RMP
REGIONAL MONITORING
PROGRAM FOR WATER QUALITY
IN SAN FRANCISCO BAY

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Microplastic Monitoring Strategy

Science for Solutions in San Francisco Bay

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San Francisco Estuary Institute

Microplastic Monitoring and Science Strategy

FOR SAN FRANCISCO BAY

DRAFT • September 2016

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Rebecca Sutton and Meg Sedlak

on behalf of the

Regional Monitoring Program for Water Quality in San Francisco Bay

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Microplastic Strategy: Goals

JUNE 2016 STRATEGY WORKSHOP

RMP stakeholders and microplastic experts established:

- Consensus priorities for the Bay
- Multi-Year Plan
- Identify study ideas to be developed into proposals for multiple funding agencies

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Microplastic Experts

Anna-Marie Cook
US EPA Region 9

Dr. Chelsea Rochman
University of Toronto

Dr. Sherri “Sam” Mason
SUNY Fredonia

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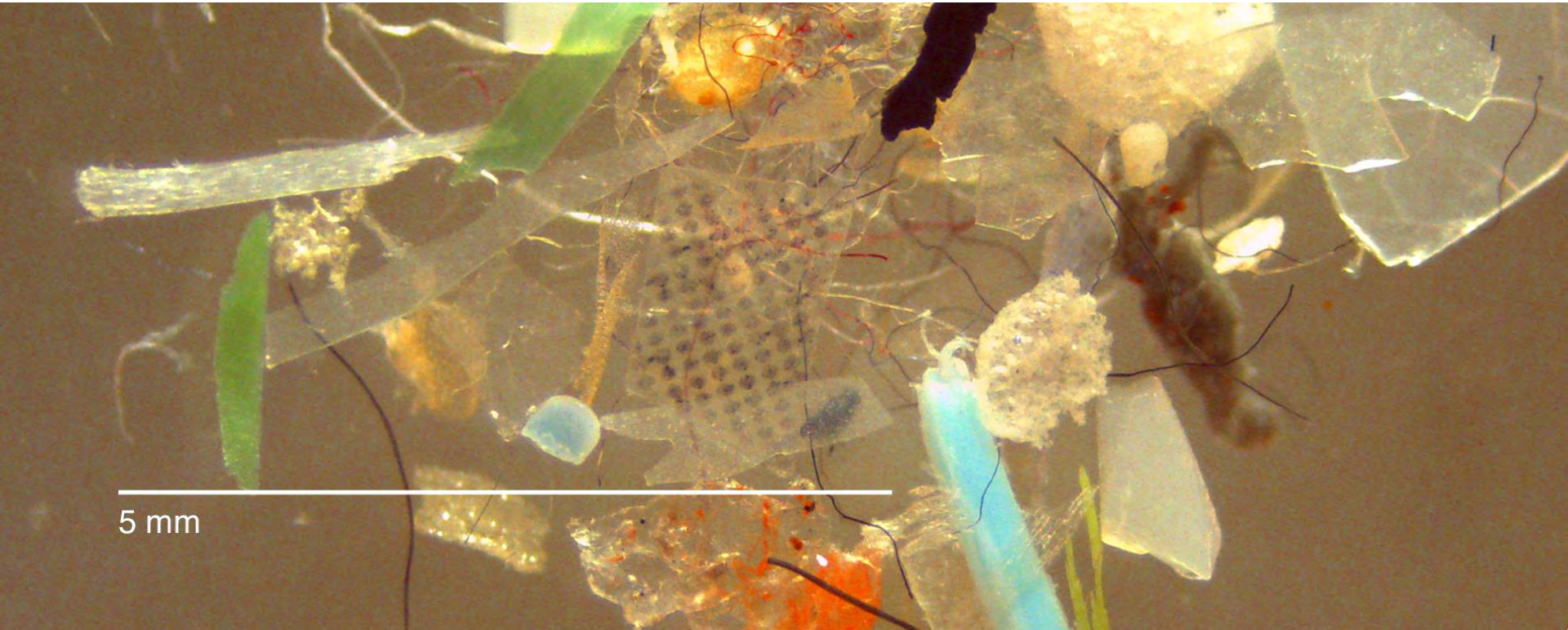
Microplastic: Definition

