2015

ANNUAL MONITORING REPORT

A report of the Regional Monitoring Program for Water Quality in the San Francisco Bay

SFEI AQUATIC SCIENCE CENTER

RMP

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1. INTRODUCTION

PROGRAM STRUCTURE AND OBJECTIVES

The Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) is the primary source for long-term contaminant monitoring information for the San Francisco Bay. The RMP is an innovative and collaborative effort among the scientific community, the San Francisco Bay Regional Water Quality Control Board (Water Board), and the regulated discharger community. The Program was initiated by the Water Board as a pilot study in 1989 and has been collecting water, sediment, and bivalve tissue data since its official inception in 1993. Regular monitoring of sport fish tissue and bird eggs for toxic contaminants was incorporated into the Program in 1997 and 2006, respectively.

The Program monitors the different matrices included in "status and trends" monitoring on varying schedules. Additional monitoring occurs as part of short-term "special studies" or pilot studies focused on new regions, matrices, or contaminants of immediate or increasing regulatory interest. In 2015, the RMP collected only water data as part of "status and trends" monitoring. A pilot study was also conducted to collect sediment data from the Bay margins. Bird egg monitoring was originally scheduled to be conducted in 2015, but was delayed until 2016.

The purpose of this report is to document RMP monitoring activities in 2015. The report is organized into chapters on water and sediment. Each chapter contains information on:

- The locations where these samples were collected,
- The field sampling methods,
- The target analytes, laboratories, and analytical methods for each matrix, and
- Any problems encountered or non-conformances to planned procedures.

The appendices to this report contain details of RMP contractors and coordinates of sampling locations in 2015, as well as a running list of target analytes and changes to the RMP sampling and analysis methods since the Program began.

2. WATER MONITORING FOR TOXIC CONTAMINANTS

BACKGROUND

For over two decades, the RMP has monitored water in the Bay for trace elements, organic contaminants, and conventional water quality parameters. Water sampling was conducted annually from 1993 to 2011. A biennial sampling schedule began in 2013.

In 2015, water sampling also included monitoring of parameters listed in the California Toxics Rule (CTR) at three sampling sites (Water Quality Standards, 2000). Parameters included in this rule were last comprehensively monitored by the RMP in ambient Bay water in 2002-2003 (BACWA & RMP, 2003). 76 CTR parameters that have not been monitored since then were monitored in 2015.

Additional water samples were collected at all sites for analysis of bisphenols, as part of a collaboration with the Southern Illinois University (SIU).

The following sections contain details about the water monitoring conducted by the RMP in 2015. The RMP also funds monthly monitoring of conventional water quality parameters by USGS, but these measurements are not described in this report.

SAMPLING SITES

In 2015, 22 sites were sampled for water (Figure 2.1). Five of these were the historic targeted stations (BA30-Dumbarton Bridge, BC10-Yerba Buena Island, BC20-Golden Gate, BG20-Sacramento River, and BG30-San Joaquin River). The remaining 17 sites were distributed through the five segments of the Bay as follows: three per segment with the exception of the Lower South Bay, which had five.

Samples were collected at all 22 sampling locations with the following exceptions: samples for asbestos analyses were collected at one fixed station only (BG20), samples for analysis of all other CTR parameters were collected at 3 fixed stations only (BC10, BG20, and BA30), and samples for toxicity analysis were collected at 9 stations only (four fixed sites and one random site in each segment). A summary of samples collected at each site is available in the RMP Water Cruise Report (AMS, 2015b).

Three of the original target random sites were "pre-abandoned" during planning and replaced with alternate sites due to access or navigation restrictions:

- Site LSB063W was rejected from the site list because of access restrictions at this location between the Dumbarton Bridge and the nearby railroad bridge, and was replaced with LSB066W.
- SB069W was rejected due to its proximity to the Oakland Airport runways and insufficient depth for transit, and was replaced with SB070W.
- CB039W was rejected due to its location within the navigation channel approximately 500 meters west of the Chevron Long Wharf Marine Oil Terminal, and was replaced with CB042W.

Sampling of all 22 sites in the revised station list was successfully completed. Station names, codes, coordinates, and sampling dates for 2015 are listed in Appendix 2.

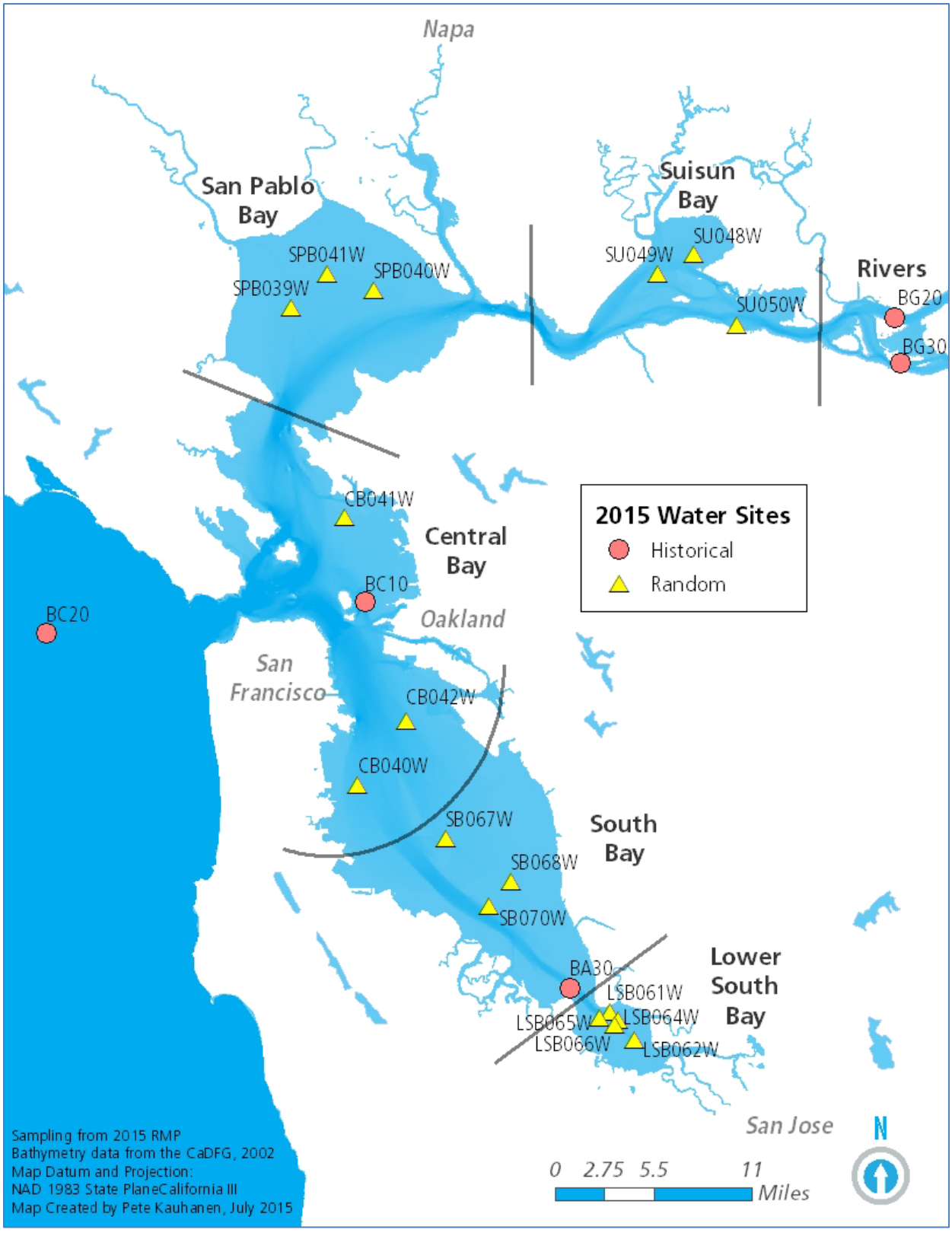

Figure 2.1 Location of 2015 Water Stations

FIELD METHODS

In 2015, total and dissolved fractions of San Francisco Estuary water were collected for trace element and select water quality analyses, including analysis of a modified list of CTR parameters. All water samples were collected aboard the USGS research vessel *RV Turning Tide* between August 26 and September 1, 2015.

Water Sample Collection Methods

In order to attain the low detection limits used in the RMP, ultra-clean sampling methods were used in all trace metal sampling procedures. Sample containers were rinsed three times with site water before filling. Samples were filled on deck on the windward side of the ship to minimize contamination from shipboard sources, handled only by a designated "clean-hands collector wearing polyethylene gloves", and stored on ice. Trace metals sample containers were stored double-bagged (Flegal and Stukas, 1987; U.S. EPA, 1995; SFEI, 2015a). Sample tubing and fittings were acid-cleaned polyethylene or fluoropolymer, and the inlets and outlets were kept covered except during actual sampling (SFEI, 2015a). Sampling tubes were replaced at the beginning of each sampling day, and rinsed with site water for at least one minute before sample collection at each new sampling location.

Similar clean sampling procedures were used to collect samples for ancillary and CTR parameter analysis, with few modifications. Sample containers were rinsed three times with site water, except organics samples (rinsed once), toxicity samples and containers containing preservatives. Samples were handled only by designated collectors wearing nitrile gloves, and stored on ice. Additional detail regarding sample containers and handling procedures are recorded in the 2015 RMP Water Cruise Plan (AMS, 2015a).

QA/QC Sample Collection

Filtered field blanks were collected at one site in South Bay prior to the collection of samples using the same acid-cleaned sampling assembly through which the water samples were collected. Ultra-clean deionized (DI) water was pumped through the sampling apparatus and an acid-cleaned filter and was collected in sample bottles. The field blanks received the same handling and analyses in the laboratory as the field samples. Field blanks were not collected for toxicity, total solids, and asbestos analyses.

A set of field duplicate samples was collected for all traditional RMP parameters (excluding toxicity) at one site in San Pablo Bay. Field duplicates were not collected for CTR parameter, toxicity, or bisphenols analyses.

Difficulties Encountered

The sample consisting of four VOA vials collected at site BA30 on August 26, 2015 for analysis of organic parameters (EPA Method 624) did not meet quality standards for analysis due to the presence of too much headspace in the vials. This sample was discarded and a replacement sample was collected using the following modified sampling method on September 22, 2015. A pre-cleaned sample transfer container supplied by the analysis laboratory was directly submerged approximately one meter below the water surface using a stainless steel sampling pole, and subsequently used to fill the sample containers.

The tributyltin sample collected at BG20 on September 1, 2015 was analyzed past its seven day hold time. This data will be reported with a data qualifier indicating this issue.

The first bisphenol blank sample, collected at the same time all other blank samples were collected on August 27, 2015, was collected using deionized water provided in a large FLPE carboy provided by BRL. FLPE does not contain

the target bisphenols, but a second blank was collected on September 1, 2015 to ensure no contamination would be introduced. The second blank sample container was filled using milli-Q water provided by the East Bay Municipal Utility District (EBMUD) in a 4 L amber glass bottle.

The bisphenol sample bottle used at SPB040W on August 31, 2015 was provided by SIU, but previously held deionized water provided by Caltest and was closed with a hard plastic screw cap of an unknown plastic type. The sample bottle was rinsed thoroughly in site water before the sample was collected.

Shipboard Measurements

Conductivity, temperature and depth (CTD) casts were taken at all stations to document the water column profiles for these parameters. At each site, the CTD instrument was lowered to approximately one meter below the water surface and allowed to equilibrate to ambient temperature for 3 minutes. Following the sampling, the CTD instrument was then lowered to the bottom at approximately 0.15 meters per second and raised. However, only data from the down cast were kept. Data were downloaded onboard the ship and processed in the laboratory using Sea-Bird software. The CTD instrument measured temperature, conductivity, pressure, dissolved oxygen, density, and backscatter at a sampling rate of two scans per second. After the cruise, the CTD profile data were post-processed to calculate the average value for each parameter in 0.25 m depth bins. At this time, salinity (based on conductivity measurements), and depth (based on pressure) were calculated from the indicated measures.

As in previous years, SFEI staff measured dissolved oxygen, conductivity/salinity, pH, and water temperature with a hand-held YSI-556 MPS instrument at all stations. The YSI meter was improperly calibrated for conductivity at one site (BA30) and for pH at two sites (SB068W and SB070W). Conductivity data is available through the CTD cast at site BA30, but reliable pH data is unavailable at the two South Bay stations. YSI measurements are recorded in Table 7 of the 2015 RMP Water Cruise Report (AMS, 2015).

LABORATORY METHODS

The laboratories and analytical methods that were used to measure target analytes for the RMP Status and Trends Program are presented in Table 2.1 below. A full list of the CTR target analytes is presented in Table 2.2 below. SFEI maintains copies of the detailed protocols for all laboratory analyses – please contact Amy Franz (amy@sfei.org) for more details.

