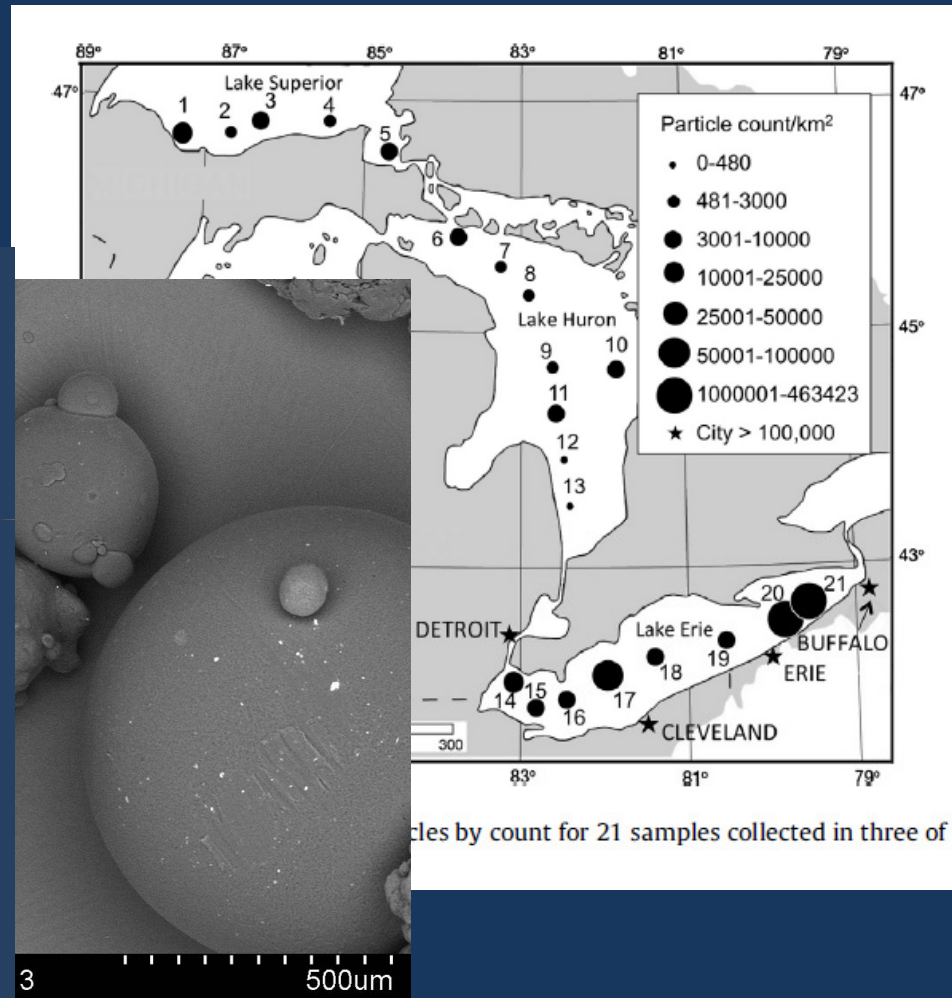
# Current Study Motivation



# Great Lakes microplastics study

Since Eriksen et al. 2013

- McCormick et al. 2014, ES&T
- Zbyszewski et al. 2014, Journal of Great Lakes Research
- Driedger et al. 2015, Journal of Great Lakes Research
- Baldwin et al. 2016, ES&T
- Mason et al. 2016, Journal of Great Lakes Research
- Twiss, 2016, Journal of Great Lakes Research



# Microbeads are leaching toxic chemicals into fish, sparking public health fears

 Esther Han   

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Fish are eating plastic microbeads, which are capable of attracting and releasing toxic chemicals, scientists say.




**The plastics in our seafood**  
On a beach in Sydney's Botany Bay, Dave West from the Boomerang Alliance shows the small bits of plastic that get into our food chain.



Australian and Chinese researchers have shown for the first time that chemical pollutants accumulated on the surface of microbeads can pass into the fish that eat them.

With fish being a staple meat in the Australian diet, the researchers say products with the tiny plastics should be immediately removed from sale.



RMIT researchers have shown microbeads can and do contaminate fish with toxic chemical

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Sections

**ooh!**


**Energy and Environment**

## What tiny plastic particles are doing to tiny fish

By Chelsea Harvey June 2



Larval perch that has ingested microplastic particles. (Image credit: Oona Lönnstedt)



Swishing water with that last bit of dish soap could save you a **little money**

Outside

Gear Travel Fitness Adventure Culture Video Magazine

## The Invisible Nightmare in Your Fleece

Washing a single polyester jacket can send 1,900 tiny synthetic micro-fibers into waterways, where they can soak up toxins and get eaten by fish. So what is the outdoor industry doing about it?

By: Mary Catherine O'Connor Jul 30, 2015



Outside

Gear Travel Fitness Adventure Culture Video Magazine

**STICK IT TO WINTER.**  
MERRELL

## The Edge

Clothing and Apparel

Patagonia's New Study Finds Fleece Jackets Are a Serious Pollutant

Mary Catherine O'Connor

Environment

The Race to Build the World's First Totally Green High-Performance Gear

Mary Catherine O'Connor

Bikes and Biking

Caught on Camera

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Matt Jancer

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Owen James Burke

Sailing

The \$10 Million Boat That Will Win the America's Cup

Jeff Foss



Your washing machine deserves a closer look. Photo: Urs Siedentop/Stockay

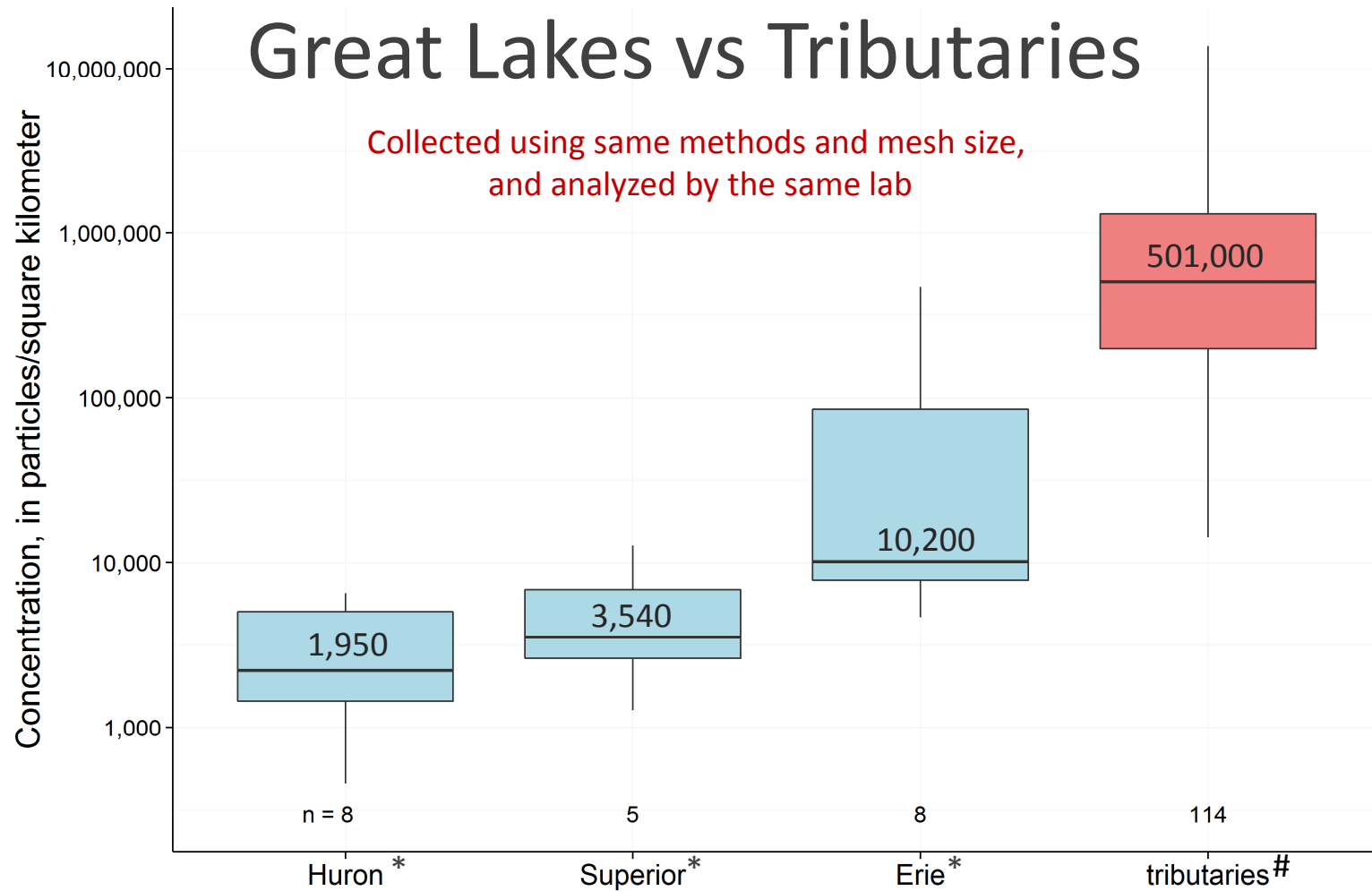
# Patagonia's New Study Finds Fleece Jackets Are a Serious Pollutant

