

Cruise Plan
Regional Monitoring Program
Bivalve Retrieval Cruise #21
September 14-16, 1999

1 INTRODUCTION

This report describes activities associated with the 1999 dry-season bivalve retrieval cruise of the Regional Monitoring Program for Trace Substances in the San Francisco Estuary. Bivalves were attached to moorings at 12 sites in the Estuary during the June 1999 deployment cruise. Measurement of contaminant bioaccumulation in transplanted bivalves during wet-season and dry-season deployments is one component of this program that is designed to provide long-term data on concentrations of trace metals and organic compounds in water, sediments, and tissues, as well as toxicity throughout the estuary. This cruise plan is available on the World Wide Web at:

<http://www.amarine.com/information/rmp/cruise/cruiseplans.html>

2 CRUISE PLAN

2.1 Objectives

The objectives of this cruise are:

- 1) Retrieve bivalves that were deployed at 12¹ sites on June 2-4, 1999.
- 2) Collect *Corbicula fluminea* from native populations near the Sacramento River and San Joaquin River bivalve stations.
- 3) Divide bivalves into three groups of 40:40:20% of the total number of live specimens. About 20% of the live specimens will be cleaned and prepared for analysis of condition by AMS. Another 40% will be wrapped in aluminum foil and sent to Texas A&M University for homogenization and analysis of trace organics. And 40% of the live specimens will be frozen in a Ziploc bag for homogenization by AMS. From this homogenate, five sub-samples will be prepared for:
 - Trace metals analysis by BADA
 - Trace organics analysis by BADA
 - As, Hg, Se analysis by BRL
 - Tissue splits at three stations for intercalibration trace metals analysis by UCSCDET
 - Tissue archive
- 4) Retrieve thermosalinograph from the Napa River and download recorded data.
- 5) Record a CTD profile at each station.

During this cruise, mooring integrity will be evaluated by checking for abrasion of lines and security of knots and cable ties. The mesh bags containing the bivalves will be removed from the

¹ Bivalves were not deployed at the Grizzly Bay, Sacramento River and San Joaquin River sites.

moorings and brought aboard the vessel where they will be portioned, packaged and frozen on dry ice.

2.2 Personnel

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

<i>Name</i>	<i>Affiliation</i>	<i>Duties</i>	<i>Contact</i>
David Bell	AMS	Cruise Manager, Dive Master	Bell@amarine.com
Jordan Gold	AMS	Vessel Skipper, M.E. II, Diver, Dive Tender	Gold@amarine.com
Dave Morgan	Romberg Tiburon Centers	Vessel Skipper, RV Questuary	Cptdavid@aol.com
Paul Salop	AMS	Diver, Dive Tender, Bivalve Delivery to BADA	Salop@amarine.com

Mr. Bell will be responsible for scientific operations and safety. Mr. Morgan will be responsible for operation and safety aboard the R/V Questuary. Messrs. Gold and Salop will trade off, assisting with mooring examinations and bivalve retrievals, assisting the divers in and out of the water, handing divers' equipment as necessary, and recording data for each station. Mr. Gold will be responsible for operation and safety aboard the M.E. II.

2.3 Cruise Schedule

The following cruise schedule assumes that a maximum of 1.0 hours will be required for vessel operations at each site. Bivalves will be counted, packaged, and frozen on dry ice as the vessel is underway to the next site.

<i>Date</i>	<i>Time</i>	<i>Activity</i>
Day 1 September 14, 1999	0700-0730	Mobilize gear on vessel R/V Questuary, Emeryville Marina. Conduct safety briefing. Depart for Yerba Buena Island.
	0730-1400	Examine moorings and retrieve bivalves at, Yerba Buena Island, Alameda, Redwood Creek, Dumbarton Bridge, and Coyote Creek. Slack water before ebb at approximately 1030 (Figure 1).
	1400-1530	Demobilize gear at Emeryville Marina. Process bivalves as necessary. All bivalves will be stored on dry ice. Refill SCUBA tanks.

