

# Brominated dioxins in San Francisco Bay sport fish

Study proposal for 2010

RMP Emerging Contaminants Workgroup Meeting  
April 17<sup>th</sup>, 2009



SAN FRANCISCO ESTUARY INSTITUTE

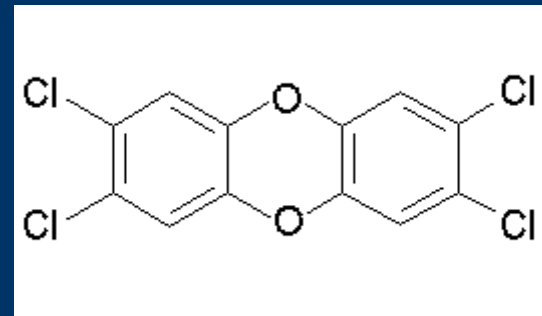
[www.sfei.org](http://www.sfei.org)

# Brominated dioxins and furans (PBDD/Fs)

Brominated analogues of chlorinated dioxins/furans (PCDD/Fs)

## Sources

- impurities in BFR mixtures
- combustion of products containing BFRs and products containing Br additives (gasoline)
- photolysis of PBDEs



# PBDD/F Occurrence Data

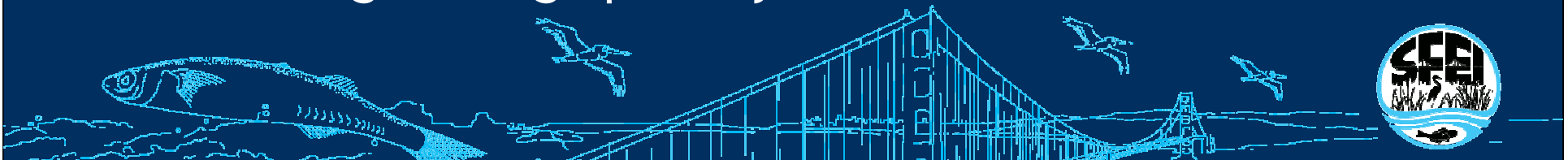
- Data is scarce
- Chinese air: e-waste recycling facility Sediment (Hong Kong and Korea): 1-2 orders of mag. lower than PCDDs
- Baltic Sea mussels: analyzed di-tetra only; 0.1-160 ng/g lipid, tri congener 160 ng/g, biogenic?
- Scottish shellfish: 0.04-0.1 pg/g TEQ; 1-6X lower than PCDDs
- Japanese fish: 0.01-25 pg/g wet wt; 0.001-0.3 pg/g TEQ
- Japanese Cormorant eggs: 30-160 pg/g lipid; ~2 orders of magnitude higher than PCDDs (Watanabe et al 2004)
- Human milk (Belgium) and adipose tissue (Japan)
- Can be transferred from BFR-containing consumer products to house dust
- Concentrations appear to be significantly lower than PCDD/DFs and dioxin-like PCBs

# PBDD/F Toxicity

- Equal or greater toxicity than PCDD/Fs
- No TEFs assigned due to lack of tox and environmental data

Recent concern:

- High volume and ubiquitous use of BFRs (in-use and new products)
- Concentrations expected to increase
- WHO panel recommended a more thorough exposure analysis for humans is needed and that among all compounds proposed for development of TEFs, PBDD/DFs should be given high priority.

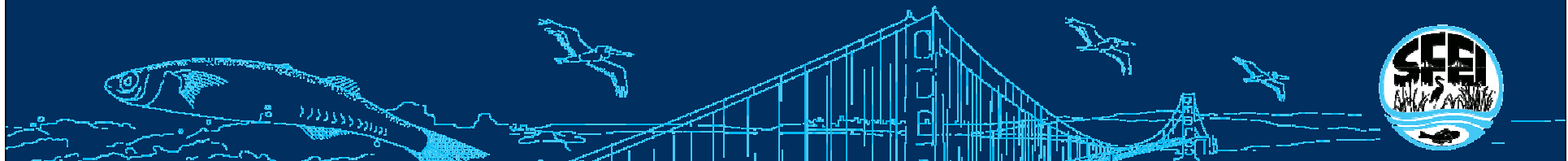


# Concern for San Francisco Bay?

- Correlations with PBDEs in air, sediment, house dust
- Atmospheric transport from e-waste/recycling regions (i.e. Asia)?
- Autoshredder facilities?
- Bromine-containing consumer product manufacturing?
- Vehicle exhaust?

