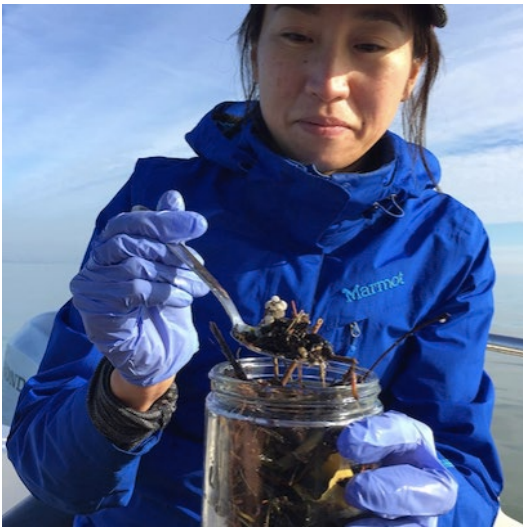


SF BAY MICROPLASTICS PROJECT



CAROLYNN BOX
5 GYRES SCIENCE PROGRAMS DIRECTOR
carolynn@5gyres.org

A photograph of a sailboat on the ocean at sunset. The sun is low on the horizon, creating a warm orange and yellow glow across the sky and water. The sailboat's mast and rigging are visible in the foreground, and the ocean stretches out to the horizon.

