

Overview of the ECWG Five-year Plan & Strategy

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Emerging Contaminant Workgroup Meeting
April 3, 2008



Outline

- Structure of RMP
 - RMP Management Questions
- Management and regulatory context for ECs
- Goals for ECWG
 - Priority question(s)
- Strategy for identifying chemicals
 - Update from Derek Muir
- Five-year plan and budget

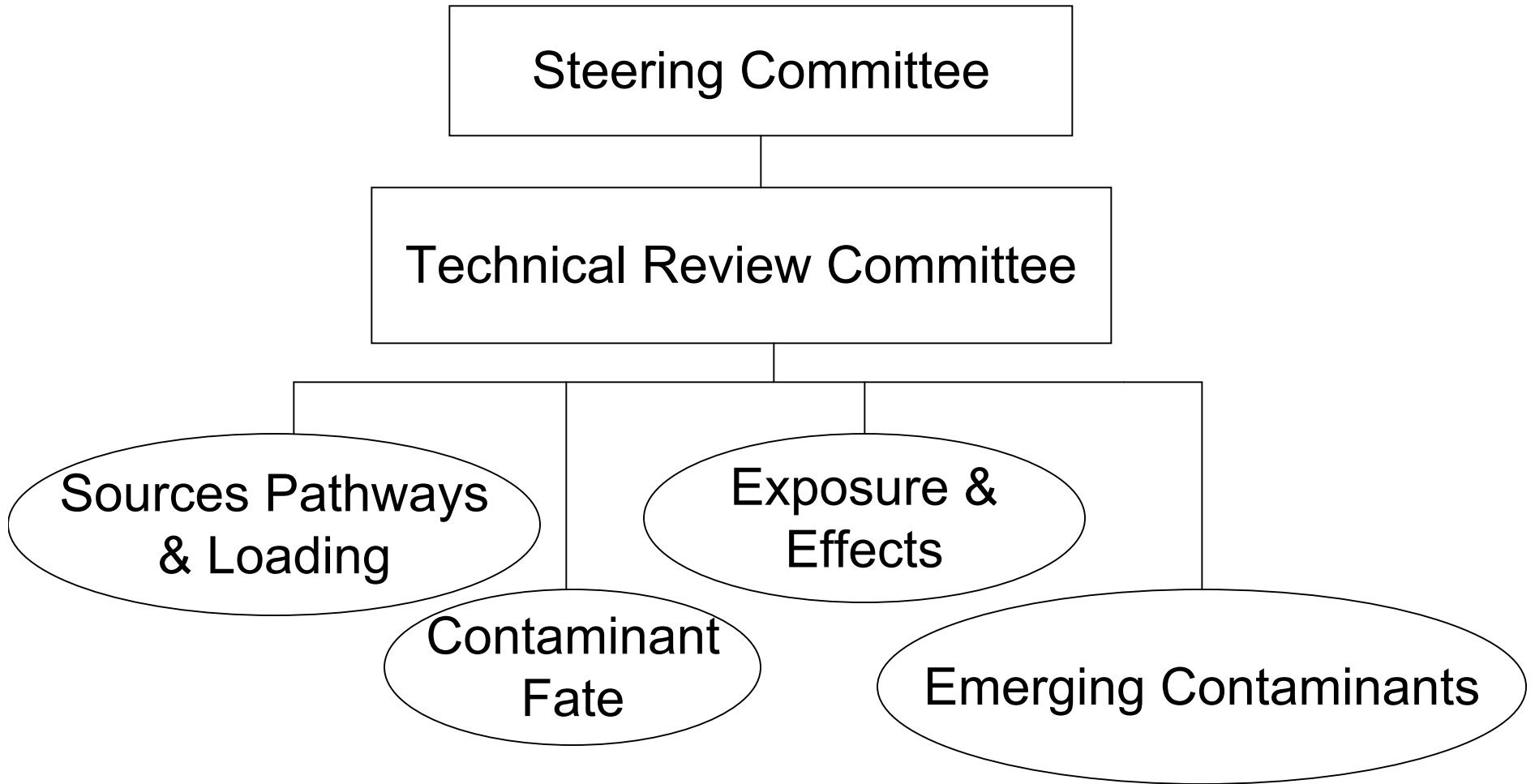


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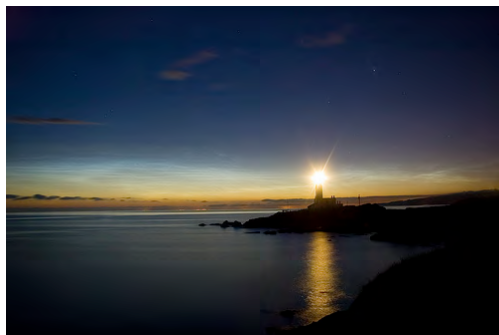
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Structure of the RMP



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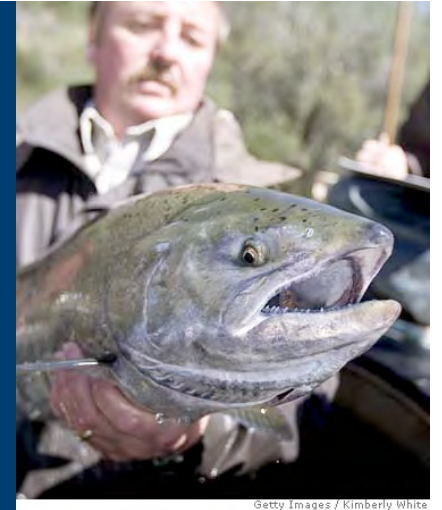


Relevant RMP Management Questions

- **MQ1. Are chemical concentrations in the Estuary at levels of concern and are associated impacts likely?**
