Linkage to Management Questions – Long Term Perspective

Karin North, City of Palo Alto

RMP

2017

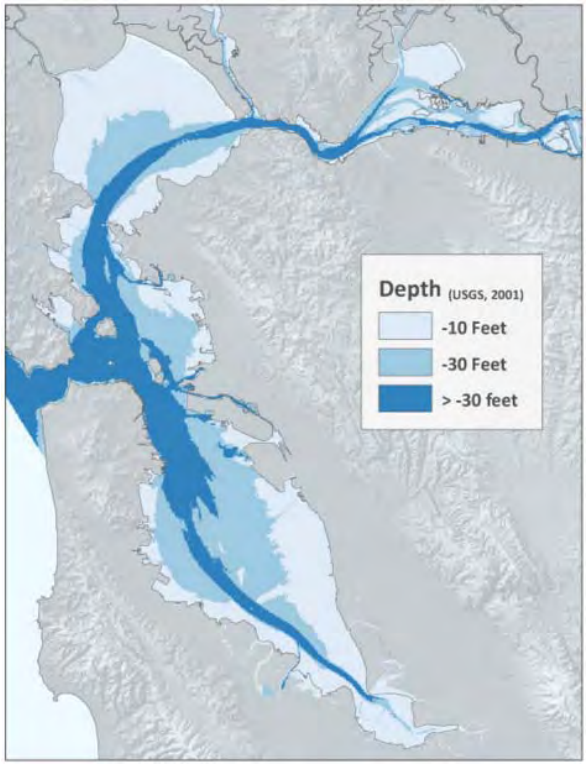
San Francisco Bay

BIG, URBANIZED

Area = 4,100 km^2

SHALLOW, COMPLEX

Median Depth = 4 m



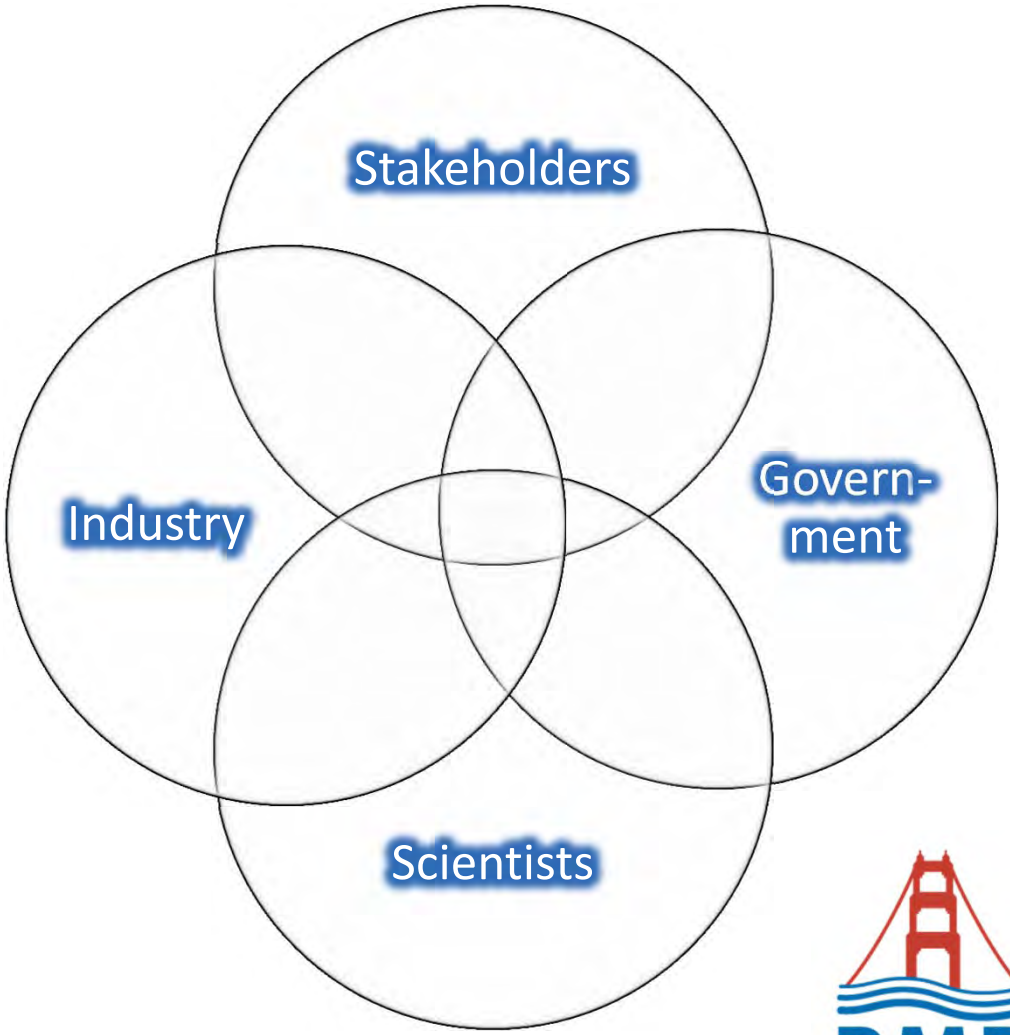
LARGE WATERSHED

40% of CA

Palo Alto Baylands Dump 1953

Regional Monitoring Program

Partnership to understand the **health** of San Francisco Bay



Celebrating our 25th year!

