



Emerging Contaminants Update

Ezra Miller, Senior Scientist, SFEI

BAPPG Meeting
August 5, 2026



SFEI

SAN FRANCISCO
ESTUARY INSTITUTE

- **Nonprofit research institute** with over 80 staff working in the Bay Area and California
- We **deliver visionary science** to empower people to revitalize nature

sfei.org

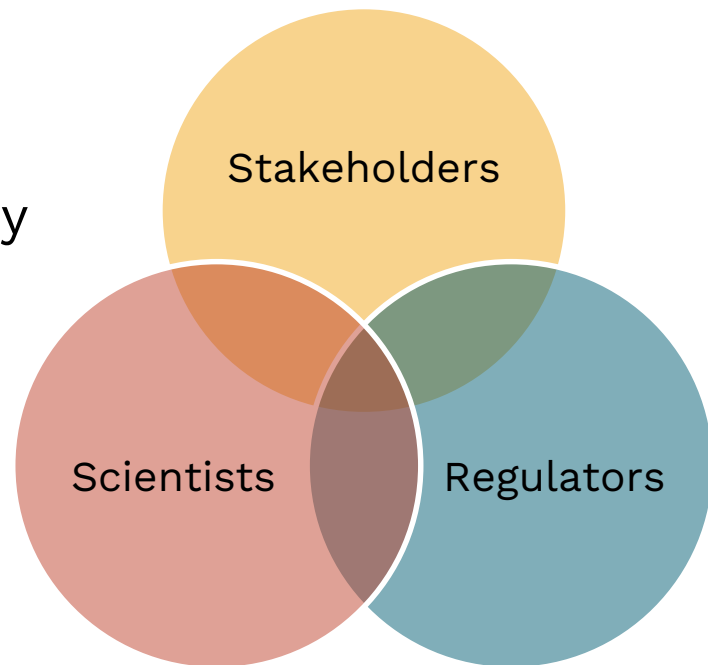
Regional Monitoring Program (RMP)

Partnership to monitor the health of SF Bay
to support management decisions



Implemented by

SFEI
SAN FRANCISCO
ESTUARY INSTITUTE





Also called “contaminants of emerging concern” (CECs)

Can enter the environment and harm people and wildlife

Not typically monitored

Emerging Contaminants Team at SFEI



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US Environmental
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Duke University



**Emerging
Contaminants
Expert
Advisors**



Miriam Diamond
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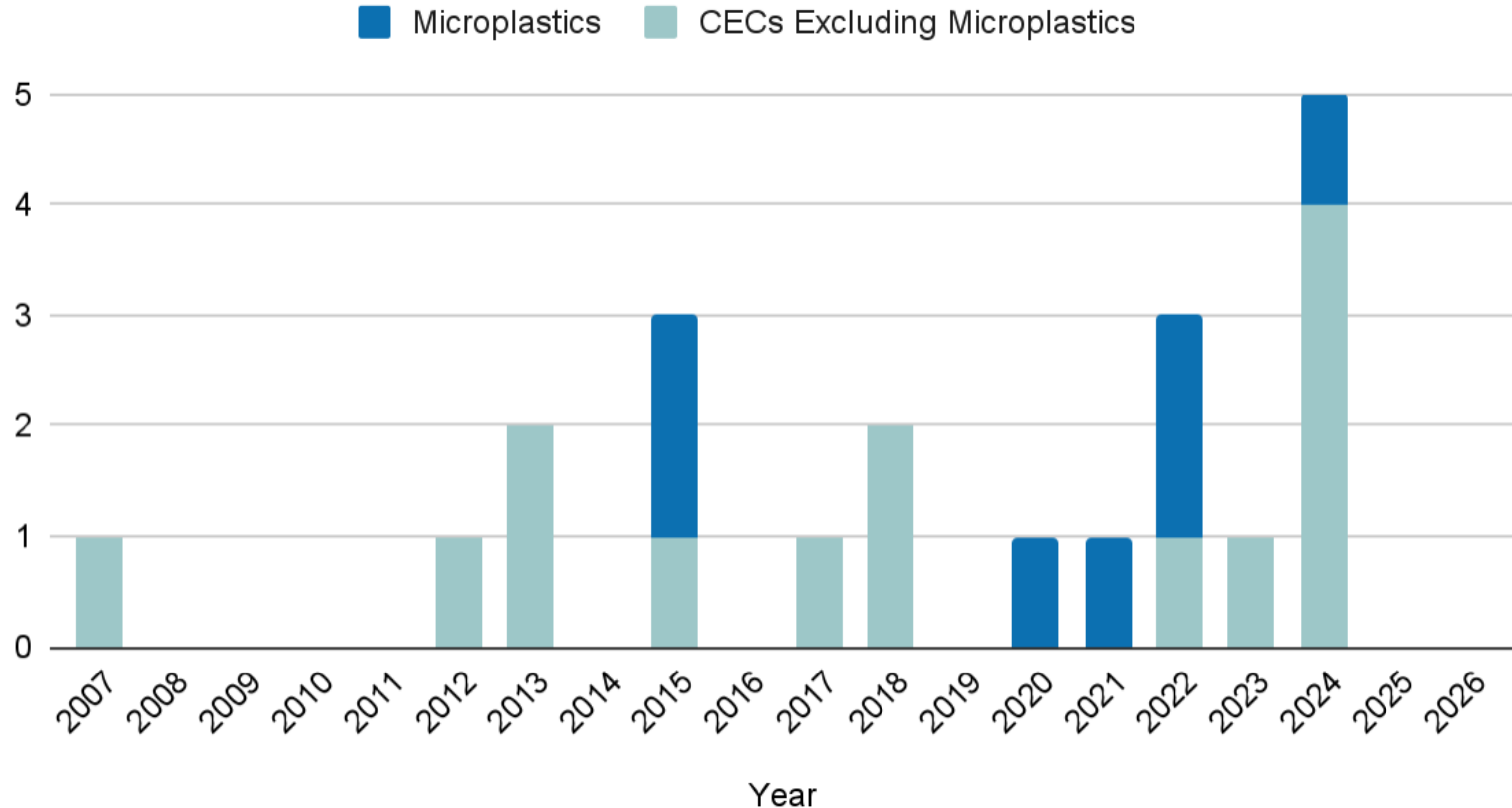
Bill Arnold
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Lee Ferguson
Duke University



