

**Cruise Plan**  
**2001 Regional Monitoring Program**  
**Summer Sediment Sampling Cruise**  
**August 8-10, 13-16, 20, 2001**

**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 and Se by Brooks-Rand (BRL)
  - Grain size, TOC and total nitrogen by University of California, Santa Cruz (UCSCDET)
  - Mercury and monomethyl mercury by UCSCDET
  - CTD profiles by AMS
  - Pore water pH and ammonia by AMS
  - Pore water sulfides by Marine Pollution Studies Lab (MPSL)
2. Collect sediment samples at two stations for the analysis of:
  - benthic infauna by CCSF
3. Collect sediment samples at 13 stations for the analysis of:
  - Toxicity and Sediment Water Interface Cores (SWICs) MPSL
4. Collect sediment samples at six stations for HF extractions by BADA.

Personnel assignments for the cruise are given in Table 1. The cruise schedule is listed in Table 2. Suggested lodging is listed in Table 3. Coordinates for sampling stations are listed in Table 4. Samples to be collected are listed in Appendix A.

**Personnel**

Mr. Bell will oversee sampling operations, compliance with cruise plan and quality assurance guidelines, maintenance of the sample field log and “on-board” electronic database, chain-of-custody procedures, sediment pore water preparation and analysis, and operation of the CTD. Ms. Lowe will conduct benthic sampling, process the benthic samples and assist in sediment sample collection. Mr. Salop will assist in sample collection and sample processing, maintenance of sample records, and operation of the CTD. Mr. Smith will be responsible for vessel operation and safety.

**Table 1. Personnel Assignments for the 2001 Summer Sediment Sampling Cruise.**

Name	Affiliation	
David Bell	AMS	Cruise manager, sample collection, sediment and pore water chemistry, CTD
Sarah Lowe	SFEI	Benthic sampling, sample collection
Paul Salop	AMS	Sample collection, sediment and pore water chemistry
Gordon Smith	UCSC	Vessel skipper