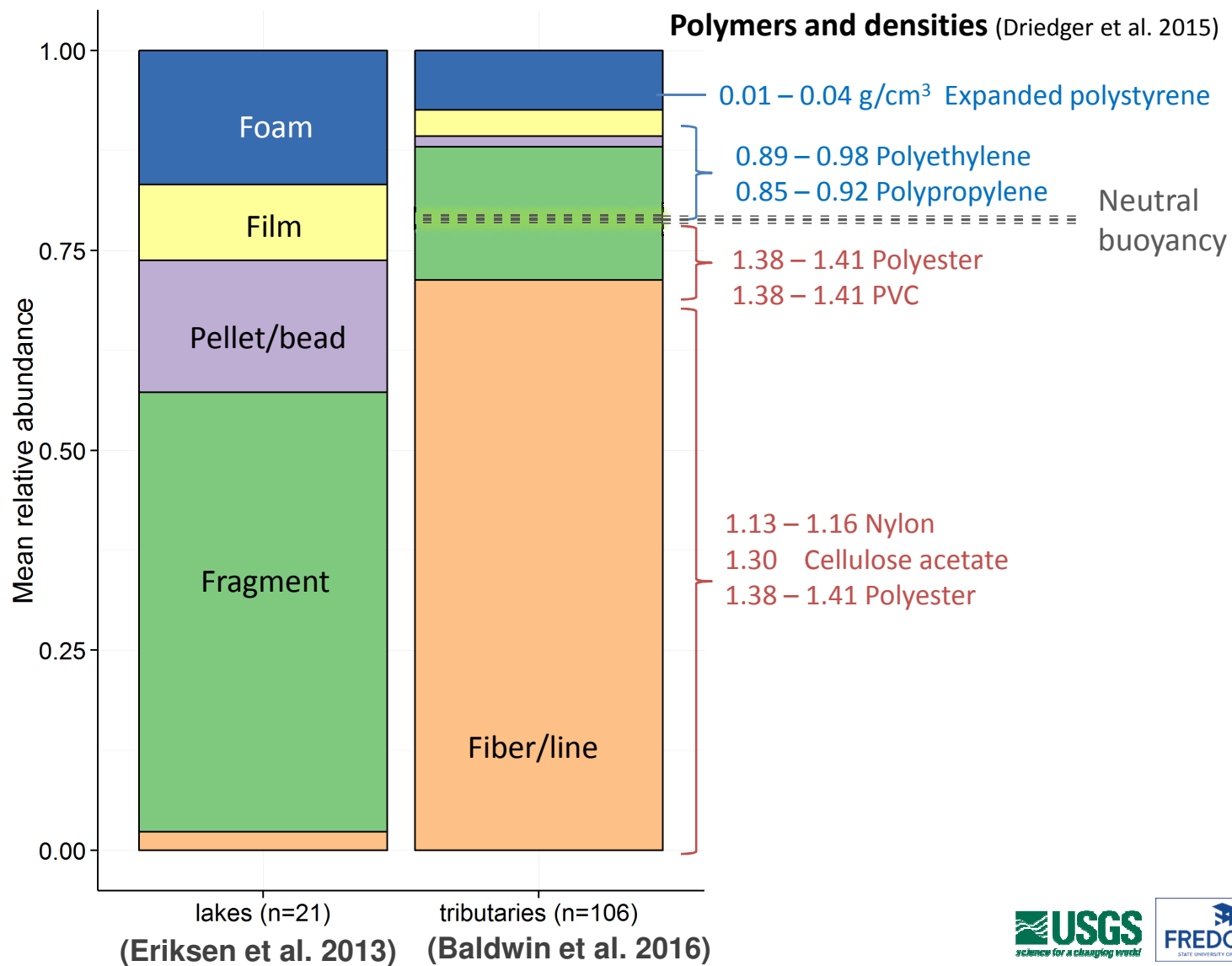
The brand commissioned a study to find out how many synthetic microfibers—the tiny bits of plastic that marine scientists say could be jeopardizing our oceans—are shed from its jackets in the wash. The results aren't pretty.

