September 20, 2014

CARMEL BAY AREA OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

DRAFT COMPLIANCE PLAN

COUNTY OF MONTEREY
RESOURCE MANAGEMENT AGENCY
ENVIRONMENTAL SERVICES DIVISION
168 WEST ALISAL STREET, 2ND FLOOR
SALINAS, CALIFORNIA 93901

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ACRONYMS

ASBS	Area(s) of Special Biological Significance
ASBS WPA	ASBS Watershed Protection Area
BMP	Best Management Practice
CC ASBS RMP	Central Coast ASBS Regional Monitoring Program
CEQA	California Environmental Quality Act
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
EHB	Environmental Health Bureau
EIR	Environmental Impact Report
IDDE	Illicit Discharge Detection and Elimination
LCP	Local Coastal Program
LID	Low Impact Development
LUP	Land Use Plan
MRSWMP	Monterey Regional Storm Water Management Program
MS4	Municipal Separate Storm Sewer System (Storm Drain System)
NPDES	National Pollution Discharge Elimination System
OWOW	Our Water – Our World
PAHs	Polynuclear Aromatic Hydrocarbons / Polycyclic Aromatic Hydrocarbons
QAPP	Quality Assurance Project Plan
RWQCB	Regional Water Quality Control Board
SCCWRP	Southern California Coastal Water Research Project
SWPPP	Storm Water Pollution Prevention Plan
SWQPA	State Water Quality Protection Area
SWRCB	State Water resources Control Board

TMDL	Total Maximum Daily Load
USEPA	United States Environmental Protection Agency
WQO	Water Quality Objective

EXECUTIVE SUMMARY

In 1972, the California State Water Resources Control Board (State Water Board) adopted the California Ocean Plan (Ocean Plan) as the State's water quality control plan for ocean waters. The Ocean Plan provides the basis for regulating waste discharges into ocean waters and applies to both point and nonpoint source discharges. It identifies Beneficial Uses of California's ocean waters, establishes Water Quality Objectives (WQOs), and sets forth a program of implementation. The Ocean Plan prohibits waste discharges, including storm water runoff, to Areas of Special Biological Significance (ASBS). This absolute waste discharge prohibition applies unless an "exception" is granted.

On March 20, 2012, the State Water Board adopted a General Exception to the Ocean Plan waste discharge prohibition to ASBS. The General Exception (State Water Board Resolution No. 2012-0012, as amended by 2012-0031) governs point and nonpoint source waste discharges to ASBS, including storm water runoff. It includes Special Protections for Beneficial Uses of ASBS and requires development of ASBS Compliance Plans by permitted point source dischargers or ASBS Pollution Prevention Plans by non-point source dischargers. Twenty-seven applicants, including the County of Monterey (County) for the Carmel Bay ASBS, were granted coverage under the General Exception.

In accordance with the General Plan Exception requirements, the Draft Carmel Bay ASBS Compliance Plan describes how Monterey County will comply with the Special Protections for Beneficial Uses of the ASBS. It addresses the portion of the Carmel Bay ASBS watershed that is under County jurisdiction and subject to the National Pollutant Discharge Elimination System (NPDES) General Permit and Waste Discharge Requirements for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s), the Phase II Small MS4 General Permit (State Water Board Order No. 2013-0001-DWQ).

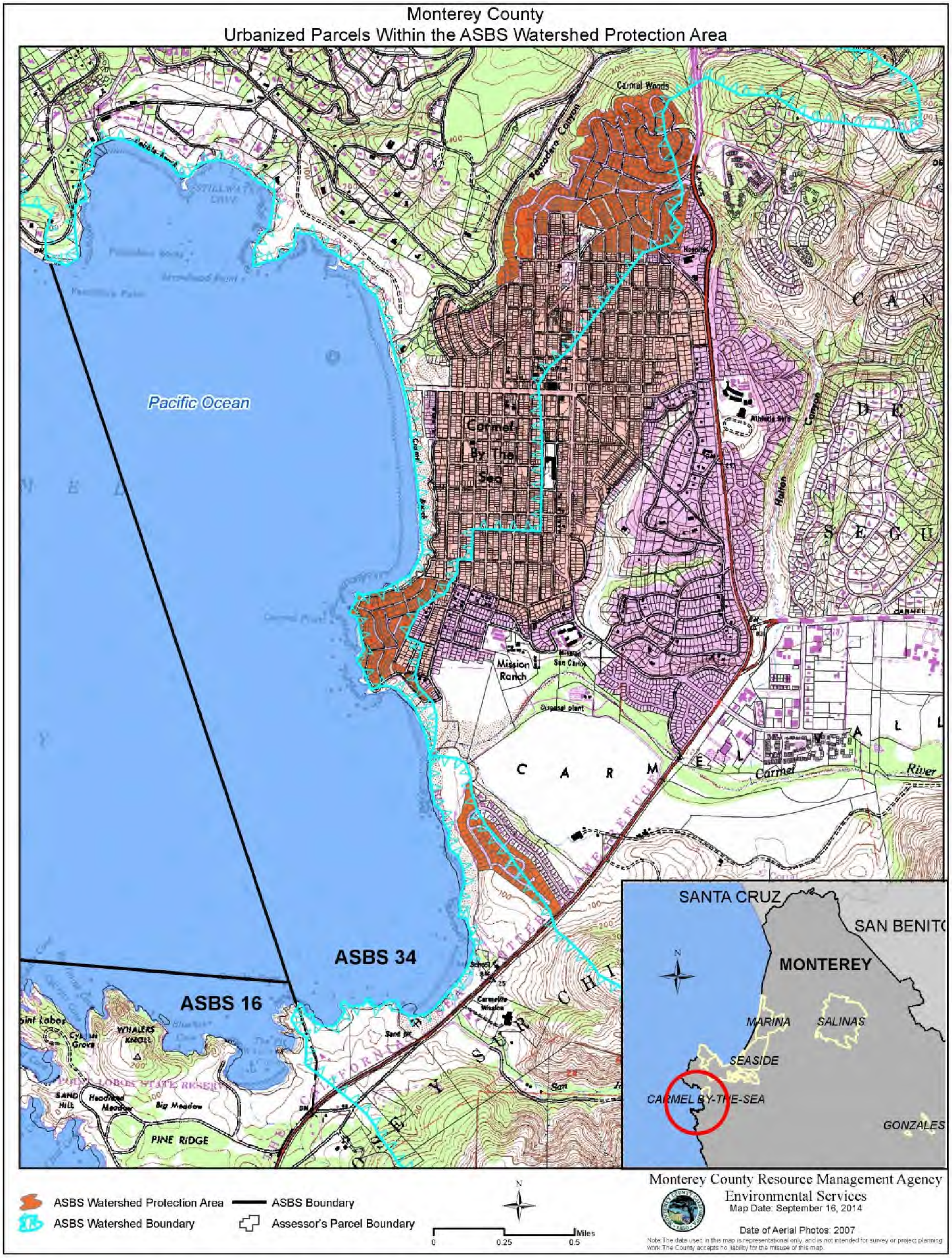

FIGURE 1.1 CARMEL BAY AREA OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

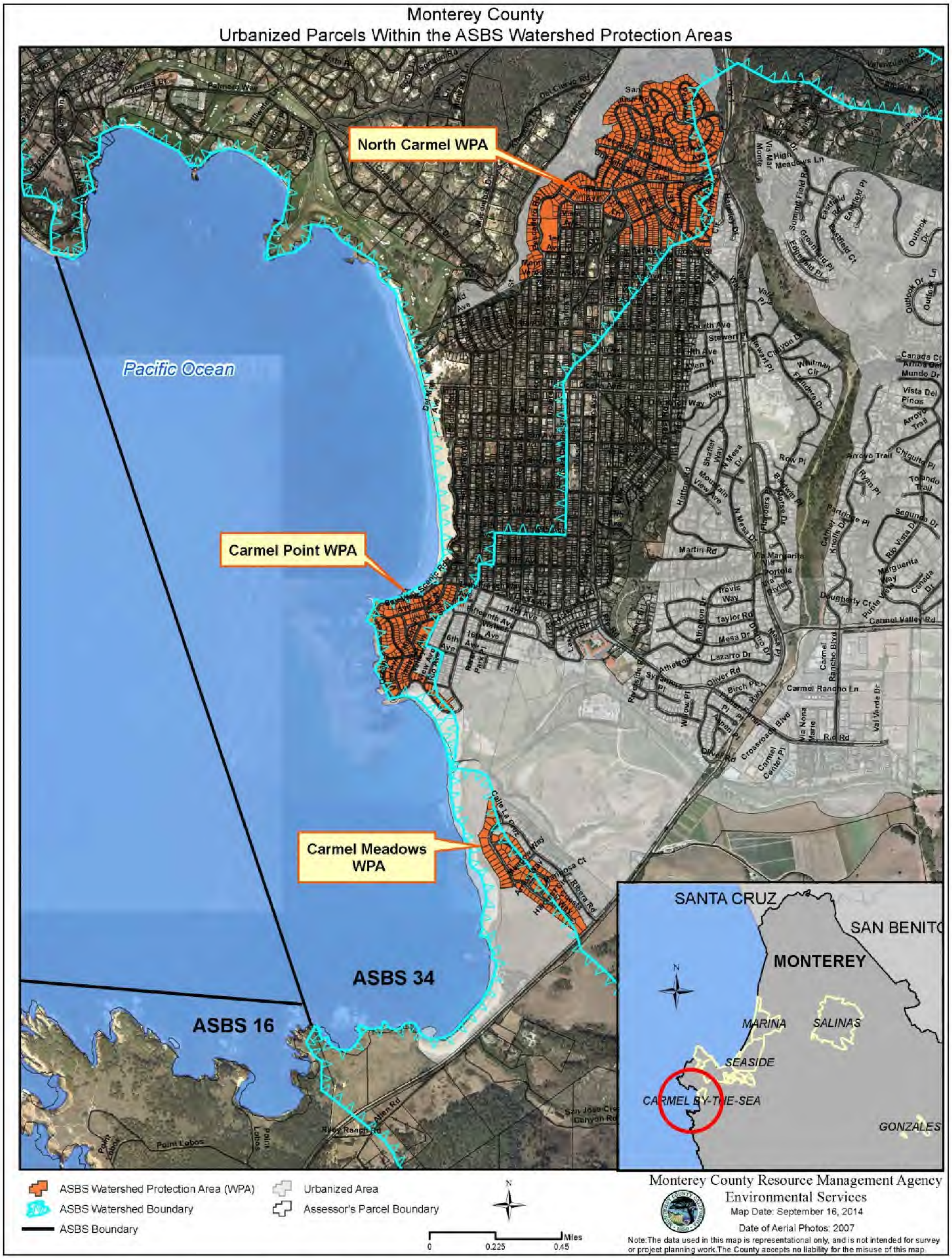

Figure 1.2 Carmel Bay ASBS Watershed Protection Areas (WPAs)

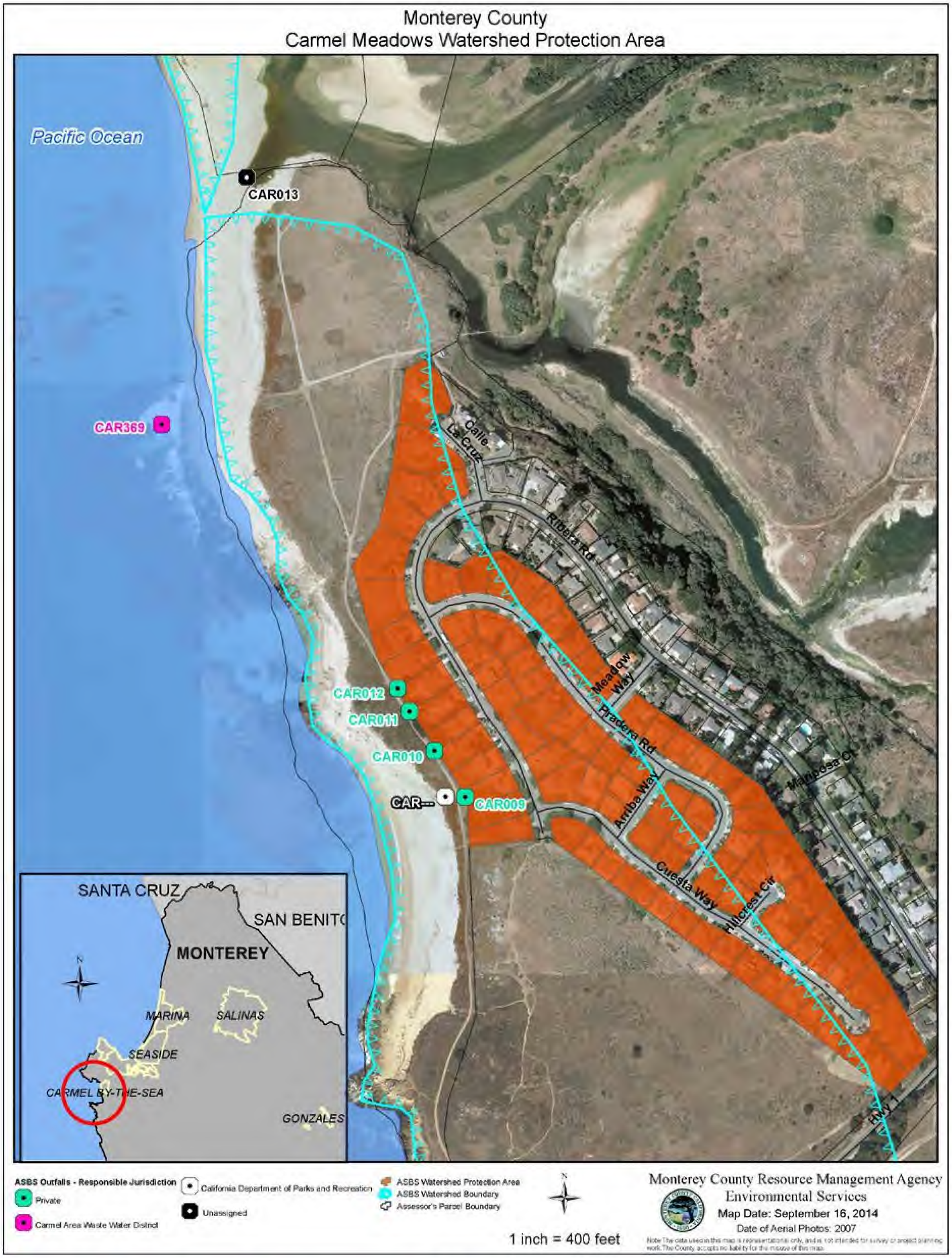

Figure 1.3 Carmel Meadows Watershed Protection Area (WPA)

Figure 1.4 Carmel Point Watershed Protection Area (WPA)

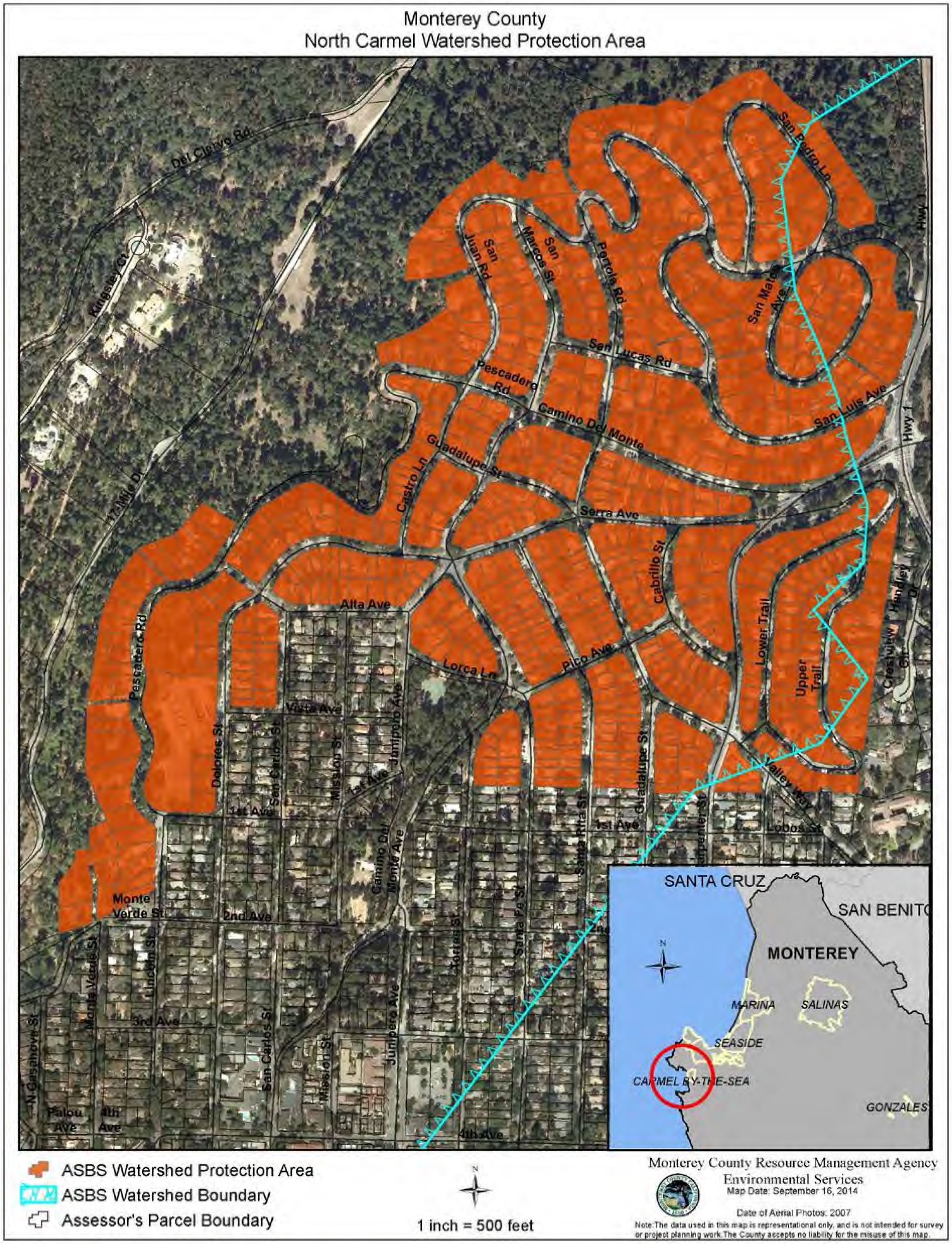

Figure 1.5 North Carmel Watershed Protection Area (WPA)

1.0 INTRODUCTION

On March 20, 2012, the California State Water Resources Control Board (State Water Board) adopted a General Exception to the California Ocean Plan waste discharge prohibition to Areas of Special Biological Significance (ASBS). The General Exception (State Water Board Resolution No. 2012-0012, as amended by Resolution No. 2012-0031) governs point and nonpoint source waste discharges to ASBS, including storm water runoff. It includes Special Protections for Beneficial Uses of ASBS and requires development of ASBS Compliance Plans by permitted point source dischargers or ASBS Pollution Prevention Plans by non- point source dischargers. Twenty-seven applicants, including the County of Monterey (County) for the Carmel Bay ASBS, were granted coverage under the General Exception. This Draft ASBS Compliance Plan describes how the County, a National Pollutant Discharge Elimination System (NPDES) program permitted point source discharger, will comply with the Special Protections.

