

Cruise Plan

2013 RMP Water Cruise

Contract No. 1048

July 22, 2013

Submitted to:

San Francisco Estuary Institute
4911 Central Ave
Richmond, CA 94804

Submitted by:



4749 Bennett Drive, Suite L
Livermore, CA 94551
925-373-7142

1. Introduction

This report details plans associated with the annual Regional Monitoring Program for Water Quality in the San Francisco Estuary (RMP) water cruise. The RMP water sampling program was redesigned in 2002 to adopt a randomized sampling design at thirty-one sites in place of the twenty-six base program stations sampled previously. In 2007, the number of sites was decreased to twenty-two stations, and it remains as such for 2013.

2. Cruise Plan

2.1. Objectives

All sampling will be conducted from the *RV Turning Tide*. The objectives of the sampling effort are to collect the following:

Real-time Data Collection

1. Real-time data over the duration of sampling for conductivity, temperature, optical back scatterance (OBS), and dissolved oxygen (DO) by AMS (1 meter CTD cast for duration of sampling, followed by a full water column profile where water depth allows).
2. Water samples from 22 sites for on-board (field meter) measurement of DO, pH, salinity, conductivity, and temperature by SFEI.
3. Document current and recent weather conditions at each site.

Total Fraction

Unfiltered water samples from 22 sites (and 2 replicates) for Brooks Rand, Ltd. (BRL) for analysis of **total**:

4. Trace metals suite (Cd, Co, Cu, Fe, Mn, Ni, Pb, Zn) by ICP-MS
5. Ag by APDC
6. Hg by CVAFS
7. MeHg by ethylation/CVAFS
8. As and Se by column chelation and ICP-MS
9. Whole water samples from 22 sites (and 2 replicates) for analysis of CN by Central Contra Costa Sanitary District (Central San)
10. Whole water samples from 22 sites (and 2 replicates) for analysis of Cu and Ni by City of San Jose
11. Whole water samples from 22 sites (and 2 replicates) for analysis of SSC by EBMUD
12. Whole water grab samples from 10 sites (and one replicate) for analysis of orthophosphate flame retardants by Chen Laboratory at Southern Illinois University (SIU)
13. Whole water samples from 10 sites for analysis of total Fipronil by CDFW Water Pollution Control Laboratory (WPCL).
14. Whole water grab samples from 2 sites for analysis of OH-BDE by Arnold Laboratory at University of Minnesota (UMN).

Particulate Fraction

15. Two particulate (filter) samples from 22 sites (and 2 replicates, 6 blanks) for POC analysis by ALS Environmental (ALS, formerly Columbia Analytical Services, Inc.).
16. Particulate (filter) samples from 22 sites (and 2 replicates) for pigment (chlorophyll-a, phaeophytin) analysis by EBMUD.

Dissolved Fraction

17. Water dissolved samples from 22 sites (and 2 replicates) for dissolved organic carbon (DOC) analysis by ALS.

Filtered (using pre-cleaned 0.45µm cartridge filter) water samples from 22 (and 2 replicates and 1 field blank) sites for Brooks Rand, Ltd. (BRL) for analysis of **dissolved**:

18. Trace metals suite (Cd, Co, Cu, Fe, Mn, Ni, Pb, Zn) by ICP-MS
19. Ag by APDC
20. Hg by CVAFS
21. MeHg by ethylation/CVAFS
22. As and Se by column chelation and ICP-MS

Filtered (using same 0.45µm cartridge as above for BRL) water samples from 22 sites (and 2 replicates) for EBMUD for analysis of dissolved:

23. Ammonia
24. Salinity
25. Hardness

Filtered (using same 0.45µm cartridge as above for BRL) water samples from 22 sites (and 2 replicates) for ALS for analysis of dissolved:

26. Nitrate/nitrite
27. Phosphate
28. Silica

29. Filtered water samples (using same 0.45µm cartridge as above for BRL) from 22 sites (and 2 replicates and one field blank) for analysis of Cu and Ni by City of San Jose

2.2. Personnel

The personnel and work assignments for this cruise are shown in Table 1.

