

**Cruise Plan  
2000 Regional Monitoring Program  
Winter Sediment Sampling Cruise  
February 11-12, 2000**

## Objectives

The objectives of this cruise are:

1. Collect sediment samples at four 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 Chesapeake Bay Laboratory (UMCES)
  - Pore water pH and ammonia by Applied Marine Sciences (AMS)
  - CTD profiles by AMS
  - Pore water sulfides by Marine Pollution Studies Laboratory (MPSL)
2. Collect sediment sample at one station for the analysis of:
  - Toxicity TIE<sup>1</sup> by MPSL

A list of the sample locations may be found in Table 4. Samples to be collected are listed in Table 5.

## Personnel

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

**Table 1. Personnel Assignments for the 1999 Summer Sediment Sampling Cruise.**

Name	Affiliation	Duties
David Bell	AMS	Cruise manager, sample collection, sediment and pore water chemistry, CTD
Sarah Lowe	SFEI	Benthic sampling on 2/10/00
Paul Salop	AMS	Sample collection, sediment and pore water chemistry, CTD
Gordon Smith	UCSC	Vessel skipper

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, and operation of the CTD. Ms. Lowe will conduct benthic sampling and process the benthic samples. Mr. Salop will assist in sample collections and sample processing, maintenance of sample records, and operation of the CTD. Mr. Smith will be responsible for vessel operation and safety.

<sup>1</sup> A minimum of 7 liters of sediment homogenate will be collected from the Grizzly Bay station.

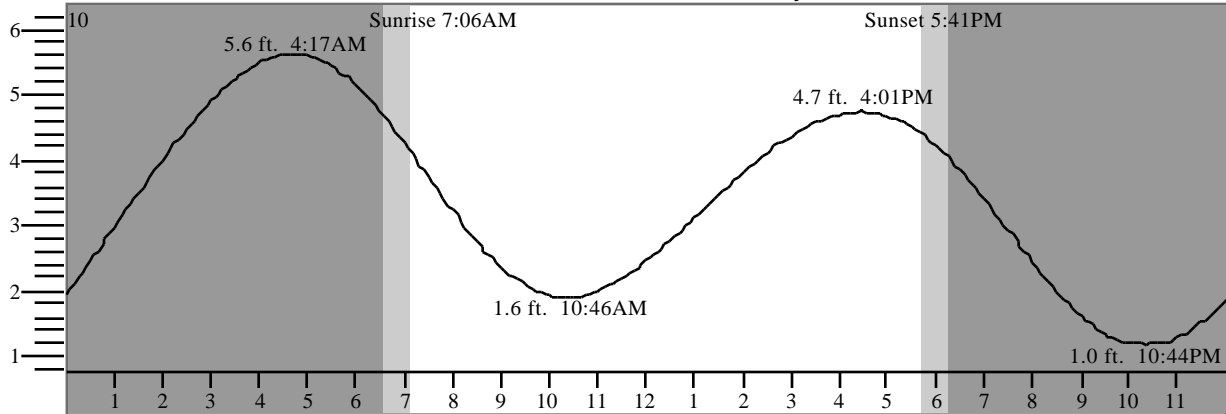
## Cruise Schedule

The following cruise schedule (Table 2) 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 2000 RMP Winter Sediment Sampling Cruise.**

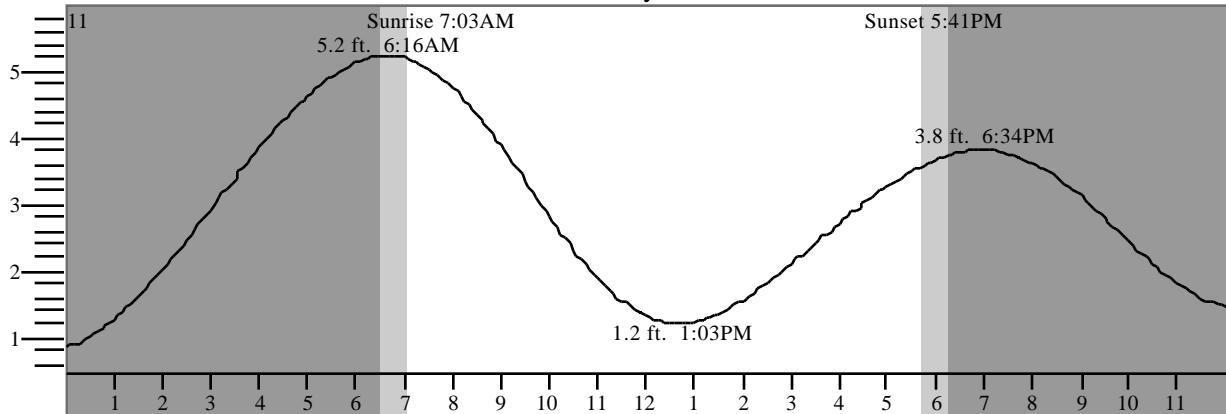
Date	Activity	Time
Day 0 2/9/00	Messrs. Bell and Salop will meet the crew of the RMP Winter Water Sampling Cruise at the Benecia Marina and load benthic sampling gear onto the vessel.	TBA
Day 1 2/10/00	Mobilize equipment on <i>R/V David Johnston</i> , Benecia Marina. Depart for Napa River.	0800-0830
	Sample Napa River, depart for Davis Point.	0900-1015
	Sample Davis Point, depart for San Pablo Bay.	1100-1215
	Sample San Pablo Bay, depart for Petaluma River.	1300-1400
	Sample Petaluma River. High tide at Petaluma River entrance is 4.7 feet at 1600 hours (Figure 1). Return to Benecia Marina.	1500-1615
	Demobilize equipment at Benecia Marina. All chemistry samples stay on board the vessel. All benthic sampling equipment and benthic samples will be removed by SFEI.	1800-1830
Day 2 2/11/00	Mobilize equipment on <i>R/V David Johnston</i> , Benecia Marina. Depart for Grizzly Bay.	0700-0730
	Sample Grizzly Bay. High tide at Point Buckler (Grizzly Bay) is 3.7 feet at 0615 hours (Figure 2). Return to Benecia Marina. AMS will notify MPSL the approximate time of arrival at the Benecia Marina.	0900-1030
	Demobilize equipment at Benecia Marina. Chemistry samples for BRL, UCSCDET and UMCES will be shipped to their respective laboratories by AMS on 2/12/00. Chemistry samples for BADA will be delivered to the BADA laboratory by AMS on 2/11/00. Toxicity and sulfides samples will be picked up at the Benecia Marina by MPSL on 2/11/00.	1200-1300

