REGIONAL MONITORING PROGRAM FOR WATER QUALITY IN SAN FRANCISCO BAY

sfei.org/rmp

Regional Monitoring Program

for Water Quality in San Francisco Bay

Sampling and Analysis Plan

2018 RMP Sediment Cruise

Contract #1343

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Prepared by

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Contribution #904

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Introduction

This report details plans associated with the annual Regional Monitoring Program for Water Quality in the San Francisco Estuary (RMP) sediment cruise. The Regional Monitoring Program through the Status and Trends conducts routine monitoring of water, sediment and biological tissue. The current study design calls for monitoring of water and bivalves every two years and sediment every four years. Bird egg monitoring (cormorant and terns) is conducted triennially, while sport fish are monitored on a five-year rotation. For 2018, sampling operations will entail dry season sample collection at 27 RMP sediment sampling sites.

1. Cruise Plan

1.1. Objectives

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

1. Collect a water column profile at each of the 27 sediment sites for analysis of temperature, salinity, electrical conductivity, optical backscatter, dissolved oxygen, density, and pressure by Applied Marine Sciences (AMS).
2. Collect cores for on-board analysis of ORP at 27 sites by San Francisco Estuary Institute (SFEI).
3. Collect direct pH measurements from the interstitial water found in the undisturbed sediment in the grab at 27 sites by AMS.
4. Collect sediment samples from 27 sites plus 2 field blanks and 2 field duplicates for analysis of:
    1. Sediment Quality Parameters (total solids, TN, total organic carbon) by ALS
    2. Sediment Grain Size by ALS
    3. Trace Elements (Al, Cd, Cu, Fe, Pb, Mn, Ni, Ag, and Zn) and total solids by the City and County of San Francisco (CCSF)
    4. Trace Elements (As, Hg, MeHg, Se) and total solids by Brooks Analytical Labs (BAL)
    5. Polycyclic Aromatic Hydrocarbons and total solids by SGS AXYS Analytical
    6. Polychlorinated Biphenyls and total solids by SGS AXYS Analytical
    7. Polybrominated Diphenyl Ethers and total solids by SGS AXYS Analytical
    8. Fipronil and total solids by SGS AXYS Analytical
5. Collect sediment samples for special studies:
    - Collect sediment samples from 16 sites plus 2 field dups and 2 field blanks for analysis of Siloxanes by DTSC
    - Collect sediment samples from 13 sites for analysis of QACs and antibiotics by UMinn
    - Collect sediment samples from 5 sites plus 2 field blanks and 1 field duplicate for non targeted analysis by Duke and SDSU
    - Collect water samples from 5 sites plus 1 field blank and 1 field duplicate for analysis of gadolinium by UFB
6. Collect sediment samples from 27 sites for short-term trace metals archives
7. Collect sediment samples from 27 sites for short-term trace organics archives

8. Collect sediment samples from 7 sites for long-term archive at NIST
9. Collect sediment samples from 7 sites for long-term NIST archive for PFAS
10. Send archive samples from three sites for analysis of:
    1. Trace Elements (Al, Cd, Cu, Fe, Pb, Mn, Ni, Ag, and Zn) and Total Solids by the City and County of San Francisco (CCSF)
    2. Trace Elements (As, Hg, MeHg, Se) and Total Solids by Brooks Analytical Labs (BAL)
    3. Polycyclic Aromatic Hydrocarbons and Total Solids by SGS AXYS Analytical
    4. Polychlorinated Biphenyls and Total Solids by SGS AXYS Analytical
    5. Polybrominated Diphenyl Ethers and Total Solids by SGS AXYS Analytical
    6. Fipronil and Total Solids by SGS AXYS Analytical

Personnel

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

Table 1. Personnel for 2018 RMP Sediment Cruise

Name	Affiliation	Duties	Cell
Paul Salop	AMS	Cruise Manager, Field Sampling 8/14, 8/20	510-323-6523
Sara Driscoll	AMS	Field Sampling, 8/14 - 8/15	714-408-0800
Clifton Herrmann	AMS	Field Sampling, 8/15 – 8/17, 8/21	916-612-8718
Winn McEnery	AMS	Field Sampling, 8/20 – 8/21	707-832-2091
Aroon Melwani	AMS	Field Sampling, 8/16 - 8/17	831-917-9243
Don Yee	SFEI	Field Sampling, 8/14 - 8/15	650-530-0603
Amy Franz	SFEI	Field Sampling, 8/17, 8/20 - 8/21	510-282-5012
Adam Wong	SFEI	Field Sampling, 8/15 - 8/16	530-400-5192
Ila Shimabuku	SFEI	Field Sampling, 8/14 - 8/15, 8/21	805-415-6811
Diana Lin	SFEI	Field Sampling, 8/14	714-932-8085
Lawrence Sim	SFEI	Field Sampling, 8/16, 8/21	818-606-8467
Meg Sedlak	SFEI	Field Sampling, 8/17, 8/20	510-918-6119
Nina Buzby	SFEI	Field Sampling, 8/16-8/17, 8/20	415-336-6485
Shira Bezalel	SFEI	Photographer, 8/21	510-761-3321
Chris Vallee	USGS	Vessel contact	916-764-2419
Jerry Eldorado	Aloha Trans	Logistics	925-640-1600

Mr. Salop will be responsible for oversight of sampling operations; compliance with cruise plan, quality assurance guidelines, and field operations manual; maintenance of the sample field log; chain-of-custody procedures; and CTD profiling. Ms. Franz will be responsible for coordination of SFEI field personnel. AMS and SFEI personnel will be responsible for sample collection and sample processing. Captain Vallee will be responsible for vessel operation and safety. Representatives of program sponsors and collaborating organizations may be aboard the *RV Turning Tide* during portions of the cruise to observe / assist with sampling operations.

1.2. Cruise Schedule

The cruise schedule shown in Table 2 assumes that an average of forty-five minutes will be required for sampling at each station. The schedule is for planning purposes only, and may be revised during sampling operations to reflect weather conditions, tide restrictions, 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 oversample site from the same segment (see Appendix A). Any sites displaying a lack of suitable substrate within the immediate vicinity (*i.e.*, a complete lack of fine materials within a 100 m radius of the target coordinates) will be automatically replaced with the first available site from the oversample list.

