

**Cruise Plan**  
**1998 Regional Monitoring Program**  
**Sediment Sampling Cruise #18**  
**July 30-31, August 3-5, 1998**

**Objectives**

The objectives of this cruise are:

1. Collect sediment samples at 26 stations for the analysis of:
  - Trace metals and trace organics by Bay Area Dischargers Authority (BADA)
  - As, Hg, Se by Brooks-Rand (BRL)
  - Grain size, TOC and total nitrogen by University of California, Santa Cruz (UCSC)
  - Pore water pH and ammonia by Applied Marine Sciences (AMS)
  - Pore water sulfides by Marine Pollution Studies Lab (MPSL)
  - Foraminifera by US Geological Survey (USGS)
  - CTD profiles by AMS
2. Collect sediment samples at 14 stations for the analysis of:
  - Toxicity by MPSL
3. Collect sediment samples at nine stations for the analysis of:
  - Benthic infauna by City and County of Santa Cruz (CCSF)
4. Collect sediment splits at three stations for the intercalibration analysis of:
  - Trace elements by UCSC
  - Trace organics by GERG
  - As, Hg, Se by BADA
5. Collect sediment splits at one “blind” station for the intercalibration analysis of:
  - Trace elements by UCSC
  - Trace organics by GERG

A list of samples to be collected at each station may be found in Table 5.

**Personnel**

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

**Table 1. Personnel Assignments for Sediment Cruise 18, 1998.**

Name	Affiliation	Duties
David Bell	AMS	Cruise manager, sample collection, sediment chemistry, pore water, watershed sampling and CTD
Sherry Fung	AMS	Sample collection, sediment chemistry, and pore water
Michael Kellogg	CCSF	Benthic samples
Paul Salop	AMS	Sample collection, sediment chemistry, pore water, watershed sampling and CTD
Gordon Smith	UCSC	Vessel skipper
TBA	SFEI	Sample collection

Mr. Bell will oversee sampling operations, compliance with cruise plan and quality assurance guidelines, maintenance the sample field log and chain-of-custody procedures, and operation of the CTD. Mr. Kellogg will oversee benthic sampling and sample processing. Mr. Smith will be responsible for vessel operation and safety. Mr. Salop, and a staff member from the San Francisco Estuary Institute (SFEI) will assist in sample collections and sample processing.

### Cruise Schedule

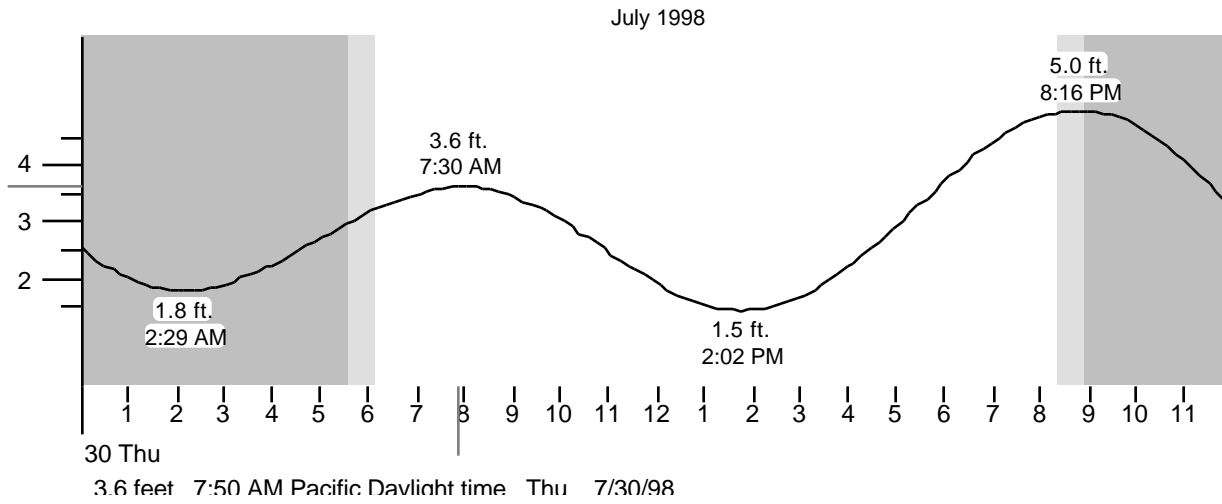
The following cruise schedule (Table 2) assumes that benthic sampling will require approximately 0.25 hours/grab on site, and that the vessel will be able to proceed at approximately 7 knots during processing of benthic samples. Actual arrival times will depend on conditions on the day of sampling. AMS will notify lab personnel when the vessel will arrive at dock for sample pick up.