The content and organization of this Draft ASBS Compliance Plan follow the requirements described in Provision I.A.2 of Attachment B (Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges) to the General Exception Resolution. Following this introduction, Section 2 provides a regulatory background and describes fundamental provisions of the Special Protections. Section 3 describes the Carmel Bay ASBS watershed. Section 4 describes existing regulatory programs that address water quality in the ASBS. Section 5 describes the structural and non-structural Best Management Practices (BMPs) currently employed or planned in the future. Section 6 summarizes the County's ASBS monitoring program. Section 7 includes the compliance and implementation schedule. References used in the development of this Draft ASBS Compliance Plan are cited in Section 8.

2.0 ASBS REGULATORY BACKGROUND

In 1972, the State Water Board adopted the California Ocean Plan (Ocean Plan) as the State's water quality control plan for ocean waters. The Ocean Plan provides the basis for regulation of waste discharges to coastal waters and applies to both point and nonpoint sources discharges. It is implemented by the State Water Board and the six coastal Regional Water Quality Control Boards (Regional Water Boards). In the Carmel Bay ASBS, the Central Coast Regional Water Quality Control Board (Regional Water Board) is the lead agency for Ocean Plan.

The Ocean Plan identifies Beneficial Uses of California's ocean waters, establishes narrative and numerical Water Quality Objectives (WQOs) protective of those Beneficial Uses, identifies areas where discharges are prohibited, and sets forth a program of implementation to ensure that WQOs are achieved and Beneficial Uses are protected. The California Water Code requires review of the Ocean Plan at least every three years to ensure that current standards are adequate and continue to protect indigenous marine species and human health. The current 2012 Ocean Plan was adopted by the State Water Board with Resolution No. 2012-0056 which became effective August 19, 2013.

Shortly after adoption of the 1972 Ocean Plan, the State Water Board designated 34 ASBS, covering approximately one-third of the State's coastline, including the Carmel Bay ASBS. ASBS support an unusual variety of aquatic life, and often host unique individual species. They are considered the basic building blocks for a sustainable, resilient coastal environment and economy. Since 1983, the Ocean Plan has prohibited waste discharges to ASBS and states that "discharges shall be located a sufficient distance from such designated areas to assure maintenance of natural water quality conditions in these areas." This absolute waste discharge prohibition applies unless an "exception" is granted.

As of January 2005, ASBS areas were re-designated as a subset of "State Water Quality Protection Areas" (SWQPAs) that require special protection. Section 36700(f) of the Public Resources Code defines a state water quality protection area as "a non-terrestrial marine or estuarine area designated to protect marine species or biological communities from an undesirable alteration of natural water quality, including but not limited to, areas of special biological significance that have been designated by the State Water Board through its water quality control planning process." The section further states that "In a state water quality protection area, point source waste and thermal discharges shall be prohibited or limited by special conditions. Nonpoint source pollution shall be controlled to the extent practicable."

Recognizing that point and nonpoint source discharges into ASBS are occurring, despite the Ocean Plan prohibition, the State Water Board contracted with the Southern California Coastal Water Research Project (SCCWRP) to survey by foot or boat all discharges into ASBS in

California. SCCWRP (2003) identified 1,658 outfalls into ASBS statewide, many of which are storm water outfalls permitted under the NPDES program through Municipal Separate Storm Sewer System (MS4) permits to local governments (Final EIR, 2012, p. 7).

On May 12, 2008, the Regional Water Board notified Monterey County that it must apply for an exception to the Ocean Plan's waste discharge prohibition to allow storm water and non-storm water discharges into the Carmel Bay ASBS or cease discharges. The County was one of 27 applicants requesting an exception to discharge to various ASBS throughout California. The exception was approved by the State Water Board as part of a General Exception in Resolution No. 2012-0012 titled, "Approving Exceptions to the California Ocean Plan for Selected Discharges into Areas of Special Biological Significance, Including Special Protections for Beneficial Uses, and Certifying a Program Environmental Impact Report." The exception is a special permission, granted by the State Water Board, to discharge into the ASBS. It is not a discharge permit and only applies to point and nonpoint source discharges (e.g., stormwater runoff, which can be either a point or nonpoint discharge) provided they are covered under an appropriate authorization, such as an NPDES permit.

Stringent Special Protections were adopted by the State Water Board as conditions for the Ocean Plan Exception. State Water Board Resolution No. 2012-0031 revised the deadline for compliance with natural ocean water quality from four years to six years. Potential environmental effects of the General Exception and Special Protections were evaluated in an Environmental Impact Report in accordance with the requirements of the California Environmental Quality Act (CEQA) (State Water Board 2012).

2.1. SPECIAL PROTECTIONS

This Draft ASBS Compliance Plan describes how the County, a point source (storm drain system) discharger, permitted under the NPDES program, will comply with the Special Protections.

The Special Protections require development of a Compliance Plan that describes the measures by which the Special Protections will be achieved. Census-designated urbanized areas of unincorporated Monterey County and other Regional Water Board-designated communities are covered under the County's Phase II MS4 General Permit (Order No. 2013-0001-DWQ), including the entirety of the County's Carmel Bay ASBS Watershed Protection Area (WPA). This draft ASBS Compliance Plan addresses the portion of the Carmel Bay ASBS watershed that is under County jurisdiction and is subject to the requirements of the Phase II Municipal General Permit.

This Draft ASBS Compliance Plan is due by September 20, 2014, per the time adjustment granted by the State Water Board on August 14, 2013, and is subject to approval by the Executive Officer of the State Water Board. The Final ASBS Compliance Plan is due by

September 20, 2015, twelve months after submittal of the Draft ASBS Compliance Plan. Implementation of the ASBS Compliance Plan is reported in the County's Phase II permit annual reports.

If, based upon results of discharge and receiving water monitoring required under Special Protections (see Section 6), it is determined that the County's identified discharge is causing or contributing to an alteration of natural ocean water quality in the ASBS, it may be necessary to revise the ASBS Compliance Plan. A process for evaluating potential alterations to natural water quality in the ASBS and their potential causes will be developed by the Central Coast ASBS Regional Monitoring Program.

2.1.1. PERMITTED POINT SOURCE STORM WATER DISCHARGES

Permitted point source storm water discharges into an ASBS are only allowed under the conditions set forth in Provision I.A.1.a of the Special Protections, which include:

(1) The discharges are authorized by an NPDES permit issued by the State Water Board or Regional Water Board;

(2) The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in the Special Protections; and

(3) The discharges:

- (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;
- (ii) Are designed to prevent soil erosion;
- (iii) Are composed of only storm water runoff.

In addition, discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS, the discharge of trash is prohibited, and only discharges from existing storm water outfalls are allowed.

2.1.2. PERMITTED POINT SOURCE NON-STORM WATER DISCHARGES

Non-storm water discharges into an ASBS are prohibited except as provided in the Special Protections.

"Non-storm water discharges" are defined in two ways in the Special Protections. The first definition is as "any waste discharges from an MS4 or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water" (p.2), and the second definition is as "Any runoff that is not the result of a precipitation event. This type of runoff is often referred to as 'dry weather flow'" (p.20).

Several types of non-storm water discharges are allowed under Provision I.A.1.e.(2) of the Special Protections, “provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally.” These include:

(a) Discharges associated with emergency firefighting operations.

(b) Foundation and footing drains.

(c) Water from crawl space or basement pumps.

(d) Hillside dewatering.

(e) Naturally occurring groundwater seepage via a storm drain.

(f) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

In addition, an NPDES permitting authority (i.e., State or Regional Water Board) “may authorize non- storm water discharges to an MS4 with a direct discharge to an ASBS only to the extent the NPDES permitting authority finds that the discharge does not alter natural ocean water quality in the ASBS.” Special Protections Provision I.A.1.e.(4) states that “authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in the Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.”

2.2. WATER QUALITY OBJECTIVES

Chapter II of the Ocean plan sets forth narrative and numeric limits or levels of water quality characteristics for ocean waters to protect Beneficial Uses, and includes bacterial (for water contact recreation and shellfish harvesting), physical, chemical, and biological standards. Provision II.A.3 of the Ocean Plan states that “compliance with the water quality objectives of this chapter shall be determined from samples collected at stations representative of the area within the waste field where initial dilution is completed.” For surface discharges, such as the Carmel Bay ASBS discharges, initial dilution is “considered to be completed when the momentum induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the Regional Board, whichever results in the lower estimate for initial dilution.”

2.2.1. NATURAL WATER QUALITY DEFINITION

In response to regulatory concerns about ASBS, the State Water Board empanelled eight experts from different scientific disciplines to develop a functional definition of “natural water quality.” Recognizing that natural ocean water would be expected to vary noticeably from place to place and from time to time, and that there are naturally occurring large-scale ocean cycles that dramatically influence water quality characteristics, and that truly natural water quality probably does not now exist in California's coastal ocean, the Natural Water Quality Committee set up criteria that could be used to define *operational natural water quality for an ASBS*. The definition must satisfy the following (SCCWRP 2010):

- It should be possible to identify a reference area or areas for each ASBS that currently approximate natural water quality and that are expected to exhibit the likely natural variability that would be found in that ASBS,
- Any detectable human influence on the water quality must not hinder the ability of marine life to respond to natural cycles and processes.

Ten reference sites under the Central Coast ASBS Regional Monitoring Program to cover the ASBS located within its operating area. Sites are located throughout the region at locations adjacent to watersheds with limited development, to approximate conditions that most closely resemble natural ocean water.

3.0 CARMEL BAY ASBS DESCRIPTION

The Carmel Bay ASBS is located in Monterey County, immediately adjacent to the town of Carmel. The ASBS is south of the Monterey Peninsula, just north of the Santa Lucia mountain range, and west of the Carmel Valley. Pescadero Point, the northern boundary of the ASBS, is located at 36°34' north latitude, 121°57' west longitude; Granite Point, the southern boundary, is located just north of Point Lobos at 36°31'north latitude, 121°56' west longitude. The seaward boundary of the ASBS is formed by a straight line drawn between Pescadero and Granite Points; the landward boundary is the mean high tide line (SWRCB 1979). The ASBS encompasses 1,584 acres (2.48 mi^2; 6,411,404 m^2) of various coastal marine habitats. The length of coastline included in the ASBS is 6.7 miles (10.756 km), encompassing about 0.43% of California's coastline.

The Carmel Bay ASBS is entirely overlapped by the Carmel Bay State Marine Conservation Area.

The ASBS is included in this designation for the following reasons: (1) it has a diversity of habitat and biological assemblages; (2) the intertidal zone is a valuable educational resource, due to the high biodiversity and excellent access.

Figure 1.2 (p. 6) depicts the County's MS4 permit boundary and the Watershed Protection Areas (WPAs) that subject to this ASBS Compliance Plan. The North Carmel, Carmel Point, and Carmel Meadows WPAs total 233 acres, or approximately 0.1% of the total 273-square mile area that drains into the Carmel Bay ASBS.

The watersheds adjacent to the Carmel Bay ASBS include the city of Carmel-by-the- Sea and the private Pebble Beach community. Approximately 60% of the urban runoff from Carmel-by-the-Sea flows through storm drains directly into the ASBS, and 40% drains into the Carmel River, which also flows into the ASBS. The Carmel Area Wastewater District sewage treatment plant has an existing exception and discharges treated wastewater at a submerged location offshore near the mouth of the Carmel River. Other discharges drain runoff from the golf courses, streets, highways, and private homes. There are also ten known springs/seeps that may drain nonpoint source pollutants into the ASBS.

Eight natural streams also discharge into the ASBS from the Pebble Beach Company and Carmel-by-the-Sea. All freshwater discharges into the Carmel Bay ASBS are seasonal. Pescadero Canyon discharges at the north end of Carmel City Beach, and San Jose Creek discharges through Monastery Beach at the southern end of the ASBS. The principle drainage is the Carmel River Basin, which covers a total of about 255 square miles in a northwest-southeast direction. Carmel Valley, the lower portion of the watershed, extends eastward about 15 miles (24 km) from the river mouth. (Final EIR, 2012)

The Carmel Bay ASBS has 33 storm drains greater than 18 inch diameter discharging directly into the ASBS. Dischargers are the County of Monterey, the Pebble Beach Company, the City of Carmel-by-the-Sea, Caltrans, and State Parks. In addition to the larger storm drains, there are 135 smaller storm drains, 4 inches to 12 inches in size. These discharges are considered to be a considerable threat due to the very nature of the source and size of the discharges; runoff from managed turf can contain pesticides, herbicides, rodenticides, and fertilizers; and residential and road runoff typically contains oils, grease, and metals. Copper is used as an adjuvant in many herbicides, pesticides, and fertilizers, and can be carried by the runoff. (Final EIR, 2012)

3.1. LAND USE

Caltrans classified and mapped the land use and summarized population density within the Carmel Bay ASBS tributary drainage area. Twenty-nine point one percent (29.1%) of the tributary drainage area is low density residential, 28.5% is agricultural, 25.2% is open space-public lands, and 14.6% is medium-residential. The remaining land use type is less than 2.0% each of urban reserve, low density commercial and high density residential. Population density of about half of the tributary drainage are is less than 100 people per square mile. Population density in the remaining area of the tributary drainage area ranges from 100 to 10,000 people per square mile, though density exceeds 5,000 people per square mile in the city of Carmel-by-the-Sea. Overall, the Carmel Bay watershed is 25.6% impervious. (Final EIR, 2012).

Table 3.1. Carmel Bay ASBS Watershed Protection Area - Land Use

LAND USE	AREA (Acres)	PERCENT of LAND AREA in ASBS WPA	No. of PARCELS
Residential	168.79	72.4%	929
Commercial	0.73	0.3%	2
Industrial	0.00	0.0%	0
Other (Non-Residential)	3.63	1.6%	2
Vacant, Miscellaneous, Not Buildable	2.32	1.0%	25
Public (Roads, Rights of Way)	57.69	24.7%	0
TOTALS	**233.16**	**100.0%**	**958**

Source: Monterey County Global Information System (GIS) Database

3.2. LANDSLIDES AND EROSION

Soil erosion is the process of dislodgement and transport of soil particles from the surface by water and wind. It is a natural process but can be exacerbated by anthropogenic activities (e.g., construction of impervious surface, compaction) that reduce infiltration and increase the volume and flow rate of stormwater runoff. Wetting of subsurface materials can also contribute to erosion on coastal bluffs. The greatest source of erosion in the County's ASBS Watershed Protection Area is generated from upland activities with improperly installed or maintained erosion and sediment controls.

3.3. DRAINAGES TO CARMEL BAY ASBS

The 2003 SCCWRP survey identified 369 "drainages" to the Carmel Bay ASBS. In addition to its location and size, each "drainage" was categorized according to one of four source types: discharge, outlet, spring/seep, or unknown. The term "outlet" was used to describe natural streams and gullies, which themselves may be impacted by upstream pollutants, but are regulated under the Basin Plan (Regional Water Board 2010). Spring/seeps also fall into this category. The Special Protections requirements apply only to drainages categorized as "discharges" which are defined as 'an anthropogenic source or location of a discernable volume of water that flows or is released directly into or immediately adjacent to the marine environment of a SWQPA.' The 2003 SCCWRP study further narrowed the source of the discharges according to upstream land use. In the Carmel Bay ASBS, upstream sources include golf course, groundwater, parking lot, pier facility, rural watershed, sewage treatment plant, and urban watershed. The 2003 SCCWRP study identified five gullies; 54 municipal / industrial storm drains; 30 non-point sources, 273 small storm drains, four streams, two unknown sources, and one wastewater treatment plant discharge. These drainages are listed in Appendix 5 of the Program Final EIR published by the State Water Board in 2012. Errors in this information are known to exist.

