

Table 1. Metrics explicitly used in regulatory decision-making (blue) and others that are also high priorities for consideration in decision-making.

	Sport Fish	Bird Eggs	Bivalves	Water	Sediment (Open Bay)
Methylmercury	X	X			
Mercury					
PCBs	X	X			X
Selenium	X	X	?	X	X
Copper				X	X
PAHs			X	X	X
DDTs				X	X
Chlordanes				X	X
Dieldrin				X	X
Dioxins and Furans		X		X	X
Toxicity				X	X
Berthos				X	X
Other-CTR Pollutants				X	X
Cyanide				X	
CECs		X	X	X	X
PBDES		X	X	X	X
PFOS		X	X		X
Current Use Pesticides				X	
Fipronil				X	
Ammonia				X	
Other Metals				X	
Nonylphenol			X	X	
	Baywide Comparison to Objective				
	Segment Comparison to Objective				
	Baywide Long-term Trend				
	Segment Long-term Trend				
	Site Long-term Trend				
	Baywide Long-term Trend	X			
	Segment Long-term Trend	X			
	Site Long-term Trend	X			
	Baywide Long-term Trend				
	Segment Long-term Trend				
	Site Long-term Trend				
	Baywide Comparison to Objective				
	Segment Comparison to Objective or Trigger				
	Baywide Long-term Trend				
	Segment Long-term Trend				
	Reasonable Potential Analysis (Comparison of Pathway to Ambient)				
	Baywide Comparison to Objective				
	Segment Comparison to Objective				
	Baywide Long-term Trend				
	Segment Long-term Trend				
	Dredged Material Testing Thresholds (Comparison of Pathway Particles to Ambient)				

Table 2. Monitoring frequency for analytes in the existing Status and Trends program.  
A=every round, B=mid-level, C=minimal screening (e.g., every 8 yr at 3 sites for water)

	Sport Fish	Bird Eggs	Bivalves (reduced number of sites?)	Water	Sediment - Open Bay
Methylmercury	A	A		?	C
Mercury	A	A		C	C
PCBs	A	A	C	C	C
Selenium	A	A	?	A	C
Copper				A	C
PAHs			A	C	B
DDTs				C	C
Chlordanes				C	C
Dieldrin				C	C
Dioxins and Furans	A	A		C	C
Toxicity				B	C
Benthos (dry only)					C
Other CTR Pollutants				C	
Cyanide				A	
CECs		B	C	B	B
PBDEs	A*	A*	A*		B*
PFOS	A	A			B
Current Use Pesticides				B	
Fipronil				A	C
Ammonia				A	
Other Metals				A	C
Nonylphenol			A*	A*	B*

\* Continue for a limited period to track expected decline.

## WATER

Water	Old Design	Cost/Yr	New Design	Cost/ Yr	Savings/Yr	Uses of Data in Decision-Making
Analytical costs						
Se, Cu,CN, ancilliary <sup>1</sup>	Every 2 yr at 22 sites <sup>2</sup>	\$14,810	No change	\$14,810	\$0	Cu/ CN - SSO; Se - TMDL; CTR: RPA
MeHg	Every 2 yr at 22 sites <sup>2</sup>	\$4,000	No change	\$4,000	\$0	Hg TMDL - wealth of data. Hg not needed. Interesting trends in MeHg. Possible value to food web trends.
Other metals <sup>3</sup>	Every 2 yr at 22 sites <sup>2</sup>	Included				
PCBs, PAHs, Pesticides, THg	Every 4 yr at 22 sites <sup>2</sup>	\$14,535	Every 8 yr at 22 sites <sup>2</sup>	\$6,893	\$7,643	CTR, TMDLs (PCB/Hg), RPA, long-term trends
PBDEs	Every 4 yr at 22 sites <sup>2</sup>	\$5,005	None	\$0	\$5,005	No monitoring
Current Use Pesticides (CUPs)	Special studies		TBD			CEC identification and prioritization
Toxicity	Every 5 yr at 9 sites	\$1,400	Every 4 yr at 9 sites <sup>2</sup>	\$1,750	-\$350	Assessment of the narrative
CECs	Special studies		TBD			
Other CTR Pollutants	?		Every 8 yrs; 3 sites	TBD		CTR
Fipronil <sup>4</sup>	Special studies		Monitor in			ND in Bay samples
Nonylphenol <sup>5</sup>	studies		TBD			special study if any.
Furans	studies		TBD			CTR, RPA
PFOS	Special studies		Conduct effluent monitoring to evaluate sources			
Logistics						
Vessel and Fieldwork	Every 2 yr at 22 sites <sup>2</sup>	\$66,000	Every 2 yr at 22 sites <sup>2</sup>	\$66,000	\$0	
Vessel and Fieldwork	Every 2 yr at 22 sites <sup>2</sup>	\$66,000	Every 8 yr at 22 sites <sup>2</sup>	\$16,500		
Data Management						
Se, Cu, CN, ancilliary, MeHg & CUPs	Every 2 yr at 22 sites <sup>2</sup>	\$9,000	Every 2 yr at 22 sites <sup>2</sup>		\$0	Assumes no change in Se and Cu design. Does not include CUPs- TBD
PCBs, PAHs, Pesticides, Tox, Hg	Every 4 yr at 22 sites <sup>2</sup>	\$16,000	Every 8 yr	\$8,000	\$8,000	
<b>Total</b>					\$20,298	

<sup>1</sup> Ancilliary analyses include SSC, chlorophyll a, hardness, ammonia, DOC and POC, etc. Cu and Se analyses

<sup>2</sup> 22 Stations includes 17 random and 5 historic

<sup>3</sup> Copper analyses include Cd, Co, Ni, Pb, and Zn. Selenium analyses include Ar and Ag.