**Table 2. Sediment Cruise 18 Activity Schedule.**

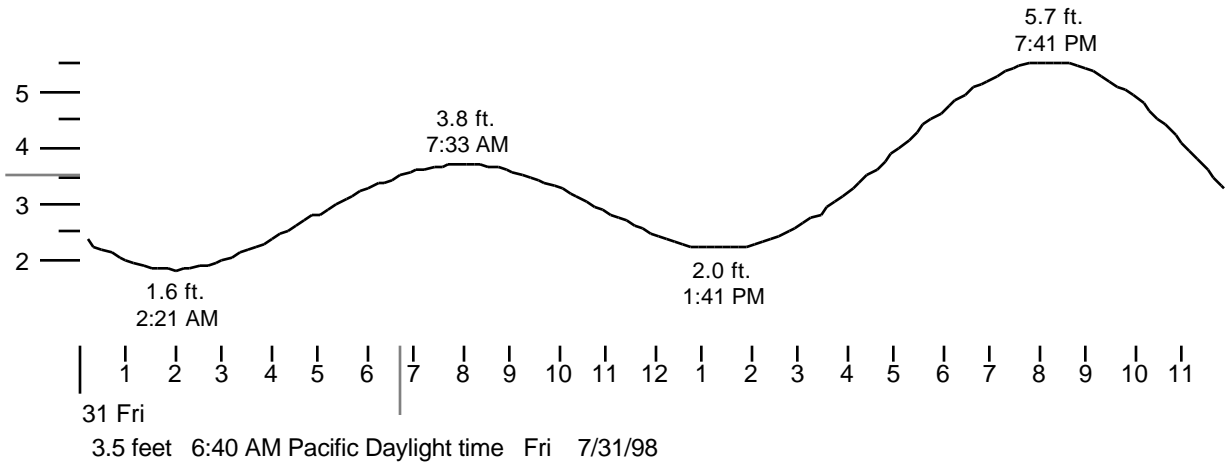
Date	Activity	Time
<b>Day 1</b>		
7/30/98	Mobilize gear on vessel R/V David Johnston, conduct safety briefing at the Martinez Marina. Depart for Grizzly Bay.	0630-0715
	Sample at Grizzly Bay, Honker Bay, Sacramento River, San Joaquin River, and Pacheco Creek. High tide at Point Buckler 3.6 ft at 0730, low tide 1.5 ft at 1402 (Figure 1). Drop off crew at Martinez Marina and shuttle cars to Vallejo. Vessel transits to Vallejo Marina.	0715–1630
	Demobilize gear at Vallejo Marina. Load benthic sampling gear onto vessel. All chemistry and toxicity samples will be stored on ice aboard the vessel.	1630–1730
<b>Day 2</b>		
7/31/98	Mobilize gear on vessel R/V David Johnston at the Vallejo Marina. Depart for Napa River.	0630-0700
	Sample at Napa River, Davis Point, Petaluma River, San Pablo Bay, Pinole Point, and Red Rock. High tide at Petaluma River 3.8 ft at 0733, low tide 2.0 ft at 1341 (Figure 2). Vessel transits to the Emeryville Marina.	0700–1730
	Demobilize gear at the Emeryville Marina. Toxicity, pore water, trace metal and organic intercalibration samples for UCSC and GERG will be stored on ice and left aboard the vessel. As, Hg, Se samples for BRL will be transferred to AMS for shipment on 8/3/98. Trace metal and organic samples for BADA will be picked up at the vessel by a BADA representative. Benthic samples will be removed from the vessel by CCSF. The crew will shuttle back to Vallejo to retrieve their cars.	1730–1900

