

Cruise Report
2001 Regional Monitoring Program
Winter Water Cruise

A P P L I E D
*ocean*marine
S C I E N C E S

February 5 - February 14, 2001

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1.0 INTRODUCTION

This report describes activities associated with the first of two water sampling cruises to be conducted in the year 2001 as part of the Regional Monitoring Program for Trace Substances in the San Francisco Estuary. Water sampling is one component of this program that is designed to provide long-term data on concentrations of trace metals and organic compounds as well as ancillary measurements, suitable for determining trends.

All sampling, except for the two watershed sites sampled from shore, was conducted from the *R/V David Johnston*. Water samples were collected and distributed in the following manner:

- Samples for the analysis of arsenic and selenium were collected from 25 sites by personnel from the Flegal Laboratory at the University of California Santa Cruz Department of Environmental Toxicology (UCSC) and were sent by Applied Marine Sciences, Inc. personnel (AMS) to Brooks-Rand, Ltd. (BRL) in Seattle, Washington.
- Samples for the analysis of other trace elements (cadmium, copper, cobalt, iron, manganese, lead, nickel, silver, and zinc) and ancillary measurements (TSS, salinity, dissolved organic carbon, chlorophyll a, ammonia, nitrate, nitrite, phaeophytin, silicates, and orthophosphate) were collected from 25 sites by UCSC and retained at the conclusion of the cruise for analysis.
- Samples for direct particulate measurement of aluminum, silver, cadmium, cobalt, copper, manganese, lead, nickel, and zinc were collected from 6 sites by UCSC and retained by them for analysis.
- Samples for analysis of total mercury and methyl mercury from 25 sites were collected by UCSC and sent by AMS to Dr. Rob Mason at the University of Maryland Chesapeake Biological Laboratory (UMCBL) at the conclusion of the cruise.
- Samples for analysis of total mercury and methyl mercury splits from 5 sites were collected by UCSC and retained at the conclusion of the cruise for analysis.
- Samples for analysis of hardness were collected from 14 sites by UCSC and retained by AMS for shipment to Union Sanitary District at conclusion of the cruise.

- Samples for analysis of toxicity were collected from five sites by AMS and were picked up by Pacific Eco-Risk Laboratory Inc. personnel at various locations during the cruise.

2.0 CRUISE REPORT

2.1 Objectives

The objectives of this cruise were to:

1. Collect water samples from 26 sites for analysis of total and dissolved trace elements.
2. Collect water samples from 26 sites for analysis of Mercury (Hg) and monomethyl mercury (mmHg).
3. Collect water samples from 26 sites for analysis of chlorophyll-a, dissolved organic carbon, phaeophytin, salinity, total suspended sediments, and nutrients (ammonium, nitrate, nitrite, orthophosphate, and silicates).
4. Collect water samples for analysis of total hardness at 13 sites, and where salinity is <5ppt.
5. Collect profiles of surface water and water-column conductivity, dissolved oxygen, optical back-scatterance, and temperature at 24 bay sites, and optical back-scatterance at watershed sites. The CTD profile will be of surface water for the majority of time at each sampling site. At the end of the sample collections at each site, the CTD will be lowered to the bottom and brought to the surface, to profile the water column.
6. Collect particulate trace metals samples from six sites.
7. Collect water column toxicity samples from five sites.
8. Record date and time of all samples collected using an electronic bar code scanner and document using the scanner as an aid in field sampling operations. Document weather conditions at each site.

2.2 Personnel

The personnel and work assignments for this cruise were as follows:

<u>Name</u>	<u>Affiliation</u>	<u>Duties</u>
David Bell (2/6-2/7)	AMS	Cruise Manager, CTD
Jordan Gold (2/5)	AMS	Cruise Manager, CTD
Andy Gunther (2/14)	AMS	Cruise Manager, CTD
Paul Salop (2/8, 2/12-2/13)	AMS	Cruise Manager, CTD
Sharon Hibdon (2/5)	UCSC	Trace Metal Chemistry
Kim Bracchi (2/5-2/8, 2/12-2/14)	UCSC	Trace Metal Chemistry
Genine Scelfo (2-5-2/8)	UCSC	Trace Metal Chemistry
Bob Kurkjian (2/5-2/8)	UCSC	Trace Metal Chemistry
Mihran Aslanyan (2/5-2/8)	UCSC	Trace Metal Chemistry
Mara Ranville (2/12-2/14)	UCSC	Trace Metal Chemistry
Lindsay Whalin (2/12-2/14)	UCSC	Trace Metal Chemistry
Miranda Spang (2/12-2/14)	UCSC	Trace Metal Chemistry
Gordon Smith (2/6-2/9, 2/12-2/14)	UCSC	<i>R/V David Johnston</i> Skipper

