

Emerging Problems?

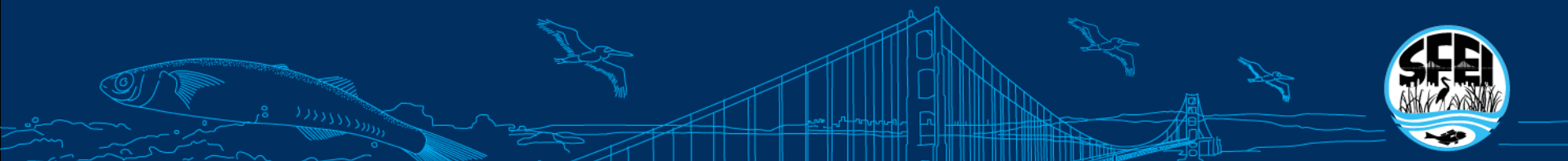
Progress on Identifying Contaminants of Concern in San Francisco Estuary

Susan Klosterhaus

San Francisco Estuary Institute

RMP Annual Meeting

October 2, 2007



Emerging Contaminant Workgroup Approach

Chemical Screening



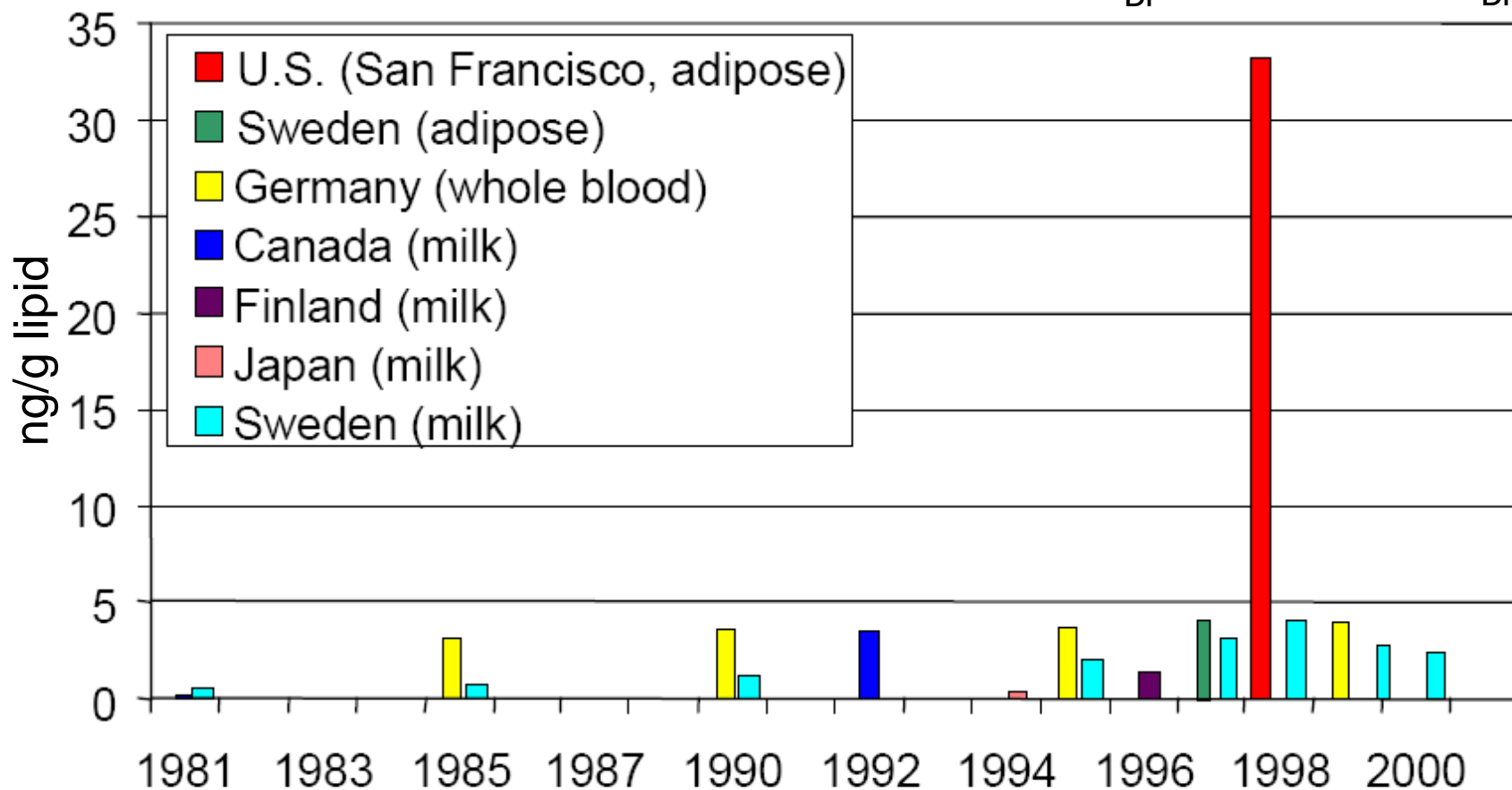
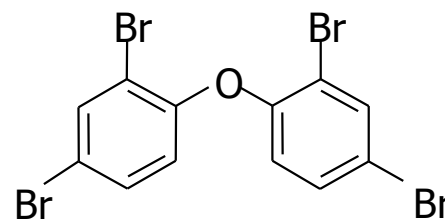
RMP Pilot Study/SFEI Project