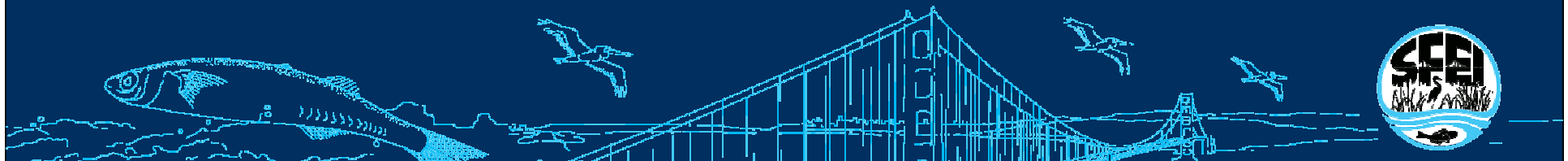
RMP dioxin strategy 2008-2012:

Opportunity to see if PBDD/Fs are an issue in SF Bay foodweb



# Study Objectives

- Determine whether PBDD/Fs are present in the Bay foodweb
- Determine their TEQ concentrations relative to PCDD/DFs and dioxin-like PCBs
- Identify areas of concern within the Bay



# Possible Approaches

1. 10 samples of sport fish
  - 2009 white croaker and shiner surfperch
  - Funding for PCDD/F analysis from Dioxin Strategy
  
2. 10 samples of bird eggs
  - 2009 cormorant eggs (3 comps x 3 sites + 1)
  - No funding for PCDD/DF analysis from RMP Dioxin Strategy
  
3. Suite of dioxin-like compounds in fish
  - Include PCDD/Fs, dioxin-like PCBs, PCNs
  - 2009 white croaker and shiner surfperch
  - Funding for PCDD/F analysis from Dioxin Strategy
  
4. Analyze archived samples if needed in the future

<b>AXYS Analytical Typical Detection Limits</b>	
	SDL's
<b>Matrix</b>	Solids/Tissues
<b>Units</b>	<b>pg/g (ppt)</b>
<b>Sample Size</b>	10 grams
<b>2,3,7, 8-TBDD</b>	0.5
<b>1,2,3,7,8-PeBDD</b>	0.5
<b>1,2,3,4,7,8/1,2,3,6,7,8-HxBDD</b>	0.5
<b>1,2,3,7,8,9-HxBDD</b>	0.5
<b>OBDD</b>	2
<b>2,3,7,8-TBDF</b>	0.5
<b>1,2,3,7,8-PeBDF</b>	0.5
<b>2,3,4,7,8-PeBDF</b>	0.5
<b>1,2,3,4,7,8-HxBDF</b>	0.5
<b>1,2,3,4,6,7,8-HpBDF</b>	0.5
<b>OBDF</b>	2

PCDD/Fs in RMP fish  
collected in 2000:

- 0.1-3 pg/g wet wt
- Most 0.1-0.4 pg/g
- Could increase sample size



Task	Estimated Cost
Sport fish PBDD/DF and PCDD/DF analysis - 10 samples total, various sites depending on availability - Funding for PCDD/DF analysis from RMP Dioxin Strategy	\$9,000
Cormorant egg PBDD/DF and PCDD/DF analysis - 10 samples total; 3 samples x 3 sites + 1 additional to meet 10 minimum - PCDD/DFs \$700/sample; PBDD/DFs \$900/sample - <u>No</u> funding for PCDD/DF analysis from RMP Dioxin Strategy	\$16,000
Sport fish PBDD/DF, PCDD/DF, coplanar PCB, PCN analysis - 10 samples total, various sites depending on availability - Funding for PCDD/DF analysis from RMP Dioxin Strategy - PBDD/DFs \$900/sample; coplanar PCBs \$650/sample*, PCNs \$800/sample*	\$23,500
Project Management	\$2,000
Data Management	\$3,000
Data Analysis and Reporting	\$5,000
Shipping, miscellaneous expenses	\$1,000
Total for sport fish PBDD/DF and PCDD/DF analysis	\$20,000
Total for cormorant egg PBDD/DF and PCDD/DF analysis	\$27,000
Total for sport fish PBDD/DF, PCDD/DF, coplanar PCB, PCN analysis	\$34,500