2.3 Sampling Activities

<u>Date</u>	<u>Time</u>	<u>Activity</u>
February 5, 2001	0930–1141	Sampled at Standish Dam (BW10), departed for Guadalupe River site (BW15).
	1230-1355	Sampled at Guadalupe River, departed for Emeryville to mobilize gear onto the <i>R/V David Johnston</i> .
February 6, 2001	0700-0720	Mobilized additional gear onto the vessel at Emeryville Marina, conducted safety briefing, and departed for Oyster Point site (BB30).
	0834-1025	Sampled at Oyster Point, departed for San Bruno Shoal site (BB15).
	1108-1211	Sampled at San Bruno Shoal, departed for Redwood Creek site (BA40).
	1305-1414	Sampled at Redwood Creek, departed for MARFAC (USGS Marine Facility in Redwood City).
	1745-1800	Arrived at MARFAC, demobilized gear and departed for the motel.
February 7, 2001	0630-0645	Mobilized gear onto vessel at MARFAC, departed for San Jose site (C-3-0)

Date	Time	Activity
February 7, 2001 (cont.)	1050-1135	Sampled at Sunnyvale, departed for Coyote Creek site (BA10).
	1215-1258	Sampled at Coyote Creek, departed for South Bay site (BA20).
	1318-1420	Sampled at South Bay, departed for Dumbarton Bridge site (BA30)
	1440-1515	Sampled at Dumbarton Bridge site, departed for MARFAC and delivered toxicity samples to PERL personnel. Sampling crew disembarked for transit of van to Emeryville. Vessel transited to Emeryville.
February 8, 2001	0800-0816	Mobilized gear onto the vessel at Emeryville Marina and departed for Pt. Isabel site (BC41).
	0843-0942	Sampled at Pt. Isabel, departed for Red Rock site (BC60).
	1018-1101	Sampled at Red Rock, departed for Richardson Bay site (BC30).
	1141-1234	Sampled at Richardson Bay, departed for Alameda site (BB70).
	1355-1449	Sampled at Alameda, departed for Yerba Buena Island site (BC10).
	1521-1611	Sampled at Yerba Buena Island, departed for Emeryville Marina.
	1630-1638	Arrived at Emeryville Marina and demobilized gear off of the vessel.
February 9, 2001	0800-1200	Captain Smith transited the vessel to Benicia Marina.
February 12, 2001	0700-0716	Mobilized gear onto the vessel at Benicia Marina, departed for Davis Point site (BD40).
	0754-0901	Sampled at Davis Point, departed for Petaluma River site (BD15)
	1020-1102	Sampled at Petaluma River, departed for San Pablo Bay site (BD20).
	1146-1229	Sampled at San Pablo Bay, departed for Pinole Point site (BD30).
	1259-1350	Sampled at Pinole Point, departed for Napa River site (BD50).
	1444-1533	Sampled at Napa River, departed for Benicia Marina.
	1623-1640	Arrived at Benicia Marina, demobilized gear off vessel, delivered toxicity sample to PERL personnel, departed for motel.

Date	Time	Activity
February 13, 2001	0700-0706	Mobilized gear onto the vessel at Benicia Marina and departed for Honker Bay site (BF40).
	0824-0912	Sampled at Honker Bay, departed for Grizzly Bay site (BF20).
	0957-1050	Sampled at Grizzly Bay, departed for Pacheco Creek site (BF10).
February 13, 2001 (cont.)	1154-1237	Sampled Pacheco Creek site, departed for Benicia Marina.
	1310-1330	Arrived Benicia Marina, demobilized gear off vessel, delivered toxicity sample to PERL personnel.
February 14, 2001	0730-0750	Mobilized gear onto the vessel at Benicia Marina and departed for Sacramento River site (BG20).
	0945-1034	Sampled Sacramento River site, departed for San Joaquin River site (BG30).
	1113-1205	Sampled San Joaquin River site, departed for Benicia Marina.
	1345-1430	Arrived Benicia Marina, demobilized gear off vessel removing all samples and sampling gear.

2.4 Discussion

Site Locations and Sample Collections

Sampling was conducted at the locations described in Table 1. Samples collected from each site are indicated in Table 2. Weather conditions at time of sampling are given in Table 3.

General Comments

All cruise objectives were accomplished with the following exceptions: the Golden Gate site (BC20) was unable to be sampled due to unsafe weather conditions; a hardness sample was inadvertently not taken at the South Bay site (BA20).