County staff has reviewed the information from the SCCWRP study and has conducted field surveys to verify the data. Staff focused on the areas in and adjacent to the discharges in the County's Carmel Point and Carmel Meadows WPAs. A summary of these discharges from Appendix 5 is presented in Table 3.2. Corrections to several of the discharges were made, primarily regarding discharge size and responsible party. One discharge that was not included in the SCCWRP study was added to the list (CAR - - -). This outfall discharges urban runoff from an upstream urbanized neighborhood onto the Carmel River State Beach. Four small foundation drains (CAR009 – CAR012) that were included in the SCCWRP study were corrected for size (4" PVC) and ownership (private).

Corrections to the information on the five County-operated discharges along Scenic Road were also made. Three of these discharges are gaps in the asphalt curb along Scenic Road which allow runoff to discharge at low points in the road; one is an 8" corrugated metal pipe; one is a 12" HDPE (high density polyethylene) pipe. These five discharges will be inspected twice annually, prior to, and during the rainy season.

Public and privately-maintained drainages are listed in Table 3.2. Information on other Carmel Bay ASBS discharges and outfalls is available in Appendix 5 of the Program Final EIR prepared by the State Water Board (2012).

(Table 3.2 begins on the following page)

Table 3.2. Carmel Bay ASBS Drainages

Discharge Point						
State ID	Location, Source Type	Threat Level	Approx. Size, Material	Responsible Party	Upstream Source	Notes
CAR004	San Jose Creek (Outlet) ephemeral stream	L	75 ft, earthen	Unassigned (Natural Watercourse)	Rural watershed	San Jose Creek is a natural watercourse
CAR009	Private Residence, (Discharge) Ribera Road	M	4 in, PVC	Private	Unknown; (foundation drain?)	
CAR010	Private Residence, (Discharge) Ribera Road	M	4 in, PVC	Private	Unknown; (foundation drain?)	
CAR011	Private Residence, (Discharge) Ribera Road	M	4 in, PVC	Private	Unknown; (foundation drain?)	
CAR012	Private Residence, (Discharge) Ribera Road	M	4 in, PVC	Private	Unknown; (foundation drain?)	This discharge is also identified as CAR014, CAR015, & CAR016 in Appendix 5
CAR - - -	Near Pedestrian Trail (Discharge) Municipal Storm Drain	H	18 in, PVC	California Department of Parks and Rec	Urban Watershed	This outfall was not included in Appendix 5
CAR369	CAWD- POTW (Submerged) (Discharge) treated wastewater	H	unknown	Carmel Area Wastewater District	Sewage treatment plant	Exact location of outfall undetermined
CAR013	Carmel River (Outfall) ephemeral stream	L	200 ft, earthen	Unassigned (Natural Watercourse)	Rural and Urban watersheds	Carmel River is a natural watercourse
CAR017	State Beach parking lot (Discharge) nonpoint	L	non-point, asphalt	California Department of Parks and Rec	Asphalt Parking Lot	
CAR018	Scenic Rd earthen trail (Discharge) nonpoint	L	8 ft, earthen	California Department of Parks and Rec	Urban Watershed	Earthen trail from Scenic Road to Carmel River State Beach
CAR019	Scenic Road (Discharge) Urban runoff	H	8 in, CMP	California Department of Parks and Rec	Urban Watershed	
CAR020	Scenic Road (Discharge) Urban runoff	M	8 in, CMP	California Department of Parks and Rec	Urban Watershed	
CAR021	Scenic Rd earthen stairs (Discharge) nonpoint	L	5 ft, earthen	California Department of Parks and Rec	Urban Watershed	Earthen stairway from Scenic Road to Carmel River State Beach

Table 3.2. Carmel Bay ASBS Drainages (continued)

Discharge Point						
State ID	Location, Source Type	Threat Level	Approx. Size, Material	Responsible Party	Upstream Source	Notes
CAR023	Scenic Road conc stairs (Discharge) nonpoint	L	5 ft, concrete	California Department of Parks and Rec	Urban Watershed	Concrete stairway from Scenic Road to Carmel River State Beach
CAR024	Scenic Road (Discharge) Urban runoff	M	8 in, CMP	California Department of Parks and Rec	Urban Watershed	
CAR025	Scenic Road (Discharge) Urban runoff	H	8 in, CMP	County of Monterey	Urban Watershed	
CAR026	Scenic Road (Discharge) Urban runoff	H	12 in wide, shotcrete swale	County of Monterey	Urban Watershed	curb gap
CAR027	Scenic Road (Discharge) Urban runoff	H	5 ft wide, shotcrete swale	County of Monterey	Urban Watershed	curb gap
CAR028	Scenic Road (Discharge) Urban runoff	H	30 in wide, shotcrete swale	County of Monterey	Urban Watershed	curb gap
CAR029	Scenic Road (Discharge) Urban runoff	MH	12 in, HDPE pipe	County of Monterey	Urban Watershed	

Notes:

m = meters, in = inches, ft = feet,

CMP = Corrugated Metal Pipe; conc = concrete HDPE = High Density Polyethylene

Reference:

Appendix 5 of the Special Protections Final EIR (2012, SWRCB). Appendix 5 contains multiple worksheets listing outfalls, discharges and drains and assigned threat levels. Errors were discovered in the data, and inconsistencies exist between worksheets.

Disclaimer:

This table contains updated information to Appendix 5 of the Final Program EIR that is based upon field investigations and measurements completed by County Staff. Changes to the information presented in Appendix 5 has neither been reviewed nor approved by the State Water Board as of completion of this Draft Compliance Plan (Sep 2014). It is anticipated that approval for these changes can be completed prior to completion of the 2015 Final ASBS Compliance Plan.

3.4. EXISTING AND POTENTIAL WATER QUALITY IMPACTS

Pollutants potentially generated from the ASBS Watershed Protection Areas that may be conveyed by stormwater runoff include trash, pesticides, polynuclear aromatic hydrocarbons (PAHs), petroleum hydrocarbons (e.g., gasoline, diesel fuel, and oil and grease), metals, nutrients, sediment, and pathogens. Other pollutants potentially discharged include sediment from ground disturbing activities, such as landscaping and construction. Pollutants generated within the County's Watershed Protection Areas are not expected to be atypical of similar watersheds.

4.0 EXISTING REGULATORY PROGRAMS ADDRESSING WATER QUALITY IN CARMEL BAY ASBS

Several plans, policies, and ordinances exist that have been developed to protect natural resources throughout the County and the Beneficial Uses of the ocean and other water bodies. The primary policies are presented in the Phase II Small MS4 General Permit which, along with several other overarching plans, are described in this Section. The requirements and compliance schedules of these programs are generally consistent with the requirements of the Special Protections. Additional programs being implemented (or planned) to meet requirements of the Special Protections are described in Section 5 of this Draft Compliance Plan.

4.1. PHASE II PERMIT MS4 GENERAL PERMIT

Storm water runoff and non-storm water discharges from the ASBS Watershed Protection Areas (WPAs) are regulated under the Phase II MS4 General NPDES Permit (Phase II permit). The County is a Permittee and coordinates some of its Permit-related activities with the six other Monterey Peninsula municipalities (Permittees) through the Monterey Regional Storm Water Management Program (MRSWMP). The County's Resource Management Agency (RMA) – Environmental Services Division is responsible for implementing storm water management and Phase II permit compliance within the unincorporated, urbanized areas of the County that are subject to its Phase II permit. Monterey County's Carmel Bay ASBS Watershed Protection Areas are entirely located within the area covered under its Phase II MS4 Permit. RMA-Environmental Services manages the local storm water program and implements the storm water control measures required by the Phase II Permit with the cooperation of other County departments and agencies, as well as the other participants of MRSWMP. The Special Protections for ASBS are included as Attachment C of the Phase II MS4 General Permit.

The current Phase II permit (Order No. 2013-0001-DWQ) went into effect on July 1, 2013, superseding the requirements of the previous permit which was adopted in 2003 (WQO 2003-0005-DWQ). Storm water control measures include a number of structural and non-structural BMPs which have been implemented to meet previous Permit requirements, or are being developed to meet new requirements of the current Permit. Implementation of many of the new or modified BMPs required under the current Permit is being phased in over several years.

The County of Monterey is a member of the Monterey Regional Storm Water Management Program, a group of Phase II Small MS4 Permittees from the Monterey Peninsula Region who coordinate their Permit-related activities. The MRSWMP Group performs common program elements on behalf of all its members, specifically public education and public outreach, to assist Permittees with their individual stormwater program management and provide consistency throughout the region. Public education and training on Low Impact Development

(LID) design principles and techniques have been presented over the course of the previous Permit cycle. Under the current Permit, training will continue to be provided to designers, contractors, homeowners and municipal staff to instill a deeper understanding of preventing pollutants from entering our waterways.

In 2013, the Central Coast Regional Water Board adopted new regulations for new development and redevelopment projects that create greater than 2,500 square feet of impervious surface. LID design principles are required to be met on each project that increase with the level of impervious surface created. Training on the new program requirements, called Post Construction Requirements (PCRs) has been presented for the past several years to educate developers and designs alike on Low Impact Development techniques that will improve the quality of runoff and reduce the pollutants that enter our local waterways.

Non-structural BMPs required by the Phase II Permit include public education and outreach, inspections of businesses and construction sites, construction site stormwater pollution prevention, spill response, investigation of illicit discharges, street sweeping and other municipal maintenance, and associated reporting to the Regional Water Board. Structural BMPs include post-construction storm water management consisting of site design measures, source control measures, LID design standards, and hydromodification management measures, all of which are incorporated into the PCRs. With continuing assistance from the MRSWMP Program, Permittees will continue to assistance to report on ASBS Compliance Plan implementation to the State and Regional Water Boards through the state's Storm Water Multiple Application and Report Tracking System (SMARTS).

The County is currently developing proposed changes to its Code of Ordinances to further clarify the County's authority to implement applicable Phase II Permit, Post Construction Requirements, and the Special Protections for the Carmel Bay ASBS. The ordinance changes are expected to be adopted by June 30, 2015 and will include revisions to the County's Stormwater, Grading, Landscaping and Erosion Control Ordinances. While the current Codes provide the County with the authority to implement the requirements of these regulatory programs, the updates are intended to clarify major program elements that will together provide greater protection and enhancement of the water quality of all of local receiving waters, including the Carmel Bay.

4.2. LOCAL COASTAL PROGRAM

The Local Coastal Program (LCP) is the County's guiding document for implementation of the State Coastal Act (administered by the Coastal Commission). The LCP is the primary document that governs land development in the County's designated Coastal Zone. It is comprised of a Land Use Plan (LUP), an Implementation Program (IP), and accompanying land use and zoning maps. The LCP LUP contains information and policies pertaining to issues such as build-out and development, water supply capacity, wastewater treatment capacity, recreation, impervious surface zoning standards, non-point surface runoff controls, and sensitive species and habitat protection in unincorporated coastal areas of Monterey County. The LCP IP contains and references specific sections of the Monterey County Code of Ordinances. All development in the Coastal Zone must comply with the policies and ordinances of the LCP in order to be issued a coastal permit, or be granted an exemption from the requirements.

4.3. PROGRAMS ON AGRICULTURAL LANDS

Monterey County's stormwater program generally has no jurisdiction over agricultural lands primarily because agricultural land is typically not urbanized (and therefore subject to Municipal Permit requirements) and the Clean Water Act (CWA) provides an exemption for active agricultural operations. There are no agricultural land uses in the County's ASBS Watershed Protection Areas.

5.0 BEST MANAGEMENT PRACTICES

The County will continue to implement the Phase II Permit, LCP, and Code of Ordinances which require a range of structural and non-structural BMPs, as well as monitoring and reporting. The additional BMPs that are or will be employed in the ASBS WPA to comply with the Special Protections are included in the comprehensive summary in the following sections of non-structural BMPs (Section 5.1) and structural BMPs (Section 5.2).

The need for additional non-structural and structural BMPs to maintain natural ocean water quality will be assessed following review of the results of the monitoring program (Section 6.0). Any additional structural BMPs determined necessary to comply with the Special Protections will become operational by March 2018 (Section 7.0).

5.1. NON-STRUCTURAL BMPS

Non-structural BMPs involve operational, maintenance, regulatory (e.g., ordinances), or educational activities designed to reduce or eliminate increased flow/volume and pollutant-related impacts of stormwater runoff. Installing new physical structures is not involved.

5.1.1. INSPECTIONS

In accordance with the Special Protections, the County will implement inspection programs of the following types with the following minimum inspection frequencies:

- **Construction sites** – *weekly during rainy season*. All construction sites in the County's ASBS WPAs will be flagged as high priority under Provision E.10.c of the Phase II permit. Inspections for compliance with County ordinances will be conducted prior to land disturbance, weekly during the rainy season, and at least once following active construction, including earth disturbing activities as well as outdoor activities that could result in a non-stormwater discharge. Tracking of construction site activity and project status will be maintained through Monterey County's permit and development tracking database/program (Accela Land Management software).

- **Industrial facilities -** *monthly during the rainy season*. There are no industrial facilities in the County's Carmel Bay ASBS Watershed Protection Areas. In the unlikely event that one is identified in the future (the entire area is zoned residential), inspections would be performed by the Monterey County Environmental Health Bureau's Certified Unified Program Agency (CUPA).

Table 5.1. Summary of Inspection Programs in the Carmel Bay ASBS Watershed Protection Area:

Type	Responsible Department	Rainy Season Inspection Frequency
Construction Sites with soil disturbance (Building, Grading or Encroachment Permits)	RMA- Environmental Services (primary); RMA – Building (secondary)	Weekly
Industrial Facilities [1]	Environmental Health Bureau (primary); RMA-Environmental Services (secondary)	Monthly
Commercial Facilities (e.g., restaurants) [2]	Environmental Health Bureau (primary); RMA-Environmental Services (secondary)	Twice during the Rainy Season
Stormwater Outfalls ≥18" diameter discharging into ASBS [3]	RMA-Environmental Services (primary); RMA-Public Works (secondary)	Twice Annually, once prior to the start of the rainy season, and once during the rainy season

Footnotes:

1. No Industrial Facilities currently exist in the ASBS Watershed Protection Area. In the event that one is identified in the future, rainy season inspections will comply with the minimum frequency indicated.
2. Two commercial businesses (inns) are currently identified in the ASBS WPAs. One private elementary school (K-8) and one utility-owned and operated parcel are located within the ASBS WPA. Inspections of these facilities will be conducted twice during the Rainy Season.
3. Monterey County-operated outfalls that discharge directly into Carmel Bay ASBS will be inspected as indicated, regardless of size.

- **Commercial facilities** – *twice during the rainy season*. Two commercial businesses are located within the ASBS WPAs; both are inns. If food is prepared and served on site, annual inspections are conducted by the Monterey County Environmental Health Bureau (EHB). Health Department inspectors look for stormwater violations during their inspections and refer any issues to RMA-Environmental Services' stormwater staff. Under Phase II MS4 Permit requirements, the County will create an inventory of commercial and industrial facilities and sources within its MS4 Permit boundary, including ASBS WPAs, in Fiscal Year 2014-15 for its Illicit Discharge Detection and Elimination Program. The inventory will be updated annually.

- **Storm water outfall drains equal to or greater than 18 inches in diameter** – *twice annually, prior to and during the rainy season*. None of the five "storm water outfall drains" that the County operates that discharge directly into the Carmel Bay ASBS exceed 18 inches in diameter. However, all County-operated discharges will be inspected and maintained to remove trash and other anthropogenic debris at least once prior to and once during the rainy season. Inspections may be performed by RMA-Public Works staff, or by RMA-Environmental Services inspectors in conjunction with other inspections that are being performed in the area.

All inspections will be documented, reported and certified as required through the Phase II Permit annual report.

5.1.2. NEW DEVELOPMENT AND REDEVELOPMENT

Because the vast majority of the Watershed Protection Area has already been developed, very little new development is expected. Projects are typically residential additions or remodels, both of which, depending upon the size and nature of the project, are subject to Phase II Permit and Central Coast Post Construction Requirements standards. Projects will be designed and constructed in accordance with current standards that require or strongly recommend implementation of Low Impact Development principles.

In addition to the Phase II Permit and PCRs, the LCP, and several County ordinances regulate storm water runoff from new and redevelopment projects. These measures are discussed above in Section 4 and below in Section 5.2.

5.1.3. PUBLIC OUTREACH

The County and MRSWMP already implement an extensive public outreach and education program throughout the region. Numerous publications covering storm water related topics such as car care, erosion control, swimming pool and spa maintenance, landscaping, pet ownership, choosing least toxic pesticides, low impact development, rainwater management, etc. are developed and/or distributed by MRSWMP. MRSWMP's Public Education and Public Outreach Coordinator conducts in-class presentations to educate local students about storm water pollution prevention. The general public is reached through the Our Water – Our World (OWOW) program which is designed to help consumers make informed decisions when purchasing pest control products for home or garden use. Among other awards, the PE/PO Coordinator was recently honored nationally by the US EPA for her exceptional effort and the effectiveness of the local OWOW program.

The overwhelming majority of storm water runoff developed in the Carmel Bay ASBS WPA originates on private property. Therefore, the County plans to continue developing public outreach materials targeted specifically to residents located within the Carmel Bay ASBS Watershed Protection Area. Existing outreach efforts have focused on educating residents about the significance of the two local ASBS (Carmel Bay, Pacific Grove) and suggesting measures to prevent non-storm water discharges and storm water pollution, and protect the ASBS marine habitat.

5.1.4. TRASH ELIMINATION

In addition to the Special Protections inspection program and consistent with the Phase II permit (Provision E.11.f), all storm drain system facilities in the ASBS WPA will be assessed and prioritized based on accumulation of sediment, trash, and/or debris by May 2015. High priority storm drains will be inspected and cleaned according to schedules developed during the prioritization process.