<i>Date</i>	<i>Time</i>	<i>Activity</i>
Day 2		
September 15, 1999	0800-0830	Mobilize gear on vessel R/V Questuary, Emeryville Marina. Depart for Horseshoe Bay.
	0830-1530	Examine moorings and retrieve bivalves at Horseshoe Bay, Red Rock, Pinole Point, San Pablo Bay, and Petaluma River. Slack water before flood at approximately 1235 (Figure 2).
Day 3		
September 16, 1999	1200-1230	Mobilize gear on vessel M.E. II, Vallejo public launch ramp. Depart for Davis Point.
	1230-1445	Examine moorings and retrieve bivalves at Davis Point and Napa River. The thermosalinograph at Napa River will be retrieved and the data collected will be transferred to a computer for later analysis. Slack water before flood at approximately 1420 (Figure 3).
	1445-1630	Return to Vallejo public launch ramp and demobilize gear. Process bivalves as necessary. All bivalves will be stored on dry ice and transferred to AMS for shipment.
	1530-1700	Demobilize gear at Emeryville Marina. Process bivalves as necessary. All bivalves will be stored on dry ice and transferred to AMS for shipment.

2.4 Mooring Examination and Bivalve Retrieval Procedures

All diving operations will be conducted by divers working in pairs and tethered together. The vessel will tie up to the deployment sites and the vessel crew will attach a safety line (floating line with large life ring on end) to the structure. The divers will enter the water, descend to the bottom and locate the ground line to the mooring. When the ground line has been located, its attachment to the piling will be examined by feeling for abrasion and looseness in the knots and cable ties. After this examination, the divers will proceed along the ground line checking its integrity. At the mooring, the earth anchors will be checked to confirm that they have not worked out of the bottom and that serious erosion of bottom sediments has not occurred around them. All knots will be checked for integrity and the presence of intact cable ties. When the integrity of all lines and knots has been verified and any problems have been corrected, the divers will ascend the mooring line to the bags of bivalves and cut the cable ties holding the bags to the mooring line. The divers will then return to the surface by retracing their route along the ground line and piling.

When the bivalves are onboard the vessel, they will be carefully removed from the bags and packaged for shipment to the analytical laboratories. Initially, the bags of bivalves will be removed from the mesh bags and placed into a cleaned (scrubbed with Alconox and rinsed with ambient water) cooler. Dead bivalves will be counted and discarded. Approximately 80% of the live organisms will be equally divided for trace organic and trace metal analyses, with the remaining 20% being saved for analysis of condition. The bivalves for organic analyses will be wrapped in aluminum foil, placed into Ziploc bags, and frozen on dry ice. Bivalves for trace metal analyses will be placed into doubled Ziploc bags and frozen on dry ice. Bivalves for analysis of condition will be cleaned, sealed shut with cable ties, air-dried, placed into Ziploc bags, and frozen on dry ice. All

bags will be labeled by station, date, species and quantity. Bivalves will remain frozen on-board the vessel until the conclusion of the cruise.

At the conclusion of the cruise, the bivalves for trace organics analysis will be shipped to Texas A&M University for homogenization. Bivalves for trace metals analyses will remain with AMS for tissue homogenization at UCSC. Homogenized bivalves will be shipped to BADA following processing. Bivalves for condition analyses will be retained by AMS.

2.5 Species Deployed and Site Locations

The number and species of bivalves deployed at each site are shown in Table 1. The location (Latitude, Longitude) for the deployment sites are listed in Table 2.

Table 1. Bivalve deployments from June 2-4, 1999.

<i>Site Name/Code</i>	<i>Number per Species</i>
Coyote Creek BA10	144 <i>C. gigas</i> 80 triploid <i>C. gigas</i> 80 <i>M. edulis</i> 160 <i>M. californianus</i>
Dumbarton Bridge BA30	160 <i>M. californianus</i> 80 <i>M. edulis</i>
Redwood Creek BA40	160 <i>M. californianus</i> 80 <i>M. edulis</i>
Alameda BB71	160 <i>M. californianus</i> 80 <i>M. edulis</i>
Yerba Buena Island BC10	160 <i>M. californianus</i> 80 <i>M. edulis</i> 80 triploid <i>C. gigas</i> 80 <i>C. gigas</i>
Horseshoe Bay BC21	160 <i>M. californianus</i> 80 <i>M. edulis</i>
Red Rock BC60	160 <i>M. californianus</i> 80 <i>M. edulis</i>
Point Pinole BD30	160 <i>M. californianus</i> 80 <i>M. edulis</i>
San Pablo Bay BD20	144 <i>C. gigas</i> 80 <i>M. californianus</i> 80 <i>M. edulis</i>
Petaluma River BD15	144 <i>C. gigas</i> 80 <i>M. californianus</i> 80 <i>M. edulis</i>
Davis Point BD40	144 <i>C. gigas</i> 80 <i>M. californianus</i> 80 <i>M. edulis</i>
Napa River BD50	144 <i>C. gigas</i> 80 triploid <i>C. gigas</i> 80 <i>M. edulis</i> 160 <i>M. californianus</i>
	recording thermosalinograph

<i>Site Name/Code</i>	<i>Number per Species</i>
Grizzly Bay BF20	No deployments
Sacramento River BG20	No deployments Resident <i>C. fluminea</i> will be collected at the end of the deployment
San Joaquin River BG30	No deployments Resident <i>C. fluminea</i> will be collected at the end of the deployment

Table 2. Locations of bivalve moorings for the Regional Monitoring Program.

