SOE-RMP 2013 ANNUAL MEETING

Update

SC Meeting April 23rd

Prior Attendance and Funding

- 2012 David Brower Center
  - ~ $10K
  - 165 Attendees
- 2011 Oakland Marriott
  - ~ $15K
  - 170 Attendees

2013 Proposal

- 2013 Oakland Marriott
  - $15K
  - 100 RMP registrations and reduced rate for 2nd day
    - RMP participants 1-day free; 2nd day reduced rate of $100
    - (Background: 2013 SOE registration ~ one day $150; two days $275)
  - Are 100 slots enough?
    - ~165 participants in past RMP meetings
    - ~ 15 have no direct affiliation – press, consultant, etc.
    - ~ 10 are Water Board staff who will be covered by other means
    - ~ 5 are SFEI staff who are speakers (free)
    - Some portion of the remaining will be sponsors (BACWA) and will also not need the free registration

How will the process work?

- Details need to be work out
- RMP will manage a website for RMP participants to pre-register before August
  - Will allow us to make sure that there is an equitable cover among participants and confirm RMP participants
- We will send out advance notice to all RMP members and monitor the registration process
- Likely that registration will need to be completed mid-summer and that RMP participants will receive code to register on SOE website for 2nd day

Modeling and Nutrients Update

RMP SC meeting – April 23 2013

Modeling

Discussion Goals

- Update SC on decision to not include contaminants in effort
- Status update on planning
- Future RMP funding – 2014?
- Oversight

Developing a SFB Nutrient/Phytoplankton/Ecological Model

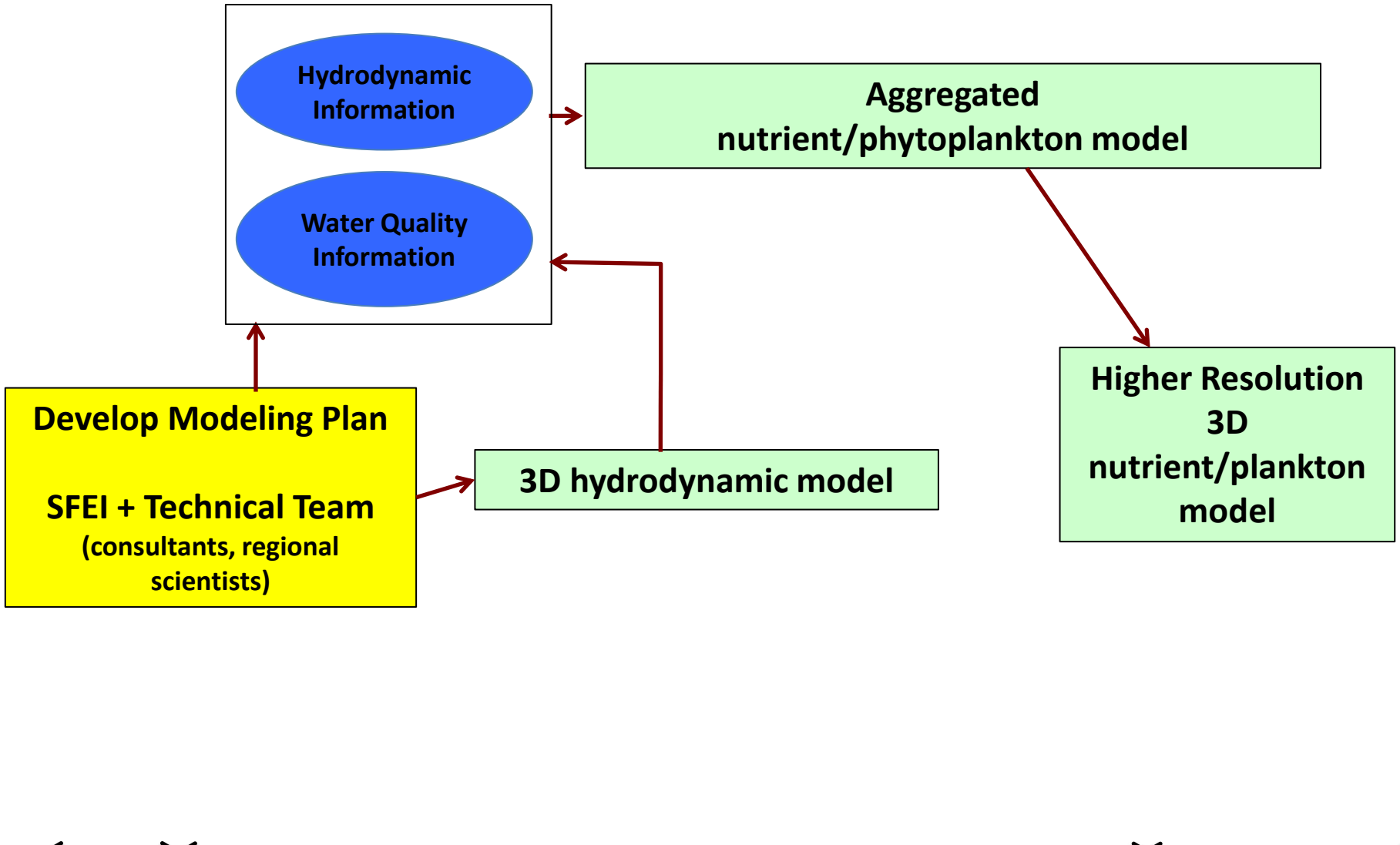
Goal: Develop a model for informing current and future nutrient management decisions

- Balance sophistication with the resolution needed to inform management decisions
- Model primary use: nutrients, phytoplankton, biogeochem.
- Possible other future uses
  - ‘contaminants’ – legacy, bioaccum., CEC
  - Sediments
- Built on existing tools
- Open source, large user community

Developing a Bay-wide Modeling Tool

Overall Approach:

- Engage Regional Water Quality Control Board and stakeholders in identifying management questions and modeling needs
- Develop a modeling program white paper, and receive technical input/guidance from team of modeling experts. (Draft May 2013)
- Host a modeling workshop with modeling experts and other regional scientists (nutrient/phytoplankton), regulators, and stakeholders (June 2013)
- Recommend a modeling approach
- Revise (June 2013)
- Implement (begin Q3/Q4 2013)


Hydrodynamic Information
Water Quality Information
Aggregated nutrient/phytoplankton model
Higher Resolution 3D nutrient/plankton model
Develop Modeling Plan
SFEI + Technical Team
(consultants, regional scientists)
3D hydrodynamic model
2012
2013-2014
2015 -

Current Timeline

• White paper outline	Mid-March
• Technical team meeting -	March 20
• Write draft paper	Early May
• Second meeting of technical team	mid May
• Revise/finalize	early June
• Nutrient modeling meeting	late June/July

Modeling advisory team

• Li Erikson	USGS
• Oliver Fringer	Stanford
• Jim Fitzpatrick	HDR-Hydroqual
• Ed Gross	RMA
• Craig Jones	Sea Engineering
• Lisa Lucas	USGS
• Emily Novick	SFEI
• David Senn	SFEI
• Don Yee	SFEI