By: Mary Catherine O'Connor Jun 20, 2016

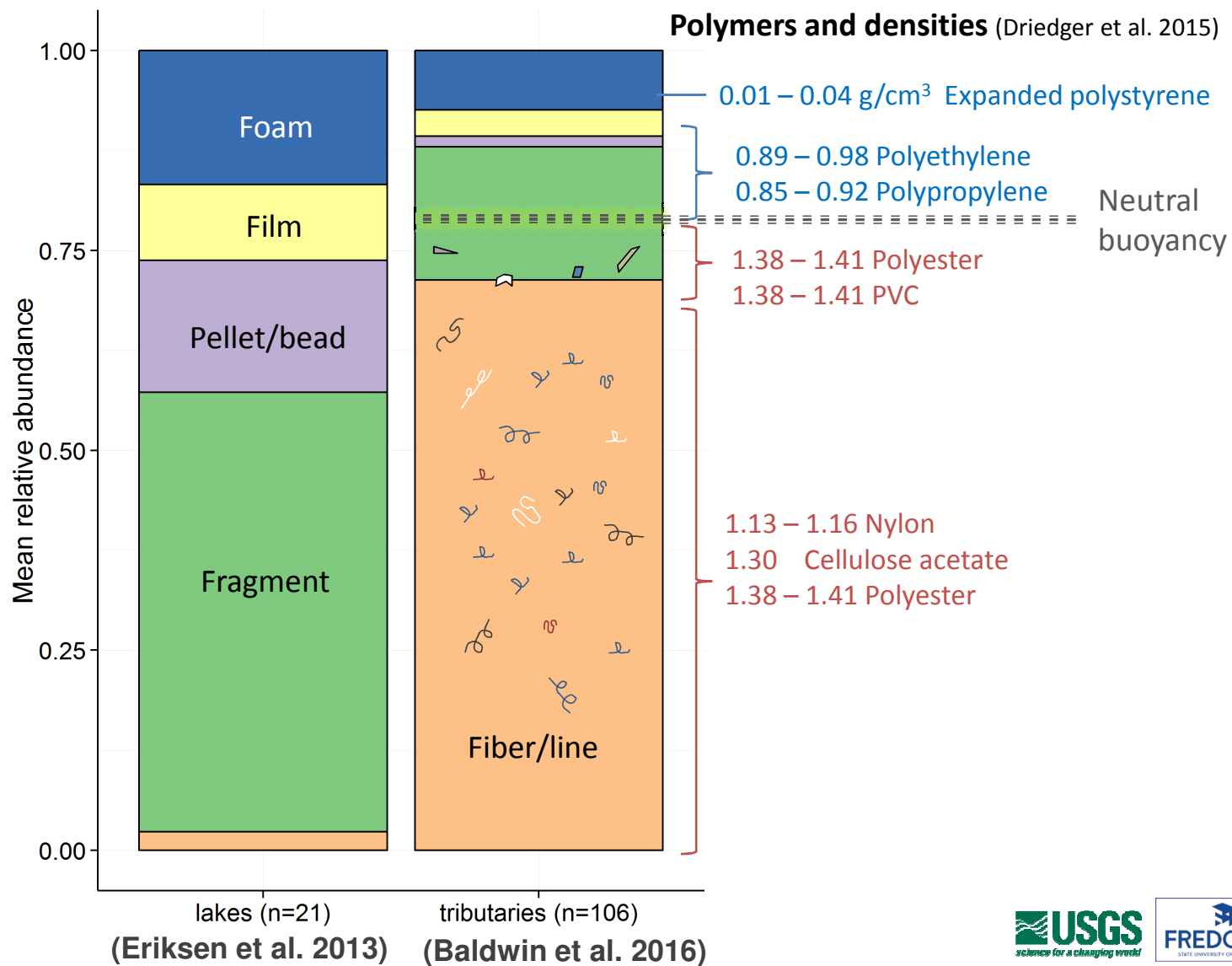
# Great Lakes vs Tributaries

Collected using same methods and mesh size,  
and analyzed by the same lab









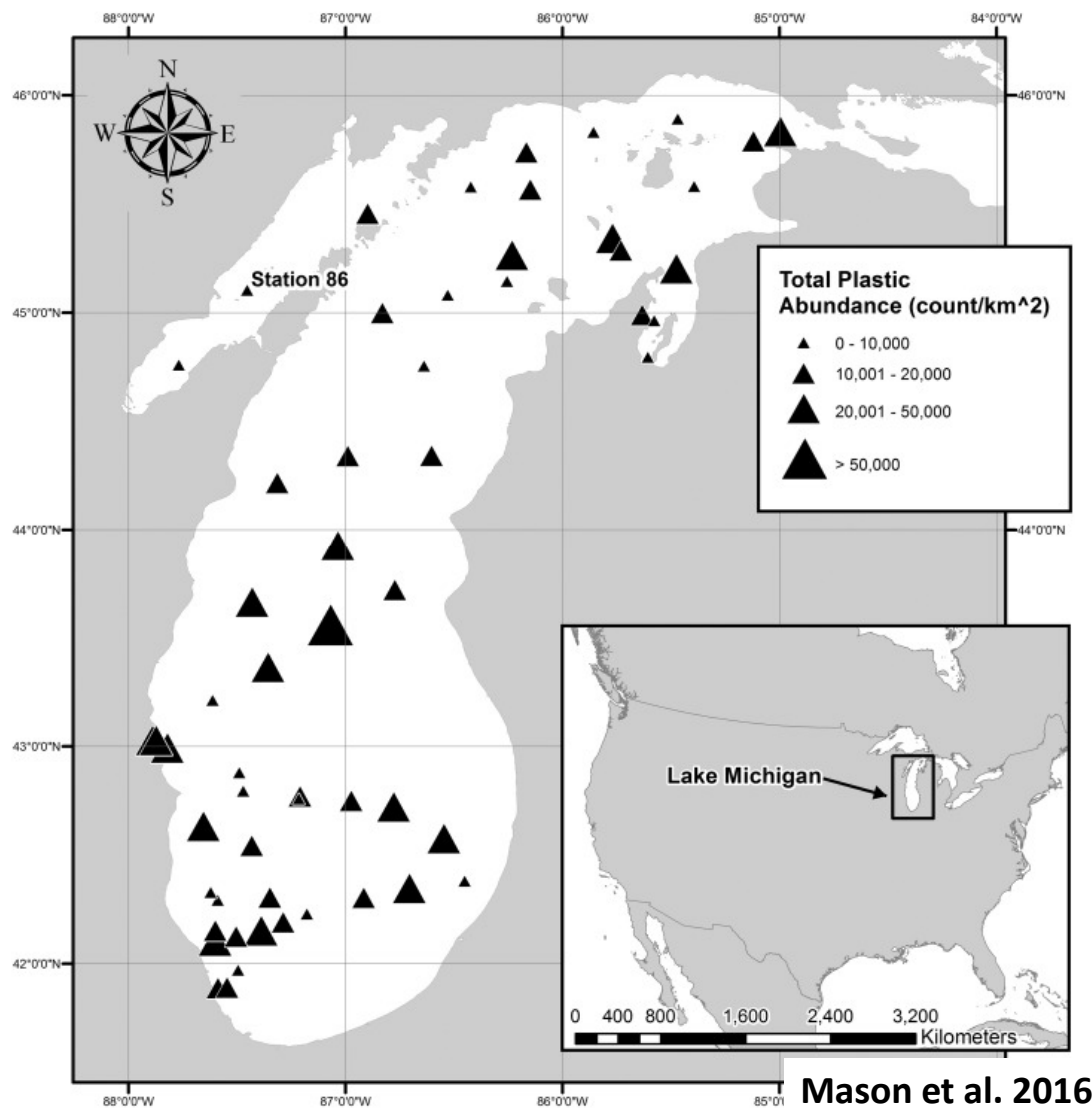
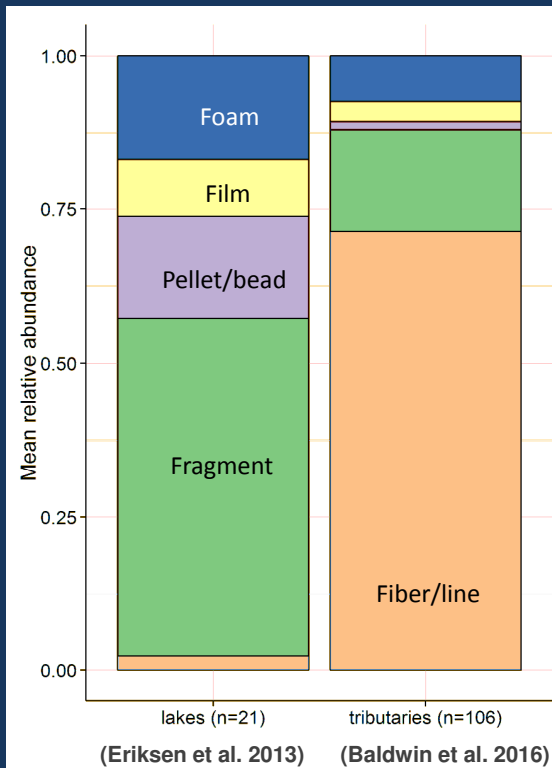


Table 2. Plastic abundances (count/km<sup>2</sup>) averaged over all 59 samples, distinguished by size (Mason et al. 2016)