647 38° 06.7' N 122° 29.9' W Petaluma River entrance, San Pablo Bay



**Figure 1. Tides at the Petaluma River Entrance on February 10, 2000.**

697 38° 06.0' N 122° 01.0' W Point Buckler, Suisun Bay



February 11, 2000 1.2 ft. 12:45PM

**Figure 2. Tides at Point Buckler on February 11, 2000.**

## Lodging

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

**Table 3. Suggested Lodging for RMP 2000 Winter Sediment Cruise.**

Date	Location	Hotel
2/9-2/10/00	Benicia	Best Western Heritage Inn 1955 East 2 <sup>nd</sup> St. Benicia, CA 94510 707-746-0401

## 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 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.

At the Petaluma River and Davis Point 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, grainsize, and toxicity<sup>2</sup>. 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

<sup>2</sup> Only Toxicity TIE will be analyzed at the Grizzly Bay site. At the remaining sites, toxicity will not be analyzed.

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 Table 5.

**Table 4. Coordinates of RMP 2000 Winter Sediment Sampling Sites.**

Site Name/Code	Latitude	Longitude	Depth (m)	Sediment Description from 2/94
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
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 <i>Potamocorbula</i>
Grizzly Bay/BF21	38° 06.97'	122° 02.35'	3	very soft light brown sediment

**Table 5. Sample Collection List for RMP 2000 Winter Sediment Sampling Cruise.**

Site Name (Code)	Petaluma River (BD15)	San Pablo Bay (BD22)	Davis Point (BD41)	Napa River (BD50)	Grizzly Bay (BF21)
Sample Type (Lab)					
As, Se <sup>3</sup> (BRL)	1	1	1	1	0
Trace Elements <sup>4</sup> (BADA)	1	1	1	1	0
Trace Organics + Archive <sup>5</sup> (BADA)	2	2	2	2	0
Cognates <sup>6</sup> (UCSCDET)	1	1	1	1	0
Hg, mmHg <sup>7</sup> (UMCES)	1	1	1	1	0
Benthic <sup>8</sup> (CCSF/SFEI)	1	0	1	0	0
Pore Water <sup>9</sup> (AMS)	1	1	1	1	1
CTD Profile (AMS)	Yes	Yes	Yes	Yes	No
Toxicity <sup>10</sup> (MPSL)	No	No	No	No	7
Total Number of containers	8	7	8	7	8

<sup>3</sup> Sample containers is 25 ml amber glass, filled 1 inch to the top and frozen on dry ice. Containers will be provided by BRL.

<sup>4</sup> Sample container is 100 ml polyethylene, certified trace clean, filled 1 inch to the top and frozen on dry ice. Containers will be provided by BADA.

<sup>5</sup> Sample containers are 200 ml glass, certified trace clean, filled 1 inch to the top and frozen on dry ice. Containers will be provided by BADA.

<sup>6</sup> Sample container is 100 ml polyethylene, filled 1 inch to the top and frozen on dry ice. Containers will be provided by UCSCDET.

<sup>7</sup> Sample containers will be provided to AMS by UMCES. Container will be filled 1 inch to the top and frozen on dry ice.

<sup>8</sup> Sample containers will be provided to SFEI by CCSF.

<sup>9</sup> Sample containers will be provided to AMS by MPSL. Samples will be kept in the dark, unfrozen.

<sup>10</sup> Sample containers will be provided to AMS by MPSL. Enough containers will be used to provide 7 liters of sample volume. Samples will be chilled on wet ice.