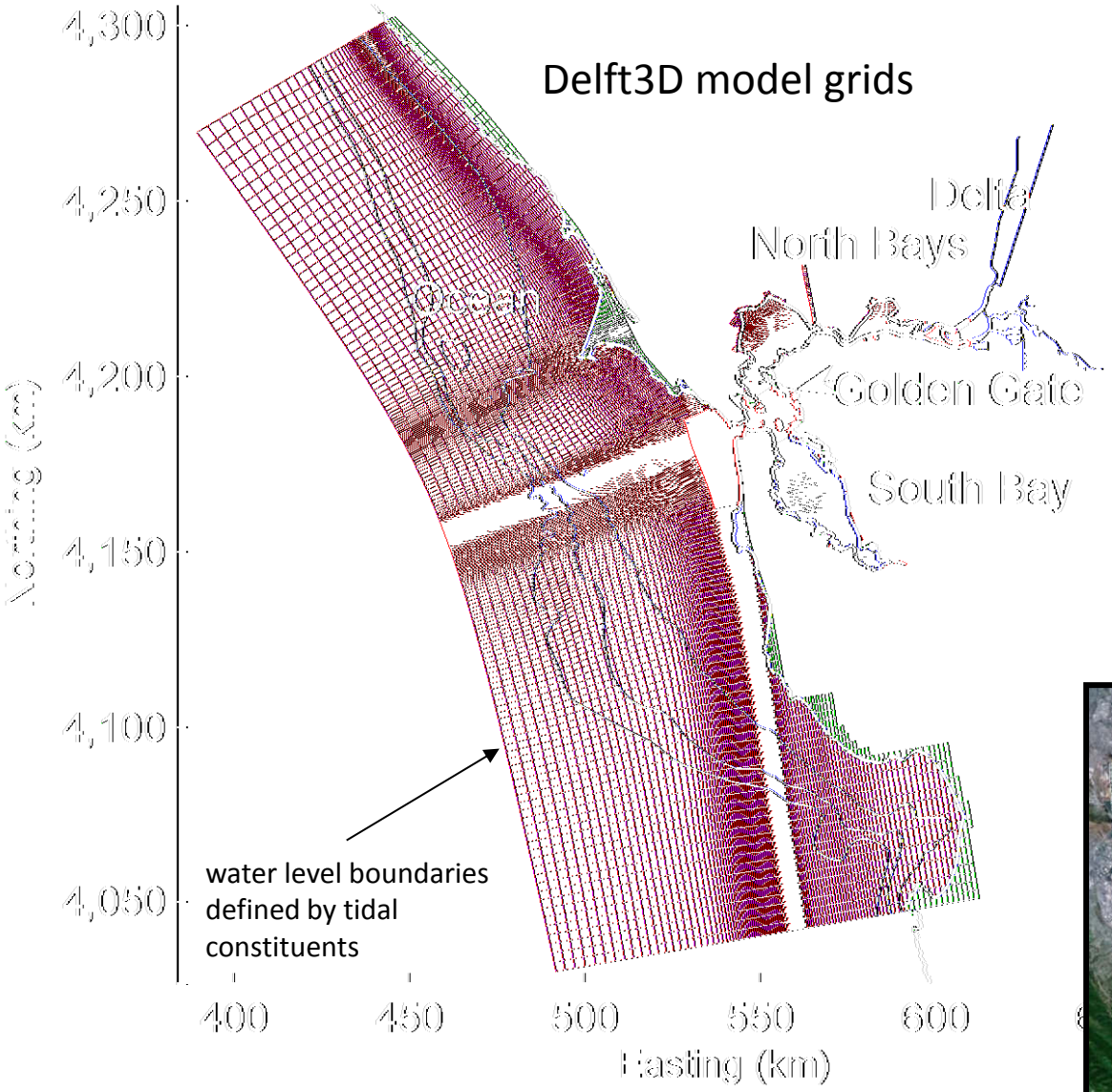
Not on the call

Jim Cloern (USGS)

Modeling Team Meeting Goals

- Background information about goals of overall effort.
- Describe the major management questions that are driving the effort.
  - Explore how these questions define required model output
- Review model platform selection criteria
- Solicit initial feedback from Modeling Team, and request electronic feedback

Current USGS Delft3D Grid



5 domains
Grid cell size in region
of GG ~50 (as) x 70 (cs)

Pros

- USGS willing to share
- Among the best model platforms available
- Open-source
- Peer-reviewed, well-documented, big user community

Cons

- Currently no river inputs
- Limited effort to date on calibration/validation within Bay (especially South Bay)

Modeling

Discussion Goals

- Update SC on decision to not include contaminants in effort

- Status update on planning

- Future RMP funding – 2014?
  - Funding to date: $100k (2012) + $100k (2013)
  - By time modeling begins: $140k
  - Cost per year: $300-500k
    - initial model development + on-going support
    - Staff scientist

- Oversight

Model Requirements

- Peer-reviewed model with a history of addressing these types of site management questions

- Reasonable "buy in" costs and learning curve for end user

- Support for technical continuity over multi-year period
  - Large user community
  - Substantial institutional support
  - Sufficiently state of the art (avoid obsolescence before project completion)

Model Requirements

- Mechanistic processes for management scenarios
  - Appropriate spatial and temporal resolution
  - 3D capability
  - Water Quality
    - Standard capabilities (nutrient transformations, dissolved oxygen, etc.)
    - Sediment:water
    - Multiple phytoplankton classes
    - Zooplankton grazing
    - Filter-feeding benthos

- Accommodates grid aggregation to facilitate “scaling”

Nutrient Modeling Related Questions

1. What are the relative magnitudes/contributions of factors controlling ecosystem response to nutrients?
   - *Response*: phytoplankton biomass, DO, phyto comm compos. (?), HABs (?)
   - *Regulating factors*: light attenuation, clam grazing, NH4-inhibition, nutrient abundance

2. To what extent can observed changes in ecosystem response over the past ~25 years be explained by actual or hypothesized changes in regulating factors?
   a. Decrease in phytoplankton biomass/blooms in Suisun Bay post-1987 (Corbula, NH4)
   b. Change in phytoplankton composition in Suisun Bay post-1987 (Corbula, NH4)
   c. Gradual increase in biomass in Suisun post-1990 (light attenuation)
   d. 3x increase in chl-a in South Bay during Summer/Fall months since 1998 (clam loss, light)
   e. Emergence of a fall bloom in South Bay/LSB after 1998 (clam loss, light)
   f. Unprecedented red tide bloom in South Bay Fall 2004 (warm/calm spell)

1. What is the contribution of anthropogenic nutrient loads to low DO in shallow poorly-exchanging margin habitats?
   - E.g., Low DO in LSB sloughs

1. What is the natural capacity to assimilate/process nutrients, at the subembayment (or finer) scale?
   - Nutrient transformations and losses (benthic and pelagic nitrification, denitrification, OM burial), losses, flushing

Nutrient Modeling Related Questions

5. Under what future conditions would impairment be expected? What magnitude(s) of changes in drivers could lead to a tipping point, and are those changes plausible/probable?
   - *Causes:*
     - prolonged stratification, loss of clams, increased water clarity, stochastic introduction(s) of opportunistic harmful phytoplankton species
   - *Effect:*
     - Large blooms, Low dissolved O_2, acute nuisance blooms, HABs, shifts in species composition

6. How do nutrient loads from known sources contribute to concentrations (and impairment) as a function of space and time?
   - Source types: POTWs, Delta, stormwater
   - Once hydrodynamics and mixing/dilution/reaction are taken into account, what spatial scales are relevant in terms of
     - Regulating and, for example, nutrient "trading"

7. What potential effects would various control measures have on mitigating current or future problems at the subembayment (or finer) scale?
   - E.g., load reductions, wetlands, shellfish beds

Nutrients

Discussion Goals

- Brief update SC on RMP projects' status

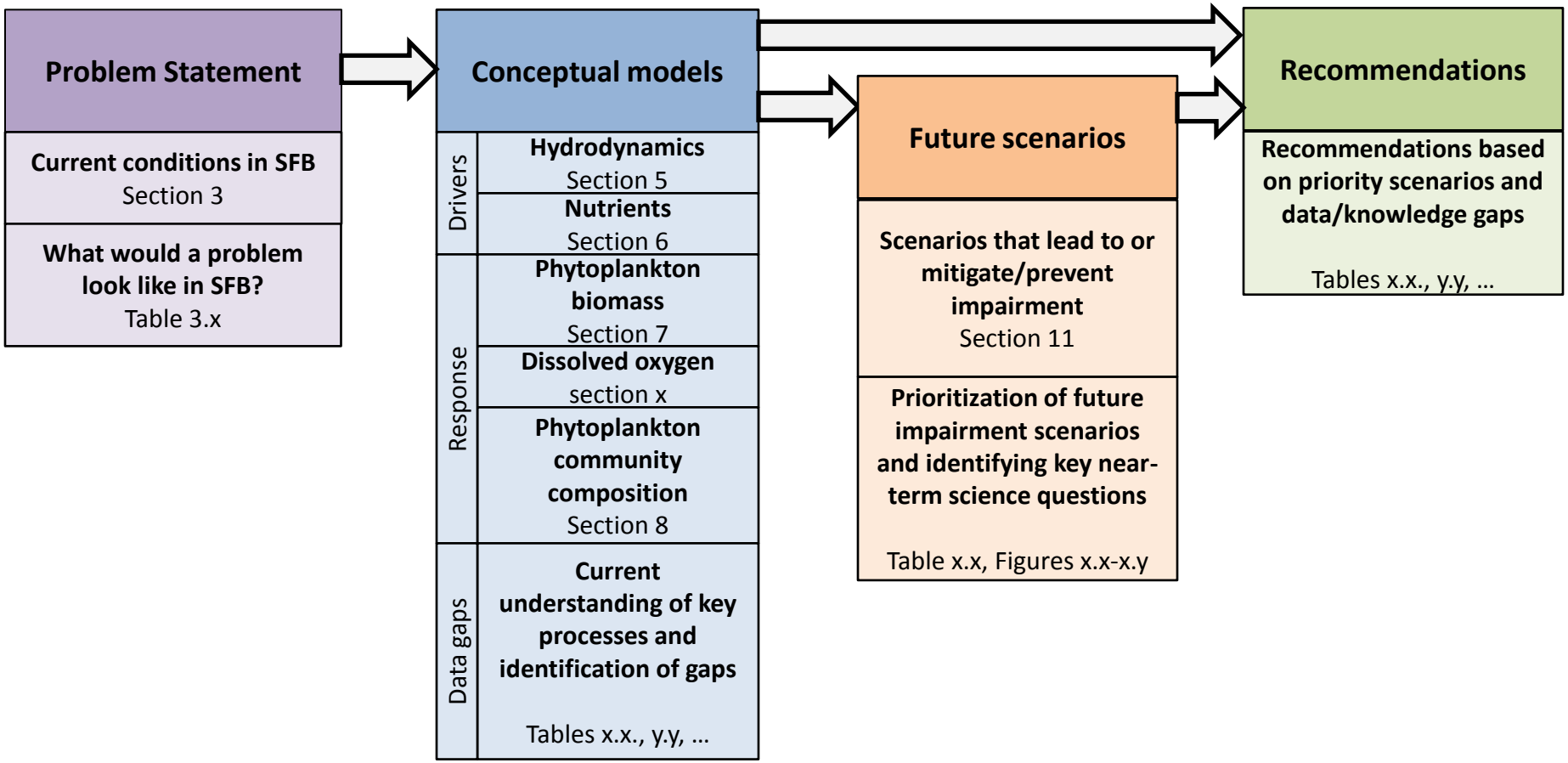
- RMP-funded nutrient oversight:
  - Review of work products (internal, regional, "external" science review)
  - Update on planning effort between Water Board and BACWA
  - Funding proposal to RMP