Table 2.1. Target Water Analytes: A summary table of the 2015 target analytes, fraction analyzed, reporting units, special field handling requirements, analytical laboratories, and laboratory method

Analyte	Fraction Analyzed	Reporting Unit	Special Field Handling Requirements	Analytical Lab**	Method
Field parameters					
Dissolved oxygen, conductivity, water temperature, optical backscatter density	n/a	mg/L, S/m, degC, FTU*	None	Collected in field by AMS	SeaBird CTD instrument
Dissolved oxygen, conductivity/salinity, pH, water temperature	n/a	mg/L, µS/cm, none, degC	None	Collected in field by SFEI	Hand-held YSI (556 MPS)
Traditional Water Quality parameters					
Toxicity (Survival, Biomass - Growth)	Total	% survival, mg/individual	Cooled with wet ice and refrigerated. Delivered to analysis lab overnight.	PER	EPA Method 1007.0
Dissolved Organic Carbon	Dissolved	µg/L	Field filtered, preserved with 1-2 mL sulfuric acid, cooled with wet ice and refrigerated	ALS	EPA Method 9060
Particulate Organic Carbon	Particulate	µg/L	Field filtered, field frozen on dry ice	ALS	EPA Method 9060M
Hardness	Dissolved	mg/L	Cooled with wet ice and refrigerated	ALS	Standard Method 2340C
Suspended Sediment Concentration	Total	mg/L	Cooled with wet ice and refrigerated	ALS	ASTM D3977-97
Cyanide	Total	µg/L	Preserved with NaOH to a pH ≥ 12	ALS	Standard Method 4500-CN-I
Trace Elements (Cu, Se, Sb, Be, Tl, Cr)[1]	Total and dissolved	µg/L	Field filtered, cooled with wet ice and refrigerated	BRL	EPA Method 1640, modified (Cu, Se by column chelation; Sb, Be, Tl, Cr by reductive precipitation)
Methylmercury	Total and dissolved	ng/L	Preserved with 1-2 mL 50% sulfuric acid, cooled with wet ice and refrigerated	BRL	EPA Method 1630, modified
California Toxics Rule parameters[1] (see Table 2.2 for details)					
Total Solids	Total	%	Cooled with wet ice and refrigerated	Caltest	Standard Method 2540B
Tributyltin	Total	µg/L	Cooled with wet ice and refrigerated	Caltest (subcontracted to TestAmerica)	GC/MS

Analyte	Fraction Analyzed	Reporting Unit	Special Field Handling Requirements	Analytical Lab**	Method
Asbestos	Total	fibers/L	Cooled with wet ice and refrigerated	Caltest (subcontracted to EMSL)	EPA Method 100.1/100.2
SVOCs, VOCs	Total	µg/L	Two vials preserved with HCL; two vials unpreserved. Cooled with wet ice and refrigerated	Caltest	EPA Method 624
SVOCs, VOCs, PAHs, phthalates	Total	µg/L	Cooled with wet ice and refrigerated	Caltest	EPA Method 625
Pesticides	Total	µg/L	Cooled with wet ice and refrigerated	Caltest	EPA Method 608
Additional target parameters for RMP Special Studies or pro-bono research collaborations					
Bisphenols[2]	Total	µg/L	Cooled with wet ice and refrigerated	Southern Illinois University	

*FTU = Formazin Turbidity Unit

**See Appendix 1 for a list of acronyms

1. Sb, Be, Tl, and Cr are parameters on the CTR parameter list. Trace elements samples were analyzed for all parameters listed in Table 2.1 (including Cu and Se) at the three CTR sampling sites, and for Cu and Se only at all other sites. Cu, Se, and methylmercury were measured in both the total and dissolved phase.

2. In 2015, an additional request was made by researchers outside of the RMP to collect samples to support their research during the 2015 cruise. Water samples were collected at all locations for analysis of bisphenols by Southern Illinois University (SIU). This request was accommodated alongside regular Status and Trends sampling with minimal disruption to regularly planned sampling activities.

Table 2.2. California Toxics Rule Target Water Analytes: A table of parameters listed in the California Toxics Rule that were analyzed in Bay water in 2015.

CTR No.	Analyte Name	Analyte Group	Analysis Method
1	Antimony	Trace Elements	EPA 200.8
3	Beryllium	Trace Elements	EPA 200.8
5	Chromium	Trace Elements	EPA 200.8
12	Thallium	Trace Elements	EPA 200.8
15	Asbestos	Other	EPA 100.1/100.2
17	Acrolein	VOCs	EPA 624
18	Acrylonitrile	VOCs	EPA 624
19	Benzene	PAHs	EPA 624
20	Bromoform	VOCs	EPA 624
21	Carbon Tetrachloride	VOCs	EPA 624
22	Chlorobenzene	VOCs	EPA 624
23	Chlorodibromomethane	VOCs	EPA 624
24	Chloroethane	VOCs	EPA 624

CTR No.	Analyte Name	Analyte Group	Analysis Method
25	2-Chloroethylvinyl Ether	VOCs	EPA 624
26	Chloroform	VOCs	EPA 624
27	Dichlorobromomethane	VOCs	EPA 624
28	1,1-Dichloroethane	VOCs	EPA 624
29	1,2-Dichloroethane	VOCs	EPA 624
30	1,1-Dichloroethylene	VOCs	EPA 624
31	1,2-Dichloropropane	VOCs	EPA 624
32	1,3-Dichloropropene	VOCs	EPA 624
33	Ethylbenzene	VOCs	EPA 624
34	Methyl Bromide	VOCs	EPA 624
35	Methyl Chloride	VOCs	EPA 624
36	Methylene Chloride	VOCs	EPA 624
37	1,1,2,2-Tetrachloroethane	VOCs	EPA 624
38	Tetrachloroethylene	VOCs	EPA 624
39	Toluene	VOCs	EPA 624
40	1,2-Trans-Dichloroethylene	VOCs	EPA 624
41	1,1,1-Trichloroethane	VOCs	EPA 624
42	1,1,2-Trichloroethane	VOCs	EPA 624
43	Trichloroethylene	VOCs	EPA 624
44	Vinyl Chloride	VOCs	EPA 624
45	2-Chlorophenol	VOCs	EPA 625
46	2,4-Dichlorophenol	VOCs	EPA 625
47	2,4-Dimethylphenol	VOCs	EPA 625
48	2-Methyl-4,6-Dinitrophenol	VOCs	EPA 625
49	2,4-Dinitrophenol	VOCs	EPA 625
50	2-Nitrophenol	VOCs	EPA 625
51	4-Nitrophenol	VOCs	EPA 625
52	3-Methyl-4-Chlorophenol	VOCs	EPA 625
53	Pentachlorophenol	VOCs	EPA 625
54	Phenol	VOCs	EPA 625
55	2,4,6-Trichlorophenol	VOCs	EPA 625
59	Benzidine	VOCs	EPA 625
65	Bis2-ChloroethoxyMethane	VOCs	EPA 625
66	Bis2-ChloroethylEther	VOCs	EPA 625
67	Bis2-ChloroisopropylEther	VOCs	EPA 625
68	Bis2-EthylhexylPhthalate	SVOCs	EPA 625
69	4-Bromophenyl Phenyl Ether	VOCs	EPA 625
70	Butylbenzyl Phthalate	SVOCs	EPA 625
71	2-Chloronaphthalene	VOCs	EPA 625
72	4-Chlorophenyl Phenyl Ether	VOCs	EPA 625

CTR No.	Analyte Name	Analyte Group	Analysis Method
75	1,2-Dichlorobenzene	VOCs	EPA 624
76	1,3-Dichlorobenzene	VOCs	EPA 624
77	1,4-Dichlorobenzene	VOCs	EPA 624
78	3,3'-Dichlorobenzidine	VOCs	EPA 625
79	Diethyl Phthalate	Phthalates	EPA 625
80	Dimethyl Phthalate	Phthalates	EPA 625
81	Di-n-Butyl Phthalate	SVOCs	EPA 625
82	2,4-Dinitrotoluene	VOCs	EPA 625
83	2,6-Dinitrotoluene	VOCs	EPA 625
84	Di-n-Octyl Phthalate	Phthalates	EPA 625
85	1,2-Diphenylhydrazine	VOCs	EPA 625
89	Hexachlorobutadiene	VOCs	EPA 625
90	Hexachlorocyclopentadiene	VOCs	EPA 625
91	Hexachloroethane	VOCs	EPA 625
93	Isophorone	VOCs	EPA 625
95	Nitrobenzene	VOCs	EPA 625
96	N-Nitrosodimethylamine	VOCs	EPA 625
97	N-Nitrosodi-n-Propylamine	VOCs	EPA 625
98	N-Nitrosodiphenylamine	VOCs	EPA 625
101	1,2,4-Trichlorobenzene	VOCs	EPA 624
116	Endrin Aldehyde	Pesticides	EPA 608
126	Toxaphene	Pesticides	EPA 608
	Tributyltin	Other	GC/MS
	Total Solids	Other	SM 2540 B

REFERENCES FOR ADDITIONAL DETAILS

2015 Water Cruise Plan (AMS, 2015a) - http://www.sfei.org/documents/2015-rmp-water-cruise-plan

2015 Water Cruise Report (AMS, 2015b) – http://www.sfei.org/documents/2015-rmp-water-cruise-report

Quality Assurance Project Plan (SFEI, 2015a) – http://www.sfei.org/documents/quality-assurance-program-plan-regional-monitoring-program-water-quality-san-francisco-b-0

3. BAY MARGINS SEDIMENT MONITORING

BACKGROUND

Since 1993, the RMP has routinely monitored contaminants in surface sediments (top 5 cm) collected at stations in Bay waters at depths greater than 1 m below mean lower low water (referred to as "open Bay"). Sediment sampling was conducted annually from 1993-2012. Biennial sampling was adopted for a brief period after 2012 (i.e., sampled in 2014), and subsequently reduced to once every four years.

The reduction in open Bay sediment sampling frequency reflects a shift in interest towards understanding sediment contamination in the "Bay margins," or locations ranging from depths lesser than 1 m below mean lower low water to the unvegetated shoreline (roughly mean high water). These areas generally include mudflats and adjacent areas. Bay margins are more productive and highly utilized by both humans and wildlife than the open Bay, but have not previously been monitored by the RMP in part due to logistical considerations (sampling by a boat with about a 1 m draft). Analysis of margins contaminant concentrations in the RMP Margins Conceptual Model Report (Jones et al., 2012) suggested higher and more variable contaminant concentrations in the Bay margins, but much of the historical monitoring was not spatially distributed and instead focused on known contaminant hot spots of management interest. Existing data suggests that elevated contaminant concentrations in the Bay margins may be partially responsible for the unchanging concentrations of legacy contaminants (PCBs and mercury) in open Bay sediments and biota despite efforts to reduce sources of these contaminants.

Bay margins have also become areas of regulatory interest because these locations may often have a closer linkage with upstream watersheds. Therefore, data collected in these areas have a higher potential for showing responses to upstream watershed management actions aimed at reducing contaminant loads and impairment.

In 2015, the RMP conducted a pilot effort to sample sediment in the Central Bay margins. The data will be used to develop an unbiased spatially distributed characterization of surface sediment contamination and ancillary characteristics in this region. This information can be used to inform the development of management targets, identify new contaminant hot spots, and measurements of contaminant load reductions due to upstream management activities.

The following sections contain details about the Bay margins sediment sampling conducted in 2015. The field work for this monitoring was conducted by Coastal Conservation and Research (CCR) as a subcontractor to the RMP.

SAMPLING SITES

In 2015, 40 Bay margins sites were targeted for sediment sampling. For this pilot study, sampling was focused on the Central Bay, which is highly urbanized area with a large number of known contaminant hot spots. For this study, the northern boundary of the Central Bay segment is defined by a line running between Point San Pablo in Richmond and Point San Pedro in San Rafael, while the southern limit extends below the Bay Bridge, running approximately between the San Francisco Airport and the Oakland Airport (Figure 3.1).

Because contaminant hot spots are known to be associated with urban industrialized areas, data in these areas are of primary interest. In order to focus monitoring in these areas, the sampling sites in the study area were further split into two sub-regions: areas in the less industrialized Marin County (the "Marin" region), and areas outside Marin County (the "non-Marin" region; the Central Bay study area shown in Figure 3.1 includes both the Marin and non-Marin regions). The non-Marin region was expected to have higher variability in contaminant concentrations.

Therefore, the randomized design was weighted to put a higher density of stations in the non-Marin region. As a result, half (seven) of the original, unweighted target sites in Marin County were replaced with non-Marin sites in Central Bay.

In addition to these modifications, three sites in the non-Marin region were rejected during the planning phase due to poor substrate or accessibility issues. These sites were replaced with three randomly chosen sites also located in the non-Marin region.

- Site CB08 was located along a sandy shoreline that would not provide the appropriate substrate for analysis
- Site CB35 was inaccessible due to its location near a boat dock
- Site CB40 was inaccessible due to its location near the Oakland harbor tugboat dock

No sites had to be abandoned during the cruise but 5 sites were relocated outside of the allowable 50 m radius of the target location due to the original target location being too deep, being on land, or having poor substrate (filled with rocks and shell fragments). Five sites were relocated outside the target 50 m relocation radius due to accessibility issues, but were moved to sites that were representative of conditions at the original target location. Sites monitored in 2015 are shown in Figure 3.1. Site names, codes, coordinates, and sampling dates for the 2015 sediment monitoring effort are listed in Appendix 2.

