

Cruise Plan
2002 Regional Monitoring Program
Bivalve Deployment Cruise

May 16-17, 2002
May 27-31, 2002

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

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Objectives

The objectives of this cruise are:

- 1) Collect *Mytilus californianus* from Bodega Head and deploy at twelve sites.
- 2) Collect Bay mussels from Tomales Bay and deploy at twelve sites.
- 3) Obtain *Crassostrea gigas* from Tomales Bay and deploy at five sites.
- 4) Install containment cages at six sites to continue analysis of growth and survival of bivalves of species in bagged vs. caged deployments.
- 5) Install containment cages at six sites to test growth and survival of bivalves at maintained vs. unmaintained stations.
- 6) Deploy multiple species at the same sites to develop data that could be used to move the RMP bivalve program toward use of a single bivalve species at all RMP stations.

Bivalves Deployed

This 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 potential use of a single transplanted species, either the Bay mussel (formerly referred to as *M. edulis*) or *M. californianus*, at all RMP stations.

Deployments in 1999, 2000, and 2001 demonstrated that both *M. californianus* and Bay mussels survive at all RMP stations west of Carquinez Strait during the summer, indicating that either species could be the sole species for deployment at all present transplantation sites. For the 2002 deployment, we will continue side-by-side deployments of *M. californianus* and Bay mussels at each deployment station. Fewer bivalves will be deployed at each site than in previous years due to lack of trace element analyses (trace metal analyses is next scheduled for 2006). A minimum of 80 individuals of both Bay mussels and *M. californianus* will be deployed at every RMP bivalve transplantation site. In addition, 72 *C. gigas* will be deployed at the five stations where it is the current base species. This will allow for a side-by-side comparison of bioaccumulation by Bay mussels and *M. californianus* at each station, and with *C. gigas* at appropriate stations. It will also allow for a full set of chemistry and growth data for a single species at all transplant sites to be analyzed.

The 2002 deployment will also continue investigation into the use of cages as the containment method. Limited use of PVC cages on previous deployments suggested that the cages reduce mortality at stations with typically high predation (*i.e.*, Horseshoe Bay and Yerba Buena Island), but may have a slight negative effect on growth. Using cages at all stations would also lessen the possibility of predation at sites where it has not occurred in the past (such as from the Atlantic Green crab, an introduced species that is increasing in its range in the Pacific). Side-by-side analyses of growth and survival will be performed at six sites, three mainstem sites and three margin sites, with both *M. californianus* and *M. edulis* deployed in bags and cages at each site.

In addition, the 2002 deployments will also analyze the effect of the maintenance cruise operations on growth and survival of caged bivalves to determine if the maintenance cruise could potentially be eliminated with a transition to all caged deployments. Maintained and unmaintained cages will be established at three mainstem and three margin sites.

A list of all bivalves to be deployed for the 2002 deployment cruise is given in Table 1. In addition to the bivalves listed in this table, approximately 130 individuals of each species will be collected for use in time zero analyses and to make up one extra cage/bag for each species in case of loss of a cage/bag during deployment. The total number of bivalves to be collected/purchased is 1,600 *M. californianus*, 1,600 Bay mussels, and 520 *C. gigas*.

Personnel

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

Name	Affiliation	Duties	Contact
Mey Akashah	AMS	Bivalve Collection, Tender, Diver	akashah@amarine.com
David Bell	AMS	Bivalve Collection, Tender	bell@amarine.com
Jordan Gold	AMS	Bivalve Collection, Cruise Manager, Diver, Vessel Skipper (6/31), Tender	gold@amarine.com
Paul Salop	AMS	Bivalve Collection, Diver, Tender	salop@amarine.com
David Morgan	RTC	Vessel Skipper, 6/27-30	dmorgan@sfsu.edu

Captain Morgan will be responsible for vessel operation and safety on 6/27-30. Mr. J. Gold will be responsible for overall cruise management throughout the cruise and vessel operation and safety on 6/31. Messrs. Gold, Bell, and Salop and Miss Akashah will alternate diver responsibilities and tending.

Cruise Schedule

This cruise schedule assumes that approximately 30 minutes will be required for operations at each site and the vessel proceeds between stations at approximately 15 knots. Table 2 gives an estimated schedule for cruise operations.

Table 2. Cruise schedule for RMP Summer 2002 Bivalve Deployment.

