CECs in SF Bay

Meeting of the Science Advisory Panel for CECs in CA's Aquatic Ecosystems

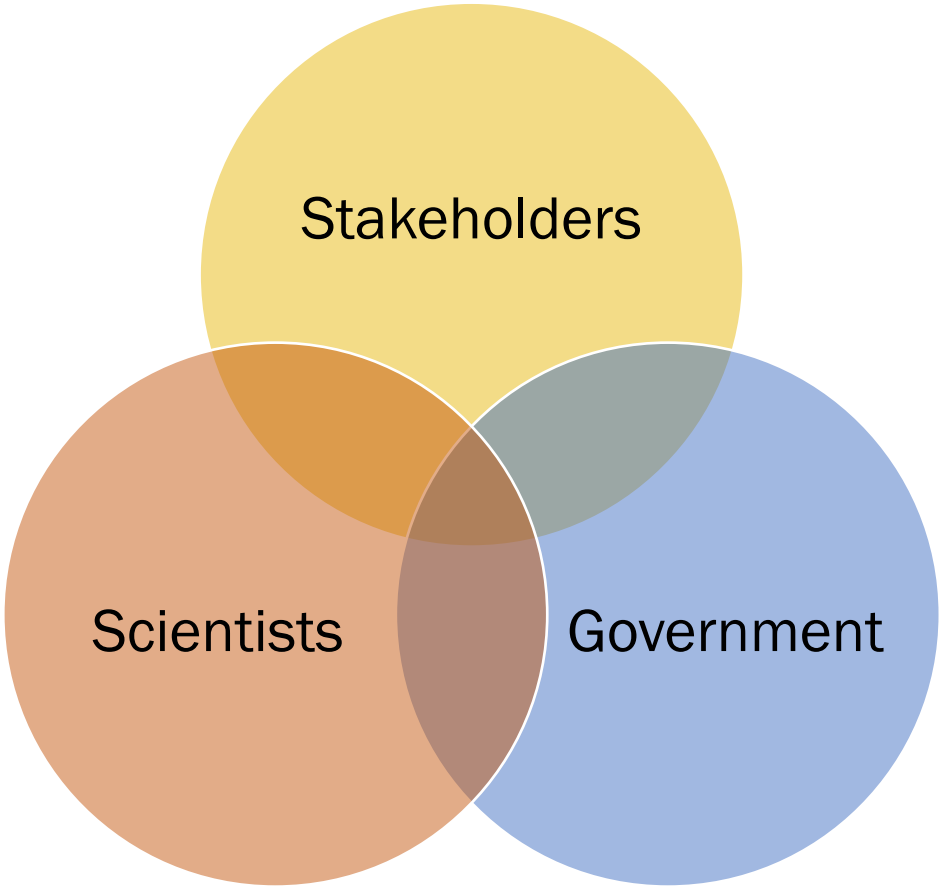
October 13, 2020

Thomas Mumley, PhD
Assistant Executive Officer
San Francisco Bay
Regional Water Quality Control Board