Table 2. Anticipated Cruise Schedule for 2018 RMP Sediment Cruise

Date	Time	Activity
August 13, 2018	0800-1400	*R/V Turning Tide* transits from Rio Vista to Redwood City.
	1400-1600	Sampling personnel mobilize sampling gear on vessel *R/V Turning Tide* at **Redwood City Marina (**451 Seaport Court, 650-363-1390).
August 14, 2018	0730-0800	Sampling personnel mobilize remaining sampling gear on vessel *R/V Turning Tide* at **Redwood City Marina**. Conduct safety briefing. Depart for LSB011S.
	0800-1530	Sample LSB011S, LSB001S, BA10, LSB002S, and LSB056S (high tide at Dumbarton Bridge 9.0' at 16:16 (Figure 6). Return to **Redwood City Marina**.
	1530-1730	Aloha Transportation (925-640-1600) meets vessel at Redwood City Marina, delivers wet and dry ice, and retrieves all samples for transport to AMS.
August 15, 2018	0700-0715	Aloha Transportation meets sampling personnel at Emeryville Marina public parking lot (will need to pay for all-day parking). Aloha transports sampling personnel to Redwood City.
	0900-0930	Mobilize remaining sampling gear aboard vessel at **Redwood City Marina**. Conduct safety briefing. Depart for BA41.
	0930-1715	

	1700-1900	Sample BA41, SB058S, SB042S, SB002S, SB011S, and CB002S (high tide at San Mateo Bridge 7.9' at 18:41 (Figure 7)). Transit to **Emeryville Marina (3310 Powell Street, 510-654-3716).** Aloha Transportation meets vessel at **Emeryville Marina**, delivers wet and dry ice, and retrieves all samples for transfer to AMS.
August 16, 2018	0800-0815 0815-1300 1300-1330	Mobilize remaining sampling gear aboard vessel at **Emeryville Marina**. Conduct safety briefing. Depart for BC11. Sample BC11, CB001S, CB057S, CB011S, SPB047S, and SPB011S (high tide at Pinole Point 6.3' at 17:31 (Figure 9)). Transit to **Benicia Marina** (266 E B St, Benicia, 707-745-2628). Aloha Transportation meets sampling personnel at Benicia Marina, retrieves all samples for transport to AMS and all personnel for transfer to Emeryville.
August 17, 2018	0700-0715 0715-1230 1230-1330	Mobilize remaining sampling gear aboard vessel at **Benicia Marina**. Conduct safety briefing. Depart for SPB001S. Sample SPB001S, BD31, and SPB002S (high tide at Pinole Point 6.1' at 18:21 (Figure 10)). Return to **Benicia Marina (**266 E. B Street, 707-745-2628**).** Aloha Transportation meets sampling personnel at Benicia and returns all samples to AMS.
August 20, 2018	0645-0715 0715-1430 1430-1730	Mobilize remaining sampling gear aboard vessel at **Benicia Marina.** Conduct safety briefing. Depart for SU073S. Sample SU073S, BF21, SU011S, SU041S, and SU001S, (high tide at Suisun Slough Entrance 3.92' at 11:13 (Figure 8)). Transit to **Driftwood Marina (**6338 Bridgehead Rd, Oakley, 925-757-9449). Aloha Transportation meets sampling personnel at **Driftwood Marina**, delivers wet and dry ice, delivers sampling personnel to personal vehicles in Benicia, and retrieves all samples for transport to AMS.
August 21, 2018	0730-0800 0800-1115 1115-1315	Mobilize remaining sampling gear aboard vessel at **Driftwood Marina.** Conduct safety briefing. Depart for BG20. Sample BG20 and BG30 (all sample sites at depths >12'). Return to Antioch Marina. Demobilize vessel and offload all samples and equipment. Mr. Salop meets sampling personnel at **Driftwood Marina**, retrieves all samples and equipment and transports to AMS.
August 22, 2018	As needed	Scheduled makeup day as required.

1.3. Lodging and Supplies

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

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

Location	Nights	Hotel	Confirmations
Redwood City	8/13, 8/14	Comfort Inn 1818 El Camino Real Redwood City, CA 650-599-9636	

Table 4. Dry Ice Vendors Proximate to RMP Sediment Cruise Berthing Locations.

Port City	Vendor	Address / Phone	Hours (M-F)
Redwood City	Albertsons	200 Woodside Place Redwood City 650-873-4212	0700-1600
Redwood City	Airgas	820 Industrial San Carlos 650-592-9305	0730-1700
Oakland	Arco	889 West Grand Oakland 510-465-4450	24 hrs
Vallejo	Concord Airgas	1825 Arnold Industrial Concord 925-825-8822	0700-1700
Vallejo	Four Corners Liquor	1661 Monument Blvd Concord 925-682-2323	0900-2200

1.4. Sample Labeling

Each container will be labeled with a unique sample ID, the station code, analyte code, collection date, and collection time. The 4 digit unique ID number included in the sample ID should be written in permanent marker on top of the container in case the label becomes detached from the container.

The sample ID labeling system used for the 2018 cruise is as follows:

RMP-18SC-XXXX

Where:

RMP	=	Project
18	=	Cruise Year
SC	=	Matrix (Sediment Cruise)
XXXX	=	Unique ID number

The sample ID labeling system used for the NIST and short term archive samples for the 2018 cruise is as follows:

RMP-18SC-XXXX-Y

Where:

RMP	=	Project
18	=	Cruise Year
SC	=	Matrix (Sediment Cruise)
XXXX	=	Unique ID number
Y	=	Unique aliquot number

1.5. Sample Collection Plan

The number of samples, type and size of container and handling requirements for each analyte at each station are shown in Table 5.

Table 5. Analyte Collection, Counts and Handling Instructions

https://docs.google.com/spreadsheets/d/1aXTVwY5hLizrRnPIVtPLU1qlaIueK3n3wwi1620ZIfI/edit#gid=0

1.6. Sampling Procedures

Order of Sample Collection:

Note: Field blind duplicate samples of the same sample type should be collected at the same time.

Field blanks will be collected by opening the sample jar in the cabin during the filling process and closing it up again.