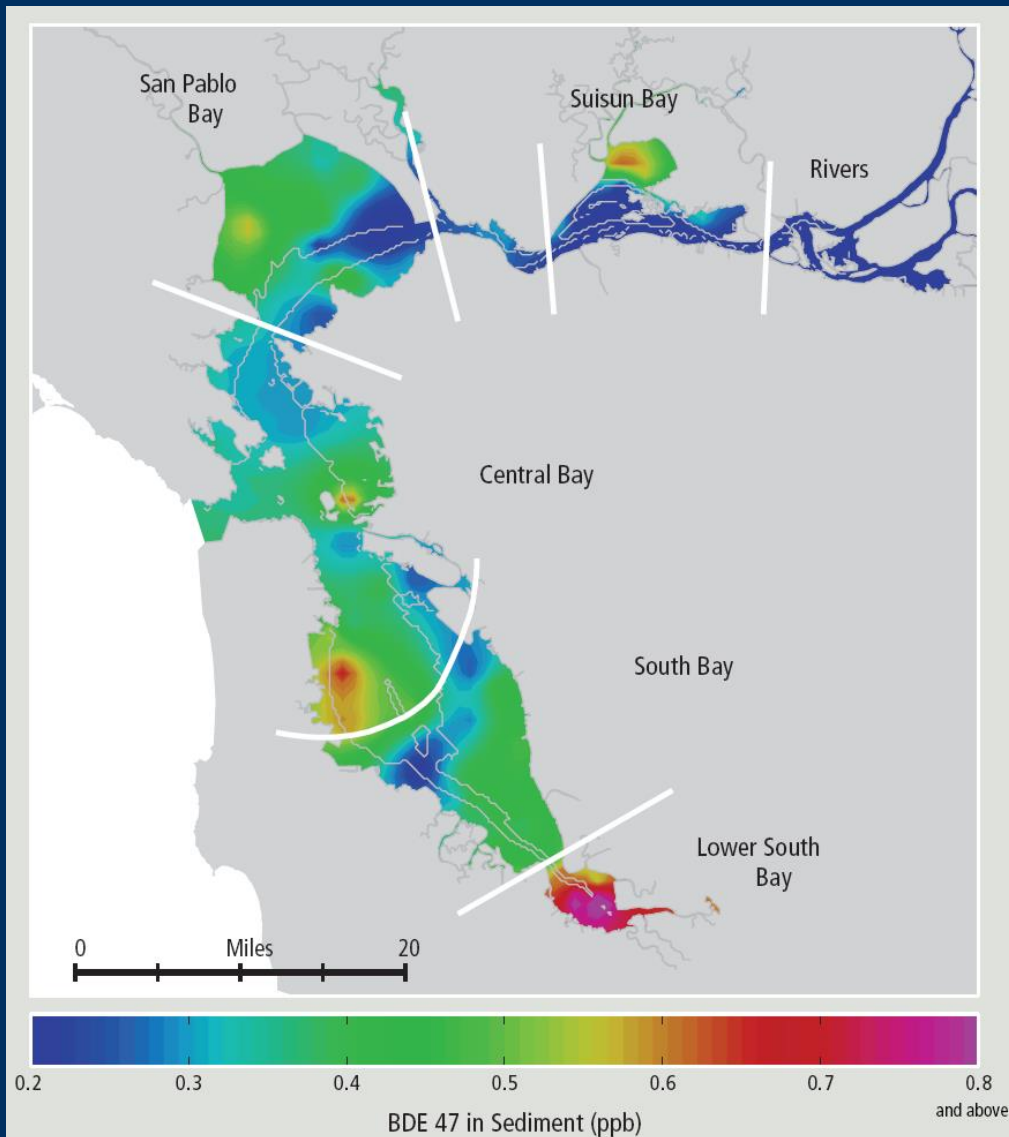
Status and Trends Monitoring

Polybrominated Diphenyl Ethers (PBDEs)

BDE 47 in Human Tissues



BDE 47 in Sediment (2004 - 2006)



- Sources in most segments
- No trend
- Similar or higher than other locations worldwide

PBDEs in the Bay Area

Detected in:

- Water, WW effluent, sediment
- Bivalves
- Sport fish
- Harbor seals
- Bird eggs
- People



