

Cruise Report
2001 Regional Monitoring Program
Bivalve Retrieval Cruise

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

September 25-28, 30 2001

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Summer 2001 Bivalve Retrieval Report
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1 INTRODUCTION

This report describes activities associated with the 2001 dry-season bivalve retrieval cruise of the Regional Monitoring Program for Trace Substances in the San Francisco Estuary. Bivalves were attached to moorings at 12¹ sites. Measurement of contaminant bioaccumulation in transplanted bivalves during 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.

Contaminant bioaccumulation in bivalves is being measured in this program by attempting to collect bivalves from sites that are known to have low contaminant concentrations and transplanting them to separate mooring locations in the Estuary. During June deployments, three species of bivalves, *Mytilus californianus*, *Mytilus edulis*, and *Crassostrea gigas* were deployed at different locations depending upon the expected range of salinity. *M. californianus* were collected from Bodega Head, *M. edulis* were collected from Tomales Bay, and *C. gigas* were obtained from a commercial grower in Tomales Bay. Bivalve cages tested on previous cruises were used at seven sites, with deployments of both *M. californianus* and *M. edulis*. Additionally, specimens of *Corbicula fluminea* were collected from the native populations in areas adjacent to the historical mooring sites in the Sacramento River and San Joaquin River.

2 CRUISE REPORT

2.1 Objectives

The objectives of this cruise were:

- 1) Retrieve all bivalves deployed during June deployments.
- 2) Examine the bivalve moorings and make note of any needed repairs
- 3) Obtain data from a CTD cast at each bivalve station
- 4) Obtain survival data for cage-type containment systems
- 5) Obtain survival data for alternative species that can be used to move the RMP bivalve program toward use of a single bivalve species at all RMP stations
- 6) Divide surviving bivalves into three groups for analysis of trace organics and trace elements by Bay Area Clean Water Agencies (BACWA) and condition by Applied Marine Sciences

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

2.2 Personnel

The personnel and work assignments for this cruise are shown in the following table:

<u>Name</u>	<u>Affiliation</u>	<u>Duties</u>
Gordon Becker	AMS	Dive Tender, Bivalve Processing
David Bell	AMS	Cruise Manager, Diver, Bivalve Processing
Aaron Gold	AMS	Clam Collections
Jordan Gold	AMS	Clam Collections, Diver, Bivalve Processing
Paul Salop	AMS	Diver, Bivalve Processing
David Morgan	Romberg Tiburon Center	Vessel Skipper

The deployments of more than one species at each site resulted a large number of bivalves to be processed during this cruise. An extra crew member was added to the normal complement in order to process all animals in a timely manner.

2.3 Activities

<u>Date</u>	<u>Time</u>	<u>Activity</u>
9/25/01	0800-0900	Mobilized gear aboard vessel <i>R/V Questuary</i> , Emeryville Marina. Departed for Red Rock site (BC61).
	0945-1002	Retrieved bivalves from Red Rock, departed for Horseshoe Bay site (BC21).
	1031-1050	Vessel boarded by USCG during retrieval operations. Retrieved bivalves from Horseshoe Bay, departed for Yerba Buena Island site (BC10).
	1117-1132	Retrieved bivalves from Yerba Buena Island, departed for Emeryville Marina.
	1150-1600	Arrived Emeryville Marina and demobilized vessel. Completed all processing of bivalves on-shore. All bivalves stored overnight on dry ice.
9/26/01	0730-0800	Mobilized gear aboard <i>R/V Questuary</i> , Emeryville Marina. Departed for Alameda site (BB71).
	0850-0916	Retrieved bivalves from Alameda, departed for Redwood Creek site (BA40).
	1011-1027	Retrieved bivalves from Redwood Creek, departed for Dumbarton Bridge site (BA30).