CALIFORNIA Water Boards

SF Bay Regional Monitoring Program

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



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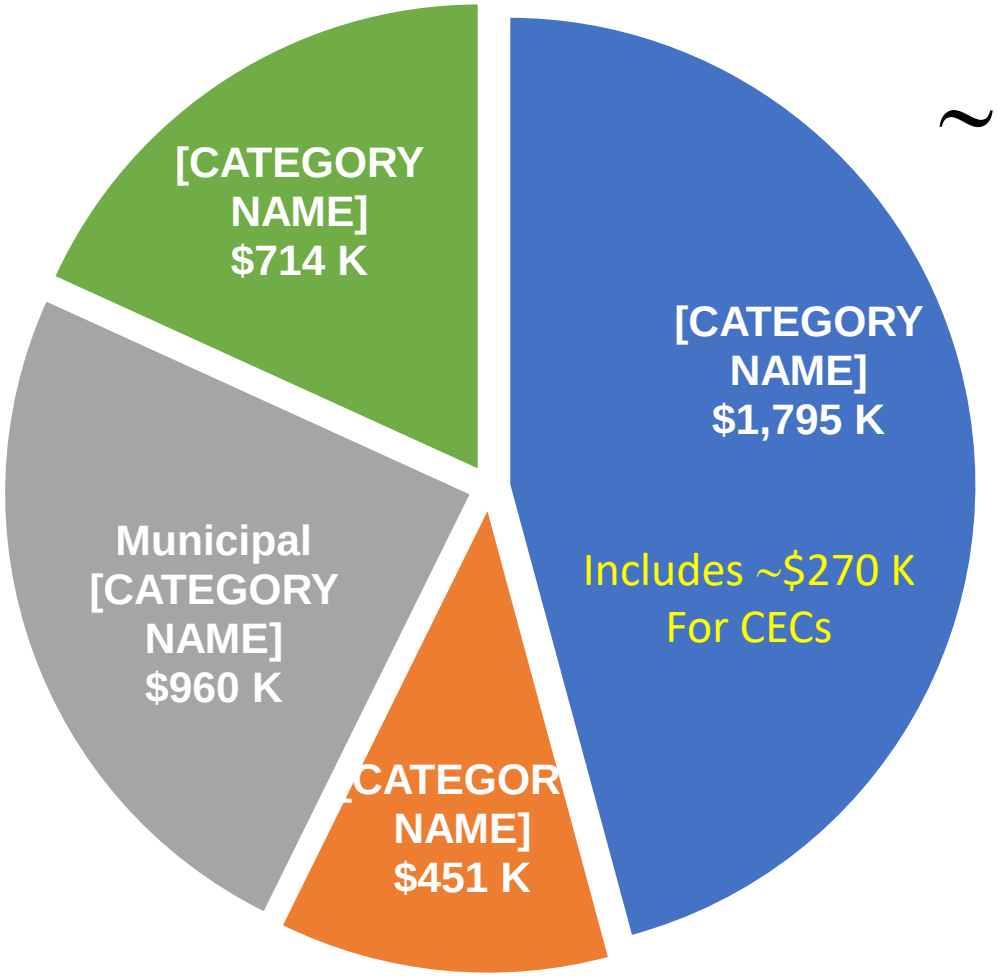
In our 28th year!

SF Bay RMP Fees by Sector

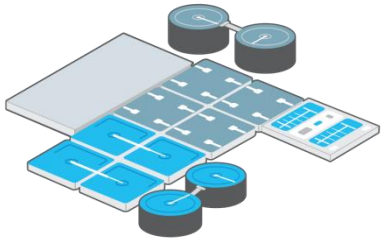


~$4 million/yr

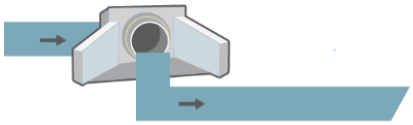
~$400 K/yr for CECs

CECs Monitoring in SF Bay

Sources



Wastewater



Stormwater

Bay Monitoring

Water

Sport Fish

Bivalves

Prey Fish

Bird Eggs

Harbor Seals

Sediment

SF Bay CECs Strategy Management Questions

1. Which CECs have the potential to adversely impact beneficial uses in San Francisco Bay?
2. What are the sources, pathways, and loadings leading to the presence of CECs in the Bay?
3. What are the physical, chemical, and biological processes that may affect the transport and fate of CECs in the Bay?
4. Have the concentrations of CECs increased or decreased in the Bay?
5. Are the concentrations of individual CECs or groups of CECs predicted to increase or decrease in the future?
6. What are the effects of management actions?

CECs = individual or groups

SF Bay CECs Strategy
Three Elements

1. CEC monitoring, evaluating risk

2. Learning from others, sharing expertise

3. Non-targeted monitoring (bioassays, broadscans)

SF Bay CECs Strategy

1.

