

Great Lakes Plastic Pollution Survey

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I just want to say one word to you.



Just one word. PLASTICS.

- The Graduate, 1967

World plastics production grows

1950 1976 1989 2002 2009 2010 2011 2012

1,7

47

99

204

250

270

280

2012

288

Mtonne

1967:
25 million tons

300

250

200

150

100

50

WORLD
PLASTICS
PRODUCTION

EUROPEAN
PLASTICS
PRODUCTION

1950

1960

1970

1980

1990

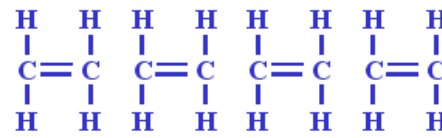
2000

2010

2020

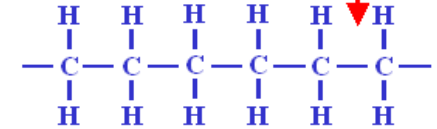
year

Source:
PlasticsEurope,
Plastics – The Facts 2013



ETHYLENE

POLYMERIZATION



POLYETHYLENE

❖ Synthetic polymers

- Modeled after natural polymers
- Created to replace the (over)use of natural materials
- Moldable, Light-weight, Durable





5 Subtropical Convergence Zones



A stylized blue map of the Great Lakes region is centered on a light gray background. The map shows the outlines of the five Great Lakes: Superior, Michigan, Huron, Erie, and Ontario. Each lake is labeled with its name in a bold, dark blue font, enclosed within a rounded rectangular border. The borders for Superior, Huron, and Erie are yellow, while the borders for Michigan and Ontario are green.