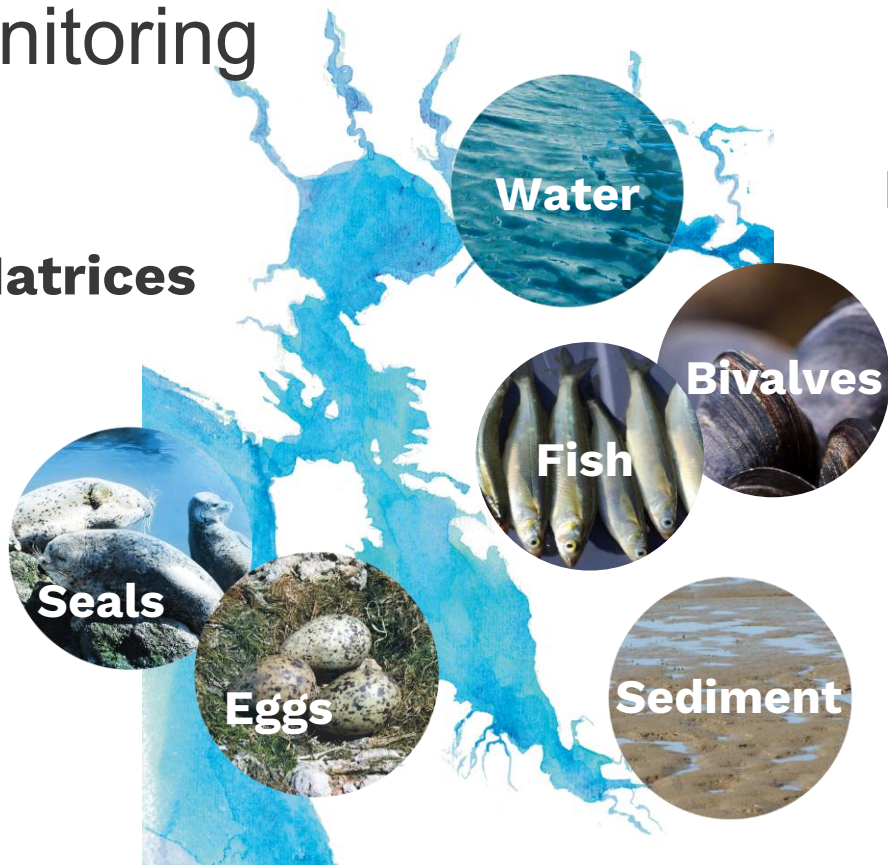
RMP CEC Science Has Informed 20+ State/Federal Decisions



