

Applying Lessons Learned from San Francisco Bay to the Delta

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Monitoring Tied to Management Actions

- What are the key data needs to inform decision-making?
- Goals drive study design



Class-based Approach

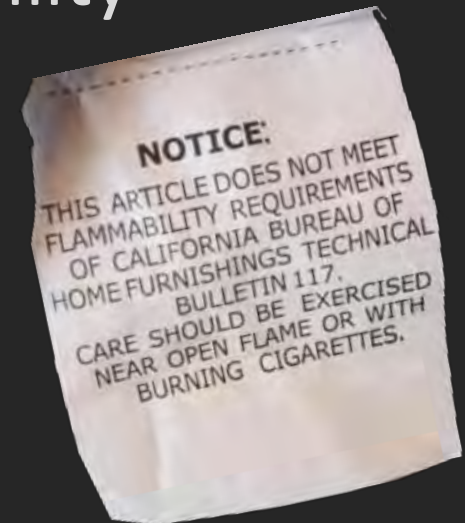
- Chemical class
 - Similar structure, chemical properties may mean similar toxicity / fate
- Functional class
 - Use of alternatives increases following a ban or phase-out
- Proactive, protective of water quality
 - Accounts for “regrettable substitution”

Classes of CECs

1. Flame Retardants
2. Pharmaceuticals
3. Personal Care & Cleaning Products
4. Fluorinated Substances
5. Plastic Additives
6. Hormones
7. Everything Else!

1. Flame Retardants

Added to products to meet flammability standards



Potential management actions

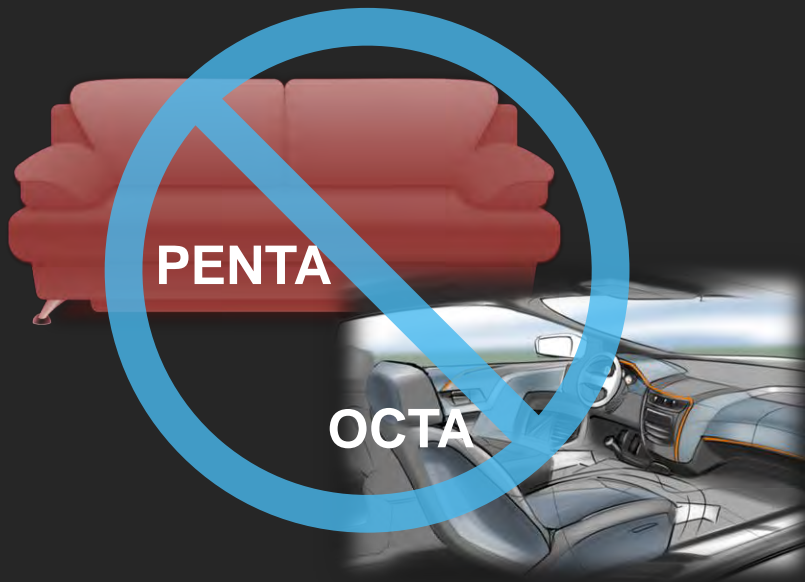
- Bans / phase-outs
- Review & revise flammability standards

1. Flame Retardants

Polybrominated diphenyl ethers (PBDEs)