Penta- and Octa-BDE mixtures banned in 2006

Potential Emerging Contaminants

Pyrethroid pesticides

Most information

Pharmaceuticals and Personal Care Products

Perfluorinated chemicals

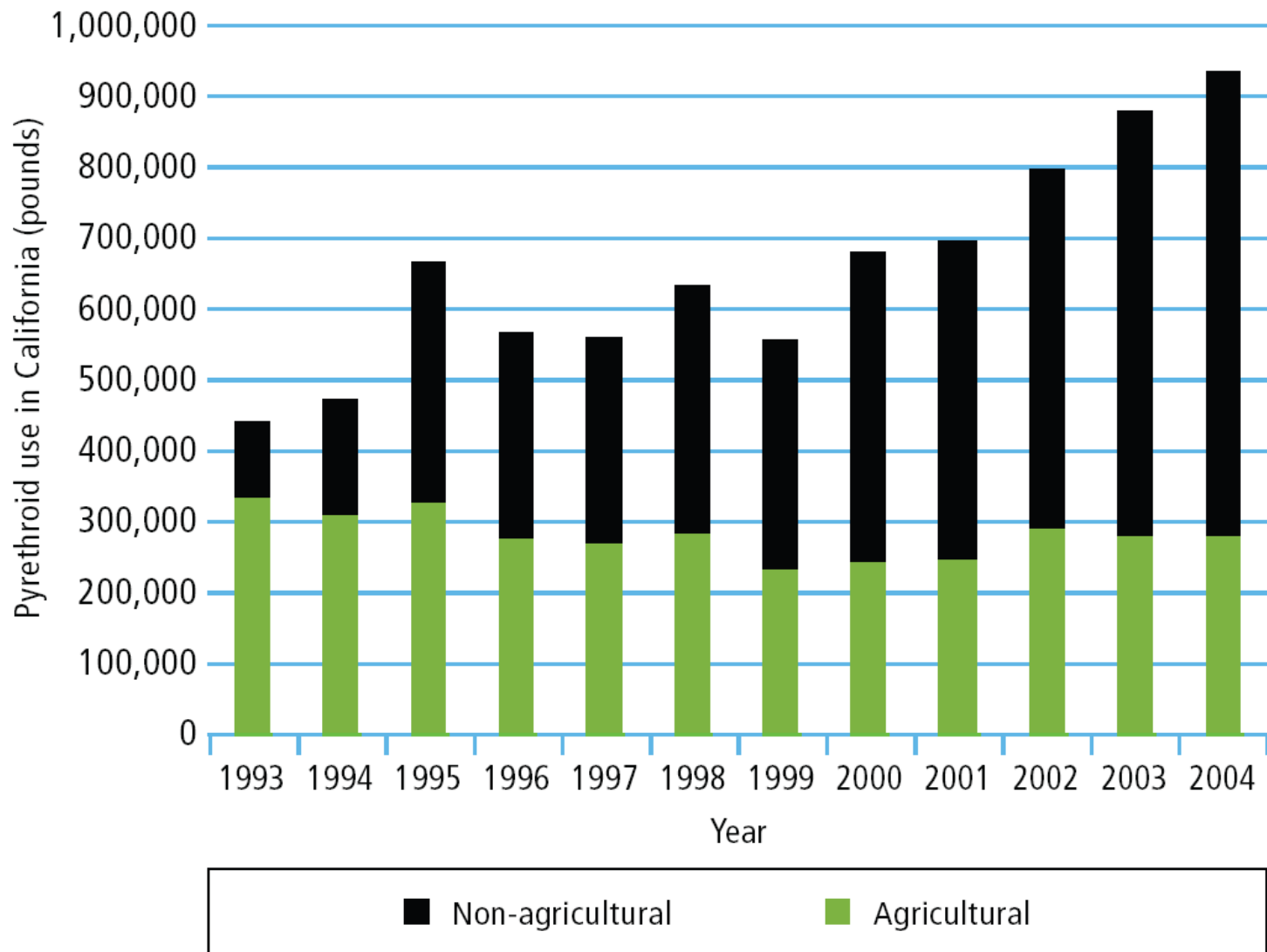
Non-PBDE, alternative flame retardants