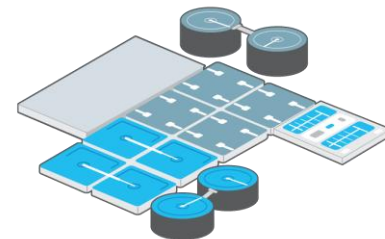
SFEI Monitoring



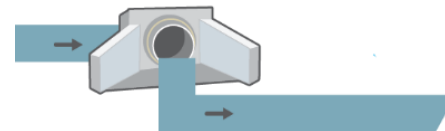
Bay Matrices



Pollution Pathways



Wastewater Effluent



Urban Stormwater Runoff

Reactionary & Anticipatory: Legacy and Emerging Contaminants

Risk from Emerging Contaminants in San Francisco Bay



To determine risk, you need to know:

what levels could threaten
human or wildlife health

what levels are currently in
the Bay

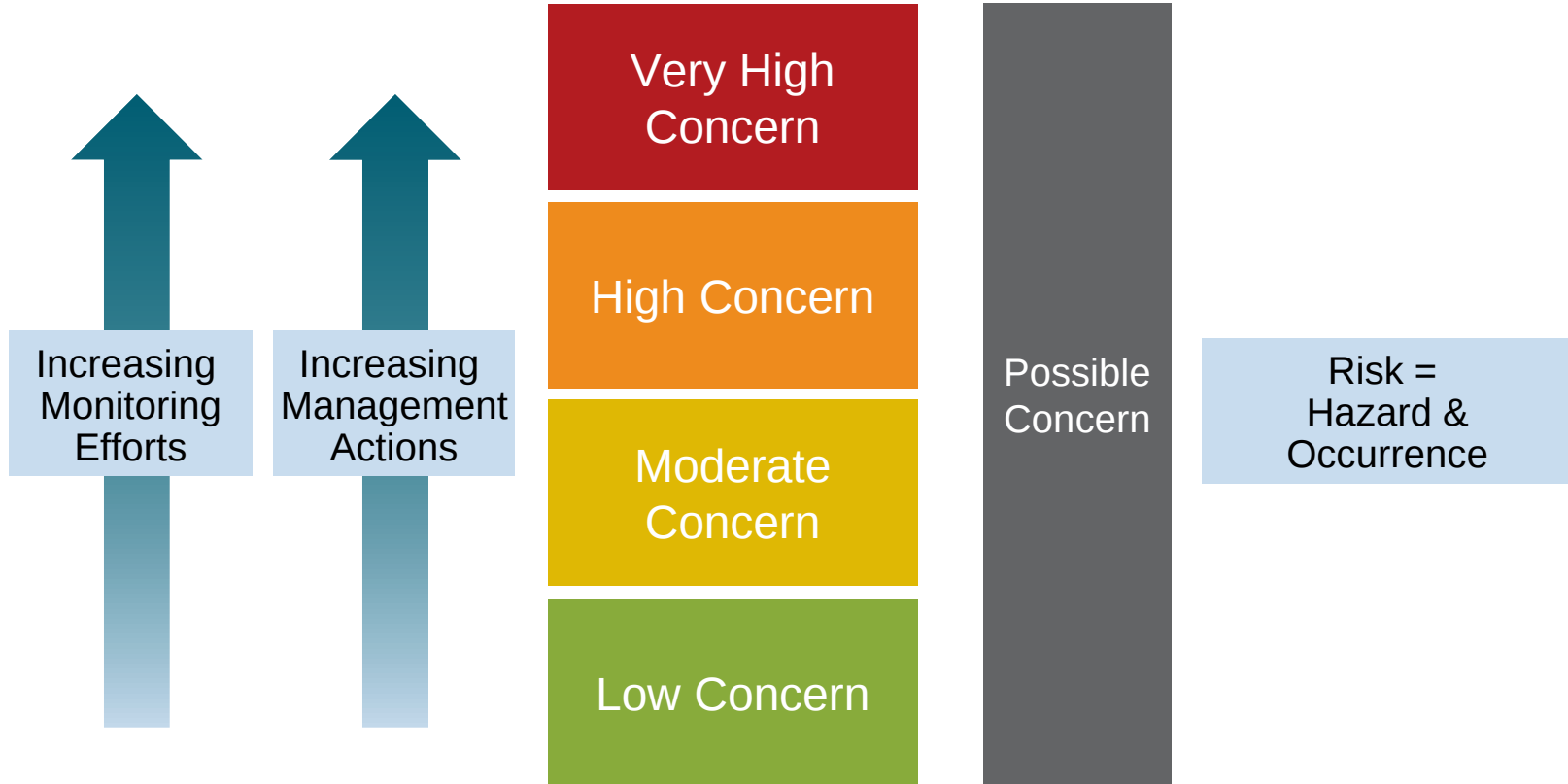
A class-based approach to risk



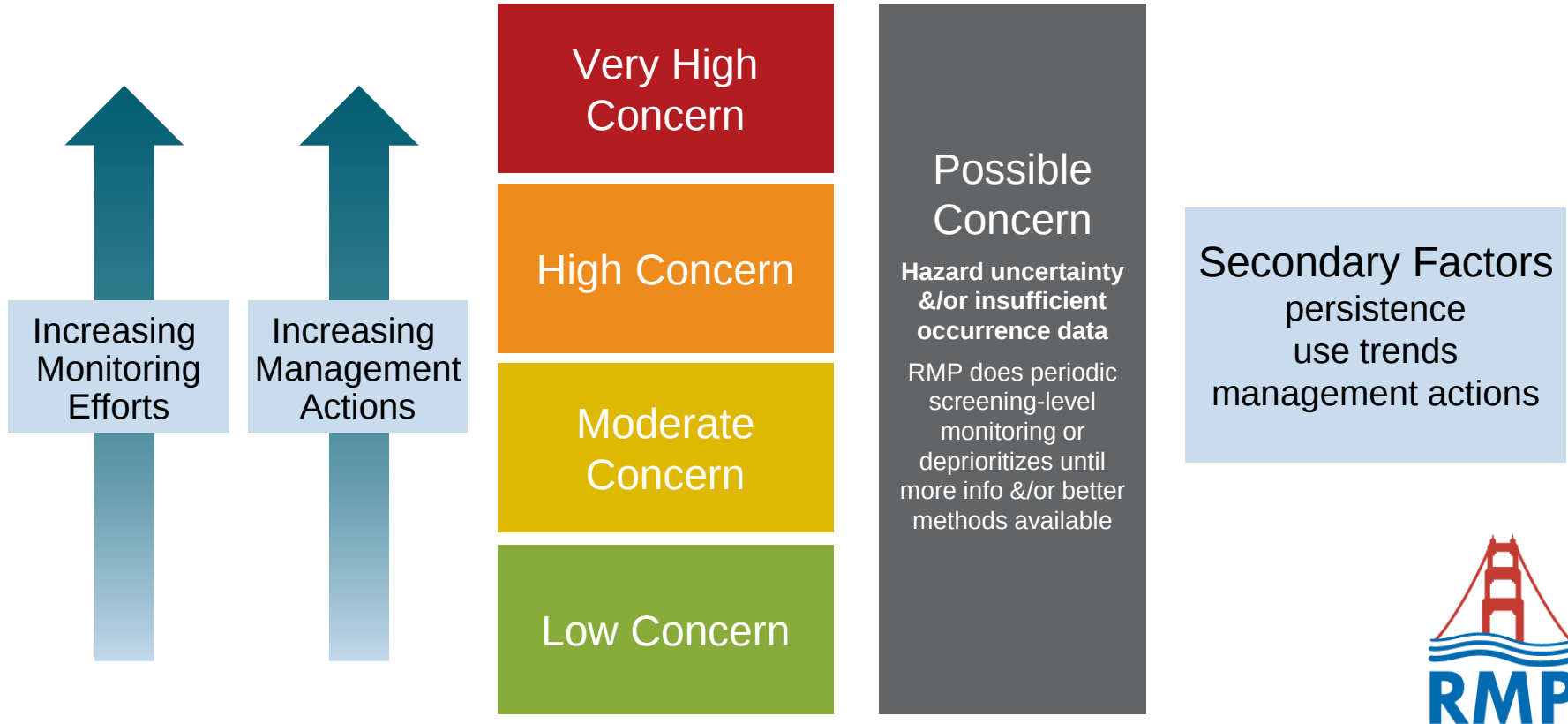
We group chemicals with similar structures or properties together

Reduces “regrettable substitutions,” where older chemicals are replaced with similar chemicals that have comparable impacts

Tiered Risk-based Framework for CECs



Tiered Risk-based Framework for CECs



Pharmaceuticals + Personal Care & Cleaning Product Ingredients

Available Bay data generally
indicate concentrations are well
below levels of concern

Haven't actually looked at that
many analytes

Appreciate your source control
efforts (e.g., take-back programs)