- San Francisco Bay – Contamination Hot Spot

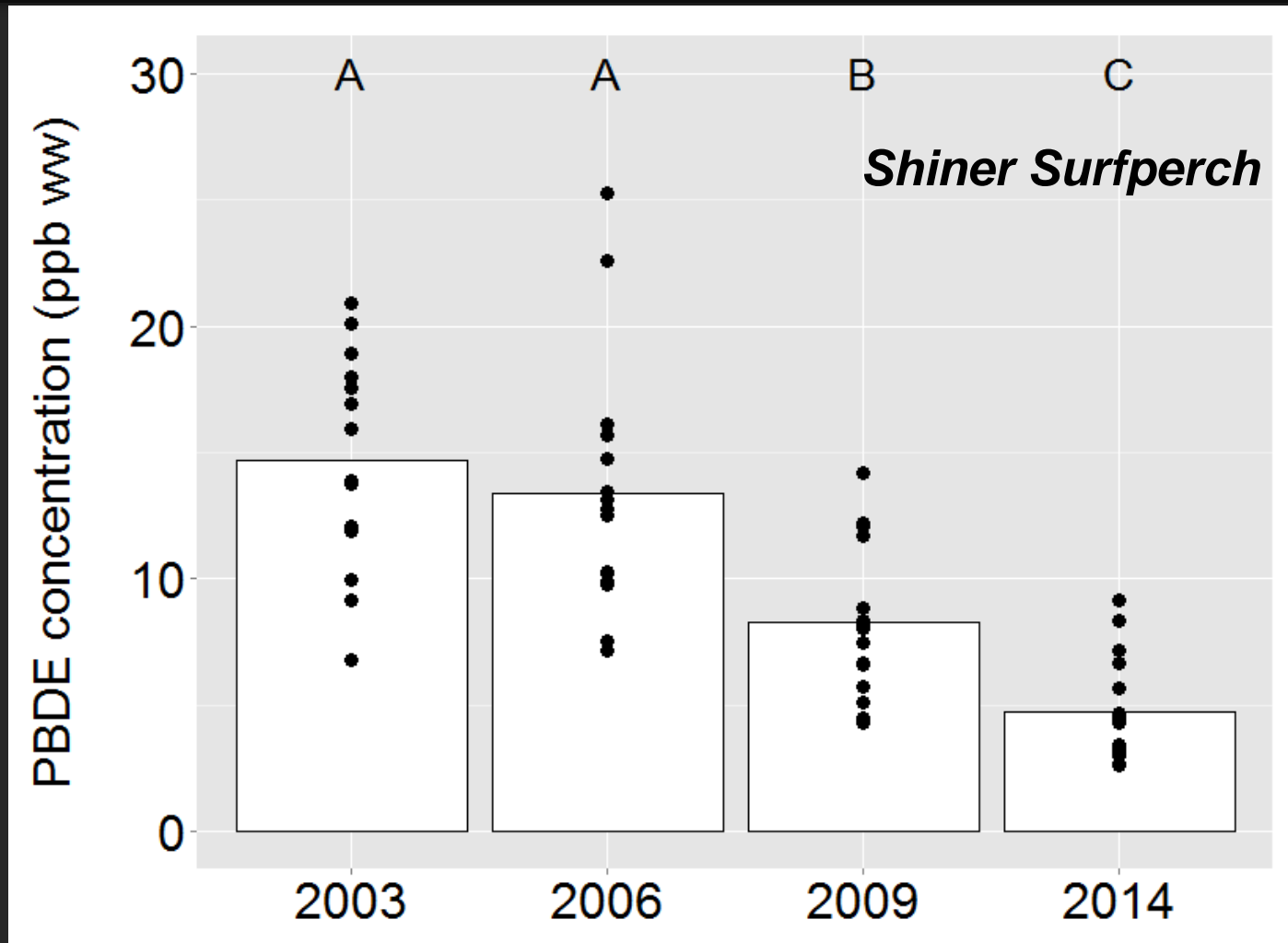
US Phase-out 2004
(ahead of CA ban)



US Phase-out 2013



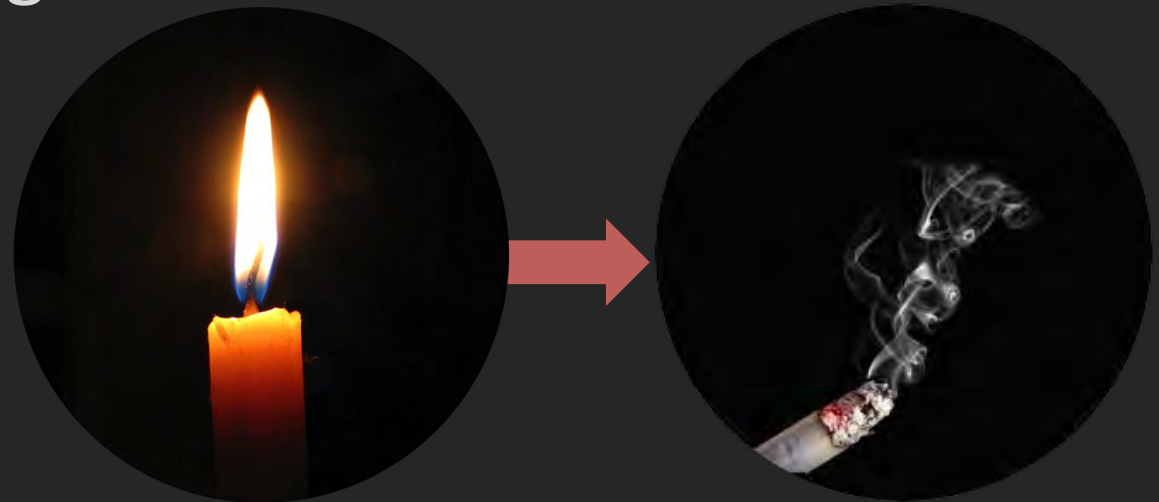
1. Flame Retardants



1. Flame Retardants

Alternatives to PBDEs in products and SF Bay

- Regrettable substitution
- Address flammability standards
- Product labeling



1. Flame Retardants

Recommendations

- PBDEs – Sediment, Tissue
- Consider: Phosphate Flame Retardants –
Water, Sediment
 - Triphenyl phosphate, chlorinated phosphates
 - Widely detected, toxicity concerns
 - Commercial, agency, academic laboratories