Table 1. Personnel for 2013 RMP Water Cruise

Name	Affiliation	Duties	Cell
Paul Salop	AMS	Cruise Manager (7/30, 8/5)	510-323-6523
Bryan Bemis	AMS	Logistics	925-785-0671
Traci Linder	AMS	Cruise Manager (8/5-8/8)	925-642-1304
Rebecca Isquith	AMS	Cruise Manager (7/30-8/2)	206-300-2924
Meg Sedlak	SFEI	Field Sampling, 7/30, 8/5, 8/7, 8/9	510-918-6119
Emily Novick	SFEI	Field Sampling, 7/31, 8/1, 8/8-9	240-277-3669
Don Yee	SFEI	Field Sampling, 7/30, 7/31, 8/1	510-508-2995
Amy Franz	SFEI	Field Sampling, 7/30, 8/2, 8/7, 8/8	510-282-5012
Ellen Willis-Norton	SFEI	Field Sampling, 7/31, 8/2, 8/5, 8/6	858-692-8630
David Gluchowski	SFEI	Field Sampling, 8/7, 8/8	925-487-5900
Rebecca Sutton	SFEI	Field Sampling, 8/1, 8/6	510-701-7050
Michael Weaver	SFEI	Field Sampling, 8/5, 8/9	415-602-7779
Adam Wong	SFEI	Field Sampling, 8/2, 8/6	530-400-5192
Julian Damashek	Stanford	Special study, 7/30-31, 8/1-2, 8/5-8	415-637-7347
Chris Vallee	USGS	Vessel contact	916-764-2419
Jerry Eldorado	Aloha Trans	Logistics	925-640-1600

Representatives of program sponsors may be aboard the *RV Turning Tide* during portions of the cruise to observe sampling operations. Msrs. Salop, Isquith, and Linder will be responsible for oversight of sampling operations, compliance with cruise plan and quality assurance guidelines, maintenance of the sample field log, chain-of-custody procedures, and CTD profiling. Captain Vallee will be responsible for vessel operation and safety. Msrs. Sedlak, Franz, Yee, Willis-Norton, Novick, Sutton, Wong, Weaver, and Gluchowski will alternate trace metals, fipronil, and ancillary sampling.

2.3. Cruise Schedule

Sampling activities for the 2013 RMP Water Cruise are shown in Table 2. The tentative schedule assumes that an average of one and one-half hours will be required for sampling at each station. Sampling times may also vary depending upon suspended sediment loads, number and type of samples collected, and other factors. The schedule is for planning purposes only, and may be revised during sampling operations to reflect weather conditions, equipment performance, or other factors. Any sites unable to be sampled at the scheduled time will be rescheduled later in the cruise if possible, or will be replaced with the first available site within the segment from the current 2015 sampling schedule (see Appendix A for site locations). A record of all sites not able to be sampled and why will be maintained as part of the cruise recordkeeping.

There are no target sites for 2013 within close proximity to sensitive areas. AMS personnel have arranged to check in with USCG Command Center (**415-399-3547**) as needed in attempt to minimize disruptions to sampling.