Nanoparticles

Least information



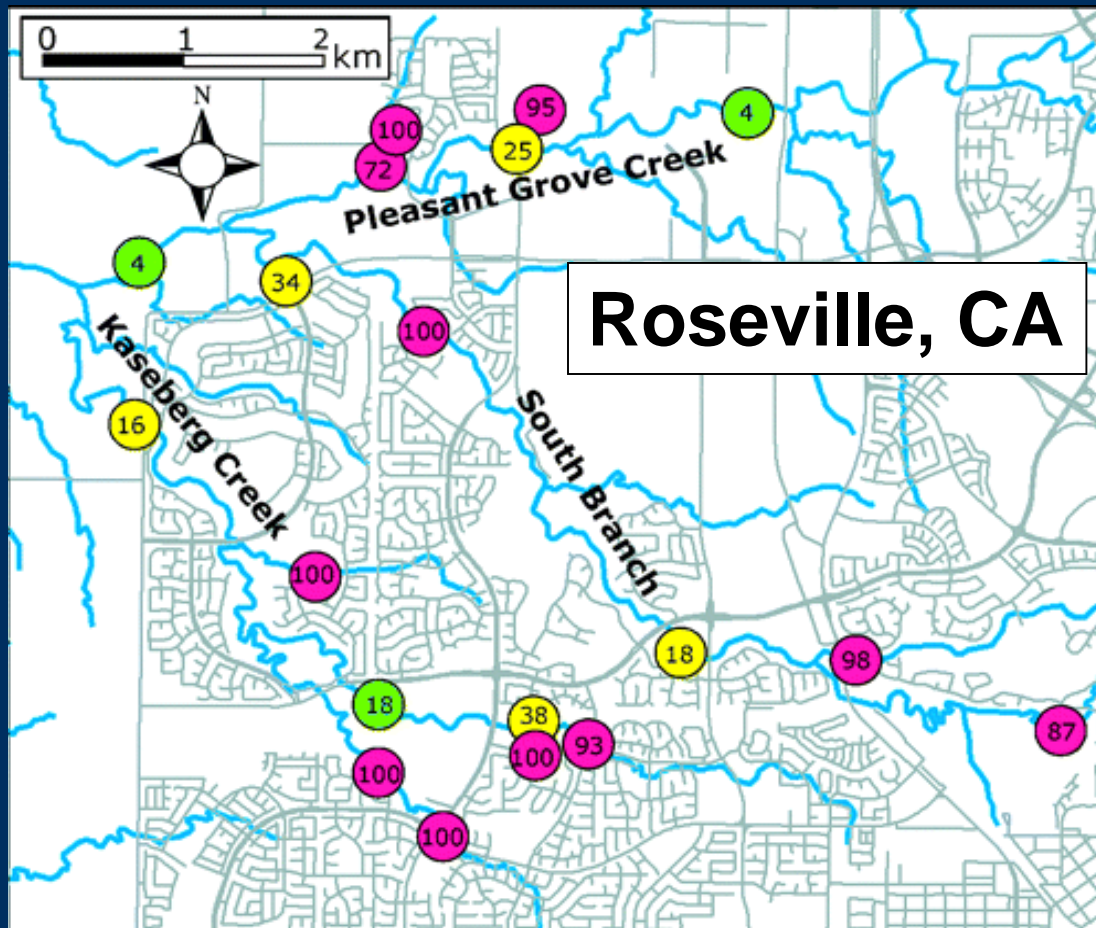
Pyrethroid Pesticides



Data from the Pesticide Use Reporting database of the CA Dept. of Pesticide Regulation

Aquatic Toxicity Due to Residential Use of Pyrethroid Insecticides

(Weston et al. 2005)