Superior

Huron

Michigan

Ontario

Erie



SGYRES









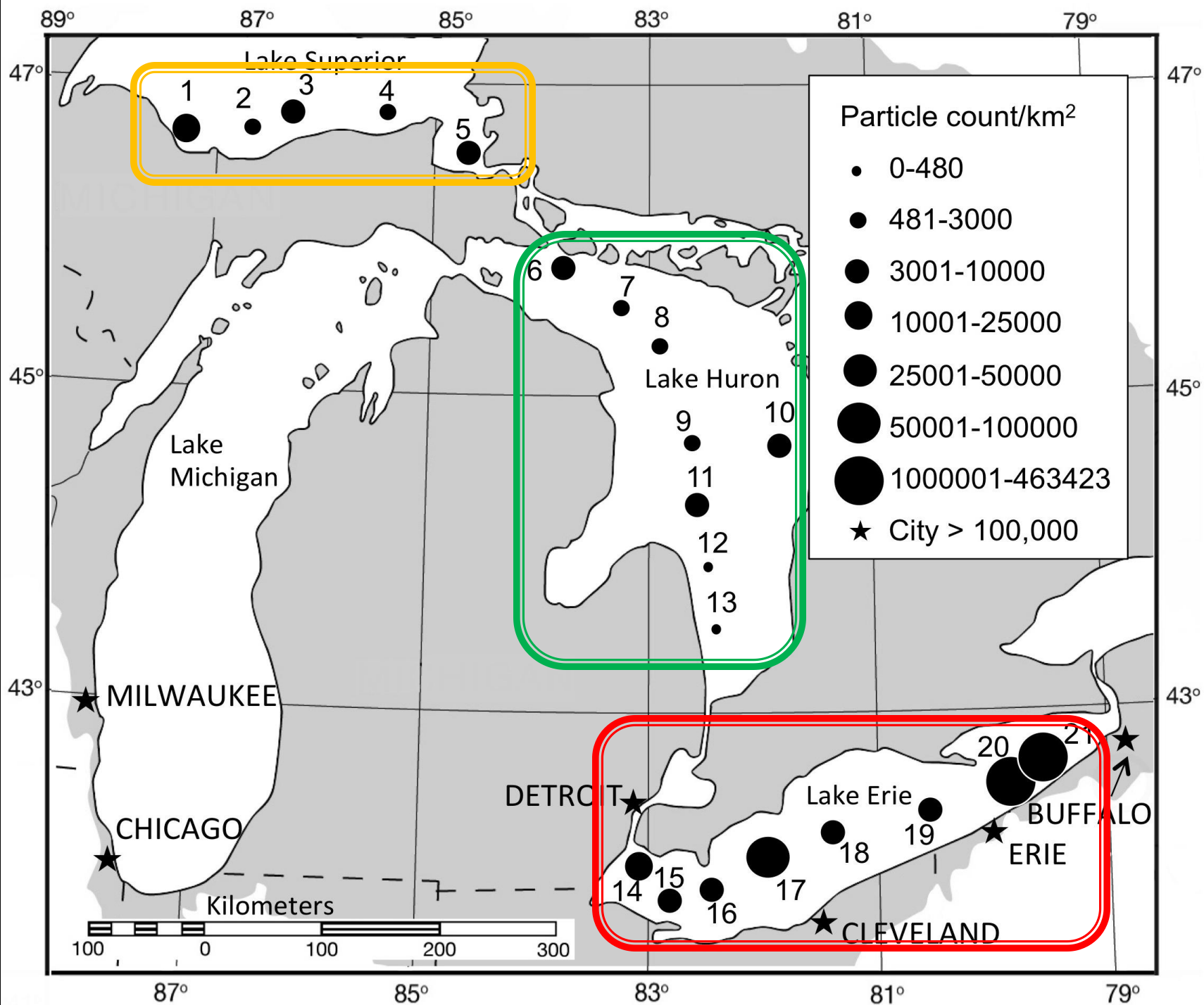
Photos courtesy of Brendan Bannon





Extrapolate

2012



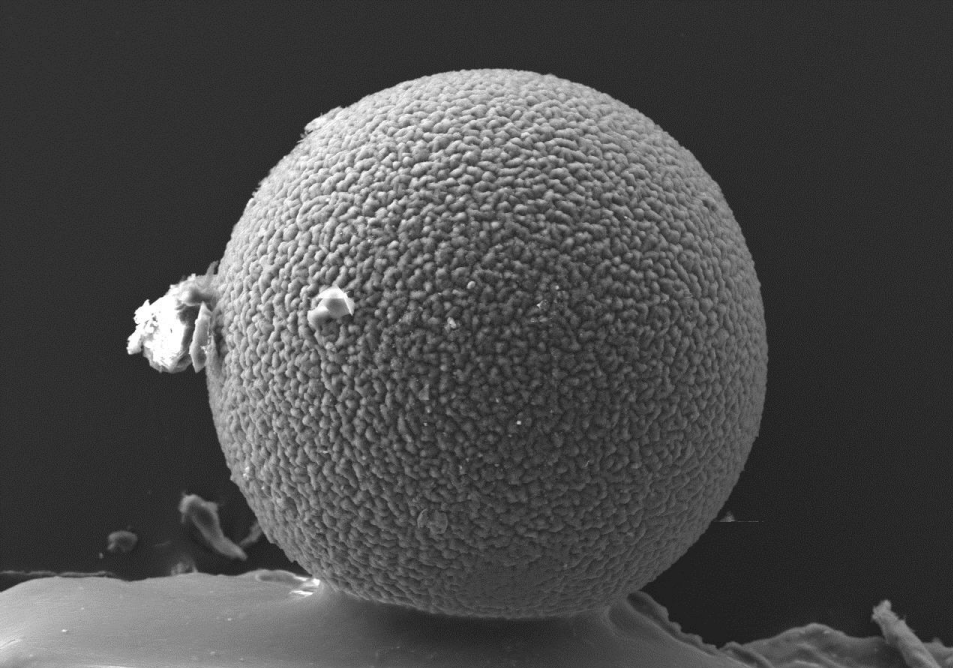
Abundance of plastic pieces (count/km²) by type and size

	Great Lakes		
	0.355— 0.999mm	1.000— 4.749mm	> 4.75mm
Fragment	247,106.5	123,906.2	11,219.8
Film	3,943.5	1,332.2	4,006.1
Foam	54,340.9	18,208.4	1,810.5
Pellet	430,029.8	5,614.1	420.9
Line	1,328.9	2,571.9	449.0
count/km ²	736,749.6	151,632.9	17,906.3
% of total	81%	17%	2%