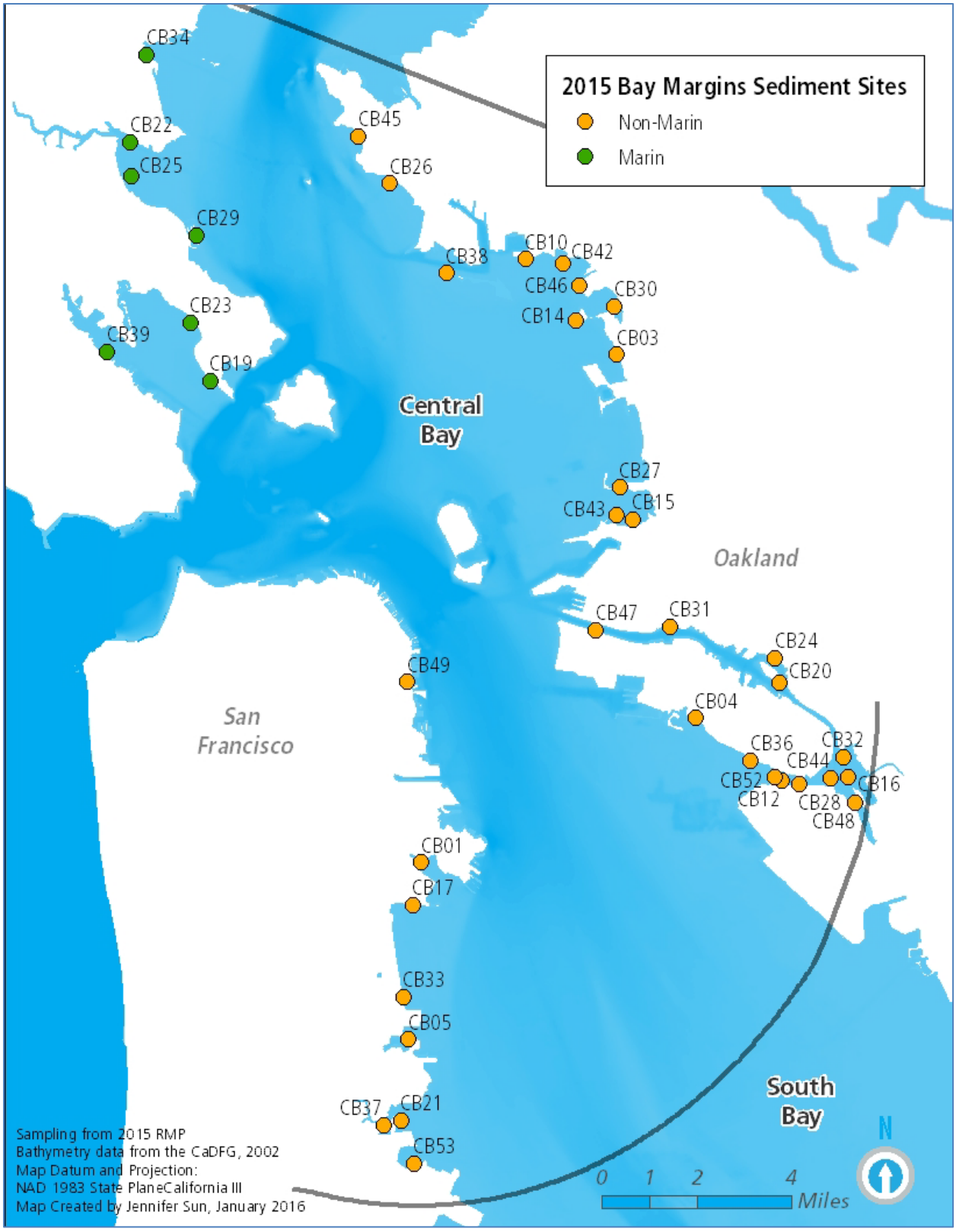

Figure 3.1 Location of 2015 Bay Margins Sediment Stations

FIELD METHODS

All 2015 sediment samples were collected aboard an 18' Boston Whaler operated by Coastal Conservation and Research, Inc. during four sampling cruises between July 27 and September 14, 2015.

Shipboard Measurements

Measurements of *in situ* pH were recorded onboard the sampling vessel by submerging a Cole-Parmer All-in-One pH/ATC probe (mode 59002-72) directly into each sediment sample to approximately 4 cm in depth after the Van Veen grab was brought on deck. One measurement was taken for each grab sample. The pH meter was recalibrated at the beginning of each sampling day.

Sediment oxidation-reduction potential (ORP) was measured in a cored sub-sample (5 cm depth) of the Van Veen grab sample by inserting a probe (WTW Sentix ORP, KCl electrolyte) to a depth of 2.5 cm from the sediment surface. The probe did not require calibration, but was equilibrated for 10 minutes before recording each measurement. One ORP measurement was taken at each station.

For each grab sample, additional field measurements recorded included sediment color, description of sediment composition (sand, mud, etc.), and anoxic transition depth.

Sediment Sampling Field Methods

Two to three sediment grabs were taken at each site, with sediment sub-samples collected for ancillary and chemical analyses. Sediment samples were collected using a modified Van Veen grab with a surface area of 0.1 m^2. The grab is constructed entirely of stainless steel, and the jaws and doors are coated with Dykon® (formerly known as Kynar®) to make them chemically inert. All scoops, buckets, and stirrers used to collect and homogenize sediments were constructed of polycarbonate material. Sediment sampling equipment (including the grab, sample scoops, compositing and storage buckets, polycarbonate coring devices, and wash bottles) was thoroughly cleaned (sequentially with detergent, three rinses of deionized or site water, 1.0% solution of hydrochloric acid, methanol, and deionized or site water) prior to each sampling event. All equipment except the grab was stored in clean Ziploc™ bags until used in the field, and all equipment was cleaned between sampling stations. Airborne contamination was avoided by keeping sample containers, sample scoops and compositing buckets covered when not in use. In order to further minimize sample contamination, personnel handling samples wore nitrile gloves and avoided contacting any materials or equipment that were not already otherwise in contact with the sample (the grab, compositing buckets, etc).

To ensure the quality of the sediment samples, each grab had to satisfy several criteria in order to be accepted, including complete closure, no evidence of sediment washout through the doors, even distribution of sediment in the grab, and minimum disturbance of the sediment surface. Overlying water was drained off an accepted grab.

Sediment from the first grab sample was used for the ORP core, as well as the collection of samples that needed to be frozen in the field (total mercury and methylmercury samples, short term archives for labile emerging contaminants, and antibiotic resistant bacterial samples). The antibiotic resistant bacteria samples were collected by scooping the sample vial directly into the grab, while the remaining samples were collected from the grab using a polycarbonate scoop. A second sediment grab was taken for the collection of samples and archives for analysis of perfluorinated compounds and precursors. These samples were collected directly from the grab into the sample container, avoiding any areas of sediment that may have come into contact with the Dykon® coated grab.

Any remaining undisturbed sediment in the top 5 cm of each grab (avoiding portions cored, probed, or disturbed by sample collection) was scooped into a compositing bucket to provide a single composite sample for each site. Additional sediment grabs were taken until approximately 3 L of sample was collected in the compositing buckets, which were stored on wet ice in the field. Subsequently, back in the laboratory, composite samples were thoroughly homogenized and subsampled into appropriate containers for analysis of ancillary parameters, trace metals, PCBs, and archives within 7 days of sample collection. All samples were stored in the laboratory at -20 C except for grain size samples, which were refrigerated at 4-6 C.

Sampling methods are described in greater detail in the 2015 Bay Margins Cruise Plan (SFEI, 2015b).

QA/QC Sample Collection

Two bottle blanks were retained for the containers for all archive types and samples for total mercury, methylmercury, and trace elements analysis. Bottle blanks were not opened or brought into the field, but were shipped to the laboratory and archive agencies along with the filled sample containers.

Field blanks were collected for the antibiotic resistant bacterial samples at two sites, CB01 and CB33. The field blanks were handled in the same manner as sample containers (e.g. opening the container, pouring solution, labeling, and cleaning the container exterior), except sediment was not scooped into the vial.

Two field duplicate samples were collected for all analyses at two sites, CB01 and CB33.

Difficulties Encountered

All 40 sites were successfully sampled, with 5 sites sampled within 100 m of the target location but outside the 50 m allowable relocation radius. At site CB05, the pH measurement was mistakenly recorded as an ORP measurement, so no ORP measurement was recorded.

Laboratory Methods

The laboratories and analytical methods that were used to measure target analytes are presented in Table 3.1 below. Additional target analytes for special studies or *pro bono* research by collaborators are listed below the table. SFEI maintains copies of the detailed protocols for all laboratory analyses – please contact Amy Franz (amy@sfei.org) for more details.

The methods and laboratory for PCB analyses are yet to be determined, pending the results of an interlaboratory comparability study to ensure comparability to previous measurements of PCBs in sediments.

Table 3.1 Target Sediment Analytes: A summary table of the 2015 target analytes, analytical laboratories, reporting units, special field handling requirements, and method codes.

Analyte	Analytical lab*	Reporting Unit	Special Field Handling Requirements	Method
Field Parameters				
Oxidation-Reduction Potential (Eh)	CCR	mV	None	WTW Sentix ORP
pH (porewater, interstitial sediment)	CCR	pH	None	Cole Parmer pH meter Model 20
Ancillary Sediment Parameters				
Total Solids	1.ALS 2.BRL 3.SFPUC	%	Cooled on wet ice and refrigerated, never frozen. Keep dark.	1.EPA Method 160.3 2.SM 2540G 3.EPA Method 3550C, section 11.2
Particle Size	ALS	% dw	Cooled in wet ice and refrigerated, never frozen. Keep dark.	ASTM D422
CHN	ALS	% dw	Cooled on wet ice and refrigerated, frozen after subsampling	EPA Method 440.0
TOC and TN	ALS	% dw	Cooled on wet ice and refrigerated, frozen after subsampling	EPA Method 440.0 modified (Macro CHN analyzer)
Traditional Sediment Quality Parameters				
Trace Elements (Al, Ag, As, Cd, Cu, Fe, Mn, Ni, Pb, Se, Zn) Aluminum (Al)	SFPUC	mg/kg dw	Cooled on wet ice and refrigerated, frozen after subsampling	EPA Method 3050B (digestion); EPA 6020A, modified
Mercury (Hg)	BRL	mg/kg dw	Collected directly from top 5 cm of the sediment grab, using scoop, to 75% full. Frozen on dry ice within 20 minutes of sample collection	EPA 1631 E
Mercury, Methyl (MeHg)	BRL	µg/kg dw	Collected directly from top 5 cm of the sediment grab, using scoop, to 75% full. Frozen on dry ice within 20 minutes of sample collection	EPA 1630, modified
PCBs 209	To Be Determined	µg/kg dw	Cooled on wet ice and refrigerated, frozen after subsampling	To Be Determined
Additional target parameters for RMP Special Studies or pro-bono research collaborations				
Microplastics	Not yet determined	--	None. Refrigerated or frozen to reduce odor.	--
Anitibiotic-resistant bacterial	UCB	--	Collected directly from surface of the sediment grab. Poured 15 mL sterile storage solution (phosphate buffered saline/15% glycerol) into sediment vial, shaken to mix, and frozen on dry ice	--

*see Appendix 1 for a list of acronyms.

In 2015, several requests were made by researchers outside of the RMP to collect samples to support their research during the 2015 cruise. These requests were accommodated with minimal disruption to regularly planned sampling activities.

- Sediment was collected from 10 sites and archived at SFEI for future analysis of microplastics
- Sediment was collected from all 40 sites for analysis of antibiotic-resistant bacteria by UC Berkeley

Additional sediment samples were collected and archived at both -18 °C (short-term archive) and -150 °C (long-term archive) for potential future analyses, such as for organic parameters and perfluorinated chemicals. These samples are presented below in Table 3.2

Table 3.2 Archive Sediment Sample Target Analyses: A summary table of the 2015 archive samples, storage location, and special field handling requirements.

Target Analysis	Storage Location (Short or Long Term Archive)	Special Field Handling Requirements	Container Type	Number of Samples per site
Perfluorinated chemicals and precursors	Short and Long Term	Collected directly from top 5 cm of the sediment grab, using sample container. Cooled on wet ice, optionally frozen. Frozen in the lab.	10 mL polypropylene cryovials	2 (short term); 3 (long term)
Labile non-PFC emerging contaminants	Short Term	Collected directly from top 5 cm of the sediment grab, using scoop, to 75% full. Frozen on dry ice.	60 mL clear short glass jar	1
Non-PFC organics or trace metals	Long Term	Collected directly from top 5 cm of the sediment grab, using scoop, to 75% full. Frozen on dry ice.	22 mL standard Teflon vial, round interior	3
Non-PFC organics	Short Term	Cooled on wet ice and refrigerated, frozen after subsampling	60 mL clear short glass jar	4
Trace Metals	Short Term	Cooled on wet ice and refrigerated, frozen after subsampling	250 mL polyethylene jar	1

REFERENCES FOR ADDITIONAL DETAILS

2015 Bay Margins Cruise Plan (SFEI, 2015b) – http://www.sfei.org/documents/2015-bay-margins-sediment-study-cruise-plan

2015 RMP Contaminant Concentrations in Central Bay Margins Sediment Cruise Report (CCR, 2015) - http://www.sfei.org/documents/2015-rmp-contaminant-concentrations-central-bay-margins-sediment-cruise-report

RMP 2015 Quality Assurance Project Plan (SFEI, 2015a) – http://www.sfei.org/documents/quality-assurance-program-plan-regional-monitoring-program-water-quality-san-francisco-b-0

4. DATA ACCESS AND REPORTS

ANNUAL MONITORING ONLINE GRAPHICS AND DATA ACCESS TOOLS

Web Tools: Contaminant Data Display and Download (CD3)

The RMP Status and Trends data are available online using a dynamic mapping and graphing tool. The online Contaminant Data Display and Download (CD3, http://cd3.sfei.org) can be used to view, summarize, or download all water, sediment, and tissue monitoring results that have met specific data quality objectives and have passed a rigorous QA/QC evaluation as outlined in the RMP's Quality Assurance Project Plan. Additional information about data available through CD3 can be found on the RMP webpage (http://www.sfei.org/rmp/data).

The 2015 samples are still being analyzed by the laboratories. Once these data are received and quality assured by the RMP, they will be made available through CD3 by August 31, 2016. The RMP Technical Review Committee will be notified at the time of data release. Data for CTR analytes will be quality assured and made available in database format by March 2016.

Although the CTD profile data are not available for download using the CD3, SFEI maintains these data in a database. Data are available upon request (contact DS@sfei.org).