-

Report: Conceptual Model, Scenarios, and Recommendations

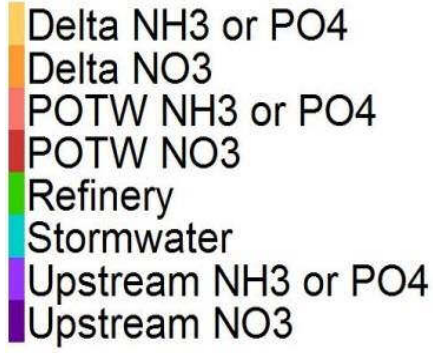
- Sending out to TRC, SC, and technical team on April 26
- 3-4 weeks for comments
- Final technical team meeting: Mid-May
- Funding left: ~15k

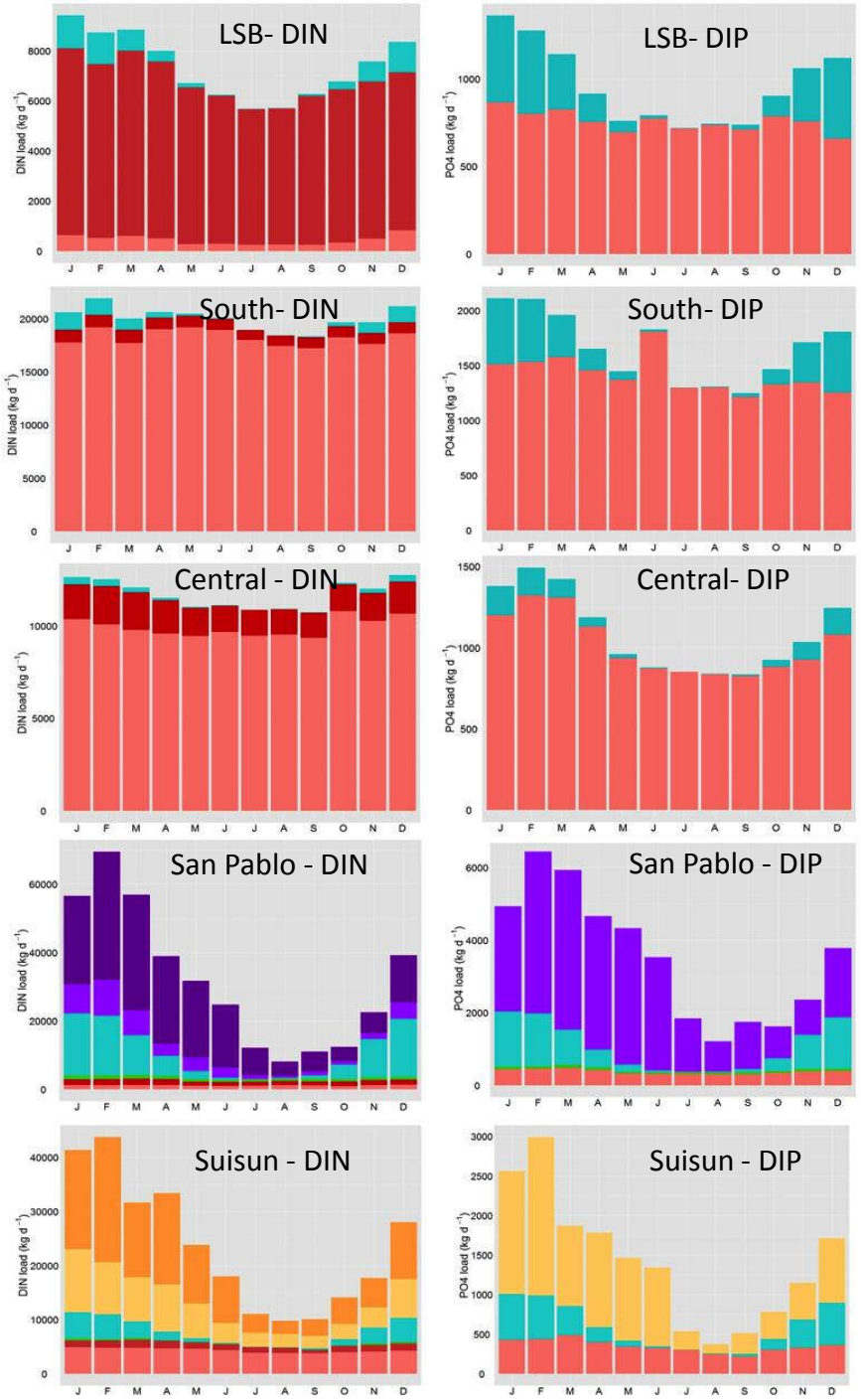
Project approach:



Report: External Nutrient Loads

- Quantify loads from POTWs, stormwater, refineries, and Delta
- Sent out April 9
- Review Process?
- Funding left: $7k



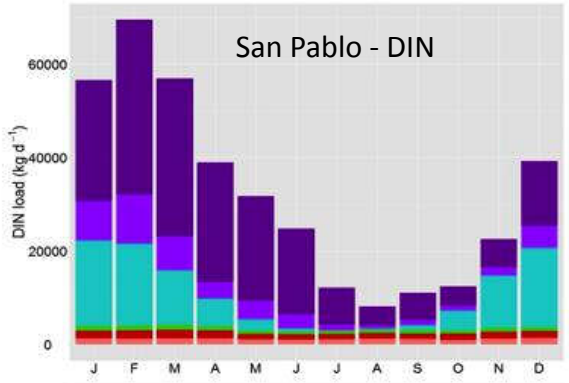


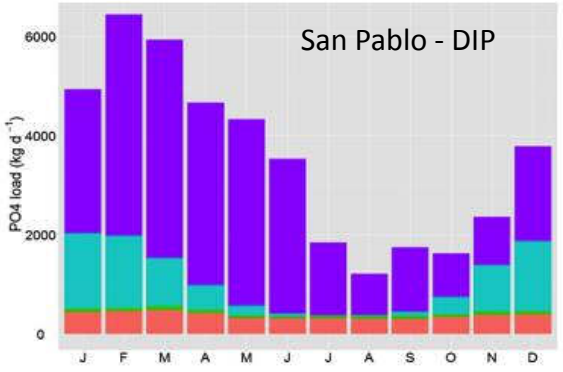
Stormwater nutrient concentrations

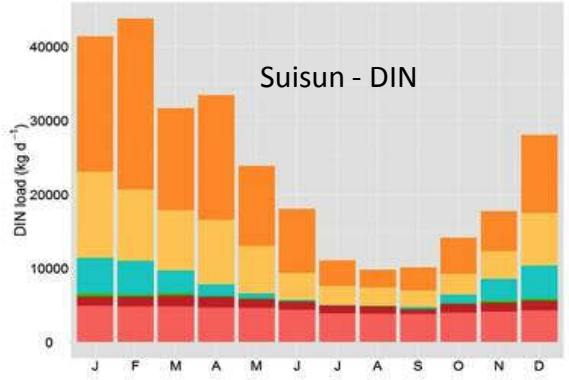
- Original plan: Analyze 2 years of nutrient data from stormwater sampling (WY2012-2013)

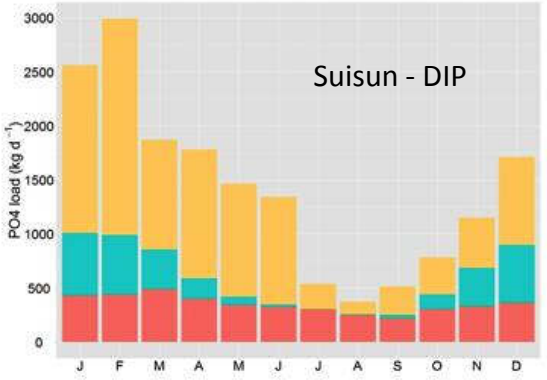
- Issues: Few storms, late rollout of full dataset

- Propose: Focus most of effort on uncertainty/sensitivity analysis of loads to determine if/where/when stormwater loads a priority
  - Available funds: 30k (do a 5/25 split)
  - Possibly more rigorous model loads from e.g., Napa or Sonoma