TIER
HIGH
CONCER

Emerging Contaminants Workgroup

Stakeholders and Science Advisors

others,

se

3

SF Bay RMP
CECs Science Advisors

Dr. Bill Arnold
University of Minnesota

Dr. Kelly Moran
TDC Environmental

Dr. Derek Muir
Environment & Climate Change Canada

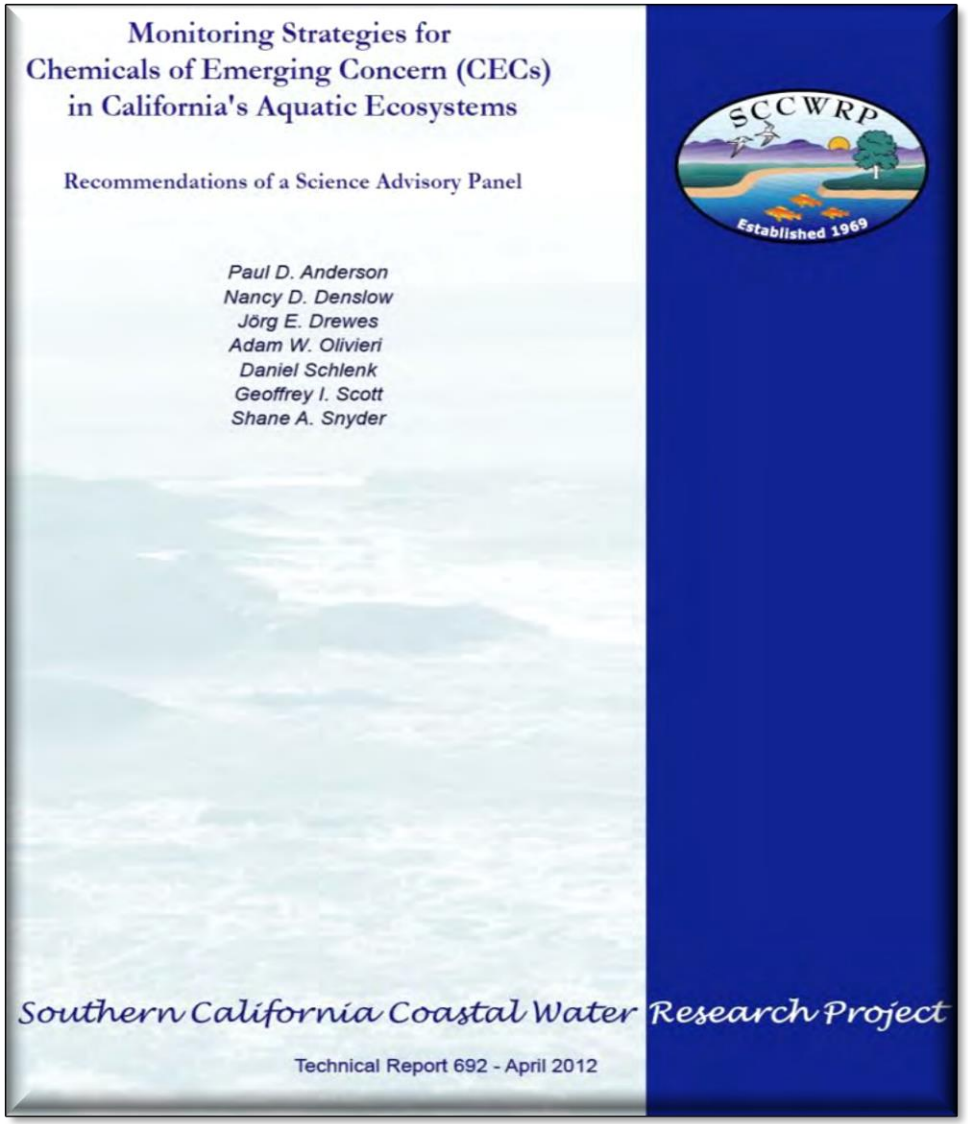
Dr. Miriam Diamond
University of Toronto