<i>Site Name/Code</i>	<i>Latitude (N)</i>	<i>Longitude (W)</i>	<i>Comments</i>
Coyote Creek BA10	37° 28.19'	122° 03.83'	Channel marker "18"
Dumbarton Bridge BA30	37° 30.80'	122° 08.08'	Channel marker "14"
Redwood Creek BA40	37° 32.82'	122° 11.70'	Channel marker "4"
Alameda BB71	37° 41.73'	122° 20.38'	Channel marker "1" 1.65 nmi. SE of Hunters Point
Yerba Buena Island BC10	37° 49.12'	122° 20.81'	Dolphin 0.2 nmi. SW of Bay Bridge
Horseshoe Bay BC21	37° 49.87'	122° 28.65'	Dolphin 100 ft W of fishing pier
Red Rock BC60	37° 55.70'	122° 28.13'	Channel marker "2" for Larkspur ferry terminal
Point Pinole BD30	38° 01.00'	122° 22.05'	Channel marker "P"
San Pablo Bay BD20	38° 02.72'	122° 25.71'	Channel marker "1"
Petaluma River BD15	38° 06.77'	122° 30.05'	NE end of railroad bridge
Davis Point BD40	38° 03.26'	122° 15'.63	E side of UNOCAL loading dock

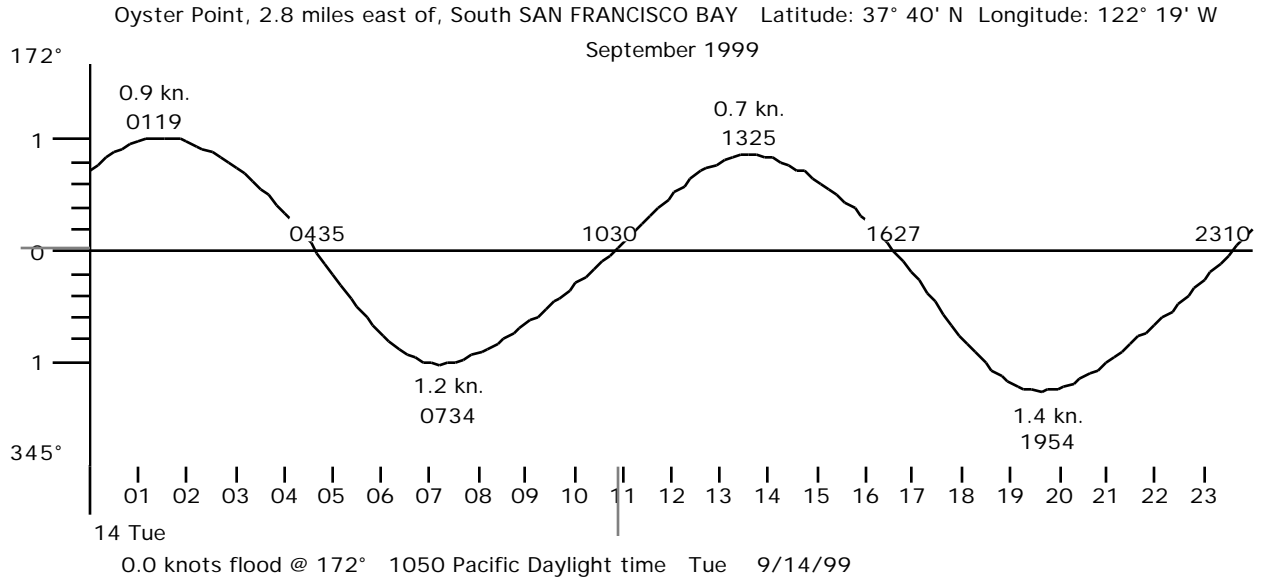


Figure 1. Currents for Oyster Point, September 14, 1999.