The State Board is in the process of developing a statewide policy for trash control in California. It is anticipated that the Trash Policy will establish methods to control trash pollution and that this policy will eventually be integrated into the Phase II permit.

5.1.5. ILLICIT DISCHARGES

Consistent with the Phase II permit, the County prohibits illegal dumping and most non-storm water discharges. Non-storm water sources that are exempted by the permit are similar to those allowed under the Special Protections. However, the Phase II permit also does not prohibit water line flushing, residential car washing, discharges from potable water sources, air conditioning condensation, de-chlorinated swimming pool discharges, and incidental runoff from landscaped areas. The control measures required under the Phase II permit for these discharges would maintain natural ocean water quality in the ASBS. The Phase II permit requires that these discharges are identified and that appropriate control measures to minimize the impacts of such discharges are developed and implemented.

Through its Illicit Discharge Detection and Elimination (IDDE) Program, Monterey County staff (RMA-Environmental Services, Environmental Health Bureau, Code Enforcement) will continue to respond to illicit discharge complaints in the ASBS WPA and will track complaints and follow up actions through an existing database. MRSWMP will continue to refer reports of illegal discharges (including non-storm water discharges) to appropriate County staff and will continue to encourage members of the public to report discharges through their webpage: http://www.montereysea.org/contact_spills.php This webpage provides the public with a list of local storm water contacts and instructions on what to do in the event of an observed illegal discharge to a storm drain, creek, or wetland. In addition, the webpage provides information on what to do when other potential violations are observed, including: oil and chemical spills or potential spills occurring in or threatening storm drains and "open waters"; habitat destruction, fish kills, or poaching; pesticide misuse or contamination; and, littering on highways/freeways.

5.1.6. HERBICIDES AND PESTICIDES

The County participates in the OWOW program, described above in Section 5.1.3, which assists individual consumers in choosing least toxic and non-toxic pest management approaches to gardening, landscaping, and pest control. The County's DPW and County Parks are both responsible for performing pest control in compliance with the County of Monterey's Integrated Pest Management (IPM) Policy. It should be noted that no County-operated parks are locate within the Carmel Bay ASBS WPA.

5.1.7. HAZARDOUS MATERIALS

The County's Environmental Health Bureau has a Hazardous Materials Management division that is trained in pre-incident planning and preparedness for hazardous materials releases. In addition to performing annual inspections of sites that contain hazardous materials (CUPA Program), EHB's Hazardous Materials staff is called out on all emergency spills and accidents. The County's Hazardous Materials Incident Response Plan is available at http://www.mcftoa.org/wp-content/uploads/2011/05/Monterey-County-Haz-Mat-Area-Plan-Jan-2007-Final-1.pdf

5.1.8. PERMIT TRACKING SYSTEM

Construction and development permits issued by the County for all projects, including those that could impact the natural water quality of the Carmel Bay ASBS are tracked using the County's permit-tracking software/database, Accela Land Management software. The County's Department of Public Works (RMA-Public Works) is responsible for issuing encroachment permits; RMA-Building Services issues, inspects and tracks building permits, and RMA-Environmental Services issues, inspects and tracks stormwater, grading and erosion control permits. The Accela Land Management system is a web-based system that allows tracking of all applications, approvals, and follow-up activities (i.e., inspections) and offers web-based citizen access to most records. RMA-Planning administers and enforces zoning and subdivision regulations and is responsible for issuing discretionary development approvals. The Accela permit tracking system has been updated to address requirements of the Phase II Permit and includes mechanisms to trigger construction site inspections and the increased inspection frequencies for projects in the ASBS WPA.

5.1.9. STREET SWEEPING AND ROAD MAINTENANCE

All streets within the County's urbanized Phase II Permit boundary are currently scheduled to be swept twice annually. Because many of the County-maintained roads in the ASBS WPA are not curbed, the effectiveness of sweeping on these streets has been questioned. Studies and analyses will be performed within the current Phase II Permit term to determine how effective sweeping is in these areas and whether the costs of maintaining the program are justified.

Regular maintenance of the paved roads in the ASBS watershed will be undertaken in a manner consistent with the ASBS Special Protections and an assessment of their activities in the watershed will occur through the Phase II permit-required assessment of Operations and Maintenance Activities (provision E.11.h). In addition to pavement or road repair, the County's Public Works Roads and Bridges (Maintenance) Division activities will include inspections of all County-maintained road crossings and culverts in the Phase II Permit area and ASBS WPA (at least twice during each rainy season). Road-side drainages and ditches are also inspected and maintained on an annual and as-needed basis.

5.1.10. CONSTRUCTION BMPS

All construction projects, whether or not a permit and/or detailed Erosion and Sediment Control Plan from the County is required, must comply with the County's Urban Stormwater Quality Management and Discharge Control Ordinance (Monterey County Code Chapter 16.14). Projects that include significant earth disturbing activities and that trigger a grading permit from the County must comply with both the County's Grading Ordinance (MCC Chapter 16.08) and Erosion and Sediment Control Ordinance (MCC Chapter 16.12). County-permitted projects are tracked on Accela Land Development tracking system (see Section 5.1.8). New construction and alteration building permits issued by the County must also comply with the site development mandatory measures of the California Green Building Code (Section 4.106.2 – Storm Water Drainage and Retention During Construction for residential permits, and section 5.106.1 – Storm Water Pollution Prevention for non- residential permits).

The abovementioned codes require implementation of appropriate BMPs to prevent the discharge of construction wastes (including sediment) or contaminants from construction materials, tools, and equipment from entering the County's storm drain system. In order to receive a grading permit, a site-specific Erosion and Sediment Control (ESC) Plan must be approved by the County. All disturbed surfaces must be protected against erosion by measures which the County determines to be appropriate to the site and time of year. Minimum erosion and sediment control measures are provided to project applicants and will soon be posted on the County's website. They include BMPs such as construction scheduling, use of straw wattles or erosion control blankets, concrete washout measures, drain inlet protection, and prevention of equipment fluid leaks onto the ground. MRSWMP also provides a number of construction site BMP Guidance documents and links to other resources, such as the California Stormwater Quality Association's BMP handbooks.

Construction projects that disturb more than one acre of land must also comply with the NPDES Construction General Permit (Order No. 2009-0009-DWQ, as amended by 2010-0014-DWQ and 2012-006-DWQ) which requires development and implementation of a project-specific Stormwater Pollution Prevention Plan (SWPPP). Within the County, the SWPPP may be substituted for the ESC Plan that is approved by County staff. The SWPPP must describe the BMPs that will be used at the project.

In order to enforce implementation of SWPPPs and ESC Plans, the County conducts inspections at priority construction sites prior to land disturbance, during active construction, and following active construction. Construction sites within the ASBS WPA are considered priority projects and will be inspected weekly accordance with Attachment C of the Phase II permit (see Section 5.1.1 for details of the inspection program). All inspections are documented by the County. The County will report annual compliance to the State and Regional Water Boards per provision E.10 (Construction Site Management) and Attachment C of the new Phase II permit.

5.2. STRUCTURAL BEST MANAGEMENT PRACTICES

Structural BMPs involve the installation of engineering solutions to the physical treatment or infiltration of runoff. The Special Protections require that "BMPs to control storm water runoff discharges (at the end-of-pipe) during a design storm shall be designed to achieve on average the following target levels:

1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or
2) A 90% reduction in pollutant loading during storm events, for the applicant's total discharges."

5.2.1. EXISTING STORM WATER CONVEYANCE AND LID

The structure and function of the existing stormwater drainage system in the Carmel Bay ASBS WPA is an informal system of ditches and culverts which allows a portion of the stormwater runoff to infiltrate into the ground. This is an example of a Low Impact Development (LID) practice, providing opportunities for runoff (and any pollutants that it has collected) to soak into the ground before it flows into Carmel Bay. The drainage system consists mostly of open, vegetated, road-side ditches connected by a minimum of constructed infrastructure such as road culverts. The storm drain watersheds are small, and consist of primarily single family residential development with small houses, and narrow paved roads. The watershed has a moderate percentage of pervious surfaces (approximately 25 percent, Final EIR, Table 5.4.1). This existing structural BMP will continue to be maintained in its current form.

Section I.A.1.d of the Special Protections states that "only discharges from existing storm water outfalls are allowed. Any proposed or new stormwater runoff discharge shall be routed to existing stormwater discharge outfalls and shall not result in any new contribution of waste to an ASBS". This prohibition applies existing stormwater outfalls as of January 1, 2005, and allows for re-location or alteration to existing outfalls (Special Protections, I.A.1.d).

5.2.2. POST-CONSTRUCTION BMPS

Effective March 6, 2014, any project that creates and/or replaces greater than 2,500 square feet of impervious surface, must implement one or more of the site design measures described in Performance Requirement 1 of the Central Coast Post Construction Requirements (PCRs). Projects that create or replace greater than 5,000 square feet of impervious surface are required to treat runoff before it leaves the project site, as described in Performance Requirement 2. Projects creating greater than 15,000 square feet of impervious surface are required to retain the 95th percentile runoff volume (based approximately on a 1.2-inch rainfall depth) on site. Projects that exceed the highest threshold, 22,500 square feet of impervious surface, are required to match post-developed flow rates to pre-project discharge rates for smaller storms through a 10-year event. Over time, as more and more projects are constructed, water quality is expected to improve as the volume of runoff that enters Carmel Bay is reduced and the watershed begins to mimic pre-developed hydrologic conditions.

5.2.3. FUTURE STRUCTURAL BMPS

Should monitoring results from the ASBS Monitoring Program show that stormwater discharges from Monterey County's outfalls is causing or contributing to exceedances of natural water quality, structural BMPs may need to be constructed to address specific pollutants that causing the exceedances. Two general options that may be employed are to treat runoff prior to being discharged into Carmel Bay. In the area of the County-operated stormwater discharge, Scenic Road is a one-way street that generally runs parallel to shoreline. It may be possible to install some type of linear LID treatment system along the shoreline edge of the road. The road appears to be wide enough to meet safety concerns, allowing a long, narrow treatment structure to be constructed. While shoreline access and pedestrian safety concerns would need to be addressed, the location is ideal in that there is significant pedestrian traffic. Interpretive signage would draw more attention to the ASBS, LID, and the purpose and operation of the treatment system.

A second general option is to divert dry weather runoff into the nearby sewage lift station for transport to the Carmel Area Wastewater District treatment plant. Technical and political obstacles would need to be resolved, but physically, the road is flat, and the sewer infrastructure is already in place.

Both projects would require a significant effort for planning, design and environmental permitting, but both appear to be physically viable in concept.

6.0 MONITORING PROGRAM

The Central Coast ASBS Regional Monitoring Program (RMP) is a collaboration of various agencies and entities on the Coast, covering an area from Big Sur, in Monterey County, to Pt. Reyes, in Marin County. The project includes monitoring requirements (i.e. water sampling and analysis for various pollutants of concern) specified in the Special Protections for ten (10) participants designated as Responsible Parties that include: The Counties of Marin, Monterey, San Mateo; the Cities of Carmel-by-the-Sea, Monterey, Pacific Grove; Caltrans, Hopkins Marine Station, Monterey Bay Aquarium and the Pebble Beach Company. The Scope of Work for the Central Coast ASBS RMP has been developed through discussions with staff from State and Regional Water Boards, as well as the responsible parties discharging storm water into ASBS.

The Ocean Plan prohibits the discharge of both point and non-point source waste into ASBS unless the SWRCB grants an “exception”. In 2012, the SWRCB approved a list of direct or indirect storm water discharges into local ASBS, including those into the Carmel Bay ASBS, which included the Pebble Beach Company, the City of Carmel by the Sea, California Department of Parks and Recreation (State Parks), the California Department of Transportation (CalTrans), the Carmel Area Wastewater District, and the County of Monterey. A total of 369 discharges into the Carmel Bay ASBS were identified in Appendix 5 of the Final EIR (2012).

Water quality and biological sampling of urban storm water discharges and receiving waters are a mandatory stipulation of the Special Protections for Areas of Special Biological Significance. In 2012, the County of Monterey joined forces with nine other ASBS Permittees along the Central Coast of California to form a collaborative RMP that complies with the monitoring requirements of the Special Protections. The purposes of the RMP are to leverage limited agency funds to address shared monitoring compliance needs by providing consistent methods and data quality among all participants, while also performing the scientific work required by the Special Protections in a manner so the final data can be compared to or contrasted with those from other regional efforts along the California coastline.

In early 2013, a RMP Memorandum of Agreement was executed between all parties to perform a coordinated monitoring effort to investigate concentrations of pollutants of concern at particular freshwater reference sites, ocean receiving water sites, and urban storm water discharge sites. Additionally, the program includes biological and bioaccumulation monitoring.

Applied Marine Sciences (AMS) was selected to direct and perform the scientific monitoring needs of the RMP members, including field and follow-up analytical and statistical work. Monterey Bay National Marine Sanctuary staff and volunteers also assist with portions of the ASBS monitoring program.

In total, the RMP has 40 receiving water sampling locations. Eighteen (18) urban storm water discharges are sampled in the Carmel Bay ASBS to assist in better understanding the relative health of this ASBS ecosystem and the effects of discharges entering it. A list of all sampling sites, including their respective sampling requirements and the overall sampling scheme, are outlined in Appendix B, Memorandum of Agreement, Central Coast ASBS Dischargers Monitoring Program.

The RMP collects Reference Site samples at eleven (11) locations between Point Reyes and the Big Sur Coast, and conducts biological monitoring at eight (8) rocky intertidal sites including the Stillwell site in the Carmel Bay ASBS. Bioaccumulation monitoring occurs at seven (7) Central Coast sites, including the Fanshell Overlook and Carmel River Beach sites in Carmel Bay. Those data are planned for use in determining the existing relative health of the Monterey Peninsula's nearshore biological environment for this RMP effort.

Water quality and biological results received over two years of the RMP program will be analyzed to determine the relative health or lack thereof of the ASBS being studied as a part of this RMP. These efforts are also meant to identify any potential urban storm water discharges that may be impacting the health of the ASBS, including that of the Carmel Bay ASBS.

As of September 2014, only one sampling season has been completed – Season 1, Winter 2013/2014. Season 1 data are undergoing quality assurance/quality control (QA/QC) review and statistical analyses. Preliminary results are expected in late August 2014, with final report generation in October 2014. Final results were not available for inclusion in this Draft Compliance Plan; however, study results will be shared as they become available, and subsequent water quality reports shall be incorporated into this Plan in future finalization efforts. Season 2, Winter 2014/2015 sampling results are anticipated for preliminary review in summer 2015 with subsequent analytical report finalization in fall 2015.

The RMP efforts at Carmel Bay ASBS sampling locations and all others in the region are providing the scientific water quality and biological data necessary to comply with the monitoring requirements of the Special Protections at this time. The study results are anticipated to provide insight to the local agencies and SWRCB as to the current and relative health and quality of California ASBS. Additionally, further study of the RMP's reference site water quality data is planned for utilization as part of a SWRCB contract to analyze the North Coast, Central Coast, and South Coast reference data report to be produced by contractor Ken Schiff.

6.1.1. PROCESS FOR ADDRESSING WATER QUALITY OBJECTIVE EXCEEDANCES

The process for evaluating whether alterations of natural ocean water quality in the Carmel Bay ASBS is still in development. If exceedances of Ocean Plan Water Quality Objectives (WQOs) are observed, it does not necessarily imply that natural ocean water quality will be altered, nor would observed alterations in natural ocean water quality necessarily be caused by discharges from the land-based watershed. Dilution processes within the receiving water are an important consideration as well as ocean influences that may not be detected at reference points. The challenges in establishing these types of regulatory links will be considered as the regional natural water quality process and standards are defined.

7.0 COMPLIANCE SCHEDULE

The County's ASBS Special Protections implementation schedule is presented in the Special Protections (I.A.3) and summarized in Table 7.1.

Table 7.1. Monterey County ASBS Special Protections Implementation Schedule

Element	Deadline	Remarks
Prohibit all non-authorized non-stormwater discharges and trash	March 20, 2012	Completed through implementation of Phase II Permit. Illicit discharge prevention and response BMPs are described in Section 5.1.5. Trash elimination BMPs are described in sections 5.1.4.
Implement non-structural BMPs including inspection program	Sept 20, 2013	Completed and ongoing. Consistent with the Phase II Permit and this Draft Compliance Plan. • The construction, industrial, commercial, and storm drain outfall inspection program is described in 5.1.1. • Other non-structural BMPs include ASBS-targeted public outreach (Sections 5.1.3 and 5.3.4), and permit tracking (section 5.1.8). Documents describing procedures (e.g., IDDE Program) and Monterey County Code of Ordinances will be updated by June 30, 2015.
Submit Draft Compliance Plan to State and Regional Water Boards	Sept 20, 2014	Completed with submittal of this Draft compliance Plan.
Submit Final Compliance Plan to State and regional Water Boards	Sept 20, 2015	Contingent upon receipt of comments from State and/or Regional Water Board.
Any additional structural BMPs determined to be necessary to comply with Special Protections are operational	March 20, 2018	Pending final analyses of data collected under the monitoring programs for Program Year 1 (FY 13-14) and Program Year 2 (FY 14-15)
Discharges from Monterey County's Carmel Bay ASBS Watershed Protection Areas do not alter natural ocean water quality in ASBS	March 20, 2018	Reference and receiving water quality will be characterized by 2015 as part of the Central Coast Regional Monitoring Program. Discharge Monitoring will be conducted in 2013/14 and 2014/15 by the Central Coast RMP. The need for additional non-structural and structural BMPs to maintain natural ocean water quality will be assessed following review and analysis of all monitoring data.