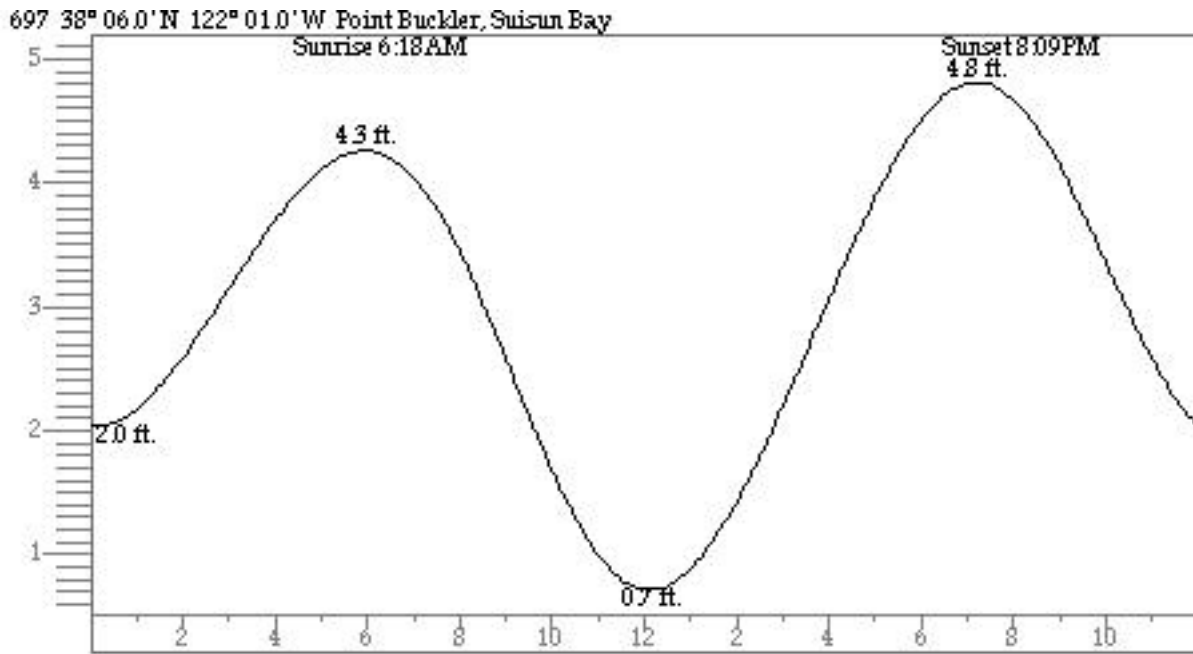
## Cruise Schedule

The following cruise schedule depends on weather conditions on the day of sampling. AMS will notify BADA and MPSL lab personnel when the vessel will arrive at dock for sample pick-up.

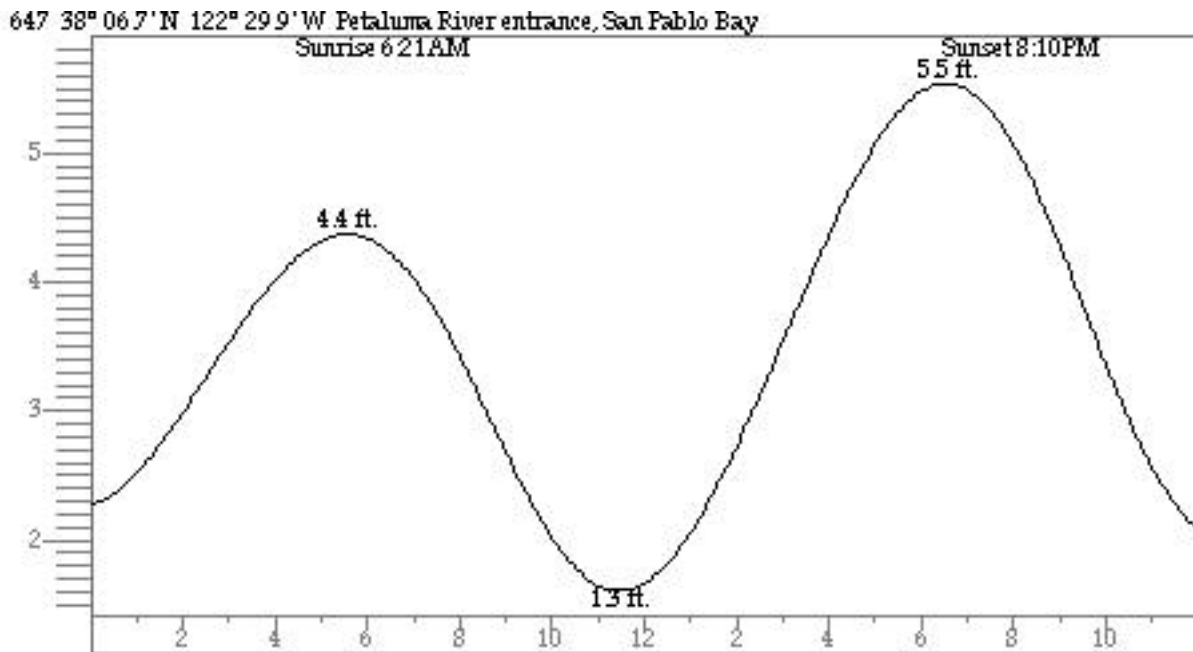
**Table 2. Activity Schedule for 2001 RMP Summer Sediment Sampling Cruise.**