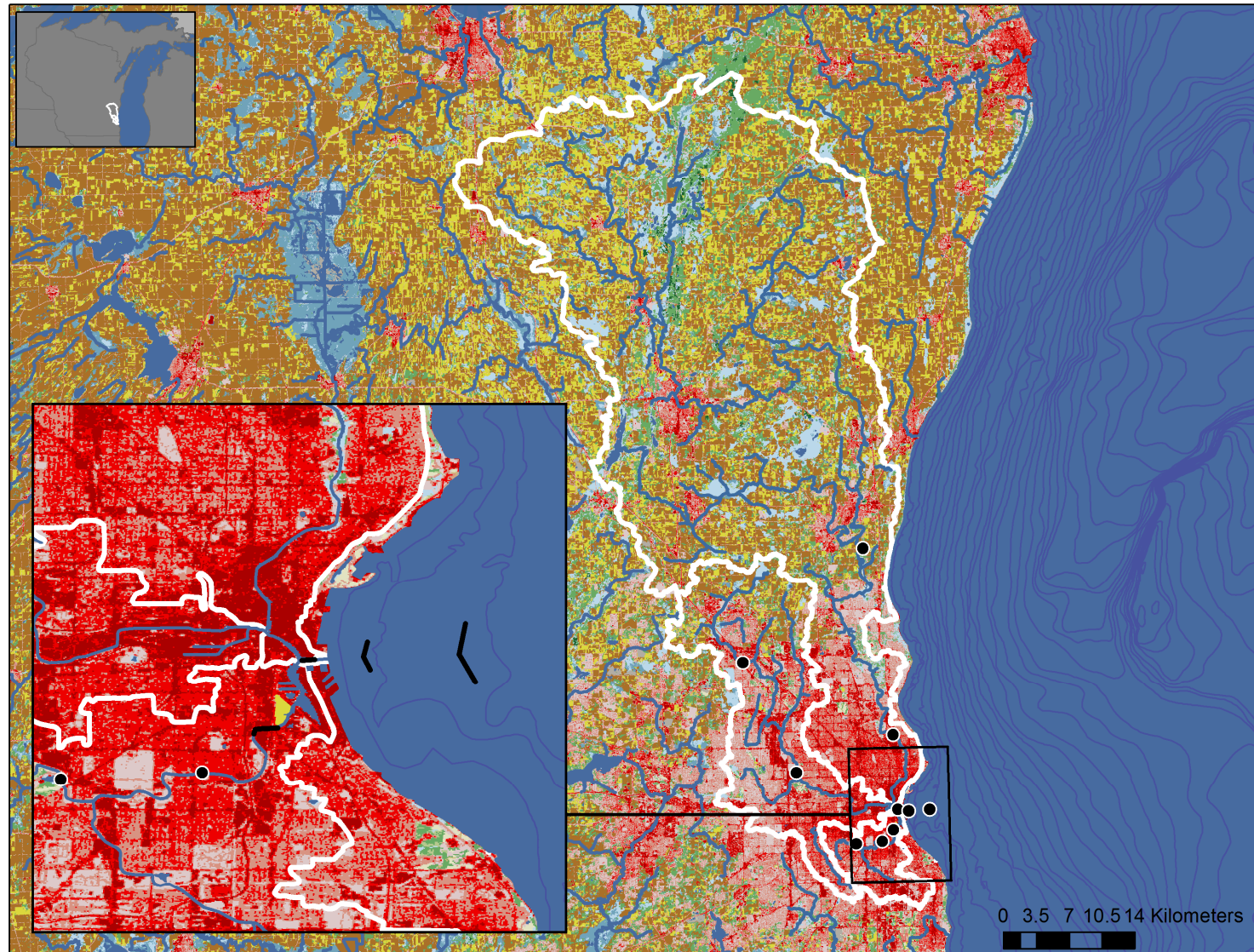
	0.355–0.999 mm	1.000–4.749 mm	> 4.75 mm	% of total
Fragment	8381.3	4418.4	866.3	79%
Pellet	540.8	141.9	23.8	4%
Fiber/line	1006.3	858.9	549.6	14%
Film	105.3	97	139	2%
Foam	118.7	29	0	1%
Count/km <sup>2</sup>	10,152.50	5545.2	1578.8	
% of total	59%	32%	9%	



# Sampling Locations

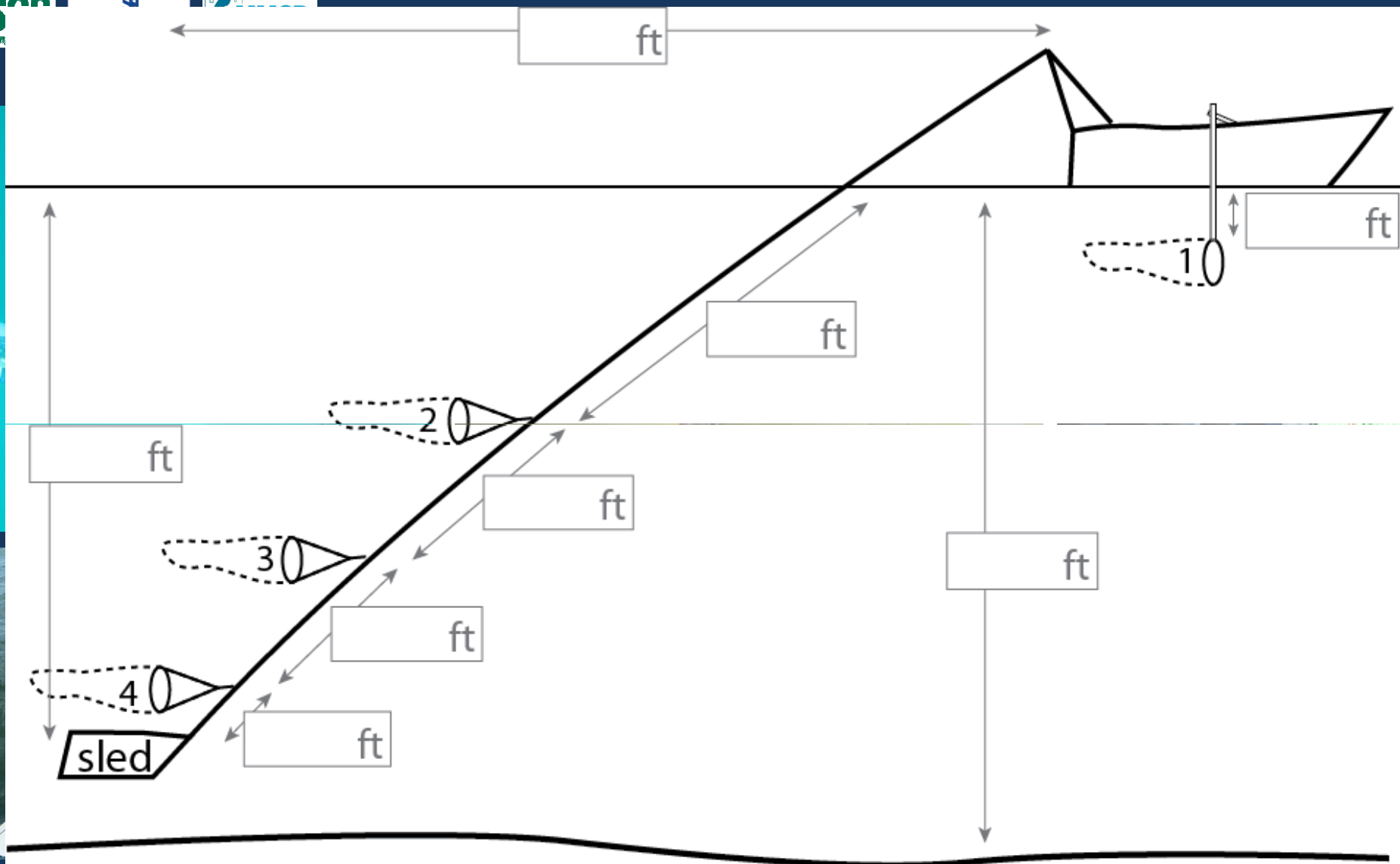
## Locations and Depths

- Milwaukee River at Cedarburg
  - Surface
- Menomonee River at Menomonee Falls
  - Surface
- Milwaukee River at Estabrook Park
  - Surface and 1 depth
- Menomonee River at Ridge Blvd.
  - Surface and 1 depth
- Kinnickinnic River at Jackson Park
  - Surface
- Kinnickinnic River at 1<sup>st</sup> St.
  - Surface and 1 depth
- Inner Harbor
  - Surface and 4 depths
- Outer Harbor
  - Surface and 4 depths
- Lake Michigan
  - Surface and 4 depths





# Methods



# Sample Processing









# Analytical Methods

Sherri Mason's lab at SUNY Fredonia



Sieved into three size classes:

- 0.355-0.999mm
- 1.00-4.749mm
- >4.75mm

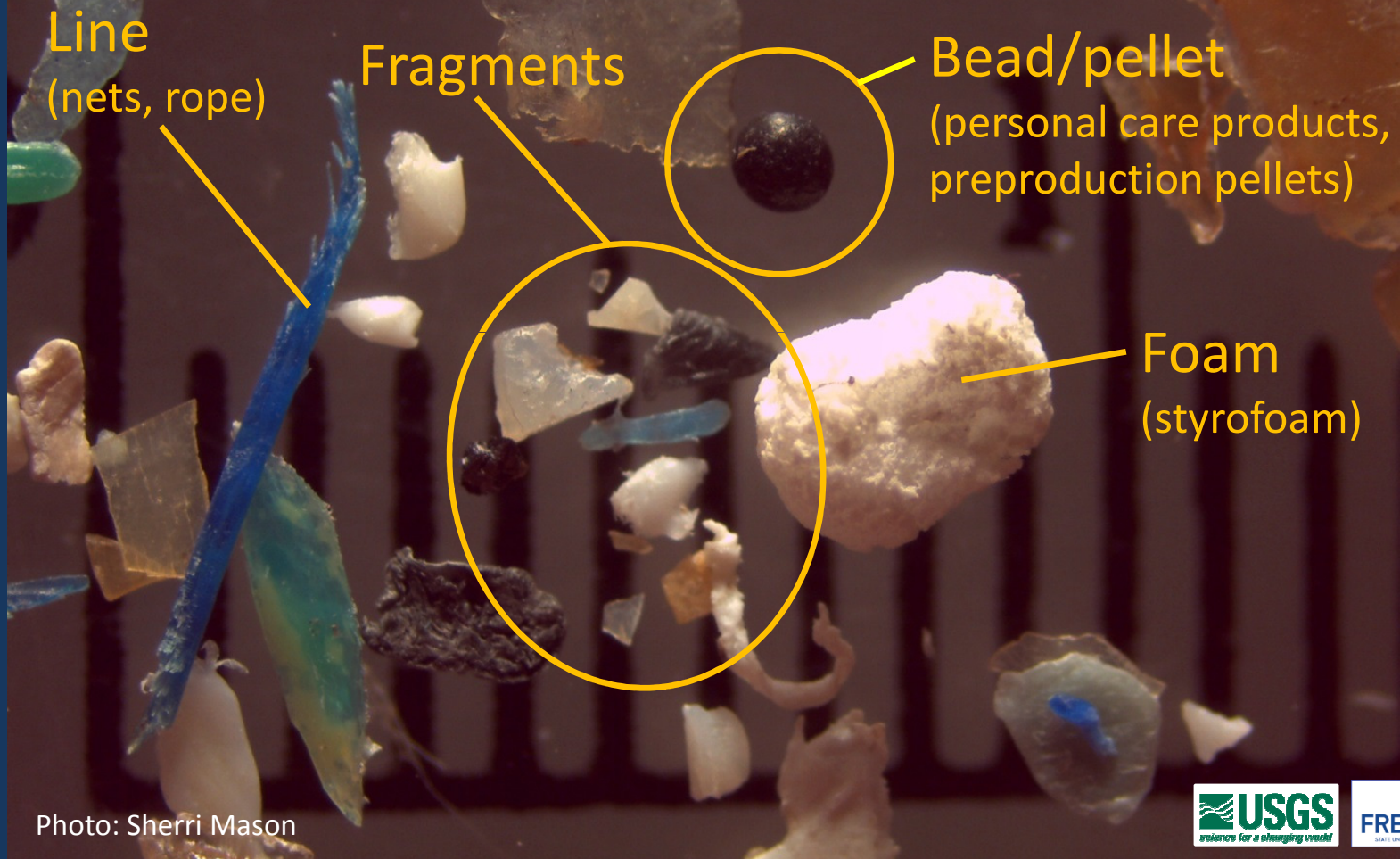
Digestion of organic matter using wet peroxide oxidation



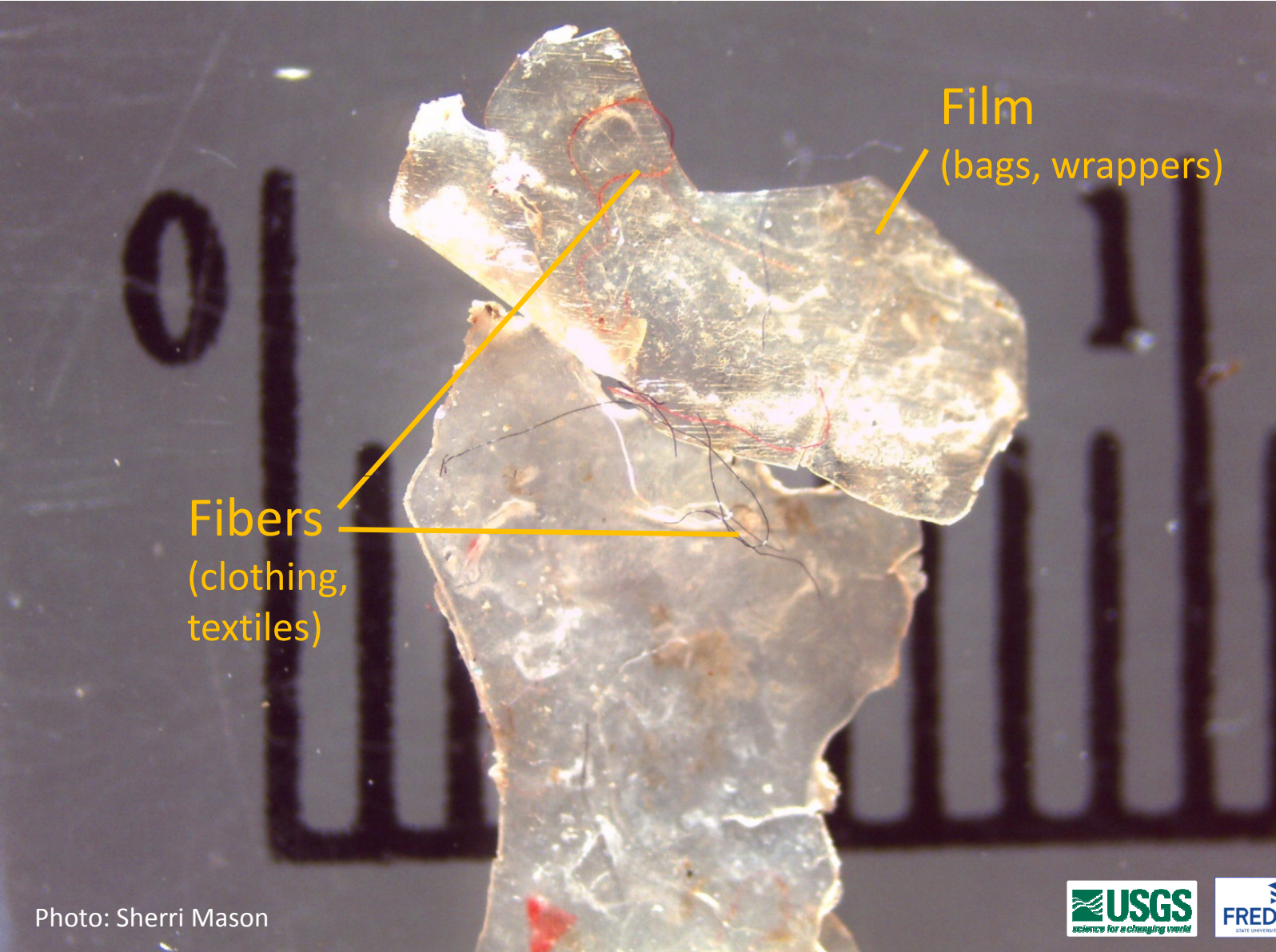
Floatation in salt water to separate plastic particles

*Photos courtesy of  
Tim Hoellein*

## Particles counted & categorized using light microscope







Film  
(bags, wrappers)

Fibers  
(clothing,  
textiles)