5. REFERENCES

Applied Marine Sciences. 2015a. 2015 RMP Water Cruise Plan. Applied Marine Sciences, Livermore, CA http://www.sfei.org/documents/2015-rmp-water-cruise-plan

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Coastal Conservation & Research. 2015. 2015 RMP Contaminant Concentrations in Central Bay Margins Sediment Cruise Report. Coastal Conservation & Research, Moss Landing, CA. http://www.sfei.org/documents/2015-rmp-contaminant-concentrations-central-bay-margins-sediment-cruise-report

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Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California. 65 Fed. Reg. 31682. (May 18, 2000) (to be codified as 40 CFR Part 131) http://www.waterboards.ca.gov/water_issues/programs/tmdl/records/state_board/2003/ref476.pdf

SFEI. 2015a. Quality Assurance Program Plan for The Regional Monitoring Program for Water Quality in San Francisco Bay. San Francisco Estuary Institute, Richmond, CA. http://www.sfei.org/documents/quality-assurance-program-plan-regional-monitoring-program-water-quality-san-francisco-b-0

SFEI. 2015b. 2015 Bay Margins Sediment Study Cruise Plan. San Francisco Estuary Institute, Richmond, CA. http://www.sfei.org/documents/2015-bay-margins-sediment-study-cruise-plan

U.S. EPA. 1995. Method 1669: Sampling ambient water for trace metals at EPA water quality criteria levels. EPA 821-R-95-034, United States Environmental Protection Agency, Washington, D.C

6. APPENDIX TABLES

APPENDIX 1 RMP CONTRACTORS AND PRINCIPAL INVESTIGATORS IN 2015

Acronym	Laboratory/Contractor	Contact
Field Contractors		
AMS	Applied Marine Sciences Livermore, CA	Paul Salop salop@amarine.com RMP Water Cruise Logistical Coordinator
CCR	Coastal Conservation & Research Moss Landing, CA	Russell Fairey fairey@mlml.calstate.edu Ship Captain – Bay Margins Cruise
USGS	United States Geological Survey Sacramento, CA	Chris Vallee cvallee@usgs.gov Captain, *RV Turning Tide* Ship Captain - Water Cruise
Analytical Laboratories		
ALS	ALS Environmental Kelso, WA Tuscon, AZ	Howard Boorse howard.boorse@alsglobal.com Ralph Poulsen rpoulsen@caslab.com
To Be Determined – Laboratory for PCB analyses		
BRL	Brooks-Rand Laboratory Bothell, WA	Tiffany Stilwater tiffany@brooksrand.com
Caltest	Caltest Analytical Laboratories Napa, CA	Melinda Kelley Melinda_Kelley@caltestlabs.com Todd Alberton Todd_Albertson@caltestlabs.com
PER	Pacific EcoRisk, Inc. Fairfield, CA	Scott Ogle scottogle@pacificecorisk.com
SFPUC	San Francisco Public Utilities Commission Millbrae, CA	Robert Wellbrock RWellbrock@sfwater.org
Academic Partners (pro bono studies)		
Southern Illinois University	Southern Illinois University Carbondale, IL	Da Chen dachen@siu.edu
UC Berkeley	UC Berkeley Berkeley, CA	Ben Greenfield greenfieldben1@gmail.com

APPENDIX 2 SUMMARY OF 2015 RMP SAMPLING STATIONS

Cruise Type	Region	Site Code	Site Type	Collection Date	Latitude	Longitude	Site Depth (m)
WATER	South Bay	BA30	Historical	2015-08-26	37.51361	-122.13436	6.4
WATER	Central Bay	BC10	Historical	2015-08-27	37.82259	-122.34977	7
WATER	Central Bay	BC20	Historical	2015-08-28	37.79166	-122.67382	30.8
WATER	Rivers	BG20	Historical	2015-09-01	38.05897	-121.81440	8
WATER	Rivers	BG30	Historical	2015-09-01	38.02277	-121.80856	9.3
WATER	Central Bay	CB040W	Random	2015-08-27	37.67517	-122.35460	8.5
WATER	Central Bay	CB041W	Random	2015-08-28	37.89081	-122.37338	3.6
WATER	Central Bay	CB042W	Random	2015-08-28	37.72777	-122.30599	9.7
WATER	Lower South Bay	LSB061W	Random	2015-08-26	37.49572	-122.09360	2.1
WATER	Lower South Bay	LSB062W	Random	2015-08-26	37.47336	-122.06907	6.7
WATER	Lower South Bay	LSB064W	Random	2015-08-26	37.48906	-122.08600	4.6
WATER	Lower South Bay	LSB065W	Random	2015-08-26	37.49079	-122.10474	3.7
WATER	Lower South Bay	LSB066W	Random	2015-08-26	37.48511	-122.08888	3.7
WATER	South Bay	SB067W	Random	2015-08-27	37.63318	-122.26368	7.1
WATER	South Bay	SB068W	Random	2015-08-27	37.59945	-122.19647	3
WATER	South Bay	SB070W	Random	2015-08-27	37.57895	-122.21902	3.6
WATER	San Pablo Bay	SPB039W	Random	2015-08-31	38.05935	-122.43178	2.5
WATER	San Pablo Bay	SPB040W	Random	2015-08-31	38.07473	-122.34761	3.9
WATER	San Pablo Bay	SPB041W	Random	2015-08-31	38.08719	-122.39538	3.3

Cruise Type	Region	Site Code	Site Type	Collection Date	Latitude	Longitude	Site Depth (m)
WATER	Suisun Bay	SU048W	Random	2015-09-01	38.10830	-122.02161	2.2
WATER	Suisun Bay	SU049W	Random	2015-09-01	38.09216	-122.05773	4
WATER	Suisun Bay	SU050W	Random	2015-09-01	38.05216	-121.97656	2.9
MARGINS SEDIMENT	Central Bay (non-Marin)	CB01	Random	2015-08-21	37.721950	-122.382250	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB03	Random	2015-09-14	37.878167	-122.310800	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB04	Random	2015-09-02	37.767583	-122.277750	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB05	Random	2015-08-20	37.667817	-122.385783	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB10	Random	2015-07-28	37.906683	-122.346670	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB12	Random	2015-09-02	37.748933	-122.244167	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB14	Random	2015-09-14	37.888183	-122.326833	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB15	Random	2015-09-01	37.827900	-122.303417	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB16	Random	2015-09-01	37.750317	-122.218517	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB17	Random	2015-08-21	37.708933	-122.385217	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB20	Random	2015-09-02	37.779033	-122.245583	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB21	Random	2015-08-31	37.643033	-122.387883	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB24	Random	2015-09-02	37.786350	-122.247483	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB26	Random	2015-07-29	37.929017	-122.399450	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB27	Random	2015-09-01	37.837633	-122.308500	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB28	Random	2015-09-02	37.748067	-122.237400	Not recorded

Cruise Type	Region	Site Code	Site Type	Collection Date	Latitude	Longitude	Site Depth (m)
MARGINS SEDIMENT	Central Bay (non-Marin)	CB30	Random	2015-09-14	37.892833	-122.312000	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB31	Random	2015-09-14	37.795333	-122.288333	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB32	Random	2015-09-01	37.756633	-122.220400	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB33	Random	2015-08-20	37.680683	-122.388033	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB36	Random	2015-09-02	37.755083	-122.256283	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB37	Random	2015-08-31	37.641400	-122.394500	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB38	Random	2015-07-29	37.902000	-122.377100	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB42	Random	2015-09-14	37.905667	-122.332267	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB43	Random	2015-09-01	37.829283	-122.309350	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB44	Random	2015-09-01	37.749983	-122.225183	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB45	Random	2015-07-28	37.943133	-122.412080	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB46	Random	2015-09-14	37.899033	-122.325767	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB47	Random	2015-09-14	37.793817	-122.316800	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB48	Random	2015-09-01	37.742767	-122.215517	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB49	Random	2015-08-21	37.776967	-122.388917	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB52	Random	2015-09-02	37.750100	-122.246917	Not recorded
MARGINS SEDIMENT	Central Bay (non-Marin)	CB53	Random	2015-08-31	37.629933	-122.382617	Not recorded
MARGINS SEDIMENT	Central Bay (Marin)	CB19	Random	2015-07-27	37.867600	-122.467300	Not recorded
MARGINS SEDIMENT	Central Bay (Marin)	CB22	Random	2015-07-29	37.939933	-122.500000	Not recorded

Cruise Type	Region	Site Code	Site Type	Collection Date	Latitude	Longitude	Site Depth (m)
MARGINS SEDIMENT	Central Bay (Marin)	CB23	Random	2015-07-27	37.885270	-122.475383	Not recorded
MARGINS SEDIMENT	Central Bay (Marin)	CB25	Random	2015-07-29	37.929567	-122.499433	Not recorded
MARGINS SEDIMENT	Central Bay (Marin)	CB29	Random	2015-07-29	37.911983	-122.473733	Not recorded
MARGINS SEDIMENT	Central Bay (Marin)	CB34	Random	2015-07-27	37.966833	-122.494250	Not recorded
MARGINS SEDIMENT	Central Bay (Marin)	CB39	Random	2015-07-27	37.875833	-122.507250	Not recorded

Appendix 3 Analytes reported in water samples (1993-2015)

Shaded areas indicate that parameters that were analyzed for RMP Status and Trends Sampling.

In 2015, some PAHs, phthalates, and pesticides listed in the California Toxics Rule that have not be monitored by the RMP since 2003 were analyzed. These parameters are listed in Table 2.2 and are not included in the table below, which displays the long-term monitoring frequency of Status and Trends water quality parameters.

Parameter Type Codes: ANC = Ancillary Parameters, ORGS = Organic Parameters, PESTs = Pesticide Parameters, SYN = Synthetic Parameters, TE = Trace Metal parameters, WaterTOX = Toxicity Parameters

* Data available upon request

Reportable Water Parameter	Parameter Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Ammonium as N	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		
Chlorophyll a	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		
CTD*	ANC		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■
Dissolved Organic Carbon	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■
Hardness as CaCO3	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■
Nitrate as N	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		
Nitrite as N	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		
Oxygen, Dissolved	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■		
Particulate Organic Carbon	ANC												■	■	■	■	■	■	■	■		■		■
pH	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■		■
Pheophytin a	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		
Phosphate as P	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		
Salinity (by salinometer)	ANC	■		■	■	■	■	■	■	■	■	■	■	■	■									
Salinity (by SCT)	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		
Salinity (by Solomat)	ANC					■																		
Silica	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		
Specific Conductivity	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■		■
Suspended Sediment Concentration	ANC										■	■	■	■	■	■	■	■	■	■		■		■
Temperature	ANC	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■		■
Total Suspended Solids	ANC	■	■	■	■	■	■	■	■	■				■	■	■								■

Reportable Water Parameter	Parameter Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Alkanes (C10-C34)	ORGS	■	■	■																				
Dioxins/Furans	ORGS																	■		■				
PAHs (biennially beginning 2008)	ORGS	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			■				
PAHs Alkylated (biennially beginning 2008)	ORGS						■	■	■	■	■	■	■	■	■	■	■			■				
PBDEs (annually)	ORGS										■	■	■	■	■	■	■	■	■	■				
PCBs 209 (biennially beginning 2008)	ORGS																	■		■				
PCBs 40 (biennially beginning 2008)	ORGS	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■				
Pharmaceuticals	ORGS														■									
Phthalates	ORGS										■	■												
Chlordanes	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■				
Chlorpyrifos	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■				■		■				
Cyclopentadienes	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■				
Dacthal	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■				
DDTs	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■				
Diazinon	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■				■		■				
Endosulfan I	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■				
Endosulfan II	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■				
Endosulfan Sulfate	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■				
HCHs	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■				
Hexachlorobenzene	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■				
Mirex	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■				
Oxadiazon	PESTs	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
p-Nonylphenol	SYN										■	■												
Triphenylphosphate	SYN										■													
Arsenic	TE	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		
Cadmium	TE	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		
Chromium	TE	■	■	■	■	■	■	■		■														■
Cobalt	TE								■	■	■	■	■	■	■	■	■	■	■	■		■		
Copper	TE	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		■
Cyanide	TE	■	■															■		■		■		■
Iron	TE							■	■	■	■	■	■	■	■	■	■	■	■	■		■		
Lead	TE	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■		

Reportable Water Parameter	Parameter Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Manganese	TE																							
Mercury	TE																							
Mercury, Methyl	TE																							
Nickel	TE																							
Selenium	TE																							
Silver	TE																							
Zinc	TE																							
Cell Count	WaterTox																							
Mean % Normal Development	WaterTox																							
Mean % Survival	WaterTox																							
SWI Mean % Normal Alive	WaterTox																							

Appendix 4 Analytes reported in sediment samples (1993-2015)

Shaded areas indicate that parameters that were analyzed for RMP Status and Trends Sampling. Grey = open Bay sediments, Blue = Bay margins sediments
Parameter Type Codes: ANC = Ancillary Parameters, ORGS = Organic Parameters, PESTs = Pesticide Parameters, SYN = Synthetic Parameters, TE = Trace Metal parameters, WaterTOX = Toxicity Parameters
* Data available upon request

Reportable Sediment Parameter	Parameter Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
% Solids	ANC																							
Ammonia	ANC																							
CTD*	ANC																							
Eh*	ANC																							
Grainsize - Clay <0.0039 mm	ANC																							
Grainsize - Clay <0.005 mm	ANC																							
Grainsize - Fine <0.0625 mm	ANC																							
Grainsize - Granule + Pebble 2.0 to <64 mm	ANC																							
Grainsize - Sand 0.0625 to <2.0 mm	ANC																							
Grainsize - Silt 0.0039 to <0.0625 mm	ANC																							
Hydrogen Sulfide	ANC																							
pH	ANC																							
Total Nitrogen	ANC																							
Total Organic Carbon	ANC																							
Total Sulfide	ANC																							
Benthos	Benthos																							
Dioxins/Furans	ORGS																							
PAHs	ORGS																							
PAHs Alkylated	ORGS																							
PBDEs	ORGS																							
PCBs 209	ORGS																							
PCBs 40	ORGS																							
Phthalates	ORGS																							
Chlordanes	PESTs																							
Cyclopentadienes	PESTs																							
DDTs	PESTs																							
Fipronil	PESTs																							
HCHs	PESTs																							

Hexachlorobenzene	PESTs																							
Mirex	PESTs																							
Pyrethroids	PESTs																							
Mean % Normal Alive	SedTox																							
Mean % Survival	SedTox																							
p-Nonylphenol	SYN																							
Aluminum	TE																							
Arsenic	TE																							
Cadmium	TE																							
Copper	TE																							
Chromium	TE																							
Iron	TE																							
Lead	TE																							
Manganese	TE																							
Mercury	TE																							
Mercury, Methyl	TE																							
Nickel	TE																							
Selenium	TE																							
Silver	TE																							
Zinc	TE																							

APPENDIX 5 – CHANGES TO THE RMP PROGRAM 1993-2015

Action Codes: A= Analyte added or removed from sampling design; D= Data rejected or not available/data comparability issues; L= Change in laboratory conducting analysis or in laboratory methods; P= Change in program/sampling design; S= Station added or removed; T= Trends analysis performed.