Table 2. Tentative Schedule for 2013 RMP Water Cruise

Date	Time	Activity
July 29	0900-1500 1500-1700	<p><i>RV Turning Tide</i> transits from Oakley to Redwood City Marina (675 Seaport Blvd, 650-363-1390).</p> <p>AMS and SFEI personnel mobilize sampling equipment and load aboard vessel <i>RV Turning Tide</i> at Redwood City Marina. Aloha Transportation meets vessel at Redwood City Marina and ferries skipper to Driftwood Marina to retrieve personal vehicle.</p>
July 30	0700-1630	Mobilize sampling gear aboard vessel at Redwood City Marina . Sample field blank, LSB060W, LSB058W, and LSB056W (low tide 2.5' at 1:26 pm; high tide 5.9' at 8:16 am). Return to Redwood City Marina and demobilize vessel. SFEI staff will transfer CN samples to Central Contra Costa Sanitary District (Central San). Mr. Salop retains all remaining samples for transfer to AMS.
July 31	0700-1600 1530-1600	<p>Mobilize sampling gear aboard vessel at Redwood City Marina. Sample LSB055W, LSB057W, and BA30 (low tide 2.8' at 2:30 pm, high tide 6.0' at 9:40 am). Return to Redwood City Marina and demobilize vessel.</p> <p>Sampling personnel retrieve personal vehicles. SFEI staff will transfer CN samples to Central San. Ms. Linder meets vessel to retrieve all remaining samples for transfer to AMS.</p>
August 1	0700-1500 1430-1800	<p>Mobilize sampling gear aboard vessel at Redwood City Marina. Sample SB066W, SB064W, and SB065W (low tide 2.8' at 3:36 pm; high tide 6.0' at 10:45 am). Transit to San Leandro Marina (40 Mulford Point Dr., San Leandro, 510-377-3488) and demobilize vessel.</p> <p>Aloha Transportation meets vessel at San Leandro Marina and retrieves all personnel for transfer to personal vehicles in Redwood City and all samples for transport to AMS. SFEI staff will transfer CN samples to Central San.</p>
August 2	0700-1530 1500-1700	<p>Mobilize sampling gear aboard vessel at San Leandro Marina. Sample CB038W, CB036W, and BC10, (low tide 2.7' at 3:57 pm; high tide 5.1' at 11:27 am). Transit to Emery Cove Yacht Harbor (3300 Powell Street, Emeryville) and demobilize vessel.</p> <p>Aloha Transportation meets vessel at Emery Cove Yacht Harbor and retrieves all personnel for transfer to personal vehicles in San Leandro and all samples for transport to AMS. SFEI staff will transfer CN samples to Central San.</p>
August 5	0700-1500 1500-1700	<p>Mobilize sampling gear aboard vessel at Emery Cove Yacht Harbor. Sample BC20 and CB037W (may move to north or south of Berkeley Pier depending on weather conditions). Return to Emery Cove Marina and demobilize vessel.</p> <p>SFEI staff will transfer CN samples to Central San. Ms. Isquith retrieves all remaining samples for transfer to AMS.</p>

August 6	0700-1630	Mobilize sampling gear aboard vessel at Emery Cove Marina . Sample SPB037W, SPB036W, and SPB038W (low tide 0.0' at 7:26 am; high tide 5.2' at 2:12 pm). Transit to Benicia Marina (266 E B St., 707-745-2628) and demobilize vessel.
	1630-1830	Aloha Transportation meets vessel at Benicia Marina and retrieves sampling personnel for transfer to Emeryville and samples for transport to AMS. SFEI staff will transfer CN samples to Central San.
August 7	0700-1700	Mobilize sampling gear aboard vessel at Benicia Marina . Sample SU044W, SU046W, and SU045W (low tide 0.1' at 10:03 am, high tide 5.0' at 4:15 pm). Transit to Driftwood Marina (6338 Bridgehead Road, Oakley, 925-757-9449) and demobilize vessel.
	1700-2000	Aloha Transportation meets vessel at Driftwood Marina and retrieves sampling personnel for transfer to Benicia and samples for transport to AMS. SFEI staff will transfer CN samples to Central San.
August 8	0700-1330	Mobilize sampling gear aboard vessel at Driftwood Marina . Sample BG20 and BG30. Return to Antioch Marina. Demobilize vessel.
	1330-1600	Mr. Salop meets vessel at Driftwood Marina and sampling personnel demobilize all samples and sampling equipment. Ms. Linder transports all CN samples to Central San. Mr. Salop retains all remaining samples and sampling equipment for delivery to PER and AMS.
August 9	TBD	Contingency day, as needed.

2.4. Lodging

Recommended lodging options for sampling personnel are shown in Table 3.

Table 3. Contact Information for Suggested RMP Water Cruise Lodging.

Location	Nights	Hotel	Confirmation
Redwood City	July 29-31	Comfort Inn 1818 El Camino Real Redwood City, CA 650-599-9636	
San Leandro	August 1	San Leandro Marina Inn 68 Monarch Bay Drive, San Leandro, CA 800-786-7783	
Emeryville	August 2, 5	Extended Stay America 3650 Mandela Pkwy Oakland, CA 510-923-1481	
Benicia	August 6	Best Western Heritage Inn 1955 E 2 nd St. Benicia, CA 94510 707-746-0401	
Oakley	August 7	Comfort Suites 5449 Bridgehead Road Oakley, CA 925-511-1222	

2.5. Other Contacts

Laboratory contact information for RMP field sampling is shown in Table 4, and for local dry ice vendors is shown in Table 5.

Table 4. Laboratory Contact Information for 2013 RMP Water Cruise.