Photo: Sherri Mason



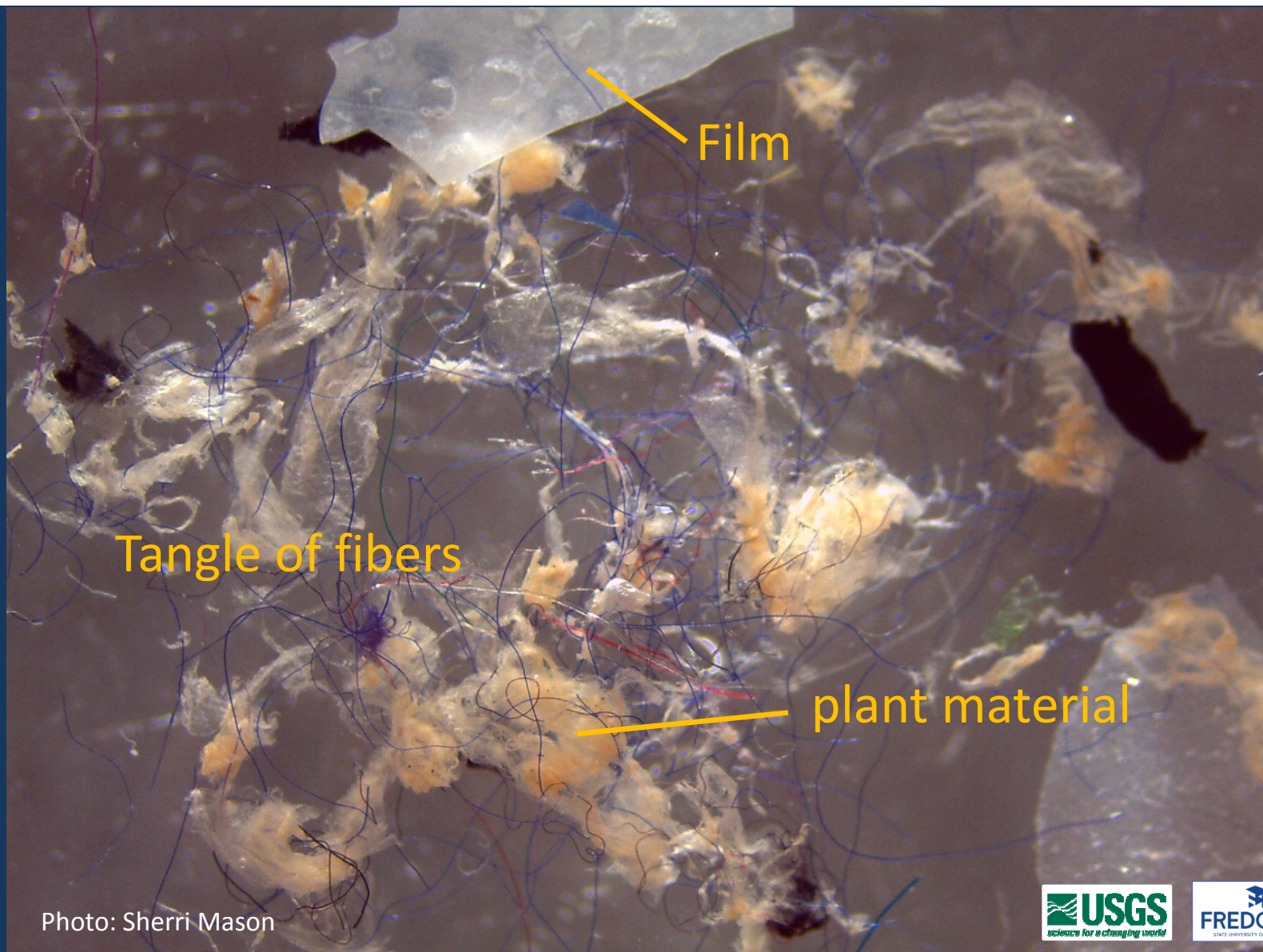
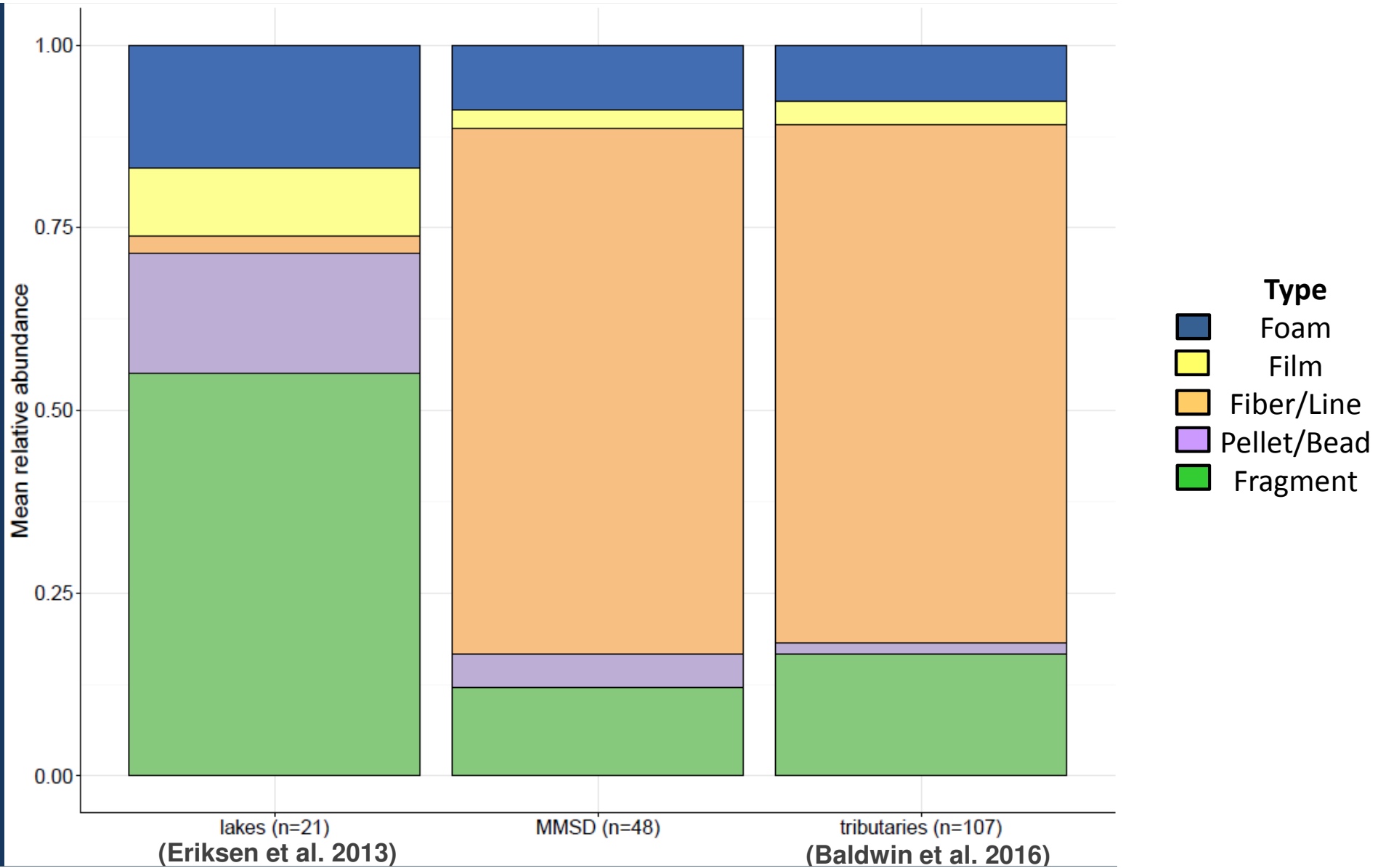