Weather conditions were less than ideal for several of the sampling sites, making sampling conditions difficult at several stations and forcing several changes to the schedule in the original cruise plan. Most significantly, sites scheduled to be sampled Friday, February 9th were moved forward by one day to avoid a weather

mercury, silica, and chromium were eliminated from the 2001 Winter Water Cruise analyte list. Additionally, splits for mercury and methyl mercury analysis were taken for analysis by UCSCDET to gauge comparability of data in preparation for UCSCDET taking over this analysis for the 2002 program.

This cruise also marked the initial use of a barcode scanner to record times individual samples were collected. The scanning equipment appeared to hold up well under field conditions. Use of the scanning equipment reduces opportunity for human error in recording times and also eases conversion of data to electronic format. Continued use of the barcode scanning equipment is planned for future RMP water cruises.

2.4 Time of Sample Collection

Times for sample collection were for the first time recorded with a barcode scanner for direct input into an electronic database. Sample times are available at <http://www.amarine.com/information/rmp/cruise/cruisereports.html>.

Table 1. Coordinates of Water Samples Collected

Site Name/Code	Latitude (N)	Longitude (W)	Depth When Sampled (m)	Comments
Standish Dam/BW10	37° 27.152'	121° 55. 481'	shore	Standish Dam on E bank
Guadalupe\River/BW15	37° 25.554'	121° 58. 786'	shore	South Bay Yacht Club Dock
Oyster Point/BB30	37° 39.992'	122° 19. 250'	9	50 m W of channel marker "4"
San Bruno Shoal/BB15	37° 36.829'	122° 16. 762'	11	1 nmi NE of channel marker "8"
Redwood Creek/BA40	37° 33.463'	122° 12. 365'	2	50 m W of channel marker "12"
Dumbarton Bridge/BA30	37° 30.820'	122° 08. 076'	5	20 m E of channel marker "14"
San Jose/C-3-0	37° 27.607'	121° 58. 536'	3	Just W of railroad bridge in Coyote Creek
Sunnyvale/C-1-3	37° 26.052'	122° 00. 562'	2	Approximately 2.23 nmi up Guadalupe Slough from channel marker "1"
Coyote Creek/BA10	37° 28.121'	122° 03. 755'	6	75 m S of channel marker "18"
South Bay/BA20	37° 29.577'	122° 05. 265'	4	200 m W of channel marker "16"
Point Isabel/BC41	37° 53.218'	122° 20. 565'	3	0.61 nmi from Brooks Island and 0.81 nmi from Fleming Point
Red Rock/BC60	37° 55.116'	122° 26. 205'	12	0.7 nmi SW of Red Rock
Richardson Bay/BC30	37° 51.719'	122° 28. 723'	4	30 m NW of channel marker "4"
Alameda/BB70	37° 44.569'	122° 19. 358'	11	20 m SSE of Buoy "A"
Yerba Buena Island/BC10	37° 49.354'	122° 20. 964'	5	0.25 nmi N of Bay Bridge between bridge supports K and L
Davis Point/BD40	38° 03.003'	122° 16. 687'	5	0.2 nmi SW from W end of barge pier
San Pablo Bay/BD20	38° 02.876'	122° 25. 524'	3	100 m S of channel marker "2"
Petaluma River/BD15	38° 06.625'	122° 29. 249'	3	50 m W of channel marker "19"
Pinole Point/BD30	38° 01.455'	122° 21. 757'	6	0.5 nmi from marker off end of pier and 0.7 nmi from channel marker "7"
Honker Bay/BF40	38° 04.011'	121° 56. 068'	2	0.65 nmi N of Simmons Point
Golden Gate/BF20	38° 06.040'	122° 02. 260'	2	100 m S of Golden Gate

Napa River/BD50	38° 05.797'	122° 15. 655'	5	50 m off concrete seawall and E of NE corner of Mare Island Naval Shipyard building
Sacramento River/BG20	38° 03.578'	121° 48. 596'	9	0.1 nmi W of channel marker "8"
San Joaquin River/BG30	38° 01.230'	121° 48. 307'	7	0.11 nmi E of channel marker "8"