<sup>4</sup> Fipronil was monitored in Bay water in 2013 and largely ND

<sup>5</sup> Nonylphenol monitor in effluent ? Bay?

<sup>6</sup> Indicates 2014 rates.

**SEDIMENT**

Sediment	Old Design	Cost/Yr	New Design	Cost/ Yr	Savings	Uses of Data in Decision-Making
<b>Analytical costs</b>						
Ancillary <sup>1</sup>	Every 2 yr ; sites dependent on season <sup>2</sup>	\$5,288	Every 4 yr; 27 sites; alt seasons	\$2,228	\$3,060	Valuable for interpretation of results and modeling
PAHs, PCBs and Hg	Every 2 yr ; sites dependent on season <sup>2</sup>	\$27,935	Every 4 yr; 27 sites; alt seasons	\$10,193	\$17,743	Dredging based on sediment data; TMDL (PCB/Hg)
PBDEs	Every 2 yr ; sites dependent on season <sup>2</sup>	\$12,950	Every 4 yr; 27 sites; alt seasons	\$4,725	\$8,225	Two more round and then consider dropping BDEs
Pesticides (including)	Every 2 yr at 27 sites <sup>2</sup>	\$11,563	Every 8 yr; 27 sites; dry seasons	\$2,109	\$9,453	Long-term trends
Copper and other metals	Every 2 yr ; sites dependent on season <sup>2</sup>	\$3,330	Every 8 yr; 27 sites; dry seasons	\$608	\$2,723	Long-term trends
Selenium and arsenic	Every 2 yr ; sites dependent on season <sup>2</sup>	\$4,662	Every 8 yr; 27 sites; dry seasons	\$861	\$3,801	TMDL- Se
Current Use Pesticides	Special studies		None			Focus on margins
Toxicity	Every 2 yr at 27 sites <sup>2</sup>	\$25,000	Every 4 yr; 27 sites; alt seasons	\$12,500	\$12,500	Comparison to SQO
Benthos	Every 2 yr at 27 sites <sup>2</sup>	\$25,000	Every 8 yr; 27 sites; dry seasons	\$6,250	\$18,750	Comparison to SQO
Dioxin and Furans	Special studies		TBD			Long-term trends
CECs	Special studies		TBD			CEC identification and prioritization
Pyrethroids	Every 2 yr at 27 sites <sup>2</sup>	\$6,500	None; focus on margins	\$6,500	\$0	Pyrethroids in Bay largely ND (93%); most detects < 1.0 ppb (82%)
Nonylphenol	Special studies		TBD			
PFOS	Every 2 yr at 20 sites <sup>2</sup>		None, focus on margins			
<b>Logistics</b>						
Vessel and Fieldwork	Every 2 yr; sites vary depending on season <sup>2</sup>	\$75,000	Every 4 yr; 27 sites; alt seasons	\$35,000	\$40,000	
<b>Data Management</b>						
Ancillary, PAHs, PCBs, PBDEs	Every 2 yr; sites vary depending on season <sup>2</sup>	\$16,000	Every 4 years	\$8,000	\$8,000	
Pesticide, Cu and other metals, Hg, Me Hg, Se, As, toxicity, and benthos	Every 2 yr; sites vary depending on season <sup>2</sup>	\$24,000	Every 8 years	\$8,000	\$16,000	
<b>Total</b>					\$140,255	

<sup>1</sup> Ancillary analyses include grainsize, total organic carbon, total solids, etc.

<sup>2</sup> Alternating wet and dry seasons. Dry seasons - 47 stations (40 random, 7 fixed); wet season 27 sites (20 random, 7 fixed)

<sup>3</sup> The following metals are included in the analysis of copper: Al, Ag, Cd, Fe, Pb, Mn, Ni, & Zn