Dr. Lee Ferguson
Duke University

Dr. Dan Villenueve
US EPA

Dr. Heather Stapleton
Duke University

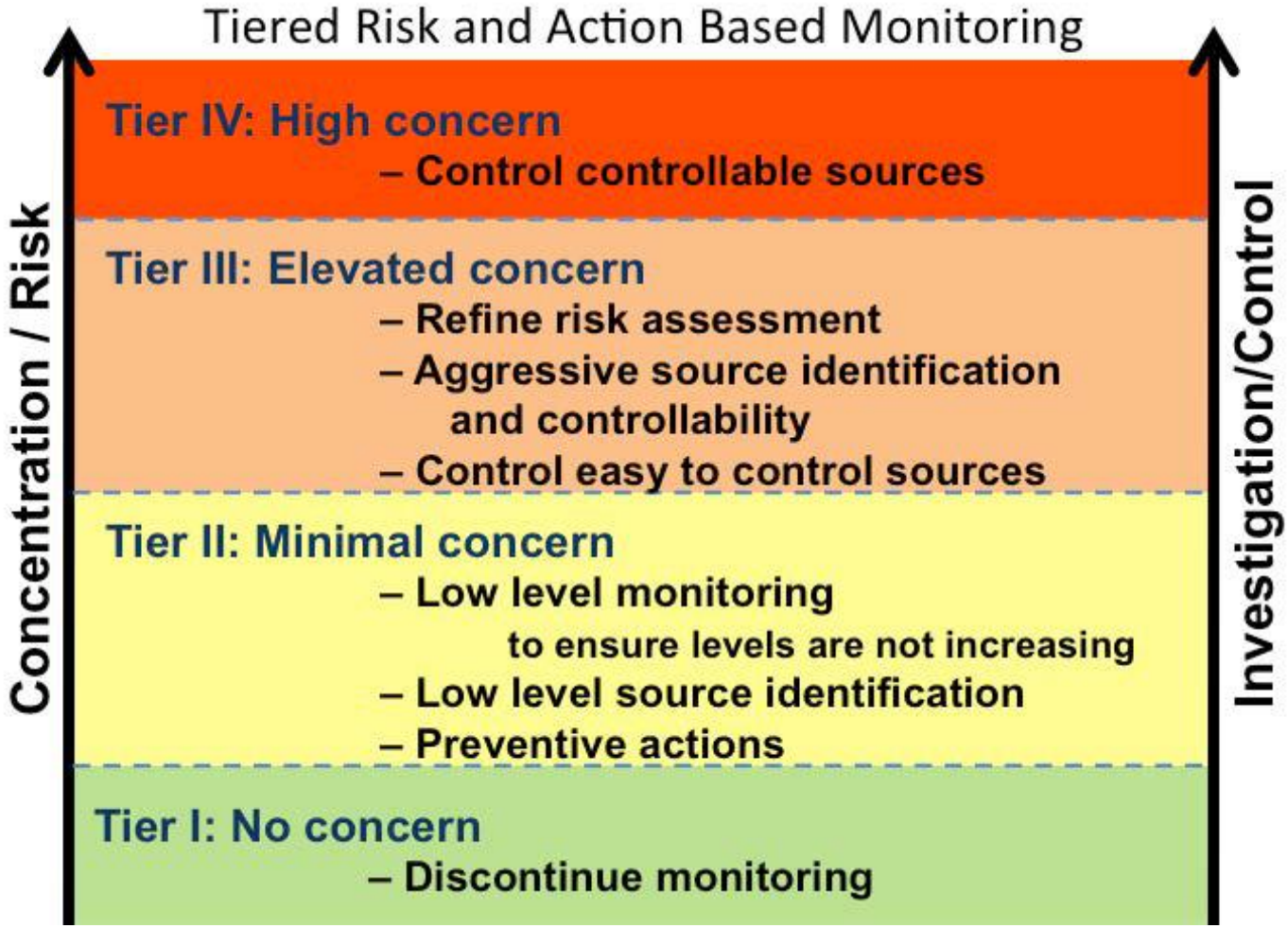
Informed and Informed-By



Phased Monitoring Program Recommended by 2012 Panel

Phase	Description	Status
1	Develop initial list(s) of CECs	✓
2	Pilot monitoring	✓
3	Assess/update monitoring and response plans	2013 - data synthesis and strategy 2017 - substantial revision with annual updates 2022 - substantial revision planned
4	Action Plans to minimize impacts	Some