Nutrients

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-

Contaminants of Emerging Concern in San Francisco Bay: A Strategy for Future Investigations

Rebecca Sutton, SFEI

RMP
San Francisco Bay
2013

RMP's Three-Pronged Approach

1. Prioritize established CECs using a risk-based screening framework; monitor
2. Review scientific literature, CECs identified by monitoring programs
3. Non-targeted research to identify new CECs:
   - Bioanalytical tool development
   - NIST broadscan analyses

1. Risk & Management Action Framework for San Francisco Bay

Risk Level Description	CECs for San Francisco Bay
Tier IV: High Concern	none
Tier III: Moderate Concern	PFOS; Fipronil; Nonylphenol & Nonylphenol Ethoxylates
Tier II: Low Concern	PBDEs; Pyrethroids; PPCPs; HBCD
Tier I: Possible Concern	Alternative Flame Retardants (TBPH, TBB, DBDPE, PBEB, BTBPE, HBB, DP, TDCPP, TCEP, TCPP, TBEP, TPP, other organophosphates); Bisphenol A; Bis(2-ethylhexyl) phthalate (BEHP or DEHP) and Butylbenzyl phthalate (BBzP); PFCs other than PFOS; Short-chain chlorinated paraffins; Other pesticides; Single-walled carbon nanotubes

2. Review Literature, Other Programs

- Literature: Journals, Government documents, Howard and Muir 2010, 2011, others
- Programs: SCCWRP, Oregon P3 List, Washington PBT List, Great Lakes Workgroup
- New additions: Puget Sound Monitoring Program, California Biomonitoring Program

3. Non-targeted Chemical Screens

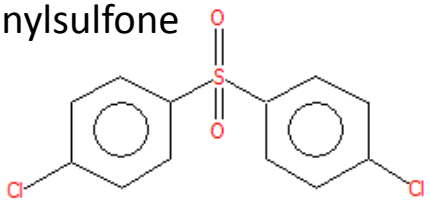
- Bioanalytical Tools: Estrogenicity Screen
  - Update: EEWG meeting, May 16th
- NIST Broadscan Analyses

NIST Broadscan Analyses: Using Cutting Edge Technologies

- Challenge to evaluate individual CECs
- Using new sophisticated instrument to decipher what is accumulating
  - Two-year RMP study with NIST to evaluate Bay seal and bivalve tissue
  - Initial results: **8** unusual compounds
- Large libraries to identify compounds
  - NIST library plus Howard and Muir list

"Matthews… we're getting another one of those strange 'aw blah es span yol' sounds."

Dichlorodiphenylsulfone

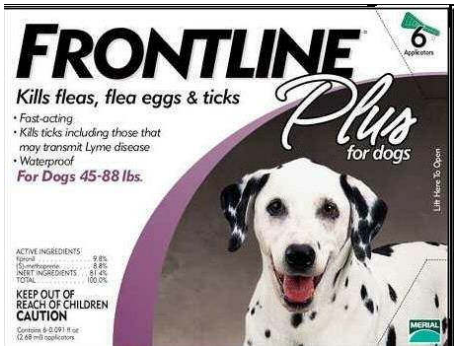


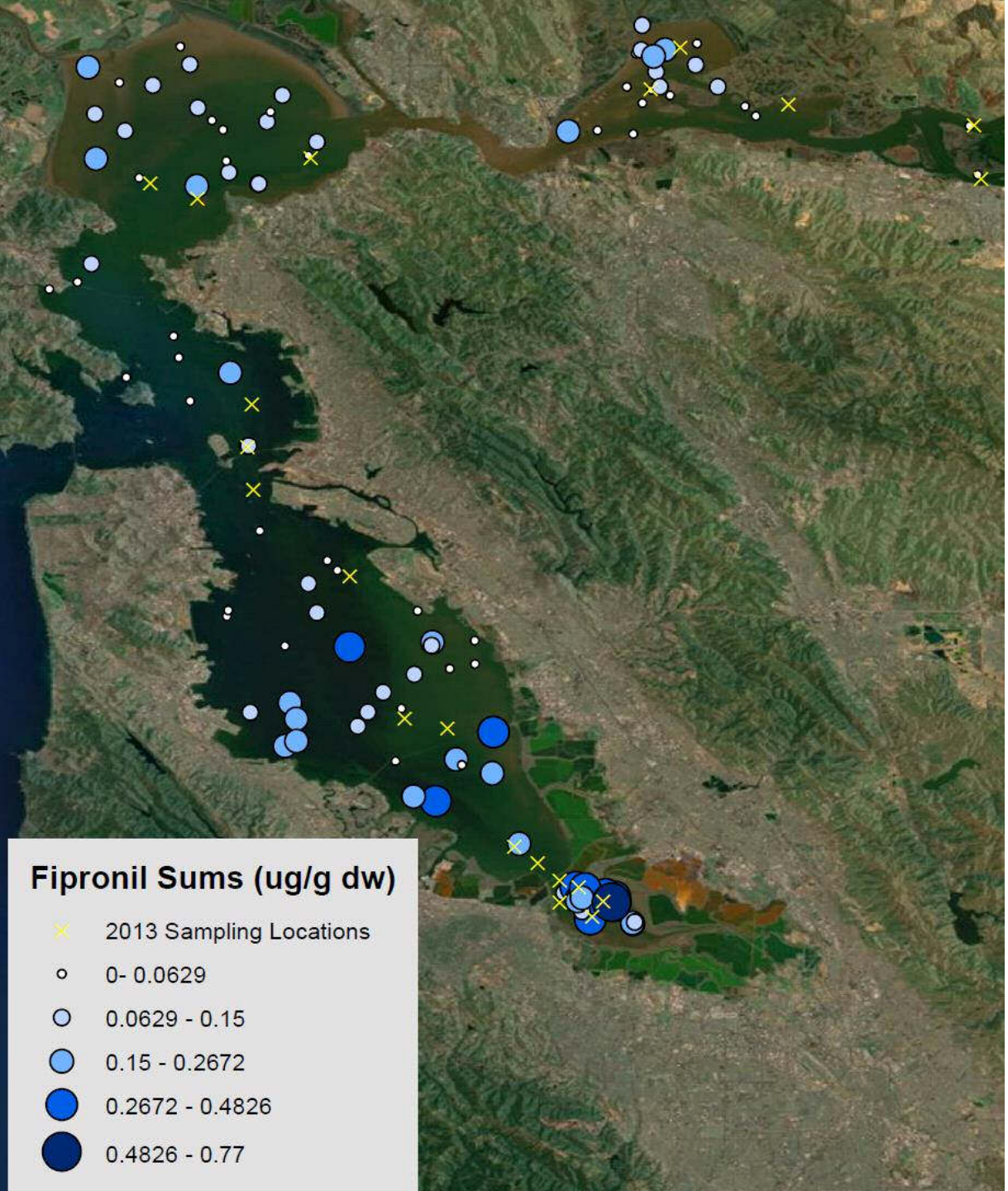
Fipronil: Tier III (Moderate Concern)

- Current use insecticide
  - Increased market share
  - Pyrethroids & other insecticides decreasing
  - Urban use
- Found in runoff & streams
- UP3 recommended including fipronil & degradates in water quality monitoring

Fipronil: Function & Use

- Disrupts nerve function
- Registered for US use in **1996**
  - Turf products
  - Seed treatments
  - Topical pet care products
  - Gel baits (e.g., ants)
  - Liquid termiticides
  - Agriculture (not in CA DPR 2007)

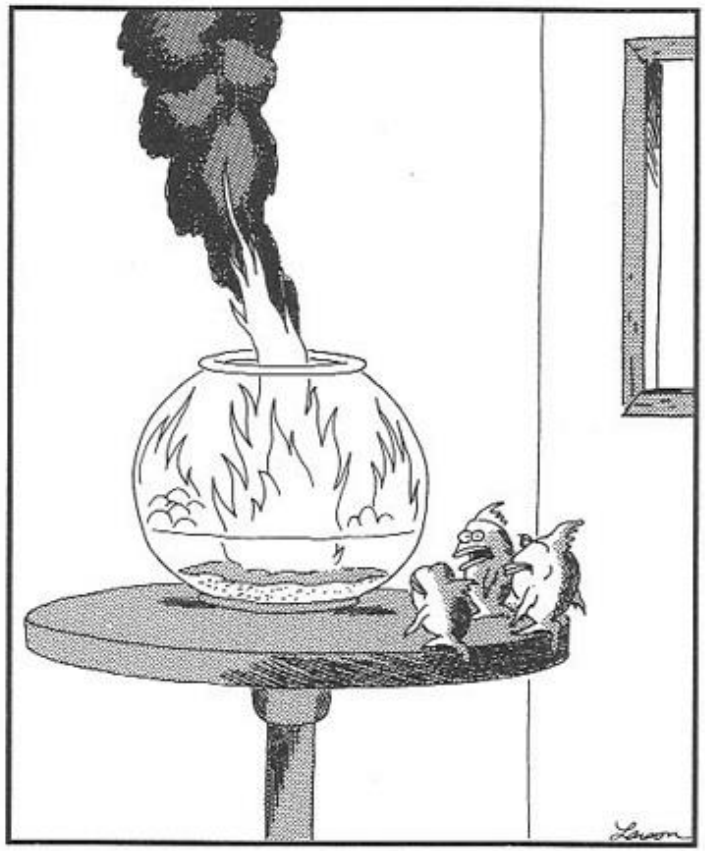




RMP Sediment Data Suggest South and Lower South Bay Sites Are Best for Targeted Water Monitoring

- Effluent monitoring from at least 2 facilities

PBDEs: Tier II (Low Concern)



"Well, thank God we all made it out in time. … 'Course, now we're equally screwed."

