

Cruise Report
2000 Regional Monitoring Program
Winter Water Cruise

A P P L I E D
ummarine
S C I E N C E S

January 31 - February 9, 2000

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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 2000 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, which are 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 Dr. Russ Flegal's laboratory at the University of California, Santa Cruz (Flegal) 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, manganese, lead, nickel, silver, and zinc) and ancillary measurements (salinity, dissolved organic carbon, chlorophyll a, ammonium, nitrate, nitrite, phaeophytin, silicates, and orthophosphate) were collected from 25 sites by Flegal and retained by them at the conclusion of the cruise.
- Samples for direct particulate measurement of aluminum, silver, cadmium, cobalt, chromium, copper, manganese, lead, nickel, and zinc were collected from 6 sites by Flegal and retained by them for shipment to Dr. Rob Mason at the University of Maryland Chesapeake Biological Laboratory (UMCBL).
- Samples for analysis of total mercury and methyl mercury from 25 sites and dissolved gaseous mercury from 10 sites were collected by Flegal and sent by AMS to Dr. Mason at the conclusion of the cruise.
- Samples for analysis of total suspended solids were collected by AMS from 25 sites and were retained for analysis by Flegal.
- Samples for analysis of hardness were collected from 14 sites by Flegal and retained by AMS for delivery to Union Sanitary District in Union City.
- Samples for analysis of silica were collected from three sites by Flegal and retained by AMS for delivery to Sequoia Analytical Inc.
- Measurement of surface water salinity, temperature, conductivity, pH, and dissolved oxygen were conducted by Flegal at each site, and the water column at each site was profiled by AMS for conductivity, temperature, salinity, dissolved oxygen, and optical back-scatterance.
- 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.
- Samples for bacterial analysis from 25 sites were collected by AMS and shipped by Flegal to Dr. Brian Palenik of UCSD.
- Samples from four sites for analysis of total suspended solids, total dissolved solids, total organic carbon, total and dissolved nickel and copper, and total mercury were collected by Flegal and delivered by hand to personnel of the city of San Jose.

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, and from six sites for particulate trace element analysis.
2. Collect water samples from 26 sites for analysis of salinity, total suspended solids, chlorophyll a, nutrients (ammonium, nitrate, nitrite, orthophosphate, silicate), and dissolved organic carbon.
3. Collect water samples for analysis of total hardness at 13 sites and any additional sites where salinity is <5ppt.
4. Collect profiles of water-column temperature, conductivity, salinity, dissolved oxygen, and optical back-scatterance at 26 sites.
5. Collect samples for analysis of silica from three sites.
6. Collect water samples for bacterial analysis from 26 sites.
7. Collect water samples for methyl mercury analysis from 26 sites, and dissolved gaseous mercury from 10 sites.
8. Collect water samples for toxicity analysis from five sites.
9. Collect water samples from four sites for the city of San Jose.
10. Document current and recent weather conditions at each site.

2.2 Personnel

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

Name	Affiliation	Duties
Kim Bracchi (2/1-4)	UCSC	Trace Metal Chemistry
Nicole David (2/3)	SFEI	Observer
Jim Downing (2/2)	CCSJ	Observer
Jordan Gold (1/31-2/4, 2/7-2/9)	AMS	Cruise Manager, Bacterial and toxicity Samples, CTD, weather
Christine Grasso (2/3)	SFEI	Observer
Sharon Hibdon (1/31, 2/7-9)	UCSC	Trace Metal Chemistry
Jon Leatherbarrow (2/3)	SFEI	Observer
Rachael Mills (2/7-9)	UCSC	Trace Metal Chemistry
Kuria Ndugu (1/31, 2/7-9)	UCSC	Trace Metal Chemistry
Genine Scelfo (2/1-4)	UCSC	Trace Metal Chemistry
Gordon Smith (1/31-2/4, 2/7-2/9)	UCSC	RV David Johnston Skipper
Sharon Squire (2/1-4)	UCSC	Trace Metal Chemistry
Martha Thomas (2/1-4)	UCSC	Trace Metal Chemistry
Lindsay Whalin (2/7-9)	UCSC	Trace Metal Chemistry
Donald Yee (2/4)	SFEI	Observer