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Classification of Bay Contaminants

USEPA Priority Pollutants

Acrolein • Acrylonitrile • Benzene • Benzidine • Carbon tetrachloride • Chlorobenzene • 1,2,4-trichlorobenzene • Hexachlorobenzene • 1,2-dichloroethane • 1,1,1-trichloreothane • Hexachloroethane • 1,1-dichloroethane • 1,1,2-trichloroethane • 1,1,2,2-tetrachloroethane • Chloroethane • Bis(2-chloroethyl) ether • 2-chloroethyl vinyl ethers • 2-chloronaphthalene • 2,4,6-trichlorophenol • Parachlorometa cresol • Chloroform • 2-chlorophenol • 1,2-dichlorobenzene • 1,3-dichlorobenzene • 1,4-dichlorobenzene • 3,3-dichlorobenzidine • 1,1-dichloroethylene • 1,2-trans-dichloroethylene • 2,4-dichlorophenol • 1,2-dichloropropane • 1,3-dichloropropylene • 2,4-dimethylphenol • 2,4-dinitrotoluene • 2,6-dinitrotoluene • 1,2-diphenylhydrazine • Ethylbenzene • Fluoranthene • 4-chlorophenyl phenyl ether • 4-bromophenyl phenyl ether • Bis(2-chloroisopropyl) ether • Bis(2-chloroethoxy) methane • Methylene chloride • Methyl chloride • Methyl bromide • Bromoform • Dichlorobromomethane • Chlorodibromomethane • Hexachlorobutadiene • Hexachlorocyclopentadiene • Isophorone • Naphthalene • Nitrobenzene • 2-nitrophenol • 4-nitrophenol • 2,4-dinitrophenol • 4,6-dinitro-o-cresol • N-nitrosodimethylamine • N-nitrosodiphenylamine • N-nitrosodi-n-propylamine • Pentachlorophenol • Phenol • Di-n-butyl Phthalate • Di-n-octyl phthalate • Diethyl phthalate • Dimethyl phthalate • Tetrachloroethylene • Toluene • Trichloroethylene • Vinyl chloride • Aldrin • Alpha-endosulfan • Beta-endosulfan • Endosulfan sulfate • Endrin • Endrin aldehyde • Alpha-BHC • Beta-BHC • Gamma-BHC • Delta-BHC • Toxaphene • Antimony • Arsenic • Asbestos • Beryllium • Cadmium • Chromium • Copper • Cyanide • Lead • Nickel • Silver • Thallium • Zinc

Pharmaceuticals

Acetaminophen • Albuterol • Alprazolam • Amitriptyline • 10-hydroxy-amitriptyline • Amlodipine • Amphetamine • Atenolol • Atorvastatin • Azithromycin • Benzoylecgonine • Benztropine • Betamethasone • Caffeine • Carbadox • Carbamazepine • Cefotaxime • Cimetidine • Ciprofloxacin • Clarithromycin • Clinafloxacin • Clonidine • Cloxacillin • Cocaine • Codeine • Cotinine • Dehydronifedipine • Desmethyldiltiazem • Diazepam • Digoxigenin • Digoxin • Diltiazem • 1,7-Dimethylxanthine • Diphenhydramine • Enalapril • Enrofloxacin • Erythromycin-H20 • Flumequine • Fluocinonide • Fluoxetine • Fluticasone propionate • Furosemide • Gemfibrozil • Glipizide • Glyburide • Hydrochlorothiazide • Hydrocodone • Hydrocortisone • Ibuprofen • Ibuprofen, 2-hydroxy- • Lincomycin • Lomefloxacin • Meprobamate • Metformin • Methylprednisolone • Metoprolol • Miconazole • Naproxen • Norfloxacin • Norfluoxetine • Norgestimate • Norverapamil • Ofloxacin • Ormetoprim • Oxacillin • Oxolinic acid • Oxycodone • Paroxetine • Penicillin G • Penicillin V • Prednisolone • Prednisone • Promethazine • Propoxyphene • Propranolol • Ranitidine • Roxithromycin • Sarafloxacin • Sertraline • Simvastatin • Sulfachloropyridazine • Sulfadiazine • Sulfadimethoxine • Sulfamerazine • Sulfamethazine • Sulfamethizole • Sulfamethoxazole • Sulfanilamide • Sulfathiazole • Theophylline • Thiabendazole • Trenbolone • Trenbolone acetate • Triamterene • Trimethoprim • Tylosin • Valsartan • Verapamil • Virginiamycin • Warfarin