 - **Which chemicals have the potential to impact humans and aquatic life and should be monitored?**
- MQ2. What are the concentrations and masses of contaminants in the Estuary and its segments?
- MQ3. What are the sources, pathways, loadings, and processes leading to contaminant-related impacts in the Estuary?
- MQ4. Have concentrations, masses and associated impacts of contaminants in the Estuary increased or decreased?
- MQ5. What are the projected concentrations, masses and associated impacts of contaminants in the Estuary?

Management Context

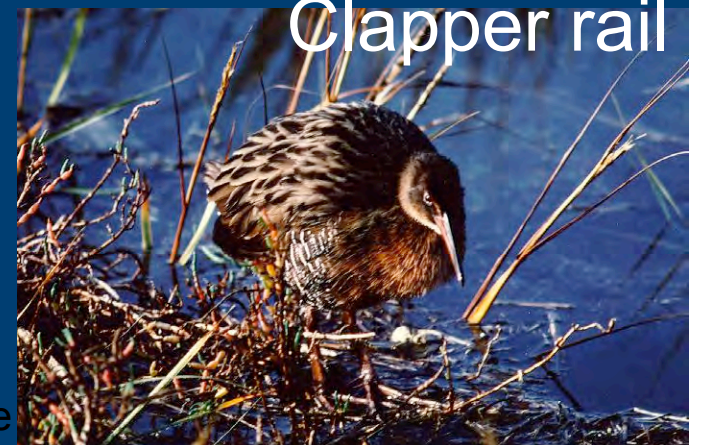
- SF Bay critical habitat for many species
 - Fish including estuarine (e.g., Delta smelt), marine (e.g., herring & anchovies), and anadromous fish (e.g., Chinook salmon, steelhead)
 - Endangered species (e.g., CA Clapper rail and salt marsh harvest mouse)