Date	Activity	Time
Day 1 8/8/01	Messrs. Bell and Salop will meet the crew of the RMP Water Cruise at the Benicia Marina and load sediment sampling gear onto the vessel.	TBA
Day 2 8/9/01	Mobilize gear on vessel <i>R/V David Johnston</i> , conduct safety briefing at the Benicia Marina. Depart for Grizzly Bay.	0730-0800
	Sample Grizzly Bay, Honker Bay, Sacramento River, San Joaquin River, and Pacheco Creek. Low tide at Point Buckler 0.7 ft at 1228 (Figure 1).	0900-1600
	Demobilize gear at Benicia Marina. Load benthic sampling gear onto vessel. All chemistry and toxicity samples will be stored on ice aboard the vessel.	1600-1700
Day 3 8/10/01	Mobilize gear on vessel <i>R/V David Johnston</i> at the Benicia Marina. Depart for Napa River.	0730-0800
	Sample Napa River, Davis Point, Petaluma River, San Pablo Bay, and Pinole Point. Low tide at Petaluma River 1.3 ft at 1151 (Figure 2). Vessel transits to the Emeryville Marina.	0830-1600
	Demobilize gear at the Emeryville Marina. Offload benthic samples and sampling gear. Trace metal and organic samples for BADA will be picked up at the vessel by a BADA representative. All other samples will remain on the vessel. AMS will contact BADA two hours prior to arrival in Emeryville. The crew will shuttle back to Benicia to retrieve their cars.	1600-1800
Day 4 8/13/01	Mobilize gear on vessel <i>R/V David Johnston</i> at the Emeryville Marina. Depart for Point Isabel.	0900-0930
	Sample Point Isabel, Red Rock, Richardson Bay and Horshoe Bay and Yerba Buena Island. Low tide at Pt. Isabel at 1300 (Figure 3). Vessel transits back to Emeryville.	0930-1600
	Demobilize gear at Emeryville Marina. All chemistry and toxicity samples will be stored on ice aboard the vessel.	1600-1700

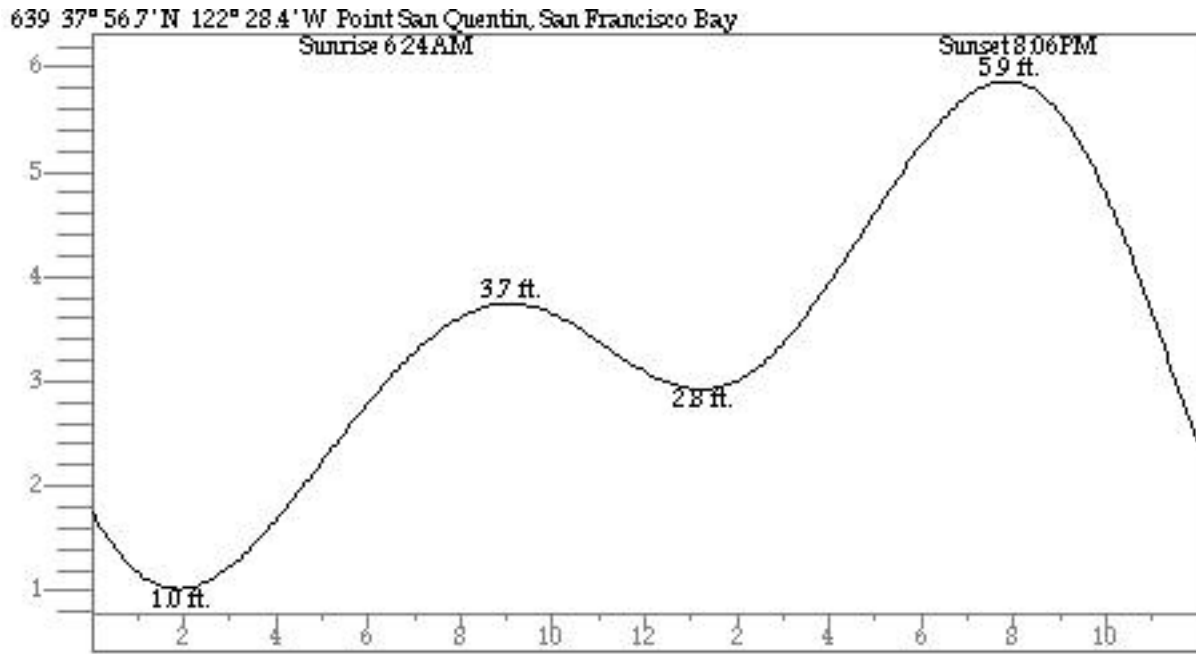
Date	Activity	Time
Day 5 8/14/01	Mobilize gear on vessel <i>R/V David Johnston</i> at the Emeryville Marina. Depart for Alameda.	0900-0930
	Sample Alameda, Oyster Point, San Bruno Shoal and Redwood Creek. High tide at Alameda at 1000 (Figure 4). Vessel transits to Redwood City.	0900-1500
	Demobilize gear at Redwood City USGS dock. All chemistry and toxicity samples will be stored on ice aboard the vessel.	1600-1700
Day 6 8/15/01	Mobilize gear on vessel <i>R/V David Johnson</i> at the Redwood City USGS dock. Depart for South Bay.	0900-0930
	Sample South Bay, Dumbarton Bridge and Coyote Creek. High tide at Dumbarton Bridge at 1130 (Figure 5). Vessel transits back to Redwood City.	1030-1530
	Demobilize gear at Redwood City. All chemistry and toxicity samples will be stored on ice aboard the vessel.	1530-1630
Day 7 8/16/01	Mobilize gear on vessel <i>R/V David Johnston</i> at the Redwood City USGS dock. Depart for San Jose.	0900-0930
	Sample San Jose and Sunnyvale. High tide at Guadalupe Slough at 1300 (Figure 6). Vessel transits to Emeryville.	1100-1500
	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. Samples for BRL and UCSC will be transferred to AMS for shipment the week of August 20 <sup>th</sup> .	1500-1700
Day 8 8/20/01	Messrs. Bell and Salop sample Standish Dam and Guadalupe Slough. Low tide at Guadalupe Slough at 0900 (Figure 7). Mr. Salop delivers samples to EBMUD facility in Oakland.	0800-1200