Pyrethroids*

Allethrin • Bifenthrin • Cyfluthrin • Cyhalothrin • Cypermethrin • Deltamethrin • Esfenvalerate/Fenvalerate • Fenpropathrin • Oxadiazon • Permethrin • Phenothrin • Phosmet • Resmethrin • Tetramethrin

Personal Care Product Ingredients

N,N-diethyl-m-toluamide (DEET) • Celestolide • Galaxolide • Tonalide • Versalide • Musk ambrette • Musk ketone • Musk moskene • Musk xylene • Di-n-butyl phthalate • Triclocarban • Triclosan • Octylphenol

Polybrominated dioxins and furans (PBDD/Fs)

1,3,7-TriBDD • 1,2,4,8-TeBDD • 2,3,7,8-TetraBDD • 1,2,3,7,8-PentaBDD • 1,2,3,4,7,8/1,2,3,6,7,8-HexaBDD • 1,2,3,7,8,9-HexaBDD • OctaBDD • 2,3,7,8-TetraBDF • 1,2,3,7,8-PentaBDF • 2,3,4,7,8-PentaBDF • 1,2,3,4,7,8-HexaBDF • 1,2,3,4,6,7,8-HeptaBDF • OctaBDF

Flame Retardants

Hexabromocyclododecane

Specific Regulations Addressed by the RMP

303d Listings

NPDES Permits

Nutrient Watershed Permit

CEC Action Plans

Copper SSO Implementation Plan

Selenium TMDL

Mercury TMDL

PCBs TMDL

Mercury and PCBs Watershed Permit

Achieving Our Goal

RMP Impacts on Management Decisions

National/State Scale	Product phase outs Identifying high risk CECs
Regional Scale	TMDLs for PCBs, Hg, Se Fish Consumption Advisories Nutrient Management Strategy
Local Scale	Ambient sediment and water concentrations for permitting

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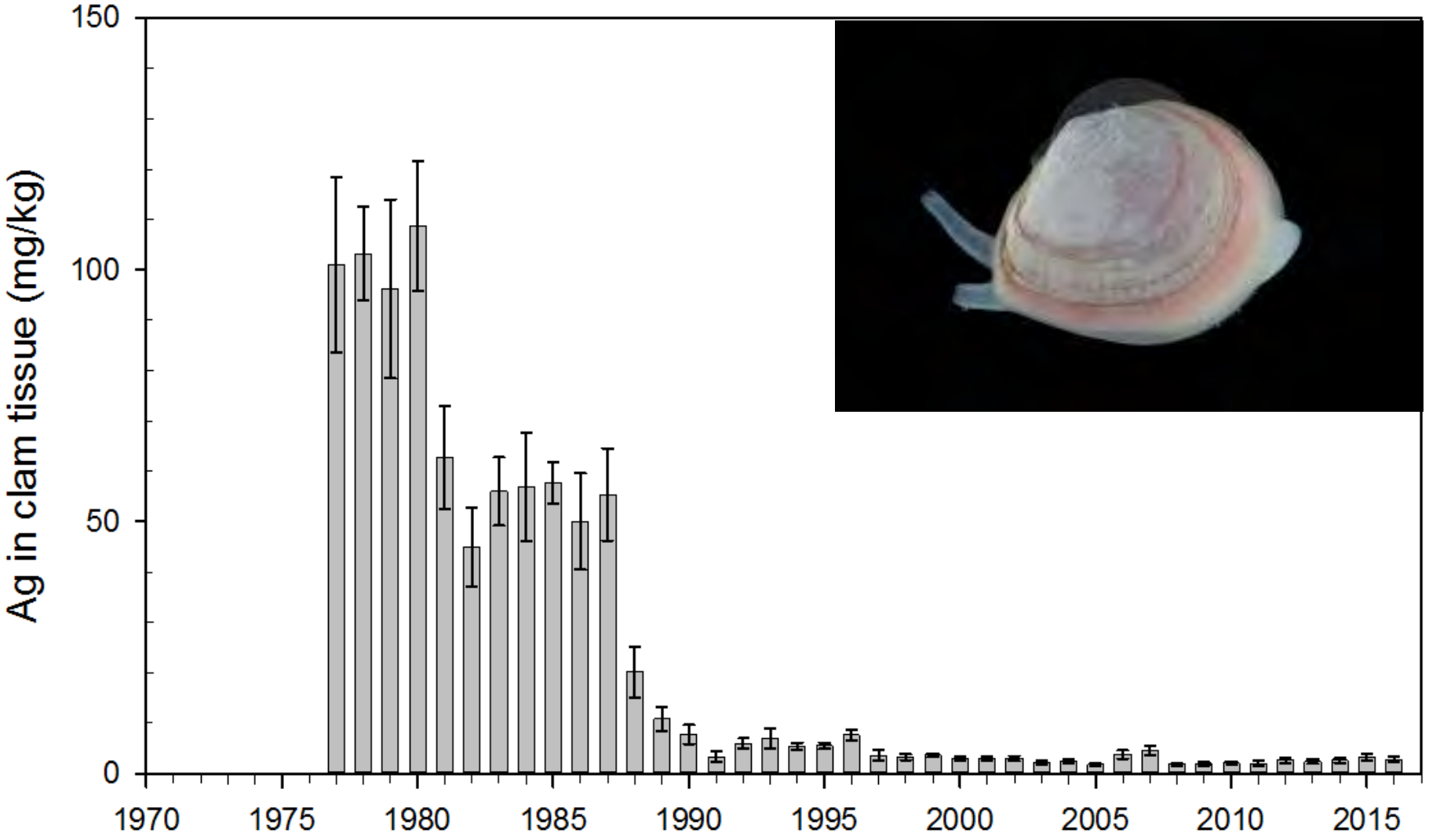
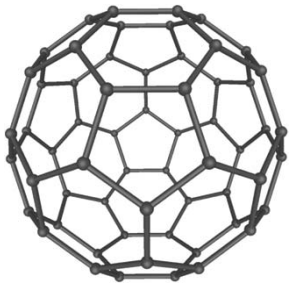
Silver in Clams in the San Francisco Bay