Particles of plastic smaller than **5 mm**

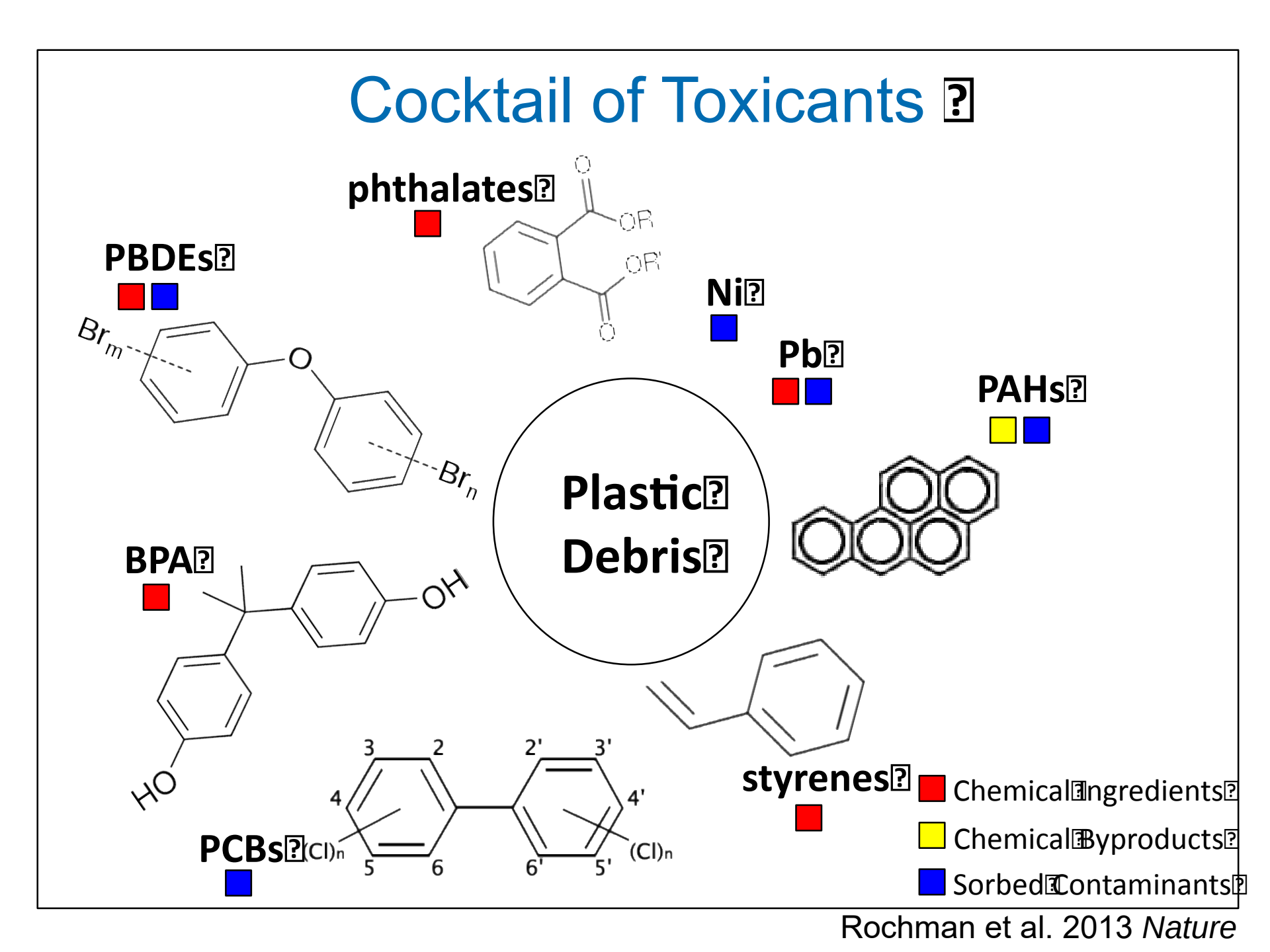


Microplastic: Risks

Zooplankton *Centropages typicus*

Cole et al. 2013

Cocktail of Toxicants



Rochman et al. 2013 *Nature*

Microplastic Monitoring:
RMP Special Study (2015)