Lab / Company	Name	Phone
BRL	Tiffany Stilwater	206-632-6206 509-594-0318 (cell)
EBMUD	Kristi Lorensen	510-287-1796
ALS	Lisa Domenighini (solids) Lynda Huckestein (nutrients)	360-577-7222 360-501-3358
City of San Jose	Noel Enoki	408-945-3711
Central San	Mary Lou Esparza	925-335-7751
WPCL	Patty Bucknell	916-358-4398
SIU	Da Chen	618-453-6946 (lab) 804-695-6501 (cell)
UMN	Bill Arnold	612-625-5522 952-693-8603 (cell)

Table 5. Dry Ice Vendors Proximate to RMP Water Cruise Berthing Locations.

Port City	Vendor	Address / Phone	Hours (M-F)
Redwood City	Albertsons	200 Woodside Place Redwood City 650-873-4212	0700-1600
Emeryville	Arco	889 West Grand Oakland 510-465-4450	24 hrs
Benicia	Concord Airgas	1825 Arnold Industrial Concord 925-825-8822	0700-1700
Benicia	Four Corners Liquor	1661 Monument Blvd Concord 925-682-2323	0900-2200
Oakley	Raley's	2077 Main Street Oakley 925-625-0744	0600-2300
Pittsburg	Safeway	660 Bailey Rd Bay Point 925-458-0181	0500-2400

2.6. Sampling Sites

One target site for 2013, LSB059W, was removed from the site list for 2013 due to its location between the Dumbarton Bridge and railroad bridge to the south (Figure 1). It was replaced for 2013 with site LSB0060W.

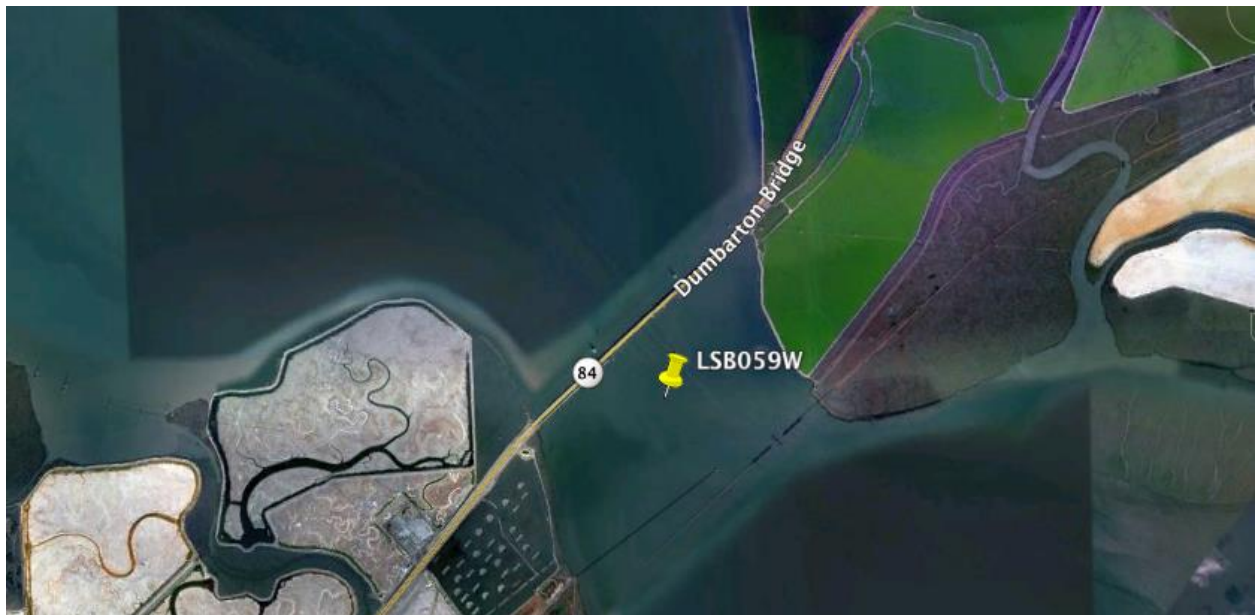


Figure 1. Target Coordinates for site LSB059W.

2013 target sampling sites are shown in Figure 2 and listed in Table 6. All coordinates are in WGS-84 datum. Target analytes are shown in Table 7. Sampling and handling requirements associated with each analyte are shown in Table 8. The replacement-site pool is shown in Appendix A.