Getty Images / Kimberly White



Herring

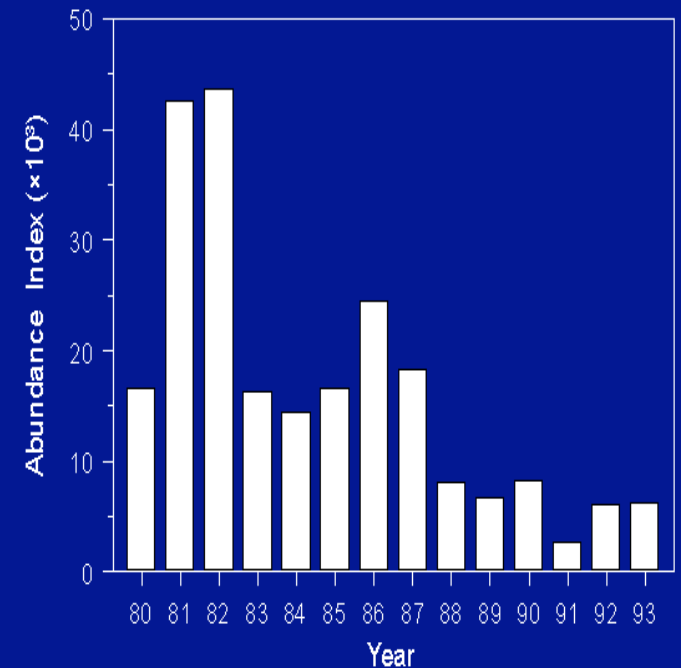
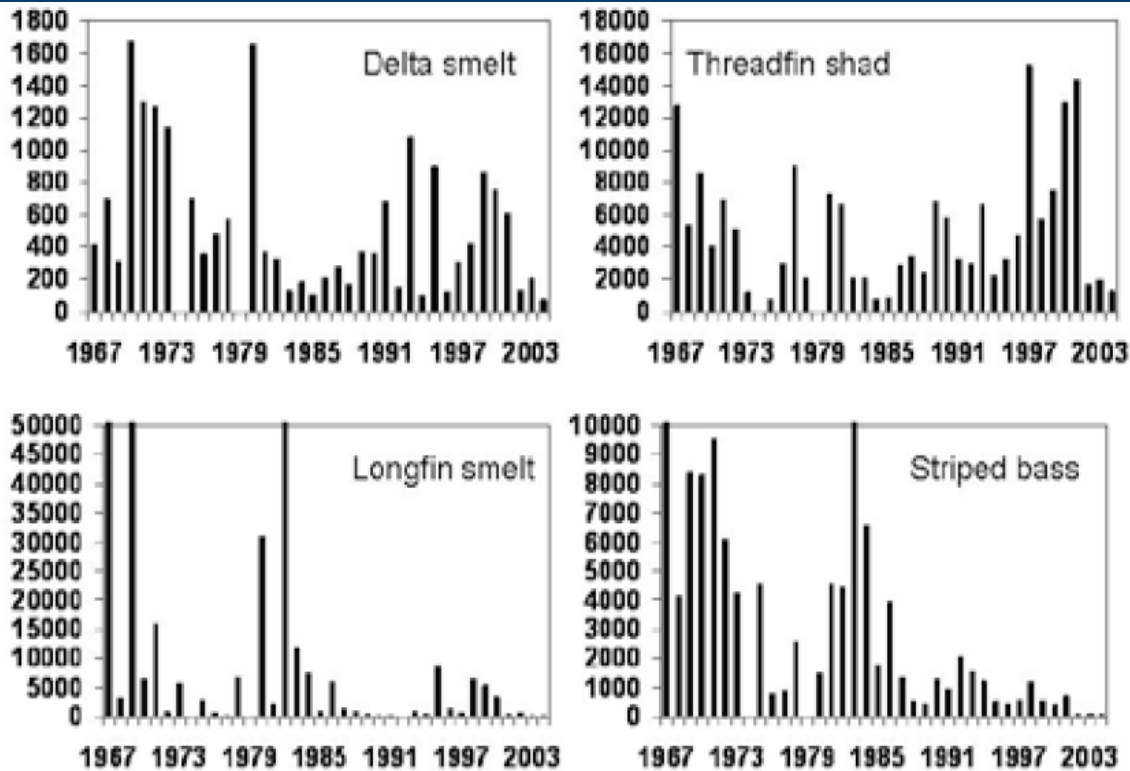


Clapper rail

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Management Context

- Many SF Bay species are in decline
- Variety of hypotheses including ECs



Source: CDFG and Delta Smelt Action Plan (2005)