Samples collected from side of ship

1.1. SeaBird depth cast measurement
1.2. Gadolinium water grab for UFB (collect as soon as on station, before deploying the grab)

Samples collected directly from VanVeen grab

1.3. Measure pH in each grab
1.4. Collect ORP cores directly out of first grab
1.5. Collect Siloxanes directly out of first grab - place on wet ice within 20 min
1.6. Collect non-targeted analyses directly out of grab, up to 3 grabs
1.7. Collect Long-term archive for PFAS directly out of grab

Fill order for samples collected from the composite bucket

1.8. Trace Elements for BAL - place on dry ice within 20 min of collection
1.9. Trace Elements for CCSF
1.10. Organics for AXYS
1.11. Total Nitrogen for ALS
1.12. TOC/TS for ALS
1.13. Particle size determination for ALS
1.14. Short-term Archives for metals

1.15. Short-term Archives for organics
1.16. Long-term archive in teflon
1.17. QACs and antibiotics for UMN

Water Quality Measurement Protocol

A profile of water quality conditions will be measured at each site following the protocols in the 2018 Field Operations Manual (Shimabuku et al., 2018, Section 1.3.1).

Sediment Sampling Protocol

Sediment samples will be collected and field measurements will be made at each site following the protocols in the 2018 Field Operations Manual (Shimabuku et al., 2018, Section 1.3.2). The number of grabs needed for each site is estimated in Table 5.

Special Study Sampling Protocols

1. Gadolinium (surface water grab samples): (Note: This sampling requires two samplers, and will use a a modified clean hand / dirty hands technique to keep sample containers as clean as possible; sampling is best conducted on site arrival and prior to deck and tool cleaning.)
   1.1. Two samplers
      1.1.1. Dirty hands: Puts on a pair of special, double bagged gloves and opens the outside bag of provided gloves, carefully using inner bag surface to push up a pair of gloves for clean hands.
      1.1.2. Clean hands: Clean puts on nitrile gloves, carefully pulls out a pair of provided gloves from the bag by the cuffs and puts them on, touching a minimum of the glove outside with nitrile (e.g. touch the cuff only on the first glove). After putting on gloves, do not touch anything except inside bottle bag and bottle. **Use a new pair of provided gloves for each sample.**
   1.2. Dirty hands: Open external plastic bag for sample bottle.
   1.3. Clean hands: Take (using gloves) the inner plastic bag out. Remove bottle from inside bag. Hold bottle up to sampling pole, while dirty hands zipties bottle to sampling pole.
   1.4. Dirty hands: Grab sampling pole and carefully ziptie bottle to sampling pole. Try to avoid grabbing bottle.
   1.5. Clean hands: Open the bottle.
   1.6. Dirty hands: Dip bottle into receiving water, and rinse 3 times. Fill the bottle at least half full.
   1.7. Clean hands: Close bottle.
   1.8. Dirty hands: Cut loose bottle. Place label inside outside bag.
   1.9. Clean hands: Place bottle inside outside bag.
   1.10. Dirty hands: Close the outside bag. Use a sharpie to label the outside bag with the last four digits of the sample ID.
   1.11. Store samples on wet ice during transit, and bring to SFEI for shipping. Do not freeze.
   1.12. Collect a blank using Milli-Q water provided in an extra sample bottle. Pour Milli-Q water into another sample bottle. Rinse the bottle 3 times with Milli-Q water in the same way as sample collection.

2. Siloxanes: **(Note: This sampling involves Personal Care Products Contamination Risk)**
   - 2.1. There is a high risk of contamination from deodorants, hand creams and body lotions. Appropriate sunscreen that does not contain siloxanes will be on the vessel for crew use. Use only deodorants and lotions for the cruise that have been reviewed by Meg Sedlak or Becky Sutton (e-mails on appropriate personal care products have been sent to the field crew).
   - 2.2. There are dedicated stainless steel sampling scoops wrapped in foil in a ziplock bag. Please use a clean scoop for each site. Prior to the cruise, scoops will be cleaned using tap water, DI and Fisher Optima LC/MS grade acetone in the lab. If needed, spoons can be cleaned on the boat using DI and LC/MS grade acetone prior to sampling. Please conduct this work outdoors where the airborne siloxane background concentrations are likely to be lower.
   - 2.3. Wash hands with soap and water prior to donning nitrile gloves for sample collection. Do not touch the exterior of the glove with bare hands to avoid cross-contamination; similarly do not touch the sediment or interior of sample jars. In addition, minimize the amount of time that the sample jar is open to avoid cross-contaminating the sample.
   - 2.4. Collect sediment sample from the center of the Van Veen grab (away from the sides) with a clean stainless steel scoop as soon as the grab is brought on deck. Collect only the very top layer of the sediment 5 to 10 mm. Fill the sample jar (i.e., 200 ml wide-mouth amber glass jar) a bit more than 3/4 of the way full so the sample jar can be placed on wet ice as soon as possible. Do not homogenize the sample as siloxanes are volatile and we will lose the sample analyte. After sample collection, rewrap scoop in foil for re-use to collect non-targeted analyses (below).
   - 2.5. Collect a blank using the LC/MS grade acetone. A small jar of LC/MS grade acetone will be with the sampling jars. Pour acetone over clean sampling spoon and into sample jar (preferably conduct this work on deck - not in the cabin to minimize contamination).
3. Non-targeted analyses Duke and SDSU **(Note: This sampling involves Detergent, Soaps, and Personal Care Products Contamination Risk)**
   - 3.1. There is a high risk of contamination from detergents and personal care products.
   - 3.2. Pre-cleaned stainless steel scoops and containers will be used to collect NTA samples. Pre-cleaned containers will be shipped directly from the lab. Stainless steel scoops will be pre-cleaned with hot tap water, DI water, and rinsed three times with high-purity acetone, and wrapped in acetone-rinsed foil for transport. These are the same scoops that will be used for collection of siloxane samples. Once the siloxane sample has been collected; please collect the NTA samples.
   - 3.3. The NTA composite jar will be filled with sediment directly from the Van Veen grabs using a pre-cleaned stainless steel scoop. Sediment for the NTA composite should be collected for the top 0-5 cm, and only from the center of the grab, avoiding contact with the detergent-washed grab. Sediment should be collected from each Van Veen grab if more than one grab is collected at site. The composite jar will remain chilled on wet ice overnight. The sample jar will be delivered to SFEI by SFEI staff for sub-sampling into appropriate laboratory specific containers in the lab the following day. Sub-sample containers will be frozen until shipping.
   - 3.4. Collect two blanks at the same site by opening two **amber** glass jars during the period of sample collection, then closing them when collection is complete. Each lab (Duke/SDSU) will receive one field blank. Note: These jars are different than the **clear** ones used for sample collection at sites (as these samples will be composited at SFEI, then portioned out to sample jars).