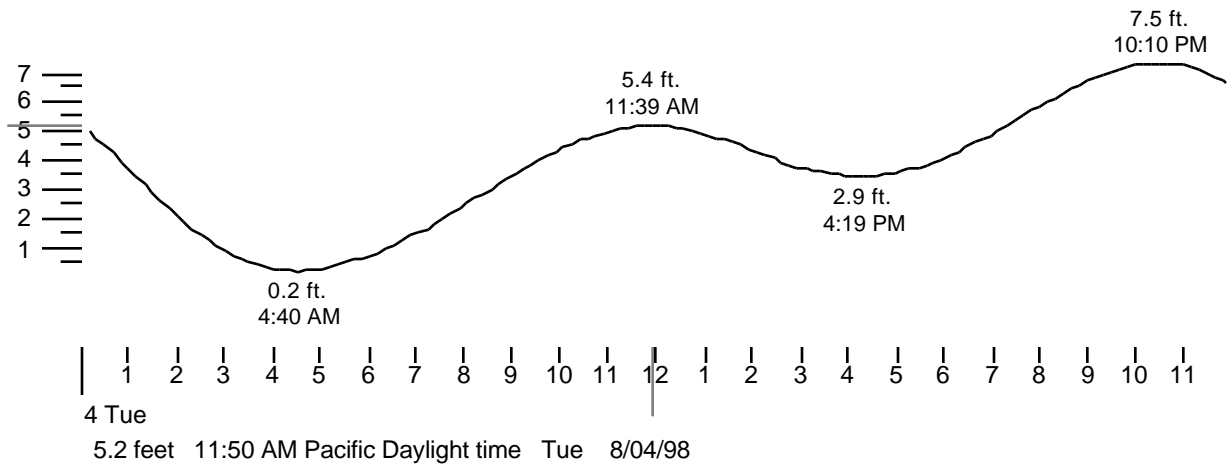
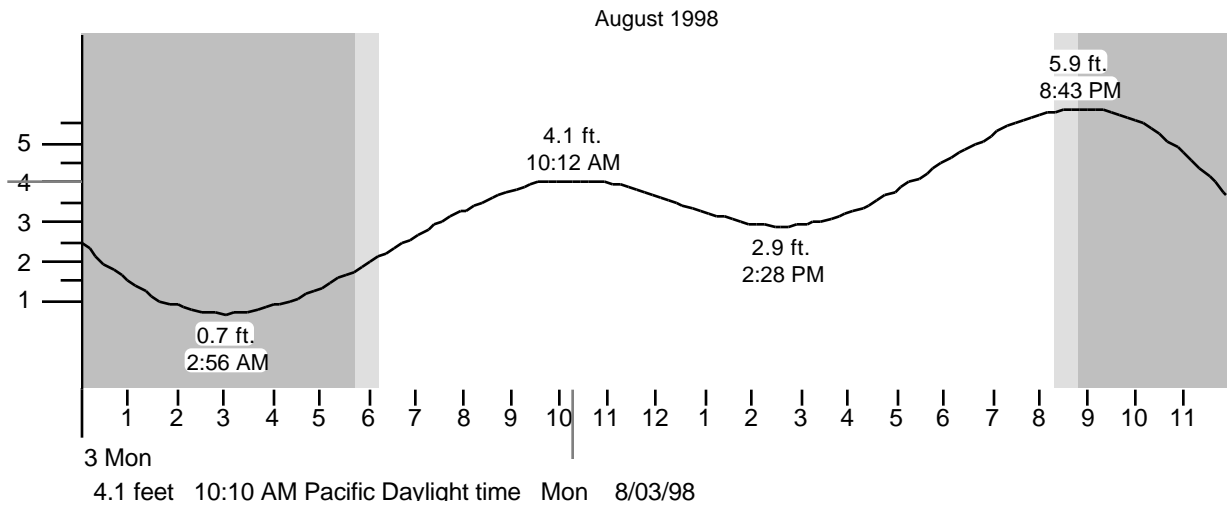
Date	Activity	Time
<b>Day 3</b>		
8/3/98	Mobilize gear on vessel R/V David Johnston at the Emeryville Marina. Depart for Point Isabel.	0800-0830
	Sample at Point Isabel, Richardson Bay, Horseshoe Bay, and Yerba Buena Island. High tide at the Golden Gate 4.1 ft at 1012, low tide 2.9 ft at 1426 (Figure 3). Vessel transits back to Emeryville.	0830-1600
	Demobilize gear at Emeryville Marina. All chemistry, benthic, and toxicity samples will be stored on ice aboard the vessel.	1600-1630
<b>Day 4</b>		
8/4/98	Mobilize gear on vessel R/V David Johnson at the Emeryville Marina. Depart for Alameda.	0700-0730
	Sample at Alameda, Oyster Point, San Bruno Shoal, Redwood Creek, and South Bay. High tide at Oyster Point 5.4 ft at 1139, low tide 2.9 ft at 1619 (Figure 4). Vessel transits to Redwood City USGS dock.	0730-1700
	Demobilize gear at Redwood City. Unload benthic sampling gear. Benthic samples will be removed from the vessel by CCSF. All chemistry and toxicity samples will be stored on ice aboard the vessel.	1700-1800
<b>Day 5</b>		
8/5/98	Mobilize gear on vessel R/V David Johnston at the Redwood City USGS dock. Depart for Dumbarton Bridge.	0700-0800
	Sample at Dumbarton Bridge, San Jose, Sunnyvale and Coyote Creek. High tide at Guadalupe Slough 7.6 ft at 1251, low tide 3.2 ft at 1817 (Figure 5). Vessel transits to Emeryville.	0800-1700
	Demobilize gear at Emeryville Marina. All toxicity and pore water samples will be picked up at the vessel by a representative from MPSL. Trace metal and organic samples for BADA will be picked up at the vessel by a BADA representative. Trace metal and organic intercalibration samples for UCSC and GERG will be transferred to AMS for shipment on 8/7/98. As, Hg, Se samples for BRL will be transferred to AMS for shipment on 8/7/98. Foraminifera samples for USGS will be transferred to AMS for pick up by a USGS representative on 8/7/98.	1700-1800
<b>Day 6</b>		
8/6/98	Bell and Salop sample Standish Dam and Guadalupe River. Low tide at Alviso Slough -0.6 ft at 0706, high tide 7.7 ft at 1326 (Figure 6). Salop delivers samples to EBMUD facility in Oakland.	0700-1200