Conceptual Tiered Risk and Action Based Monitoring Approach



from 2012 Science Advisory Panel Report

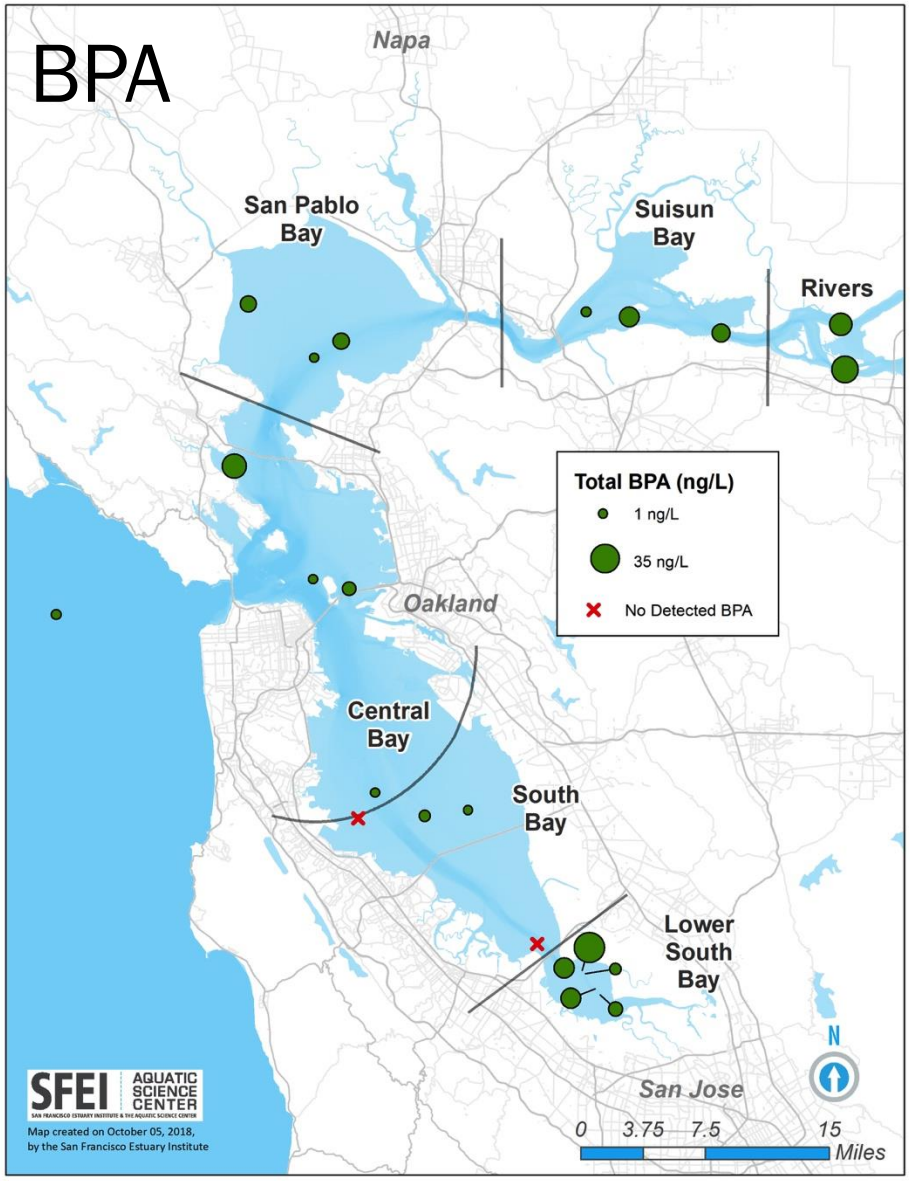
SF Bay RMP
Tiered Risk-Based Framework

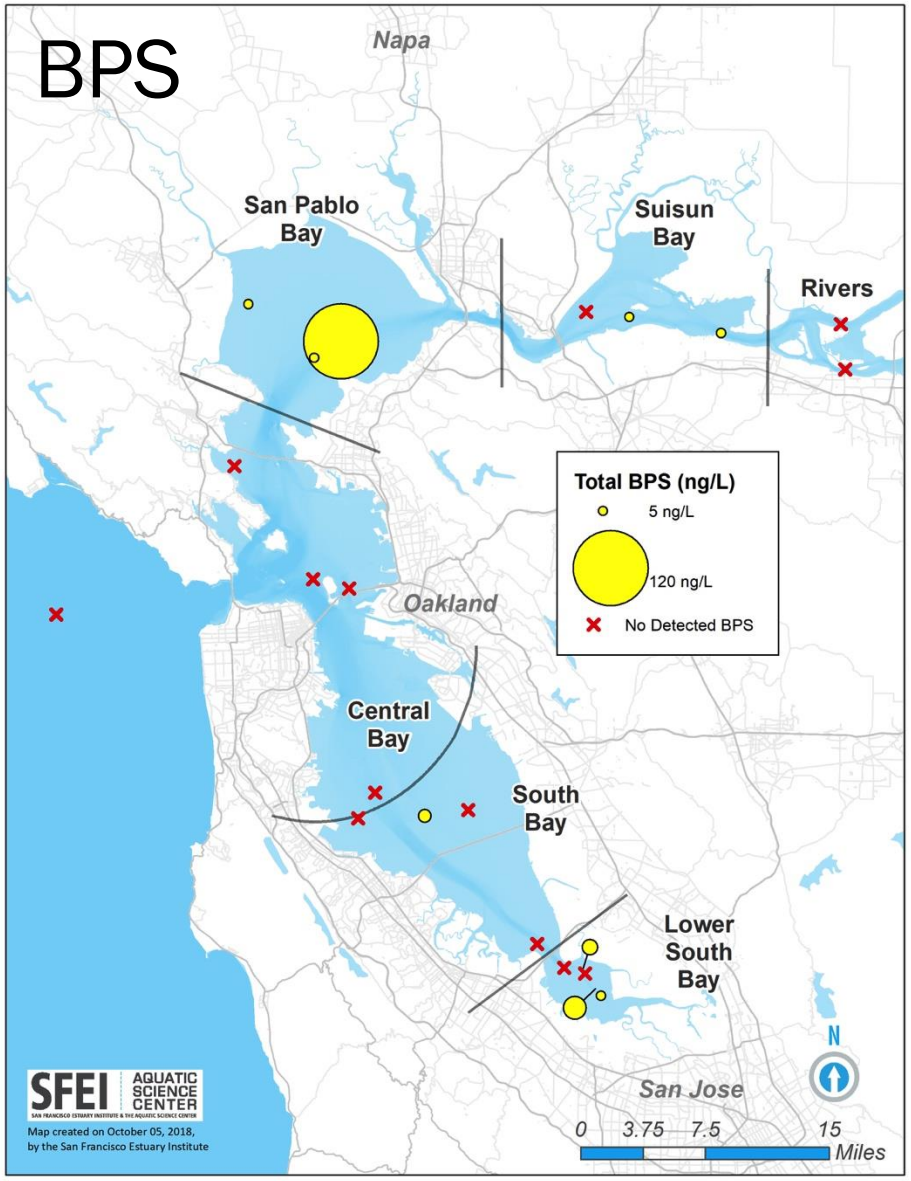
High Concern moderate or high impact	Levels above observed effects
Moderate Concern low or potential impact	Levels above or near protective thresholds
Low Concern minimal or no impact	Levels well below protective thresholds
Possible Concern uncertainty as to impact	Uncertainty Insufficient data

