



2018 Bivalve Deployment

Cruise Plan

Contract # 1343

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1. Introduction

This report details plans associated with the biennial Regional Monitoring Program for Water Quality in the San Francisco Estuary (RMP) bivalve deployment cruise. This Cruise Plan was developed based upon the decisions of the RMP Technical Review Committee in 2002 to reduce the number of bivalve transplant stations from twelve to nine, utilize deployment cages rather than bags at all stations, and deploy only *Mytilus californianus*. These changes went into effect with the 2003 program and continued through the 2012 deployments. In 2014, the RMP Technical Review Committee reduced bivalve deployment transplant stations from 9 to 7 stations, 3 of which are back-up deployment sites. In addition, as instituted initially with the 2006 deployments, there is no mid-deployment maintenance cruise, as previous analyses showed no difference in bivalve growth or survival between maintained and unmaintained deployments. In the spring of 2018, the Technical Review and Steering Committee approved the RMP's purchase of remote acoustic-release sampling equipment to eliminate the need to tether bivalve cages to impermanent moorings and reduce the effort and cost for both the deployment and retrieval cruises.

2. Cruise Plan

2.1. Objectives

All sampling will be conducted from the *RV Questuary*. The objectives of the sampling effort are as follows:

1. Collect *M. californianus* from Bodega Head State Reserve.
2. Depurate the collected mussels at Bodega Marine Lab (BML) until time of deployment.
3. Conduct defouling of all collected mussels at BML prior to deployment.
4. Deploy the mussels in containment cages at seven sites throughout the San Francisco Estuary.
5. Collect a CTD water column profile at seven sites.

2.2. Personnel

The personnel and work assignments for this cruise are shown in Table 1.

Table 1. Personnel for 2018 RMP Bivalve Deployment Cruise

Name	Affiliation	Duties
Winn McEnergy	AMS	Bivalve collections, deployment field staff, technical lead
Ryan Driscoll	AMS	Bivalve collections
Paul Salop	AMS	Bivalve collections, deployment field staff, cruise manager
Sara Thomas	AMS	Bivalve collections
Clifton Herrmann	AMS	Deployment field staff
Ila Shimabuku	SFEI	Deployment field staff
David Bell	RTC	Vessel skipper

Messrs. McEnery, Driscoll, Thomas, and Salop will be responsible for bivalve collections. BML Aquatic Resources Group will assist with collections and care of bivalves while depurating at BML, and will conduct defouling operations. Captain Bell will be responsible for vessel operation and safety. Mr. Salop will be responsible for overall cruise management, including permitting.

2.3. 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 12 knots. Table 2 gives a tentative schedule for cruise operations.

Table 2. Anticipated Cruise Schedule for 2018 RMP Sediment Cruise

Date	Time	Activity
June 15, 2018	0530-1200	McEnery, Thomas, Melwani, and Salop collect <i>M. californianus</i> from Bodega Head State Marine Reserve, Sonoma County. Low tide (-1.57 ft MLLW) occurs at 0705. <i>M. californianus</i> are then placed in filtered seawater tanks at Bodega Marine Lab (BML) for depuration and removal of fouling organisms.
July 17, 2018	1000-1700	Hermann retrieves bivalves from BML and transports to vessel at Paradise Cay. McEnery meets vessel and loads acoustic release equipment and weights.
July 18, 2018	0700-0800 0800-1600	Mobilize gear, load bivalves aboard <i>RV Questuary</i> , Emeryville Marina. Depart for YBI site. Deploy bivalves at Yerba Buena Island (BC10), Alameda (BB71), Redwood Creek (BA40), Dumbarton Bridge (BA30), and Coyote Creek (BA10) sites.
July 19, 2018	0900-0930 0930-1530	Mobilize equipment on <i>R/V Questuary</i> at Paradise Cay Marina. Depart for San Pablo Bay (BD20). Deploy bivalves at San Pablo Bay (BD20) and Pinole Point (BD30) sites. Return to Paradise Cay and demobilize vessel.
July 20, 2018	As needed	Scheduled makeup day as required.

2.4. Sampling Procedures

The target for surviving bivalves retrieved at the conclusion of deployments is a minimum of 150 live organisms to have enough tissue mass for the planned laboratory analyses. The mussels would be allocated as follows: 100 bivalves for analysis of PAHs, selenium, algal toxins, and generation of archives, 25 bivalves for analysis of microplastics, and 25-30 for analysis of growth. Sites experiencing

extremely high levels of mortality or catastrophic failure of cages may not be able to meet these targets.

To meet this target, 200 individuals of *M. californianus* will be deployed at each of four bivalve transplantation sites for S&T analyses and three backup deployment sites (to be archived but only analyzed upon failure of primary deployment stations). At each site, 100 mussels will be placed in each of two cages, with four compartments holding 25 mussels each. At site BA10, an additional cage containing 100 mussels will be deployed to account for high mortality often exhibited at this site.

Approximately 1,700 mussels are needed to support S&T analyses (including ~300 mussels allocated for T-0 analyses). An additional 200 mussels will be collected to make up for mortality prior to or during deployment operations. Therefore, the total number of bivalves to be collected from Bodega Head is targeted at approximately 1,900 *M. californianus*.

2.5. Sampling Sites

Coordinates for all RMP sampling sites are shown in Table 3. All scheduled samples to be collected at each site are shown in Table 3.

Table 3. Coordinates for 2018 RMP Bioaccumulation Cruise Sampling Sites. All coordinates are listed in WGS-84 datum (See Section 3 for a map of station locations). Coordinates for BG20 and BG30 are approximate only – dredging locations will be established at time of sampling based upon populations present.

Site	Lat	Long	Comments
T-0	38.22050	-123.06550	Mussels collected from intertidal rock outcrops
BA10	37.46983	-122.06383	Coyote Creek: Near channel marker “18”
BA30	37.51333	-122.13467	Dumbarton Bridge (backup site): Near channel marker “14”
BA40	37.54700	-122.19500	Redwood Creek: Near channel marker “4”
BB71	37.69550	-122.33967	Alameda (backup site): Near channel marker “1” 1.65 nmi. SE of Hunters Point
BC10	37.81392	-122.35873	USCG Station adjacent to Yerba Buena Island
BD30	38.01667	-122.36750	Pinole Point: Near Channel marker “P”
BD20	38.05900	-122.42367	San Pablo Bay (backup site): Near channel marker “4.” Approx. 1 nmi from channel marker “1” (site moved in 2006)
BG20	38.05570	-121.80593	Sacramento River (residents only): Near channel marker “8” N of Sherman Island
BG30	38.02362	-121.80048	San Joaquin River (residents only): Near channel marker “8” 0.75 nmi. E of Antioch Marina

3. Map of Deployment / Collection Locations for 2018 RMP Bivalve Monitoring