4. Quaternary Ammonium Compounds (QACs) and Antibiotics: **(Note: This sampling involves QAC Contamination Risk)**
   4.1. Avoid using QAC products (i.e., Lysol disinfecting sprays, Clorox wipes)
   4.2. Collect samples from the bucket after the sample has been homogenized. Sample bottles can be filled using the same teflon scoops that the RMP sediment samples are collected with. The 250 ml bottles provided by the lab should be filled 80% full. Freeze after collection. Store frozen. Be careful to not smudge label.

1.7. Sampling Sites

Twenty-seven sites will be targeted in 2018. Seven of these sites are historic stations that have been monitored repeatedly during sediment cruises. Twenty of the sites were identified through the RMP probabilistic sampling design.

Three sampling sites were removed from the target list during cruise planning operations for various reasons, as described below:

- Site SB043S is located in a fouled area around SFO that has multiple hazards identified on nautical charts (e.g., duck blinds, ruins, submerged stakes). It was replaced with oversample site SB058S.

- Site CB047S is located at approximately 150' depth in a known high current area. The odds of collecting two viable grabs is remote. The site was replaced with oversample site CB057S.

- Site LSB047S is located in a restricted anchoring zone around a pipeline south of the Dumbarton Bridge and an adjacent railroad bridge. It was replaced with oversample site LSB056S.

Figure 1. Location of Target Site SB043S within fouled area around SFO

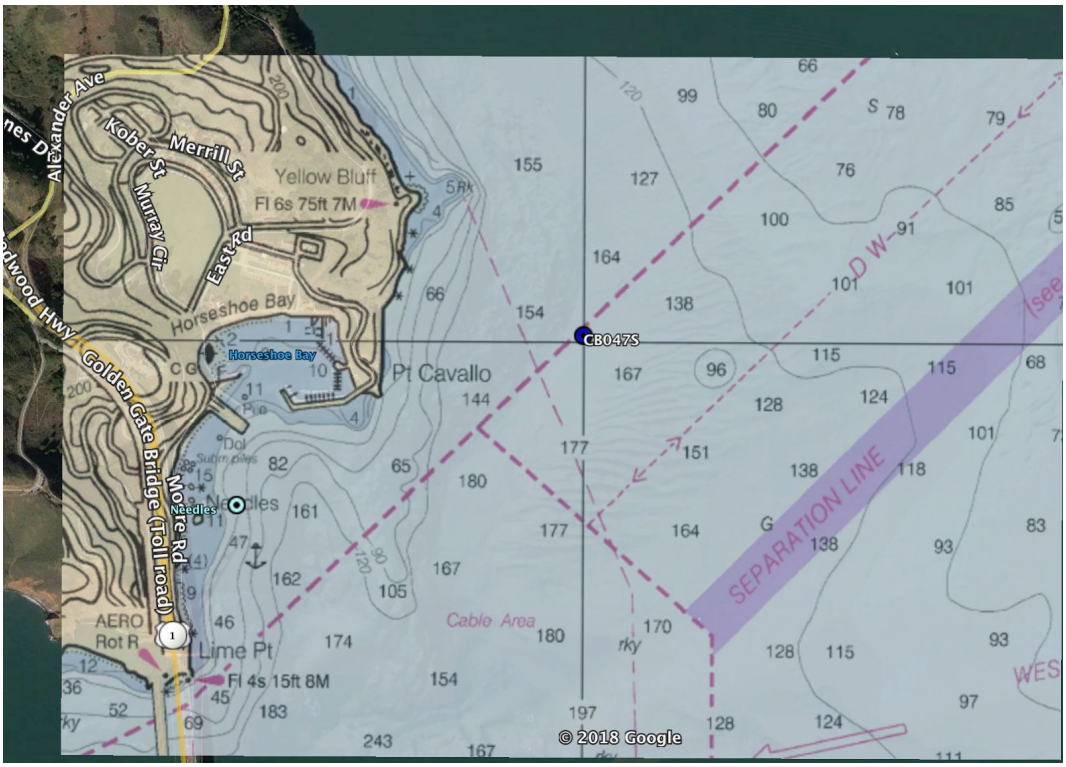

Figure 2. Location of Target Site CB047S offshore of Point Cavallo.

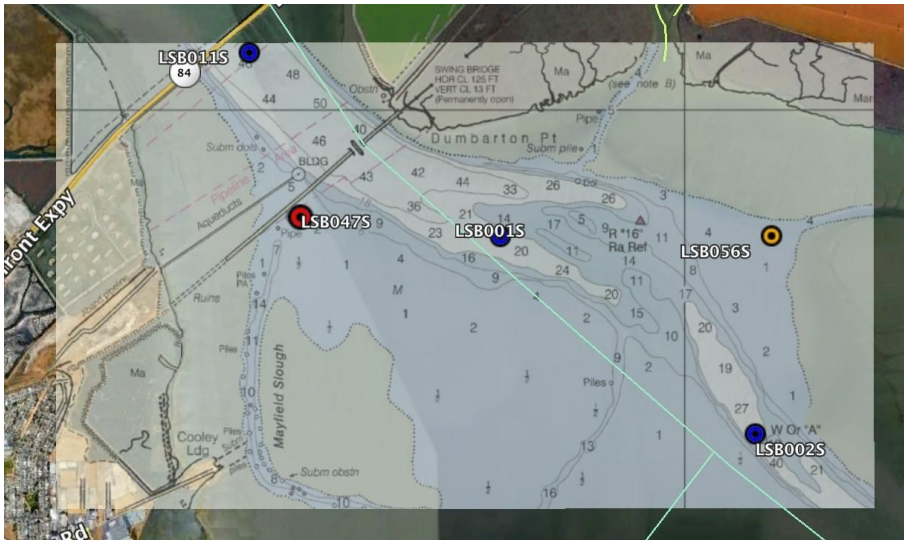

Figure 3. Location of Target Site LSB047S at Pipeline Area South of Railroad Bridge; Oversample Site LSB056S is also indicated.

In addition, one site will require additional notifications during cruise activities. As shown in Figure 4, site SU011S lies within the restricted area around the Reserve Fleet in Suisun Bay. One to two days in advance of sampling, the cruise manager will confirm sampling schedule for this site. Current contact information is Joe Pecoraro at MARAD (707-745-0487, joe.pecoraro@dot.gov).