Shiner surfperch

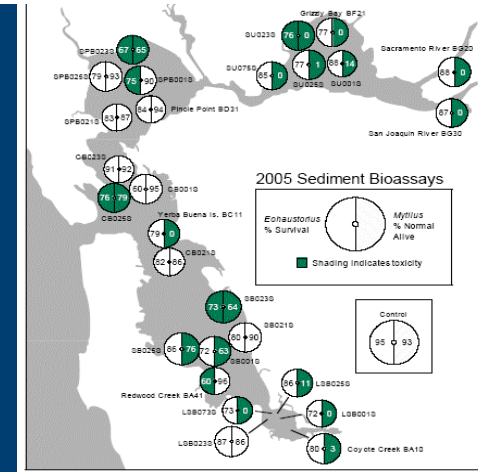
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Management Context

Shiner surfperch

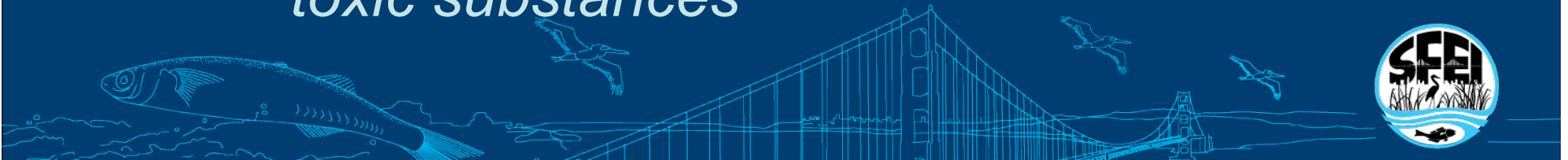
- A number of RMP studies underway
- PS - Evaluating impairment of endocrine system in SF fish (shiner & sculpins)
 - Elevated cortisol levels
- S&T - Evaluating the causes of persistent sediment toxicity
 - TIEs
- Field observations
 - Crossed bills in SBSP birds



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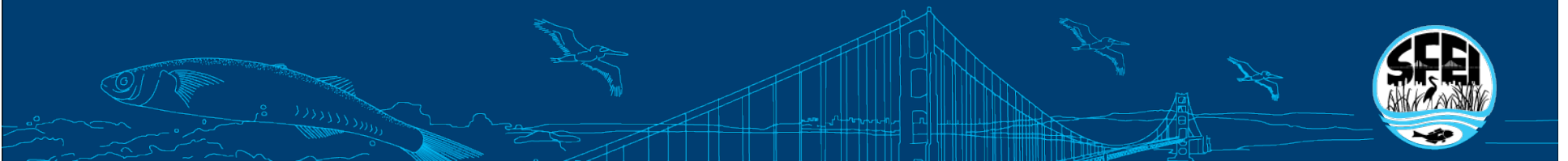
Regulatory Context

- No objective or criteria for emerging contaminants
- However, there are narrative objectives:
 - *all waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce significant alterations to populations or detrimental responses*
 - *water quality factors shall not cause a detrimental increase in concentrations of toxic substances*



Purpose of EC Workgroup

- Goals:
 - To develop cost-effective strategies to identify and monitor ECs
 - To recommend studies to TRC/SC
 - To recommend ECs for inclusion into long-term monitoring (Status and Trend Annual Monitoring)





Emerging Contaminant Priority Question

- What emerging contaminants have the greatest potential to adversely impact beneficial uses in the Bay?





Emerging Contaminant Priority Question



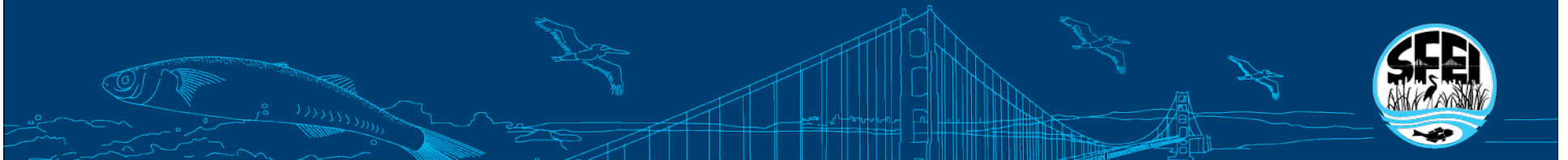
- What emerging contaminants have the greatest potential to adversely impact beneficial uses in the Bay?