**BIVALVES**

Bivalve	Old Design	Cost/Yr	New Design	Cost/ Yr	Savings/Yr	Uses of Data in Decision-Making
<b>Analytical costs</b>						
PAHs and PBDEs	Every 2 yr ; 11 sites	\$8,400	Every 2 yr; 6 sites	\$4,900	\$3,500	PAH best food web indicator (PAHs not metabolized); long term trends
PCBs	Every 2 yr ; 11 sites	\$6,000	Every 8 yrs; 6 sites	\$1,750	\$4,250	Long-term trend (infrequent check-in)
Pesticides	Every 2 yr ; 11 sites	\$4,800	None	\$0	\$4,800	None
Metals	Every 6 yr ; 11 sites	\$1,080	None	\$0	\$1,080	
Selenium	Every 2 yr ; 11 sites	\$510	TBD	\$149	\$361	Trends; TMDL
CECs	Special studies		TBD			CEC prioritization and identification
<b>Logistics</b>						
Vessel and Fieldwork	Every 2 yr; 11 sites	\$27,000	Every 2 yrs; 6 sites	\$20,250	\$6,750	
<b>Data Management</b>						
PAHs	Every 2 yr; 11 sites	\$8,000	Every 2 yrs; 6 sites	\$6,000	\$2,000	
PCBs, PBDEs, Pesticides, Metals, and Se	Every 2 yr; 11 sites	\$12,000	Every 4 yrs; 6 sites	\$9,000	\$3,000	
<b>Total</b>					<b>\$25,741</b>	

## SUMMARY

Program	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Comments?
<b>Water</b>											
Cu, CN, Se, Ancillary, MeHg		X		X		X		X		X	22 sites
PCB, PAHs, Pesticides, Hg								X			Every 8 years; last conducted in 2013
Water Toxicity				X				X		X	Every 8 years; last conducted in 2011
CTR		X								X	Every 10 years
CECs		X		X		X		X			TBD
PBDEs											Drop
<b>Sediment</b>											
Ancillary, PAHs, PCBs, Hg	X- Dry				X-Wet				X- Dry		27 sites in the Bay?
PBDEs	X- Dry				X-Wet						Drop after 2018?
Metals, Se, Ar, pesticides	X- Dry								X- Dry		
Toxicity					X-Wet				X- Dry		
Benthos									X- Dry		Part of SQO - needs to be coupled with chemistry
Pyrethroids											Drop for Bay; monitor in margins
CECs - NP, PFOS, etc.	PFOS		?		?		?		?		TBD
Margins		X	X		X		X		X		Will need ancillary, pyrethroids? , CECs?
<b>Bivalves</b>											
PAHs	X		X		X		X		X		Reduce from 11 to 6 sites
All other analytes	X				X				X		Includes PBDEs
CECs											TBD
<b>Sportfish</b>											
Suite of Analytes <sup>1</sup>	X					X					Every 5 yr
Pesticides											Drop
<b>Bird Eggs</b>											
Suite of Analytes <sup>2</sup>		X			X			X			Every 3 yr
Pesticides											Drop
<b>USGS Cruises</b>											
	X	X	X	X	X	X	X	X	X	X	Cloern/Schoelhammer

<sup>1</sup> Sportfish will be analyzed for the following in 2014: PCBs, PBDEs, Hg, Se, dioxin, and PFCs.

<sup>2</sup> Cormorant eggs are analyzed for the following: PCBs, PBDEs, Hg, PFCs, and Se. Tern eggs are analyzed for Hg, PBDEs, and Se.

**MARGINS SAMPLING DESIGN**

<b>Analyte</b>	<b>Comments</b>	<b>Cost/Year</b>	<b>New Design</b>	<b>Cost/Year</b>	<b>Optional Components</b>
Methyl-mercury	TMDL priority		2 yr; Wet:Dry - 20 random	\$2,100	
Mercury	TMDL priority		2 yr; Wet:Dry - 20 random	\$1,050	
PCBs	TMDL priority		2 yr; Wet:Dry - 20 random	\$7,750	
Selenium	TMDL priority		2 yr; Wet:Dry - 20 random	\$2,520	
Copper	includes other metals		2 yr; Wet:Dry - 20 random	\$1,800	
PAHs	needed if SQO		2 yr; Wet:Dry - 20 random		\$4,250
DDTs/Chlordane/ Dieldrin			2 yr; Wet:Dry - 20 random	\$6,250	
Dioxins and Furans	optional - if needed for TMDL		2 yr; Wet:Dry - 20 random		\$7,500
Toxicity	optional - needed if SQO		2 yr; Wet:Dry - 20 random		\$25,000
Benthos	optional - needed if SQO		2 yr; Wet:Dry - 20 random		\$25,000
CECs	from archives as needed?			TBD	
PBDEs	tracking dist & trends		2 yr; Wet:Dry - 20 random	\$7,000	
PFOS	from archives as needed?				\$0
Current Use Pesticides			2 yr; Wet:Dry - 20 random	TBD depending on analytes	
Pyrethroids	2 yr; 20 random, 7 fixed	\$4,820	None - focus on margins	\$6,500	
Fipronil	included w/ EBMUD legacy pest analysis		2 yr; Wet:Dry - 20 random		
Nonyl-phenol	from archives as needed?		2 yr; Wet:Dry - 20 random	TBD	
Ancillary			2 yr; Wet:Dry - 20 random	\$5,288	
Other Metals			2 yr; Wet:Dry - 20 random		
<b>TOTAL</b>				<b>\$40,258</b>	<b>\$61,750</b>