Sources

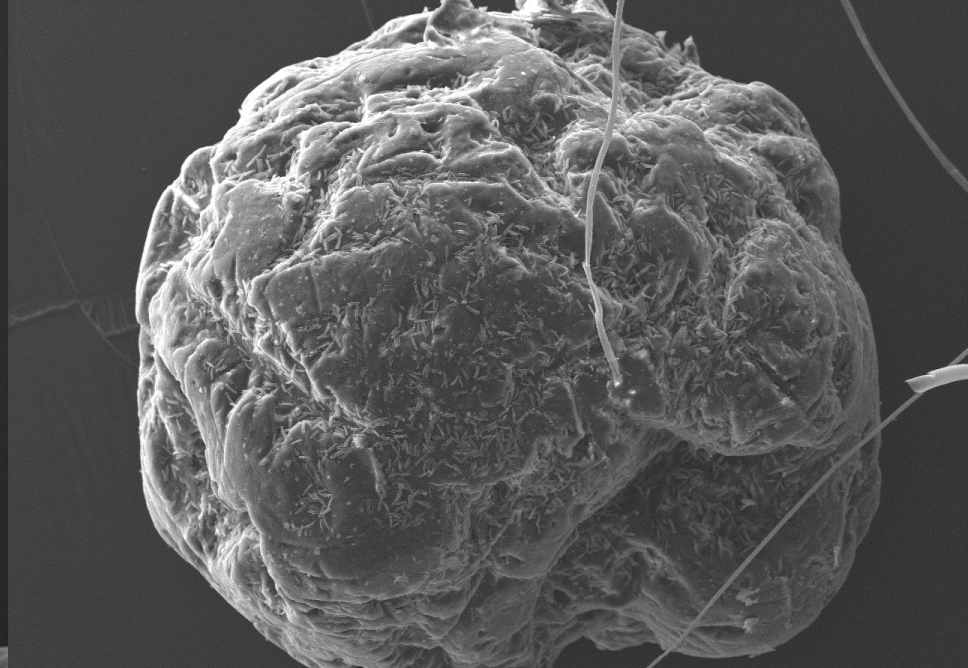
MANTA #20 LAKE ERIE
- 355-1 mm





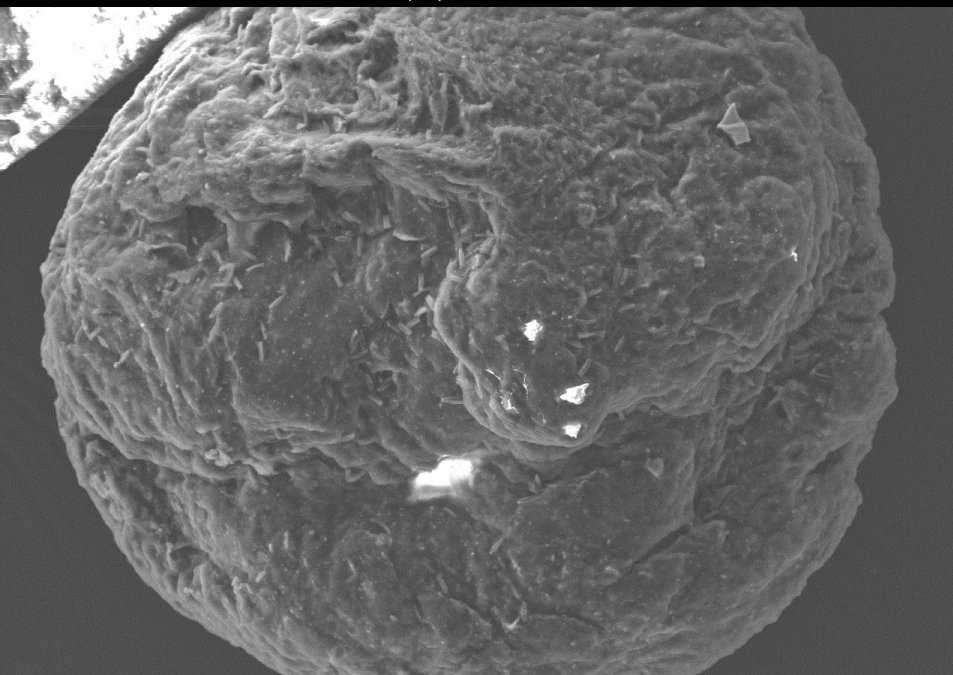
SU70 20.0kV 15.2mm x200 SE(M) 1/24/2013

200um



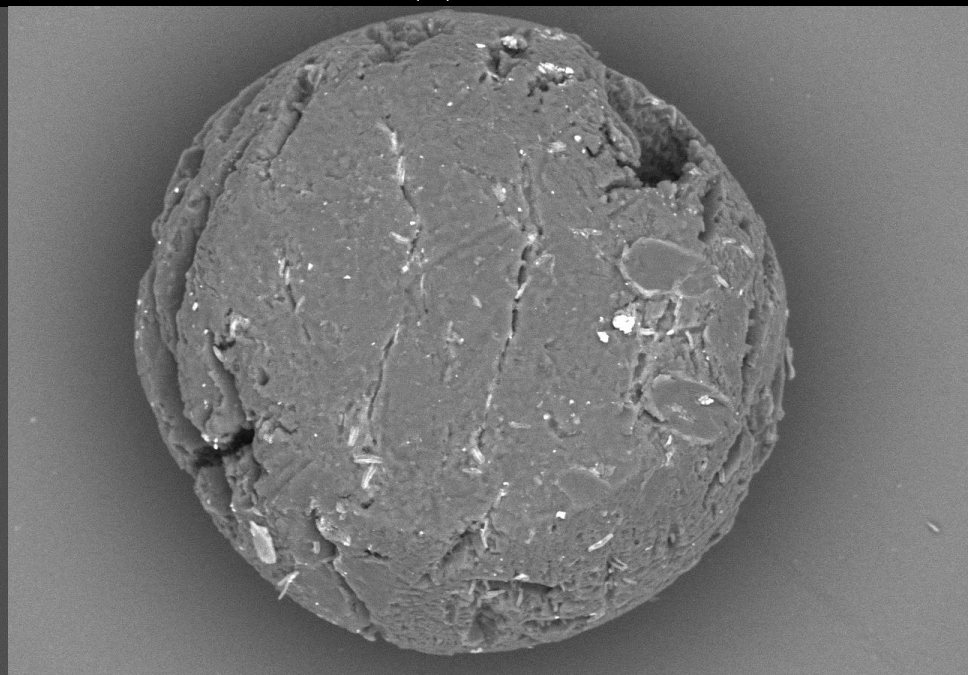
SU70 20.0kV 15.0mm x130 SE(M) 1/8/2013

400um



SU70 20.0kV 15.1mm x200 SE(M) 1/8/2013

200um



SU70 20.0kV 15.5mm x200 YAGBSE 3/19/2013

200um



GENTLE

SCRUB

...the day.
...aurate, Polyethylene, Glycen
...aric Acid, Acrylates/C10

oil free

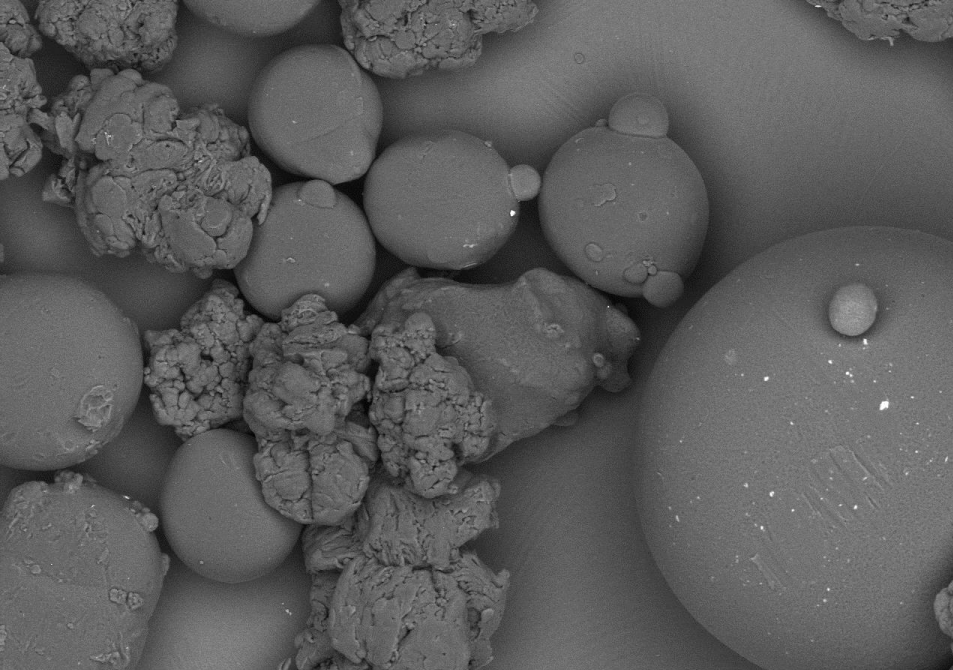
microbeads gently exfoliate,
Beta Hydroxy cleans deep into
pores for soft, smooth skin