8.0 REFERENCES

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CARMEL BAY AREA OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

DRAFT COMPLIANCE PLAN

APPENDIX A

ATTACHMENT C, PHASE II SMALL MS4 GENERAL PERMIT

STATE WATER RESOURCES CONTROL BOARD ORDER NO. 2013-0001-DWQ

SPECIAL CONDITIONS (SPECIFIC PROVISIONS) FOR TRADITIONAL AND NON-TRADITIONAL SMALL MS4 ASBS DISCHARGES

<u>Note:</u> Resolution 2012-0012 *Exception to the California Ocean Plan for Areas of Special Biological Significance Waste Discharge Prohibition for Storm Water and Nonpoint Source Discharges, with Special Protections* was adopted by the California State Water Resources Control Board on March 20, 2012. On June 19, 2012, Resolution 2012-0031 was adopted by the State Water Resources Control Board to correct minor errors in the text of 2012-0012.

On February 5, 2013, the State Water Resources Control Board adopted the Phase II Small MS4 General Permit (Water Quality Order No. 2013-0001-DWQ) and included the Special Protections for ASBS Dischargers. Traditional and Non-traditional Small MS4 Permittees are bound by the terms of the Special Protections that are included in the Phase II Permit (Attachment C).

Because language in the Special Protections contained the Phase II Small MS4 General Permit (Attachment C) differs from Resolution 2012-0031, a copy of the Special Protections from the Phase II Small MS4 General Permit (Attachment C) is included in this Appendix.

Special Conditions (Specific Provisions) for Traditional and Non-Traditional Small MS4 ASBS Discharges

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All Traditional and Non-traditional Small MS4 Permittees that discharge to ASBS as listed in Attachment D have been granted an exception to the Ocean Plan and shall comply with the following Special Protections requirements. Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges (Attachment B to State Water Board Resolution 2012-0001) (Special Protections).

The Special Protections for Areas of Special Biological Significance require submittal of Compliance Plans to be included in a SWMP. However, SWMPs are no longer required for submittal by this Order. As such, Permittees shall submit a stand-alone Compliance Plan document for ASBS discharges and submit per the Special Conditions compliance schedule, through their online Annual Report.

I. PROVISIONS FOR POINT SOURCE DISCHARGES OF STORM WATER

The following terms, prohibitions, and special conditions (hereafter collectively referred to as special conditions) are established as limitations on point source storm water. These special conditions provide Special Protections for marine aquatic life and natural water quality in Areas of Special Biological Significance (ASBS), as required for State Water Quality Protection Areas pursuant to California Public Resources Code Sections 36700(f) and 36710(f). These Special Protections are adopted by the State Water Board as part of the California Ocean Plan (Ocean Plan) General Exception.

A. PERMITTED POINT SOURCE DISCHARGES OF STORM WATER

1. General Provisions for Permitted Point Source Discharges of Storm Water

   a. Existing storm water discharges into an ASBS are allowed only under the following conditions:

      (1) The discharges are authorized by this Order;

      (2) The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in the Special Protections as laid out in this Attachment; and

      (3) The discharges:

         (i) Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;

         (ii) Are designed to prevent soil erosion;

         (iii) Occur only during wet weather;

         (iv) Are composed of only storm water runoff.

   b. Discharges composed of storm water runoff shall not alter natural ocean water quality in an ASBS.

c. The discharge of trash is prohibited.

d. Only discharges from existing storm water outfalls are allowed. Any proposed or new storm water runoff discharge shall be routed to existing storm water discharge outfalls and shall not result in any new contribution of waste to an ASBS (i.e., no additional pollutant loading). "Existing storm water outfalls" are those that were constructed or under construction prior to January 1, 2005. "New contribution of waste" is defined as any addition of waste beyond what would have occurred as of January 1, 2005. A change to an existing storm water outfall, in terms of re-location or alteration, in order to comply with these special conditions, is allowed and does not constitute a new discharge.

e. Non-storm water discharges are prohibited except as provided below:

(1) The term "non-storm water discharges" means any waste discharges from a municipal separate storm sewer system (MS4) or other NPDES permitted storm drain system to an ASBS that are not composed entirely of storm water.

(2) The following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:

(i) Discharges associated with emergency firefighting operations.

(ii) Foundation and footing drains.

(iii) Water from crawl space or basement pumps.

(iv) Hillside dewatering.

(v) Naturally occurring groundwater seepage via a storm drain.

(vi) Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

(3) Discharges from utility vaults and underground structures to a segment of the MS4 with a direct discharge to an ASBS are permitted if such discharges are authorized by the General NPDES Permit for Discharges from Utility Vaults and Underground Structures to Surface Water, NPDES No. CAG 990002. Other short-duration, intermittent non-storm water discharges related to utilities (e.g. groundwater dewatering, potable water system flushing, hydrotest discharges) to a segment of the MS4 with a direct discharge to an ASBS are permitted if such discharges are authorized by an NPDES permit issued by the relevant Regional Water Board. A Regional Water Board may nonetheless prohibit a specific discharge from a utility vault or underground structure or other specific utility-related discharge if it determines that the discharge is causing the MS4 discharge to the ASBS to alter natural ocean water quality in the

ASBS. Additional non-storm water discharges to a segment of the MS4 with a direct discharge to an ASBS are allowed only to the extent the relevant Regional Water Board finds that the discharge does not alter natural ocean water quality in the ASBS.

This provision does not supersede the authority of the MS4 to effectively prohibit a non-storm water discharge that has been found to alter natural ocean water quality in the ASBS.

(4) Authorized non-storm water discharges shall not cause or contribute to a violation of the water quality objectives in Chapter II of the Ocean Plan nor alter natural ocean water quality in an ASBS.

2. Compliance Plans for Inclusion in Storm Water Management Plans (SWMP) and Storm Water Pollution Prevention Plans (SWPPP)

The Permittee shall specifically address the prohibition of non-storm water runoff and the requirement to maintain natural water quality for storm water discharges to an ASBS in an ASBS Compliance Plan to be submitted to the appropriate Regional Water Board. The ASBS Compliance Plan is subject to approval by the Executive Director of the State Water Board.

a. The Compliance Plan shall include a map of surface drainage of storm water runoff, showing areas of sheet runoff, prioritize discharges, and describe any structural Best Management Practices (BMPs) already employed and/or BMPs to be employed in the future. Priority discharges are those that pose the greatest water quality threat and which are identified to require installation of structural BMPs. The map shall also show the storm water conveyances in relation to other features such as service areas, sewage conveyances and treatment facilities, landslides, areas prone to erosion and waste and hazardous material storage areas, if applicable. The SWMP or SWPPP shall also include a procedure for updating the map and plan when changes are made to the storm water conveyance facilities.

b. The ASBS Compliance Plan shall describe the measures by which all non-authorized non-storm water runoff (e.g., dry weather flows) has been eliminated, how these measures will be maintained over time, and how these measures are monitored and documented.

c. The ASBS Compliance Plan shall require minimum inspection frequencies as follows:

(1) The minimum inspection frequency for construction sites shall be weekly during rainy season;

(2) The minimum inspection frequency for industrial facilities shall be monthly during the rainy season;

(3) The minimum inspection frequency for commercial facilities (e.g., restaurants) shall be twice during the rainy season;

(4) Storm water outfall drains equal to or greater than 18 inches (457 mm) in diameter or width shall be inspected once prior to the beginning of the rainy season and once during the rainy season and maintained to remove trash and other anthropogenic debris.

d. The ASBS Compliance Plan shall address storm water discharges (wet weather flows) and, in particular, describe how pollutant reductions in storm water runoff, that are necessary to comply with these special conditions, will be achieved through BMPs. Structural BMPs need not be installed if the Permittee can document to the satisfaction of the State Water Board Executive Director that such installation would pose a threat to health or safety. BMPs to control storm water runoff discharges (at the end-of-pipe) during a design storm shall be designed to achieve on average the following target levels:

(1) Table B Instantaneous Maximum Water Quality Objectives in Chapter II of the Ocean Plan; or

(2) A 90% reduction in pollutant loading during storm events, for the Permittee's total discharges. The baseline for the reduction is the effective date of the Exception. The baseline for these determinations is the effective date of the Exception, and the reductions must be achieved and documented within six (6) years of the effective date.

e. The ASBS Compliance Plan shall address erosion control and the prevention of anthropogenic sedimentation in ASBS. The natural habitat conditions in the ASBS shall not be altered as a result of anthropogenic sedimentation.

f. The ASBS Compliance Plan shall describe the non-structural BMPs currently employed and planned in the future (including those for construction activities), and include an implementation schedule. The ASBS Compliance Plan shall include non-structural BMPs that address public education and outreach. Education and outreach efforts must adequately inform the public that direct discharges of pollutants from private property not entering an MS4 are prohibited. The ASBS Compliance Plan shall also describe the structural BMPs, including any low impact development (LID) measures, currently employed and planned for higher threat discharges and include an implementation schedule. To control storm water runoff discharges (at the end-of-pipe) during a design storm, permittees must first consider using LID practices to infiltrate, use, or evapotranspire storm water runoff on-site.

g. The BMPs and implementation schedule shall be designed to ensure that natural water quality conditions in the receiving water are achieved and maintained by either reducing flows from impervious surfaces or reducing pollutant loading, or some combination thereof.

h. If the results of the receiving water monitoring described in Section IV. B. below indicate that the storm water runoff is causing or contributing to an alteration of natural ocean water quality in the ASBS, the Permittee shall submit a report to the State Water Board and Regional Water Board within 30 days of receiving the results.

(1) The report shall identify the constituents in storm water runoff that alter natural ocean water quality and the sources of these constituents.

(2) The report shall describe BMPs that are currently being implemented, BMPs that are identified in the ASBS Compliance Plan for future implementation, and any additional BMPs that may be added to the ASBS Compliance Plan to address the alteration of natural water quality. The report shall include a new or modified implementation schedule for the BMPs.

(3) Within 30 days of the approval of the report by the State Water Board Executive Director, the Permittee shall revise its ASBS Compliance Plan to incorporate any new or modified BMPs that have been or will be implemented, the implementation schedule, and any additional monitoring required.

(4) As long as the Permittee has complied with the procedures described above and is implementing the revised ASBS Compliance Plan, the Permittee does not have to repeat the same procedure for continuing or recurring exceedances of natural ocean water quality conditions due to the same constituent.

(5) Compliance with this section does not excuse violations of any term, prohibition, or condition contained in the Special Protections.

3. Compliance Schedule

a. On the effective date of the Exception, all non-authorized non-storm water discharges (e.g., dry weather flow) are effectively prohibited.

b. Within 18 months from the effective date of the Exception, the Permittee shall submit a written ASBS Compliance Plan to the State Water Board Executive Director that describes its strategy to comply with these special conditions, including the requirement to maintain natural water quality in the affected ASBS. The ASBS Compliance Plan shall include a time schedule to implement appropriate non-structural and structural controls (implementation schedule) to comply with these special conditions.

c. Within 18 months of the effective date of the Exception, any non-structural controls that are necessary to comply with these special conditions shall be implemented.

d. Within six (6) years of the effective date of the Exception, any structural controls identified in the ASBS Compliance Plan that are necessary to comply with these special conditions shall be operational.

e. Within six (6) years of the effective date of the Exception, all Permittees must comply with the requirement that their discharges into the affected ASBS maintain natural ocean water quality. If the initial results of post-storm receiving water quality testing indicate levels higher than the 85th percentile threshold of reference water quality data and the pre-storm receiving water levels, then the Permittee must re-sample the receiving water, pre- and post-storm. If after re-sampling the post-storm levels are still higher than the 85th percentile threshold of reference water quality data, and the pre-storm receiving water levels, for any constituent, then natural ocean water quality is exceeded. See attached Flowchart Section C.

f. The Executive Director of the State Water Board may only authorize additional time to comply with the special conditions d. and e., above if good cause exists to do so. Good cause means a physical impossibility or lack of funding.

If a Permittee claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the Permittee first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in d. or e. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of this Exception. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the Permittee to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The Permittee shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality.

The Permittee may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. for Traditional Small MS4s, a demonstration of significant hardship to Permittee ratepayers, by showing the relationship of storm water fees to annual household income for residents within the Permittee's jurisdictional area, and the Permittee has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate; or

2. for Non-Traditional Small MS4s, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process.

II. ADDITIONAL REQUIREMENTS FOR PARKS AND RECREATION FACILITIES

In addition to the provisions in Section I (A) a Permittee with parks and recreation facilities shall comply with the following:

A. The Permittee shall include a section in an ASBS Compliance Plan to address storm water runoff from parks and recreation facilities.

1. The Section shall identify all pollutant sources, including sediment sources, which may result in waste entering storm water runoff. Pollutant sources include, but are not limited to, roadside rest areas and vistas, picnic areas, campgrounds, trash receptacles, maintenance facilities, park personnel housing, portable toilets, leach fields, fuel tanks, roads, piers, and boat launch facilities.

2. The Section shall describe BMPs or Management Measures/Practices that will be implemented to control soil erosion (both temporary and permanent erosion controls) and reduce or eliminate pollutants in storm water runoff in order to achieve and maintain natural water quality conditions in the affected ASBS. The plan shall include BMPs or Management Measures/Practices to ensure that trails and culverts are maintained to prevent erosion and minimize waste discharges to ASBS.

3. The Section shall include BMPs or Management Measures/Practices to prevent the discharge of pesticides or other chemicals, including agricultural chemicals, in storm water runoff to the affected ASBS.

4. The Section shall include BMPs or Management Measures/Practices that address public education and outreach. The goal of these BMPs or Management Measures/Practices is to ensure that the public is adequately informed that waste discharges to the affected ASBS are prohibited or limited by special conditions in in the Special Protections as laid out in this Attachment . The BMPs or Management Measures/Practices shall include signage at camping, picnicking, beach and roadside parking areas, and visitor centers, or other appropriate measures, which notify the public of any applicable requirements of the Special Protections as laid out in this Attachment and identify the ASBS boundaries.

5. The Section shall include BMPs or Management Measures/Practices that address the prohibition against the discharge of trash to ASBS. The BMPs or Management Measures/Practices shall include measures to ensure that adequate trash receptacles are available for public use at visitor facilities, including parking areas, and that the receptacles are adequately maintained to prevent trash discharges into the ASBS. Appropriate measures include covering trash receptacles to prevent trash from being windblown and periodically emptying the receptacles to prevent overflows.

6. The Section shall include BMPs or Management Measures/Practices to address runoff from parking areas and other developed features to ensure that the runoff does not alter natural water quality in the affected ASBS. BMPs or Management Measures/Practices shall include measures to reduce pollutant loading in runoff to the ASBS through installation of natural area buffers (LID), treatment, or other appropriate measures.

B. Maintenance and repair of park and recreation facilities must not result in waste discharges to the ASBS. The practice of road oiling must be minimized or eliminated, and must not result in waste discharges to the ASBS.

III. ADDITIONAL REQUIREMENTS – WATERFRONT AND MARINE OPERATIONS

In addition to the provisions in Section I (A), a Permittee with waterfront and marine operations shall comply with the following:

A. For discharges related to waterfront and marine operations, the Permittee shall develop a Waterfront and Marine Operations Management Section (Waterfront Section) for its ASBS Compliance Plan. The Waterfront Section shall contain appropriate Best Management Practices (BMPs) to address pollutant discharges to the affected ASBS.

1. The Waterfront Section shall contain appropriate BMPs for any waste discharges associated with the operation and maintenance of vessels, moorings, piers, launch ramps, and cleaning stations in order to ensure that beneficial uses are protected and natural water quality is maintained in the affected ASBS.

2. For discharges from marinas and recreational boating activities, the Waterfront Section shall include appropriate Management Measures, described in The Plan for California's Nonpoint Source Pollution Control Program, for marinas and recreational boating, or equivalent practices, to ensure that nonpoint source pollutant discharges do not alter natural water quality in the affected ASBS.

3. The Waterfront Section shall include BMPs to address public education and outreach to ensure that the public is adequately informed that waste discharges to the affected ASBS are prohibited or limited by special conditions in the Special Protections as laid out in this Attachment. The BMPs shall include appropriate signage, or similar measures, to inform the public of the ASBS restrictions and to identify the ASBS boundaries.

4. The Waterfront Section shall include BMPs to address the prohibition against trash discharges to ASBS. The BMPs shall include the provision of adequate trash receptacles for marine recreation areas, including parking areas, launch ramps, and docks. The plan shall also include appropriate BMPs to ensure that the receptacles are adequately maintained and secured in order to prevent trash discharges into the ASBS. Appropriate BMPs include covering the trash receptacles to prevent trash from being windblown, staking or securing the trash receptacles so they don't tip over, and periodically emptying the receptacles to prevent overflow.

5. The Permittee shall submit the Waterfront Plan to the Executive Director of the State Water Board within six months of the effective date of these special conditions. The Waterfront Plan is subject to approval by the State Water Board Executive Director. The plan must be fully implemented within 18 months of the effective date of the Exception.

B. The discharge of chlorine, soaps, petroleum, other chemical contaminants, trash, fish offal, or human sewage to ASBS is prohibited. Sinks and fish cleaning stations are point source discharges of wastes and are prohibited from discharging into ASBS. Anthropogenic accumulations of discarded fouling organisms on the sea floor must be minimized.

C. Limited-term activities, such as the repair, renovation, or maintenance of waterfront facilities, including, but not limited to, piers, docks, moorings, and breakwaters, are authorized only in accordance with Chapter III.E.2 of the Ocean Plan.