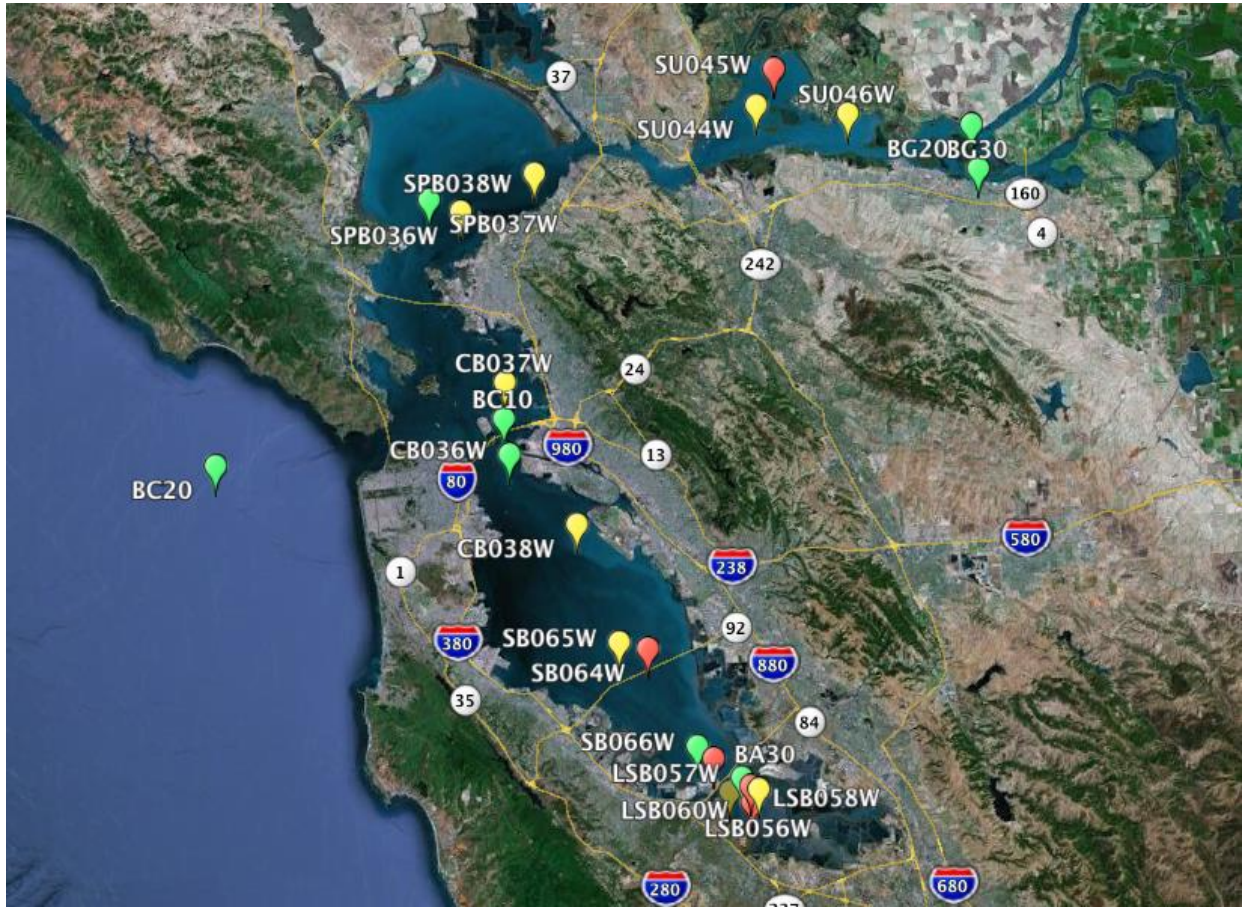


Figure 2. Location of 2013 RMP Target Water Stations

Table 6. Location of 2013 RMP Water Cruise Target Sampling Sites.