Contaminants of Emerging Concern

Pesticides

PFOS
PFAS



PBDEs &
Flame
Retardants

William Duke, NYTimes

RMP Focus on CECs

- 10+ years of monitoring and studies
  - Primarily ambient water, sediment, biota
  - Some wastewater and stormwater
- 2013 CEC Synthesis and Strategy
  - Added non-targeted analysis, bioanalytical tools
- 2017 Strategy Revision

Management Questions

Which CECs have the potential to adversely impact beneficial uses in San Francisco Bay?

What are the sources, pathways, loadings, and processes leading to CEC pollution in the Bay?

Have the concentrations of CECs in the Bay increased or decreased?

Which management actions may be effective in reducing CEC levels?

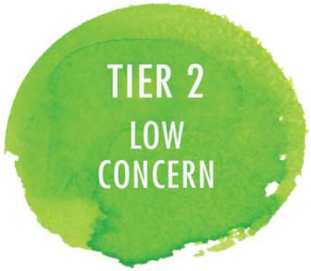
Risk Tiers

MODERATE OR HIGH IMPACT

High probability of moderate or high level effect on Bay wildlife

LOW IMPACT

High probability of low level effect on Bay wildlife



NO IMPACT

High probability of no effect on Bay wildlife

UNCLEAR

Uncertainty in Bay levels or toxic thresholds

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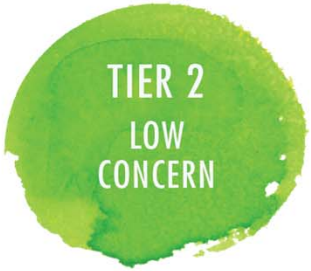
Monitoring Strategy

Studies to support Total Maximum Daily Load (TMDL) or alternatives

Trends monitoring and/or fate, effects, and sources and loadings studies



Periodic ambient and/or source trend screening

Ambient and source screening

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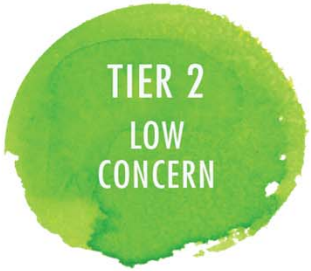
Management Strategy

303(d) list → TMDL or alternative(s)

Action plan or strategy

- Aggressive pollution prevention
- Seek product or chemical alternatives



Track product use and market trends
Easy, low-cost source identification and pollution prevention actions

Identify and prioritize potential CECs
Develop bio and chemistry methods

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MODERATE OR HIGH IMPACT

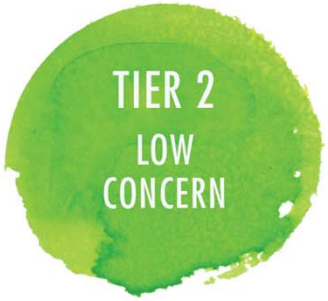
None currently

LOW IMPACT

PFOS

Fipronil

Nonylphenol



NO IMPACT

PBDEs and HBCD

Pyrethroids*

Pharmaceuticals and Personal Care Products

PBDDs and PBDFs

UNCLEAR

Alternative Flame Retardants

PFAS (Fluorinated Chemicals)