Action Code	Year	Action	Detail/Rationale
D	1993-1998	CTD data are not available for tissue	CTD cast was not deployed.
D	1998-1999	Iron in bivalves is a non-target analyte and not reported via WQT	Iron in bivalves reported by lab, but is not available via WQT.
D	1999-2001	CTD data are available for Deployment, maintenance and retrieval tissue cruises	Began deploying CTD casts during tissue cruises.
A	1993	MeHg in bivalve tissue samples was only analyzed in 1993.	Since this was part of a pilot study, the results are not displayed via the WQT. Total mercury was analyzed each year through 1999.
P	1993	Implemented Regional Monitoring Program for Trace Substances in the San Francisco Estuary (RMP). Samples collected three times per year for conventional water quality parameters and trace analytes.	Samples were collected during the rainy season (March), during declining Delta outflow (May), and during the dry season (Aug - Sept).
P	1993	Implemented Regional Monitoring Program for Trace Substances in the San Francisco Estuary (RMP) samples. Samples collected twice a year for sediment quality parameters and trace analytes.	Samples were collected during the rainy season (March) and during the dry season (Aug-Sept).
P	1993	Implemented Regional Monitoring Program for Trace Substances in the San Francisco Estuary (RMP). Bivalve samples collected twice a year for transplanted, bagged bivalve bioaccumulation and condition.	Samples were deployed during the rainy season (March-May) and during the dry season (Aug-Sept) and retrieved between 90 and 100 days after deployment.
S	1993	Collected samples along the spine of the estuary at 16 set stations for water and sediment; toxicity was measured at 8 of these stations for each matrix. Bivalves were deployed at 11 of the stations.	Original RMP sampling design.

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Action Code	Year	Action	Detail/Rationale
D	1994	Prior to 2003, there are no records for individual fish stored in the database. Therefore, there are no records in the POEFish table.	Only composite information is available.
P	1994	Status and Trends Sport Fish Monitoring	Sport fish monitoring began as a pilot study funded by the Bay Protection and Toxics Cleanup Program.All fish were analyzed as individuals for mercury, PCBs, pesticides, and selenium.
S	1994	Added 2 stations for water and sediment sampling (previously 22) as part of the Local Effects Monitoring Program (LEMP): C-1-3 (Sunnyvale) and C-3-0 (San Jose)	Sites located by water pollution control plants. Added on a trial basis by Water Board. Sites were treated identically as RMP stations. Total water stations =24.
S	1994	Added 4 stations (previously 11) for bivalve tissue sampling	Total bivalve stations = 15.
S	1994	Added 6 stations for water and sediment sampling (previously 16): San Bruno Shoal (BB15), Alameda (BB70), Red Rock (BC60), Honker Bay (BF40), Petaluma River mouth (BD15), Coyote Creek mouth (BA10)	Sites selected to fill large areas in Estuary where no samples were taken and to better monitor areas around tributaries. Total water stations = 22.
A	1996	Added trace organics analysis for Southern Slough stations Sunnyvale (C-1-3) and San Jose (C-3-0)	Trace organics were not analyzed for Sunnyvale (C-1-3) during the July 1996 or August 1997 rainy season cruises, however samples were analyzed for trace metals and ancillary parameters.
S	1996	1996-04 *Corbicula fluminea* (CFLU) clams were collected from Putah Creek.	1996-04 *Corbicula fluminea* (CFLU) couldn't be retrieved from Lake Isabella so clams were collected from Putah Creek. Due to concerns with contamination, both pre- and post-depuration analysis was performed, but only the post-depurated results were reported. In September 1996, only post-depurated analysis was performed.
S	1996	Added 2 stations for water and sediment sampling (previously 24) as part the Estuary Interface Pilot Study: Standish Dam (BW10) and Guadalupe River (BW15)	Added as part of the Estuary Interface Pilot Study. Total water and sediment stations = 26.

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Action Code	Year	Action	Detail/Rationale
A	1997	Identified 40 target PCB congeners for labs to report: PCB 008, 018, 028, 031, 033, 044, 049, 052, 056, 060, 066, 070, 074, 087, 095, 097, 099, 101, 105, 110, 118, 128, 132, 138, 141, 149, 151, 153, 156, 158, 170, 174, 177, 180, 183, 187, 194, 195, 201, 203	Analysis of RMP data collected from 1993-1995 showed 40 congeners consistently quantified in Bay samples. It was found that 40 congeners would be a good representation (~80% representative) of the total mass of PCBs in the bay.
D	1997	Prior to 2003, there are no records for individual fish stored in the database. Therefore, there are no records in the POEFish table.	Only composite information is available.
D	1997	Total salinity measurements taken in the field are not available for the April cruise.	Measurements not available.
L	1997	Changed analytical lab for analysis of PCBs and PAHs in bivalve tissue samples	Central Contra Costa Sanitary District began analysis of PCBs and PAHs in bivalve tissue.
P	1997	Implemented Sport Fish Contaminant Study - Sport Fish will be collected on a three year cycle and analyzed for mercury, PCBs, legacy pesticides (DDT, dieldrin, chlordane), and Se	Study implemented as a follow up to a 1994 study conducted by the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB).
P	1997	Status and Trends Sport Fish Monitoring	A special study was done to compare skin-on versus skin-off organics concentrations in white croaker.Analytes measured: mercury, PCBs, DDT's, chlordanes, dieldrin, dioxin and dioxin-like compounds, and selenium.Most samples were analyzed as composites except for mercury in striped bass and California halibut, and selenium in white sturgeon.EWG analyzed some archive 1997 RMP samples for PBDEs in 2002. These data are not available on the WQT.
A	1998	T-1 samples analyzed for trace organics and trace elements	While T-0 samples have been consistently analyzed throughout the years, T-1 samples were analyzed for only two cruises: 1998-04 and 2001-09. The decision to analyze was because a lot of the transplants died during deployment.
D	1998	Status and Trends Sport Fish Monitoring	Bivalves and crustaceans were analyzed as part of the sport fish study.
D	1998	Tissue results are not available for Sept. 1998 for BF20 (Grizzly Bay)	The bivalves *Corbicula fluminea* (CFLU) could not be found at the reference site Lake Chabot

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Action Code	Year	Action	Detail/Rationale
D	1999	Status and Trends Sport Fish Monitoring	Bivalves and crustaceans were analyzed as part of the sport fish study.
L	1999	Changed analytical lab for analysis of mercury in water samples	University of Maryland, Center of Environmental Studies began analysis of Hg in water.
S	1999	Removed 1 station (previously 15) for bivalve tissue sampling BF20 (Grizzly Bay)	A bivalve reference site could not be found for *Corbicula fluminea* (CFLU). Total bivalve tissue stations = 14.
A	2000	Added Cobalt (Co) analysis in water and sediment samples	Co is a useful marker of geochemical processes in the Estuary, particularly as an indicator of metal fluxes from sub-oxic sediments. Added as part of the Fe/Mn/Co group.
A	2000	Added gonadal index and growth analysis in bivalve tissue samples	Growth analysis calculated by SFEI in 2000 and 2001. AMS started calculating growth analysis in 2002.
A	2000	Added Methyl Mercury analysis in water and sediment samples	Ratios of Methyl Mercury to Total Mercury can be used to determine environments that methylation is most likely to occur in.
A	2000	Removed Mercury (Hg) and Arsenic (As) analysis in bivalve tissue samples	RMP results (1993-99) indicated that there was very little bioaccumulation of Hg beyond background concentrations and there was an absence of serious As contamination.
D	2000	Prior to 2003, there are no records for individual fish stored in the database. Therefore, there are no records in the POEFish table.	Only composite information is available.
L	2000	Changed analytical lab for analysis of PCBs and PAHs in bivalve tissue samples	Texas A&M Geochemical and Environmental Research began analysis of PCBs and PAHs in bivalve tissue.
P	2000	Changed frequency of water sampling to twice a year for ancillary and trace metal analytes	Discontinued sampling during declining Delta outflow (May). Samples were collected during the rainy season (March) and during the dry season (Aug-Sept). It was determined that samples collected during the dry season were most indicative of ambient concentrations.
P	2000	Changed frequency of sediment sampling to once a year for ancillary, trace metal and organic analytes	Samples collected during the dry season (Aug-Sept).

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Action Code	Year	Action	Detail/Rationale
P	2000	Changed frequency of water sampling to once a year for organic analytes	Samples collected during the dry season were analyzed for organic contaminants. Most organic contaminants are legacy pollutants which degrade slowly so analyzing more that once a year for these analytes was found to be unnecessary.
P	2000	Status and Trends Sport Fish Monitoring	A special study was done to compare organics concentrations across time during one year in the Oakland Inner Harbor. This study was to look at the seasonal variation of organic contaminants pre- and post-spawning. Analytes measured: mercury, PCBs, DDTs, chlordanes, dieldrin, PBDEs (qualitative), dioxin and dioxin-like compounds, and selenium.The 1998 crab data and 1999 clam data were reported in the 2000 report.Most samples were analyzed as composites except for mercury (California halibut, white sturgeon, leopard shark and striped bass) and selenium in white sturgeon.
A	2001	Removed Gonadal Index analysis in bivalve tissue samples	Unable to obtain sufficient level of precision in separating somatic and gonadal tissue.
A	2001	T-1 samples analyzed	While T-0 samples have been consistently analyzed throughout the years, T-1 samples were analyzed for only two cruises: 1998-04 and 2001-09. No rational was found for analyzing these samples.
D	2001	PBDE Tissue Data not reported	A minimum amount of QA/QC was conducted. Dataset was missing replicates and SRMs. Data was treated as a special study and not added to S&T db.
D	2001	Status and Trends Sport Fish Monitoring	Bivalves and crustaceans were analyzed as part of the sport fish study.
A	2002	Added PBDEs, phthalates, and p-nonylphenol analysis in water and sediment samples	Added potential persistent pollutants with the ability to bioaccumulate and cause toxicity.
A	2002	Added PBDEs, phthalates, p-nonylphenol, triphenylphosphate and nitro and polycyclic musks analysis in bivalve tissue samples	Added potential persistent pollutants with the ability to bioaccumulate and cause toxicity.
A	2002	Changed health indicator from Condition Index Mean to Growth Mean in bivalve tissue samples	Condition index is the ratio of tissue mass to shell volume and may be affected by factors other than health. Growth compares the pre- and post- deployment weight of each mussel and is a more direct measurement of health.

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Action Code	Year	Action	Detail/Rationale
A	2002	Reduced bivalve Trace Metals (Ag, Al, Cd, Cu, Ni, Pb, Se, Zn) analysis in bivalve tissue samples to 5 year cycle and removed tributyltin analysis in bivalve tissue samples	RMP results indicated that Trace Metals and tributyltin do not appreciably accumulate in bivalve tissue. Report link: http://www.sfei.org/rmp/Technical_Reports/RMP_2002_No109_RedesignProcess.pdf
A	2002	Removed chromium analysis in water, sediment and bivalve tissue samples	Technical Review Committee made decision based on findings by Khalil Abu-Saba that stated that the chromium found in the estuary was mostly of the trivalent form and none of the hexavalent form was detected. The concentrations in water and sediment were found to be essentially the same as those from the soils in the watersheds draining into the estuary.
D	2002	CTD casts were not taken during 2002 bivalve tissue maintenance cruise	The water and bivalve maintenance cruise occurred concurrently and it was decided that it was more important to take casts on the water cruise.
D	2002	Data unavailable/rejected for BDEs 82, 128, 203, 204, 205, 206, 207, and 209 for bivalve tissue samples	BDEs 82, 128, and 209 not part of standard mix reported by lab. BDEs 203, 204, 205, 206, 207 and 209 do not elute off of the GC-ECD columns.
D	2002	Data unavailable/rejected for PCB 132 analyzed in bivalve tissue samples	PCB 132 not analyzed in the lab due to co-elution problems.
L	2002	Changed analytical lab for analysis of mercury and methyl mercury in water	University of California, Santa Cruz Dept. of Environmental Toxicology began water Hg and MeHg analysis (formerly conducted by University of Maryland).
L	2002	Changed analytical lab for analysis of trace organics in bivalve samples	California Dept. of Fish and Game, Marine Pollution Control Laboratory began analysis of trace organics in bivalve tissue (including pesticides, PAHs, and PCBs).
L	2002	Changed analytical lab for water trace organics to AXYS	Analysis formerly conducted by University of Utah Energy and Geoscience Institute (UUEGI)
L	2002	Changed method for analysis of Total Suspended Solids (TSS) in water to Suspended Solid Content (SSC) in water	The SSC method analyzes the whole sample while TSS is a subsetting method. SSC poses less variability by human interference and attains better precision because heavier sand and sticky clay particles are not lost during analysis.
P	2002	Changed Aquatic Toxicity Testing from yearly to a five year cycle	From 1993 to 2002, a noticeable decline in aquatic toxicity to organisms was observed, especially during the dry season.