Photo: Sherri Mason



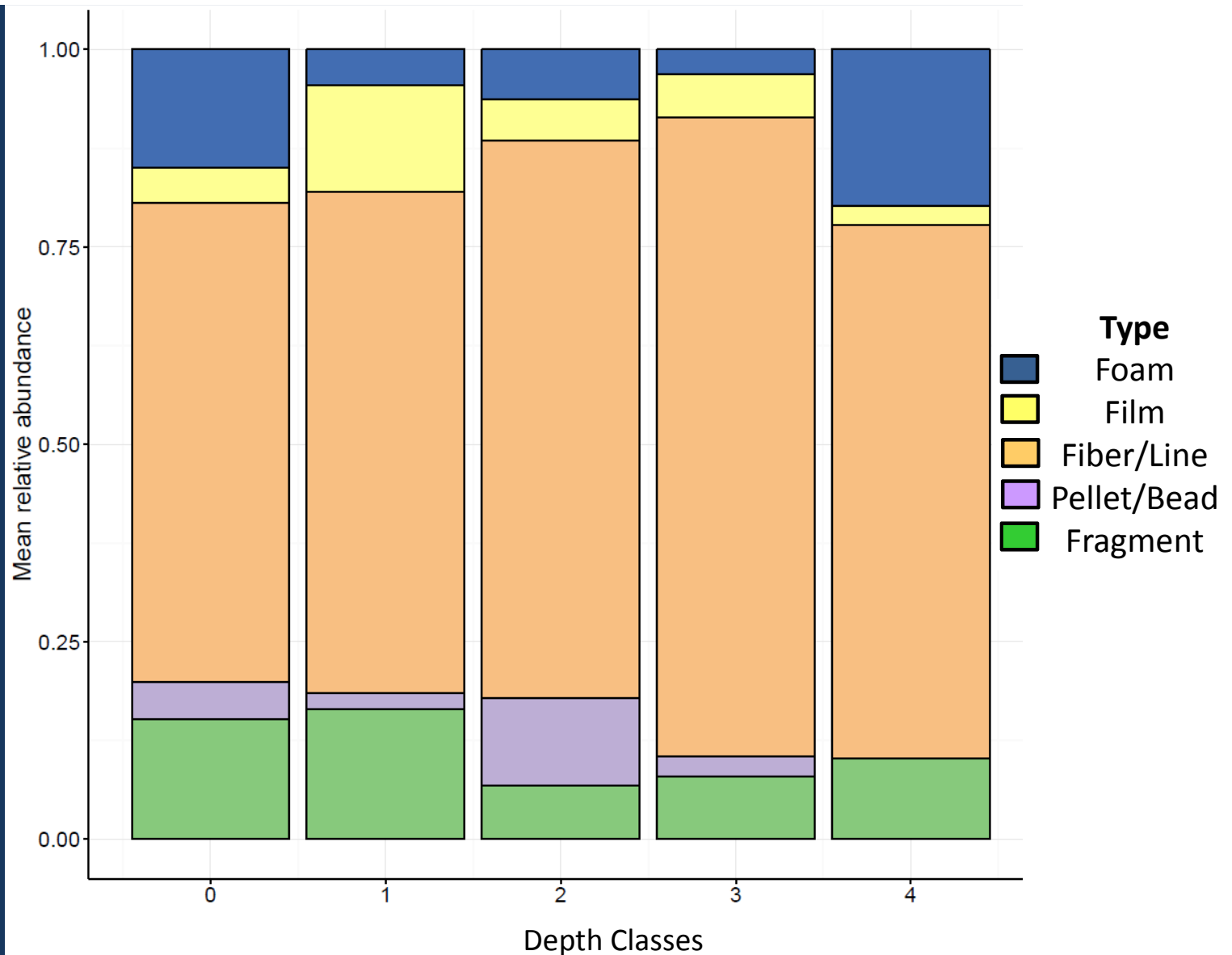
## Results

- Results are very preliminary and subject to change.
  - May and June only
- Results presented are counts only, not concentration

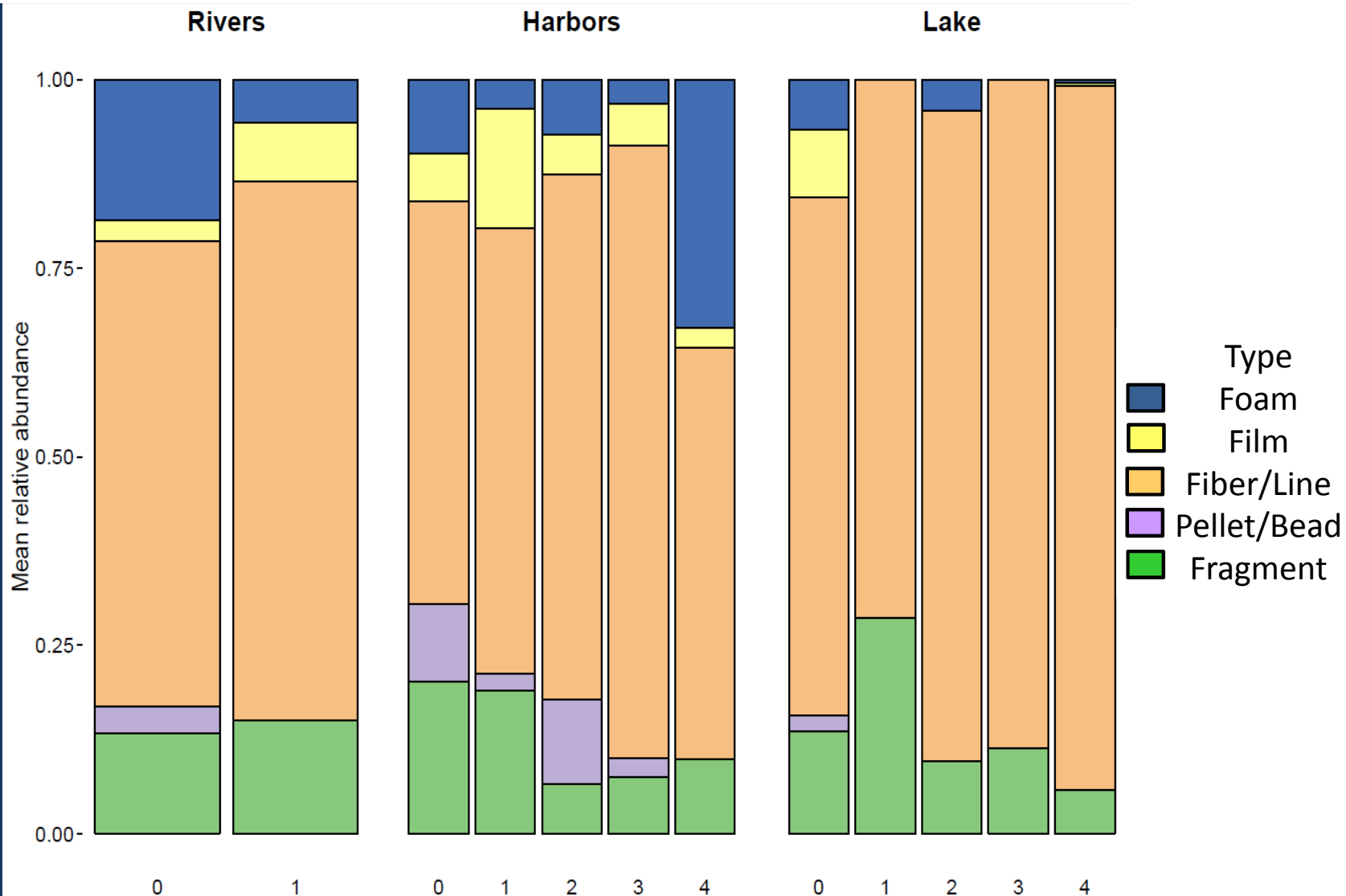


### Depth Classes:

- 0 = 0.44 – 0.98 feet
  - Rivers, Harbors, and Lake
- 1 = 1.35 – 9 feet
  - Rivers, Harbors, and Lake
- 2 = 10 – 24 feet
  - Harbors and Lake
- 3 = 15 – 34 feet
  - Harbors and Lake
- 4 = 20 – 45 feet
  - Harbors and Lake