Site Name / Region	Site Code	Target Lat	Target Long	Depth (ft)
CB	BC10	37.8215833	-122.3495	12+
CB	BC20	37.7915	-122.67333	12+
RIV	BG20	38.05969966	-121.8112677	12+
RIV	BG30	38.02054094	-121.806267	12+
SB	BA30	37.51375	-122.1346166	6
CB	CB036W	37.78989861	-122.3450314	30
CB	CB037W	37.85334175	-122.3463916	9
CB	CB038W	37.7255101	-122.2736703	7
LSB	LSB055W	37.48404519	-122.1184447	10
LSB	LSB056W	37.48483137	-122.086134	10
LSB	LSB057W	37.495815	-122.1042844	42
LSB	LSB058W	37.47376657	-122.0942941	6
LSB	LSB060W	37.48782325	-122.0948742	4
SB	SB064W	37.6133025	-122.2015673	5
SB	SB065W	37.62013923	-122.2330782	6
SB	SB066W	37.52537969	-122.1520355	42
SPB	SPB036W	38.00547229	-122.3867832	9
SPB	SPB037W	38.017013	-122.4214744	37
SPB	SPB038W	38.03576646	-122.3025015	7
SU	SU044W	38.08613191	-122.0508952	6
SU	SU045W	38.11747478	-122.0291251	5
SU	SU046W	38.07501601	-121.9488621	8

Table 7. RMP Samples to be Collected by Site. Numbers of samples at each site indicated.

SITECODE	CTD -AMS	Conventional WQ -SFEI	Trace Elements, T - BRL	Ag, As, Se, T - BRL	Hg, T - BRL	meHg, T -BRL	Cu, Ni, T – City of SJ	SSC, T (1L) - EBMUD	SSC, T (500ml) - EBMUD	CN, T (500ml) – Central San	Fipronil, T (1L) – WPCL	POC – ALS	Pigments, P - EBMUD	DOC – ALS	Trace Elements, D - BRL	Ag, As, Se, D - BRL	Hg, D - BRL	meHg, D - BRL	Cu, Ni, D – City of SJ	Ammonia, D - EBMUD	Nitrate, nitrite, phosphate, D - ALS	Silica, D - ALS	Salinity, Hardness – EBMUD	OP Flame Retardant, T -SIU	OH-BDE - UMIN
Field Blank									1		1	6			1	1	1	1	1					1	
BC10	1	1	1	1	1	1	1	1	1	1		2	1	1	1	1	1	1	1	1	1	1	1	1	
BC20	1	1	1	1	1	1	1	1	1	1		2	1	1	1	1	1	1	1	1	1	1	1		
BG20	1	1	1	1	1	1	1	1	1	1		2	1	1	1	1	1	1	1	1	1	1	1		
BG30	1	1	1	1	1	1	1	1	1	1		2	1	1	1	1	1	1	1	1	1	1	1		1
BA30	1	1	1	1	1	1	1	1	1	1		2	1	1	1	1	1	1	1	1	1	1	1	1	
CB036W	1	1	1	1	1	1	1	1	1	1		2	1	1	1	1	1	1	1	1	1	1	1		
CB037W	1	1	1	1	1	1	1	1	1	1		2	1	1	1	1	1	1	1	1	1	1	1		
CB038W	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	
LSB055W	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1
LSB056W	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1		
LSB057W	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1		
LSB058W	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	
LSB060W	1	1	1	1	1	1	1	1	1	1		2	1	1	1	1	1	1	1	1	1	1	1	2	
SB064W	1	1	2	2	2	2	2	2	2	2	1*	4	2#	2	2	2	2	2	2	2	2	2	2		
SB065W	1	1	1	1	1	1	1	1	1	1		2	1	1	1	1	1	1	1	1	1	1	1	1	
SB066W	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	
SPB036W	1	1	2	2	2	2	2	2	2	2	1	4	2#	2	2	2	2	2	2	2	2	2	2		
SPB037W	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1		
SPB038W	1	1	1	1	1	1	1	1	1	1		2	1	1	1	1	1	1	1	1	1	1	1	1	
SU044W	1	1	1	1	1	1	1	1	1	1		2	1	1	1	1	1	1	1	1	1	1	1		
SU045W	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	
SU046W	1	1	1	1	1	1	1	1	1	1		2	1	1	1	1	1	1	1	1	1	1	1		
Total	22	22	24	24	24	24	24	24	24	25	11	30	24	24	25	25	25	25	25	24	24	24	24	12	2

NOTES:

- pigment replicate to be attempted last (after POC replicate and pigment sample), if not enough time, take at next site.