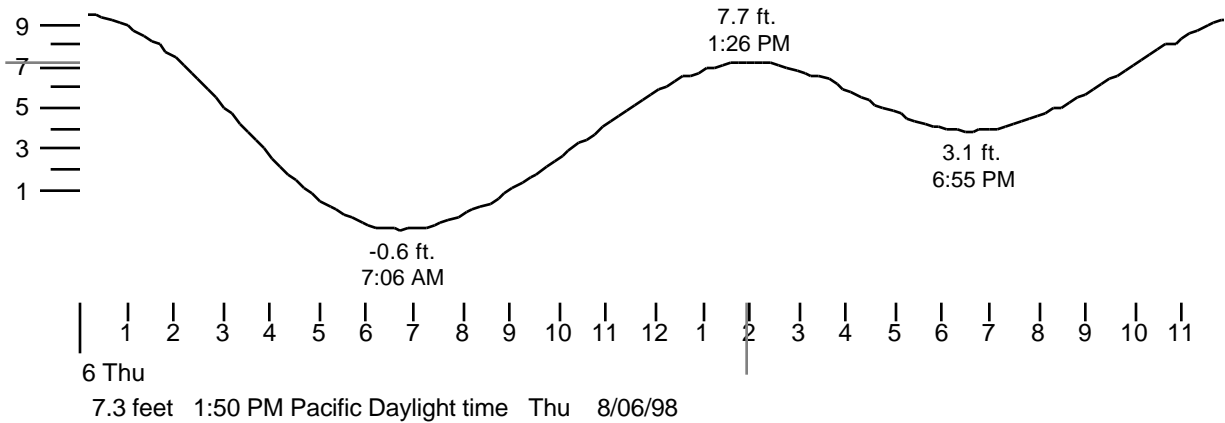
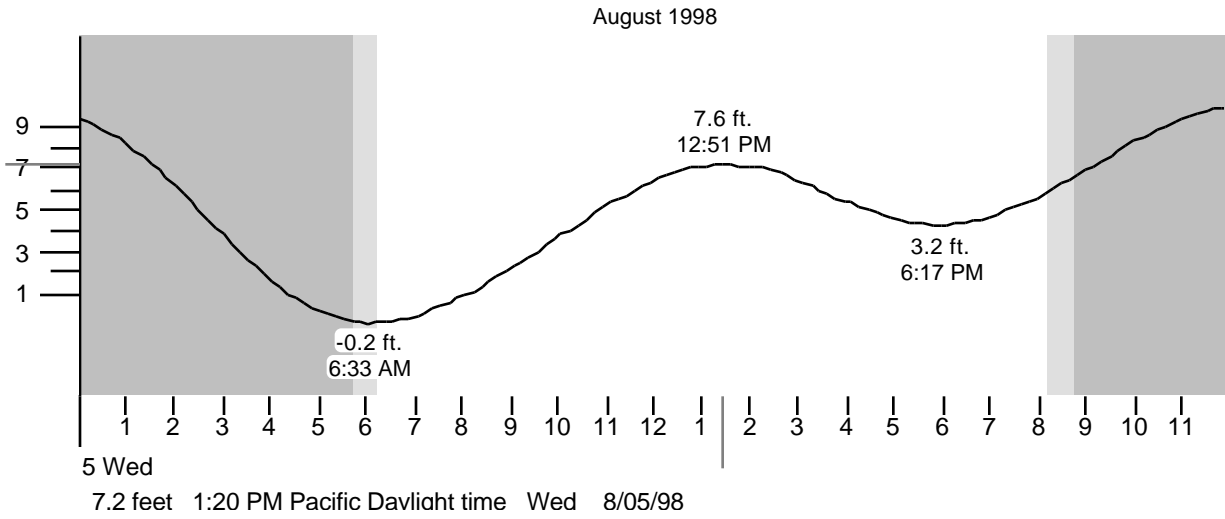
Point Buckler, Suisun Bay, CALIFORNIA Latitude: 38° 06' N Longitude: 122° 01' W