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Action Code	Year	Action	Detail/Rationale
P	2002	Implemented new random sampling design. Random sampling design based on spatially balanced probabilistic sampling design. The bay was divided into 5 hydrographic regions plus the Rivers segments. 7 Historic RMP sites were maintained in the program for sediment trends analysis and 3 (now 5) historic sites were maintained for water analysis	Sampling design will provide better statistical basis to answer regulatory questions. Will provide unbiased estimate of ambient conditions.
P	2002	Status and Trends Sport Fish Monitoring	The Environmental Working Group collected fish in 2002 from fishing piers around the Bay and analyzed fish for PBDE levels. SFEI reviewed this data set and added it to our Sportfish database. The data are not currently being included in the WQT due to some issues with the data. EWG also analyzed some archive RMP samples (1997) for PBDEs. These data are also not being displayed externally.
P	2002	Stopped Bivalve Maintenance Cruise	Cruise was found to be unnecessary.
D	2002-2003	Original results were rejected for pesticide, PCB, and PBDE sediment samples.	Samples were reanalyzed using HRGC/MS during 2008 so should show no bias relative to 2007 and later samples.
A	2003	Added PBDE analysis in sport fish samples collected for the Sport Fish Contaminant Study	Increasing PBDE concentrations in the bay area coupled with concern about the health effects on humans and wildlife led to adding PDBEs.
A	2003	CTD casts were not taken during 2003 bivalve tissue maintenance cruise	The water and bivalve maintenance cruise occurred concurrently and it was decided that it was more important to take casts on the water cruise.
D	2003	Data rejected for PAHs in bivalve tissue	Data was rejected by SFEI QA Officer due to many samples being qualified as Non Detect.
P	2003	Changed container for bivalves deployed from bags to cages. Some of the cages were maintained and some were un-maintained at each site	Findings from side by side deployment of bivalves in cages and in bags indicated that cages reduced the effects of bivalve predation. Report link: http://www.sfei.org/rmp/reports/431_AMS_bivalvestudies.pdf.

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Action Code	Year	Action	Detail/Rationale
P	2003	Status and Trends Sport Fish Monitoring	A special study to do preliminary screening of additional species began in 2003. Additional species were analyzed for mercury and PCBs. Species included anchovy, barred surfperch, black surfperch, brown rockfish, herring, Chinook salmon, diamond turbot, sardine, smooth hound shark, starry flounder, and walleye surfperch.Analytes measured: mercury, PCBs, DDT, chlordane, dieldrin, PBDEs.Most samples were analyzed as composites except for mercury (California halibut, striped bass, leopard shark, white sturgeon) and selenium in white sturgeon.
P	2003	Stopped deployment of bivalves *Corbicula fluminea* (CFLU) in the estuary. CFLU collection was continued in the delta by trawling at the Rivers sites BG20 (Sacramento River) and BG30 (San Joaquin River)	Findings from 2000-2002 special studies concluded that bioaccumulation of contaminants in the estuary could be monitored using only one species Mytilus californianus (MCAL).
S	2003	Removed three stations (previously 14) BD50 (Napa River), BD15 (Petaluma River in San Pablo Bay), and BC21 (Horseshoe Bay in Central Bay) for bivalve tissue monitoring	Findings indicated that only 2-3 stations were required to track long term changes in contaminant concentrations in bivalves. Stations = 11.
S	2003	Removed two water and sediment stations (previously 24) C-1-3 (Sunnyvale) and C-3-0 (San Jose), part of the Local Effects Monitoring Program (LEMP)	Funding ended for monitoring of trace organics in water and sediment which began in 1996 at these stations as part of the NPDES. Stations = 24.
S	2003	Removed water sampling from one random site in the South Bay segment and one random site in the Lower South Bay segment in order to add water sampling at historic sites BA30 (Dumbarton Bridge) in the South Bay and BC10 (Yerba Buena Island) in the Central Bay	Dropping these two random sites enabled the two historic sites to be added back into the sampling design at no additional cost to the program. These sites, along with BG20 (Sacramento River) are used by the Water Board for NPDES permit processing
A	2004	Added Particulate Organic Carbon (POC) analysis in water samples	Began analyzing for POC in order to be able to calculate Total Organic Carbon values (DOC+POC).

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Action Code	Year	Action	Detail/Rationale
A	2004	Data unavailable for pesticides, PAHs, PCBs, and PBDEs in bivalve tissue samples	Poor recovery and high detection limits created "too many holes in the dataset". Samples will be archived but not re-analyzed.
A	2004	Removed PBDEs, phthalates, p-nonylphenol, triphenylphosphate and nitro and polycyclic musks analysis in bivalve tissue samples	These analytes posed low levels of concern for the San Francisco Bay Region based on current literature.
A	2004	Removed phthalates and p-nonylphenol analysis in water and sediment samples	These analytes posed low levels of concern for the San Francisco Bay Region based on current literature.
D	2004	Bivalve Organics data are not available for pesticides, PAHs, PCBs, and PBDEs	Poor recovery and high detection limits created "too many holes in the dataset". Samples will be archived but not re-analyzed.
D	2004-2005	Tissue PAHs analzed by CDFG were rejected due to the method sensitivity	Most PAH measurements in transplant bivalve samples were below detection limits and thus not usable for trends analysis.
A	2005	Expanded target BDE analyte list for sediment and water samples	Based on results from BDEs sampled in previous years and capabilities of the RMP laboratories, increased number of analytes.
A	2005	Removed Toxicity Identification Evaluations (TIEs) from sediment toxicity analysis	Method development is needed to aid in understanding the toxicity found in the bay sediments. Toxicity Identification Evaluations (TIEs) will be conducted using contingency funds when sufficient toxicity is observed.
D	2005	2005 Bivalve samples were analyzed for orgaincs by CDFG. PAHs were rejected. PBDEs, PCBs and PESTS were approved.	About half the analytes in each group were NDs.
D	2005	7 archived bivalve samples (T-0,BA10,BA40,BC10,BD20,BD30,BG30) were reanalyzed in 2007 by AXYS for PBDES, PCBs, Pests and PAHs. 3 samples (BA40, BD20, BD30) were reanalyzed for PAHs using Base Extraction Method as a demonstration of appropriate lab method. Results were approved. Samples not reanalyzed included BB71, BC61, BG20, BD40, BA30. Due to lack of archived material not all samples were re-analyzed.	Reanalyzed in 2007 by AXYS as part of Intercomparison study with CDFG. The data available on the WQT include the 7 reanalyzed samples from AXYS and 5 samples analyzed in 2005 by CDFG.

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Action Code	Year	Action	Detail/Rationale
D	2005	Mallard Island PBDE Data for study year 2005 – 2006 should not be used in load calculations due to blank contamination and missing samples (especially 209).	Data should not be used in load calculations. Flagged during internal ratio review due to blank contamination and missing samples (especially 209).
L	2005	2005-09 archived bivalve tissue samples reanalyzed for organics by AXYS and CDFG in 2007	Data analyzed by two different labs: 5 samples were analyzed by CDFG and 7 samples reanalyzed by AXYS.
L	2005	Changed method for extraction of organic analytes in water samples	High blank contamination in 2003 PAH samples led to a change from the Soxhlet extraction method to an ambient temperature extraction method.
A	2006	Began collecting hardness data for all water stations where salinity <5ppt	Previously hardness data was collected at riverine stations where salinity <1ppt and estimated for estuarine sites.
A	2006	Removed BDE 82 from target analyte list	BDE 082 is not in any commercial mixtures and its rationale for reporting it was unclear as it is not a major congener.
D	2006	Analyses of 2006 bivalves for trace organics data were delayed until 2008.	Analysis was delayed pending a decision regarding a demonstration of lab capabilities.
D	2006	Tissue data are unavailable for Coyote Creek (BA10)	Nearly full mortality (1% survival) due to heavy biofouling and sedimentation
D	2006	Tissue data are unavailable for San Pablo Bay (BD20)	Mooring was removed during deployment period
D	2006	Water diazinon and chlorpyrifos data are not available	Initially, samples were not analyzed due to analytical issues. These issues were resolved. In 2010, the TRC decided to cancel the analysis due to the high cost and the lack of a pressing need for the data
L	2006	Changed lab for the water diazinon and chlorpyrifos analysis from CDFG to AXYS	Changed labs based on new method development for this analysis and difficulties with prior method for analyzing these compounds.
L	2006	Changed method for analysis of arsenic in water samples	Method changed from HGAA to ICP-MS as a cost saving measure for method development.
P	2006	Annual Bivalve Maintenance Cruise discontinued and biannual cruise implemented	TRC approved dropping the maintenance cruise after a study conducted from 2002-2005 showed no significant difference in survival of bivalves in maintained and non-maintained cages

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Action Code	Year	Action	Detail/Rationale
P	2006	Changed program name to Regional Monitoring Program for Water Quality in the San Francisco Estuary	Previous name was the Regional Monitoring Program for Trace Substances in the San Francisco Estuary. This change is intended to more adequately express the objectives of the RMP.
P	2006	Status and Trends Sport Fish Monitoring	The special study to look at contaminants in other species continued in 2006. Barred surfperch, brown rockfish, black surfperch, Chinook salmon, rubber lip surfperch, walleye surfperch, and northern anchovy were analyzed for PCBs, PBDEs and mercury.Analytes measured: mercury, PCBs, PBDEs, dioxins, DDTs, dieldrin, chlordane, dioxin, and selenium.Archived 2003 white croaker samples were analyzed and reported with 2006 white croaker data in the 2006 report.Jacksmelt, leopard shark, and California halibut were discontinued as status and trends species.Most samples were analyzed as composites except for mercury in striped bass and selenium in white sturgeon.
P	2006	Stopped analyzing the dissolved water fraction for organics in water	California Toxics Rule (CTR) has only been established for the total fractions of organic contaminants. The dissolved fraction was removed as a cost saving measure. At three stations, the RMP will report our dissolved and particulate fractions separately for comparative purposes.
S	2006	Changed bivalve tissue site BD20 (San Pablo Bay) by a nautical mile. BD20 will be renamed.	USGS replaced the channel marker where bivalve mooring BD20 was attached. The site was moved from Petaluma Light 1 to Petaluma Light 4. A new mooring will be installed at that site.
A	2007	Added BDE 197 to target analyte list for water and sediment and BDE 196 for sediment only.	This will provide a more accurate estimate of total PBDEs since these congeners constitute a relatively high percentage of the Deca-BDE mix.
A	2007	Nitrogen results will be reported as "Nitrogen, Total Kjeldahl" in sediment. This is different from the historical RMP data.	Lab changed from UCSCDET to AMS-Texas.
D	2007	No bivalves data for 2007	Bivalves were not deployed in 2007. Sampling was changed to every other year.
D	2007	Water diazinon and chlorpyrifos data are not available	Initially, samples were not analyzed due to analytical issues. These issues were resolved. In 2010, the TRC decided to cancel the analysis due to the high cost and the lack of a pressing need for the data.
L	2007	Changed lab for the bivalve tissue analysis from CDFG to AXYS	2006 tissue analyses were conducted by AXYS. A subset of 2005 archive bivalves were reanalyzed by AXYS in 2007 and results much improved.

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L	2007	Changed lab from UCSCDET to AMS-Texas for analysis of sediment quality samples	Changed labs based on an evaluation of turn around time, cost, and analytical capabilities.
L	2007	Intercomparison study with UCSC (POC only) and AMS-Texas (POC/DOC) for ancillary analytes in water	UCSC sampled 9 of the 22 sites, AMS-Texas sampled all 22 sites.
L	2007	Intercomparison study with UCSC and AMS-Texas for grainsize, Total Organic Carbon and Total Nitrogen in sediment	UCSC sampled 9 of the 47 sites; AMS-Texas sampled all 47 sites.
L	2007	Intercomparison study with UCSC and BR for trace metals in water samples	UCSC sampled 9 of the 22 sites, BR sampled all 22 sites.
L	2007	Intercomparison study with UCSC and EBMUD for analysis of SSC, Pigments Nutrients, salinity, and hardness in water	UCSC sampled 9 of the 22 sites, EBMUD sampled all 22 sites. (Pigments (Chlorophyll & phaeophytin) & Nutrients (ammonia, phosphate, nitrate/nitrite, silica))
L	2007	SFEI begins taking shipboard total salinity measurements.	Switched labs for water ancillary data; new lab does not participate in cruises. UCSC used to also report salinity by SCT along with their analytical measurements.
P	2007	Modified sediment toxicity sampling design.	During 2002-2006, every other sediment sample was analyzed for toxicity, which spatially biased the samples to the Lower South Bay
P	2007	The number of water sites was changed from 31 to 22. Sampling will occur at 3 sites in each of the upper 4 segments and 5 sites in the Lower South Bay segment. The 5 historic sites will continue to be sampled.	The power analysis from San Jose suggests that this change will be able to detect about a 1 ug/L change (give or take) in dissolved copper in every segment at a very high 99% power. The TRC approved this change in December 2006.
P	2007	The S&T monitoring program was expanded to triennial bird egg monitoring (cormorant and tern).	Part of the redesign process implemented in 2006.
P	2007	Water toxicity sampling occurred in 2007. Toxicity sampling has been changed to a screening effort approximately every five years	RMP S&T aquatic toxicity monitoring in the Estuary has shown no toxicity over the past several years. Next scheduled sampling will occur in 2012.

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A	2008	Added benthos analysis (CCSF) and (MLML)	The addition of benthos collection will enable sediment assessments in accordance with the SQOs which use three lines of evidence, benthos, sediment chemistry and sediment toxicity.
A	2008	Added pyrethroids analysis in sediment (CDFG)	To investigate the potential toxicity of pyrethroids in the Bay.
A	2008	Added selenium analysis in tissue (BR)	Added to provide information for the Selenium TMDL
A	2008	PCBs were not analyzed in water. PAHs and Pesticides in water were not scheduled to be analyzed but were added into the sampling plan.	PCBs, PESTS, PAHs will be sampled every other year in water (on a biennial basis) based on recommendations from the redesign process. PAHs were analyzed because of the Cosco Busan oil spill, and PESTS were analyzed to validate the detection level for AXYS Analytical's MRES method using both whole water samples and 100L High volume extracts. Pesticide results were not reported because they were part of the Intercomparison study.
D	2008	2008 grainsize granule fraction is not available	Granule fraction was not analyzed. In 2008, RMP switched labs from UCSC-DET to MLML-Aiello. MLML did not analyze larger grainsize fractions, and only fractions <2mm are available.
D	2008	Grainsize determination changed to an optical method.	In 2008, RMP switched grainsize labs from UCSC-DET to MLML-Aiello where they employ a different method.
D	2008	Grainsize for 2008 are not comparable to previous years.	Grainsize in 2008 and later is reported for fractions 2mm and smaller, as a percentage of total volume determined by an optical (laser) method, as opposed to gravimetric measurement (as a percentage of mass) for mechanically separated samples used prior. Additionally, split samples analyzed mechanically in 2009 showed poor comparability to the optical method due to possible artifacts of handling in the mechanical separation method, usually yielding higher apparent coarse material due to aggregation of smaller particles during the drying of samples. The lab is currently testing a wet seiving method to resolve these artifacts.
D	2008	Manganese and iron in bivalves are non-target analytes and not reported via WQT	Manganese and iron are not reported as target analytes via WQT.
D	2008	Missing % Lipids for the trace metals bivalve analysis	Lab could not analyze for this.