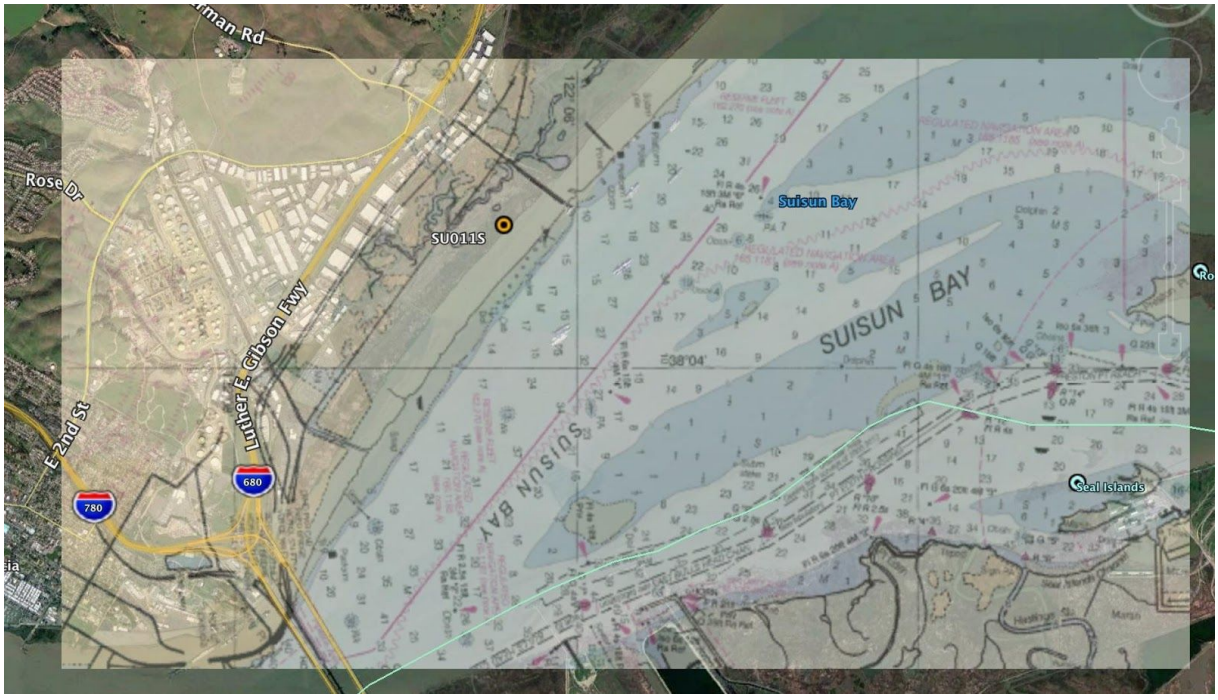

Figure 4. Location of Target Site SU011S within Restricted Area around Reserve Fleet.

Coordinates for all target RMP sampling sites are shown in Table 6 and Figure 5. All scheduled samples to be collected at each site and the sampling bottles and handling requirements for each parameter are shown in Table 7.

Table 6. Coordinates for 2018 RMP Sediment Cruise Target / Replacement Sampling Sites. All coordinates are listed in WGS-84 datum. Depths are estimated relative to MLLW.

Site Code	Site Name / Region	Target Lat	Target Long	Depth (ft)
BC11	CB	37.82232768	-122.3492815	12+
BA10	LSB	37.46823888	-122.0639734	12+
BG20	Rivers	38.05895268	-121.8143678	12+
BG30	Rivers	38.02282086	-121.8083671	12+
BA41	SB	37.55903527	-122.210577	12+
BD31	SPB	38.02412178	-122.363683	12+
BF21	SU	38.11551792	-122.0404754	12+
CB001S	CB	37.87631112	-122.3615019	6 to 12
CB002S	CB	37.62508623	-122.3472116	12+
CB011S	CB	37.96757351	-122.4506445	12+
CB057S	CB	37.87648219	-122.3817323	6 to 12
LSB001S	LSB	37.49183613	-122.0985143	12+
LSB002S	LSB	37.47912655	-122.0779838	12+
LSB011S	LSB	37.50367068	-122.1187347	12+
LSB056S	LSB	37.49187127	-122.0766739	1 to 3
SB002S	SB	37.61019366	-122.1673764	1 to 3
SB011S	SB	37.61016066	-122.3395914	6 to 12
SB042S	SB	37.59018928	-122.1948669	6 to 12
SB058S	SB	37.56262121	-122.1955567	12+
SPB001S	SPB	38.07196053	-122.3865946	6 to 12
SPB002S	SPB	38.01640698	-122.3412822	3 to 6
SPB011S	SPB	38.09251698	-122.4643975	1 to 3
SPB047S	SPB	38.00754627	-122.4580252	6 to 12
SU001S	SU	38.09944846	-122.0465753	12+
SU011S	SU	38.07633053	-122.1042465	1 to 3
SU041S	SU	38.11116618	-122.0584658	6 to 12
SU073S	SU	38.11074613	-122.0487255	6 to 12