Petaluma River entrance, San Pablo Bay, CALIFORNIA Latitude: 38° 07' N Longitude: 122° 30' W







## Lodging

Each sampling team will be responsible for arranging their lodging. Suggested facilities are listed in Table 3.

**Table 3. Suggested Lodging for Sediment Cruise 18.**

Date	Location	Hotel
July 29	Martinez	John Muir Inn 445 Muir Station Road Martinez, CA (510) 229-1010
July 30	Vallejo	Ramada Inn 1000 Admiral Callaghan Ln. Vallejo, CA (707) 643-2700
August 3	Emeryville	Holiday Inn - Bay Bridge 1800 Powell Street Emeryville, CA (510) 658-9300
August 4	Redwood City	Comfort Inn 1818 El Camino Real Redwood City (415)599-9636

## Sampling Procedures

Prior to sampling, all equipment will be thoroughly cleaned. The cleaning process will begin with a thorough washing with Alconox® detergent. The scoops and stirrers will be soaked in detergent for two days before washing. Following the detergent wash, the grab and compositing bucket will be rinsed with tap water, followed by three rinses with de-ionized water, a rinse with 10% HCl, and a rinse with petroleum ether. The utensils will be rinsed three times with de-ionized water, soaked three days with 10% HCl, and rinsed with petroleum ether. Cleaned utensils will be sealed in Ziploc® bags until used in the field.

Sampling procedures will ensure that samples are collected from a localized area at each sites to reduce uncontrolled temporal and spatial variation. In the field, the vessel will be anchored at the coordinates listed in Table 4. The coordinates will be checked throughout sampling to ensure that the anchor has not dragged. Coordinates will be recorded for two grabs from each site.