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D	2008	MRS Pesticide Results should not be combined with prior years for Trends Analysis.	Axys switched to a multiple residue (MRES) method for pesticides. Whole water MRES samples typically showed higher concentrations than in solid phase (XAD) extracted samples, due to only partial retention of pesticides by the XAD. Interannual trends should therefore be evaluated only within any given collection type (i.e. whole water 2008 and later or XAD 2007 and before).
D	2008	Oxadiazon was not reported	The MRES method cannot analyze for Oxadiazon and because the 2008 demonstration project used only the MRES method, it was not possible to collect this data.
D	2008	Pyrethroid tralomethrin not analyzed in sediment samples	Tralomethrin was not analyzed in 2008 by CDFG, but will be in the future.
D	2008	Water MRES pesticide data	The 2008 samples were part of a demonstration project for the MRES method and were conducted on a subset of stations using whole water grabs (7 samples). These results were then compared to the extracts from the 100-liter infiltrex samples at the same location. These results will not be reported on the web.
L	2008	Added sediment-water interface cores exposure (SWIC) toxicity testing method for bivalve larval (Mytilus galloprovincialis) SWIC will be analyzed for toxicity by UCD-GC.	The Sediment Quality Objectives recommend using sediment–water interface core exposure (SWIC) for bivalve larva toxicity instead of elutriate testing for toxicity. Toxicity testing for amphipods will continue to be conducted using the elutriate method. TIEs will be conducted in samples that show significant toxicity.
L	2008	Changed lab for analysis of Total Organic Carbon and Total Nitrogen in sediment from UCSC to MLML – Hunter	Changed labs based on an evaluation of turn around time, cost, and analytical capabilities.
L	2008	Changed lab for analysis of grainsize in sediment from UCSC to MLML - Aiello	Changed labs based on an evaluation of turn around time, cost, and analytical capabilities.
L	2008	Changed lab for analysis of SSC, Pigments, Nutrients, salinity, and hardness in water from UCSC to EBMUD	Changed labs based on an evaluation of turn around time, cost, and analytical capabilities.
L	2008	Changed lab for POC and DOC analysis from UCSC and AMS-Texas to Columbia Analytical Services	Changed labs based on an evaluation of turn around time, cost, and analytical capabilities/ AMS-Texas went out of business.

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L	2008	Changed principle lab for trace metals in water from UCSC to BR and changed principle lab for trace metals in tissue from UCSC to BR (Se) and CCSF (other metals)	Changed labs based on an evaluation of turn around time, cost, and analytical capabilities such as elevated methyl mercury quantitation limits. Due to BR's method, metals (Al, Cd, Cu, Fe, Pb, Mn, Ni, Ag, and Zn) are no longer reported as near-total concentrations. UCSC extracted with a weak acid (pH < 2) for a minimum of one month, resulting in measurements that approximate bioavailability of these metals to Estuary organisms. BR used reductive precipitation according to EPA Method 1640.
L	2008	Intercomparison study with BR and City and County of San Jose for Copper and Nickel in water	Samples were analyzed by both labs at all 22 sites.
L	2008	Pesticide water analysis conducted by AXYS was performed using MRES method on samples collected on 100L infiltrix system. In previous years pesticides were analyzed using GC/LRMS which could not detect chlorpyrifos/diazinon.	The MRES method is able to detect the standard suite of RMP pesticides including chlorpyrifos/diazinon (oxadiazon is not tested for using MRES).
P	2008	Began reporting water particulate trace organic results.	New design of web query tool makes it easier to post particulate results.
P	2008	Benthos sampling was added as part of the sediment sampling cruise.	With all three lines of evidence (i.e., benthos, sediment chemistry and sediment toxicity), it will be possible to conduct sediment assessments in accordance with the Sediment Quality Objectives (SQOs), which are scheduled to be promulgated in 2008.
T	2008	Bivalve Trends	These are available in the AMR beginning in 2008 for years bivalves are collected, biennially for trace organic contaminants and every five years for trace metal contaminants.
A	2009	Cyanide was analyzed in water.	New site specific objective was developed for cyanide in water in San Francisco Bay.
A	2009	Dioxins were added as part of the Small Tributary Loading Study.	Data will fill the dearth of information that currently exists for dioxin. This is a special study.

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A	2009	Dioxins were analyzed for all 22 water stations, all 47 sediment stations, and in sportfish.	Data will fill the dearth of information that currently exists for dioxin. This is a 5 year special study that is not a part of the Status and Trends Component.
A	2009	Oxadiazon was dropped from the RMP target analyte list.	The different MRES method for analyzing pesticides in water adopted by the RMP doesn't include oxadiazon. Since concentrations of oxadiazon have remained relatively constant over time, the TRC approved removing it from the target list in July 2009.
A	2009	PFC analysis was added to bird samples.	Part of Exposure and Effects Pilot Study.
A	2009	PFC analysis was added to sportfish samples.	Part of Emerging Contaminants Special Study.
A	2009	PFC samples were collected at a subset of water stations.	Special Study - Added because of concern over elevated concentrations found in Bay Area tissue samples as compared to reference samples from Tomales Bay.
A	2009	The RMP PCB list was expanded from 40 congeners to 209 congeners for all matrices.	The non-Aroclor PCB, PCB 11, was unexpectedly observed in air and effluent samples outside the Bay Area in significant concentrations, prompting the expansion of the RMP PCB congener list to include all possible congeners.
A	2009	Water PAHs were not analyzed.	Due to the Cosco Busan oil spill, PAHs were analyzed in 2008. Because no significant changes in the water column were identified, PAH sampling was skipped in 2009 and 2010. Water PAHs are scheduled to be sampled again in 2011.
A	2009	Whole water samples were collected at 22 sites for analysis of pesticides.	Whole water samples are collected for the analysis of pesticides using MRES methods. Beginning in 2009, pesticides analyzed using the MRES method are considered the RMP's target analytes.
D	2009	2009 total cyanide water results are not reported.	The RMP's previous California Toxics Rule (CTR) work was based on the Weak Acid Dissociable (WAD) fraction. Total cyanide will most likely give an over-estimation of the bio-available fraction. Several of the 2009 total cyanide water results were above the cyanide trigger level (1.0 ug/L) for ambient monitoring as stated in the Basin Plan Amendment, which is based on the WAD fraction. Hence, at the request of the Water Board these samples were not reported to avoid confusion.
D	2009	Water PBDEs 196, 201, and 202 are not available.	AXYS has not developed a method for detecting these PBDEs in water.

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L	2009	Contra Costa County Sanitation District will analyze water for cyanide.	New analyte for analysis in water only.
P	2009	Added Pesticides Fipronil, Fipronil desulfinyl, Fipronil sulfide, and Fipronil sulfone for sediment analysis	These pesticides are highly used in the Bay Area and are of emerging concern. Fipronil is widely-used in flea/tick applications. It is exceedingly toxic to insects/crustaceans. There is relatively little Bay Area data so it would be very helpful to report these data when available.
P	2009	Changed the statistical design for sediment sampling from five-year panels to six-year panels	Changed to incorporate rainy season sediment sampling which will occur every other year starting in 2010. Rainy season sediment sampling will occur at 20 random sites and 7 historic sites. Dry season sediment sampling will continue to occur at 40 random sites and 7 historic sites.
P	2009	Dioxins were analyzed in water, sediment, sediment core, bird egg, small tributary loading, and sportfish samples.	The Dioxin Pilot Study is not part of the Status and Trends component, but samples were collected during regular RMP sampling events.
P	2009	Status and Trends Sport Fish Monitoring	The 2009 monitoring effort was combined with the BOG coast year 1 sampling effort. This resulted in adding one additional species to the RMP list: Jacksmelt.Most samples were analyzed as composites except for mercury in striped bass and selenium in white sturgeon.Analytes measured: mercury, PCBs, DDTs, dieldrin, chlordanes, PBDEs, dioxins, PFCs, and selenium.There were two side-by-side studies in 2009:Comparison of selenium concentrations in filet, muscle plug, and liver of white sturgeon. This was done for the development of the North Bay selenium TMDL. The comparison was also to determine if we could use muscle plugs (nonlethal) instead of filet (lethal) to determine selenium levels in white sturgeon.Comparison of skin-on and skin-off PCBs, legacy pesticides, PBDEs, and dioxin concentrations in white croaker. Starting in 2009, white croaker will be analyzed skin-off.
T	2009	Sport Fish	SWAMP/RMP/Bight Program Report on Contaminants in Fish from the California Coast. 2011.
A	2010	Began reporting Sum of PCBs 208 (SFEI)	This sum provides an index of the PCBs present in Aroclor mixtures. PCB-11 is excluded from the sum because it is a by-product of dye manufacturing and is not related to Aroclors. PCB 11 does not have dioxin-like potency and has different sources than Aroclors.

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A	2010	Pyrethroids Tetramethrin and piperonyl butoxide moved to a status of "Information only" by analytical lab	Compounds have a history of persisting high variability in Ongoing Precision and Recovery (OPR) and linearity data. Results are estimated to be accurate only within an order of magnitude.
D	2010	Added new PrepPreservation Code: FieldFiltered,FieldSolventPres,FieldFrozen	This code is used for Chlorophyll-a and Pheophytin samples beginning in 2010. We will not update previous years' sample records which have codes "FieldFiltered, LabAcidified" and "FieldFiltered, FieldFrozen" because it was determined that the benefit does not justify the time and effort at this time.
D	2010	Bivalve data not available for BD40 Davis Point Station because it was not sampled.	BD40 was not sampled due to terminal construction and weather issues.
D	2010	TRC cancelled scheduled analysis of archived 2006 and 2007 water samples for Diazinon and Chlorpyrifos	Initially, water samples were stored during method development for analysis once analytical issues were resolved. These issues have since been resolved. In 2010, TRC decided to cancel the analysis due to the high cost ($60,000) and the lack of a pressing need for the data.
D	2010	Whole water PBDE sample results are not available through the Web Query Tool.	In 2010, 4L whole water samples were analyzed for PBDEs as part of an intercomparison study. The Web Query Tool Does note report data from Intercomparison studies.
D	2010	YSI data collected by SFEI on water cruise are not available for 2010	Data were inadvertently deleted from YSI machine by staff working on another project before it was downloaded.
L	2010	Began adding LabPoisoned to the PrepPreservation code for organic water samples when samples tested positive for residual chlorine.	It was decided that we will not update the PrepPreservation code for samples prepped with poison from 2002-2009 because the benefit does not justify the time and effort at this time.
P	2010	Sediment samples will be collected in alternate seasons starting with a rainy season (winter) sampling event in February 2010.	There appears to be a seasonal element to sediment toxicity with winter sampling exhibiting higher toxicity. 27 samples will be collected during the dry season and 47 samples will be collected during the rainy season. February of 2010 was the first rainy season collection. The next sampling event is August 2011.
A	2011	Range dropped from grainsize parameter names and is now stored in fraction field.	Changed as part of effort to incorporate SWAMP comparability to SFEI data reporting.

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A	2011	Sediment toxicity test organisms changed at select sites.	In 2011 the TWG and EEWG switched to sediment bioassays using freshwater amphipods (Hyalella azteca) and daphnids (Ceriodaphnia dubia) instead of the previous amphipod (Eohaustorius estuarius) and bivalve (Mytilus galloprovincialis)larvae at BG20 and BG30.
A	2011	Three sums of PCBs: 40, 208, 209 will be reported through the Web Query Tool.	Three sums of PCBs: RMP 40, 208, 209 for all matrices and all studies. Sum of 209 PCBs is provided solely for comparison to other studies that use this statistic. SFEI does not recommend using this sum for comparison to any Aroclor-based thresholds (the TMDL target, OEHHA thresholds, etc.) - the Sum of 208 PCBs is better for that purpose because the sum of 208 does not include PCB 11.
D	2011	SWAMP has changed the definition of LCS Sample Type. The new definition indicates that LCS samples have gone through the entire QA process.	SWAMP has provided a new definition for samples that have not gone through the entire QA process. The new sample type code is 'UnkAcc' – Control Sample used to assess accuracy, unknown whether or not taken through the full analytical process. We will not go back and update the database for samples previously called LCS since we do not always know whether the samples have gone through the entire analytical process but in future data sets we will use the code 'UnkAcc'.
D	2011	Updated coelution flag for PCB 156(Surrogate) to DO156L. In previous years, the flag DO156 was reported.	The L indicates that it is a labeled compound. Including the 'L' in the coelution flag increases accuracy.
D	2011	Cyanide results are not available for SB061W	The sample was not analyzed due to hold time violations.
D	2011	2011 data from Brooks Rand was reanalyzed for As/Se and Pb, Ni, Zn	The metal trace elements in select 2011 samples were reanalyzed for Pb, Ni, and Zn due to average dissolved concentrations much (2-6x) higher than in previous years as well as sporadically high blank contamination and/or analytical interferences. Reanalyzed results were more in line with historical average concentrations.Several pairs of dissolved/total selenium and arsenic samples in 2011 were also reanalyzed, due to dissolved concentrations that were higher than total concentrations by amounts that could not be explained by typical (acceptable) analytical variation. The results on reanalysis were more consistent with expectations (total concentrations about equal to or greater than dissolved).