Table 2. Samples Collected During 2001 Winter Water Cruise

COLLECTION INFORMATION			FILTERED AND UNFILTERED		FILTERED				UNFILTERED			
Site	Day	As, Se	mmHg, Hg,	Other Trace Elements	Nutr.	DOC	Sal.	Hardness	pH	Chl	TSS	Tox
Standish Dam	1	•	•	•	•	•	•	•	•	•	•A	
Guadalupe River	1	•	•	•	•	•	•	•	•	•	•A	
Oyster Point	2	•	•	•	•	•	•		•	•	•	
San Bruno Shoal	2	•	•	•	•	•	•		•	•	•	
Coyote Creek	2	•	•	•	•	•	•		•	•	•	
Redwood Creek	2	•	•	•	•	•	•		•	•	•	
Dumbarton Bridge	3	•	•	•	•	•	•		•	•	•	•
Sunnyvale	3	•	•	•	•	•	•	•	•	•	•	•
San Jose	3	•	•	•	•	•	•	•	•	•	•	•
South Bay	3	•	•	•	•	•	•		•	•	•A	
Golden Gate	4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Richardson Bay	4	•	•	•	•	•	•		•	•	•	
Red Rock	4	•	•	•	•	•	•		•	•	•	
Alameda	4	•	•B	•	•	•	•		•	•	•	
Point Isabel	4	•	•B	•	•	•	•		•	•	•	
Yerba Buena Island	4	•	•	•	•	•	•		•	•	•A	
Petaluma River	6	•	•	•	•	•	•	•	•	•	•	
San Pablo Bay	6	•	•	•	•	•	•	•	•	•	•A	
Pinole Point	6	•	•B	•	•	•	•	•	•	•	•	•
Davis Point	6	•	•	•	•	•	•	•	•	•	•	
Napa River	6	•	•	•	•	•	•	•	•	•	•	
Grizzly Bay	7	•	•	•	•	•	•	•	•	•	•	•
Honker Bay	7	•	•B	•	•	•	•	•	•	•	•	
Pacheco Creek	7	•	•	•	•	•	•	•	•	•	•	
Sacramento River	8	•	•	•	•	•	•	•	•	•	•A	
San Joaquin River	8	•	•B	•	•	•	•	•	•	•	•	

• = Sample collected at this site.

Filtered samples will be collected for analysis of total hardness at all sites with salinities <5 parts per thousand.

A = Particulate trace metals sample collected

B = Hg / mmHg split collected

NS = Not sampled

Table 3. Weather conditions during sampling

Site	Day	Sea State	Tide Stage	Wind Speed (knots)	Wind Direction	Cloud Cover	Precipitation	Comments
Standish Dam/BW10	1	calm	slack to ebb	0	NA	0%	none	No precipitation for previous 4-5 days
Guadalupe River/BW15	1	calm	ebb	<5	West	0%	none	
Oyster Point/BB30	2	2-3 ft.	flood	20	ESE	0%	none	
San Bruno Shoal/BB15	2	4 ft.	ebb	30	Northwest	5%	none	
Redwood Creek/BA40	2	1-2 ft.	ebb	40	West	5%	none	Gusts to 45 kts.
Dumbarton Bridge/BA30	3	<1 ft.	ebb	10	Northwest	0%	none	
San Jose/C-3-0	3	<1 ft.	flood	8	Northwest	0%	none	
Sunnyvale/C-1-3	3	<1 ft.	flood	8-12	Northwest	0%	none	
Coyote Creek/BA10	3	1 ft.	slack	12	West	0%	none	
South Bay/BA20	3	<1 ft.	ebb	20	Northwest	0%	none	
Point Isabel/BC41	4	calm	flood	5	North	20%	none	
Red Rock/BC60	4	calm	flood	3	South	10%	none	
Richardson Bay/BC30	4	calm	slack	5	Southeast	5%	none	
Alameda/BB70	4	<1 ft.	ebb	5	South	30%	none	
Yerba Buena Island/BC10	4	1 ft.	ebb	8	Southwest	90%	none	
Davis Point/BD40	5	calm	ebb	0	NA	100%	light rain	Moderate precipitation two days previously
Petaluma River/BD15	5	<1 ft.	flood	8	East	100%	light rain	
San Pablo Bay/BD20	5	1 ft.	flood	8	Northeast	100%	light rain	
Pinole Point/BD30	5	1-2 ft.	flood	10	Northeast	100%	light rain	
Napa River/BD50	5	calm	flood	5	Northeast	100%	sprinkles	
Honker Bay/BF40	6	2 ft.	slack	12-20	North	90%	none	
Grizzly Bay/BF20	6	1 ft.	ebb	15-20	North	40%	none	
Pacheco Creek/BF10	6	<1 ft.	ebb	3	West	60%	none	
Sacramento River/BG20	7	calm	slack	5	West	0%	none	
San Joaquin River/BG30	7	<1 ft.	ebb	3	Southwest	10%	none	