D. If the Permittee anticipates that it will fail to fully implement the approved Waterfront Plan within the 18 month deadline, the Permittee shall submit a technical report as soon as practicable to the State Water Board Executive Director. The technical report shall contain reasons for failing to meet the deadline and propose a revised schedule to fully implement the plan.

E. The State Water Board Executive Director may, for good cause, authorize additional time to comply with the Waterfront Plan. Good cause means a physical impossibility or lack of funding.

If a Permittee claims physical impossibility, it shall notify the Board in writing within thirty (30) days of the date that the Permittee first knew of the event or circumstance that caused or would cause it to fail to meet the deadline in Section III.A.5. The notice shall describe the reason for the noncompliance or anticipated noncompliance and specifically refer to this Section of the Special Protections as laid out in this Attachment. It shall describe the anticipated length of time the delay in compliance may persist, the cause or causes of the delay as well as measures to minimize the impact of the delay on water quality, the measures taken or to be taken by the Permittee to prevent or minimize the delay, the schedule by which the measures will be implemented, and the anticipated date of compliance. The Permittee shall adopt all reasonable measures to avoid and minimize such delays and their impact on water quality. The Permittee may request an extension of time for compliance based on lack of funding. The request for an extension shall require:

1. a demonstration of significant hardship by showing that the Permittee has made timely and complete applications for all available bond and grant funding, and either no bond or grant funding is available, or bond and/or grant funding is inadequate.

2. for governmental agencies, a demonstration and documentation of a good faith effort to acquire funding through that agency's budgetary process, and a demonstration that funding was unavailable or inadequate.

IV. MONITORING REQUIREMENTS

Monitoring is mandatory for all Permittees to assure compliance with the Ocean Plan. Monitoring requirements include both: (A) core discharge monitoring, and (B) ocean receiving water monitoring. The State and Regional Water Boards must approve sampling site locations and any adjustments to the monitoring programs. All ocean receiving water and reference area monitoring must be comparable with the Water Boards' Surface Water Ambient Monitoring Program (SWAMP).

Safety concerns: Sample locations and sampling periods must be determined considering safety issues. Sampling may be postponed upon notification to the State and Regional Water Boards if hazardous conditions prevail.

Analytical Chemistry Methods: All constituents must be analyzed using the lowest minimum detection limits comparable to the Ocean Plan water quality objectives. For metal analysis, all samples, including storm water effluent, reference samples, and ocean receiving water samples, must be analyzed by the approved analytical method with the lowest minimum detection limits (currently Inductively Coupled Plasma/Mass Spectrometry) described in the Ocean Plan.

A. CORE DISCHARGE MONITORING PROGRAM

1. General sampling requirements for timing and storm size:

   Runoff must be collected during a storm event that is greater than 0.1 inch and generates runoff, and at least 72 hours from the previously measurable storm event. Runoff samples shall be collected when post-storm receiving water is sampled, and analyzed for the same constituents as receiving water and reference site samples (see section IV B) as described below.

2. Runoff flow measurements

   a. For municipal/industrial storm water outfalls in existence as of December 31, 2007, 18 inches (457mm) or greater in diameter/width (including multiple outfall pipes in combination having a width of 18 inches, runoff flows must be measured or calculated, using a method acceptable to and approved by the State and Regional Water Boards.

   b. This will be reported annually for each precipitation season to the State and Regional Water Boards.

3. Runoff samples – storm events

   a. For outfalls equal to or greater than 18 inches (0.46m) in diameter or width:

      (1) samples of storm water runoff shall be analyzed during the same storm as receiving water samples for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination, and

      (2) samples of storm water runoff shall be analyzed for critical life stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS

      (3) If a Permittee has no outfall greater than 36 inches, then storm water runoff from the Permittee's largest outfall shall be further analyzed during the same storm as receiving water samples for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates).

   b. For outfalls equal to or greater than 36 inches (0.91m) in diameter or width:

      (1) samples of storm water runoff shall be analyzed during the same storm as receiving water samples for oil and grease, total suspended solids, and, within the range of the southern sea otter indicator bacteria or some other measure of fecal contamination; and

      (2) samples of storm water runoff shall be further analyzed during the same storm as receiving water samples for Ocean Plan Table B metals for protection of marine life, Ocean Plan polynuclear aromatic hydrocarbons (PAHs), current use pesticides (pyrethroids and OP pesticides), and nutrients (ammonia, nitrate and phosphates) and

      (3) samples of storm water runoff shall be analyzed for critical stage chronic toxicity (one invertebrate or algal species) at least once during each storm season when receiving water is sampled in the ASBS.

   c. For a Permittee not participating in a regional monitoring program [see below in Section IV (B)] in addition to (a.) and (b.) above, a minimum of the two largest outfalls or 20 percent of the larger outfalls, whichever is greater, shall be sampled (flow weighted composite samples) at least three times annually during wet weather (storm event) and analyzed for all Ocean Plan Table A constituents, Table B constituents for marine aquatic life protection (except for toxicity, only chronic toxicity for three species shall be required), DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, and Ocean Plan indicator bacteria. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one (the largest) such discharge shall be sampled annually in each Region.

4. The Executive Director of the State Water Board may reduce or suspend core monitoring once the storm runoff is fully characterized. This determination may be made at any point after the discharge is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

B. OCEAN RECEIVING WATER AND REFERENCE AREA MONITORING PROGRAM

In addition to performing the Core Discharge Monitoring Program in Section IV..A above, all applicants having authorized discharges must perform ocean receiving water monitoring. In order to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS, Permittees may choose either (1) an individual monitoring program, or (2) participation in a regional integrated monitoring program.

1. Individual Monitoring Program: The requirements listed below are for those Permittees who elect to perform an individual monitoring program to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within the affected ASBS. In addition to Core Discharge Monitoring, the following additional monitoring requirements shall be met:

   a. Three times annually, during wet weather (storm events), the receiving water at the point of discharge from the outfalls described in section (IV)(A)(3)(c) above shall be sampled and analyzed for Ocean Plan Table A constituents, Table B constituents for marine aquatic life, DDT, PCBs, Ocean Plan PAHs, OP pesticides, pyrethroids, nitrates, phosphates, salinity, chronic toxicity (three species), and Ocean Plan indicator bacteria.

      The sample location for the ocean receiving water shall be in the surf zone at the point of discharges; this must be at the same location where storm water runoff is sampled. Receiving water shall be sampled at approximately the same time prior to (pre-storm) and during (or immediately after) the same storm (post storm). Reference water quality shall also be sampled and analyzed for the same constituents pre-storm and post-storm, during the same storms when receiving water is sampled. Reference stations will be determined by the State Water Board's Division of Water Quality and the applicable Regional Water Board(s).

   b. Sediment sampling shall occur at least three times during every five (5) year period. The subtidal sediment (sand or finer, if present) at the discharge shall be sampled and analyzed for Ocean Plan Table B constituents for marine aquatic life, DDT, PCBs, PAHs, pyrethroids, and OP pesticides. For sediment toxicity testing, only an acute toxicity test using the amphipod *Eohaustorius estuarius* must be performed.

c. A quantitative survey of intertidal benthic marine life shall be performed at the discharge and at a reference site. The survey shall be performed at least once every five (5) year period. The survey design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The results of the survey shall be completed and submitted to the State Water Board and Regional Water Board at least six months prior to the end of the permit cycle.

d. Once during each five (5) year period, a bioaccumulation study shall be conducted to determine the concentrations of metals and synthetic organic pollutants at representative discharge sites and at representative reference sites. The study design is subject to approval by the Regional Water Board and the State Water Board's Division of Water Quality. The bioaccumulation study may include California mussels (*Mytilus californianus*) and/or sand crabs (*Emerita analoga* or *Blepharipoda occidentalis*). Based on the study results, the Regional Water Board and the State Water Board's Division of Water Quality, may adjust the study design in subsequent permits, or add or modify additional test organisms (such as shore crabs or fish), or modify the study design appropriate for the area and best available sensitive measures of contaminant exposure.

e. Marine Debris: Representative quantitative observations for trash by type and source shall be performed along the coast of the ASBS within the influence of the Permittee's outfalls. The design, including locations and frequency, of the marine debris observations is subject to approval by the Regional Water Board and State Water Board's Division of Water Quality.

f. The monitoring requirements of the Individual Monitoring Program in this section are minimum requirements. After a minimum of one (1) year of continuous water quality monitoring of the discharges and ocean receiving waters, the Executive Director of the State Water Board (may require additional monitoring, or adjust, reduce or suspend receiving water and reference station monitoring. This determination may be made at any point after the discharge and receiving water is fully characterized, but is best made after the monitoring results from the first permit cycle are assessed.

2. Regional Integrated Monitoring Program: Permittees may elect to participate in a regional integrated monitoring program, in lieu of an individual monitoring program, to fulfill the requirements for monitoring the physical, chemical, and biological characteristics of the ocean receiving waters within their ASBS. This regional approach shall characterize natural water quality, pre- and post-storm, in ocean reference areas near the mouths of identified open space watersheds and the effects of the discharges on natural water quality (physical, chemical, and toxicity) in the ASBS receiving waters, and should include benthic marine aquatic life and bioaccumulation components. The design of the ASBS stratum of a regional integrated monitoring program may deviate from the otherwise prescribed individual monitoring approach (in Section IV.B.1) if approved by the State Water Board's Division of Water Quality and the Regional Water Boards.

   a. Ocean reference areas shall be located at the drainages of flowing watersheds with minimal development (in no instance more than 10% development), and shall not be located in CWA Section 303(d) listed waterbodies or have tributaries that are 303(d) listed. Reference areas shall be free of wastewater discharges and anthropogenic non-storm water runoff. A minimum of low threat storm runoff discharges (e.g. stream highway overpasses and campgrounds) may be allowed on a case-by-case basis.

Reference areas shall be located in the same region as the ASBS receiving water monitoring occurs. The reference areas for each Region are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean reference water samples must be collected from each station, each from a separate storm. A minimum of one reference location shall be sampled for each ASBS receiving water site sampled per responsible party. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

b. ASBS ocean receiving water must be sampled in the surf zone at the location where the runoff makes contact with ocean water (i.e. at "point zero"). Ocean receiving water stations must be representative of worst-case discharge conditions (i.e. co-located at a large drain greater than 36 inches, or if drains greater than 36 inches are not present in the ASBS then the largest drain greater than18 inches.) Ocean receiving water stations are subject to approval by the participants in the regional monitoring program and the State Water Board's Division of Water Quality and the applicable Regional Water Board(s). A minimum of three ocean receiving water samples must be collected during each storm season from each station, each from a separate storm. A minimum of one receiving water location shall be sampled in each ASBS per responsible party in that ASBS. For parties discharging to ASBS in more than one Regional Water Board region, at a minimum, one reference station and one receiving water station shall be sampled in each region.

c. Reference and receiving water sampling shall commence during the first full storm season following the adoption of these special conditions, and post-storm samples shall be collected when annual storm water runoff is sampled. Sampling shall occur in a minimum of two storm seasons. For those ASBS Permittees that have already participated in the Southern California Bight 2008 ASBS regional monitoring effort, sampling may be limited to only one storm season.

d. Receiving water and reference samples shall be analyzed for the same constituents as storm water runoff samples. At a minimum, constituents to be sampled and analyzed in reference and discharge receiving waters must include oil and grease, total suspended solids, Ocean Plan Table B metals for protection of marine life, Ocean Plan PAHs, pyrethroids, OP pesticides, ammonia, nitrate, phosphates, and critical life stage chronic toxicity for three species. In addition, within the range of the southern sea otter, indicator bacteria or some other measure of fecal contamination shall be analyzed.

3. Waterfront and Marine Operations: In addition to the above requirements for ocean receiving water monitoring, additional monitoring must be performed for marinas and boat launch and pier facilities:

   a. For all marina or mooring field operators, in mooring fields with 10 or more occupied moorings, the ocean receiving water must be sampled for Ocean Plan indicator bacteria, residual chlorine, copper, zinc, grease and oil, methylene blue active substances (MBAS), and ammonia nitrogen.

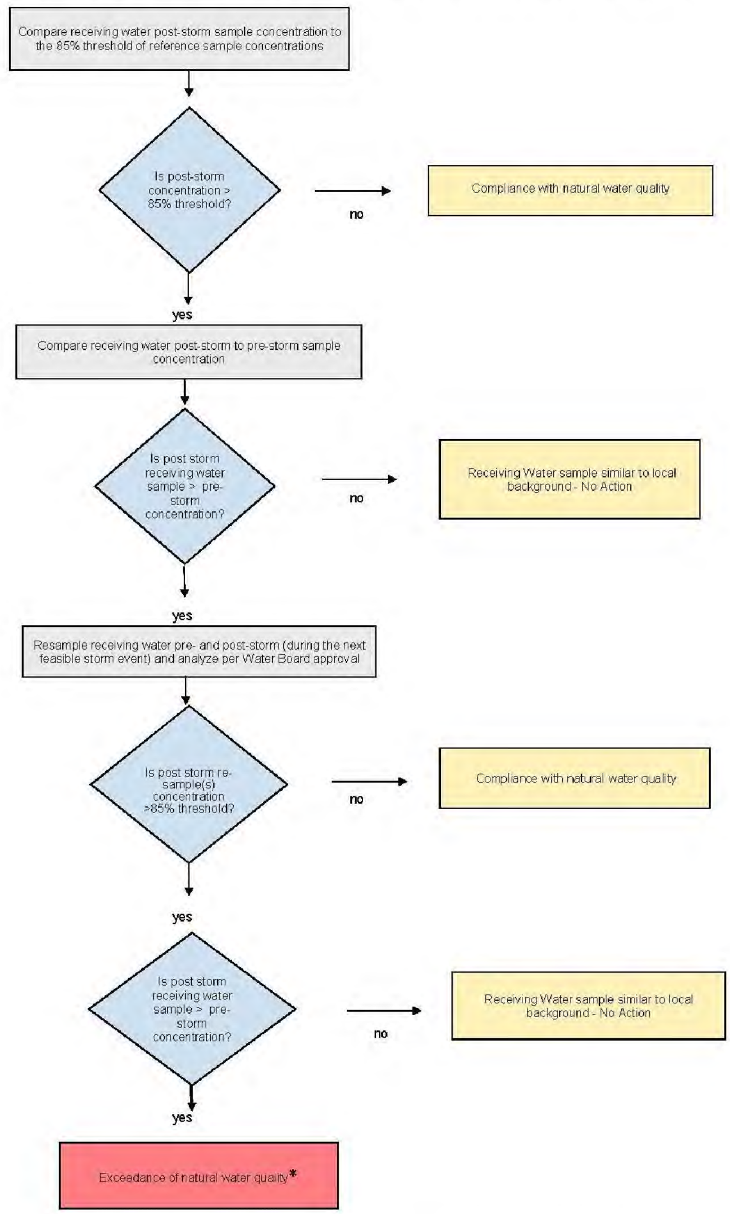
(1) For mooring field operators opting for an individual monitoring program (Section IV.B.1 above), this sampling must occur weekly (on the weekend) from May through October.

(2) For mooring field operators opting to participate in a regional integrated monitoring program (Section IV.B.2 above), this sampling must occur from May through October on a high weekend in each month. The Water Boards may allow a reduction in the frequency of sampling, through the regional monitoring program, after the first year of monitoring.

b. For all mooring field operators, the subtidal sediment (sand or finer, if present) within the mooring fields and below piers shall be sampled and analyzed for Ocean Plan Table B metals (for marine aquatic life beneficial use), acute toxicity, PAHs, and tributyltin. For sediment toxicity testing, only an acute toxicity test using the amphipod *Eohaustorius estuarius* must be performed. This sampling shall occur at least three times during a five (5) year period. For mooring field operators opting to participate in a regional integrated monitoring program, the Water Boards may allow a reduction in the frequency of sampling after the first sampling effort's results are assessed.

C. ASBS Flow Chart

Figure 2
ASBS Special Protections
Flowchart to Determine Compliance with Natural Water Quality



*** When an exceedance of natural water quality occurs, the Department must comply with section I.A.2.h of the Special Protections as well as the requirements of this Order. Note, when sampling data is available, end-of-pipe effluent concentrations will be considered by the Water Boards in making this determination.**

D. ASBS Monitoring Constituents

TABLE A
Monitoring Constituent List
(excerpted from California Ocean Plan dated 2009)

Constituent	Units
Grease and Oil	mg/L
Suspended Solids	Mg/L
Settleable Solids	mL/L
Turbidity	NTU
PH	

TABLE B
Monitoring Constituent List
(excerpted from California Ocean Plan dated 2009)

Constituent	Units
Arsenic	ìg/L
Cadmium	ìg/L
Chromium	ìg/L
Copper	ìg/L
Lead	ìg/L
Mercury	ìg/L
Nickel	ìg/L
Selenium	ìg/L
Silver	ìg/L
Zinc	ìg/L
Cyanide	ìg/L
Total Chlorine Residual	ìg/L
Ammonia (as N)	ìg/L
Acute Toxicity	TUa
Chronic Toxicity	TUc
Phenolic Compounds (non-chlorinated)	ìg/L
Chlorinated Phenolics	ìg/L
Endosulfan	ìg/L
Endrin	ìg/L
HCH	µg/L

CARMEL BAY AREA OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

DRAFT COMPLIANCE PLAN

APPENDIX B

MEMORANDUM OF AGREEMENT

CENTRAL COAST ASBS DISCHARGERS REGIONAL MONITORING PROGRAM

MEMORANDUM OF AGREEMENT

CENTRAL COAST REGIONALAREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE DISCHARGERS MONITORING PROGRAM

This Memorandum of Agreement (AGREEMENT), dated, for reference purposes only, December 1, 2012, is made by and between the MONTEREY REGIONAL WATER POLLUTION CONTROL AGENCY, hereinafter referred to as "AGENCY," a Joint Powers Authority (JPA) organized under the laws of the State of California, and the following entities, each of which is hereinafter referred to as "DISCHARGER" or collectively as "DISCHARGERS":

CITY OF PACIFIC GROVE, a municipal corporation of the State of California;
CITY OF MONTEREY, a municipal corporation of the State of California;
CITY OF CARMEL-BY-THE-SEA, a municipal corporation of the State of California;
COUNTY OF MONTEREY, a political subdivision of the State of California;
COUNTY OF SAN MATEO, a political subdivision of the State of California;
COUNTY OF MARIN, a political subdivision of the State of California;
PEBBLE BEACH COMPANY, a California general partnership;
THE BOARD OF TRUSTEES OF THE LELAND STANFORD JUNIOR UNIVERSITY, THROUGH ITS HOPKINS MARINE STATION, a trust with corporate powers under the laws of the State of California;
MONTEREY BAY AQUARIUM, a 501(c)(3) a nonprofit incorporated in the State of California
CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans), an executive department of the State of California

The AGENCY and the above-mentioned entities may also hereinafter be collectively referred to as "PARTIES" or individually as "PARTY."