Neutrogena®



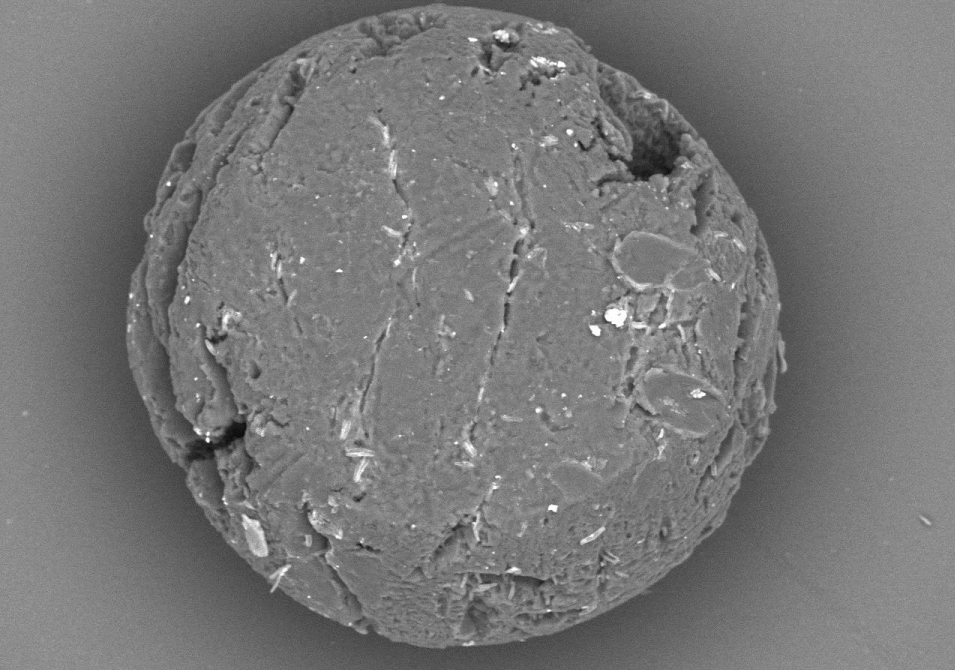
POSSIBLE SOURCE OF MICROPLASTIC SPHERES





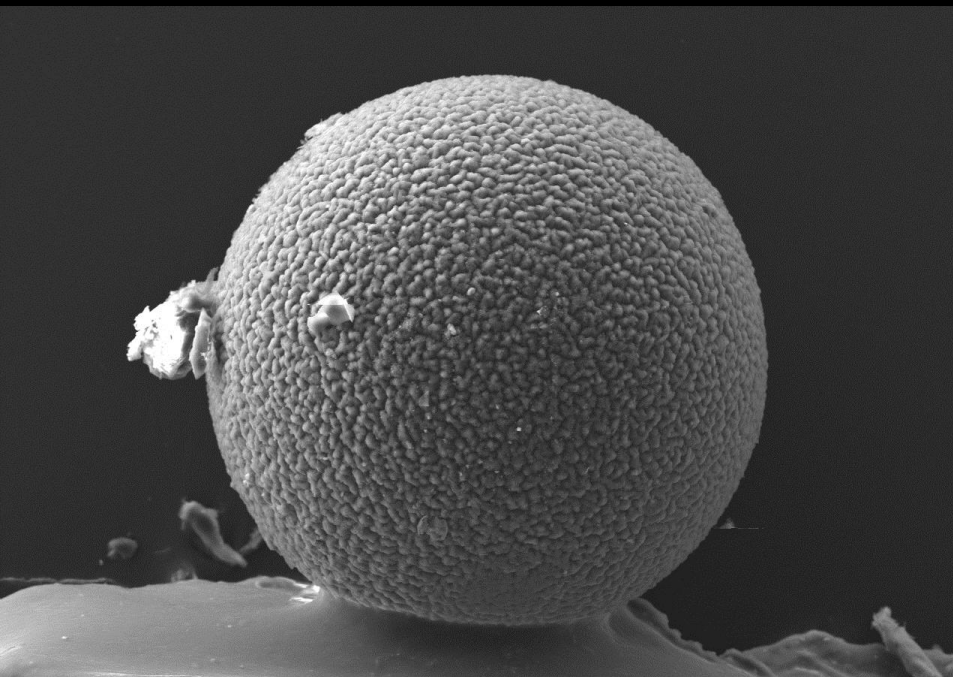
SU70 20.0kV 16.0mm x70 YAGBSE 1/8/2013

500um



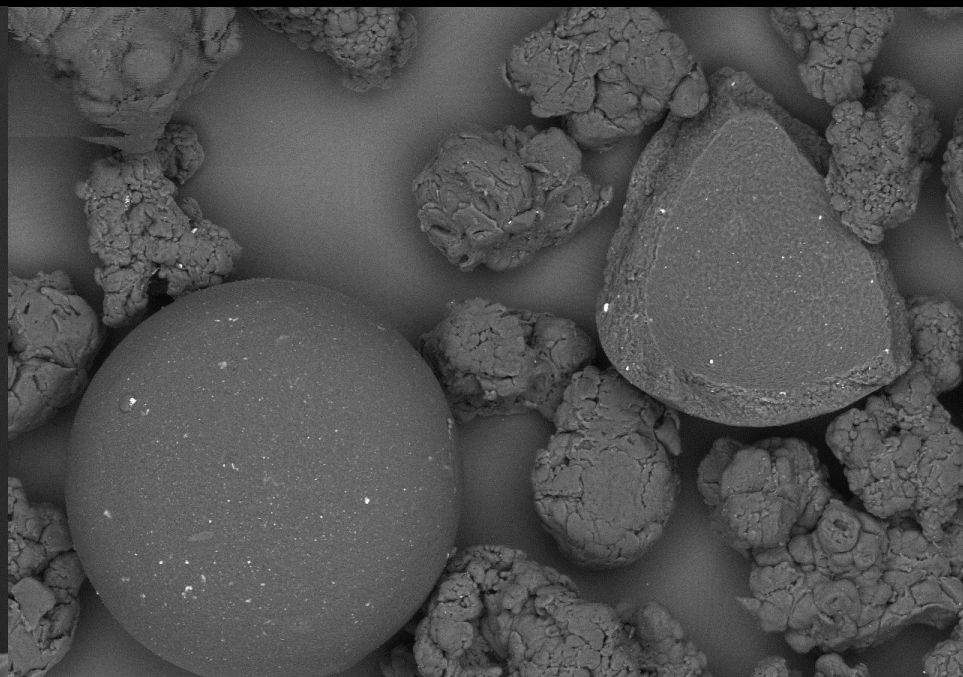
SU70 20.0kV 15.5mm x200 YAGBSE 3/19/2013