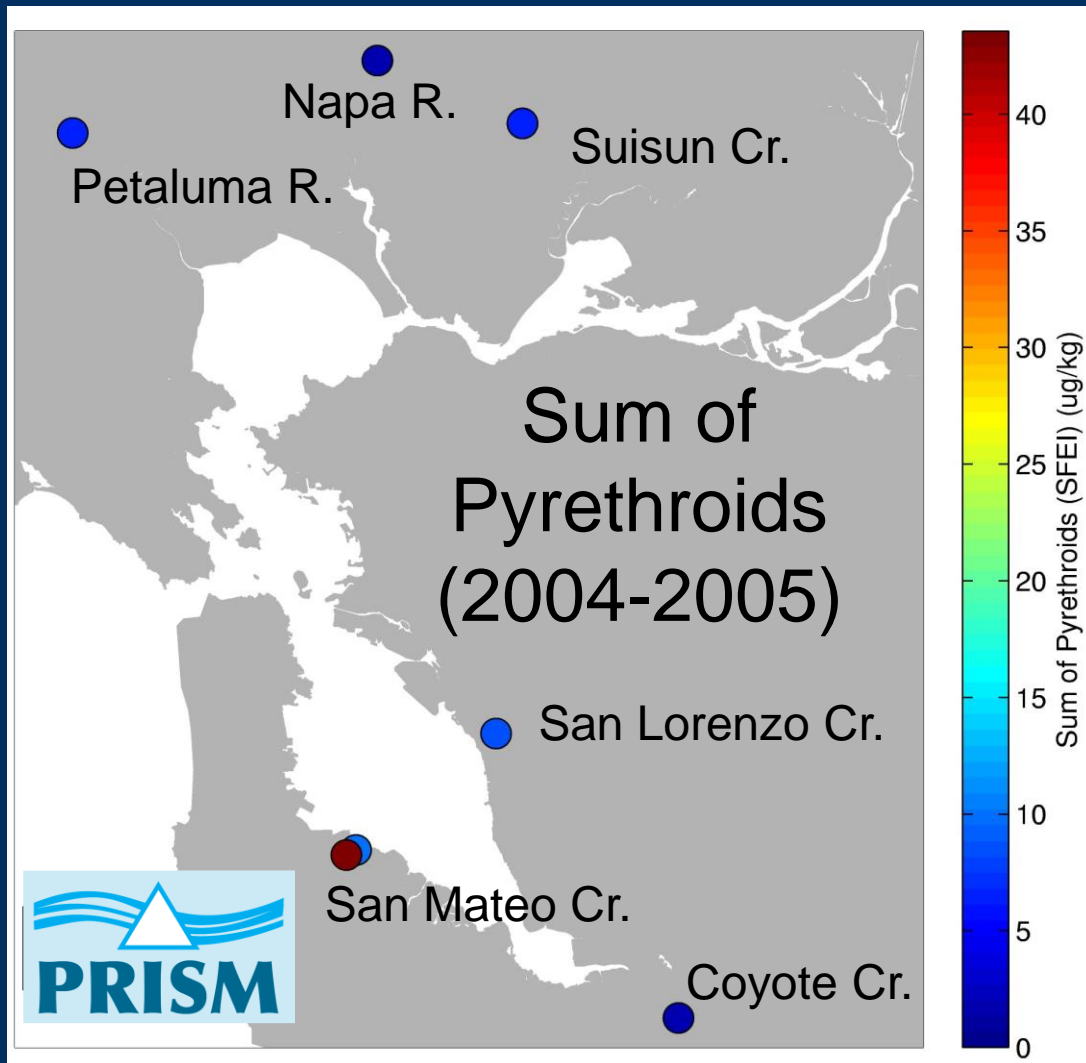


- High toxicity
- Moderate toxicity
- Non-toxic



Hyalella azteca
Freshwater amphipod

Investigations of Sources and Effects of Pyrethroid Pesticides in Watersheds of the San Francisco Bay Estuary



- Detected in urban tributaries
- Source of toxicity ?

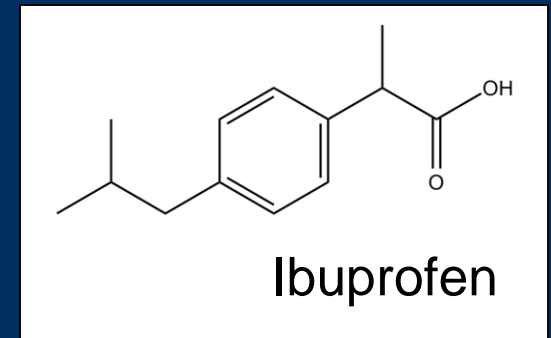
Pharmaceuticals and Personal Care Products

- Previously identified in Bay water

RMP Pilot Study (2007)

Determine concentrations in:

- Influent, effluent from 2 WWTP
- Surface water, 10 South Bay sites



In-kind Contributions

- City of Palo Alto, City of San Jose, AXYS Analytical

Pharmaceuticals and Personal Care Products in the South Bay

Average concentration (ng/L)

compound	influent	effluent	Bay
Acetaminophen	60,000	<500	<300
Albuterol	20	2	<20
Caffeine	60,000	40	70
Ciprofloxacin	500	<300	<100
Codiene	200	<200	<200
Cotinine	1,000	30	<20
Diltiazem	200	30	2
Erythromycin Hydrate	200	200	10
Fluoxetine	20	30	<20
Gemfibrozil	1,000	30	10
Ibuprofen	10,000	<100	<100
Lincomycin	20	2	<5
Roxithromycin	3	<4	<1
Sulfadimethoxine	2	1	<200
Sulfamethoxazole	1,000	70	200
Sulfathiazazole	4	<4	<100
Trimethoprim	300	26	1
Warfarin	5	<1	<1