Low Concern



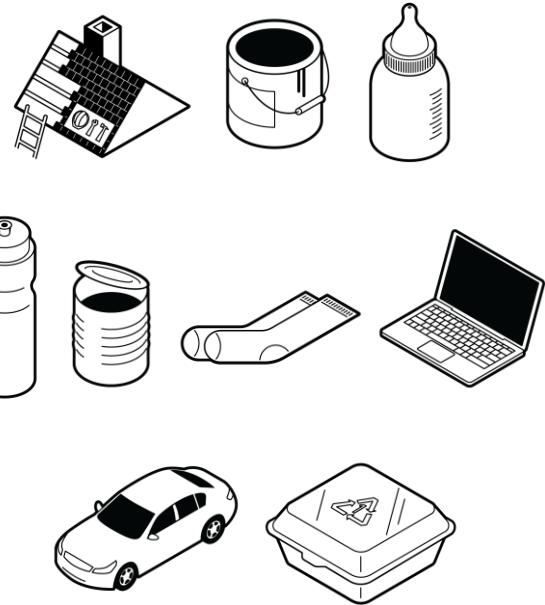
Bisphenols

Plastic additives

Endocrine disruptors

Concentrations in Bay water and sediment approaching protective aquatic toxicity thresholds

BPA bans have led manufacturers to switch to other bisphenols (with similar properties)



Moderate Concern



Preservatives

Commonly added to a range of consumer products to prevent the growth of bacteria and mold

Carbendazim detected in stormwater and throughout Bay water exceeding available toxicity thresholds



Moderate Concern



Preservatives

Commonly added to a range of consumer products to prevent the growth of bacteria and mold

Carbendazim detected in stormwater and throughout Bay water exceeding available toxicity thresholds

Isothiazolinones detected but not yet quantified



Moderate Concern



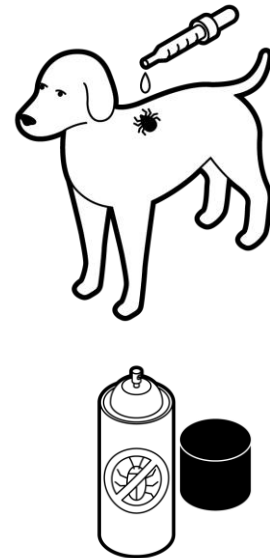
Fipronil/Imidacloprid (Pesticides)

In spot-on flea/tick control products like Frontline® and Advantage® flea collars/sprays

Concentrations in POTW effluent and Bay water exceed aquatic toxicity thresholds

Human health concerns for pet groomers and owners, especially children

One of the foci of the BACWA Pesticides Workgroup



Moderate Concern



Microplastics

Plastic fragments smaller than 5 mm

Many different sizes, shapes, and chemicals!

Loads from stormwater far exceed loads from wastewater

Concentrations that cause impacts in environment are unknown



Moderate Concern



Other non-RMP Microplastics Work

Reports Coming Soon!

Dryers study: Clothes dryers are
a significant source of
microplastic fiber pollution

California Statewide Plastics
Monitoring Strategy



Image credit: Lorien Fono



Image credit: SFEI



Quaternary Ammonium Compounds (QACs)

Used as antimicrobials, preservatives, antistatic agents, and for other functions in many products (but only sometimes on the label)

Linked with antimicrobial resistance

Evidence of human and aquatic toxicity

Linked with WWTP upsets



Possible Concern → Moderate Concern



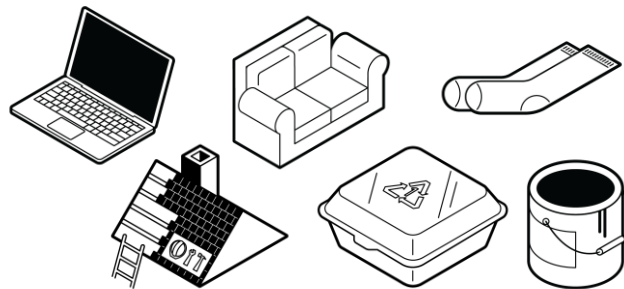
OPEs (Flame Retardants)

Flame retardants and plasticizers

Neurological toxicity (humans and aquatic organisms)

Now banned in upholstered furniture, mattresses, and children's products in California

Concentrations in Bay water well above aquatic toxicity thresholds



High Concern



PFAS (Forever Chemicals)

Thousands of chemicals that
don't degrade in the environment

Toxic to people and wildlife

Concentrations in Bay sportfish well above human health consumption thresholds



High Concern



PFAS Sources to Solutions:

Identifying and Preventing PFAS Pollution
in San Francisco Bay

PROPOSAL TO THE EPA WATER QUALITY IMPROVEMENT FUND 2023
SUBMITTED BY THE **SAN FRANCISCO ESTUARY INSTITUTE** with

Regional Monitoring Program for Water Quality in San Francisco Bay (RMP)
Department of Toxic Substances Control (DTSC)
Bay Area Clean Water Agencies (BACWA)
Bay Area Municipal Stormwater Collaborative (BAMSC) Member Programs
Indiana University Bloomington
University of Toronto

US EPA Grant

San Francisco Bay Water Quality
Improvement Fund

\$5.2 Million Project

50% grant funds

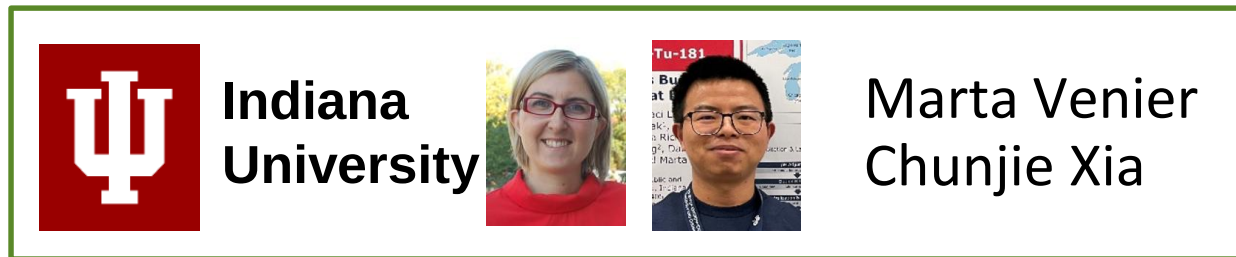
50% partner match

Awarded July 2024

Complete by 12/31/2029



Project Partners



Report Coming Soon!

PFAS in San Francisco Bay: Synthesis and
Monitoring Strategy

2026 Revision

Miguel Méndez, Diana Lin, Ezra Miller, Kayli Paterson, Jennifer Sun,
Jennifer Dougherty, Martin Trinh, Adam Wong, Sierra Garcia, and Rebecca
Sutton

San Francisco Estuary Institute

DRAFT - April 2026

SFEI Contribution No. 1299

Suggested Citation:

Méndez, M.; Lin, D.; Miller, E.; Paterson, K.; Sun, J.; Dougherty, J.; Trinh, M.; Wong, A.;
Garcia, S.; Sutton, R. PFAS in San Francisco Bay: Synthesis and Monitoring Strategy
2026 Revision. SFEI Contribution # 1299. San Francisco Estuary Institute, Richmond,
CA.