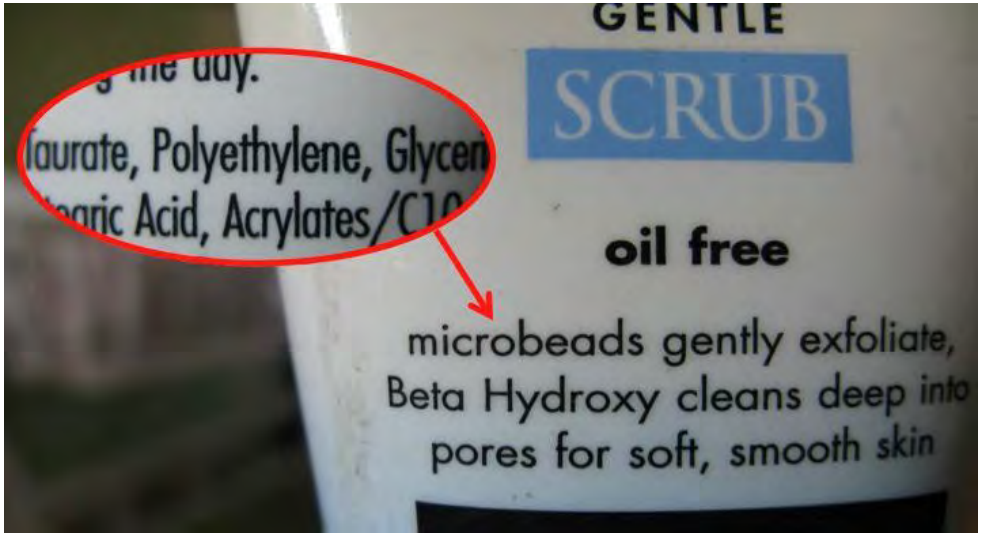


Image: 5 Gyres

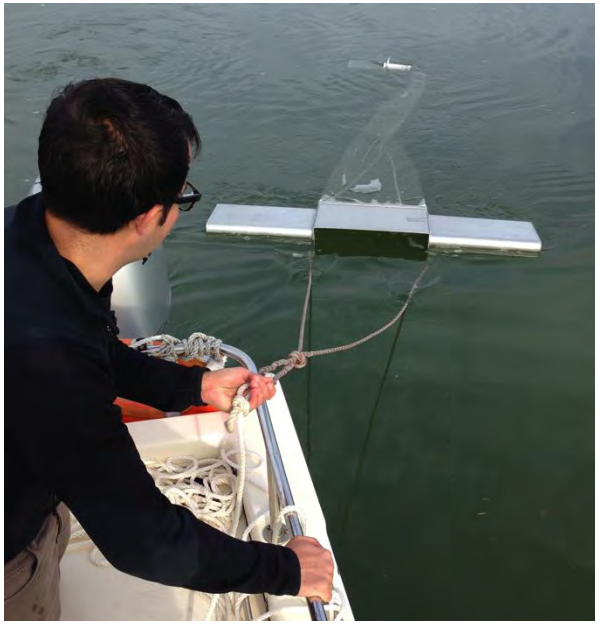


Photo: Meg Sedlak

Photo: Cheryl Corley

Sherri Mason
SUNY Fredonia