2.3 Sampling Activities

Date	Time	Activity
January 31, 2000	0830–1145	Sampled at Standish Dam (BW10), departed for Guadalupe River site (BW15).
	1230–1405	Sampled at Guadalupe River, departed for Emeryville to mobilize gear onto the R/V David Johnston.
February 1, 2000	0630–0750	Departed from motel, mobilized additional gear onto the vessel at Emeryville marina, conducted safety briefing, and departed for Oyster Point site (BB30).
	0904–1102	Sampled at Oyster Point, departed for San Bruno Shoal site (BB15).
	1136–1250	Sampled at San Bruno Shoal, departed for Redwood Creek site (BA40).

2.3 Sampling Activities (cont.)

February 1, 2000	1332–1435	Sampled at Redwood Creek, departed for Dumbarton Bridge site (BA30)
	1451–1628	Sampled at Dumbarton Bridge site, departed for MARFAC (USGS Marine Facility in Redwood City).
	1720–1800	Arrived at MARFAC, demobilized gear and departed for the motel.
February 2, 2000	0620–0658	Departed from the motel, mobilized gear onto the vessel and departed for San Jose site (C–3–0).
	0837–0944	Sampled at San Jose site, departed for Sunnyvale site (C–1–3).
	1041–1138	Sampled at Sunnyvale, departed for Coyote Creek site (BA10).
	1213–1315	Sampled at Coyote Creek, departed for South Bay site (BA20).
	1329–1457	Sampled at South Bay, departed for Emeryville marina.
	1744–1810	Arrived at Emeryville marina, demobilized gear off vessel, departed for motel.
February 3, 2000	0730–0827	Departed from the motel, mobilized gear onto the vessel at Emeryville marina and departed for Pt. Isabel site (BC41).
	0857–0954	Sampled at Pt. Isabel, departed for Red Rock site (BC60).
	1031–1127	Sampled at Red Rock, departed for Richardson Bay site (BC30).
	1213–1233	Arrived at Richardson Bay, unable to begin sampling due to rough weather, anchored in protected area then moved to site.
	1233–1400	Sampled at Richardson Bay, departed for Emeryville marina.
	1506–1530	Arrived at Emeryville marina, demobilized gear off vessel and departed for motel and home.

2.3 Sampling Activities (cont.)

February 4, 2000	0730–0818	Departed from the motel, mobilized gear onto the vessel at Emeryville marina and departed for Alameda site (BB70).
	0907–1005	Sampled at Alameda, departed for Yerba Buena Island site (BC10).
	1045–1142	Sampled at Yerba Buena Island, departed for Emeryville marina.
	1205–1225	Arrived at Emeryville marina, demobilized gear off of the vessel and departed for home.
	1232–1553	Captain Smith transited the vessel to Benicia marina and then departed for home.
February 7, 2000	0600–0741	Departed motel, mobilized gear onto the vessel at Benicia marina, conducted safety briefing and departed for Davis Point site (BD40).
	0824–0933	Sampled at Davis Point, departed for San Pablo Bay site (BD20).
	1015–1122	Sampled at San Pablo Bay, departed for Petaluma River site (BD15).
	1203–1259	Sampled at Petaluma River, departed for Pinole Point site (BD30).
	1408–1504	Sampled at Pinole Point, departed for Benicia marina.
	1619–1640	Arrived at Benicia marina, demobilized gear off vessel, delivered toxicity samples to PERL personnel, departed for motel.
February 8, 2000	0600–0645	Departed from motel, mobilized gear onto the vessel at Benicia marina and departed for Honker Bay site (BF40).
	081–0910	Sampled at Honker Bay, departed for departed for Grizzly Bay site (BF20).