Status of CECs in SF Bay

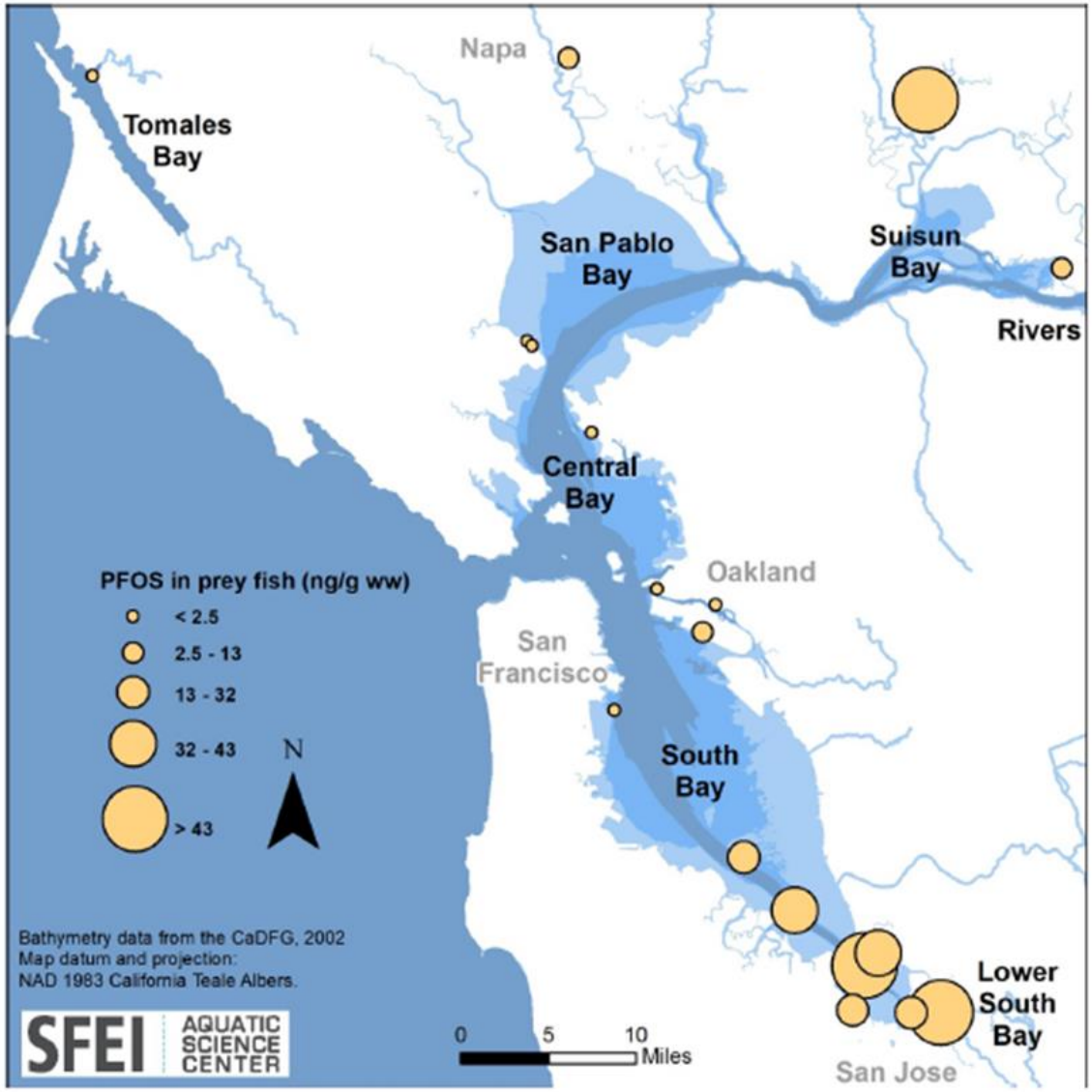
High Concern moderate or high impact	None currently
Moderate Concern low or potential impact	PFAS, Fipronil, Imidacloprid, Bisphenols Alkylphenols, Alkylphenol Ethoxylates Organophosphate Esters, Microplastics
Low Concern minimal or no impact	PBDEs and HBCD Pharmaceuticals, Pyrethroids* Personal Care & Cleaning PBDDs / PBDFs
Possible Concern uncertainty as to impact	Alternative Flame Retardants Plastic Additives, Siloxanes, QACs SDPAs, UV-BZTs, others