The first sampling operation at each site will be the collection of the benthic sample with the Ponar grab. After the required benthic samples have been collected, the Ponar grab will be replaced with the Van Veen grab for collection of chemistry samples. After being sieved, benthic samples will be preserved in buffered 10% formalin/seawater.

When the Van Veen grab is brought on deck, sediment will be carefully removed for compositing. After any overlying water has been siphoned off, a small amount of sediment will be removed using a dropper and placed into a jar with algal culture medium. Then, a single scoop will be taken from each grab for foraminifera sampling and cores will be removed for measurement of pH, ammonia, and total sulfides in pore water. Finally, the remaining top 5-cm of sediment will be scooped from each of two replicate grabs and mixed in the bucket to provide a single composite sample for each site for analysis of chemistry, TOC, grainsize, and toxicity. Portions of the composited sample will be placed into containers provided by each laboratory. Duplicate chemistry samples will be collected from this composite for archival. Cores collected for analysis of pore

water will be centrifuged onboard the vessel. The supernatant will be preserved for analysis of sulfides (analyzed by MPSL) and ammonia (analyzed by AMS).

The quality of grab samples will be ensured by requiring each sample to satisfy a set of criteria concerning the depth of penetration and disturbance of the sediment within the grab. In this way, each sample will normally contain the top 10-cm of sediment within the area of the grab jaws. Samples will be rejected for the following conditions:

- There is a rock or shell fragment wedged between the jaws of the grab allowing the sample to wash out.
- The sample surface is significantly disturbed.
- The sample is uneven from side to side, indicating that the grab was tilted when it penetrated the sediment.
- The surface of the sample is in contact with the top doors of the grab, indicating over-penetration of the grab and possible loss of material around the doors.

Samples will be collected from each site and placed into the containers indicated in Table 5.

**Table 4. Coordinates of Regional Monitoring Program Sediment Sampling Sites.**

Site Name/Code	Latitude	Longitude	Depth (m)	Sediment Description from 2/94
Standish Dam/BW10	37° 27.20'	121° 55.45'	shore	silty sand
Guadalupe River/BW15	-	-	shore	silty sand
San Jose/ C-3-0	37° 27.72'	121° 58.53'	3	approximately 5 cm of coarse sand with shell debris over mud
Sunnyvale/C-1-3	37° 26.13'	122° 00.67'	2.5	soft to semi-soft light brown sediment with some plant debris
South Bay/BA20	37° 29.64'	122° 05.25'	5.5	top 8–10 cm of sediment very soft light brown with Potamocorbula
Coyote Creek/BA10	37° 28.20'	122° 03.80'	5	Shell debris and sandy silt over gray clay
Dumbarton Bridge/BA30	37° 30.87'	122° 08.08'	7	soft brown sediment with shell debris and numerous polychaete tubes near surface over dark gray clayey sediment
Redwood Creek/BA41	37° 33.67'	122° 12.62'	2.5	shell debris near the surface with numerous polychaete tubes over dark gray clayey sediment
San Bruno Shoal/BB15	37° 37.00'	122° 17.00'	12	sandy mud with shell debris over gray clay

Site Name/Code	Latitude	Longitude	Depth (m)	Sediment Description from 2/94
Oyster Point/BB30	37° 40.21'	122° 19.77'	9	soft brown sediment with shell debris and numerous polychaete tubes near the surface over very firm dark gray clay
Alameda/BB70	37° 44.84'	122° 19.40'	10	soft brown sediment with numerous polychaete tubes near the surface over gray clay
Yerba Buena Island/BC11	37° 49.44'	122° 20.93'	6	mixed soft sediment with shell debris over clay
Horseshoe Bay/BC21	37° 49.98'	122° 28.43'	12	very soft light brown sediment with sulfide pockets, over gray clay
Richardson Bay/BC32	37° 51.82'	122° 28.72'	1	soft light brown surficial sediment over firm dark clay
Point Isabel/BC41	37° 53.34'	122° 20.55'	1.5	soft dark brown surficial sediment with dense polychaete tubes over firm, dark clay
Red Rock/BC60	37° 55.00'	122° 25.97'	11	heavy shell debris and coarse sand
Petaluma River/BD15	38° 06.66'	122° 29.00'	4	soft light brown surficial sediment over dark gray mud/clay
San Pablo Bay/BD22	38° 02.86'	122° 25.24'	3	soft light brown surficial sediment over dark gray mud/clay
Pinole Point/BD30	38° 01.49'	122° 21.71'	6.5	soft light brown surficial sediment over dark gray clay
Davis Point/BD41	38° 03.11'	122° 16.65'	6.5	sandy silt with shell debris
Napa River/BD50	38° 05.79'	122° 15.61'	4	soft light brown silty mud with high density of Potamocorbula
Pacheco Creek/BF10	38° 02.85'	122° 05.66'	4	sandy sediments with layers of soft fine material, with occasional oil droplets
Grizzly Bay/BF21	38° 06.97'	122° 02.35'	3	very soft light brown sediment
Honker Bay/BF40	38° 04.00'	121° 56.00'	3	very soft light brown sediment
Sacramento River/BG20	38° 03.36'	121° 48.63'	8	soft light brown silty sand with high densities of Potamocorbula, over sandier sediments
San Joaquin River/BG30	38° 01.36'	121° 48.44'	5	sandy sediments with plant debris and Corbicula