RECITALS:

A. The California Ocean Plan ("Ocean Plan") prohibits the discharge of both point and nonpoint source waste into Areas of Special Biological Significance ("ASBS"), unless the State Water Resources Control Board ("SWRCB") grants an exception.

B. The DISCHARGERS have been determined to have direct or indirect storm water discharges into the Carmel Bay ASBS, the Pacific Grove ASBS, the Año Nuevo ASBS, the James V. Fitzgerald ASBS, and the Duxbury Reef ASBS.

C. The SWRCB has adopted "Special Protections for Selected Storm Water and Nonpoint Source Discharges into Areas of Special Biological Significance," dated March 20, 2012, and adopted Resolutions No. 2011-0050/0051, on October 18, 2011.These documents are hereinafter referred to simply as the "Special Protections," and the "Mitigated Negative

Declarations"(MNDs). These Special Protections and MNDs contain monitoring requirements with which each of the DISCHARGERS are required to comply commencing in the winter of 2012-2013.

D. In and for the mutual interest of the DISCHARGERS, the DISCHARGERS wish to develop and implement a Regional Monitoring Program by entering into this AGREEMENT for the purpose of cooperating to efficiently and economically comply with the Special Protections and MNDs monitoring requirements.

NOW, THEREFORE, THE PARTIES HERETO AGREE AS FOLLOWS:

Section 1. Incorporation of Recitals

1.1 The foregoing Recitals are incorporated into this AGREEMENT.

Section 2. Central Coast Regional ASBS Dischargers Monitoring Program

2.1 There is hereby established the Central Coast Regional ASBS Dischargers Monitoring Program ("Program") that is intended to fulfill the DISCHARGERS' respective discharge monitoring and obligations set forth in Section IV of the Special Protections and the MND's.

Section 3. Effective Date and Term

3.1 The effective date of this AGREEMENT shall be the date it is duly executed by all of the DISCHARGERS.

3.2 This AGREEMENT shall terminate on June 30, 2015 unless extended, or terminated earlier, pursuant to Section 8.3 or 8.4, by the DISCHARGERS.

Section 4. Management Committee

4.1 A Management Committee consisting of one representative of each of the DISCHARGERS is hereby created to provide for overall coordination, review, and budget oversight with respect to the Program.

4.2 The Management Committee shall: provide technical oversight, direct and guide the Program, review and approve the Program Budget, select consultant(s) or outside contractor(s), and establish timelines and budgets for completion of Program tasks. The Management Committee shall consider Special Protections monitoring and MND monitoring compliance issues as its primary objective in approving Program tasks and corresponding budgets compliance with Section IV of the Special Protections and Monitoring requirements of the MNDs.

4.3 The Management Committee Bylaws (Exhibit A) shall govern the Management Committee and its meetings.

4.4 Meetings of the Management Committee shall be subject to the California Brown Act (Government Code section 54950 et seq.).

Section 5. Administrator

5.1 There is hereby created the position of Administrator to administer and implement this AGREEMENT and to carry out the responsibilities assigned to the Administrator herein and as outlined in Responsibilities of Administrator (Exhibit B).

5.2 AGENCY shall serve as the initial Administrator for the Program.

5.3 AGENCY may withdraw as the Administrator upon the provision of ninety days' (90) days written notice to the Management Committee. Such notice of withdrawal shall be effective to terminate AGENCY's rights and obligations under this AGREEMENT. The Management Committee may replace the AGENCY and select a new Administrator upon the provision of ninety days (90) written notice to AGENCY. Any new entity that may become the Administrator must assent to the terms of this AGREEMENT. In either event, any outstanding compensation due Administrator shall be paid. Work assignments shall be made to the Administrator by the Management Committee and not by individual DISCHARGERS.

5.4 Other than as provided for in the Program, the Administrator shall not be responsible for providing program management services related to individual DISCHARGER permit programs.

5.5 The Administrator shall be paid from Program Funds in accordance with the adopted Program Budget for providing the services described herein.

5.6 The Administrator shall be the treasurer of the Program Funds. The Administrator, in accordance with generally-accepted accounting principles, shall keep the Program Funds segregated from any other funds administered by the Administrator, shall credit the Program with appropriate interest income earned on Program Funds in each fiscal year, and shall not expend any funds except in accordance with the annual budget approved by the Management Committee, or as otherwise directed by the Management Committee.

Any unauthorized expenditures, including, but not limited to, expenditures in excess of the annual projected budget, made by Administrator shall be payable by the Administrator or AGENCY.

5.7 In conjunction with preparing the proposed Program Budget each year, the Administrator will include a proposed Administration component of the Program Budget and present it to the Management Committee for its approval. The Administration component that is approved by the Management Committee shall be the maximum amount of funds the Administrator may expend without receiving additional funding approval from the Management Committee.

5.8 Within 30 days from the close of the Fiscal Year (July 1 to June 30), the Administrator shall cause an independent annual audit of the accounts and records by a Certified Public Accountant in Compliance with California Government Code section 6505 and Generally Accepted Accounting Principles.

5.9 The Administrator shall be reimbursed by the Program Fund, at actual cost, for any direct cost incurred to administer this AGREEMENT and carry out the Program. Direct costs are defined in the Program Budget Guidelines and Cost Share (Exhibit C).

5.10 In the event that the Administrator withdraws as Administrator, or in the event that the Management Committee wishes to select a new Administrator, a DISCHARGER may serve as a successor Administrator. Any DISCHARGER willing to serve as successor Administrator may be nominated by another DISCHARGER. Selection of an Administrator shall be by majority vote of the Management Committee.

Section 6. Program Budget, Program Fund, and Annual Assessments

6.1 The Management Committee shall adopt a budget for each winter storm season (the "Program Budget"). The Program Budget shall be prepared and administered as described in the attached Program Budget Guidelines and Cost Share (Exhibit C).

6.2 Not later than sixty (60) days after the receipt of an invoice by the Administrator, the DISCHARGERS shall each pay an annual assessment("Annual Assessment") into a fund ("Program Fund") maintained by the Administrator for the purpose of paying Program expenses. The Annual Assessment for each DISCHARGER shall be detailed and reflected in the Program Budget. The Annual Assessment for each DISCHARGER shall be determined as set forth in the Program Budget Guidelines and Cost Share (Exhibit C). Should any DISCHARGER fail to pay the Annual Assessment within sixty (60) days after being invoiced by the Administrator, the DISCHARGER's participation in this AGREEMENT shall be terminated, and the terminated DISCHARGER will bear the full responsibility for its compliance with the monitoring requirements of the Special Protections commencing on the date its participation is terminated. In such event the DISCHARGER shall forfeit its contributed share of Program Funds, if any.

6.3 The Program Fund shall be maintained and managed in trust by the Administrator solely for purposes of the Program. The Management Committee shall determine the type of account in which the Program Fund shall be deposited. All Program expenditures required to implement the approved Special Protections Scope of Work shall be paid out of the Program Fund. The Administrator shall be authorized to make expenditures for the purchase of services or materials allocated in the Program Budget. Where a purchase for a necessary, but unapproved, expenditure for services or materials is required, the Program Administrator may make such a purchase, in an amount not-to-exceed $5,000, where the purchase must be made before a meeting of the Management Committee can be convened. Such purchases may not be made more than twice per fiscal year. Expenditures greater than $5,000 shall require prior approval of the Management Committee.

6.4 Except as provided in Section 8.3 and 8.4 (regarding termination of DISCHARGER status and termination of this AGREEMENT), any ending balance in the Program Fund at the close of each fiscal year shall, at the election of each DISCHARGER and based upon that DISCHARGER'S Percentage Participation, be disbursed to that DISCHARGER, or credited to that DISCHARGER'S Annual Assessment for the subsequent winter storm season.

6.5 Upon approval of a new member as set forth in Section 8.1, the Management Committee shall revise the Annual Assessment for each DISCHARGER consistent with the method set forth in Program Budget Guidelines and Cost Share (Exhibit C) taking into account the new member.

Section 7. Additional Rights and Duties of the DISCHARGERS

7.1 In addition to participation in the Management Committee, each of the DISCHARGERS agrees to perform the following duties:

7.1.1 Participate in Management Committee meetings and activities, and other meetings required of the DISCHARGERS;

7.1.2 Provide the requisite reports to the Administrator for purposes of complying with the joint reporting and compliance mandates applicable to the Special Protections and MNDs and the status Program implementation.

7.2 DISCHARGERS agree they are individually responsible for compliance matters not covered by this AGREEMENT.

7.3 This AGREEMENT does not restrict the DISCHARGERS from the ability to individually (or collectively) request modifications of or to otherwise challenge, administratively, through litigation, or otherwise, Special Protections or MNDs or other requirements to the extent that a requirement affects an individual DISCHARGER (or group of DISCHARGERS).

Section 8. Additional Parties, Early Termination of Dischargers, and Third Party Data Sharing

8.1 Subject to a majority vote of the DISCHARGERS, any agency, corporation or individual responsible for discharges to the State of California's Areas of Special Biological Significance within Regional Water Quality Control Boards (RWQCB) Regions 2 or 3 may become a member of the Program and a party to this AGREEMENT (a "New Party"). New Parties shall execute a copy of this AGREEMENT through their appropriate officials pursuant to the authority conferred by the governing body of the New Party. The Representative of the New Party shall file with the Administrator a duly executed copy of the AGREEMENT. Upon approval, each New Party shall pay an Annual Assessment as determined by the Management Committee. In addition to paying the Annual Assessment, each New Party shall also pay an appropriate buy-in fee as established by the Management Committee, intended to reimburse the Program Fund for the New Party's share of costs that the DISCHARGERS have expended up to the date of the New Party's membership.

8.2 Upon approval of the Management Committee Members, the DISCHARGERS may enter into agreements with third-party state or federal agencies for the purpose of sharing data. These agencies shall not become a party to this AGREEMENT, shall not have representation on the Management Committee, and shall not be part of the cost-sharing described in the Program Budget Guidelines and Cost Share (Exhibit C). Such agreements shall be for the sole objective of data sharing.

8.3 Any DISCHARGER may terminate its participation in this AGREEMENT by giving the Management Committee at least thirty (30) days written notice. If a DISCHARGER terminates its participation, the terminating DISCHARGER will bear the full responsibility for its compliance with the monitoring requirements of the Special Protections commencing on the date it terminates its participation. Unless the termination is scheduled to be effective at the close of the fiscal year in which the notice is given, termination shall constitute forfeiture of all of the terminating DISCHARGER's contributed share of the

Program Budget for the fiscal year in which the termination occurs. The cost allocations for the remaining DISCHARGERS shall be recalculated for the following fiscal year by the DISCHARGERS without the withdrawing DISCHARGER'S participation.

8.4 This AGREEMENT shall terminate immediately and without further notice should sufficient DISCHARGERS terminate their participation pursuant to Section 8.3 such that only a single DISCHARGER has not terminated its participation (Remaining DISCHARGER). Unless the AGREEMENT terminates pursuant to this section at the close of a fiscal year, any funds remaining in the Program Budget shall be forfeited to the Remaining DISCHARGERS to be used solely and exclusively in furtherance of the Remaining DISCHARGER's monitoring requirements pursuant to the Special Protections.

Section 9. General Provisions

9.1 Amendment. This AGREEMENT may be amended only by written agreement of all PARTIES. All PARTIES agree to bring any proposed amendment to this Agreement to their respective Executive Management, as applicable, within two (2) months following acceptance of the proposed amendment by the Management Committee.

9.2 Execution. This AGREEMENT may be executed by facsimile and delivered in any number of copies (counterparts) by the DISCHARGERS. When each DISCHARGER has signed and delivered at least one (1) counterpart to the Administrator, each counterpart shall be deemed an original and, taken together, shall constitute one and the same AGREEMENT, which shall be binding and effective as to the PARTIES hereto.

9.3 Liability. No PARTY shall, by entering into this AGREEMENT, participating in the Management Committee, or serving as the Administrator, assume or be deemed to assume responsibility for any other PARTY in complying with the requirements of the Special Protections. This AGREEMENT is intended solely for the convenience and benefit of the PARTIES and shall not be deemed to be for the benefit of any third party and may not be enforced by any third party, including, but not limited to, the Environmental Protection Agency, the SWRCB, the RWQCB, or any other person.

In lieu of and notwithstanding the pro rata risk allocation which might otherwise be imposed between the DISCHARGERS pursuant to Government Code Section 895.6, the DISCHARGERS agree that all losses or liabilities incurred by a DISCHARGER shall not be shared pro rata, but instead, the DISCHARGERS agree that pursuant to Government Code Section 895.4, each of the DISCHARGERS shall fully defend, indemnify, and hold harmless each of the other DISCHARGERS from any claim, expense, or cost, damage, or liability imposed for injury, including, but not limited to, as defined by Government Code Section 810.8,occurring by reason of the negligent acts or omissions or willful misconduct of the indemnifying DISCHARGER, its officers, agents, or employees, under or in connection with or arising from any work, authority, or action taken under this AGREEMENT, including but not limited to any non-compliance by a DISCHARGER with its obligations under the Special Protections or MNDs. No DISCHARGER, nor any officer, Councilmember, Board member, employee, or agent thereof, shall be responsible for any damage or liability incurred by reason of the negligent acts or omissions or willful misconduct of any other DISCHARGERS, their officers, Council members, Board members, employees, or agents, under or in connection with or arising from any work, authority, or actions taken under this AGREEMENT, including but not limited to any non-compliance by a DISCHARGERS with its obligations under the Special Protections or MNDs.

Notwithstanding the above, if the Administrator is negligent or intentionally wrongful in the performance of its duties under this AGREEMENT, it will be liable to the DISCHARGERS for any consequences of such negligent or intentionally wrongful performance.

9.4 Venue. Venue for any actions brought under this Agreement shall be as prescribed by California or Federal law.

9.5 Notices: Unless otherwise specified herein, all notices or demands required under this Agreement shall be in writing and shall either be hand-delivered or mailed by first class registered or certified mail, postage prepaid, addressed to the PARTIES to the addresses and to the attention of the person named in Exhibit D.

9.6 Governing Law: The terms of this Agreement are governed by, and shall be construed in accordance with, the laws of the State of California.

9.7 Severability: If any provision of this Agreement is held to be invalid, for any reason, by a court of law, the remaining provisions of this Agreement shall not be affected thereby and shall continue in full force and effect.

9.8 Authorization: Each individual signing this Agreement warrants that he/she is authorized to do so on behalf of the entity on whose behalf he/she is signing and that they have the authority to bind that entity/individual to all the terms of this AGREEMENT, unless the individual's signature block indicates a different purpose for their signature.

9.9 Waiver: No waiver by the PARTIES of any breach of any provision of this Agreement shall constitute a waiver of any other breach or of such provision of this Agreement.

9.10 Entire Agreement: This Agreement, including Exhibits A, B, C, D, and E constitutes the complete and exclusive understanding between the PARTIES which supersedes all previous agreements, written or oral, regarding the subject matter of this Agreement. No changes, modifications or amendments to this Agreement (including Exhibit A, B, C, D and/or E) shall be valid unless they are in writing and duly executed by authorized representatives of all the PARTIES.

IN WITNESS WHEREOF, the PARTIES hereto have executed this AGREEMENT as of the dates shown below:

MONTEREY REGIONAL WATER POLLUTION CONTROL AGENCY

Date: ________

____
Signature

____
Printed Name and Title

CITY OF PACIFIC GROVE

Date: ________

____
Signature

____
Printed Name and Title

CITY OF MONTEREY

Date: ________

____
Signature

____
Printed Name and Title

CITY OF CARMEL-BY-THE-SEA

Date: ________

____
Signature

____
Printed Name and Title

COUNTY OF MONTEREY

Date: ________

____
Signature

____
Printed Name and Title

COUNTY OF SAN MATEO

Date: _________

____
Signature

____
Printed Name and Title

COUNTY OF MARIN

Date: _________

____
Signature

____
Printed Name and Title

PEBBLE BEACH COMPANY

Date: _________

____
Signature

____
Printed Name and Title

HOPKINS MARINE STATION

Date: _________

____
Signature

____
Printed Name and Title

MONTEREY BAY AQUARIUM

Date: _________

____
Signature

____
Printed Name and Title

CALIFORNIA DEPARTMENT OF TRANSPORTATION

Date: ________

____
Signature

____
Printed Name and Title

EXHIBIT "A"

CENTRAL COAST REGIONAL AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE DISCHARGERS MONITORING PROGRAM

MANAGEMENT COMMITTEE BYLAWS

The Central Coast Regional Areas of Special Biological Significance Dischargers Monitoring Program Management Committee shall be governed by the following Bylaws.