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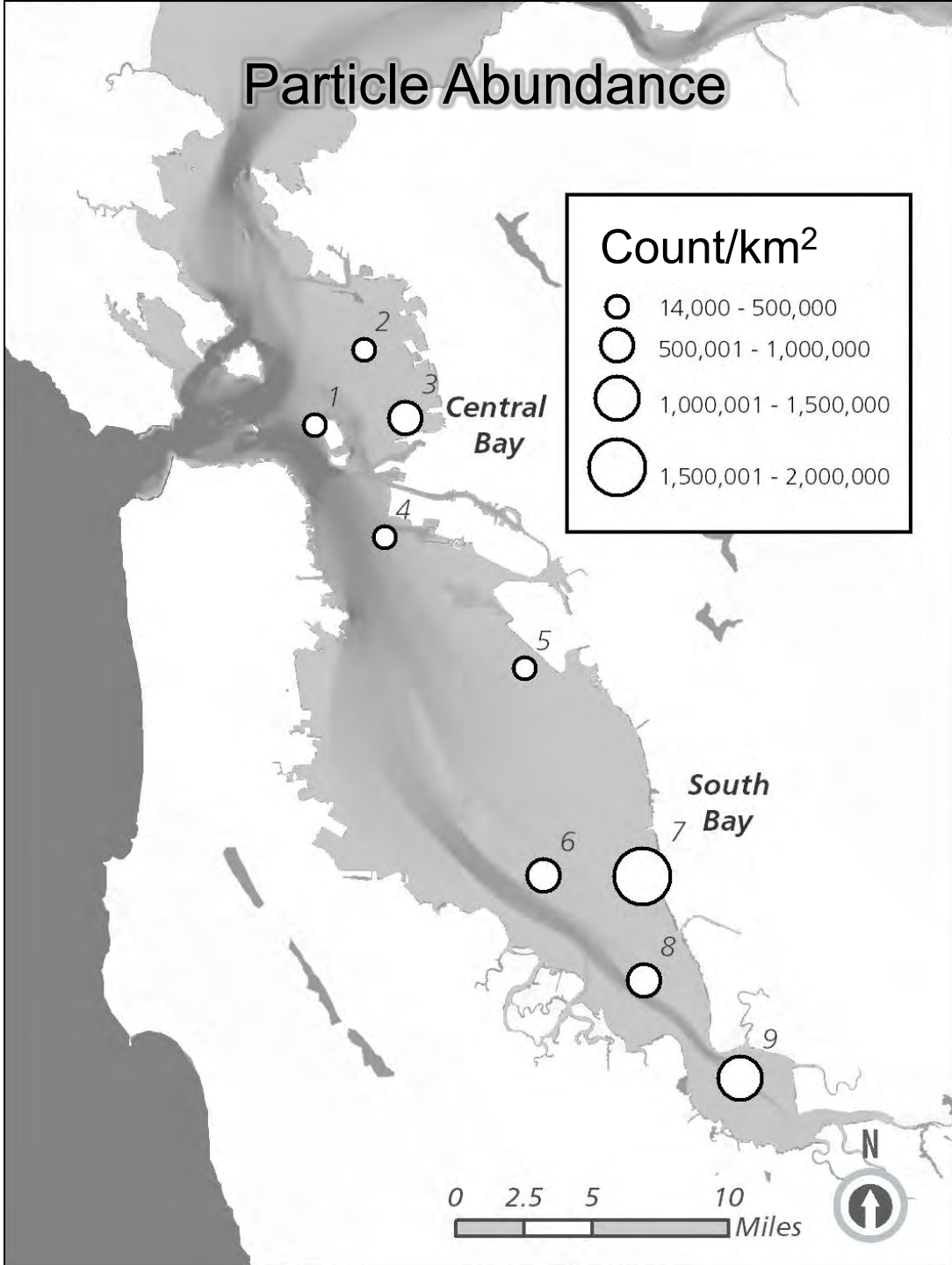
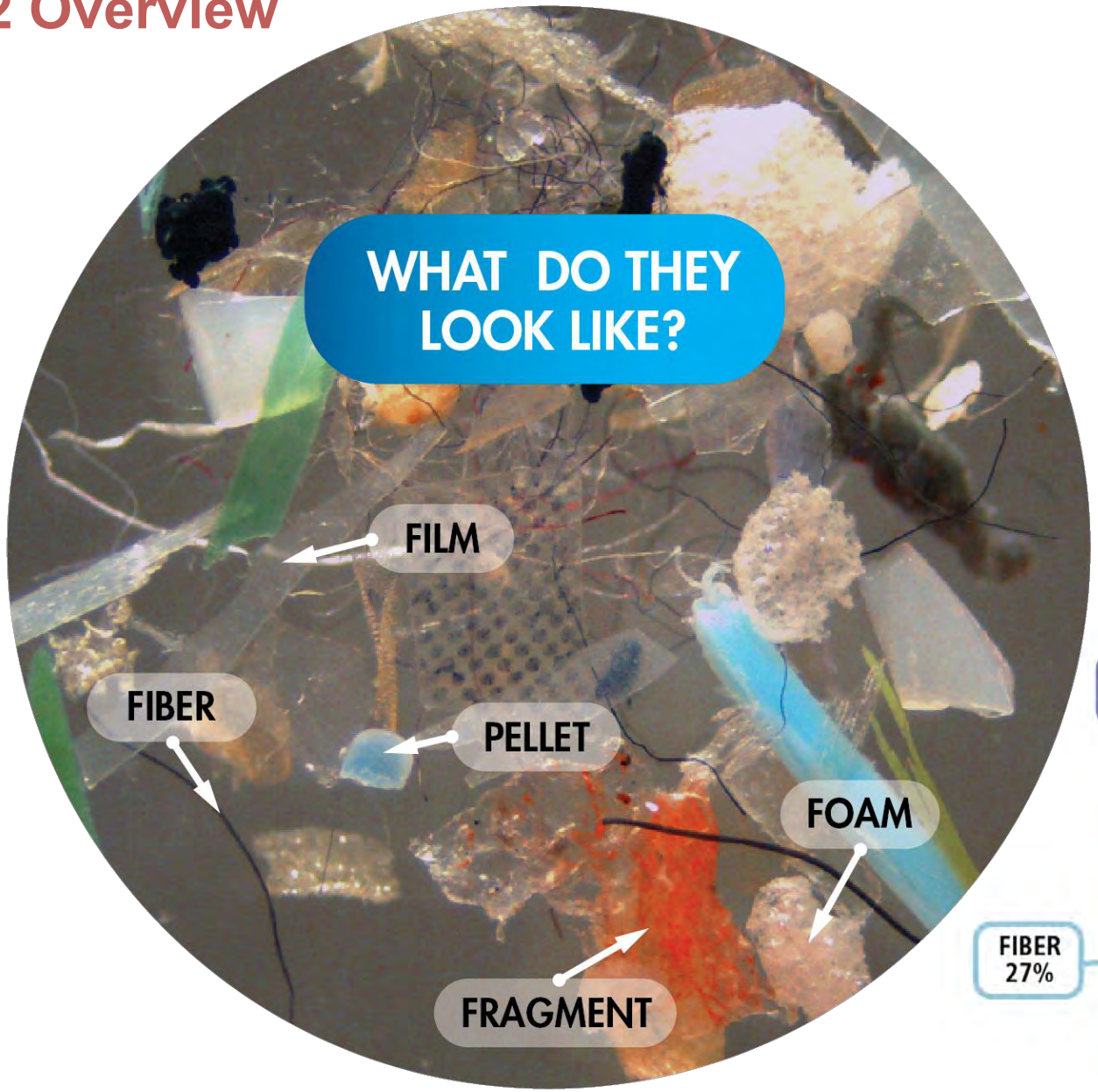
Microplastic Particles Detected in Bay