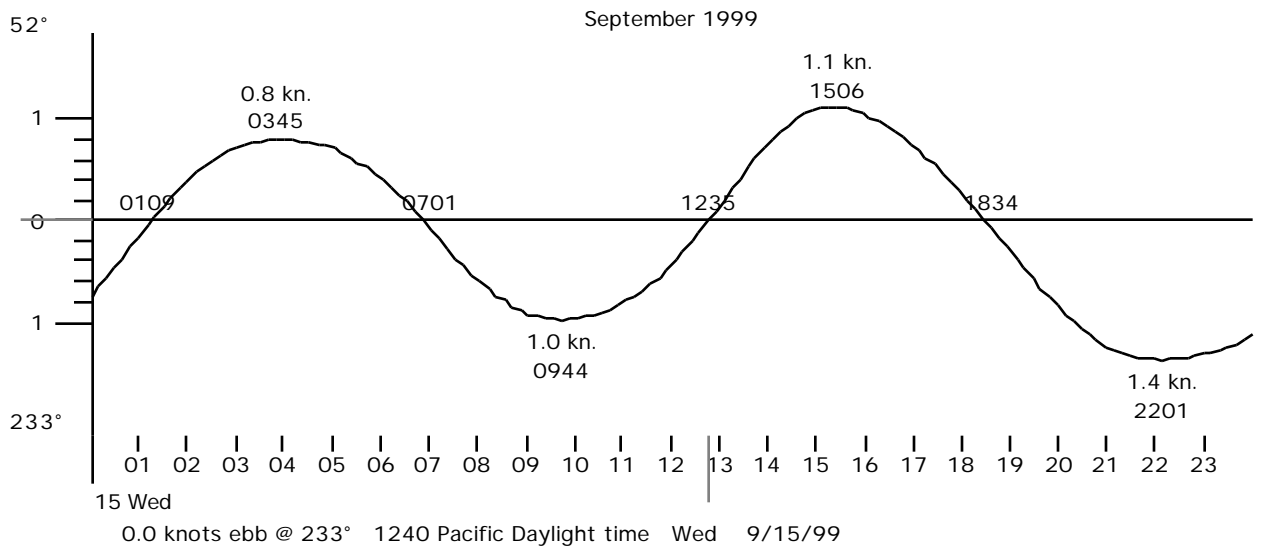


Figure 2. Currents for Pinole Point, September 15, 1999.

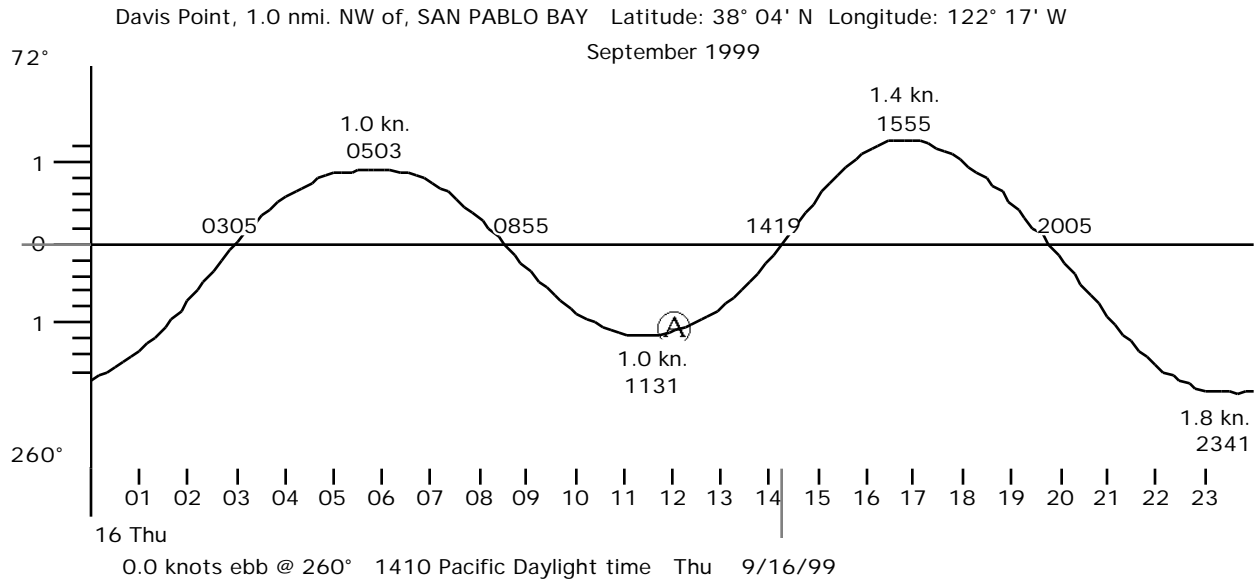


Figure 3. Currents for Davis Point, September 16, 1999.