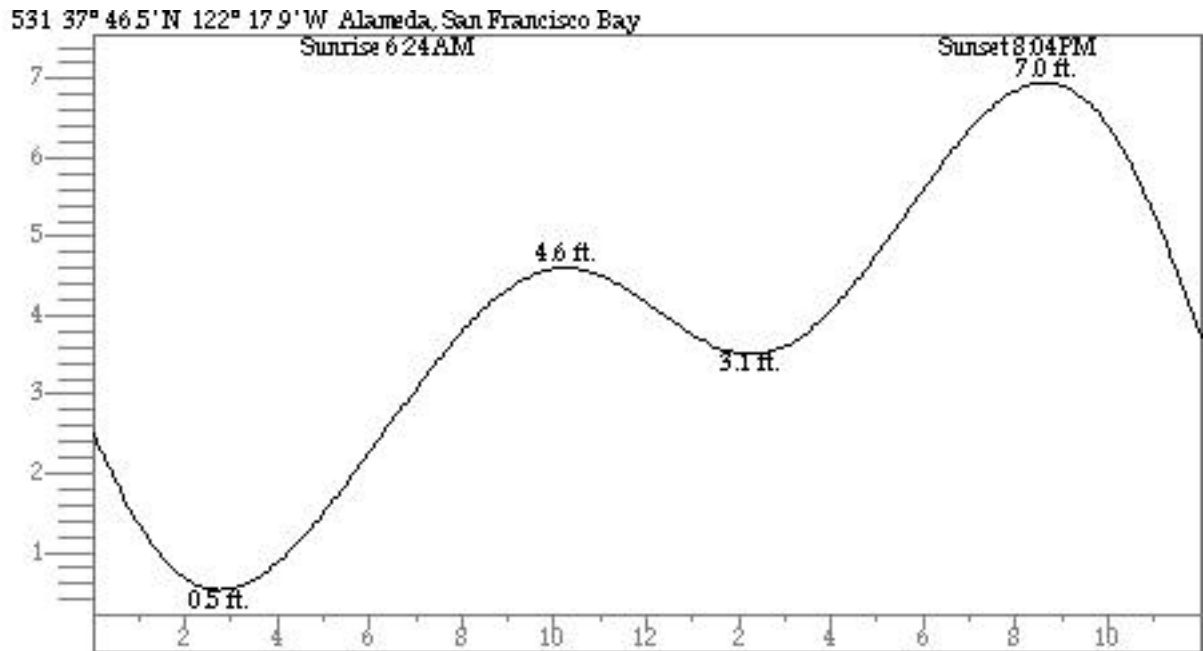
**Figure 1. Tides at Point Buckler on August 9, 2001.**