2.3 Sampling Activities (cont.)

February 8, 2000	0953–1051	Sampled at Grizzly Bay, departed for Pacheco Creek site (BF10).
	1134–1226	Sampled at Pacheco Creek, departed for Napa River site (BD50).
	1334–1417	Sampled at Napa River, departed for Benicia marina.
	1504–1520	Arrived at Benicia marina, demobilized gear off vessel, delivered toxicity samples to PERL personnel and departed for the motel.
February 9, 2000	0730–0810	Departed from the motel, mobilized gear onto the vessel at Benicia marina, conducted safety briefing and departed for Sacramento River site (BG20).
	1022–1110	Sampled at Sacramento River site, departed for San Joaquin River site (BG30).
	1153–1253	Sampled at San Joaquin River site, departed for Benicia marina.
	1452–1630	Arrived at Benicia marina, demobilized gear off the vessel and departed for home.

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.

General Comments

All cruise objectives were accomplished within the scheduled number of days with the exception of sampling the Golden Gate site (BC20), which could not be sampled due to unsafe conditions.

Many changes in analytes and methods occurred for the first time during this cruise, and are highlighted below. The CTD was left at the surface from shortly after arriving on site, until after the last sample was acquired, at which point the water column was profiled by lowering it to the bottom and then retrieving it at approximately 0.5 meters per second. This was done to allow analysis of changes in surface water conductivity and optical back-scatterance at each site during the duration of water sampling activities. The time of initiation of the filling of sample containers was documented to allow comparison with concurrent conductivity and optical back-scatterance data collected by the CTD. The total suspended solids sample was collected through use of a Niskin bottle to provide a grab sample for use in deriving the correlation between optical back-scatterance and total dissolved solids. Additionally, particulate trace metal samples were collected at six sites, and several chromium samples were collected by Flegal personnel for internal laboratory analysis.

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° 40.166'	122° 19. 768'	10.2	50 m W of channel marker "4"
San Bruno Shoal/BB15	37° 36.894'	122° 16. 940'	4.1	1 nmi NE of channel marker "8"
Redwood Creek/BA40	37° 33.519'	122° 12. 574'	2.7	50 m W of channel marker "12"
Dumbarton Bridge/BA30	37° 30.804'	122° 08. 038'	6.1	20 m E of channel marker "14"
San Jose/C-3-0	37° 27.638'	121° 58. 556'	3.4	Just W of railroad bridge in Coyote Creek
Sunnyvale/C-1-3	37° 26.052'	122° 00. 594'	2.7	Approximately 2.23 nmi up Guadalupe Slough from channel marker "1"
Coyote Creek/BA10	37° 28.117'	122° 03. 779'	6.5	75 m S of channel marker "18"
South Bay/BA20	37° 29.584'	122° 05. 272'	4.1	200 m W of channel marker "16"
Point Isabel/BC41	37° 53.234'	122° 20. 552'	3	0.61 nmi from Brooks Island and 0.81 nmi from Fleming Point
Red Rock/BC60	37° 55.096'	122° 26. 165'	12.3	0.7 nmi SW of Red Rock
Richardson Bay/BC30	37° 51.732'	122° 28. 703'	3.3	30 m NW of channel marker "4"
Alameda/BB70	37° 44.520'	122° 19. 263'	11.3	20 m SSE of Buoy "A"
Yerba Buena Island/BC10	37° 49.308'	122° 20. 922'	6	0.25 nmi N of Bay Bridge between bridge supports K and L
Davis Point/BD40	38° 03.018'	122° 16. 646'	5	0.2 nmi SW from W end of barge pier
San Pablo Bay/BD20	38° 02.913'	122° 25. 365'	4.0	100 m S of channel marker "2"
Petaluma River/BD15	38° 06.615'	122° 29. 256'	4.2	50 m W of channel marker "19"
Pinole Point/BD30	38° 01.471'	122° 21. 718'	7.0	0.5 nmi from marker off end of pier and 0.7 nmi from channel marker "7"
Honker Bay/BF40	38° 04.047'	121° 56. 089'	1.4	0.65 nmi N of Simmons Point
Grizzly Bay/BF20	38° 06.952'	122° 02. 394'	1.7	100 m S of dolphin
Pacheco Creek/BF10	38° 03.100'	122° 05. 906'	12.0	0.2 nmi N of buoy "7"
Napa River/BD50	38° 05.794'	122° 15. 635'	2.8	50 m off concrete seawall and E of NE corner of Mare Island Naval Shipyard building
Sacramento River/BG20	38° 03.575'	121° 48. 613'	9.6	0.1 nmi W of channel marker "8"
San Joaquin River/BG30	38° 01.237'	121° 48. 398'	5.9	0.11 nmi E of channel marker "8"