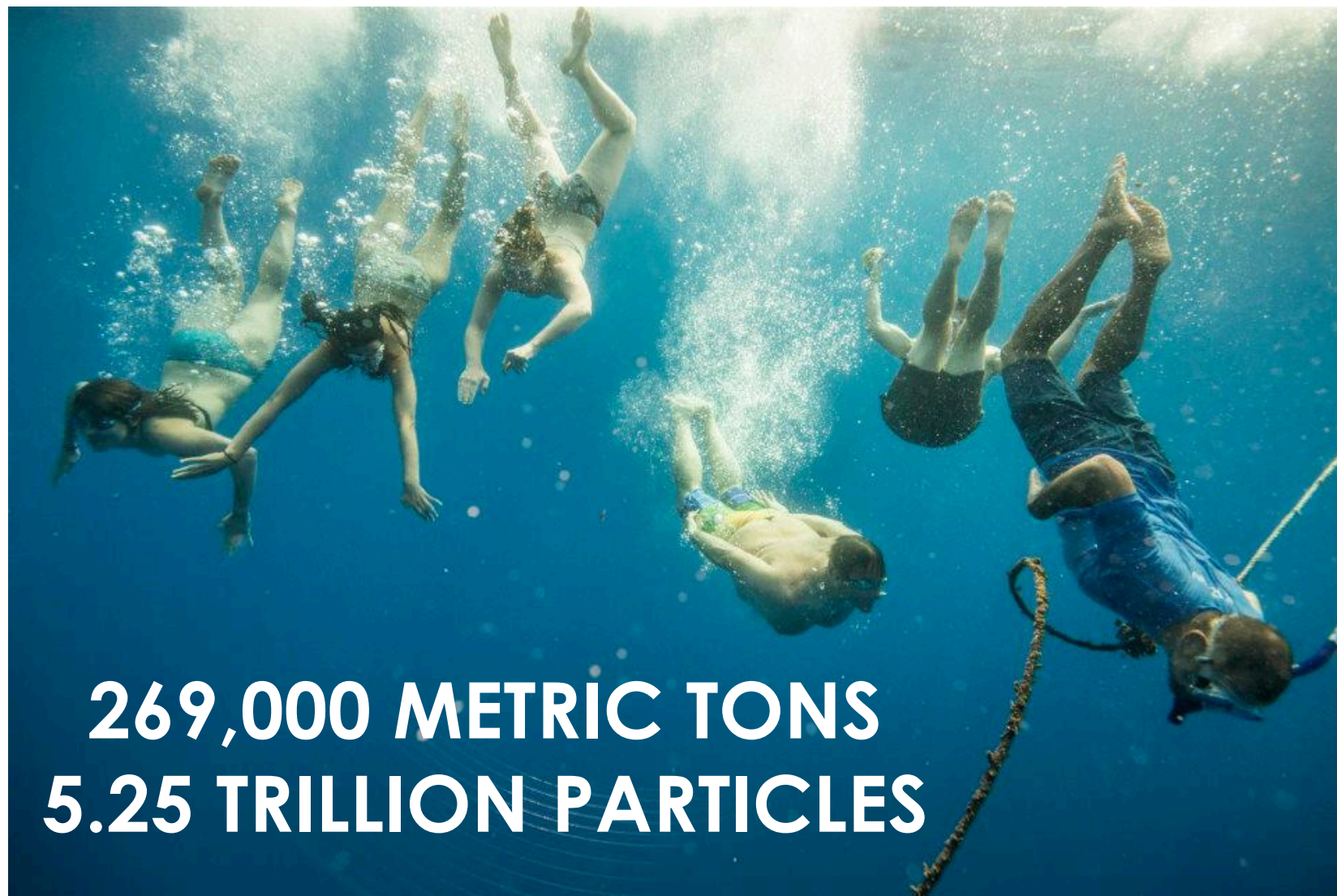
OUR MISSION IS TO EMPOWER

ACTION

AGAINST THE GLOBAL HEALTH CRISIS OF
PLASTIC POLLUTION
THROUGH SCIENCE,
EDUCATION AND ADVENTURE



5 GYRES
SCIENCE TO SOLUTIONS



269,000 METRIC TONS
5.25 TRILLION PARTICLES



5 GYRES
SCIENCE TO SOLUTIONS

SAN FRANCISCO BAY



Regional Monitoring Program

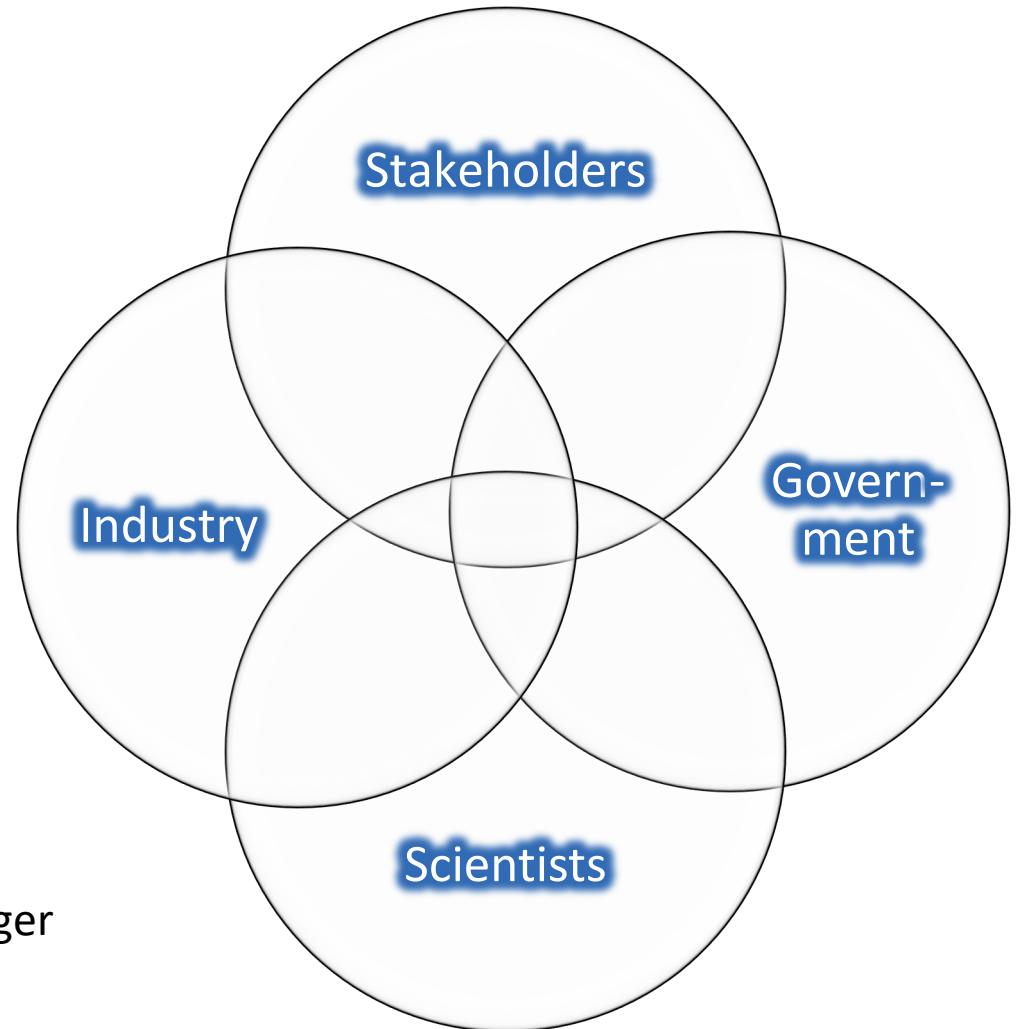
Partnership to
understand the
health of San
Francisco Bay