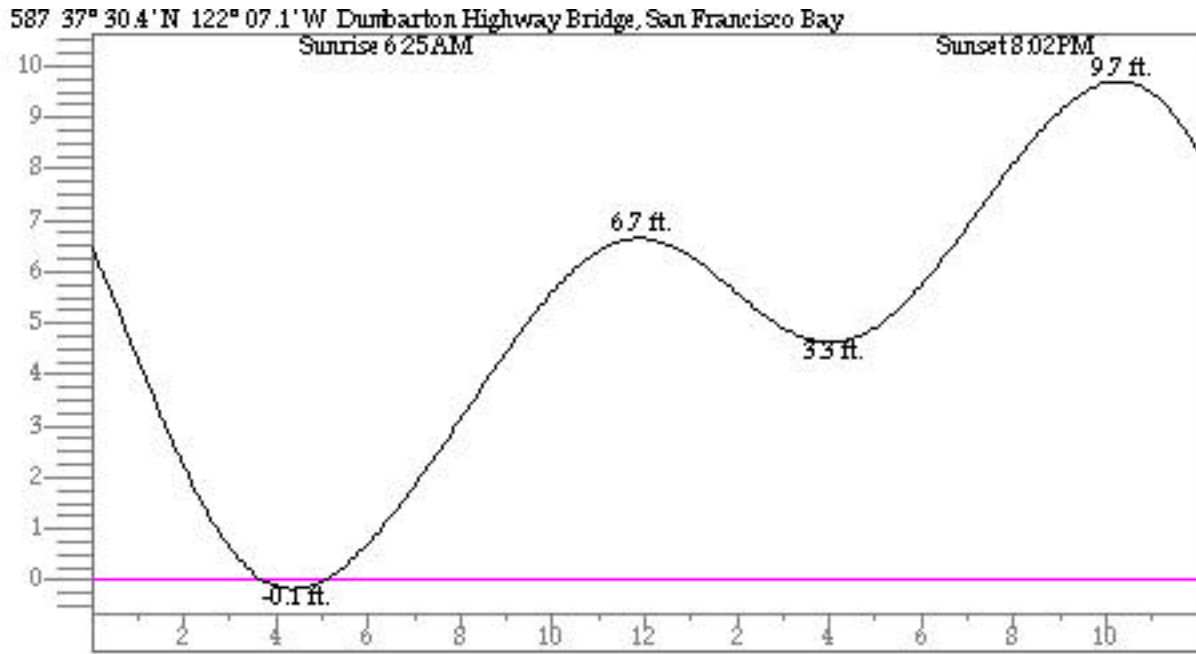
**Figure 2. Tides at Petaluma River on August 10, 2001.**