Table 2. Samples Collected During 2000 Winter Water Cruise

COLLECTION INFORMATION		FILTERED AND UNFILTERED				FILTERED			UNFILTERED						
Site	Day	As, Se	dgHg	mmHg, Hg	Other Trace Elements	Nutr.	DOC	Hardness	Sal.	Chl.	Si	TSS	Tox.	PM	Bact.
Standish Dam/BW10	1	•	•	•	•	•	•		•	•		•		•	•
Guadalupe River/BW15	1	•		•	•	•	•		•	•		1		•	•
Oyster Point/BB30	2	•		•	•	•	•		•	•		•			•
San Bruno Shoal/BB15	2	•	•	•	•	•	•		•	•		•			•
Redwood Creek/BA40	2	•		•	•	•	•		•	•		•			•
Dumbarton Bridge/BA30	2	•		•	•1	•	•		•	•		•	•		•
San Jose/C-3-0	3	•	•	•	•1	•	•	•	•	•		•	•		•
Sunnyvale/C-1-3	3	•		•	•	•	•	•	•	•		•	•		•
Coyote Creek/BA10	3	•		•	•1	•	•		•	•		•			•
South Bay/BA20	3	•	•	•	•1	•	•	•	•	•		•		•	•
Point Isabel/BC41	4	•		•	•	•	•		•	•		•			•
Red Rock/BC60	4	•		•	•	•	•		•	•		•			•
Richardson Bay/BC30	4	•		•	•	•	•		•	•		•			•
Alameda/BB70	5	•		•	•	•	•		•	•		•			•
Yerba Buena Island/BC10	5	•		•	•	•	•		•	•		•		•	•
Davis Point/BD40	7	•		•	•	•	•	•	•	•		•		•	•
San Pablo Bay/BD20	7	•	•	•	•	•	•	•	•	•		•		•	•
Petaluma River/BD15	7	•	•	•	•	•	•	•	•	•		•			•
Pinole Point/BD30	7	•		•	•	•	•	•	•	•		•	•		•
Honker Bay/BF40	8	•		•	•	•	•	•	•	•		•			•
Grizzly Bay/BF20	8	•	•	•	•	•	•	•	•	•		•	•		•

Table 2. Samples Collected During 2000 Winter Water Cruise (cont.)

COLLECTION INFORMATION		FILTERED AND UNFILTERED				FILTERED			UNFILTERED						
Site	Day	As, Se	dgHg	mmHg, Hg	Other Trace Elements	Nutr.	DOC	Hardness	Sal.	Chl.	Si	TSS	Tox.	PM	Bact.
Pacheco Creek/BF10	8	•		•	•	•	•	•	•	•	•	•			•
Napa River/BD50	8	•		•	•	•	•	•	•	•		•			•
Sacramento River/BG20	9	•	•	•	•	•	•	•	•	•	•	•		•	•
San Joaquin River/BG30	9	•	•	•	•	•	•	•	•	•	•	•			•

• = Sample was collected at this site.

1 = Total and dissolved (filtered and unfiltered) samples were taken for the City of San Jose at these sites.