200um



SU70 20.0kV 15.2mm x200 SE(M) 1/24/2013

200um

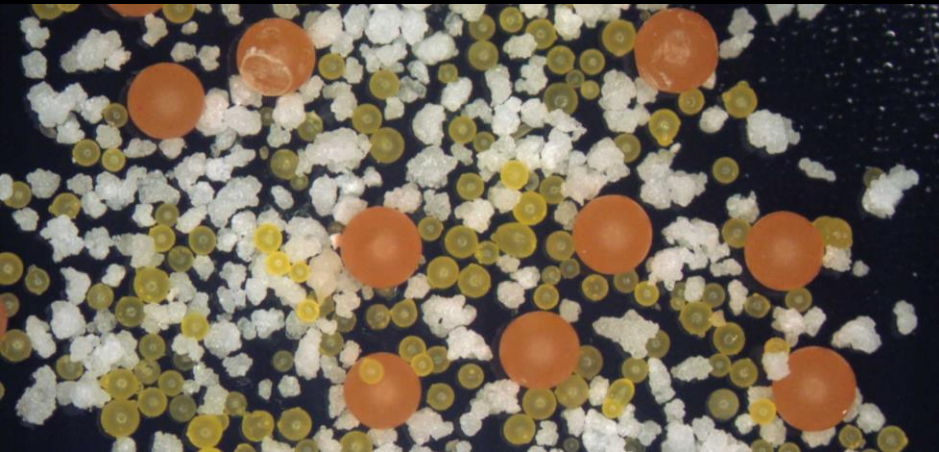


SU70 20.0kV 15.9mm x80 YAGBSE 1/8/2013

500um

Sources

- Consumer Products
 - Exfoliating Microbeads



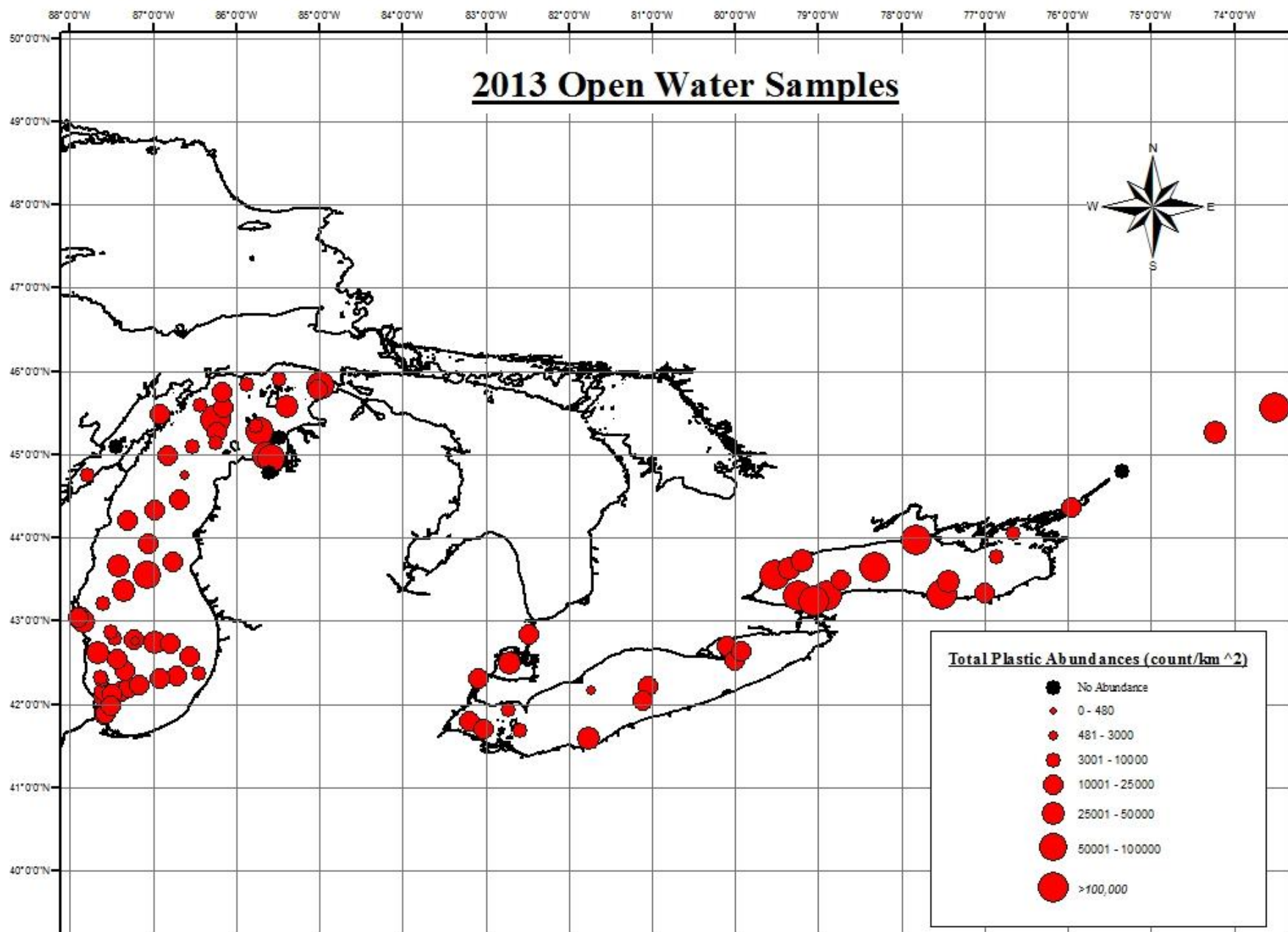
- Photodegradation of larger plastic items