Strategy for Identifying Chemicals

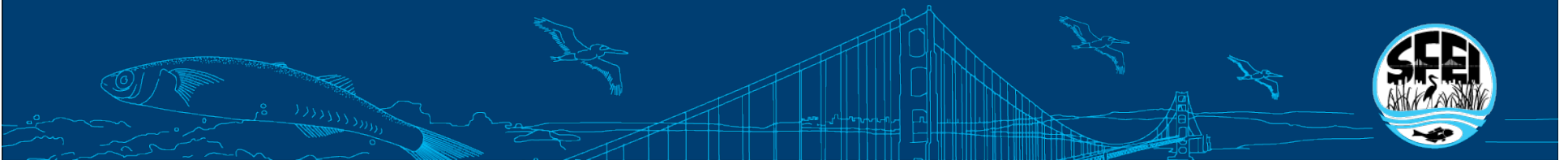
The Challenge

- 100,000++ chemicals in commerce
 - 30,000 used in quantities > 1 ton per year (Muir and Howard 2006)
- RMP only monitors ~ 50 chemicals or classes of chemicals



So how does the RMP choose which chemicals to look for?

- Literature review
 - Widely used
 - Persistence
 - Bioaccumulative
 - Toxic (e.g., mutagenic, carcinogenic)



Top 30 Bioaccumulative and Persistent Substances

Disadvantages with modeling efforts:

- Very little information on:
 - toxicity
 - degradation/metabolites
- Few off-the-shelf analytical techniques
- Maybe intermediates – unlikely release
- Potential for false positives/negatives
 - Peroxides/Dechlorane Plus

TABLE 2. Top 30 Bioaccumulative and Persistent Substances

no.	Chemical Name	no.	log K _{ow}	log K _{ow}	log K _{ow}	log K _{ow}	log K _{ow}	log K _{ow}	log K _{ow}	log K _{ow}	log K _{ow}	log K _{ow}	log K _{ow}	log K _{ow}	log K _{ow}	log K _{ow}	log K _{ow}
1	[1,1'-bi-2-naphthyl] (BINOL)	15086949	6.91	4.75	4.22	182	S	LPVC									
2	benzene, 1,4-dichloro-	93469	6.39	4.83	4.22	60	W	LPVC									
3	1-naphthylamine, N,N-dimethyl-	540976	6.33	4.83	4.17	60	A	LPVC									
4	1-octadecanol	128698	6.26	4.82	4.12	182	S	LPVC									
5	spirol[3,4-cd:9,10-c'd']dipyran-1,3,8,10-tetrone	515037	6.00	4.78	3.92	182	S	LPVC									
6	spirol[3,4-cd:9,10-c'd']dipyran-1,3,8,10-tetrone	22524910	7.66	4.95	3.91	182	S	LPVC									
7	peroxybis(2,2,6,6-tetramethyl-1,3-dioxane)																
8	peroxybis(2,2,6,6-tetramethyl-1,3-dioxane)																
9	anthracene, 1,3,8-trimethyl-																
10	anthracene, 1,3,8-trimethyl-																
11	spirol[isobenzofuran-1(3H),9'-[9H]xanthen]-3-one, 2',4',5',7'-tetrabromo-3',6'-dihydroxy-	15086949	6.91	4.75	4.22	182	S	LPVC									
12	1,4-benzenediamine, N,N-di-2-naphthalenyl-	93469	6.39	4.83	4.22	60	W	LPVC									
13	cyclohexasiloxane, dodecamethyl- (D6)	540976	6.33	4.83	4.17	60	A	LPVC									
14	peryl[3,4-cd:9,10-c'd']dipyran-1,3,8,10-tetrone	128698	6.26	4.82	4.12	182	S	LPVC									
15	1-naphthalenepropanol, α-ethenyldecahydro-2-hydroxy-α,2,5,5,8a-pentamethyl-, [1R-[1α(R*),2,4a,8aα]]-	515037	6.00	4.78	3.92	182	S	LPVC									
16	benzene, 1,1-dicyclohexyl- pentabromo deriv. (pentaPBDE)	22524910	7.66	4.95	3.91	182	S	LPVC									