PM= particulate trace metals

Table 3A. Time of sample collection

COLLECTION INFORMATION		FILTERED SAMPLES			UNFILTERED SAMPLES				
Site	Day	As, Se	mmHg, Hg	Other Trace Elements	As, Se	dgHg	mmHg, Hg	Particulate metals	Other Trace Elements
Standish Dam/BW10	1	1110	1123	1114	1032	1040	1028	1017	1010
Guadalupe River/BW15	1	1314	1337	1330	1248		1305	1303	1254
Oyster Point/BB30	2	1034	1045	1040	1002		1016		1007
San Bruno Shoal/BB15	2	1228	1239	1232	1148	1208	1200		1154
Redwood Creek/BA40	2	1408	1422	1414	1343		1352		1347
Dumbarton Bridge/BA30	2	1557	1610	1605	1520		1544		1535
San Jose/C-3-0	3	0917	0928	0922	0850	0903	0907		0857
Sunnyvale/C-1-3	3	1110	1120	1115	1051		1059		1054
Coyote Creek/BA10	3	1251	1300	1255	1226		1235		1229
South Bay/BA20	3	1430	1445	1439	1354	1405	1418	1400	1414
Point Isabel/BC41	4	0930	0940	0934	0907		0917		0912
Red Rock/BC60	4	1102	1112	1107	1041		1050		1045
Richardson Bay/BC30	4	1310	1320	1315	1251		1300		1255
Alameda/BB70	5	0940	0951	0945	0915		0925		0921
Yerba Buena Island/BC10	5	1118	1127	1123	1053		1106	1057	1102
Davis Point/BD40	7	0908	0919	0914	0846		0852		0855
San Pablo Bay/BD20	7	1058	1109	1102	1026	1046	1340	1037	1029
Petaluma River/BD15	7	1229	1240	1245	1216	1222	1214		1216
Pinole Point/BD30	7	1431	1436	1444	1417		1420		1424
Honker Bay/BF40	8	0849	0852	0857	0828		0836		0832
Grizzly Bay/BF20	8	1030	1035	1039	1005	1017	1010		1012

Table 3A. Time of sample collection (cont.)

COLLECTION INFORMATION		FILTERED SAMPLES			UNFILTERED SAMPLES				
Site	Day	As, Se	mmHg, Hg	Other Trace Elements	As, Se	dgHg	mmHg, Hg	Particulate metals	Other Trace Elements
Pacheco Creek/BF10	8	1207	1212	1216	1149		1152		1154
Napa River/BD50	8	1358	1400	1405	1344		1347		1350
Sacramento River/BG20	9	1103	1054	1058	1031	1046	1034	1036	1039
San Joaquin River/BG30	9	1231	1234	1237	1205	1217	1209		1212

Table 3B. Time of sample collection

COLLECTION INFORMATION		SAMPLE TYPE								
Site	Day	TSS	Ch.	Tox.	Si	Hardness	Sal.	Nut.	Dissolved Organic Carbon	pH
Standish Dam/BW10	1	1036	1001			1103	1100	1109	1130	1102
Guadalupe River/BW15	1	1255	1246			1311	1345	1355	1340	1247
Oyster Point/BB30	2	1010	1000				1025	1030	1048	1000
San Bruno Shoal/BB15	2	1156	1140				1220	1223	1243	1143
Redwood Creek/BA40	2	1350	1340				1400	1403	1406	1339
Dumbarton Bridge/BA30	2	1551	1518	1540-1620			1550	1553	1535	1521
San Jose/C-3-0	3	0908	0840	0850-0935		0919	0912	0914	0933	0844
Sunnyvale/C-1-3	3	1101	1050	1100-1132		1108	1103	1105	1124	1049
Coyote Creek/BA10	3	1232	1220				1245	1249	1305	1221
South Bay/BA20	3	1406	1349				1424	1426	1448	1345
Point Isabel/BC41	4	0908	0902				0923	0924	0943	0904
Red Rock/BC60	4	1042	1038				1056	1057	1116	1039
Richardson Bay/BC30	4	1249	1250				1305	1309	1324	1249
Alameda/BB70	5	0917	0911				0930	0932	0953	0913
Yerba Buena Island/BC10	5	1109	1051				1111	1113	1130	1050
Davis Point/BD40	7	0857	0845			0902	0903	0905	0923	0844
San Pablo Bay/BD20	7	1033	1024			1051	1053	1055	1112	1023
Petaluma River/BD15	7	1220	1208			1228	1231	1232	1247	1210
Pinole Point/BD30	7	1431	1416	1426-1452		1428	1433	1434	1445	1415
Honker Bay/BF40	8	0844	0827			0843	0844	0847	0859	0825
Grizzly Bay/BF20	8	1017	1004	1008-1036		1023	1024	1028	1042	1003

Table 3B. Time of sample collection (cont.)