Date	Time	Activity
May 16	0800-1600	Gold and Akashah collect Bay mussels from Tomales Bay and pick up <i>C. gigas</i> from Hog Island Oyster Co., and transport bivalves to BML where the bivalves are placed in free-flowing seawater tanks.
May 17	0900-1700	Akashah, Bell, Gold and Salop collect <i>M. californianus</i> from Bodega Head, Sonoma County. <i>M. californianus</i> are then placed in free-flowing seawater tanks at (BML).
May 27	0900-1600	Gold picks up bivalves from BML.
May 28	0800-0830	Mobilize gear, load bivalves aboard <i>RV Questuary</i> , Emeryville Marina. Depart for San Pablo Bay site.
	0830-1500	Check mooring integrity and deploy bivalves at San Pablo Bay (BD20), Petaluma River (BD15), and Pinole Point (BD30) sites. Slack current near Pinole Point is at 1135. (Figure 1).
May 29	0700-0730	Mobilize gear, load bivalves aboard <i>RV Questuary</i> , Emeryville Marina. Depart for Alameda site.
	0730-1530	Check mooring integrity and deploy bivalves at Alameda (BB71), Redwood Creek (BA40), Dumbarton Bridge (BA30), and Coyote Creek (BA10). Slack current near Alameda is at 0923 (Figure 2).
May 30	0900-0930	Mobilize gear, load bivalves aboard <i>RV Questuary</i> , Emeryville Marina. Depart for Red Rock site.
	0930-1430	Check mooring integrity and deploy bivalves at Red Rock (BC61), Horseshoe Bay (BC21), and Yerba Buena Island (BC10) sites. Slack current near Red Rock is at 1108 (Figure 2).
May 31	1130-1300	Mobilize gear, process T-0 bivalves, and load remaining bivalves aboard <i>Karen M.</i> , Vallejo Public Boat Launch. Depart for Davis Point site.
	1300-1530	Check mooring integrity and deploy bivalves at Davis Point (BD40) and Napa River (BD50). Slack current near Davis Point is at 1456 (Figure 4).

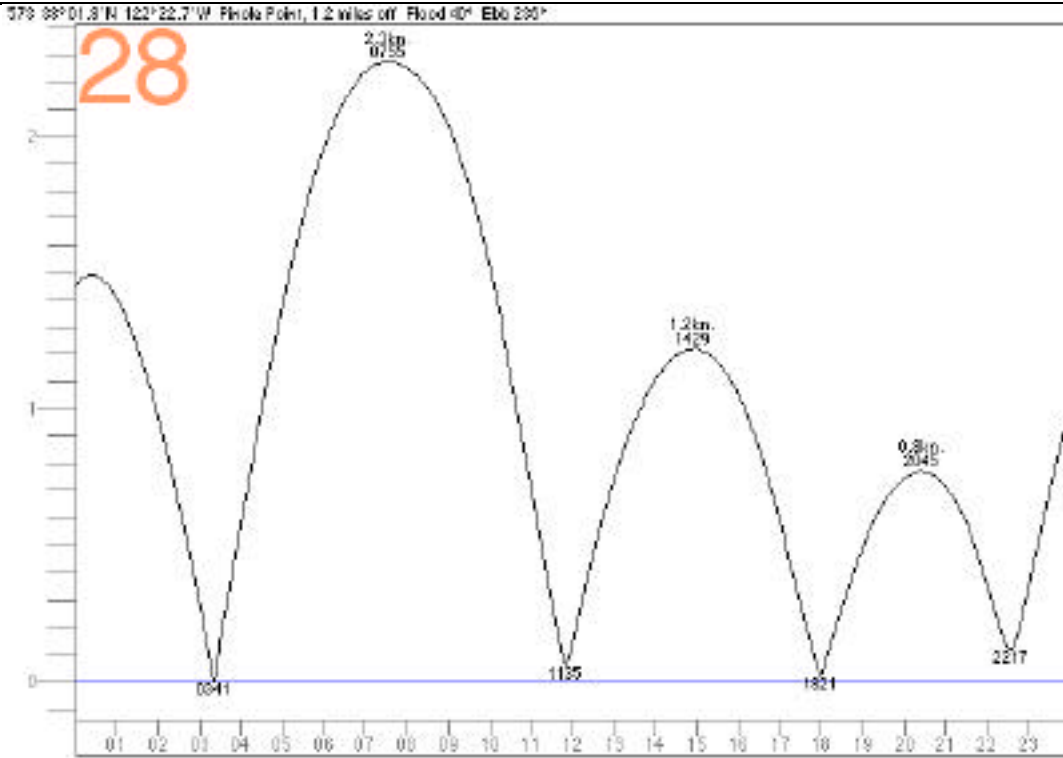


Figure 1. Currents near Pinole Point, May 28, 2002.