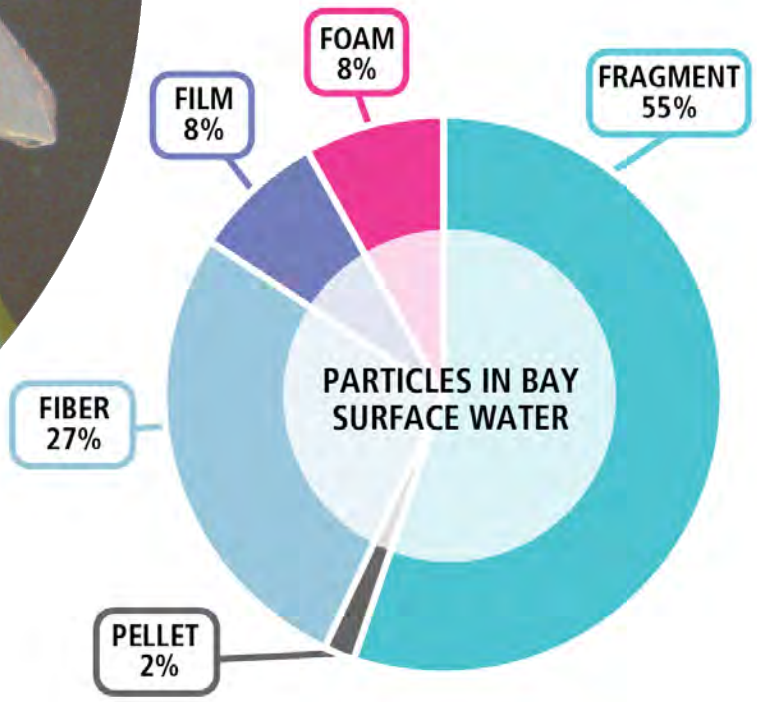
Levels higher than:

- Great Lakes
- Chesapeake Bay
- Salish Sea

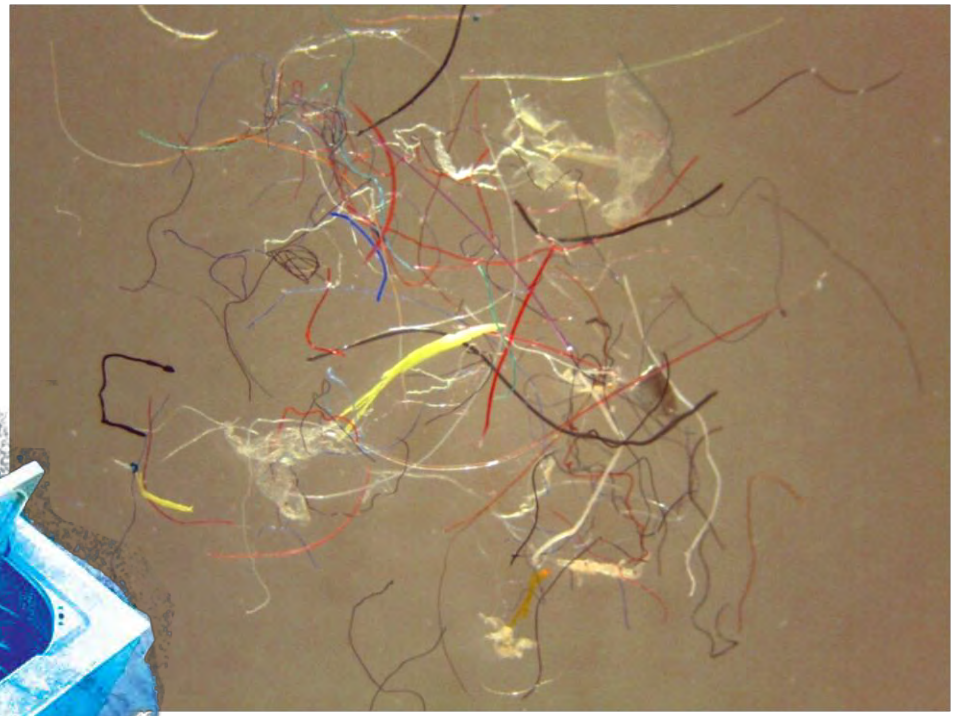


Sutton et al. 2016


WHAT DO THEY LOOK LIKE?
FILM
FIBER
PELLET
FOAM
FRAGMENT


FOAM 8%
FILM 8%
FRAGMENT 55%
PARTICLES IN BAY SURFACE WATER
FIBER 27%
PELLET 2%

Pollution Pathway: Wastewater



To be continued…

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Science to Support Decision-Making