Bisphenol A and S detected in SF Bay



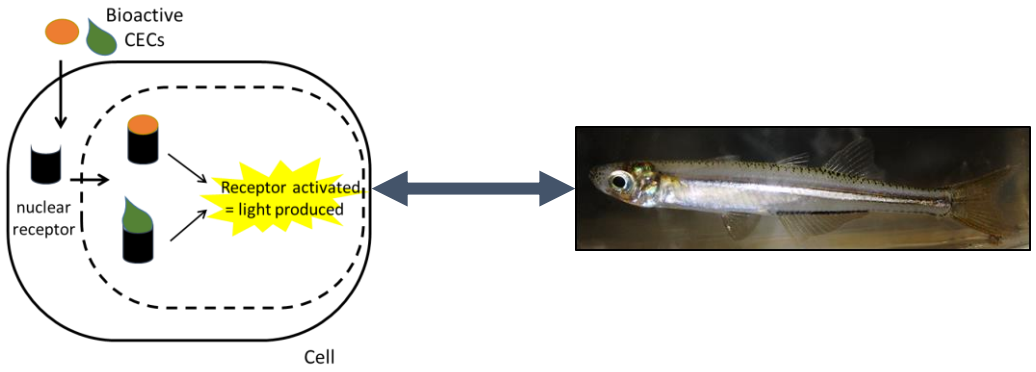


PFOS in SF Bay Prey Fish



Bioanalytical Screening Tools

- Estrogenicity
  - Link *in vitro* assays and *in vivo* end point ✓
  - Screen South Bay water and sediment ✓
- Glucocorticoid screen (proposed)