- Influent > Effluent > Bay Water
- Concentrations in Bay << toxicity thresholds
- Potential Studies for 2009
 - Triclosan
 - Degradation products

Perfluorinated Chemicals (PFCs)

Applications:

Stain repellants, packaging materials, industrial surfactants, fire-fighting foams



Persistent, bioaccumulative, toxic

Perfluorinated Chemicals (PFCs)

RMP Pilot Study:

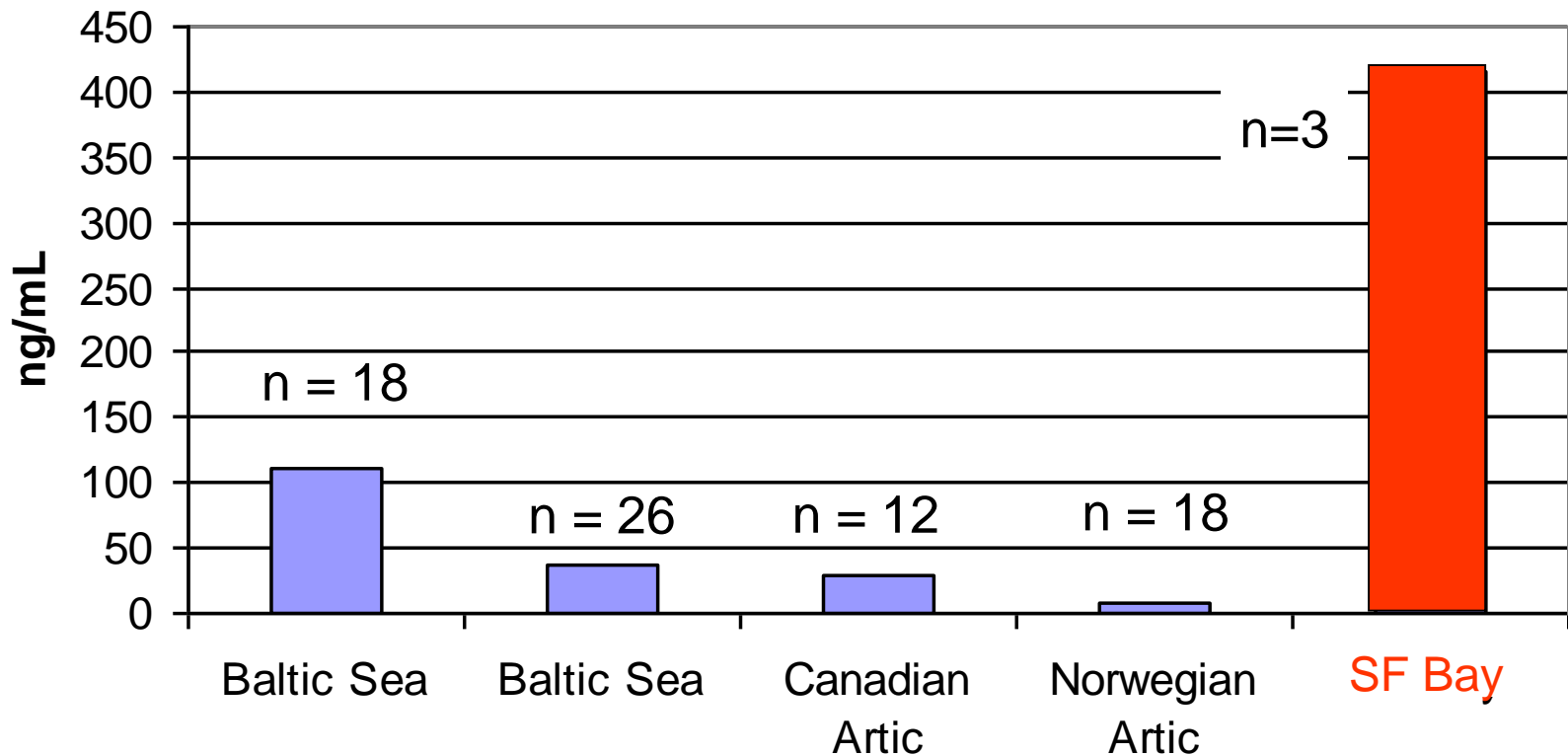
- Collaboration with Marine Mammal Center
- Health of seal population
- PFCs, PBDEs in harbor seal blood
- Exposure to apex predators