WINNER OF THE 2012 PULITZER PRIZE FOR COMMENTARY

Chicago Tribune

♦ Final

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TRIBUNE WATCHDOG

Playing with fire

A deceptive campaign by industry brought toxic flame retardants into our homes and into our bodies. And the chemicals don't even work as promised.

BY PATRICIA CALLAHAN AND SAM ROE
Tribune reporters

Dr. David Heimbach knows how to tell a story.

Before California lawmakers last year, the noted burn surgeon drew gasps from the crowd as he described a 7-week-old baby girl who was burned in a fire started by a candle while she lay on a pillow that lacked flame retardant chemicals.

"Now this is a tiny little person, no bigger than my Italian greyhound at home," said Heimbach, gesturing to approximate the baby's size. "Half of her body was severely burned. She ultimately died after about three weeks of pain and misery in the hospital."

Heimbach's passionate testimony about the baby's death made the long-term health concerns about flame retardants voiced by doctors, environmentalists and even firefighters sound abstract and petty.

But there was a problem with his testimony: It wasn't true. Records show there was no dangerous pillow or candle fire. The baby he described didn't exist.

Neither did the 9-week-old patient who Heimbach told California legislators died in a candle fire in 2009. Nor did the 6-week-old patient who he told Alaska lawmakers was fatally burned in her crib in 2010.

Heimbach is not just a prominent burn doctor. He is a star witness for the manufacturers of flame retardants.

His testimony, the Tribune found, is part of a decades-long campaign of deception that has loaded the furniture and electronics in American homes with pounds of toxic chemicals linked to cancer, neurological

stoked the public's fear of fire and helped organize and steer an association of top fire officials that spent more than a decade campaigning for their cause.

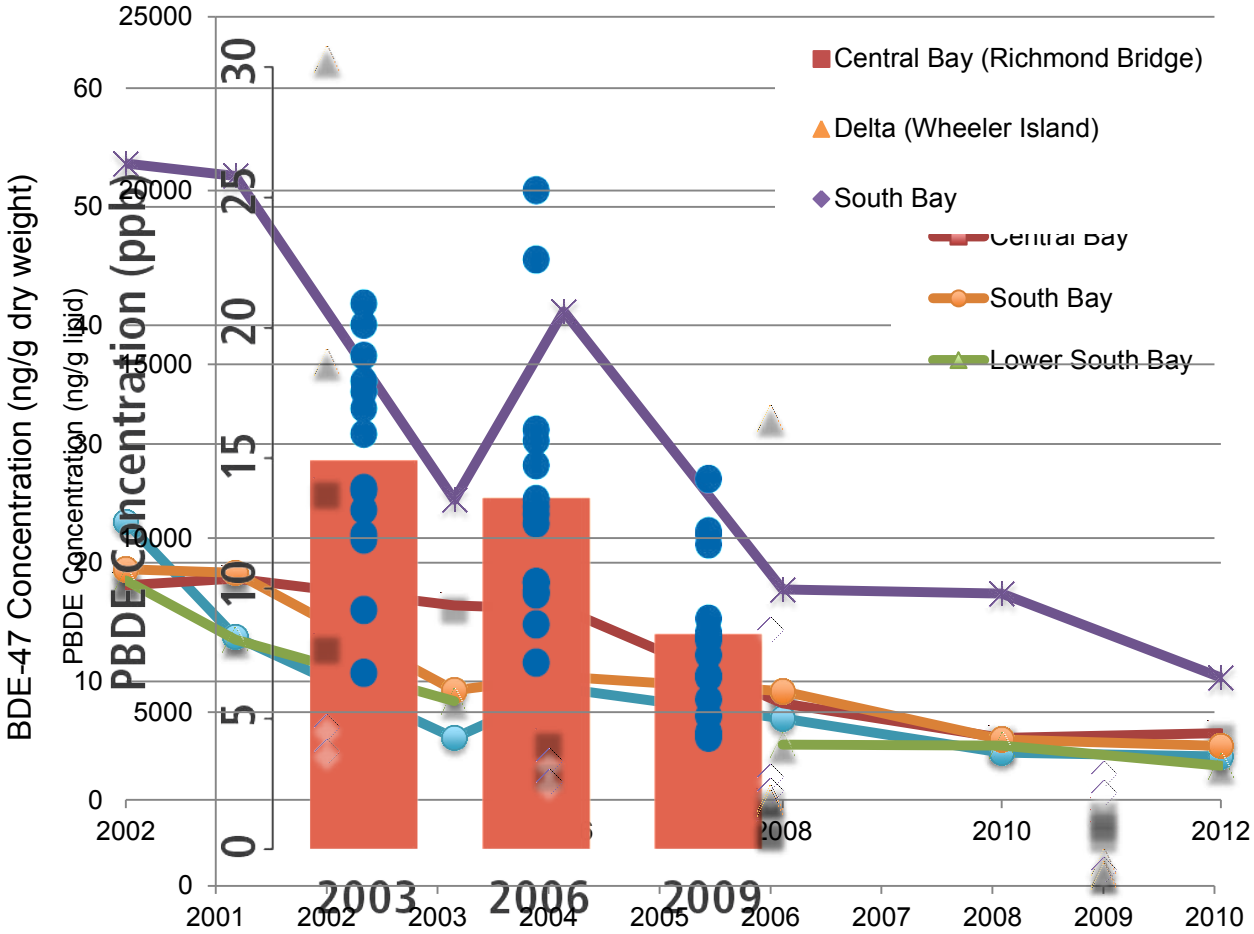
Today, scientists know that some flame retardants escape from household products and settle in dust. That's why toddlers, who play on the floor and put things in their mouths, generally have far higher levels of these chemicals in their bodies than their parents.

Blood levels of certain widely used flame retardants doubled in adults every two to five years

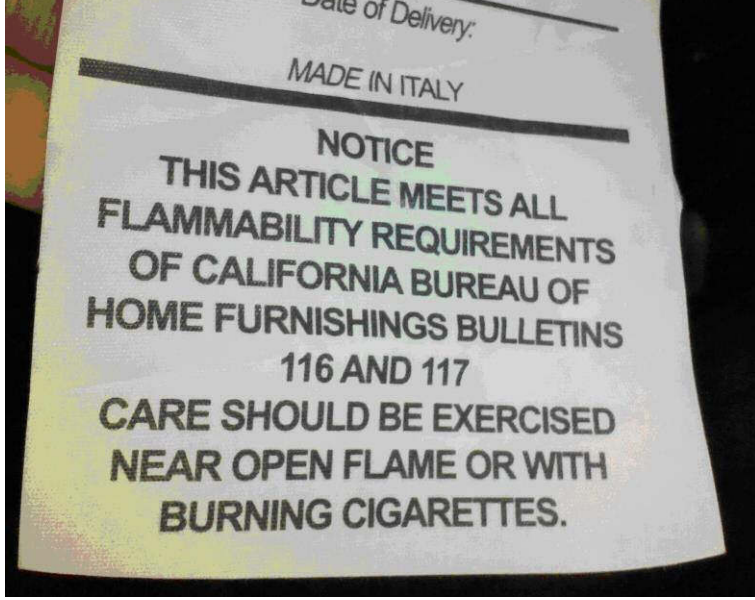
PBDEs: Bans & Phase-Outs

PBDE declines in Bay wildlife

- Bivalves
- Sport Fish
- Cormorant Eggs



Alternative flame retardants: Tier I (Possible Concern)



- California flammability standards lead to use of flame retardants
- Efforts to change standards to improve fire safety & reduce use of flame retardants
- Until then, manufacturers must use alternative flame retardants for PBDEs
- Many flame retardants have little to no toxicity data