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L	2011	Beginning in 2011, the MDLs from EBMUD for sediment trace organics are all 40CFRs.	EBMUD wanted to provide consistent MDLs between analytes.
P	2011	the name of the Web Query Tool (WQT) changed to Contaminant Data Download and Display (CD3).	This name is more descriptive and is more representative of what the SFEI data query tool does.
T	2011	Small fish Trends Report.	Report by Ben Greenfield will be published in 2011.
A	2012	Updated the parameter name for 'Phosphate as P' to 'Orthophosphate as P'.	Orthophosphate as P specifically indicates the type of phosphate being measured, removing all ambiguity as to what was measured.
A	2012	PBDEs PBDE 179, 184, 188, 200, 201, and 202 were added to the list of target analytes for bird egg analysis	
D	2012	1993-03 sediment Mn results have been updated to have a QACode of "VRVQ", a CompCode of "Rej", and a DisplayCode of "-40".	An external user noticed that the numbers looked unusually high for two stations, suspecting a subscription error. Since we do not have the raw results to verify that unit conversion calculations were done correctly and because the numbers are so much different than other years (about 10X higher than all other sediment Mn numbers reported by the same lab) the QA officer decided to flag and censor these results.
L	2012	Beginning in 2012, EBMUD will increase the batch size to reduce the number of QA samples they need to analyze.	Change in laboratory methodology.
L	2012	AXYS analytical samples that have been qualified in the LABQA Code field with 'G' - lock mass interference present, are given a QA code 'LRJA' - Data rejected - Analyte positively identified but quantitation is an estimate, flagged by laboratory.	This flag alerts data users to an increased uncertainty in the value where the severity of the impact cannot be categorized. This change was applied beginning with WY2012 POC data and 2012 RMP data.

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P	2012	In 2012 the sampling design was modified to alternate water and sediment to biennial sampling, e.g., 2012=sed, 2013 = water, 2014 = sed. Alternating between seasons (wet and dry sampling) will continue to occur for sediment (2012 Sed = wet, 2014 sed = dry).	The purpose for alternating seasons is to assess the potential for increased toxicity in the winter months.
P	2012	Whole bivalves will no longer be stored in short term archive storage.	Whole bivalves were subject to prevalent degradation. Homogonized bivalves will be stored in long term archive storage at NIST and if enough sample material remains, aliquots will be kept in short term storage.
A	2013	Reportable pyrethroid analyte name changed from Deltamethrin and Tralomethrin to the co-elution Deltamethrin/Tralomethrin.	The labs cannot separate these during analysis so report these analytes as a co-elution.
D	2013	Added QA code VNTR to Al and Cr sediment samples for all years.	VNTR: Not Total Recovery: Method typically provides <50% recovery of analyte in native samples despite good recovery in spiked samples, flagged by QAO. The results were flagged because hydrofluoric acid digestion was not used to extract the metals.
L	2013	EBMUD stopped subcontracting ALS for nitrate, nitrite, silica and phosphate analysis because SFEI was already sending samples directly to ALS. Now the RMP contracts analysis for these analytes directly with ALS.	This change created an efficiency in data reporting.
P	2013	Name changed from "Regional Monitoring Program for Water Quality in the San Francisco Estuary" to "Regional Monitoring Program for Water Quality in the San Francisco Bay"	The name change reflects the fact that the Delta RMP is forming and there needs to be clear distinction between the Bay RMP and the Delta RMP.
A	2014	The target analytes for sediment samples in 2014 were Al, As, Cd, Cu, Fe, Pb, Mn, Ni, Se, Ag, Zn, Hg, MeHg, PCBs, PAHs, Pesticides, PBDEs.	

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A	2014	Sediment benthos assessment was not conducted in 2014 as regularly scheduled.	The assessment method for sediment benthos data is uncertain. It was not considered prudent to collect more sediment benthos samples until the assessment method is ready.
A	2014	Sediment toxicity assessment was not conducted in 2014 as regularly scheduled.	The assessment method for sediment toxicity data is uncertain. It was not considered prudent to collect more sediment toxicity samples until the assessment method is ready.
A	2014	Starting with the 2015 water sampling event, the target analytes for water samples will be changed to the following: Cu, CN, Se, MeHg, ancillary, parameters, and aquatic toxicity (at a subset of sites). Every 10 years, PCBs, PAHs, and pesticides will be added to the target analyte list. These parameters were last monitored in 2011. The next sampling year for PCBs, PAHs, and pesticides is 2023.	Since the organic pollutants are hydrophobic, they are often below detection in the water column and there is no clear trend in the data. It is better to track these compounds in sediment and biota. Similarly, the only inorganic pollutants that will be routinely monitored are those that either have a TMDL or a site-specific objective. Finally, the frequency of aquatic toxicity monitoring was increased from every 5 years to every 2 years due to increased interest in this data related to the State Water Board's new rule on aquatic toxicity in effluent and receiving waters.
D	2014	The decision was made to not show any of the original 2004-2006 EBMUD sediment PAH and pesticide results on CD3 but to show the results from the reanalysis (the few samples that were reanalyzed with the latest method). Therefore, the 2004-2006 EBMUD sediment results for PCBs, pesticides, PAHs and PBDES have been censored in the RDC database. Records were censored by adding a QACode of "VRLB" (Data Rejected-Result Negatively Biased, Flagged by QAO), changing the compliance code to "Rej", and making the DisplayCode for the records "40".	EBMUD modified their drying and extraction technique starting with the 2007 sediment samples. For the 2004-2006 sediment samples, EBMUD used a different drying and extraction method that appears to have produced concentrations that were 2-5 times lower than the new method. The effect of the old drying and extracting method was discovered after a handful of archived samples were reanalyzed using the new method. As a result, the TRC requested that SFEI remove the 2004-2006 EBMUD sediment data from CD3 to prevent their use in assessments. The 2004-2006 sediment data for PCBs, PAHs, Pesticides, and PBDEs are available from SFEI upon request. The EBMUD sediment results from 2002-2003 are still valid because they were analyzed after 2006 using the new method.

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D	2014	Insufficient mass of *Corbicula fluminea* (CFLU) collected at BG20 during the 2014 bivalve cruise to conduct all analysis	Abundance of live CFLU at target locations was insufficient to support allocation of bivalves for all desired analyses. All CFLU collected were shipped to AXYS for analysis and eventual distribution to laboratories, sufficient mass permitting.

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L	2014	Sediment grain size was reanalyzed in 2012 and the lab was changed from MLML-Aiello to ALS.	A combination of technical challenges compounding long turnaround times led to a change in the labs and method for sediment grain size analysis. Conventional mechanical grainsize methods typically use a large subsample (>10g sometimes up to 100g) of dried sediment, physical separation into several (few) size bins, and reporting as gravimetric percentages. Laser particle size analysis in 2008-2012 used a very small (<1g) subsamples of wet sediment, reporting results as % of total solids volume for potentially a large number of size bins (which can be aggregated into bins equivalent to those in conventional methods). Split samples analyzed by both methods for intercomparison showed good agreement in 2008, but in later years, results were more variable. The drying in conventional methods may bias size distributions larger when fine materials aggregate, and the small subsamples used in laser analyses may amplify variations among aliquots taken from a heterogeneous sediment despite best efforts to homogenize. When these variations were not eliminated by revisions to the method, a decision was made to analyze up to 10 subsamples from any sample showing heterogeneity (based on BPJ, typically ~20% or more difference in major size bins) in laser analyses to get a more representative characterization of average distribution. These technical challenges and use of an academic lab led to many reanalyses and especially long turnaround times for 2012 grainsize samples, so a decision was made to return to mechanical separation methods using a commercial contract laboratory in 2014.
P	2014	The number of sediment sites in each year was reduced from 47 to 27. The frequency of monitoring was reduced from every 2 years to every 4 years (2014, 2018, etc.). The sampling season will alternate between dry and wet seasons. In 2014, samples were collected in the dry season. In 2018, samples will be collected in the wet season.	The objective of this shift was to reduce the cost of S&T monitoring. A power analysis was performed to confirm that the reduced number of stations would not significantly affect the program's ability to answer management questions. The cost savings ($120k/year) will be used to monitor sediment quality in the bay margins.

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P	2014	Bivalve transplant deployment reduced from 11 stations to 9, 3 of which are back-up stations. Two stations were removed from the bivalve sampling design, Red Rock (BC61) and Davis Point (BD40). Monitoring will occur for samples collected from 6 stations BG20 (Sacramento River), BG30 (San Joaquin River), BD30 (Pinole Point), BC10 (Yerba Buena Island), BA40 (Redwood Creek), and BA10 (Coyote Creek). Additional samples will be deployed as back-up samples at 3 stations BD20 (San Pablo Bay), BB71 (Hunter's Point/Alameda), and BA30 (Dumbarton). In addition to the 6 transplant stations, bivalve samples will continue to be collected and analyzed at the Bodega Reserve site (T-0), the location from which the samples are collected for the transplant sites.	The objective of this shift was to reduce the cost of S&T monitoring. At the back-up stations, bivalves are deployed and collected, but are only analyzed if the samples from the primary stations are lost during deployment.
P	2014	For bivalve samples, pesticides and all trace metals except selenium were removed from the sampling design in 2014.	The objective of this shift was to reduce the cost of S&T monitoring.
P	2014	The target parameters for bivalve samples were changed to PCBs, PAHs, PBDEs, and Selenium. PAHs, PBDEs, and Selenium will be analyzed every sampling event (ever 2 years). PCBs will be measured every 8 years (2014, 2022, etc).	The objective of this shift was to reduce the cost of S&T monitoring.
P	2014	Sport fish collection was changed from a 3 year to a 5 year cycle. Sportfish were collected in 2009 and 2014. The next collection will occur in 2019.	The objective of this shift was to reduce the cost of S&T monitoring.

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P	2014	The purpose and outline of the Annual Monitoring Results report was changed. Its primary objective will be to describe the field sampling efforts in a "Annual Monitoring Report". Information on non-conformances with field and lab methods in the QAPP and cruise reports will be documented in this report. Quality assurance information on datasets will be documented in separate Quality Assurance reports. The 2013 & 2014 field activities will be combined together in one report as a "catch-up year". Subsequent reports will be written the year collection occurs. The CD3 tool will be have the ability to generate the sediment toxicity maps and bivalve trend graphs that the AMR used to contain.	The old format of the report contained a lot information that was already available in other sources such as the QAPP and the Detailed Work Plan. The report was always 2 years late because it was waiting for all the lab data to be reported and quality assured. Going forward, the main purpose of the report will be to capture sample monitoring activites that occured that year. A separate the QA report will be written after all data has been received and reviewed by the QA/QC review team.
S	2014	Added new site codes for RMP sport fish caught in Suisun Bay and Carquinez Strait for 2014 (207SUISUN, 206CARQNZ). Previously fish caught in Suisun Bay and Carquinez Strait were commented in the sample table under the code 206SNPBLO. Added new site code for RMP sport fish caught in Central Bay (203CENTRL).	The goal is to collect shiner surfperch in Suisun Bay and Carquinez Strait to have them as indicators of PCB concentrations in Suisun. The new Central Bay location is located in deeper waters of Central Bay.

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A	2015	Added TEQ values to CD3 for 2008, 2009, and 2010 sediment RMP S&T samples (no averaging of field samples, lab replicates and field replicates by station per year); Sum of Dioxin-Furan TEQs (WHO 2005;ND=0 SFEI) Sum of Dioxin TEQs (WHO 2005;ND=0 SFEI) Sum of Furan TEQs (WHO 2005;ND=0 SFEI)	Internal request to make these values available through CD3
A	2015	Update all RMP sediment data for the following four analytes Fipronil Sulfide Fipronil Desulfinyl Fipronil Fipronil Sulfone to have a compliance code of 'Est' as long as it's not already 'Rej'. Including QA data. There is data for 2002-2012.	Per QAO, all the past fipronil related sediment data should be tagged as Est (estimated), because this past year's data was the first with poor matrix spike recoveries on ALL analytes simultaneously, confirming the deviances on random analytes in the past were hints of the same quantitative difficulties - much of the challenge was the lack of direct isotopic surrogates for the analytes at the time of analysis.
A	2015	Nutrients dropped from RMP water cruise samping parameters	A once every 2 years snapshot of nutrient concentrations is less useful than seasonal readings coordinated to specific events or tide phases so these measurements have been dropped (especially given ongoing nutrient strategy efforts at more relevant temporal and spatial scales. The need for periodic snapshots can be re-evaluated if/when these more localized/intensive efforts are ceased or scaled back. This change was discussed with and approved by the TRC.

Action Codes: A= Analyte added or removed from sampling design; D= Data rejected or not available/data comparability issues; L= Change in laboratory conducting analysis or in laboratory methods; P= Change in program/sampling design; S= Station added or removed; T= Trends analysis performed.

Action Code	Year	Action	Detail/Rationale
L	2015	EBMUD no longer the RMP sediment organics lab	This decision was made because of the time demand and cost of performing RMP or similar work. It did not make business sense for EBMUD to continue accepting these projects.
L	2015	RMP water CN- data: reported as Total CN by the lab (4500 CN E rather than 4500 CN I (WAD (weak acid dissociable) CN as requested in contract), but will be entered in the database as WAD CN.	Data will be stored in the database as WAD CN in order to group/display with other CN data, but will include actual method (4500 CN E for total CN) and notes on use of the incorrect method in comments. All the data were reported as ND for total CN, so WAD CN would at most be less than or equal to this value (i.e., all ND or below given MDL as well).
P	2015	Changed the program name in CEDEN and RDC to specify SF Bay	In preparation for the upcoming Delta RMP program to easily identify each project
P	2015	The bird egg sampling that was scheduled for 2015 was postponed to 2016 due to a permitting issue.	