COLLECTION INFORMATION		SAMPLE TYPE								
Site	Day	TSS	Ch.	Tox.	Si	Hardness	Sal.	Nut.	Dissolved Organic Carbon	pH
Pacheco Creek/BF10	8	1205	1146		1147	1200	1202	1205	1218	1145
Napa River/BD50	8	1355	1343			1353	1355	1356	1407	1342
Sacramento River/BG20	9	1039	1029		1030	1050	1051	1052	1102	1028
San Joaquin River/BG30	9	1208	1203		1203	1227	1228	1228	1243	1202

Table 4. Weather conditions during sampling

Site	Day	Sea State	Beaufort Scale	Tide Stage	Wind Speed (knots)	Wind Direction	Cloud Cover	Precipitation	Comments
Standish Dam/BW10	1	calm	0	ebb	<5	South	100%	none	Heavy rain during previous days. Water was brown but not extremely turbid.
Guadalupe River/BW15	1	calm	0	ebb	<10	Southwest	100%	none	Heavy rain during previous days. Water was very turbid with high outflow.
Oyster Point/BB30	2	calm	1	flood	<5	Northwest	90%	none	
San Bruno Shoal/BB15	2	calm	1	ebb	<5	Northwest	75%	none	
Redwood Creek/BA40	2	calm	1	ebb	<5	Northwest	50%	none	
Dumbarton Bridge/BA30	2	calm	1	ebb	<5	Northwest	50%	none	
San Jose/C-3-0	3	calm	0	flood	0	NA	10%	none	
Sunnyvale/C-1-3	3	calm	0	ebb	0	NA	0%	none	
Coyote Creek/BA10	3	calm	0	ebb	0	NA	0%	none	
South Bay/BA20	3	calm	0	ebb	0	NA	0%	none	
Point Isabel/BC41	4	.5 ft chop	1	flood	<5	West	90%	none	
Red Rock/BC60	4	1 ft.	1	flood	<5	West	90%	none	
Richardson Bay/BC30	4	1 ft. chop	3-8	ebb	5-20	West	100%	rain	Many squalls moving through. Approx. 60kn. gusts just prior to arriving on site.
Alameda/BB70	5	calm	0	flood	0	NA	100%	none	
Yerba Buena Island/BC10	5	calm	0	ebb	0	NA	90%	none	
Davis Point/BD40	7	.5 ft. chop	1	ebb	5	East	60%	none	
San Pablo Bay/BD20	7	calm	0	ebb	0	NA	90%	none	
Petaluma River/BD15	7	calm	0	flood	0	NA	75%	none	
Pinole Point/BD30	7	1 ft. chop	1	flood	<5	West	90%	none	

Table 4. Weather conditions during sampling (cont.)

Site	Day	Sea State	Beaufort Scale	Tide Stage	Wind Speed (knots)	Wind Direction	Cloud Cover	Precipitation	Comments
Honker Bay/BF40	8	1 ft. chop	1	ebb	<5	Southwest	90%	none	
Grizzly Bay/BF20	8	1 ft. chop	1	slack	<5	Southwest	85%	none	
Pacheco Creek/BF10	8	calm	0	flood	0	NA	80%	none	
Napa River/BD50	8	1 ft. chop	0	ebb	<5	Westsouth west	50%	none	
Sacramento River/BG20	9	calm	0	ebb	0	NA	100%	light sprinkle	
San Joaquin River/BG30	9	calm	0	ebb	0	NA	100%	none	

The unsafe conditions at the Golden Gate site that resulted in not sampling were approximately 20 knots of wind, and a 10-12 ft. swell every 10 seconds.