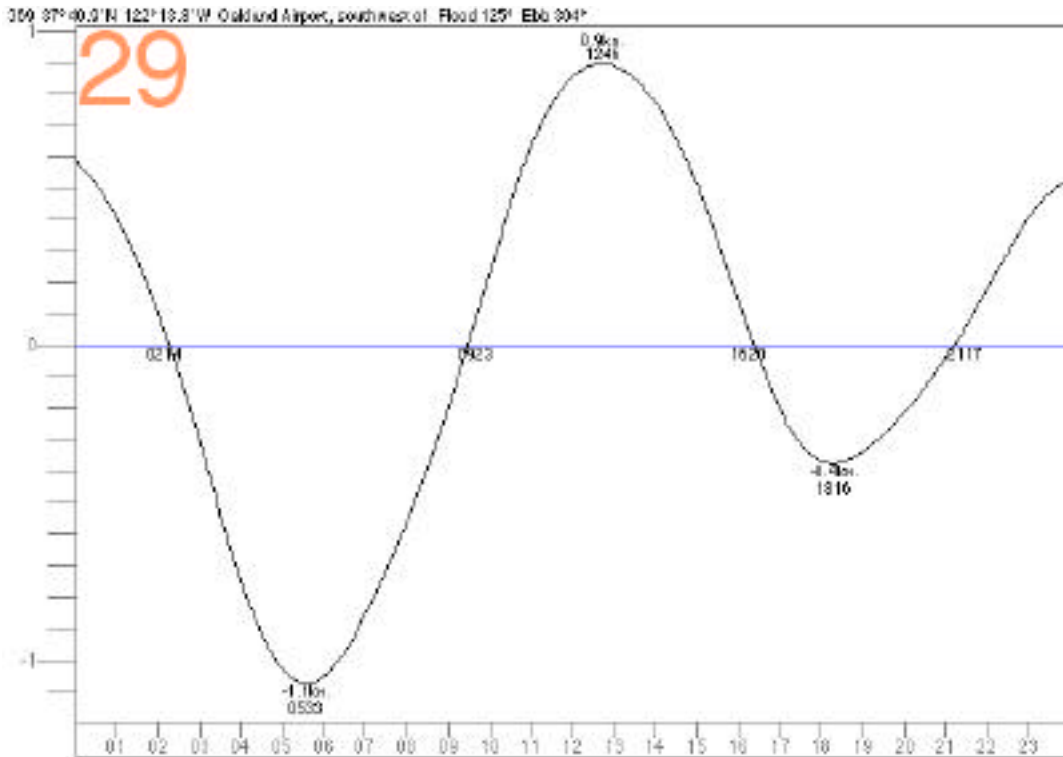


Figure 2. Currents near Alameda on May 29, 2002.

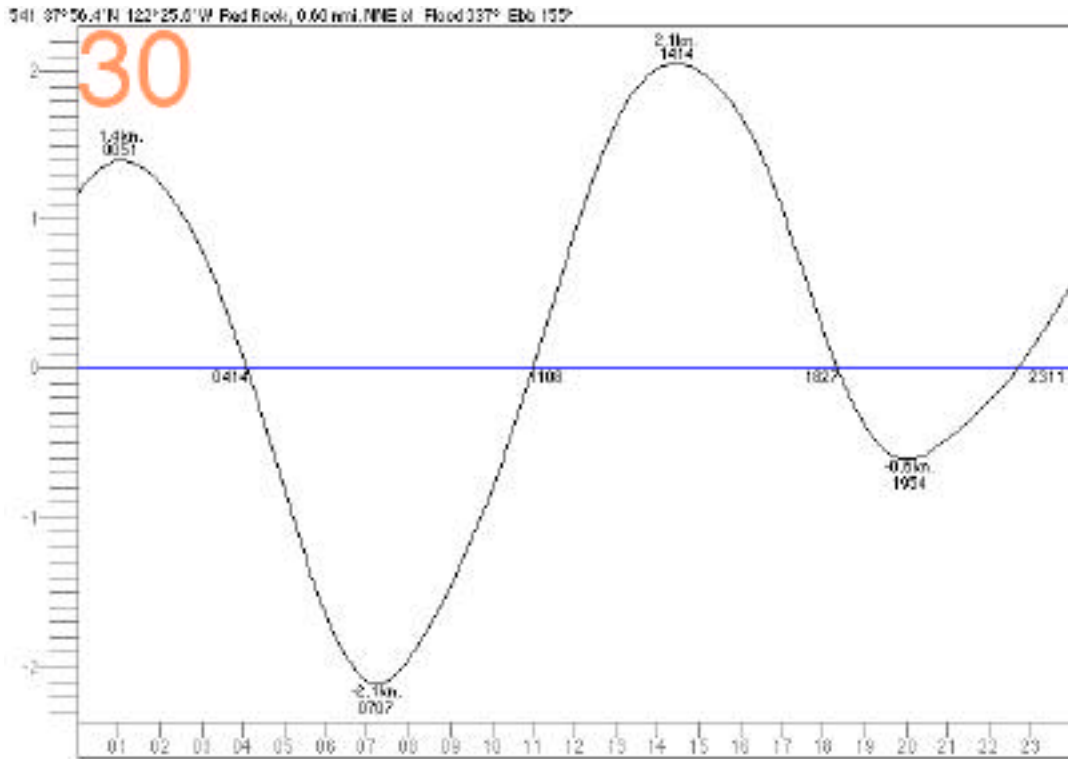


Figure 3. Currents near Red Rock on May 30, 2002.