* - MS/MSD site, 3 containers total with same ID

Table 8. Containers and Sample Handling for RMP Water Cruise. (T=total, P=particulate, D=dissolved). Samples to be stored with no additional preservation, on wet ice or refrigerated (4C), and in the dark, unless otherwise noted with an “ * ”.

Sample	T/P/D	Lab	Containers per station	Handling Requirements
DO, cond, pH, temp, OBS	T	AMS	None	CTD deployment
DO, cond, pH, temp, sal	T	SFEI	None	Grab measurement on board vessel
Trace Elements Suite	T	BRL	1 x 500ml HDPE	Dup at 2 sites
Ag, As, Se	T	BRL	1 x 2L HDPE	Dup at 2 sites
MeHg	T	BRL	250 ml FLPE	No rinse; has 1-2 ml 50% H2SO4; dup at 2 sites
THg	T	BRL	250 ml FLPE	Dup at 2 sites
Cu, Ni	T	City of SJ	500 ml HDPE	Dup at 2 sites
CN	T	Central San	1L HDPE	*Preserve with NaOH to a pH ≥ 12 (14 day hold if preserved)
SSC	T	EBMUD	1L and 500ml PE	7 day hold; dup at 2 sites
Fipronil	T	WPCL	1L amber glass	7 day hold; dup at 1 site
POC	P	ALS	Filters and containers (2 per site)	Field filtered; quick freeze -20C; dup at 2 sites
Pigments (Chlorophyll, phaeophytin)	P	EBMUD	40 ml amber vial	*Field filtered, preserve filter in 90% MeOH, amber vial in bubble bag, quick freeze -20C; 3 week hold; dup at 2 sites
DOC	D	ALS	250 ml HDPE	Field filtered (filtrate of POC sample); has 1-2ml H2SO4, dup at 2 sites
Trace Elements Suite	D	BRL	1 x 500ml HDPE	Dup at 2 sites
Ag, As, Se	D	BRL	1 x 2L HDPE	Dup at 2 sites
MeHg	D	BRL	250 ml FLPE	No rinse; has 1-2 ml 50% H2SO4; dup at 2 sites
THg	D	BRL	250 ml FLPE	Dup at 2 sites
Cu, Ni	D	City of SJ	500 ml HDPE	Dup at 2 sites
Salinity, Hardness (<5ppt)	D	EBMUD	500 ml PE	Salinity @ all stations, 7 day hold (for salinity); dup at 2 sites
Ammonia	D	EBMUD	500 ml PE	*Quick freeze -20C; dup at 2 sites
Nitrate, nitrite, phosphate	D	ALS	250 ml PE	*Quick freeze -20C; dup at 2 sites
Silica	D	ALS	250 ml PE	*Quick freeze -20C; dup at 2 sites
Organophosphate Flame Retardants	T	SIU	4L glass	Grab sample, dup at 1 site
OH-BDE	T	UMN	4@1L glass	Hold on wet / blue ice; return to lab asap

APPENDIX A

2015 TARGET SITES (Replacement sites for 2013). All coordinates are in WGS-84 datum.

Site Code	Site Name / Region	Target Lat	Target Long	Depth (ft)
Central Bay	CB039W	37.92331585	-122.4190534	12+
Central Bay	CB040W	37.67518852	-122.3541416	12+
Central Bay	CB041W	37.89051473	-122.3731122	3 to 6
Lower South Bay	LSB061W	37.49578108	-122.0934142	3 to 6
Lower South Bay	LSB062W	37.47366172	-122.0693736	12+
Lower South Bay	LSB063W	37.49518696	-122.1138946	3 to 6
San Pablo Bay	SPB039W	38.05927587	-122.4315357	6 to 12
San Pablo Bay	SPB040W	38.07478345	-122.3480335	6 to 12
San Pablo Bay	SPB041W	38.08730512	-122.3952352	3 to 6
South Bay	SB067W	37.63346894	-122.2636692	12+
South Bay	SB068W	37.59946797	-122.1966771	3 to 6
South Bay	SB069W	37.68887201	-122.2156684	3 to 6
Suisun Bay	SU047W	38.03974867	-122.1163163	12+
Suisun Bay	SU048W	38.10814102	-122.0220148	3 to 6
Suisun Bay	SU049W	38.09219376	-122.0580855	6 to 12