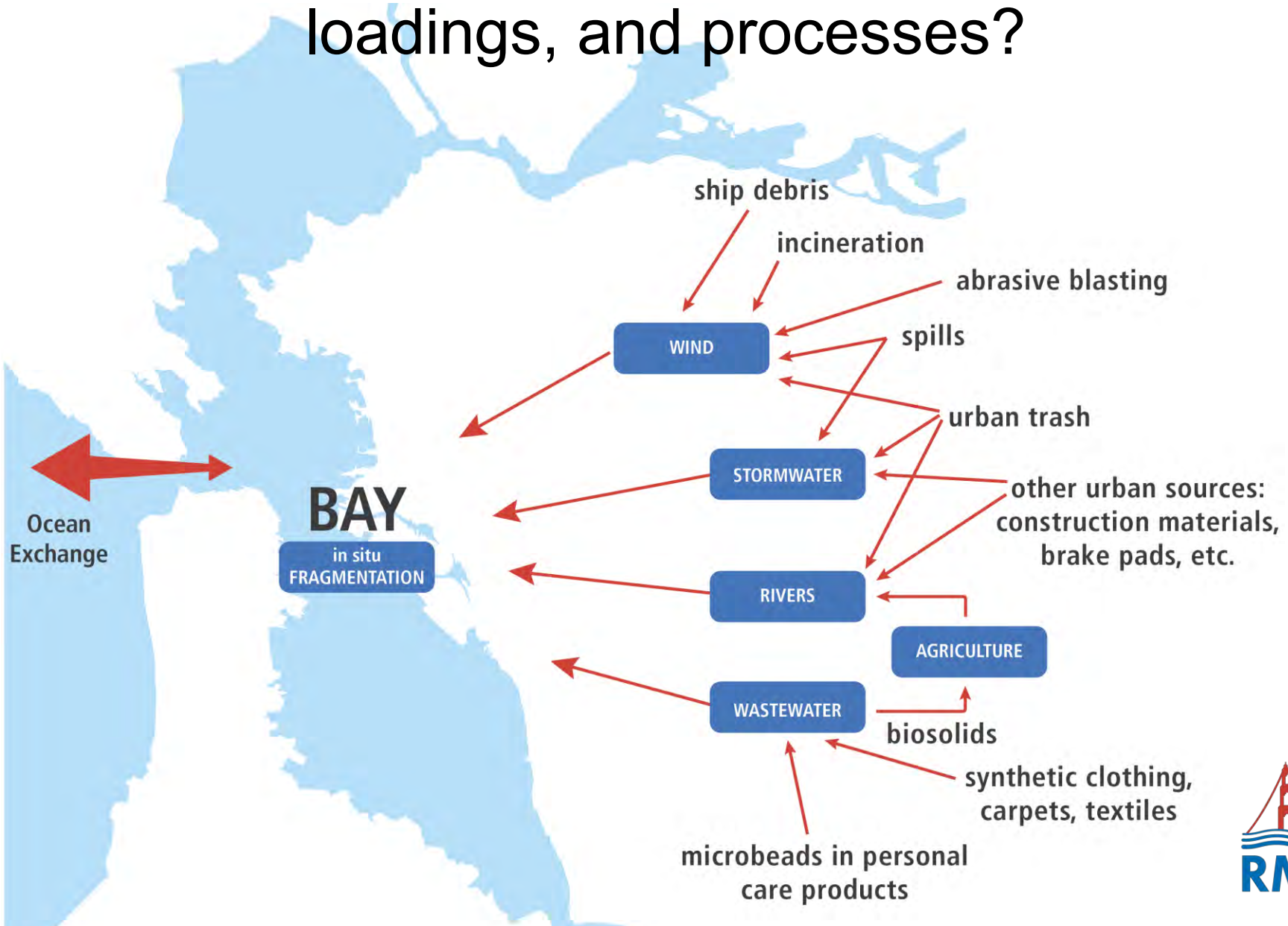
MQ1: How much microplastic pollution is there in the Bay?

- Analytical methods
- Quantification across matrices

MQ2: What are the health risks?

- Wildlife
- Humans

MQ3: What are the sources, pathways, loadings, and processes?