PFAS in San Francisco Bay: Synthesis and Monitoring Strategy

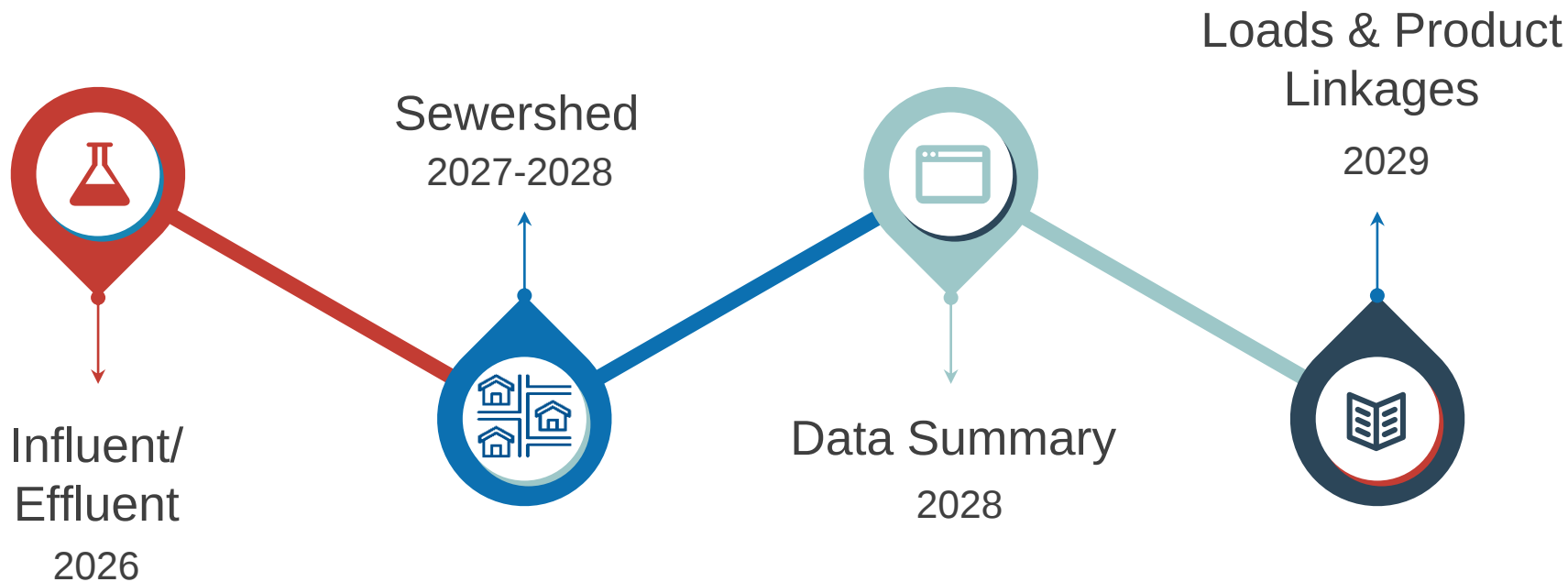


Miguel Méndez, Diana Lin, Ezra Miller, Kayli Paterson,
Jennifer Sun, Jennifer Dougherty, Martin Trinh, Adam
Wong, Sierra Garcia, and Rebecca Sutton

Synthesis of RMP PFAS data and regional PFAS monitoring strategy

Wastewater PFAS Monitoring (Grant + BACWA)

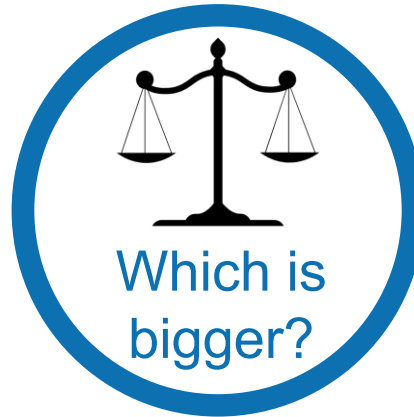
Design informed by two prior studies



Grant Deliverable Report: Urban PFAS Load Estimates (2029)



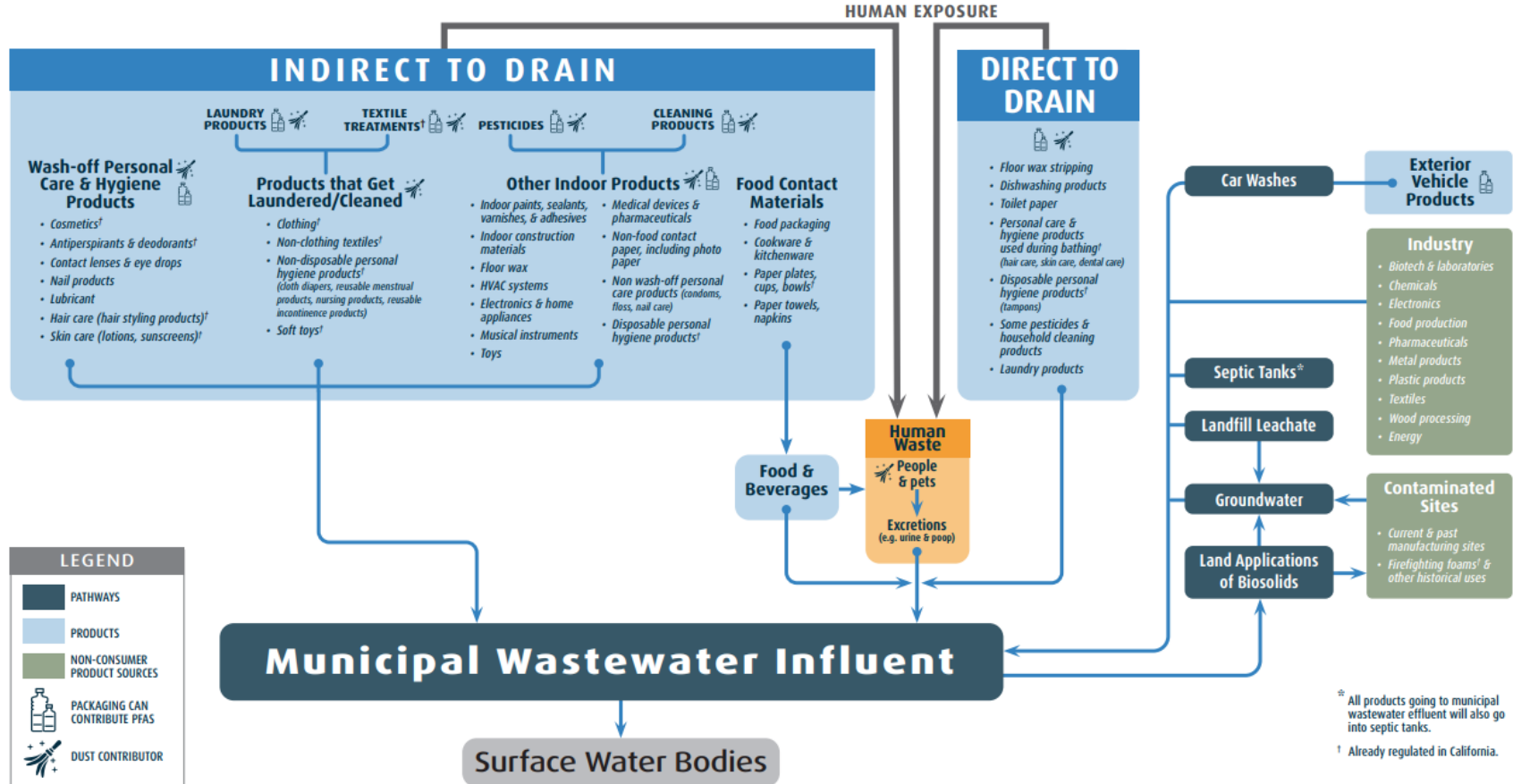
Additional effluent data to
be collected in 2026