Perfluorinated Chemicals (PFCs)



Perfluorooctanesulfonate (PFOS) in Seal Blood: SF Bay vs. Other Locations



Source: Giesy and Kannan 2001

Alternative Flame Retardants: Flammability Standards

1. Consumer product-specific standards



2. CA Furniture Flammability Standard (TB 117, 1975)

- Polyurethane foam
- CA first, only state to have standard
- Penta-BDE



3. National Mattress Flammability Standard (July 1, 2007)

4. National Furniture Flammability Standard (in development)

Chemical	2002 Prod. Vol. (lbs)	Accumulates	Persists	Eco Tox	Mam Tox
Tris(1,3-dichloro-2-propyl)phosphate (TDCPP)	10-50M	?	M?	M	H
Triphenylphosphate (TPP)	10-50M	H?	L?	H	?
Octyl tetrabromobenzoate (OTB)	?	?	?	H?	?
Tetrabromobisphenol A (TBBPA)	100-500M	L	M	H	H
Hexabromocyclododecane (HBCD)	10-500K	H	H	H	H
Decabromodiphenylethane (DBDPE)	?	L	H?	?	?
1,2-Bis(2,4,6-tribromophenoxy)ethane (BTBPE)	1-10M	H?	M?	?	?
Pentabromoethylbenzene (PBEB)	0	M?	M?	?	?
Dechlorane Plus (DP)	1-10M	L	H	?	?

2008 Pilot Study: Alternative Flame Retardants in San Francisco Bay

with the Marine Mammal Center
EBMUD, Duke University, Skidaway Institute of Oceanography

Analyze bioaccumulative compounds in:

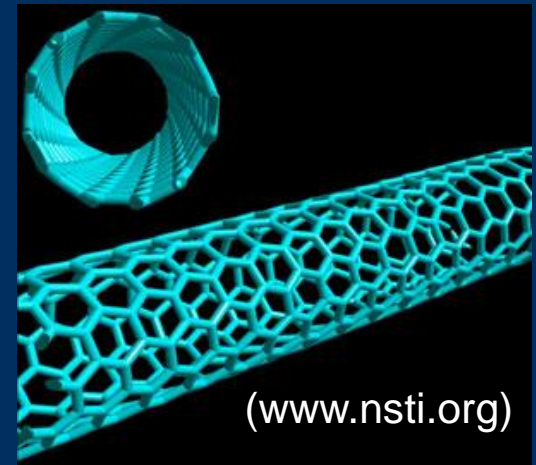
- harbor seal blubber
- sport fish
- cormorant eggs



Analyze non-bioaccumulative compounds in:

- Bay surface water
- WWTP influent, effluent (if feasible)

Nanoparticles



Applications:

electronics, biomedical, pharmaceutical, cosmetic, environmental

Production: 2000 tons in 2004, 30-fold increase by 2011-2020

A Concern in the Bay?

- Bioavailable, toxic to aquatic organisms
- Urban sources
- Colloidal fraction or form aggregates
- Adsorbent for metals and organic contaminants

Emerging Contaminant Workgroup

- Approach works
- Making progress on new issues
- 5 Year Work Plan in development
- Surveillance monitoring continues

How balance priorities?
'New' vs. Legacy chemicals