3 Management Questions

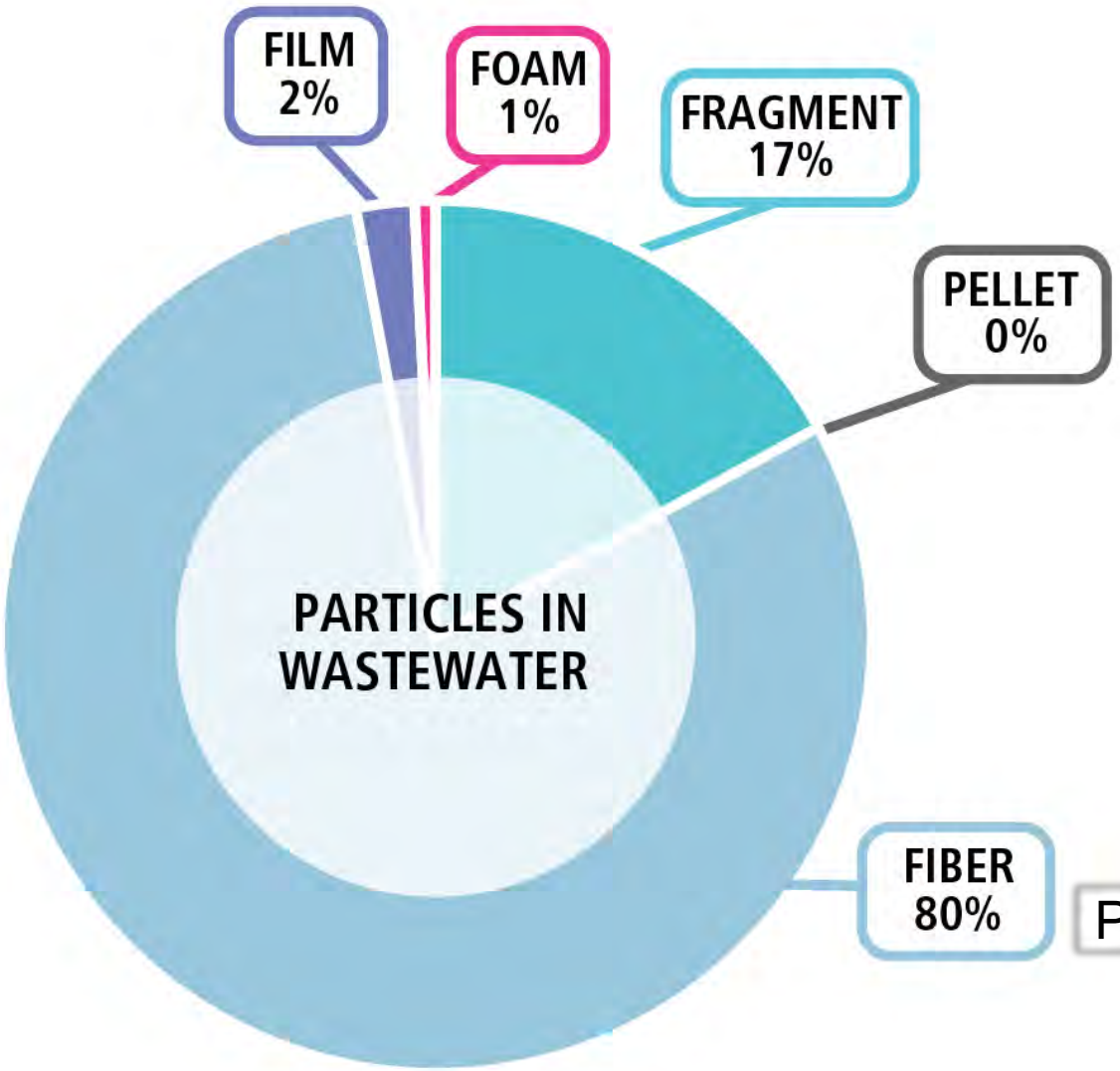
MQ4: Have the concentrations of microplastic increased or decreased?

MQ5: Which management actions may be effective in reducing microplastic pollution?

- Source controls
- Pathway controls

Not all fibers are plastic

BACWA
BAY AREA
CLEAN WATER
AGENCIES



Followup Investigation

Cotton

Polyethylene

Microplastic Science from Wastewater Agencies

Nirmela Arsem,
EBMUD,
BACWA Lab
Workgroup Lead

Noel Enoki, San Jose
Jim Wan, CCCSD
Ken Lee, SFPUC
Guy Moy, Union San
Farid Remezanzadeh,
Hayward

METHOD DEVELOPMENT:

Is NOAA method appropriate for wastewater samples?

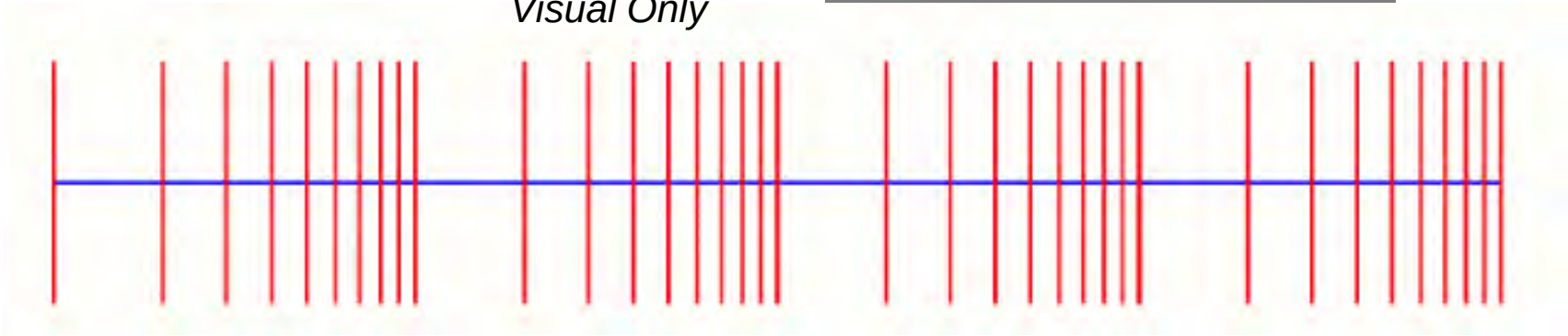
- NOAA sample processing not optimized for effluent
- Cellulose-based fibers require aggressive digestion
- Visual-only identification is insufficient
- Quality control, documentation, 24-hour composite