Bay Monitoring Data: Alternative Flame Retardants

Alternative Flame Retardants	Sediment (ng/g dw)	Mussels (ng/g)	Sport Fish (ng/g ww)	Bird Eggs (ng/g ww)	Seals (ng/g lw)
HBCD	1.7	1.3 (dw)	0.4	1.8	19
Dechlorane Plus (DP)	0.9	0.05 (ww)	0.06	0.09	7
PBEB	0.1	0.02 (ww)	ND	ND	0.5
DBDPE	ND				
BTBPE	0.06	ND	ND	ND	ND
HBB	ND	ND	ND	ND	ND
TBPH or BEHTBP	ND	ND		ND	
TBB or EHTBB	ND	ND	ND	ND	ND
TDCPP or Chlorinated Tris	19	ND		ND	
TCPP	16	ND		1	
TPP	20	378 (dw)		ND	
TCEP				3.3	
TBEP				1.2	
Tripropylphosphate, Tris(2,3-dibromopropyl) phosphate, Tributyl phosphate, Tricresyl phosphate, 2-Ethylhexyl-diphenyl phosphate, Tris(2-bromo-4-methylphenyl) phosphate, Tris(2-ethylhexyl) phosphate				ND	

RMP Research Priorities

- 2013: Fipronil and pesticides (TBD)
- 2014: Alternative flame retardants, Perfluorinated compounds
- 2015: New PPCPs
- Studies based on non-targeted approaches as initial research is completed
- Ongoing monitoring of PBDEs, Pyrethroids, others

RMP Monitoring Priorities

	2013	2014	2015	2016	2017
Monitoring Strategy for CECs Assigned to Risk and Management Action Tiers (Section 3.0)					
Water	PFASs; Fipronil; Pesticides (TBD)		PBDEs		
Sediment		PFASs (sources); Fipronil; PBDEs; Pyrethroids; Alternative flame retardants		PBDEs	
Stormwater & Effluent		PFASs; Pyrethroids (stormwater)			
Bivalves		PBDEs; Alt. flame retardants			PBDEs
Sport Fish		PBDEs			PBDEs
Bird Eggs			PBDEs; PFASs		
Seals		Alt. flame retardants	PBDEs		

RMP Monitoring Priorities

	2013	2014	2015	2016	2017
CECs Identified through Review of Literature & Other CEC Monitoring Programs (Section 4.0)					
New info tracking	Alternative flame retardants	Ongoing	Design study on PPCPs not yet examined in the Bay	ongoing	ongoing
Non-targeted Approaches to CEC Identification (Section 5.0)					
NIST screening	Identify chemicals	Follow-up monitoring study TBD			
Bioanalytical tools	E1, BPA, NP, HHCB	Water, effluent testing	Follow-up monitoring study TBD		
Supporting RMP Activities					
Special Studies	CEC Synthesis & Strategy; PBDE Synthesis; Pesticide Workgroup Meeting				

What do you think?

RMP
San Francisco Bay
2013

Moderate Toxicity in Sediments

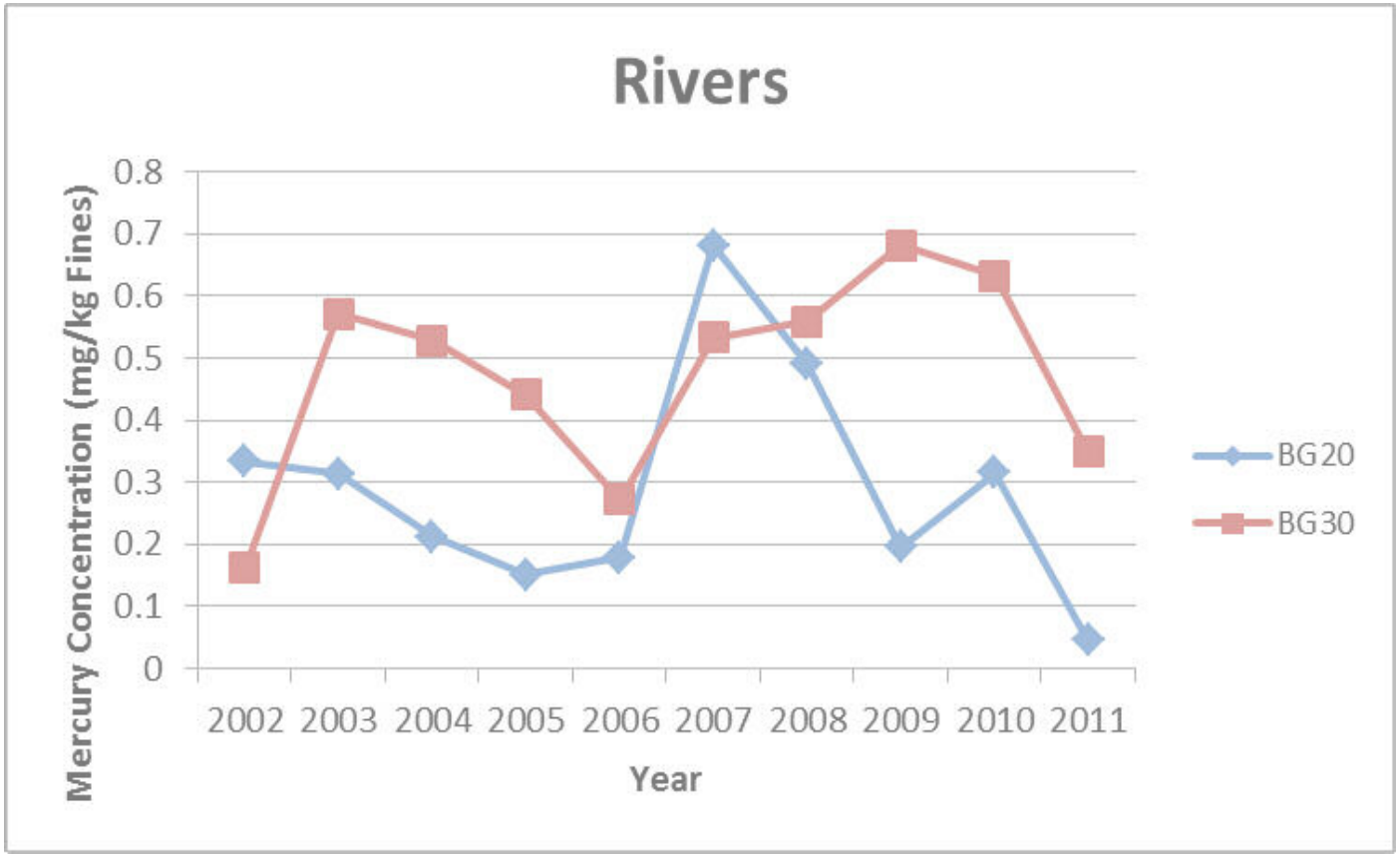
Presentation to SC – April 23rd , 2013

Meg Sedlak

Goal of Sediment Analyses

- Answering Management Questions:
  - Q2 Concentrations and masses (spatial distribution)
  - Q4 Trends
  - Q5 Forecasting/ Modeling
- Sediment S&T Monitoring:
  - Alternate years; alternate seasons (wet/dry)
    - 2014 – Dry (47); 2016 – Wet (27); 2018 – Dry (47) etc.
  - Chemistry, Toxicity, and Benthic Assessments

Sediment Chemistry



Ambient Sediment Concentrations

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Home :: Regional Monitoring Program :: RMP Data :: Dredged Material Testing Thresholds for San Francisco Bay Area Sediments

Dredged Material Testing Thresholds for San Francisco Bay Area Sediments

This page presents sediment chemistry thresholds for seven different contaminant classes, used by the Dredged Material Management Office (DMMO) for determining when bioaccumulation testing will typically be required for dredged material proposed to be discharged at unconfined open water disposal sites in San Francisco Bay. These same thresholds are also used by DMMO to determine when additional analysis of the post-dredge sediment surface ("residual" or "z-layer" sediments) may be warranted. The June 9, 2011, Essential Fish Habitat Agreement between USACE, USEPA, and NMFS established the approach used to determine the testing thresholds for San Francisco Bay sediments.

The individual chemical thresholds presented in the table below are of two types:

1. Thresholds for **mercury, total PCBs, and total PAHs** are based on San Francisco Bay ambient sediment concentrations determined via the Regional Monitoring Program (RMP), and are recalculated and updated each year. Similar calculations are used to update TMDL in-Bay dredged material disposal limits for mercury and total PCBs each year. (Details on how these ambient-based thresholds are calculated are provided below.)
2. Thresholds for **total DDTs, total chlordane, Dieldrin, and dioxins/furans** are based on similar values in use in other parts of the country and generally remain the same year-to-year.

Dredged Material Testing Thresholds Effective in Calendar Year 2013

	Mercury[a] (mg/kg dw)	Total PCBs (µg/kg dw)	Total PAHs (µg/kg dw)	Total DDTs (µg/kg dw)	Total Chlordane (µg/kg dw)	Dieldrin (µg/kg dw)	Dioxins/ Furans (pg/g dw)
Bioaccumulation Trigger	0.34	17	4,400	50	37	1.9	10
TMDL Limit	0.469	28.7	--	--	--	--	--
Basis	b	b	b	c	c	d	e

a. DMMO no longer requires bioaccumulation testing for mercury above the BT. See Amendment to EFH consultation.
b. Threshold based on San Francisco Bay ambient sediment concentrations, as describe further below.
c. Published bioaccumulation trigger for Puget Sound marine sediments.
d. Published marine SL value from the Pacific Northwest Sediment Evaluation Framework.
e. Toxicity Equivalency Quotient (TEQ) based on WHO 1998 Toxicity Equivalency Factors (TEFs). Value is consistent with the published Puget Sound limit for unconfined aquatic disposal, and is ½ the established limit for placement at the Hamilton Wetlands Restoration Project site.