Non-Targeted Analyses

Mussels

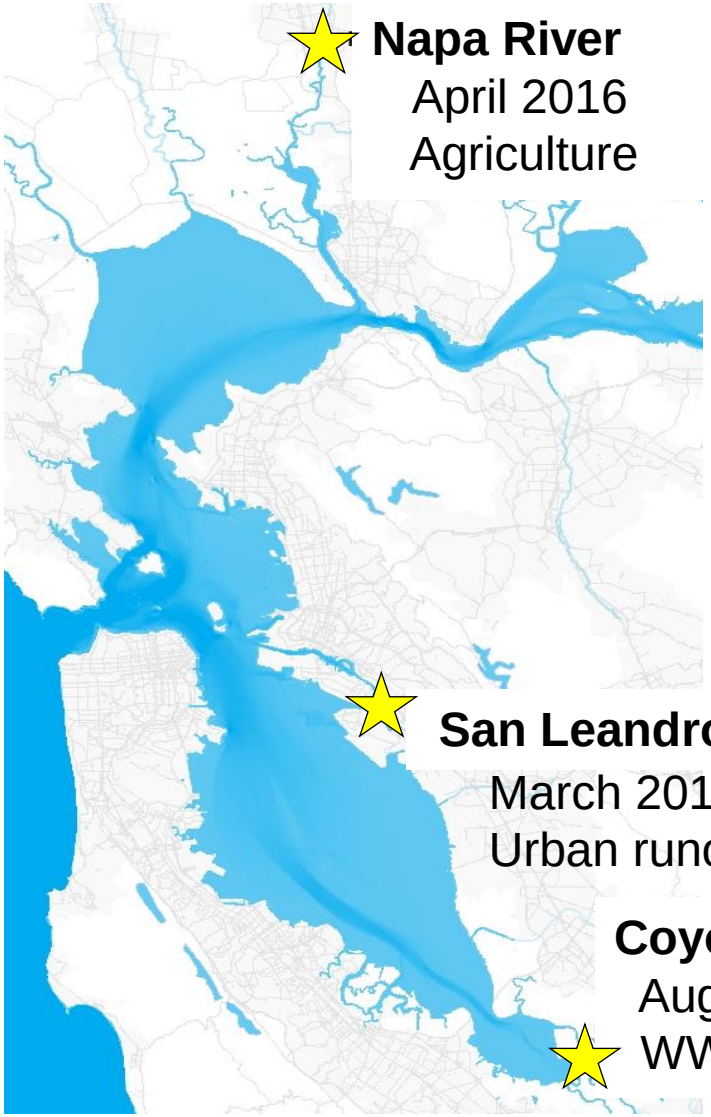
Harbor seals

Wildlife tissue

Ambient bay water
Wastewater effluent
Ag and urban runoff

Sediment

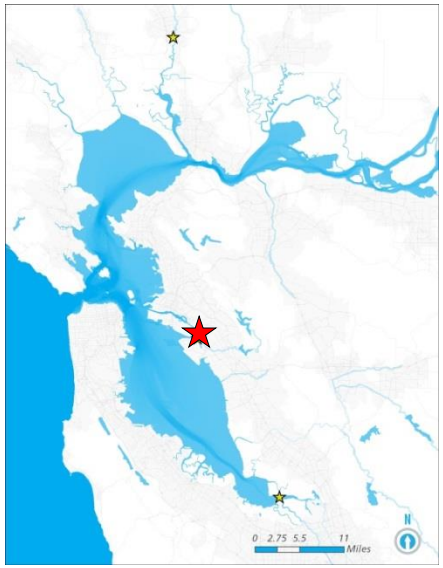
2016 Non-Targeted Study



3 ambient Bay sites

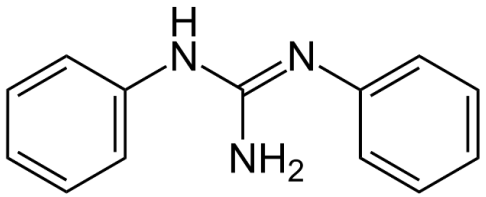
4 WWTP effluents

San Leandro Bay Non-Targeted Results



- Most contaminated site
- > 1,000 compounds found at levels > wastewater effluent
  - Surfactants
  - Plastic additives
  - Roadway contaminants
- Key compound groups highlight urban runoff sources

N,N’-Diphenylguanidine



- Rubber vulcanization (tire production)
- Highly abundant compound detected in San Leandro Bay
- Slightly bioaccumulative
- Aquatic toxicity concern

Current and Planned Studies

2020

- Bisphenols in wastewater and sediment
- Urban stormwater CECs
  - PFAS, ethoxylates, organophos-esters, bisphenols, and road chemicals
- Toxicology strategy

2021

- Urban stormwater CECs
  (Year 3 of 3, possibly 4)
- PFAS in Bay water
- Quaternary ammonia compounds in wastewater and sediment
- Toxicology strategy

2013

A Report of the Regional Monitoring Program for Water Quality in San Francisco Bay

THE PULSE OF THE BAY

CONTAMINANTS OF EMERGING CONCERN

ziram 1,2-bis bis(hexachlor gemfibrozil tris (1,3-di triclocarban 4-nonylphe fipronil caffeine sulfameth carbamazepine bis(2-ethylhexyl) ph single-walled carbon nanotubes galaxol chlorinated paraffins dehydronifedipine esfenvalerate permethrin di-n-butyl phthalate chlorothalonil perfluoroperhydrophenanthrene traseolide nanosilver polybrominated cotinine 1,3,6,8-tetrabromopyrene indoxacarb diphenhydramine ethylene bis-tetrabromophthalidimide chlorophenoxyphenols valsartan phenothrin mancozeb

Contaminants of Emerging Concern

IN SAN FRANCISCO BAY

A STRATEGY FOR FUTURE INVESTIGATIONS

2017 REVISION

Rebecca Sutton
Meg Sedlak
Jennifer Sun
Diana Lin

RMP
REGIONAL MONITORING PROGRAM FOR WATER QUALITY IN SAN FRANCISCO BAY
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