Dyachenko et al. *in review*

Essential Focus on Methods

Spectroscopic Identification	Visual Identification
Necessary	Sufficient

Previous Study
Visual Only



1 µm 10 µm 100 µm 1 mm 10 mm

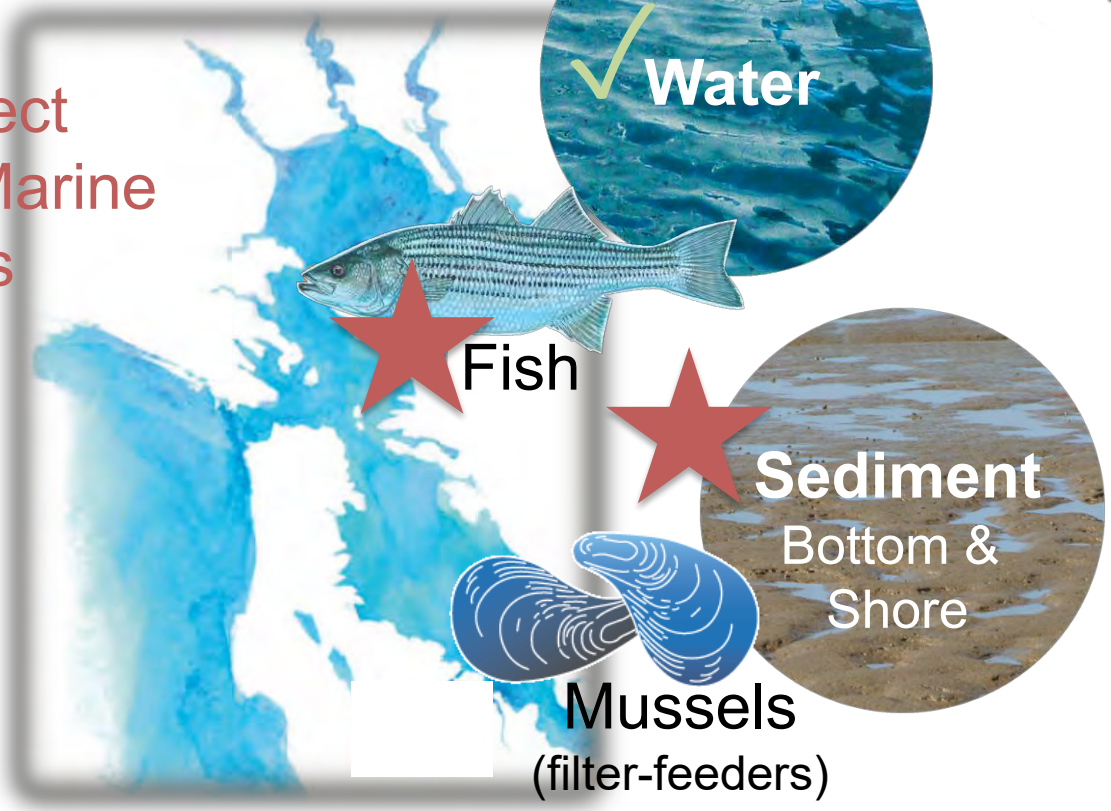
Stakeholders: Bay Data Needed

Pollution Pathways

Bay Monitoring

✓ Wastewater

Connect with Marine Debris



Stormwater

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Microplastic Monitoring Strategy: Multi-Year Plan

to 2020 and beyond

- Method development
- Monitoring fish & biota
- Monitoring water & sediment

- Characterizing sources, pathways, loadings, processes
- Evaluating control options
- Synthesis

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Source Control

OCTOBER 2015:

Governor Brown Signs AB 888, the **Microbead Ban Bill**

- Effective 2020
- Strictest among state bans

DECEMBER 2015:

Federal **Microbead-Free Waters Act** signed into law

- Microbeads in rinse-off products only
- No “biodegradable” plastic exemption
- Bans production July 2017, sale July 2018
- Preempts state bans

8 Partners

Microplastic Monitoring Strategy: Multi-Year Plan

$$$

Designed to serve broad Bay science and management community

RMP Workshop Participants:

- Industry
- State & Federal Agencies
- NGO Community

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