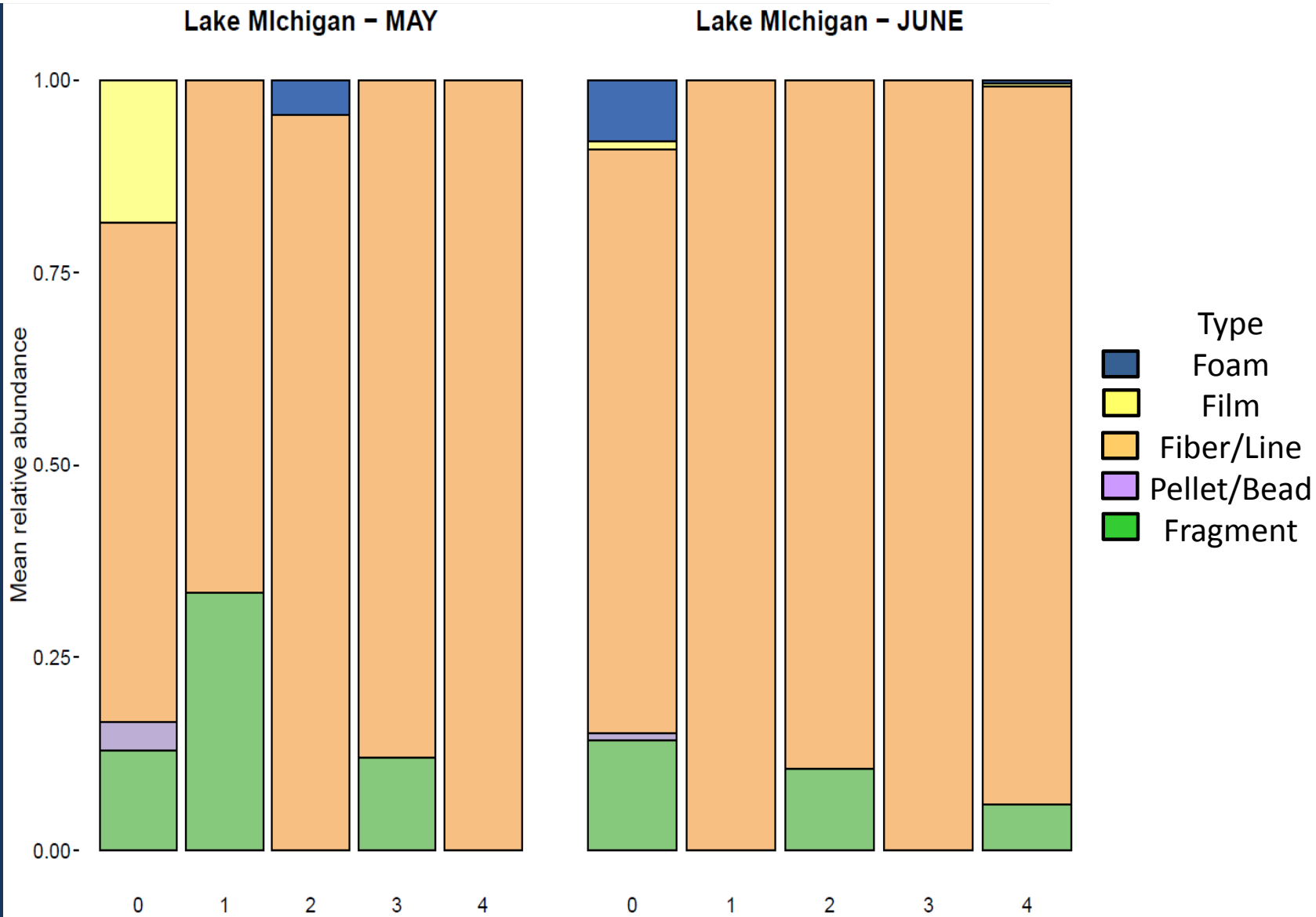
- Depth Classes:**
- **0** = 0.44 – 0.98 feet
    - Rivers, Harbors, and Lake
  - **1** = 1.35 – 7 feet
    - Rivers
  - **1** = 5 – 9 feet
    - Harbors and Lake
  - **2** = 10 – 24 feet
    - Harbors and Lake
  - **3** = 15 – 34 feet
    - Harbors and Lake
  - **4** = 20 – 45 feet
    - Harbors and Lake





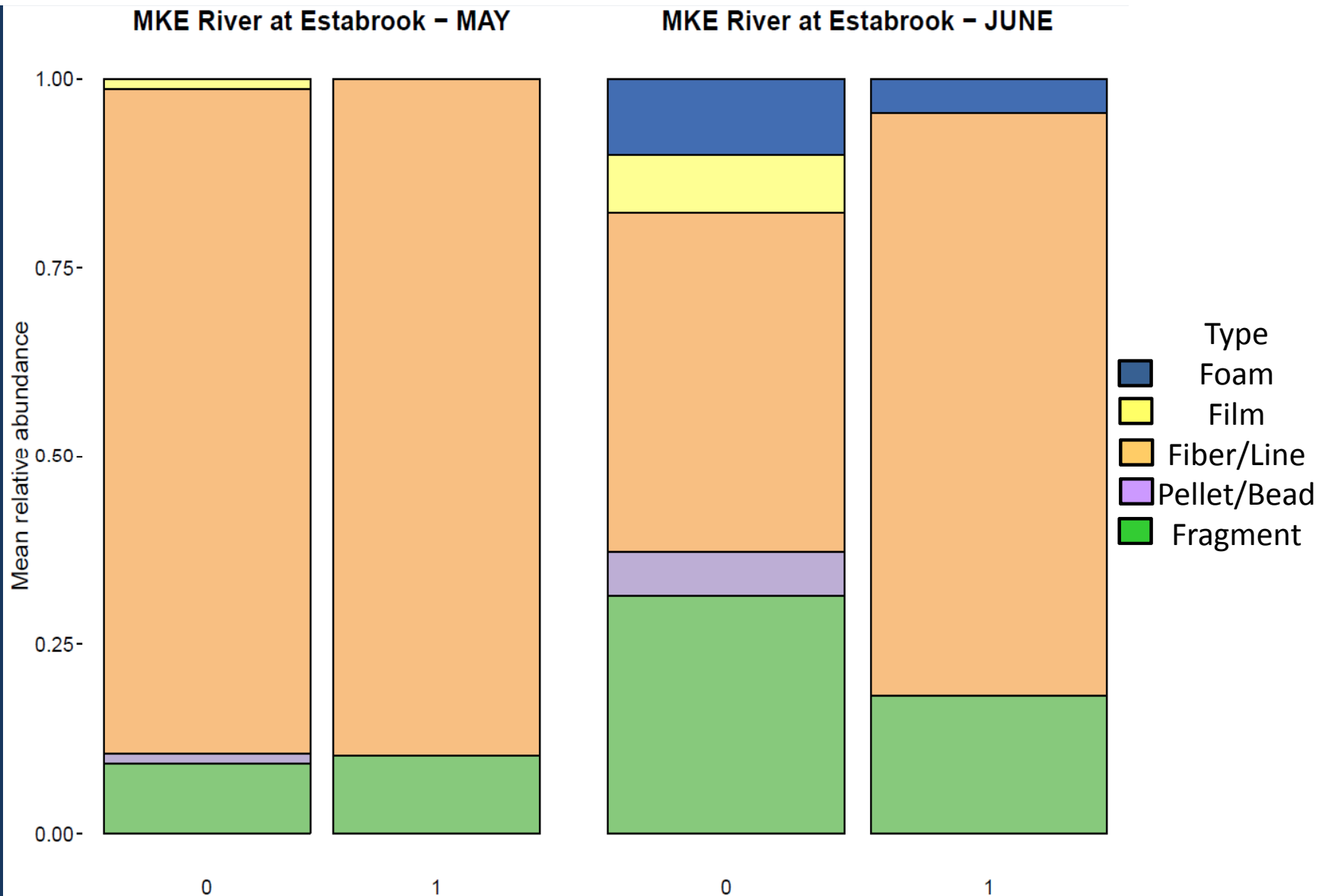
## Depth Classes:

- 0 = 0.75 – 0.98 ft
- 1 = 6 – 9 ft
- 2 = 23 – 24 ft
- 3 = 33 – 34 ft
- 4 = 45 ft



## Depth Classes:

- 0 = 0.66 – 0.82 ft
- 1 = 1.35 – 1.75 ft



A wide-angle photograph of a city skyline across a body of water. The skyline features several tall buildings, including a prominent white skyscraper on the left. The water is calm with gentle ripples. In the foreground, the corner of a boat and some ropes are visible. The word "Questions?" is overlaid in the center in a large, orange, sans-serif font.

Questions?