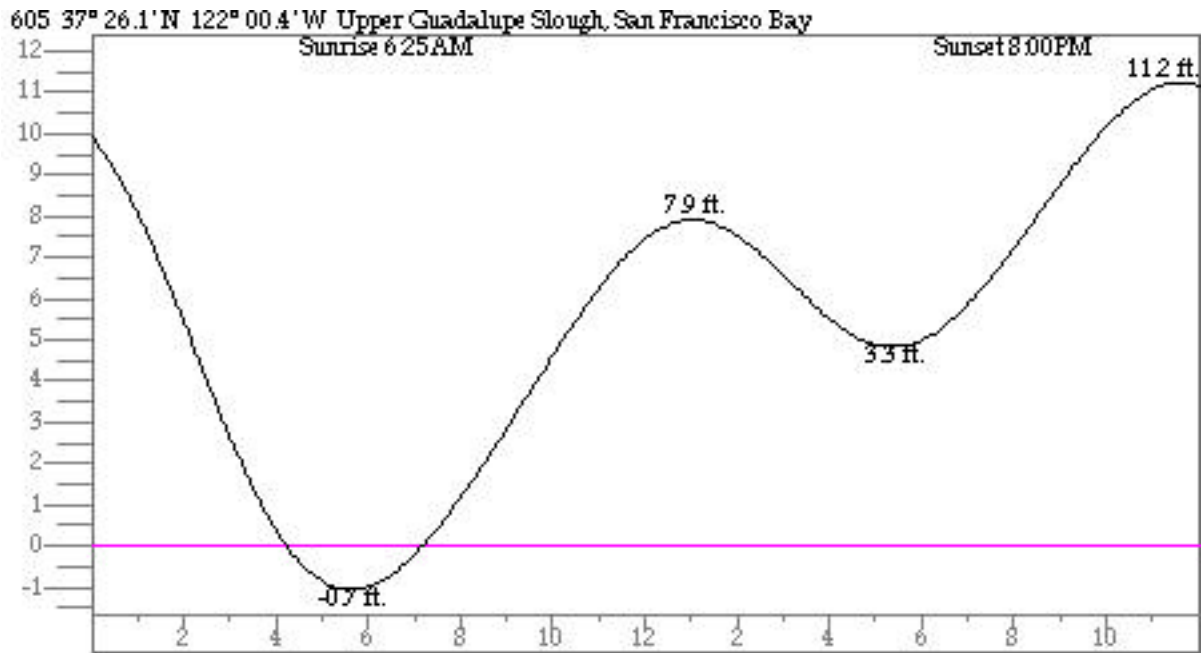
**Figure 3. Tides near Red Rock on August 13, 2001.**



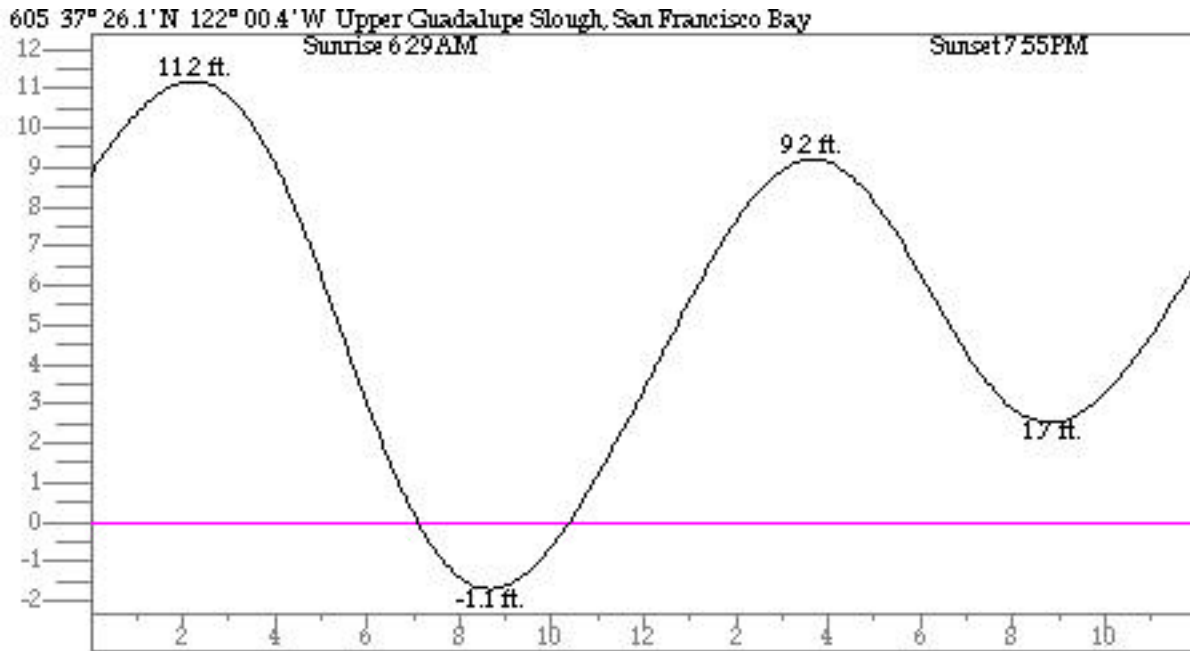
**Figure 4. Tides near Alameda on August 14, 2001.**