Pesticides, Plasticizers

Microplastic

PCB 11, PHCZs, others

Management Actions: Moderate Concern (Tier III)

Regional CEC Action Plans:

- Source identification
- Source control identification and evaluation
- Track product use and market trends
- Communication and outreach
- Monitoring/study strategy
- Track recovery
- **Referral to other regulatory authority(s)**

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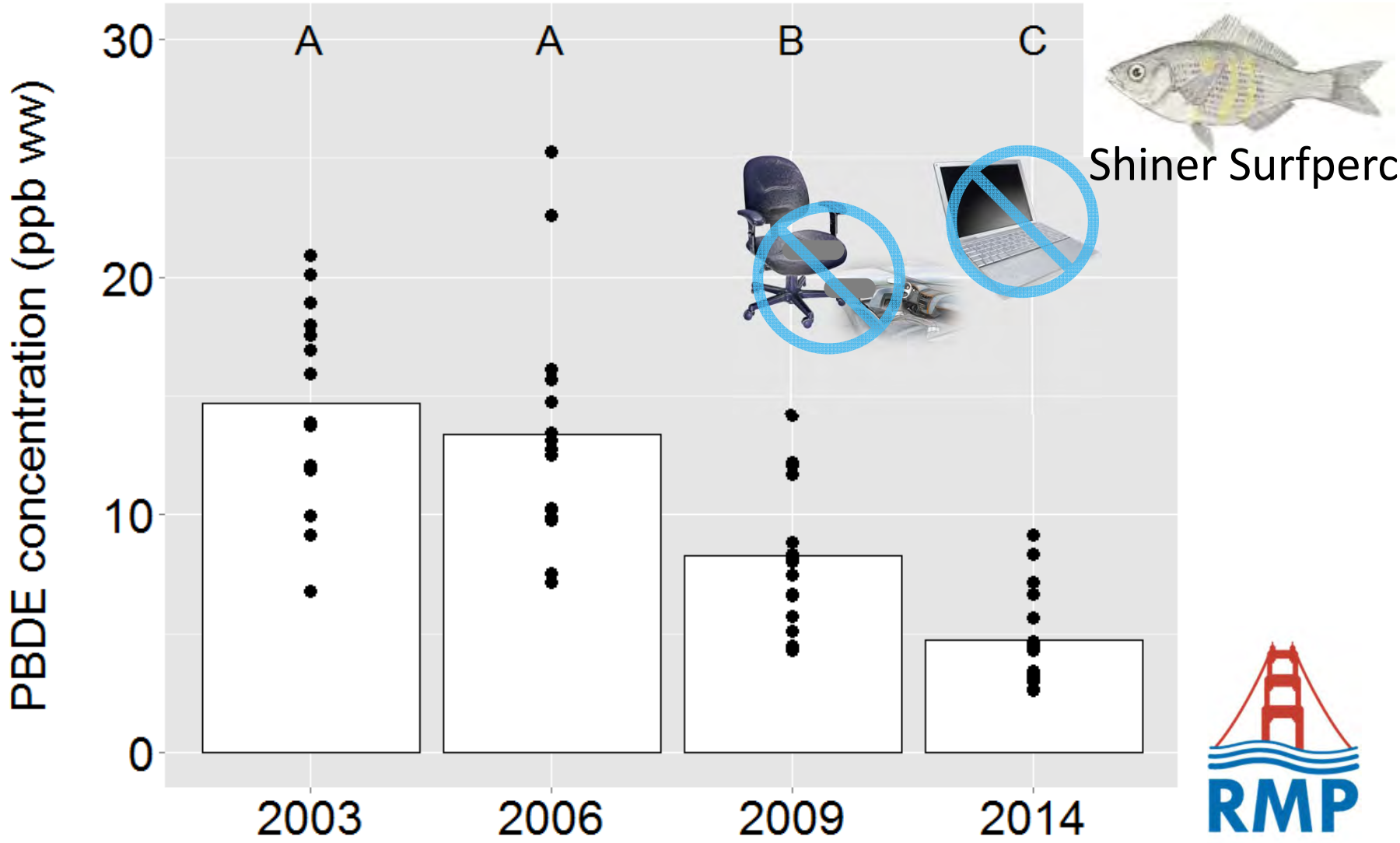
PBDE Recovery

TIER 2
LOW
CONCERN



Shiner Surfperc

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Alternative Flame Retardants

TIER 1
POSSIBLE
CONCERN

PBDE replacements detected in consumer products and San Francisco Bay led to management actions:

California Bureau of Home Furnishings

- ✓ TB117-2013: New standard for foam furniture, exemptions for baby products
- ✓ SB 1019: Furniture labeling law