EC Strategy

- As a result, we need to use scientific judgment
- EC selection strategy
 - Literature review (e.g., use, persistence, bioaccumulation, and toxicity)
 - Science advisory panel recommendations/ judgement
 - Concern for the Bay
 - Analytical methods available
 - Other programs



Current list of RMP ECs

Table 6. List of emerging contaminants to be considered for study in the RMP

Priority	Compound	Widely Used	Bioaccumulative	Persist	Toxic	Methods Available	Concern for Bay	Panel Recom	Comments
1	Brominated flame retardants (PBDEs and alternatives)	●	●	●	●	●	●	●	Wide class of compounds. Restricted use of PBDEs and some evidence of declining trends. Alternative brominated flame retardants appear to be on the increase. Methods may not be available for all alternatives.
2	Perfluorinated compounds	●	●	●	●	●	●	●	Wide class of compounds. Restricted use of PFOS/PFOA in US and Canada (Toxic substance). Some evidence of declines of PFOS in northern latitude; however, the impact of the use of alternative perfluorinated compounds needs to be determined. Listed by Environment Canada as CEPA-Toxic; USEPA has listed PFOA on the draft Contaminant Candidate list released in February 2008 for potential chemicals to regulate under Safe Drinking Water Act.
3	Chlorinated paraffins	●	●	●	●	●	●		Produced since the 1930s for use as additives in lubricants and cutting fluids, as well as flame retardants in plastics and sealants. Preliminary work on sport fish, cormorant eggs, and harbor seal blubber is being conducted this Spring.
4	Pharmaceuticals/ Personal care products	●	○	○	○	○	○		Wide class of compounds. Preliminary pilot study results suggest that these compounds may be of less of a concern. Should focus on those compounds which are highly toxic such as carbamazepine, diclofenac, indomethacine, sulfamethoxazole or have been shown to have a documented environmental effect.
5	Chlorinated naphthalenes	●	●	●	●	●	●		Dioxin-like toxicity. Byproducts in PCB mixtures and with several other applications. Correlate with PCB concentrations in Great Lakes fish. Commercial production ceased in 1980.

Other Programs

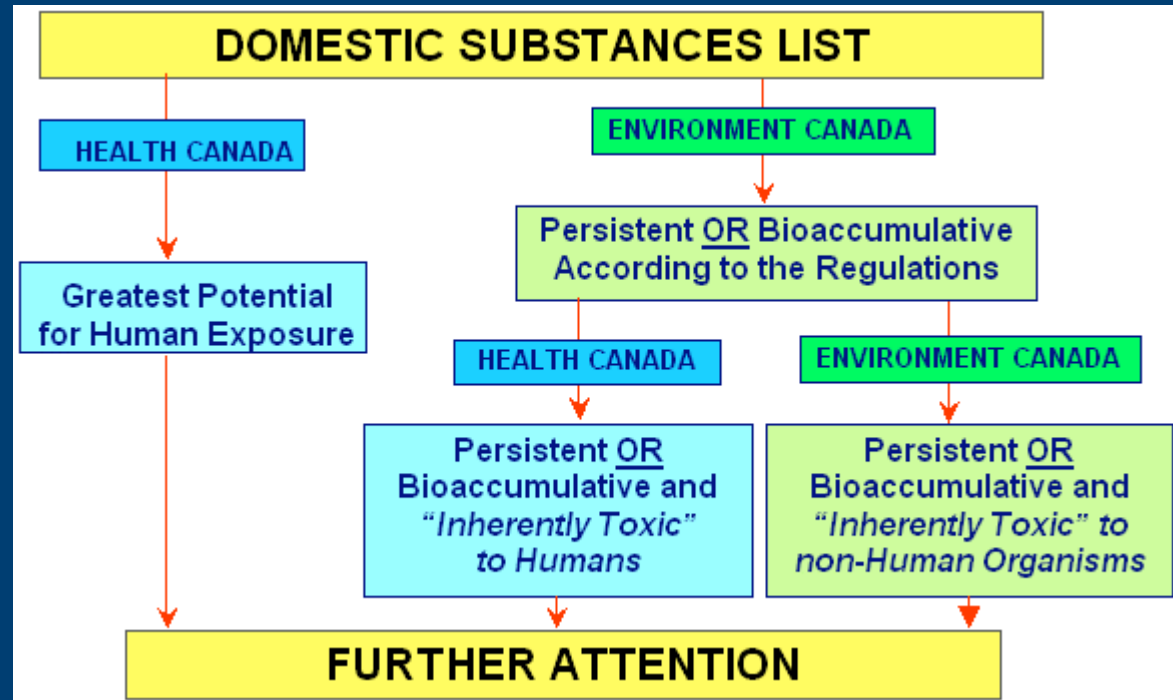
- Great Lakes National Program Office Report (Howard and Muir 2007)
 - Evaluated Canadian DSL, USEPA EHPV, TSCA, UVCBs lists
 - Identified top ten chemicals for brominated, chlorinated, fluorinated, silicone-related compounds, and nonhalogenated
 - Possible PS/SS to evaluate list of compounds and analytical capabilities
 - Bring the study idea forward at next EC meeting?