Implemented by

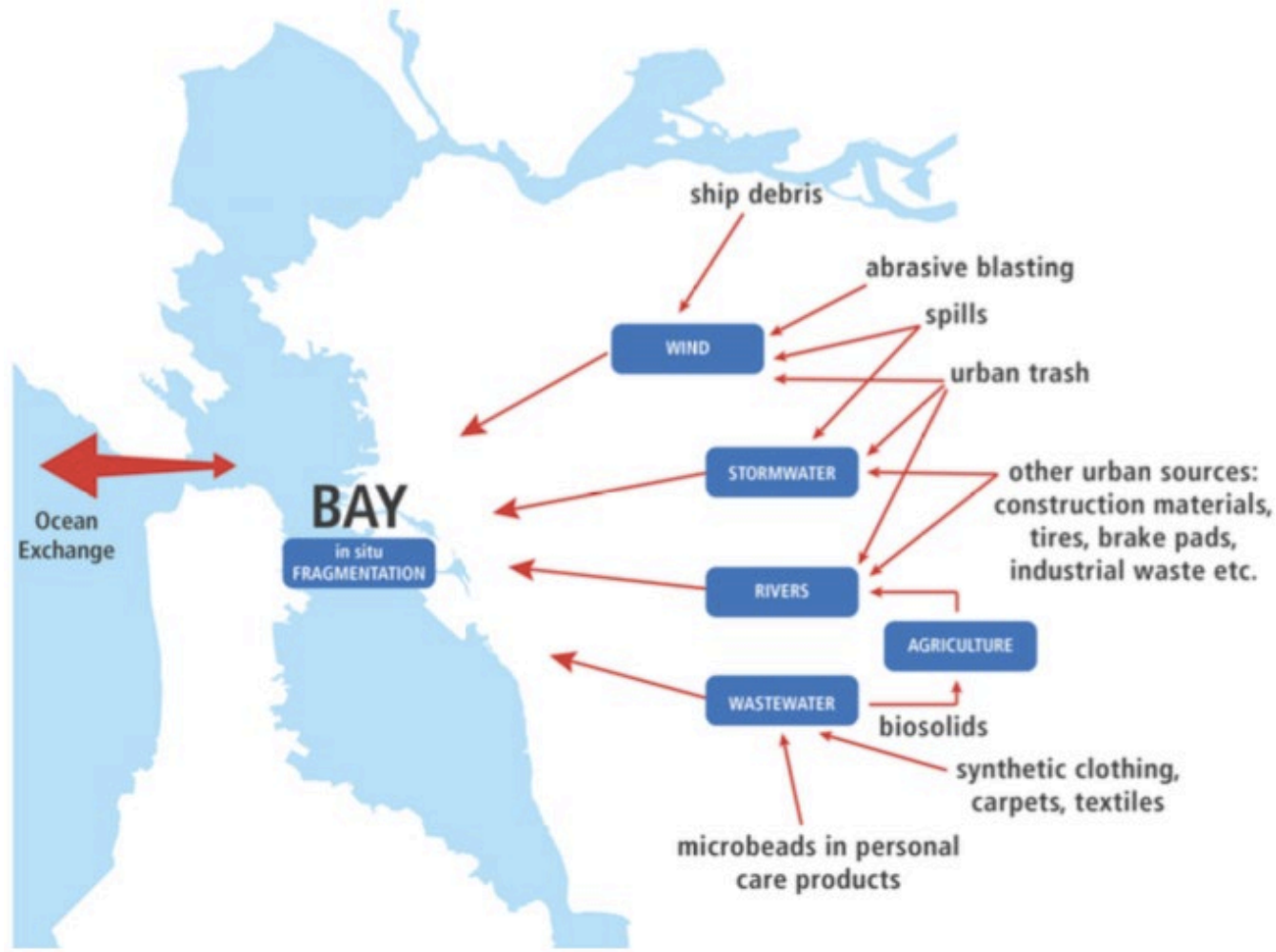
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CENTER
SAN FRANCISCO ESTUARY INSTITUTE & THE AQUATIC SCIENCE CENTER



Melissa Foley
SFEI, RMP Manager



SF BAY: CONCEPTUAL MODEL



MANAGEMENT QUESTIONS

MQ1) How much microplastic pollution is there in the Bay and in the surrounding ocean?