SUMMARY OF RMP AMBIENT SEDIMENT CALCULATIONS FOR USE IN

SEARCH

MORE INFO

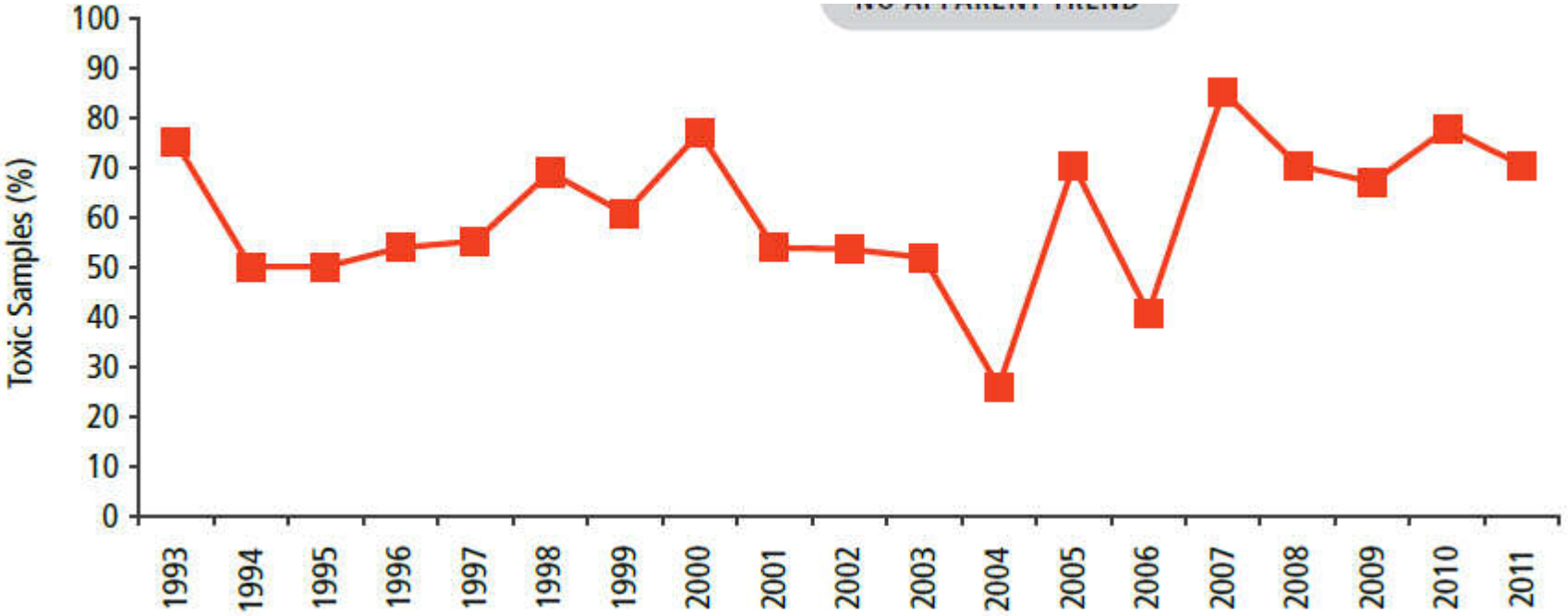
- What is the RMP?
- Committees, Workgroups, and Strategy Teams
- Status & Trends Monitoring
- Pilot & Special Studies
- RMP Projects
- RMP Data
  - USGS Monthly Water Quality Data
  - Changes to the RMP
  - Contaminant Data Display & Download
  - RMP Target Analyte List
  - Reportable Analytes
  - Sample Area Weights
  - Dredged Material Testing Thresholds for San Francisco Bay Area Sediments
  - Copper Site Specific Objective 3-year Rolling Averages
- Annual Reports and Publications
- Annual Meetings
- Glossary

RMP SPOTLIGHT

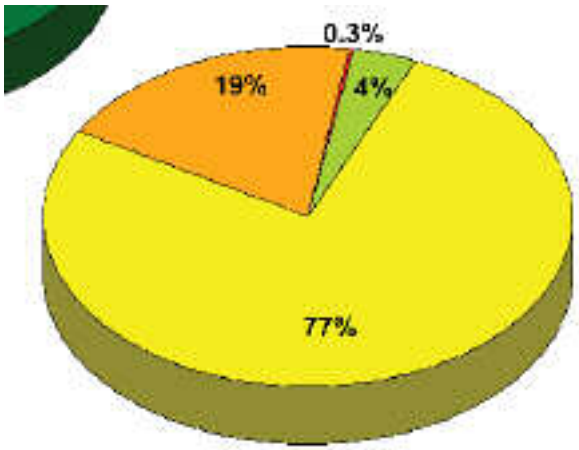
2012 Regional Monitoring Program Update

RMP Estuary Issues FLAME RETARDANTS IN SAN FRANCISCO BAY

Persistent Moderate Toxicity



Majority of Bay Possibly Impacted



San Francisco Bay
1020 km^2

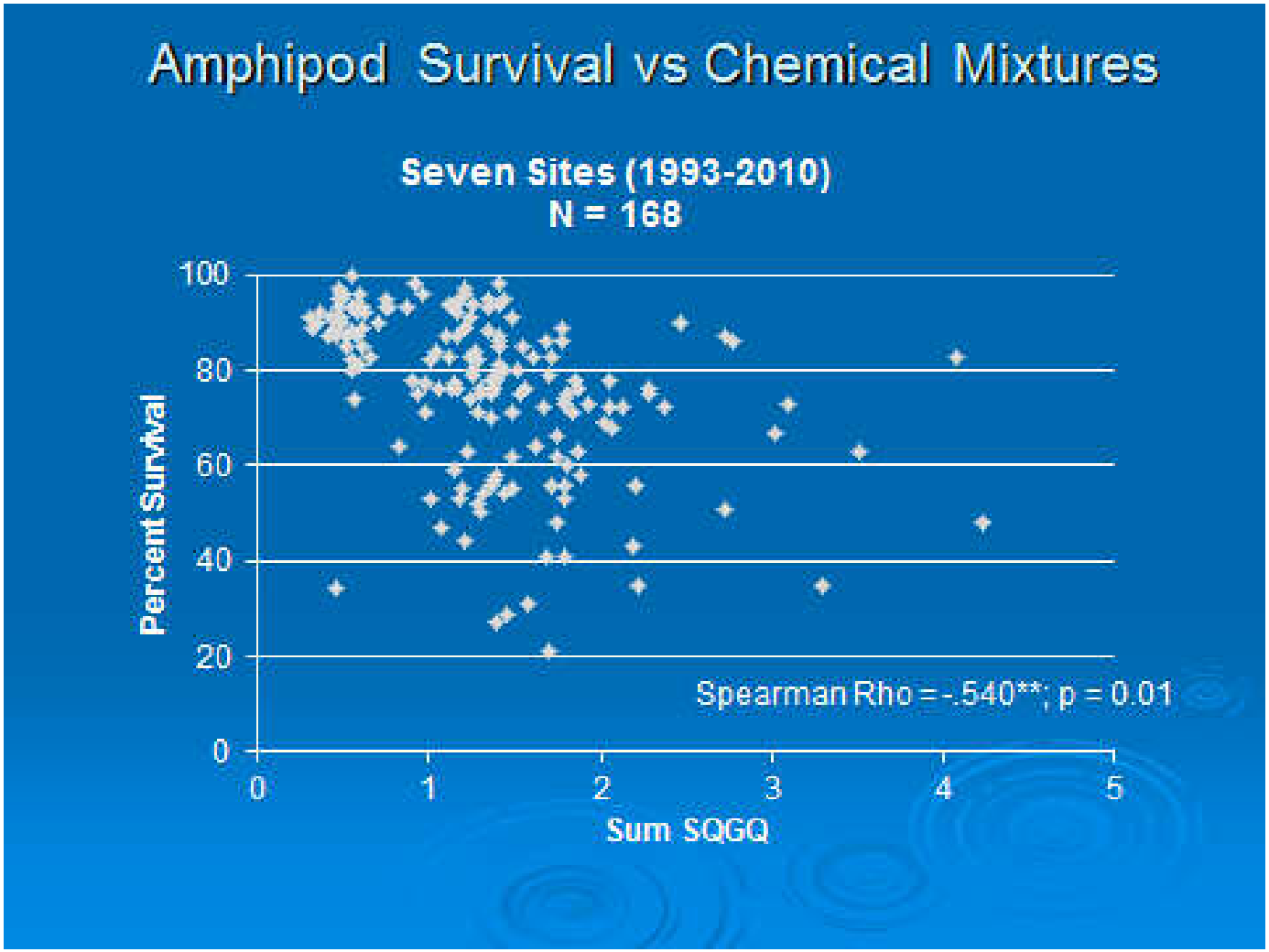
- Unimpacted
- Likely Unimpacted
- Possibly Impacted
- Likely Impacted
- Clearly Impacted
- Inconclusive

• Possibly Impacted - Contamination at the site may be causing adverse impacts to aquatic life in the sediment, but the level of impact is either small or is uncertain because of disagreement among LOEs.