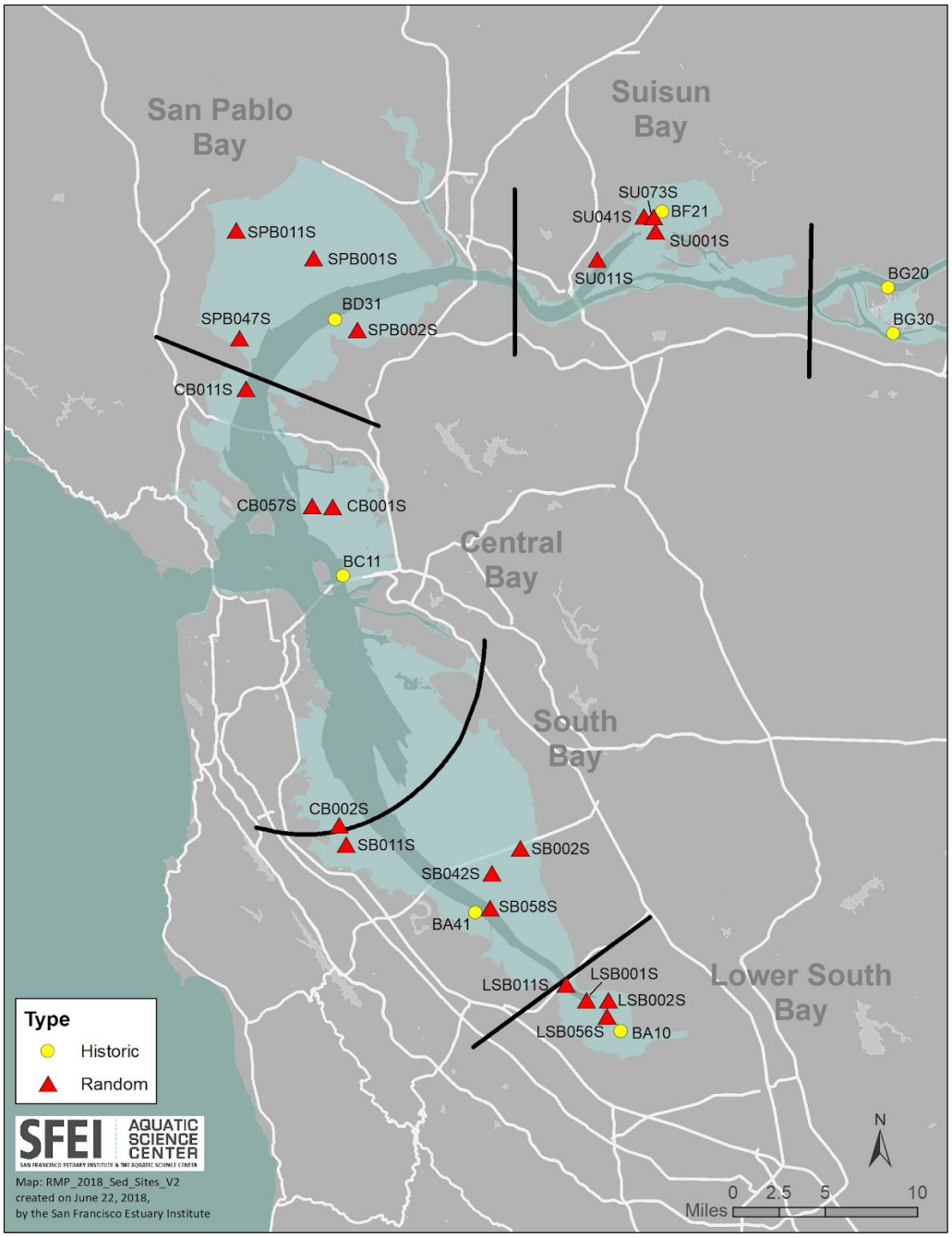

Figure 5: 2018 RMP Sediment Cruise Target Sampling Sites

1.8. Tide Charts

Predicted tides associated with the shallowest of the target sites for each embayment are presented in the following figures. No figures are presented for the two river stations, as there is sufficient water depth at both locations to support sampling on any tide.