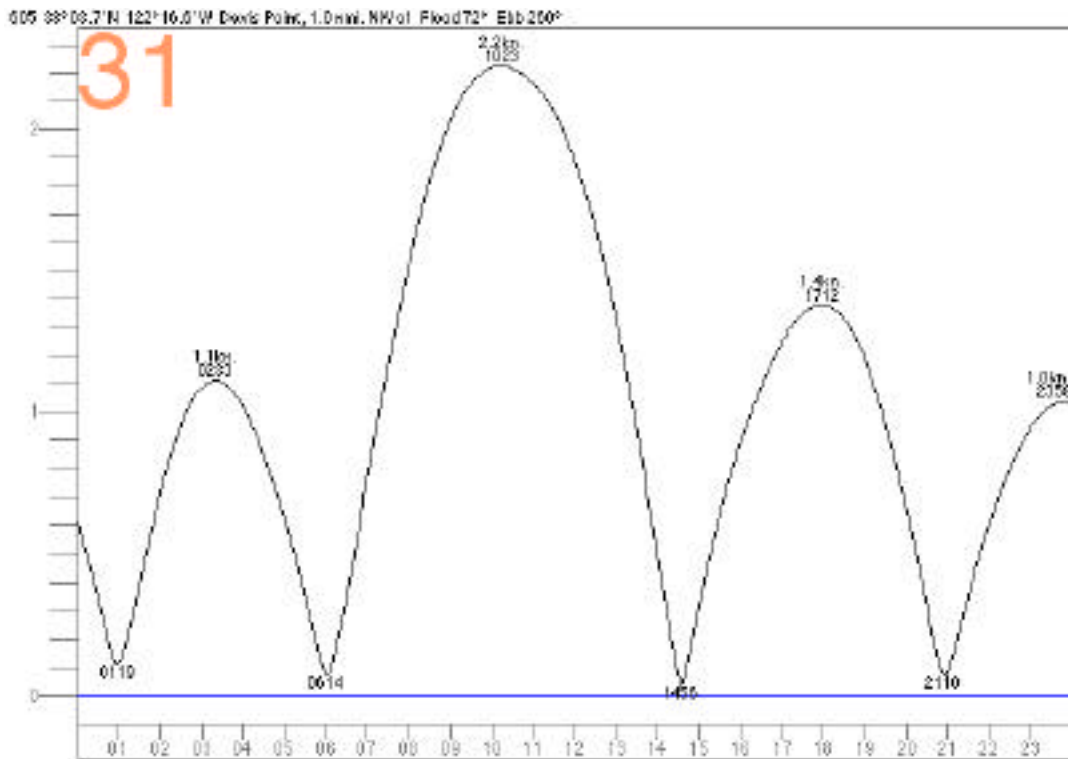


Figure 4. Currents near Davis Point on May 31, 2002.

Site Locations

The coordinates for all RMP bivalve stations are listed below:

Site Name/Code	Latitude (N)	Longitude (W)	Comments
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
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

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Table 1. Bivalves Scheduled for Deployment for the 2002 Bivalve Deployment Cruise

	Unmaint. Cages		Maintained, for side-by-sides				Add. Maintained Bags			Addl. Maintained Cages	
	MCAL	MEDU	Bags		Cages		MCAL	MEDU	CGIG	MCAL	MEDU
			MCAL	MEDU	MCAL	MEDU					
Yerba Buena Isl										1	1
Horseshoe Bay	1/2	1/2								1	1
Coyote Creek	1/2	1/2	2	2	1/2	1/2			2		
Redwood Creek	1/2	1/2	2	2	1/2	1/2					
Dumbarton Br.							2	2			
Alameda	1/2	1/2	2	2	1/2	1/2					
Red Rock							2	2			
Petaluma River							2	2	2		
San Pablo Bay	1/2	1/2	2	2	1/2	1/2			2		
Pinole Point			2	2	1/2	1/2					
Davis Point							2	2	2		
Napa River	1/2	1/2	2	2	1/2	1/2			2		
Total Bivalves	240	240	480	480	240	240	320	320	360	160	160

Notes:

- 1/2 cage deployments indicate 40 mussels (2 compartments of 20 each)
- Each full cage deployment indicates 80 mussels (4 compartments of 20 each)
- Bagged mussels indicate deployments of 40 mussels (4 compartments of 10 each)
- All oysters will be bagged, in quantities of 36 (3 compartments of 12 each)