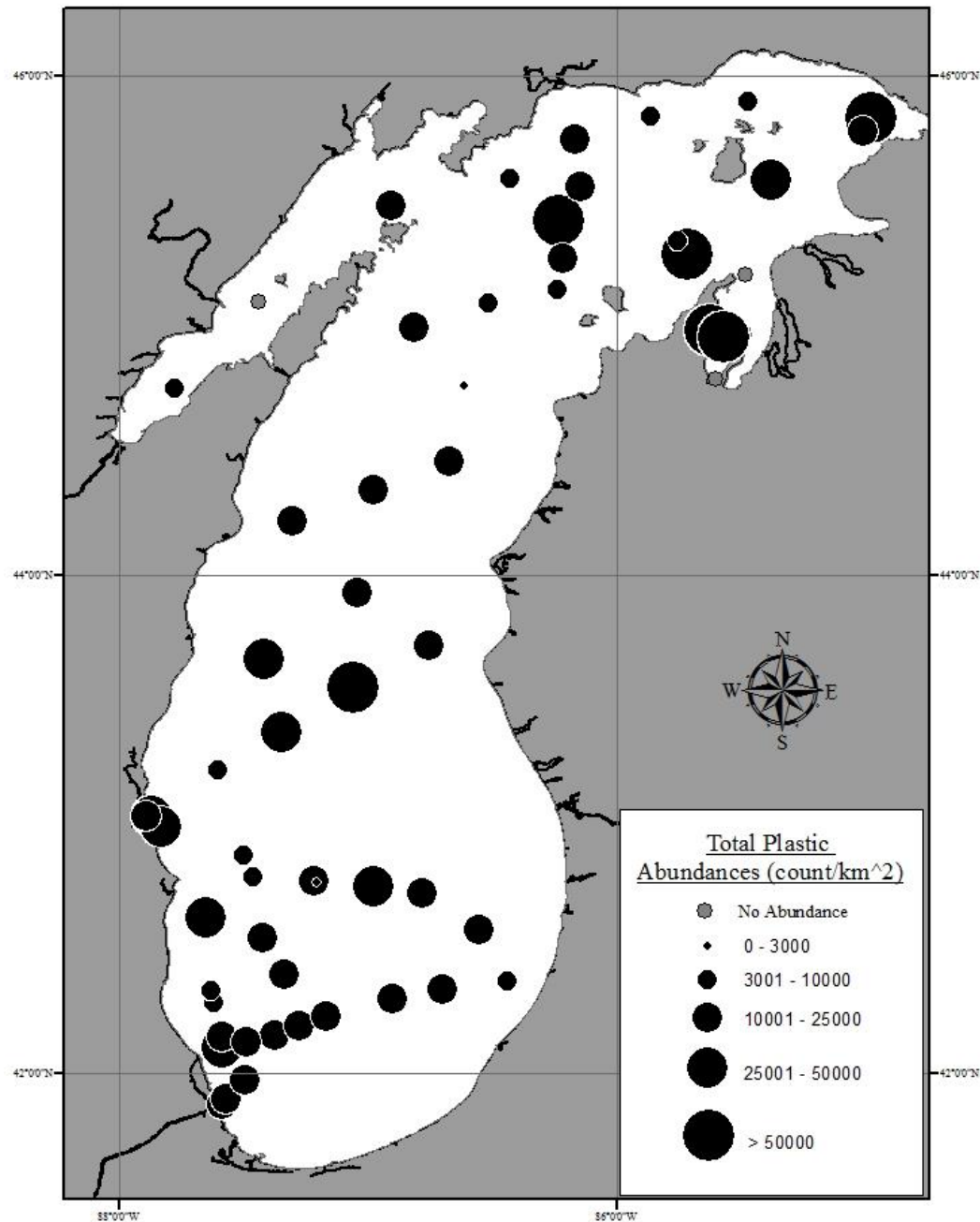
2013



Photo courtesy of Brendan Bannon



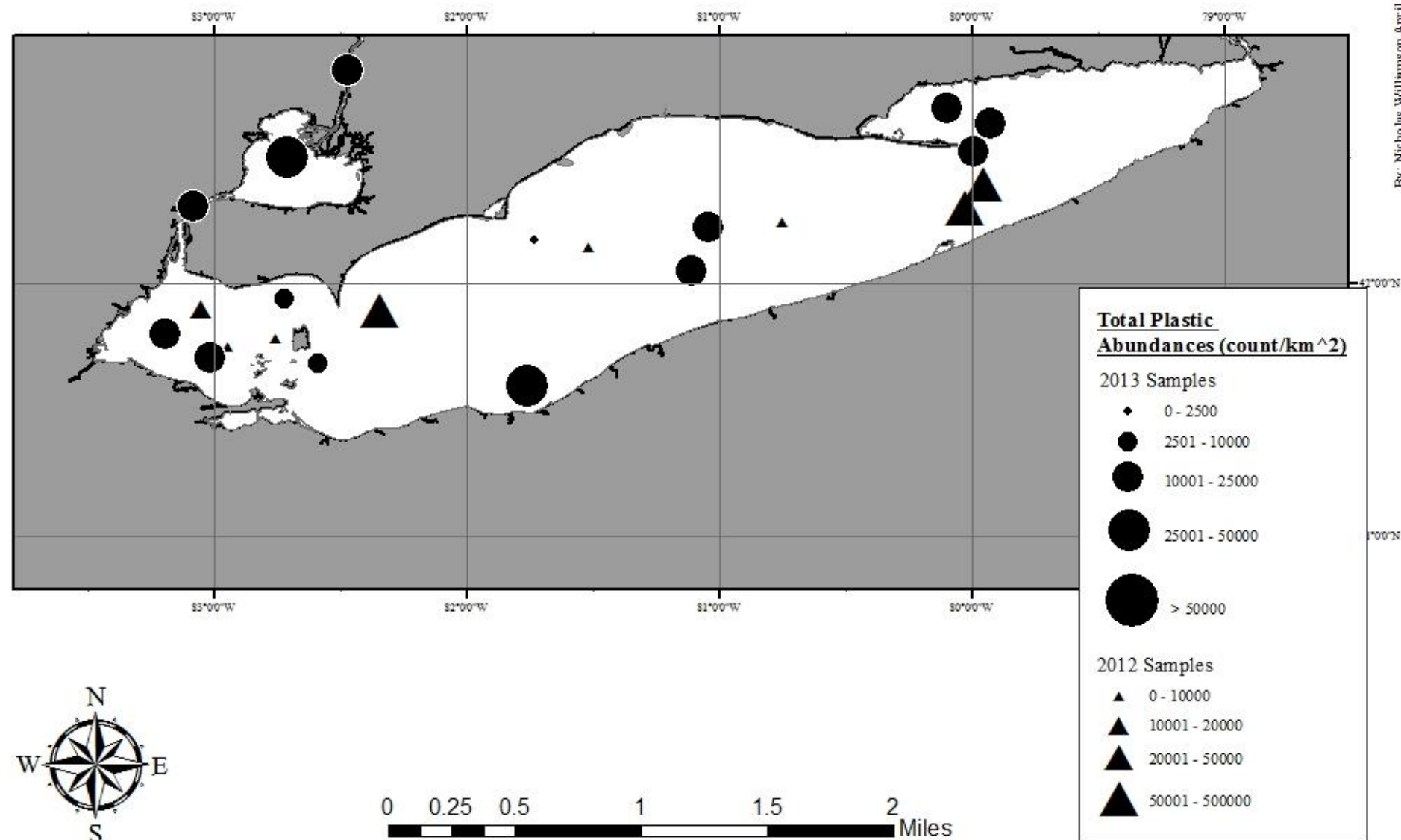
2013 Lake Michigan Open Water Samples



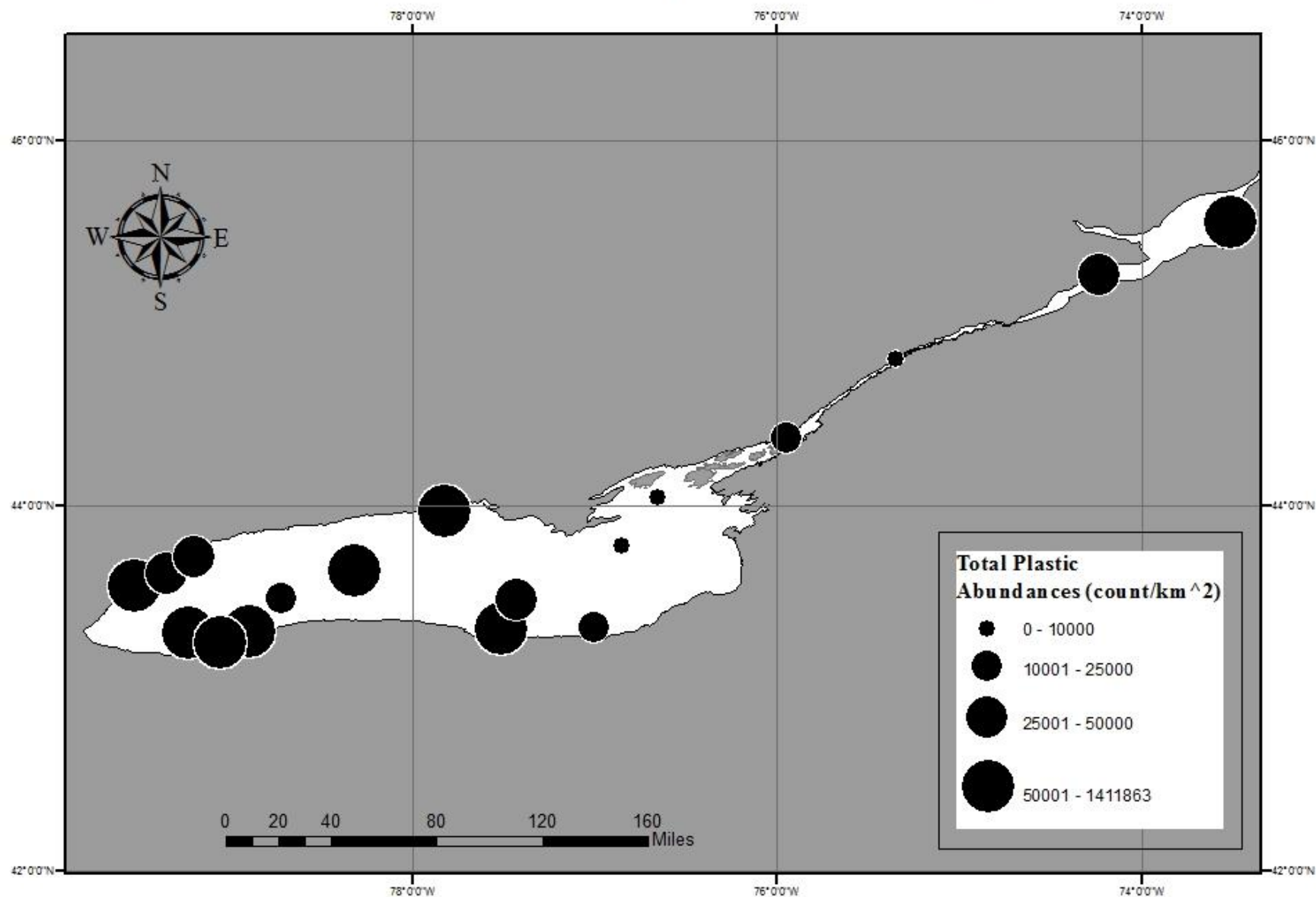
By: Nicholas Williamson April 23, 2014

Lake Erie 2012 & 2013 Open Water Samples

By: Nicholas Williams on April 23, 2014



Lake Ontario 2013 Open Water Samples

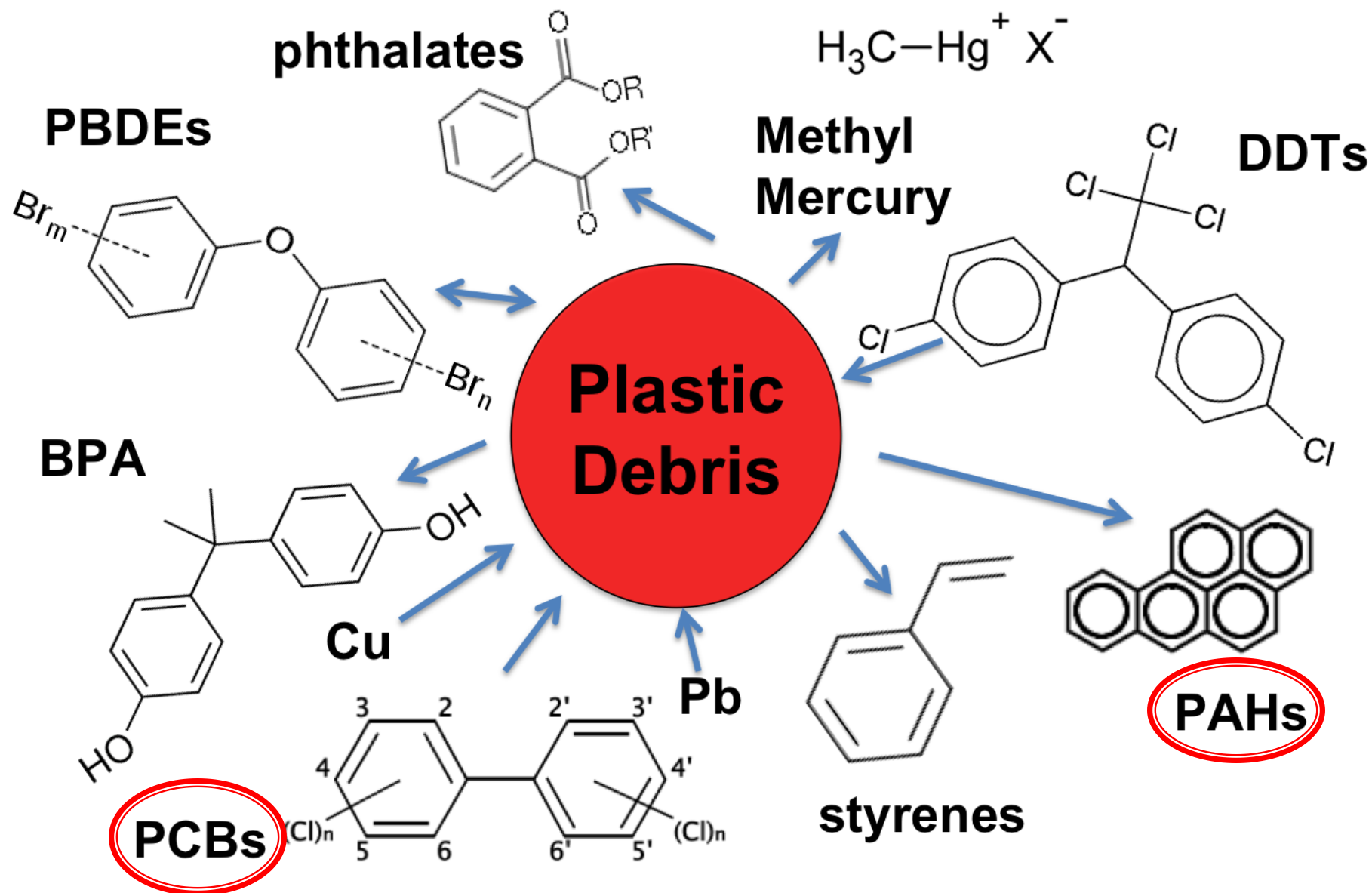


Combined Data – 2012 & 2013