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PFOS Recovery

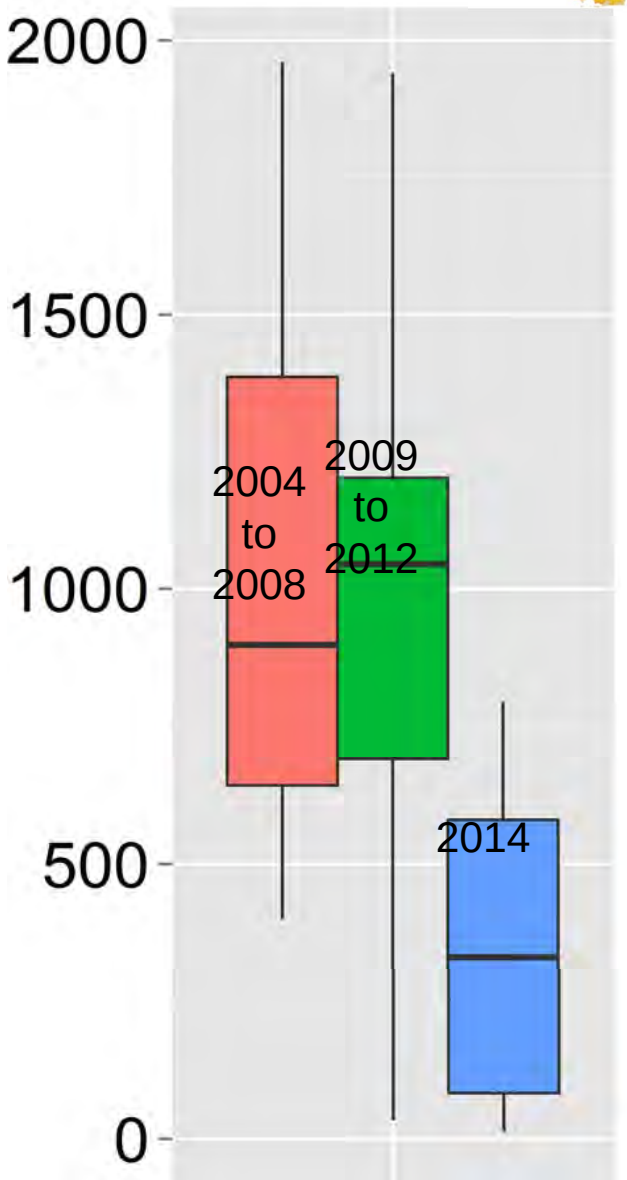
TIER 3
MODERATE CONCERN

South Bay

Harbor seals

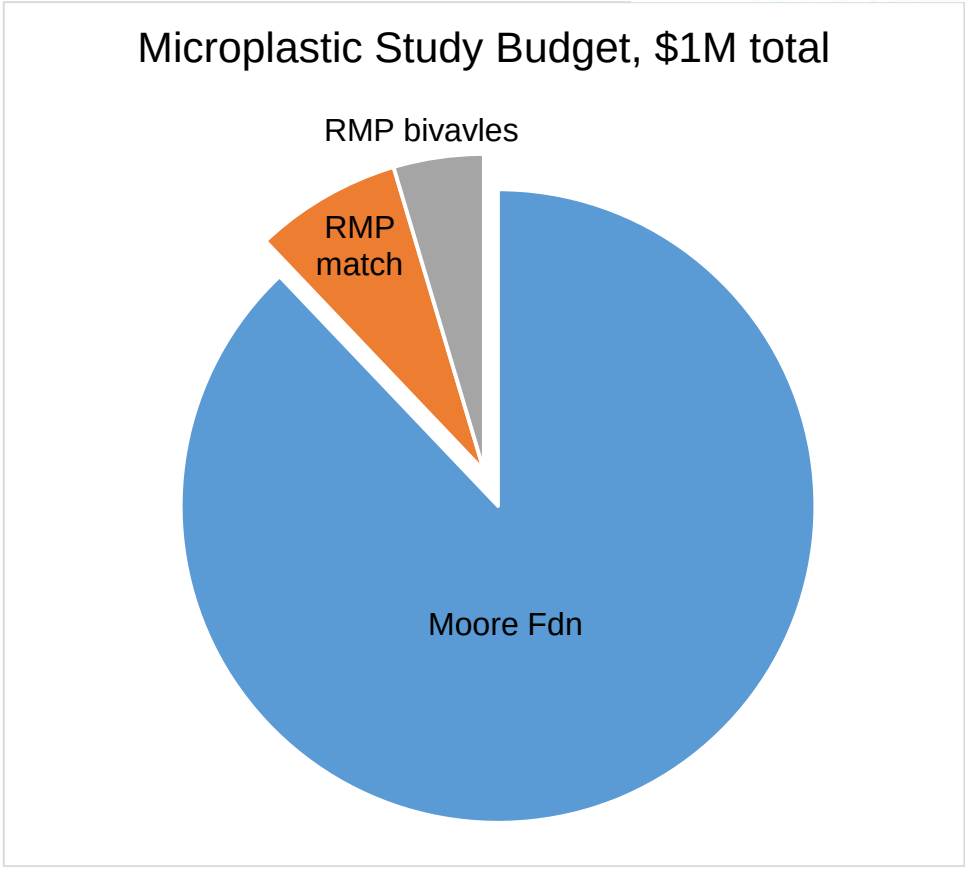
PFOS in Serum

(ng/g or ng/mL)