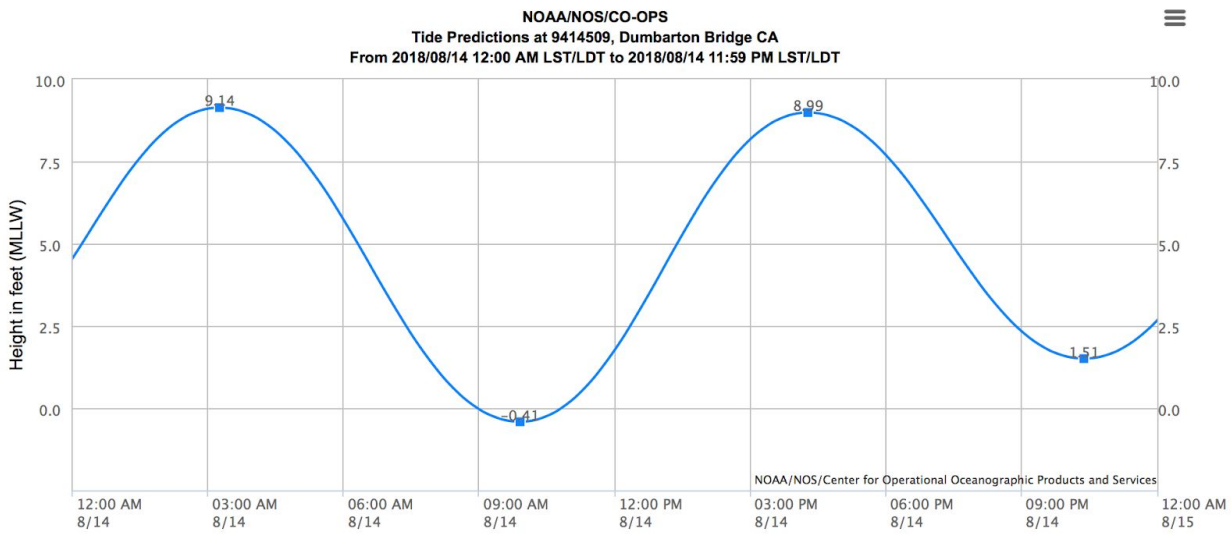

Figure 6. Predicted Tides for Lower South Bay, August 14, 2018

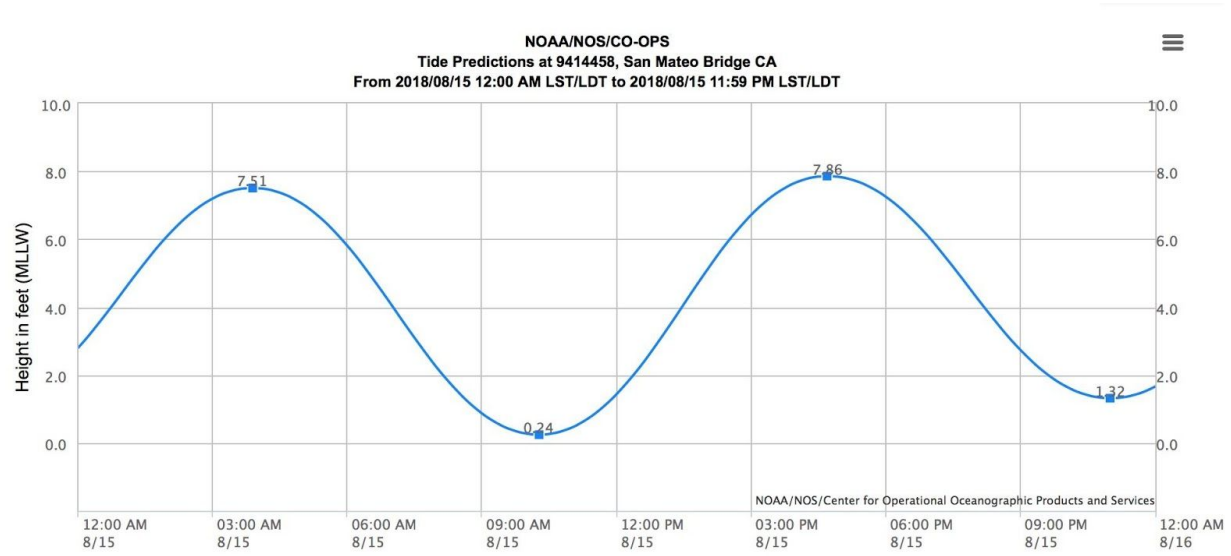

Figure 7. Predicted Tides for South Bay, August 15, 2018

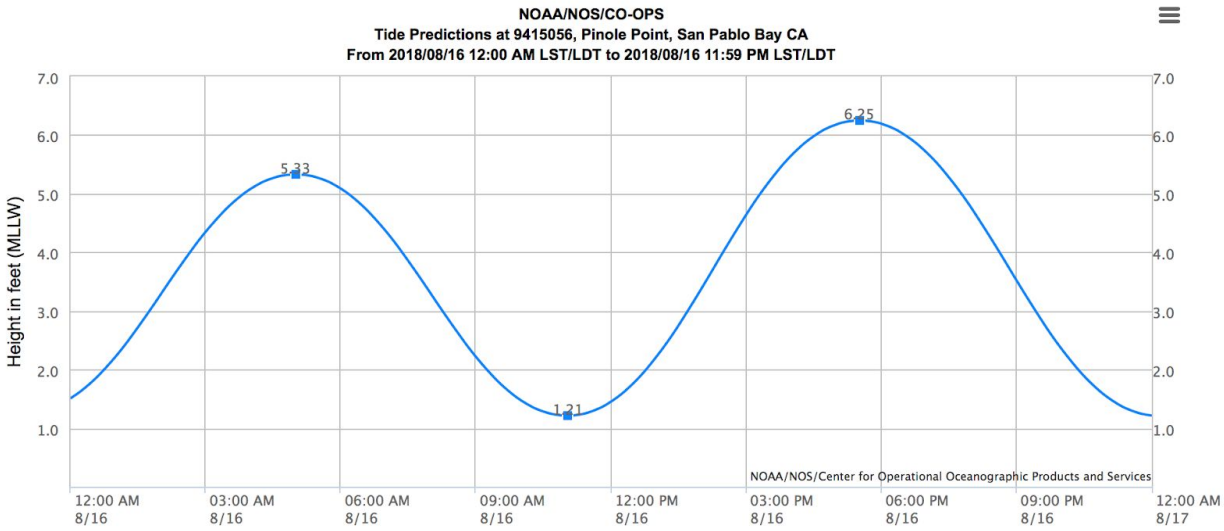

Figure 8. Predicted Tides for San Pablo Bay, August 16, 2018

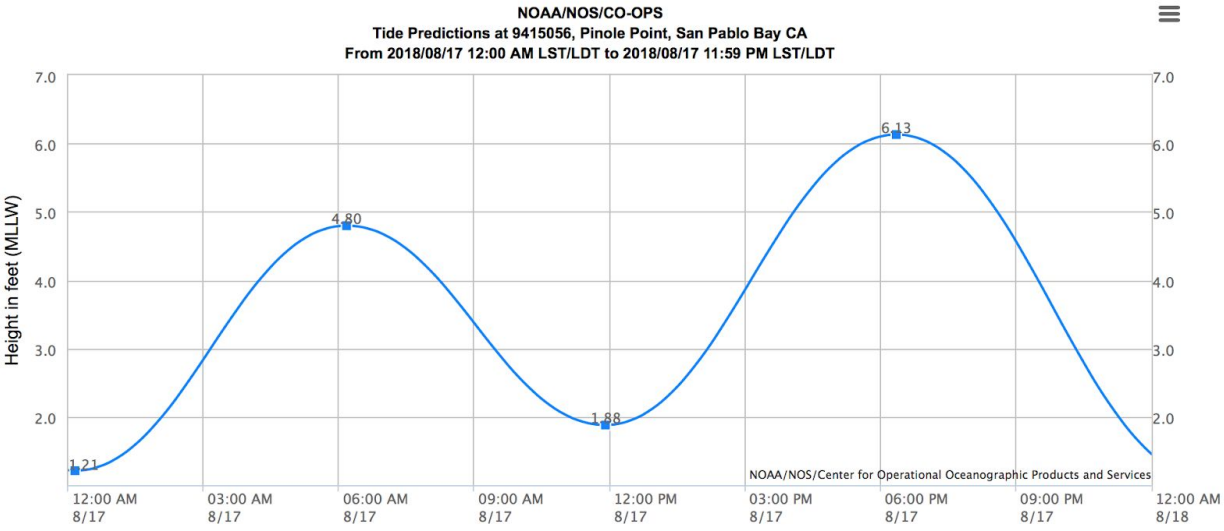

Figure 9. Predicted Tides for San Pablo Bay, August 17, 2018

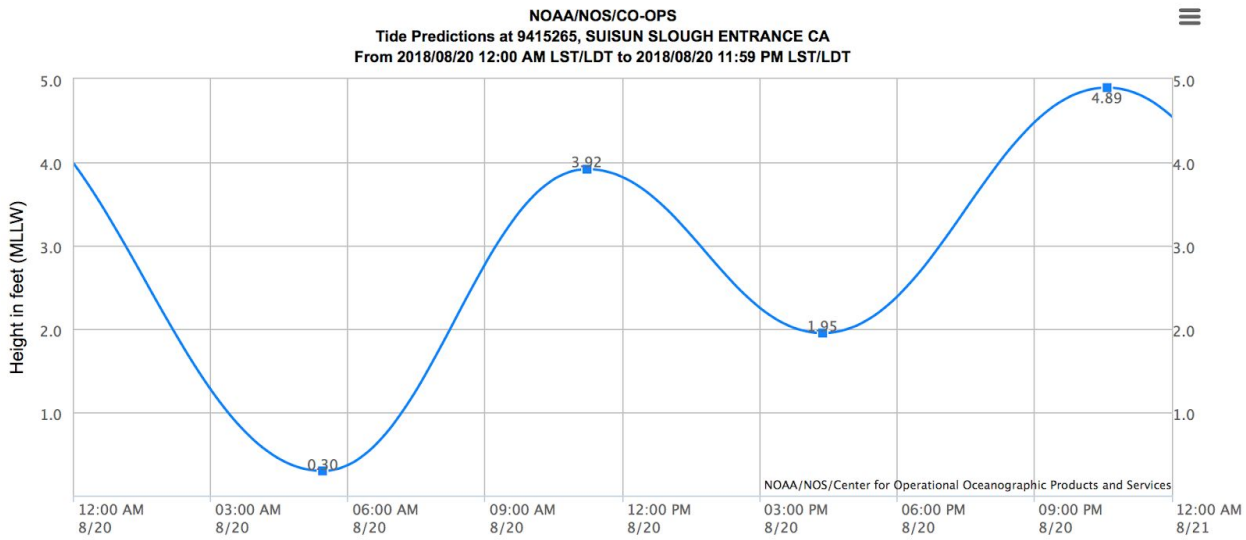

Figure 10. Predicted Tides for Suisun Bay, August 20, 2018

1.9 Sample Shipping

Sample will be shipped following the guidelines provided in Table 5 **https://docs.google.com/spreadsheets/d/1aXTVwY5hLizrRnPIVtPLU1qlaIueK3n3wwi1620ZIfI/edit#gid=0**. AMS will send draft COCs to Adam Wong adam@sfei.org prior to shipping the samples.