2. Pharmaceuticals

Potential management actions

- Drug takeback programs
 - Over-the-counter medications may be included



2. Pharmaceuticals

Recommendations

- Diclofenac & Ibuprofen – Water
- Consider: Metformin – Water
 - Widely prescribed diabetes drug
 - Recent, widespread detection in aquatic systems
 - Reproductive impacts in fish

3. Personal Care & Cleaning Product Ingredients

Potential management actions

- Bans / phase-outs
- Reformulation guided by green chemistry
- Improved product labeling
- Purchasing / procurement



3. Personal Care & Cleaning Product Ingredients

Recommendations

- Triclosan, Galaxolide – Water, Sediment
- Consider: Triclocarban – Water, Sediment

Multiple sources / consumer products

- Do not exclude urban runoff



4. Fluorinated Substances

Water & stain resistant coatings for textiles, food packaging, others (Teflon, Scotchgard); fire fighting foams; other consumer/industrial uses

Potential management actions

- Bans / phase-outs
- Reformulation – guided by green chemistry
- Purchasing / procurement

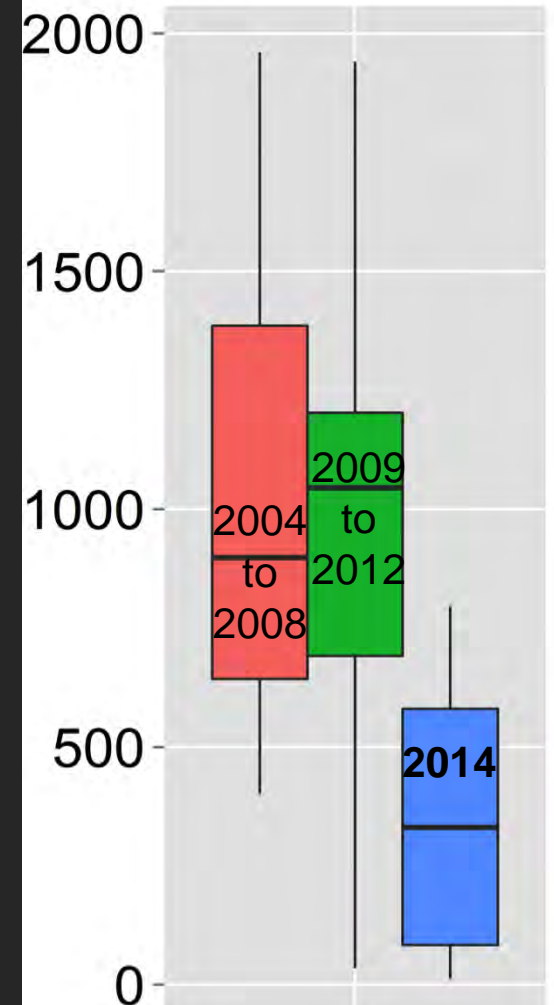
4. Fluorinated Substances



Signs of Recovery

South Bay
Harbor seals

PFOS in Serum
(ng/g or ng/mL)



4. Fluorinated Substances

Recommendations

- PFOS – Sediment, Tissue
- Consider: PFOA & PFOS in Water
 - USEPA drinking water health advisory: 70 ppt

5. Plastic Additives

Potential management actions

- Bans / phase-outs
- Reformulation – guided by green chemistry
- Purchasing / procurement

5. Plastic Additives

Recommendations

- Bisphenol A – Water
- Consider: Bisphenol S – Water

Multiple sources / consumer products

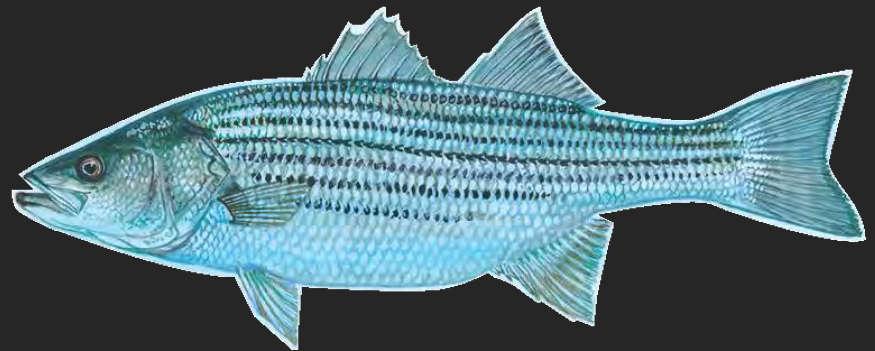
- Do not exclude urban runoff



6. Hormones

Potential management actions

- Develop bioanalytical tool to screen for estrogenicity



6. Hormones

Recommendations

- Estrone and 17 β -estradiol – Water
- Consider: Complementary use of bioanalytical tools to advance validation
 - Detects signals from other estrogenic CECs