Microplastics

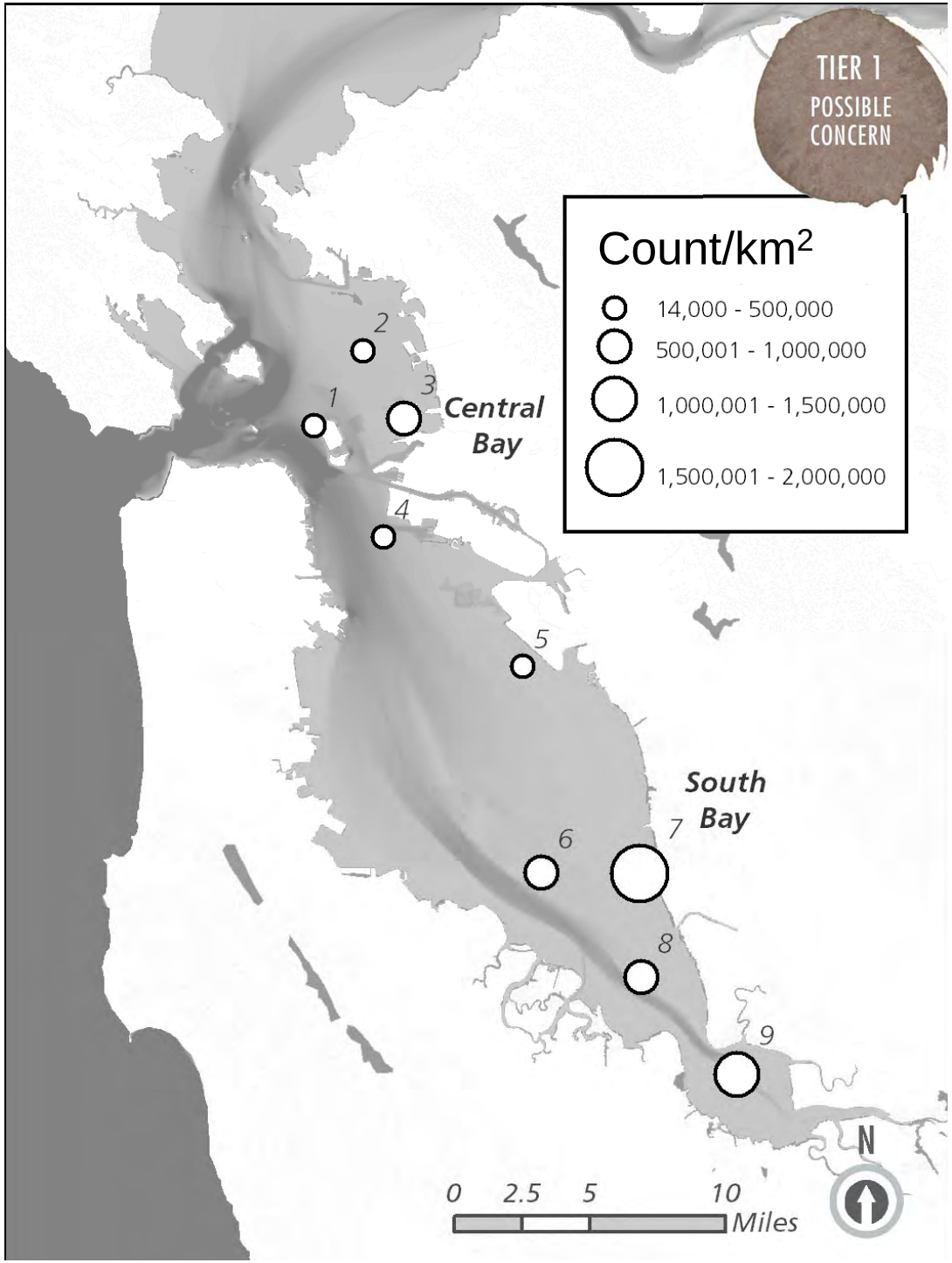
- 10:1 leveraging of RMP $$
- Sampling underway for
  - Water
  - Sediment
  - Prey Fish
- RMP testing for MP in bivalves funded for 2018