<u>Date</u>	<u>Time</u>	<u>Activity</u>
	1045-1104	Retrieved bivalves from Dumbarton Bridge, departed for Coyote Creek site (BA10).
	1122-1145	Retrieved bivalves from Coyote Creek, departed for Emeryville Marina. Bivalves processed for condition in transit
	1500-1510	Arrived at Emeryville Marina, demobilized vessel. All bivalves transported to AMS freezer storage.
9/27/01	0830-0855	Mobilized gear aboard <i>R/V Questuary</i> , Emeryville Marina. Departed for Pinole Point site (BD30).
	0950-1010	Retrieved bivalves from Pinole Point, departed for Petaluma River site (BD15).
	1045-1105	Retrieved bivalves from Petaluma River site, departed for San Pablo Bay site (BD20).
	1130-1145	Retrieved bivalves from San Pablo Bay, departed for Emeryville Marina.
	1440-1510	Arrived at Emeryville Marina, demobilized vessel. Processed bivalves removed from vessel and stored on dry ice. Unprocessed bivalves left overnight in clean coolers on board vessel.
9/28/01	1000-1130	Mobilized gear and conducted safety briefing on <i>R/V Questuary</i> , Vallejo Marina. Processed remaining bivalves from 9/27/01. Departed for Napa River site (BD50).
	1206-1236	Retrieved bivalves from Napa River, departed for Davis Point site (BD40).
	1250-1400	Processed bivalves from Napa River while awaiting USCG and Unocal authorization to proceed to Davis Point site.
	1412-1423	Retrieved bivalves from Davis Point. Departed for Vallejo Marina.
	1443-1530	Arrived Vallejo Marina, processed bivalves and demobilized vessel.
9/30/01	1500-1915	Mobilized gear on <i>M.E. II</i> at Antioch Public Launch Ramp. Dredged for resident clams at San Joaquin River site (BG30) and Sacramento River site (BG20). Departed for Antioch Public launch Ramp.
	1930-2000	Arrived at Antioch Public Launch Ramp, processed bivalves and demobilized vessel.

2.4 Discussion

General Comments

Due to the events surrounding the terrorist attacks of September 11th, a heightened sense of security was noted at several locations around the Bay that impacted normal cruise operations. At the Horseshoe Bay site, the *R/V Questuary* was stopped and boarded by the USCG. At the Yerba Buena Island and Davis Point sites, the vessel was questioned by a USCG vessel but not boarded. The *Questuary* was also circled by a USCG helicopter at the Davis Point site. Operations were delayed at the Unocal pier at the Davis Point site awaiting authorization from the dock manager to proceed with retrieval. It is recommended that representatives of the Coast Guard and Unocal be contacted well in advance of 2002 dive operations to obtain re-authorization to conduct dive operations at sensitive locations.

The Cruise Plan was developed based upon the decision of the RMP Technical Review Committee to investigate use of cages in place of bags to contain bivalves, and to continue moving the RMP toward the use of a single transplanted species, probably *Mytilus edulis*, at all RMP stations.

Limited use of PVC cages on previous deployments suggested that the cages reduce mortality over the deployment period at stations with high predation (*e.g.*, Horseshoe Bay and Yerba Buena Island) without impacting growth. For the 2001 deployment, cages were redesigned to improve ease of use in the field and reusability over several years. Cages were placed at seven stations during 2001. Survival within the cages was comparable to the bagged bivalves at all deployments, and significantly higher for some. For the Yerba Buena Island site, caged *M. californianus* will be analyzed in place of the bagged bivalves since there was nearly full mortality in the bagged bivalves due to predation.

As in 1999 and 2000, 2001 deployments demonstrated that both *M. californianus* and *M. edulis* survive at all RMP stations during the summer west of Carquinez Strait, indicating that either species could be the sole species for deployment. During processing, all bivalves were kept segregated based on species and deployment method. Thus, the opportunity now exists to perform chemical or condition analyses between different species (*e.g.*, *M. californianus* vs. *M. edulis*) and between different containment methods (*i.e.*, bagged vs. caged mussels of the same species). All non-base species bivalves have been archived awaiting dispensation. A list of all bivalves retrieved and processed is shown in the following table:

Bivalve Species, Survival, and Preliminary Allocations

Site Name	Site Code	Ret. Date	Species	Cont.	# Depl.	TM	ORG	CI	Discard	Dead	Surv. (%)
Coyote Creek	BA10	9/26/01	MCAL	Bag	80	24	24	29	0	3	96
			MCAL	Cage	80	21	21	30	0	8	90
			MEDU	Bag	80	23	23	30	0	4	95
			MEDU	Cage	80	25	25	27	0	3	96
			CGIG	Bag	108	25	25	29	24	5	95
Dumbarton Bridge	BA30	9/26/01	MCAL	Bag	160	30	30	30	68	2	99
			MEDU	Bag	160	30	30	29	63	8	95
Redwood Creek	BA40	9/26/01	MCAL	Bag	80	25	25	29	0	1	99
			MEDU	Bag	80	21	22	30	0	7	91
			MEDU	Cage	80	22	23	30	0	5	94
Alameda	BB71	9/26/01	MCAL	Bag	152	30	30	30	61	1	99
			MEDU	Bag	160	30	30	30	60	10	94
Yerba Buena Is.	BC11	9/25/01	MCAL	Bag	80	0	0	0	7	73	9
			MCAL	Cage	80	20	20	20	0	20	75
			MEDU	Bag	80	0	0	0	3	77	4
			MEDU	Cage	80	20	20	29	0	11	86
Horseshoe Bay	BC21	9/25/01	MCAL	Bag	80	22	22	28	6	2	98
			MCAL	Cage	82	25	25	30	0	2	98
			MEDU	Bag	80	14	14	28	2	22	73
			MEDU	Cage	80	23	23	30	0	4	95
Red Rock	BC60	9/25/01	MCAL	Bag	80	25	25	24	0	6	93
			MCAL	Cage	80	24	25	31	0	0	100
			MEDU	Bag	80	27	25	27	0	1	99
			MEDU	Cage	80	19	21	31	0	9	89
Petaluma River	BD15	9/27/01	MCAL	Bag	160	30	30	29	65	6	96
			MEDU	Bag	160	30	30	30	62	8	95
			CGIG	Bag	144	30	30	30	5	49	66
San Pablo Bay	BD20	9/27/01	MCAL	Bag	160	30	30	30	64	6	96
			MEDU	Bag	160	30	30	30	51	19	88
			CGIG	Bag	144	30	30	30	34	20	86
Pinole Point	BD30	9/27/01	MCAL	Bag	160	30	30	30	67	3	98
			MEDU	Bag	160	30	30	30	68	2	99
Davis Point	BD40	9/28/01	MCAL	Bag	80	24	22	30	0	4	95
			MCAL	Cage	80	25	25	29	0	1	99
			MEDU	Bag	80	22	22	30	0	6	93
			MEDU	Cage	80	24	24	30	0	2	98
			CGIG	Bag	144	30	30	28	26	30	79
Napa River	BD50	9/28/01	MCAL	Bag	80	23	23	30	0	4	95
			MCAL	Cage	80	24	22	29	0	5	94
			MEDU	Bag	81	25	25	30	0	1	99
			MEDU	Cage	80	23	23	30	0	4	95
			CGIG	Bag	144	30	30	29	47	8	94

Site Locations

The coordinates for all bivalve moorings are listed in the following table:

<u>Site Name/Code</u>	<u>Latitude (N)</u>	<u>Longitude (W)</u>	<u>Comments</u>
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 0.1 nmi. N 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
Pinole Point 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
Napa River BD50	38° 04.84'	122° 14.82'	Mare Island Strait adjacent to General Foods facility, 0.7 nmi. from channel marker "2"
Grizzly Bay BF20	38° 06.49'	122° 03.37'	Channel marker "9" 1.0 nmi. NW of Garnet Point
Sacramento River BG20	38° 03'.58	121° 47.50'	Channel marker "8" N of Sherman Island
San Joaquin River BG30	38° 01.27'	121° 48.32'	Channel marker "8" 0.75 nmi. E of Antioch Marina