MQ2) What are the health risks?

MQ3) What are the sources, pathways, loadings, and processes leading to microplastic pollution in the Bay?

MQ4) Have the concentrations of microplastic in the Bay increased or decreased?

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

MICROPLASTICS MONITORING TO INFORM POLICY

Pollution Pathways

Bay Monitoring

Marine
Monitoring
& Science

Sanctuary
Samples
Transport
Model

Water

Fish

Sediment

Mussels*



Wastewater
(BACWA)



Stormwater
(BASMAA)

BAY AND SANCTUARY SURFACE WATERS

16 Bay and 11 Sanctuary sites

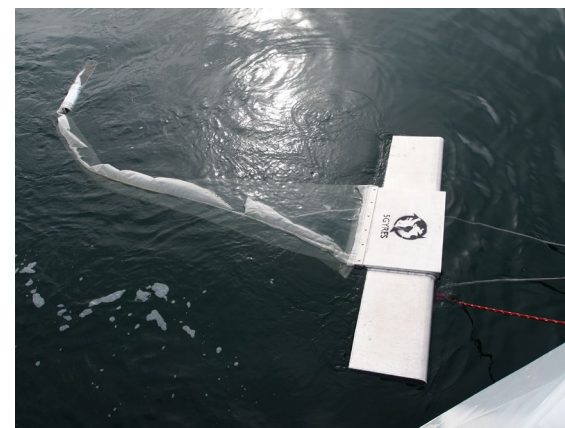
Sample Collection:

- Manta trawl collection ($>355\ \mu\text{m}$)
- Pump ($>20\mu\text{m}$)
- 1-Liter Grab

Exploring questions on:

- Ambient conditions
- Comparing Bay vs Sanctuaries
- Seasonality

Field duplicates and blanks collected



SEDIMENT

30 samples

Exploring questions on:

- Ambient conditions
- Comparing mid-Bay sites vs nearshore (margin) sites
- Influence of pathways
- Spatial differences

Field duplicates and blanks collected



SMALL FISH

8 sites; co-located with sediment

- Reference site included

20 individual fish

- Anchovy & Topsmelt

Exploring questions on:

- Influence of pathways
- Spatial differences
- Pelagic vs. benthic



PATHWAYS: WASTEWATER

2 samples collected at 8 Facilities
around SF Bay

- 24 hr composites
- 355 and 125 μm sieves

Exploring questions on:

- Treatment (secondary vs tertiary)
- Location
- Flow (40 to 160 million gallons per day)

Field duplicates and blanks collected



Diana Lin and Palo Alto Staff

PATHWAYS: STORMWATER

12 sites:

- Large watersheds for loads
- Potentially polluted areas

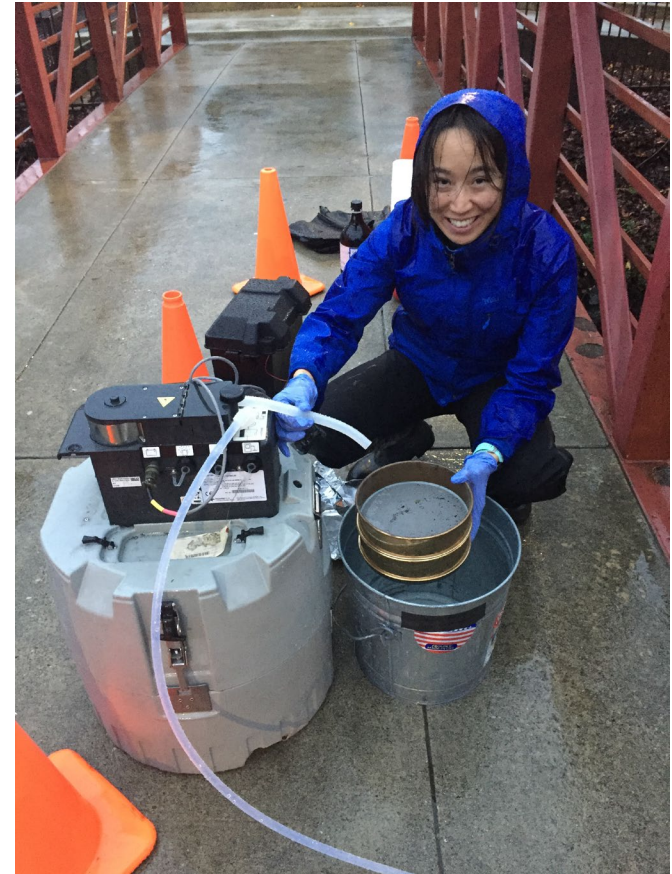
Composites of “sips” during storm

- 355 and 125 μm sieves

Exploring questions on:

- Urban vs rural
- Watershed size
- Trash hot spots

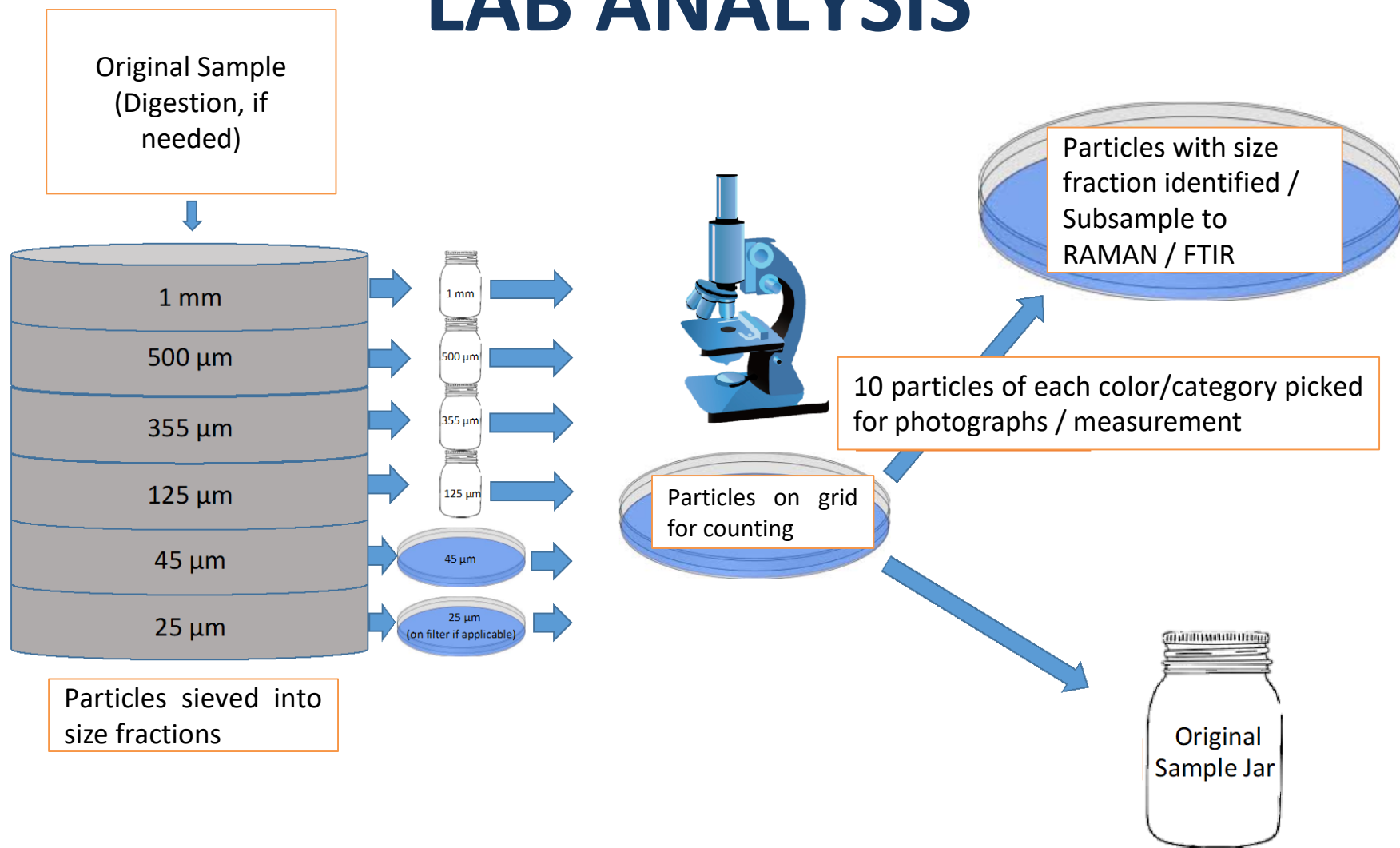
Field duplicates and blanks collected



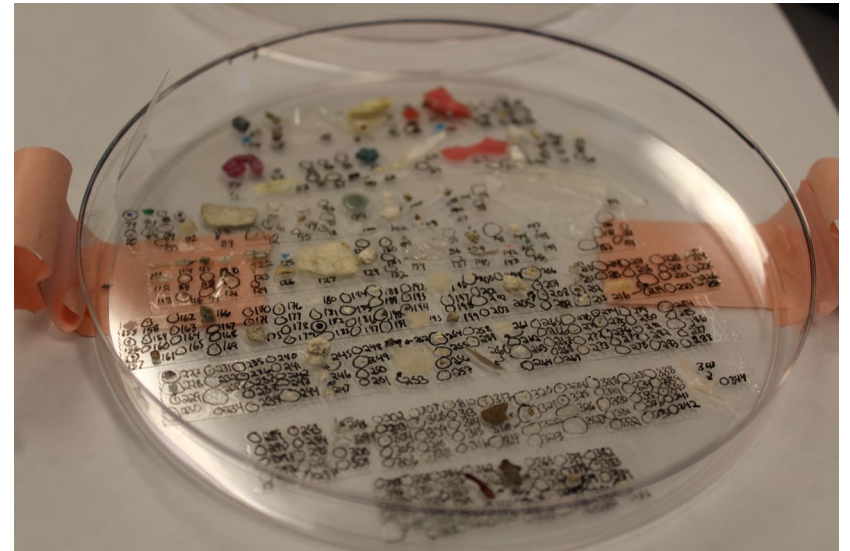
LAB ANALYSIS



LAB ANALYSIS



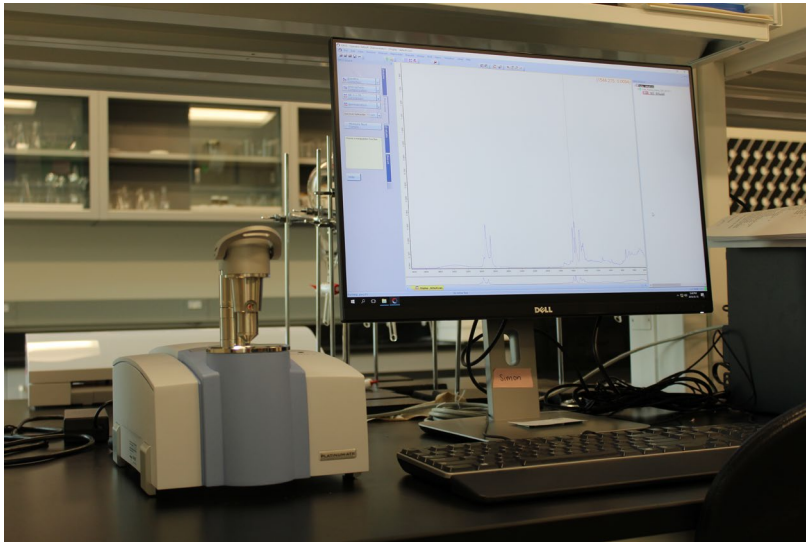
LAB ANALYSIS IS TEDIOUS



LAB ANALYSIS

FTIR

- Particles $>250\mu\text{m}$



RAMAN

- Particles $(<250\mu\text{m})$



QA/QC: BLANKS

Important to collect blanks and duplicates

Field contamination controlled by:

- No synthetic fabrics in field
- Pre-washed sieves, covered with foil
- Limited handling during sample collection

Lab contamination controlled by:

- Frequent lab cleaning schedule
- HEPA filtration
- Work in clean cabinet



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MICROFIBERS WIDELY DETECTED



Blanks



Water



Wastewater



Fish



Sediment

Stormwater

?

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SCIENCE
CENTER**



Corkscrew



5 GYRES
SCIENCE TO SOLUTIONS

STAKEHOLDER INVOLVEMENT

- ✧ May 22, 2019 RMP
Microplastics
Stakeholder Meeting
- ✧ October 2, 2019 SF Bay
Microplastics Symposium

California
Statewide
Microplastics
Strategy
(SB 1263)



Carolynn Box

5 Gyres

carolynn@5gyres.org

Rebecca Sutton

San Francisco Estuary Institute

rebeccas@sfei.org