Microplastic

2015 Bay study levels higher than:

- Great Lakes
- Chesapeake
- Salish Sea



Sutton et al. 2016

Microplastic: Broader Impacts

Policy:

- Federal **Microbead-Free Waters Act** signed into law (2015)

Funding:

- Gordon & Betty Moore Foundation 2-year, $880,000 grant for further study
- Guided by RMP Microplastic Monitoring and Science Strategy

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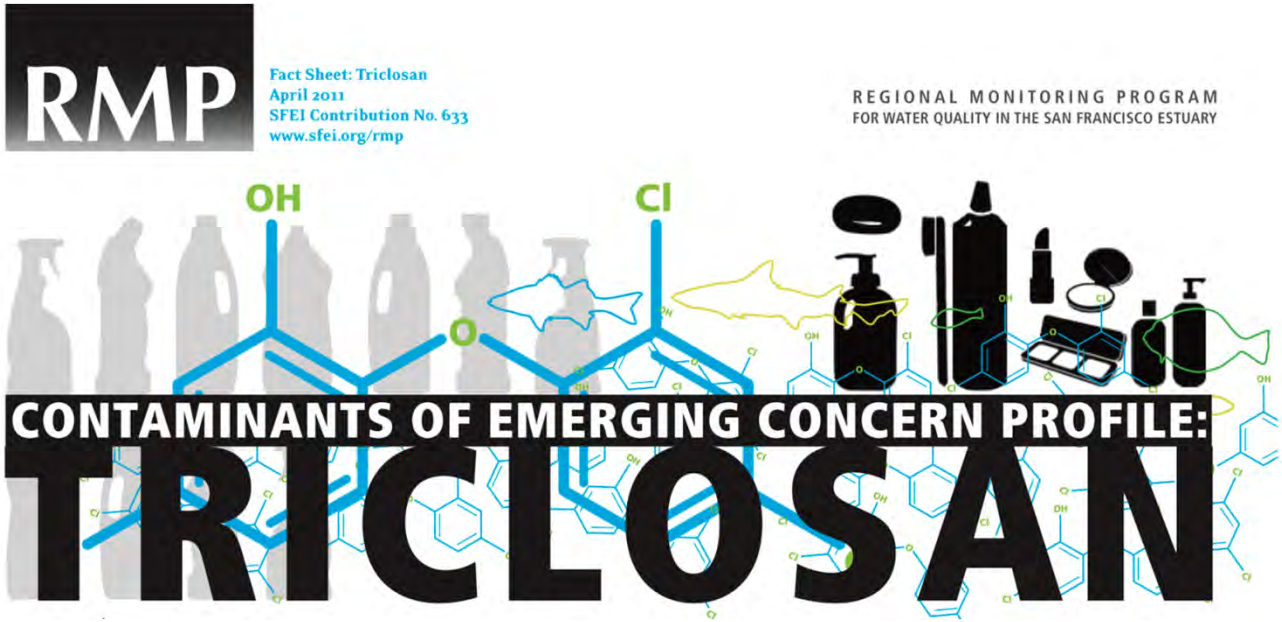
Triclosan

TIER 2
LOW
CONCERN



Palo Alto and other SF Bay wastewater agencies

- Consumer education
- Purchasing

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Triclosan

TIER 2
LOW CONCERN

2016: **FDA** bans triclosan and 18 other antibacterials from hand & body washes

Other uses may be addressed via DTSC:

- **Safer Consumer Products Program** (Green Chemistry)

Pharmaceuticals

TIER 2
LOW
CONCERN

Support for extended producer responsibility:

- RMP data for Senate hearings, council meetings, boards of supervisors
- 2016-2017 testing by wastewater agencies

BACWA
BAY AREA
CLEAN WATER
AGENCIES

RMP

Leveraging Resources

- Partnership with other organizations
  - Department of Toxic Substances Control
  - Department of Pesticide Regulations
  - Pro bono academic projects

- Alternative Monitoring Permit – provides RMP with extra funding for CECs ($235,000)
- Supplemental Environmental Projects (Enforcement) funding possible

Keys to RMP's Success

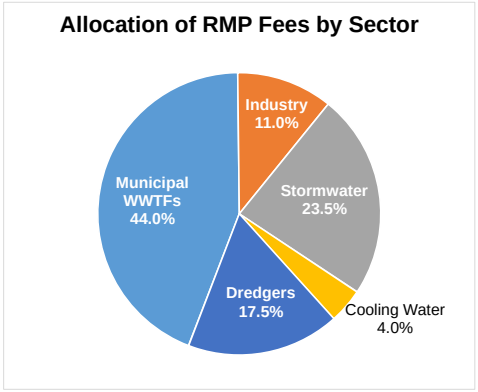
Forum for Collaboration

Clear Objectives

Adaptability

Long Range Planning

Stable Funding



A vision for the future

Thank you

For more information:

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