Other Programs

Canadian Domestic Substance List

Categorization provided baseline information for all chemicals on DSL (chemicals in use > 100 kg)



~ 4,000 chemicals



List of 'Challenge Chemicals' (~200)
Evaluating in batches

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Environment Canada

Categorization of DSL

- Toxic Substances List. 85+ compounds/ classes of compounds. Target for “virtual elimination” (reduction of releases to environment)
 - Mercury
 - Carbon tetrachloride
 - PFOS salts
 - PBDEs



Other Programs

EU's REACH Initiative

- Registration, evaluation, authorization and restriction of chemical substances (REACH)
 - Passed June 1, 2007
- Phased approach for submittal of information based on volume and risk
 - >1000 tons per year (3.5 yr - Dec 2010)
 - 100- 1000 (2013)
 - 1 to 100 (2018)
- Information maintained by ECHA
 - Much of it will be publicly available
 - List of CMR, PBT, and vPvB will be available June 1, 2009



Other Programs

- SCCWRP (Keith Maruya/ Doris Vidal)
 - EDC assays in So. Cal Bight and impacts to fish
- ECWG Santa Clara Watershed Management Initiative (Saskia van Bergen/ Luisa Valiela/ Karin North)
 - White paper on APEs
- California Biomonitoring Initiative (Myrto Petreas)



Five-year Budget

Table 8. Five-Year Plan Cost Estimates and Management Questions Addressed (costs in \$K per year)

Element	Description	Funder/Program	08	09	10	11	12	13	MQs Addressed
Status & Trends Monitoring	Measuring pyrethroids in sediment	RMP							<input type="checkbox"/> 1A, 1B, 2, and 4
Perfluorinated compounds (Part I)	Measuring PFOS in harbor seal blood	RMP PS/SS	\$35K						<input type="checkbox"/> 1A, 1B
Alternative Flame Retardants (Part I)	Measuring alternative flame retardants in water, sediments, sport fish, cormorant eggs, and blubber	RMP PS/SS	\$48K						<input type="checkbox"/> 1A, 1B
Chlorinated paraffins	Measuring chlorinated paraffins in sport fish, cormorant eggs, and blubber	Canadian Dept. of Fisheries and Oceans		\$30K					<input type="checkbox"/> 1A, 1B
PFCa (Part II) – Identifying sources	Measuring PFCs in wastewater, stormwater and groundwater	RMP PS/SS		\$60K					<input type="checkbox"/> 3A, 3B
Alternative Flame Retardants (Part II)	Depending on the results of Part I, it is likely that additional work will be needed. The need for this study will be evaluated in 2009.	RMP PS/SS			\$50K				<input type="checkbox"/> 1A, 1B and/or 3A, 3B
Pharmaceuticals in SF Bay (Part II)	Measuring water, sediment and biota to determine the uptake of pharmaceuticals in Bay	RMP PS/SS		\$30K					<input type="checkbox"/> 1A, 1B
NPE Degradation Products in SF Bay	Measuring degradation products in Bay sediment/water	RMP PS/SS		\$26K					<input type="checkbox"/> 1A, 1B

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Feedback?

- RMP EC Strategy?
- EC list?
- Priority question?
- Five-year plan?