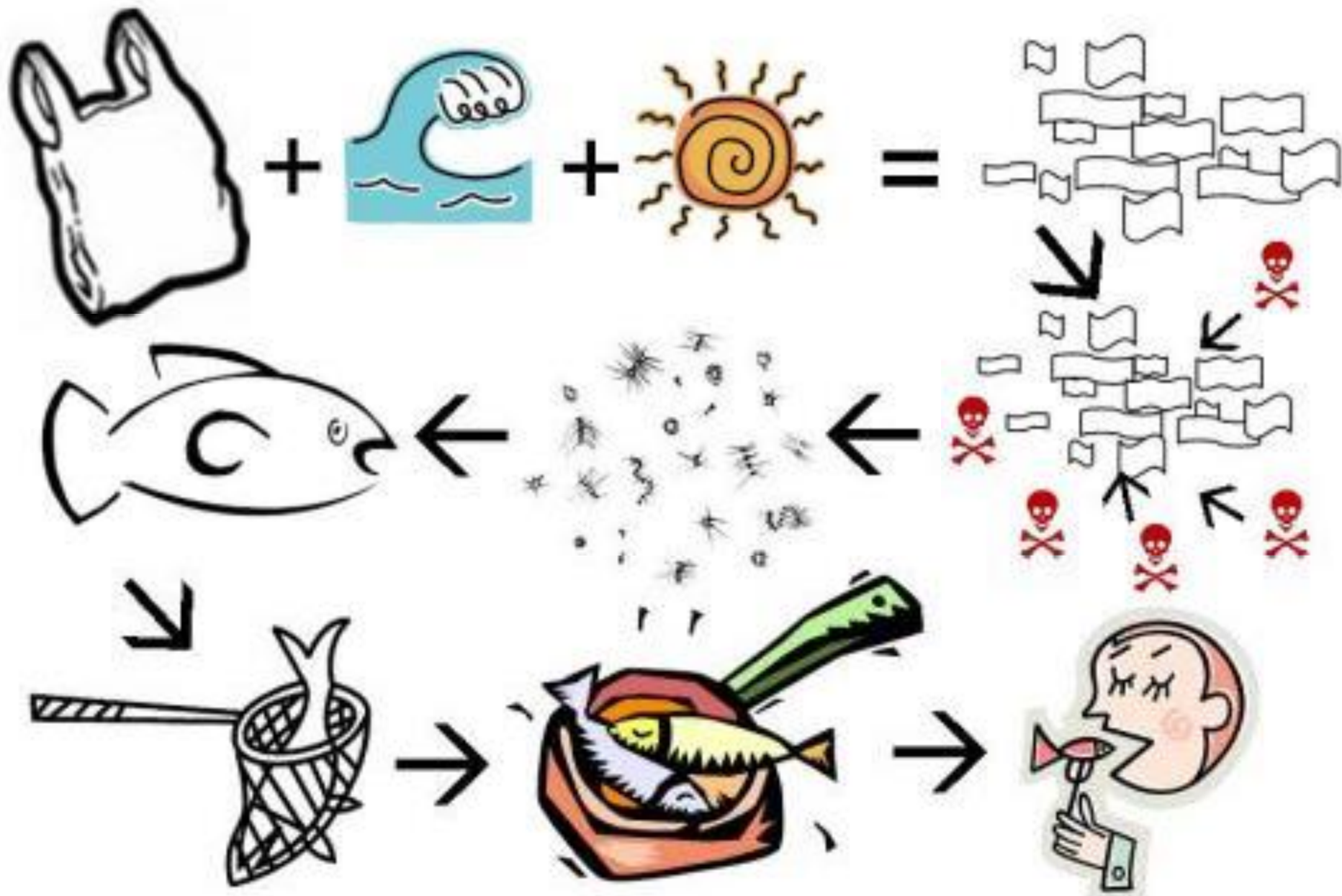
Abundance of plastic pieces (count/km ²) by type and size			
	0.355— 0.999mm	1.000— 4.749mm	> 4.75mm
Fragment	3,356,920.6	1,586,137.1	127,199.3
Pellet	920,457.4	78,815.0	4,999.6
Fiber/Line	119,116.3	94,004.7	67,245.2
Film	41,419.4	61,030.4	31,772.5
Foam	72,501.5	136,444.3	18,028.9
count/km ²	4,510,415.2	1,956,431.5	249,245.6
% of total	67%	29%	4%

Why do we care?

“Cocktail” of Chemical Contaminants



Visual courtesy of Chelsea Rochman



What can you do?

What can you do?

➤ Ban the Bead!

- ❖ Illinois – First to Pass Legislation
- ❖ New York & California – Passed Assembly
- ❖ Ohio – Has Been Proposed
- ❖ Draft Legislation:
 - <http://upstreampolicy.org/draft-microbead-legislation/>

Thank You!



➤ Susan Gateley



- Hannah Farley
- Nick Williamson
- Ghadah Aleid
- Morgan Smith
- Rachel Ricotta
- Parker Fink



Questions?



Photo courtesy of Brendan Bannon