7. Everything else?

Seek guidance from:

- Scientific literature & meetings
- Experts – CECs & Delta region

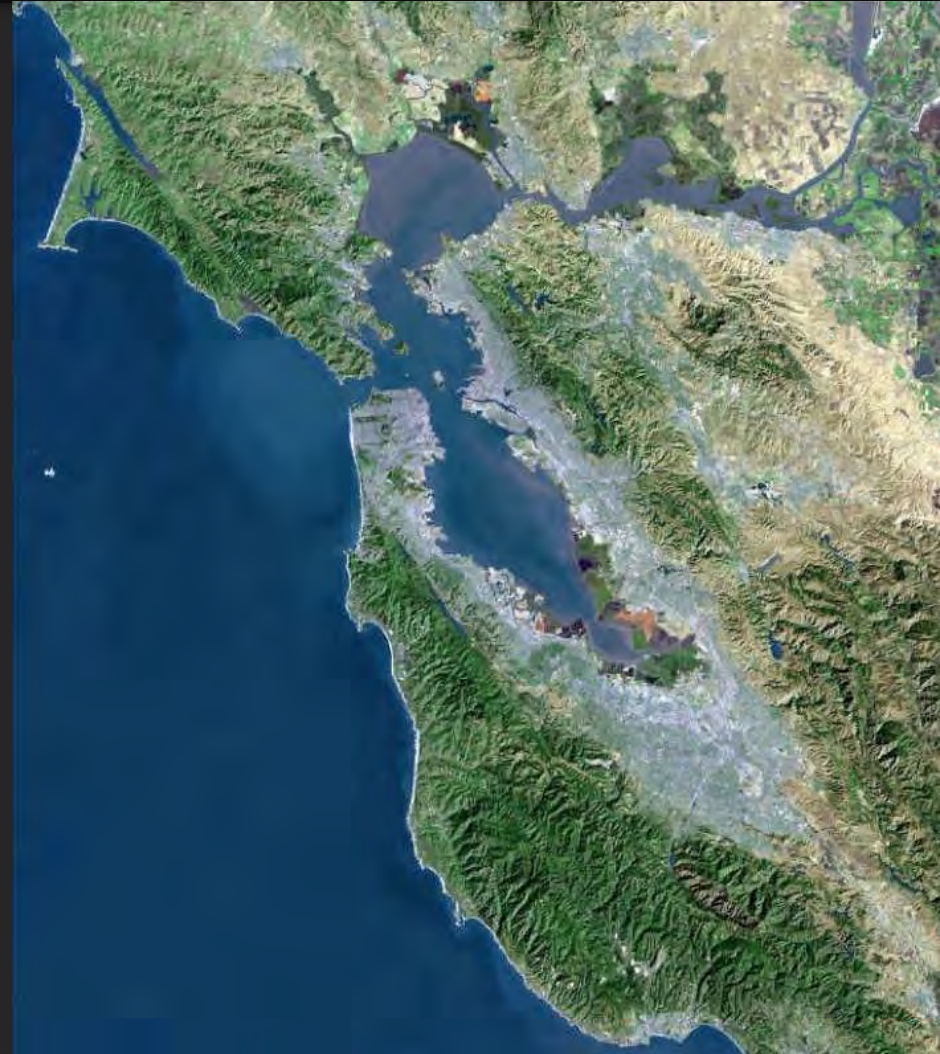
Non-target Analysis can identify unexpected contaminants

- Broad scans needed for polar (LC) and nonpolar (GC) technologies

Phased Monitoring Study Design

1. Monitor receiving waters
 - Regions of concern

2. Then effluent & stormwater
 - High volumes
 - Treatment types, unique communities



Regional Insights

Unique attributes of Delta

- Agriculture:
 - Land application of **biosolids**: May contribute to Russian River PFOS levels in fish near coast
- Fracking



Conclusions

CECs study design guided by:

- Management actions
- Class-based approach
- Scanning the horizon
 - Monitor science, Non-target Analysis
- Phased monitoring
- Regional insight