2.Laboratory Analyses

2.1. Laboratory Contacts

Laboratory contact information for RMP field sampling is shown in Table 7.

Table 7. Laboratory Contact Information for 2018 RMP Sediment Cruise.

Lab / Company / Agency	Contact	Shipping Address	Phone / Email
BAL	Lydia Greaves	18804 North Creek Parkway, Suite 100 Bothell, WA 98011	206-753-6127 lydia@brooksapplied.com
SGS AXYS	Sean Campbell	2045 Mills Rd. Sidney, BC Canada V8L 5X2	1 250-655-5834 scampbell@axys.com
CCSF	Tony Rattonetti	1000 El Camino Real, Millbrae, CA, 94030	650-871-3011 RWellbrock@sfwater.org
ALS	Howard Boorse	1317 South 13th Ave Kelso, WA 98626	360-577-7222 Howard.Boorse@alsglobal.com
DTSC	Dimitri Panagopoulos	700 Heinz Street, Suite 200 Berkeley CA	(510) 815-8971; panagopoulos.dimitrios@epa.gov
U Minn	William Arnold	William Arnold Department of Civil, Environmental, and Geo- Engineering University of Minnesota 500 Pillsbury Dr.SE Minneapolis, MN 55455	952.693.8603, arnol032@umn.edu
UFB	Vanessa Hatje	Centro Interdisciplinar de Energia e Ambiente, CIENAM Universidade Federal da Bahia, Campus Ondina Ondina, Salvador, Bahia, BRAZIL 40170-115	55 71 981776787; 55 71 32835648 vanessahatje@gmail.com
Ferguson Laboratory (Duke University)	Lee Ferguson	Lee Ferguson Duke University 140 Science Drive Gross Hall, Room 380 Durham, North Carolina 27708-9976	919-886-0692 lee.ferguson@duke.edu
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Archive Agency Contacts			
NIST	Amanda Moors	NIST Hollings Marine Laboratory 331 Ft. Johnson Rd. Charleston, SC 29412	843-762-8953 amanda.moors@noaa.gov
Short-Term Archives	Paul Salop	Applied Marine Sciences 4749 Bennett Dr., Ste. L Livermore, CA 94551	925-373-7142 salop@amarine.com

2.2. Reportable Analyte List and Constituents

Target analytes for the 2018 RMP sediment cruise are listed in table 8. The analyte name, matrix, fraction, unit and method have been approved by CEDEN and are required to be used when reporting these results to the RMP for the 2018 sediment cruise.

Table 8. Target Analyte List with Fraction, Unit, Analyte Name, and Method Code

2018 Sediment Cruise Analyte List

2.3. QA/QC Sample Collection and Analysis Plan

The number of QA/QC samples required by each analytical lab by analyte is shown in Table 8.

Table 8. QA/QC Samples by Analyte

Lab	Analyte Group	Lab Blanks	Lab Control Samples	Lab Duplicate	MS	MSD	CRM
ALS-Tucson	TN	1 per batch	2	2	0	0	0
ALS-Kelso	Grain Size	1 per batch	0	2	0	0	0
ALS-Kelso	Total Solids	1 per batch	0	2	0	0	0
ALS-Kelso	TOC	1 per batch	2	2	0	0	2
BAL	TE	1 per batch	1 per 20	1 per 10	1 per 10	0	1 per 20
CCSF-SFPUC	TE-CCSF	1 per batch	2	2	2	0	3

AXYS	Fipronil	1 per batch	1 per batch	1 per batch	1 per batch	1 per batch	0
AXYS	PAHs	1 per batch	1 per batch	1 per batch	0	0	1 per batch
AXYS	PBDEs	1 per batch	1 per batch	1 per batch	0	0	1 per batch
AXYS	PCBs (209)	1 per batch	1 per batch	1 per batch	0	0	1 per batch

2.4. Plan for Analyzing Sediment Archives

Sediment samples retrieved from the short term archive sample bank will be sent to AXYS, CCSF and BAL as part of a QA Check project. The archive samples that have been selected for the QA check are listed in Table 9.

Table 9. Plan for Analyzing Sediment Archives as a QA Check

Archive Sample Plan

Appendix A – RMP 2018 Oversample Site Coordinates

All coordinates are in WGS-84 datum.

Site Code	Site Name / Region	Target Lat	Target Long	Depth (ft)	Comments
CB059S	Central Bay	37.9572859	-122.4575945	6 to 12	
CB060S	Central Bay	37.7338305	-122.3643815	12+	
CB061S	Central Bay	37.8121831	-122.3728818	12+	
LSB057S	Lower South Bay	37.49479405	-122.1011544	12+	
LSB060S	Lower South Bay	37.4867143	-122.0910041	1 to 3	
LSB061S	Lower South Bay	37.48478729	-122.0987743	1 to 3	
SB059S	South Bay	37.60689765	-122.3301511	6 to 12	
SB062S	South Bay	37.54764289	-122.1556557	3 to 6	
SB063S	South Bay	37.65168222	-122.2507191	6 to 12	
SPB057S	San Pablo Bay	38.04839316	-122.4278153	6 to 12	
SPB058S	San Pablo Bay	37.99887846	-122.3716127	1 to 3	
SPB059S	San Pablo Bay	38.10253371	-122.441007	1 to 3	
SU054S	Suisun Bay	38.05237275	-121.9454616	12+	
SU059S	Suisun Bay	38.04617551	-122.1212366	12+	
SU061S	Suisun Bay	38.06122482	-122.0769256	6 to 12	

Appendix B - Archive Sample Bank Protocol