**Figure 5. Tides at Dumbarton Bridge on August 15, 2001.**



**Figure 6. Tides at Guadalupe Slough on August 16, 2001.**



**Figure 7. Tides at Guadalupe Slough on August 20, 2001.**

### Lodging

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

**Table 3. Suggested Lodging for RMP 2001 Summer Sediment Cruise.**

Date	Location	Hotel
8/8-8/9	Benicia	Best Western Heritage Inn 1955 East 2 <sup>nd</sup> St. Benicia, CA 94510 707-746-0401
8/14-8/15	Redwood City	Pacific Inn 2610 El Camino Real, Redwood City, CA (650) 368-1495

### Sampling Procedures

Sediment sampling equipment is prepared in the laboratory by AMS four days prior to sampling. Equipment that is pre-cleaned include:

- Van Veen Grab (excluding frame and stand)
- Sample scoops
- Compositing bucket
- Wash bottles
- Glass pore water coring tubes

Prior to sampling, all equipment will be thoroughly cleaned. Equipment is soaked (fully immersed) for three days in a 0.5 % solution of Alconox™ detergent and deionized water. Equipment is rinsed three times with deionized water and let dry in a clean place. Equipment is rinsed with 1.0 % solution of hydrochloric acid, followed by a rinse with petroleum ether, followed by another set of three rinses with deionized water. All equipment is then allowed dry in a clean place.

The cleaned grab is wrapped in aluminum foil until used in the field. All other equipment is stored in clean

Ziploc™ bags until used in the field. The CTD is checked for proper operation at least 48 hours before use. The pore water ammonia test kit is checked for proper operation and calibration standards are made prior to the cruise.

Sampling procedures will ensure that samples are collected from a localized area at each site 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.

At the benthic stations, benthic samples are collected first using the Ponar grab provided by CCSF. After benthic sampling, the Ponar grab is replaced with the Van Veen grab for collection of sediment chemistry samples.

When the Van Veen grab is brought on deck, sediment will be carefully removed for compositing. After any overlying water has been siphoned off, six core samples will be taken for measurement of pH, ammonia, and total sulfides in pore water. 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, grain size, 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 on-board the vessel 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 Appendix A.

**Table 4. Coordinates of RMP 2001 Winter 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
Site Name/Code	Latitude	Longitude	Depth (m)	Sediment Description from 2/94
Sunnyvale/C-1-3	37° 26.13'	122° 00.67'	2.5	Sediment Description from 2/94 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

Site Name/Code	Latitude	Longitude	Depth (m)	Sediment Description from 2/94
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
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
Site Name/Code	Latitude	Longitude	Depth (m)	Sediment Description from 2/94
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