Additional data to be collected
in water year 2027

What are the Sources of PFAS in San Francisco Bay Area Municipal Wastewater?

A CONCEPTUAL MODEL



Product Testing

Underway/Complete in 2028



- Fill data gaps in available data for unregulated product priorities identified via conceptual models
- Example product categories:
 - Building materials
 - Cleaning
 - Vehicle exterior

Grant Deliverable Report: Linkage Assessment (2029)

Product – Pathways linkage
assessment

Products => Pathways

Pathways => Products

Product priorities for SF Bay

Key information gaps

Recommended next steps

Stormwater & wastewater
data summaries



Wastewater



Stormwater

Sources to Solutions: Identifying and Preventing PFAS Pollution in San Francisco Bay

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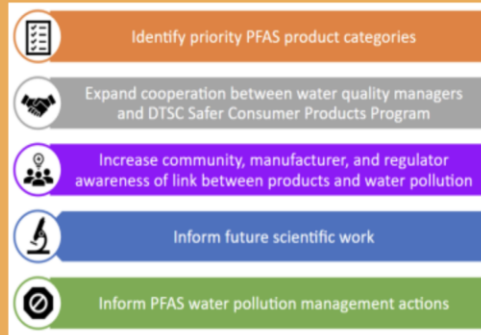
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Summary

- "Forever chemicals" ([PFAS](#)) can cause serious health issues. They are in San Francisco Bay at concerning levels for people and possibly wildlife.
- Many forever chemicals wash into the Bay from everyday products used both inside households and outdoors. They enter the Bay in [wastewater](#) and [stormwater](#).
- SFEI scientists are leading studies to better understand how forever chemicals reach the Bay. Partnering with managers and policymakers will help them build effective policy to stop pollution at the source.



Goals for PFAS Sources to Solutions: Identifying and Preventing PFAS Pollution in San Francisco Bay.



Very High Concern in SF Bay

Nothing currently in this category



Ongoing Monitoring

Contaminant	Bay Water	Sediment	Biota	Wastewater	Stormwater
PFAS	X	X	X	sewershed, influent, effluent	X
OPEs	X			effluent	X
Bisphenols	X	X		effluent	
Preservatives	X			effluent	X
Pet flea/tick control				X (DPR led)	X (DPR led)
Microplastics	X				X
QACs	X			influent, effluent, biosolids	

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Questions?

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**[www.sfei.org/programs/cw/
emerging-contaminants](http://www.sfei.org/programs/cw/emerging-contaminants)**

A scenic view of the Golden Gate Bridge in San Francisco, California, spanning the Golden Gate Strait. The bridge's iconic red-orange color contrasts with the blue sky and water. In the foreground, a wooden pier extends into the water, and a small, dark, rocky island is visible. The SFEI logo is in the bottom right corner.

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