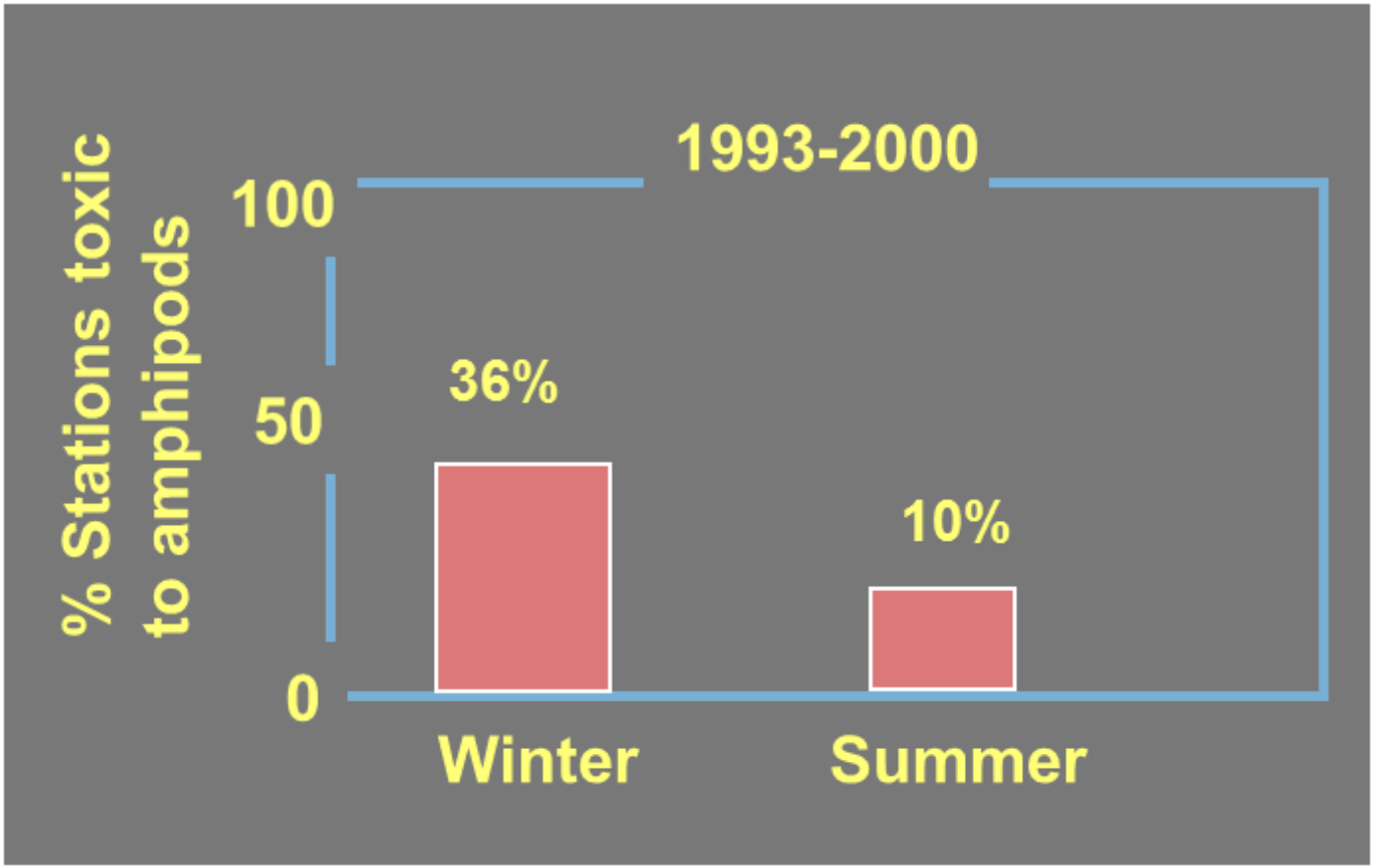
2012 Moderate Toxicity Workshop

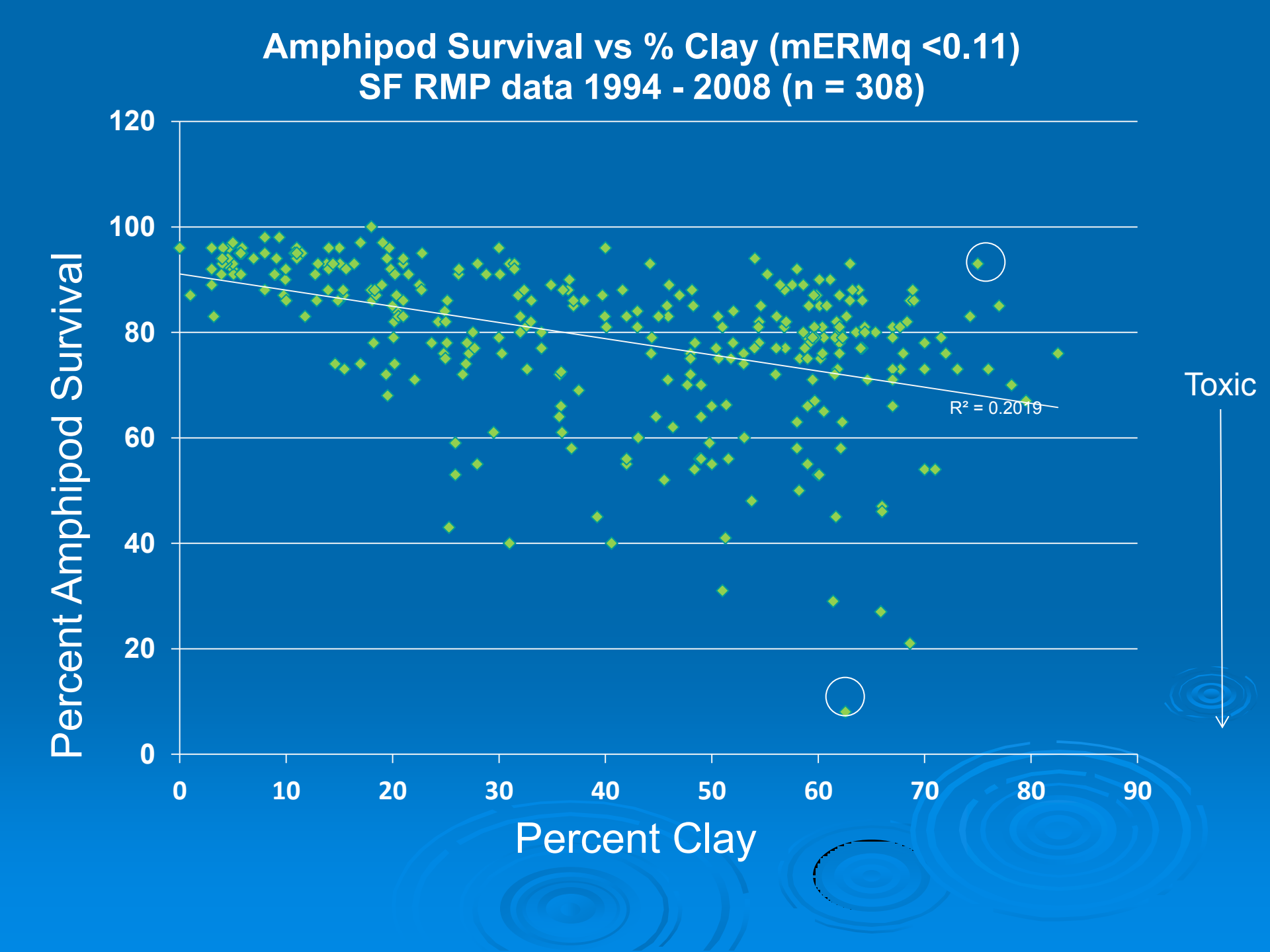
- Goal: To develop hypotheses to determine what is cause of moderate toxicity to amphipods in the Bay

Weak Correlation to Chemistry



Seasonal Element




Amphipod Survival vs % Clay (mERMq <0.11)
SF RMP data 1994 - 2008 (n = 308)
Percent Amphipod Survival
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
Percent Clay
R² = 0.2019
Toxic

Outcomes from Workshop

- Number of hypotheses:
  - Evaluate grainsize/ grain shape
  - Evaluate condition of amphipods (lipid content as a proxy)
  - Conduct statistically rigorous data mining exercise (chemicals, seasonality, particle size, year, predators, comparison to SCCWRP and interactions)
- Develop proposals for EEWG for 2014
- In interim consider putting sediment toxicity and benthic characterization on hold for 2014 to fund possible projects
  - $50K Toxicity and $60K Benthos