**Table 5. Samples to Be Collected During Regional Monitoring Program Sediment Sampling Cruise 18.**

Site Name	Site Code	Day	Trace Metals (1)	Organics (2)	Archive (3)	As, Hg, Se (4)	Cognates (5)	Intercal TM (5)	Intercal OR (6)	Blind TM (7)	Blind OR (8)	Benth
			BADA	BADA	BADA	BRL	UCSC	UCSC	GERG	UCSC	GERG	CCS
Pacheco Creek	BF10	1	*	*	*	*	*					
Grizzly Bay	BF21	1	*	*	*	*	*					
Honker Bay	BF40	1	*	*	*	*	*					
Sacramento River	BG20	1	*	*	*	*	*	*	*	**	**	
San Joaquin River	BG30	1	*	*	*	*	*					
Pinole Point	BD30	2	*	*	*	*	*					
Red Rock	BC60	2	*	*	*	*	*					*
Petaluma River	BD15	2	*	*	*	*	*	*	*	**	**	*
San Pablo Bay	BD22	2	*	*	*	*	*					
Davis Point	BD41	2	*	*	*	*	*					*
Napa River	BD50	2	*	*	*	*	*					*
Yerba Buena Island	BC11	3	*	*	*	*	*					*
Horseshoe Bay	BC21	3	*	*	*	*	*					*
Richardson Bay	BC32	3	*	*	*	*	*					*
Point Isabel	BC41	3	*	*	*	*	*					*
Redwood Creek	BA41	4	*	*	*	*	*					*
San Bruno Shoal	BB15	4	*	*	*	*	*					*
Oyster Point	BB30	4	*	*	*	*	*	*	*	**	**	*
Alameda	BB70	4	*	*	*	*	*					*
South Bay	BA21	4	*	*	*	*	*					*
Dumbarton Bridge	BA30	5	*	*	*	*	*					*
Coyote Creek	BA10	5	*	*	*	*	*					*
Sunnyvale	C-1-3	5	*	*	*	*	*					*
San Jose	C-3-0	5	*	*	*	*	*					*
Standish Dam	BW10	6	*	*	*	*	*					*
Guadalupe River	BW15	6	*	*	*	*	*					*

Recommended container type. Actual container to be determined by the contracted laboratory.

- 1 - 150 ml polypro wide-mouth container, fill 1" to top
- 2 - 250 ml glass, trace clean, wide-mouth container, fill 1" to top
- 3 - 250 ml glass, trace clean, wide-mouth container, fill 1" to top
- 4 - 25 ml teflon, trace clean container fill to top
- 5 - 100 ml polypro wide mouth, pre-cleaned container, fill to top
- 6 - 250 ml glass, trace clean, wide-mouth container, fill 1" to top
- 7 - 250 ml polypro wide-mouth container, fill 1" to top
- 8 - 250 ml glass, trace clean, wide-mouth container, fill 1" to top
- 9 - Poly-bag fill with a minimum two scoops of sediment

\* - Only one station will be selected from the three