1. Representation. Each DISCHARGER shall designate a representative to attend meetings in person, by telephone or via a web-based meeting of the Management Committee, and may designate alternates as set forth in this AGREEMENT. If a DISCHARGER'S representative is unable to attend a meeting, the DISCHARGER'S alternates shall attend.

2. Voting. Each DISCHARGER shall have one vote and the Management Committee representative or their alternate shall vote on behalf of the DISCHARGER unless stated otherwise in this AGREEMENT. Voting on all matters shall be on a voice vote unless a roll call vote is requested by any member in attendance or is required pursuant to the Brown Act.

   All actions taken by the Management Committee require the affirmative vote of a majority of the Management Committee members entitled to vote. However, the Program Budget, or any other matter having a financial impact on a DISCHARGER not contemplated in the Program Budget, shall be approved by a two-thirds majority vote of a quorum present at the Management Committee meeting where the action is taken.

3. Quorum. A majority of the Management Committee entitled to vote constitutes a quorum for the transaction of business.

4. Officers. The officers of the Management Committee shall consist of a Chair and Vice Chair. The Chair shall preside over all meetings of the Management Committee, and may call special meetings as necessary upon one week of notice to all DISCHARGERS. The Chair may vote on, and second any motion, but may not make a motion. The Vice Chair shall perform the duties of the Chair in the Chair's absence.

   In the first Fiscal Year the Administrator shall preside over the initial meeting of the Management Committee, and the first order of business for the initial meeting of the Management Committee shall be the election of the Chair and Vice Chair. The Chair and Vice Chair shall take up their duties immediately upon election.

   In subsequent Fiscal Years the positions of Chair and Vice Chair shall be filled by election annually at the Management Committee's meeting in January. If either position becomes vacant for any reason, an election shall be held to fill the position(s) at the next meeting of the Management Committee. Should both positions be vacant at the same time, the Administrator shall serve as Chair until a Chair is elected by the Management Committee.

5. Meeting Schedule. Regular meetings will be held at a frequency commensurate with the workload of the Management Committee at pre-arranged dates.

6. Starting Time. Meetings will start promptly at the times designated in the meeting notices. Representatives shall endeavor to notify the Administrator whether they will be late or unable to attend.

7. Limitation of Discussion. Discussion on any particular matter by either Management Committee members or by any member of the general public may be limited at the discretion of the chair to such length of time as the chair may deem reasonable under the circumstances.

8. Administrator. The Administrator shall serve as Secretary. The Secretary shall, upon consultation with the Chair, prepare an agenda for each meeting, keep and publish minutes for each meeting (which shall be approved by the Management Committee at the subsequent meeting), prepare and post any notices as may be required by law, and have custody of all documents relating to the Management Committee.

   The Administrator shall also serve as Treasurer. The Treasurer shall manage the Program Fund as set forth in the AGREEMENT.

9. New Members. New members may be added to the Management Committee as set forth in Section 8.1 of this AGREEMENT.

10. Bylaws. The information set forth in these Bylaws shall be deemed sufficient to serve as the Bylaws for the Management Committee, subject to approval by the DISCHARGERS.

11. Conduct of Meetings. The meetings are to be guided by the principles of Robert's Rules of Order. The Chair shall decide all questions of order.

12. Program Attorney. The Management Committee may select an attorney or law firm ("Program Attorney") to provide legal advice to the Management Committee on matters involving the Program. The Program Attorney may be the attorney of record for one of the DISCHARGERS, so long as such representation is disclosed and any conflicts of interest are resolved. The Program Attorney may provide such services under separate contract with any DISCHARGER or DISCHARGERS, but shall provide advance notification to all DISCHARGERS before providing such services to identify and resolve possible issues of conflict of interest. The Administrator may assist in coordination of activities with the Program Attorney, and shall provide such assistance as the Program Attorney may require, but shall not give direction to the Program Attorney without prior authorization from the Management Committee.

13. Amendment. These Bylaws may be amended only by a majority vote of all DISCHARGERS.

EXHIBIT "B"

CENTRAL COAST REGIONAL AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE DISCHARGERS MONITORING PROGRAM

RESPONSIBILITIES OF ADMINISTRATOR

The Administrator shall have the following responsibilities:

1. The Administrator shall administer the AGREEMENT, and maintain an appropriate book of accounts, which, among other things, shall specifically identify the costs incurred in implementing the AGREEMENT. These records shall be subject to inspection by any of the DISCHARGERS at all reasonable times.

2. Subject to the prior approval of the Management Committee, the Administrator may enter into such agreements as necessary with public agencies or outside contractors and consultants to carry out the Program objectives.

3. The Administrator shall serve as the Secretary and Treasurer to the Management Committee.

4. Arranging for and conducting meetings of the Management Committee, including preparation of agenda materials and meeting minutes.

5. The Administrator shall perform such other duties as may be required and agreed to by the Management Committee, including, but not limited to, contracting with and managing the work of outside consultants and contractors to perform related work if deemed necessary and appropriate by the Management Committee. The Administrator shall act in a reasonable amount of time to execute contracts with consultants and/or contractors, which have been requested and approved by the Management Committee. The Administrator shall provide a copy of any contract executed on behalf of the Program to any DISCHARGER or person designated by any DISCHARGER or the Management Committee upon request. The contract template shall require consultants to indemnify and name all DISCHARGERS as additional insured and shall meet minimum coverage amounts for insurance policies. The Management Committee shall approve by a majority vote the contract template to be used by the Administrator.

EXHIBIT "C"

CENTRAL COAST REGIONAL AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE DISCHARGERS MONITORING PROGRAM

PROGRAM BUDGET GUIDELINES AND COST SHARE

Program Budget Guidelines

The Year 1 Program budget shall be based upon 1) the State Water Board's approved scope of work, a request for professional services, and the selected contractor's cost proposal, and 2) Program Administrator actual time and materials costs, but not to exceed $50,000, based on the billing rate schedule included below. The Administrator costs in Year 1 shall include, but not be limited to, the following activities:

- Establishment of program fund and accounting
- Invoices to DISCHARGERS
- Solicitation for professional services to implement Scope of Work
- Procurement and management of professional services agreement
- Coordination with Management Committee

For subsequent Fiscal Years, the Administrator will prepare a Draft Program Budget no later than April 1 for the succeeding Fiscal Year. The Draft Program Budget shall include a breakdown of the costs allocated to each DISCHARGER, in accordance with the Cost Sharing table below. The Administrator will revise the Draft Program Budget, as appropriate, to address concerns and comments from the Management Committee and the Management Committee will then approve and adopt a final Program Budget by June 15 prior to the wet season in which monitoring will occur.

The Administrator and the DISCHARGERS recognize that the Program Budget will be based on estimated costs, and that actual costs may differ from the budgeted amounts. If it appears that costs will exceed the budgeted amounts, the Administrator will notify the Management Committee as soon as the Administrator becomes aware of this and before incurring costs in excess of the budgeted amounts. If the Management Committee determines it is appropriate to have the Administrator incur additional costs above the budgeted amounts, the Administrator will prepare and submit a budget revision request for approval by the Management Committee. Time shall be allotted for Management Committee representatives to request their respective governing Boards or Councils to approve a budget increase request prior to approving a Program Budget revision. Only after the Management Committee approves an increase in the Program Budget will the Administrator incur costs in excess of the budgeted amounts. If there are unspent funds left at the end of the fiscal year, the Administrator will return to each DISCHARGER the unspent portion of that DISCHARGER'S payment, or credit that amount to the DISCHARGERS annual assessment for the subsequent fiscal year, at DISCHARGER's discretion.

The Administrator will establish a separate job-cost code in its accounting system, to track the hours spent and out-of-pocket expenses directly related to performing work as the Administrator, which will be charged to the Program Fund. The Administrator will include in the Management Committee's meeting agenda reports a summary of the work the Administrator has performed during the intervening time period, the total costs of that work, and the portion of the cost allocated to each DISCHARGER. The portion of the cost allocated to the DISCHARGER will be calculated in accordance with the cost-sharing approach outlined in the Cost-Sharing chart below.

The costs for the Program Administrator will consist of direct costs, as described below.

Cost-Sharing

The Cost Sharing table below shows how the annual Program Budget will be shared amongst the DISCHARGERS based on the Scope of Work ("Exhibit E"). Each DISCHARGER's Percentage Participation in the Program Budget components shall be as set forth in the table below:

Agency	Outfalls 18" to 36"	Percentage of outfalls 18" - 36" (Budget A)	Outfalls = to or >36" w/ receiving water	Percentage of outfalls = to or >36" (Budget B)	Outfalls = to or >36" w/out receiving water	Percentage of outfalls = or >36" (Budget C)	Percentage Participation in Budget Component D
Pacific Grove	7	30.4%	1.83	22.9%	1	50%	11.6%
City of Monterey	0	0 %	.5	6.3%	0	0%	11.6%
Carmel	9	39.1%	1	12.5%	0	0%	11.6%
PBC	3	13%	1	12.5%	1	50%	11.6%
MBA	0	0%	.33	4.2%	0	0%	7.1%
Hopkins	0	0%	.33	4.2%	0	0%	7.1%
Marin County	0	0%	1	12.5%	0	0%	11.6%
Monterey County	0	0 %	1	12.5%	0	0%	11.6%
San Mateo County	4	17.4%	1	12.5%	0	0%	11.6%
Caltrans	0	0%	0	0%	0	0%	4.9%
Total	23	100%	8	100%	2	100%	100%

Program Budget Components

The Program Budget shall be allocated into the following components:

- Component "A" shall consist of all costs associated with Program Core Monitoring for Runoff and Outfalls from 18" to <36" diameter.
- Component "B" shall consist of all costs associated with Program Core Monitoring for Outfalls from >36" diameter, with a receiving water site.
- Component "C" shall consist of all costs associated with Program Core Monitoring for Outfalls from >36" diameter, without a receiving water site.
- Component "D" shall consist of the Program Regional Monitoring, including large discharge receiving water, reference site receiving water, rocky intertidal and

bioaccumulation monitoring, technical management and reporting, and Program Administrator costs (not to exceed $50,000 in Year 1). Caltrans shall participate only in the bioaccumulation and rocky intertidal Program Regional Monitoring.

Annual Assessment

Each DISCHARGER's Annual Assessment shall be the sum of the amounts calculated by multiplying each component of the Program Budget by the DISCHARGER's Percentage Participation in that component.

Administrator Costs

Administrator costs will be compensated for actual direct costs on a time and materials basis. In Year 1, time and materials costs shall not exceed $50,000 and shall be charged at the following rates (salary plus benefits):

Admin Assistant	$55/hr
Executive Assistant	$65/hr
Accountant	$80/hr
Associate Engineer	$110/hr
Director of Finance	$135/hr
Director of Admin Services	$150/hr
Assistant General Manager	$165/hr
General Manager	$190/hr

Direct Costs are defined as costs incurred for necessary services and/or materials in the course of managing the Program. Direct costs shall be charged at actual cost. All direct costs shall be tracked and accounted for each fiscal year and provided in an independent annual audit in accordance with Section 5.8. Direct costs are those which can be and are tracked through time cards, invoices, record keeping systems, and other records that specifically allocate a cost to the Central Coast Regional Areas of Special Biological Significance Dischargers Monitoring Program.

EXHIBIT "D"

NOTICES

Pursuant to Section 9.5, unless otherwise specified, all notices or demands required under this Agreement shall be in writing and shall either be hand-delivered or mailed by first class registered or certified mail, postage prepaid, addressed to the PARTIES to the addresses and to the attention of the person named below:

CITY OF PACIFIC GROVE:

Sarah Hardgrave
Environmental Programs Manager
Public Works Department
2100 Sunset Drive
Pacific Grove, CA 93950

CITY OF MONTEREY:

Tom Reeves
City Engineer
Plans and Public Works
580 Pacific St.
Monterey, CA 93940

CITY OF CARMEL-BY-THE-SEA:

Jason Stilwell
City Administrator
Carmel-by-the-Sea City Hall
P.O. Box CC
Carmel-by-the-Sea, CA 93921

COUNTY OF MONTEREY:

Tom Harty
Stormwater Program Manager
Department of Public Works
168 West Alisal Street, 2nd Floor
Salinas, CA 93901

COUNTY OF SAN MATEO:

James C. Porter
Director
Department of Public Works and Parks

555 County Center, 5th Floor
Redwood City, CA 94063-1665

COUNTY OF MARIN:

Terri Fashing
Stormwater Program Administrator
Marin County Department of Public Works
3501 Civic Center Drive, Room 304
San Rafael, CA 94903

PEBBLE BEACH COMPANY:

Thomas Quattlebaum
Environmental Manager
4005 Sunridge Road
Pebble Beach, CA 93953

THE BOARD OF TRUSTEES OF THE LELAND STANFORD JUNIOR UNIVERSITY, THROUGH ITS HOPKINS MARINE STATION:

Chris Patton
Hopkins Marine Station
Stanford University
Pacific Grove CA 93950-3094

MONTEREY BAY AQUARIUM:

Roger Phillips
Director of Applied Research
Monterey Bay Aquarium
886 Cannery Row
Monterey, CA 93940

CALIFORNIA DEPARTMENT OF TRANSPORTATION (Caltrans):

EXHIBIT "E"

SCOPE OF WORK

Central California Areas of Special Biological Significance Storm Water Monitoring to Satisfy Special Protections November 26, 2012

I. Introduction

The Central Coast ASBS Regional Monitoring Program will be implemented during the 2012–2013 and 2013-2014 storm seasons and includes all ASBS responsible parties[1] on the Central Coast, covering an area from Big Sur, in Monterey County, to Pt. Reyes, in Marin County. This Scope of Work for the Central Coast ASBS Regional Monitoring Program has been developed through discussions with staff from State and Regional Water Boards, as well as the responsible parties discharging storm water into Areas of Special Biological Significance (ASBS).

II. Technical Program

In all specifications for storm water and receiving water monitoring that follow, the minimum requirement for a storm shall satisfy the criteria specified in the Special Protections (i.e., >0.10 inches of rainfall resulting in runoff, >72 hours from the previous storm). Moreover, every attempt shall be made to satisfy the criteria for storm runoff monitoring conducted by the Monterey Bay National Marine Sanctuary (i.e., sheeting water on roadways, heavy flow through the storm drain system and conductivity levels less than 1000 micro Siemens (µS) and declining) and ensure sufficient time after the initiation of rainfall to allow for time of concentration to include flow runoff from all parts of the catchment or watershed.

This Scope of Work covers monitoring requirements specified in the Special Protections for 12 participants[1] designated as Responsible Parties, as follows:

- National Park Service, Point Reyes National Seashore
- Marin County
- San Mateo County
- Monterey Bay Aquarium
- Hopkins Marine Station
- City of Monterey
- City of Pacific Grove
- Carmel by the Sea
- Pebble Beach Company
- Monterey County

[1] It should be noted that three participants, Caltrans, National Park Service and California Department of Parks and Recreation, have not yet committed to full participation in the Central Coast regional program. These State and Federal Agencies may contract separately to implement their monitoring requirements, but with a commitment that they use the same monitoring design, laboratories for sample analysis and provide their data for analysis with the other participants.

- California Department of Parks and Recreation
- Caltrans

While the City of Monterey is a Responsible Party, it does not operate any storm runoff outfalls of its own that drain into an ASBS. It does, however, contribute runoff to an ASBS outfall operated by the City of Pacific Grove. Storm water, sediment, receiving water and reference site monitoring will be performed under this Scope of Work for Monterey Bay Aquarium and Hopkins Marine Station in compliance with the individual Draft Mitigated Negative Declaration documents issued to each. These two participants have other monitoring requirements for seawater discharges that are being performed outside this Scope of Work.

A. Core Monitoring

1. Runoff Flow Measurements
   Total annual storm runoff from each participant shall be estimated (modeled) by using measured rainfall and the amount of impervious area (to be provided by each participant) in each catchment. Targeted ground-truth measurements will be made to calibrate the model. This runoff modeling will permit estimates of total annual and event-specific loads for each participant.

2. Discharge Monitoring
   All outfalls ≥18 inches shall be sampled, as follows:
   a. 1 storm in each of 2 years, except for discharges at receiving water sites, which shall be sampled in the same 3 storms sampled for receiving water;
   b. Each sample shall be analyzed for oil and grease, total suspended solids and fecal indicator bacteria;
   c. Annual samples (1 storm in each year) shall be analyzed for critical life stage chronic toxicity with a sea urchin using salted-up water.

   All samples from outfalls ≥36 inches shall be sampled, as follows:
   a. 1 storm in each of 2 years, except for discharges at receiving water sites, which shall be sampled in the same 3 storms each year that are sampled for receiving water;
   b. Each sample shall be analyzed for oil and grease, total suspended solids and fecal indicator bacteria, California Ocean Plan trace metals, polynuclear aromatic hydrocarbons, organophosphorous pesticides, pyrethroid pesticides and nutrients (ammonia, nitrate, urea and phosphate);
   c. Annual samples (1 storm in each year) shall be analyzed for critical life stage chronic toxicity with a sea urchin test using salted-up discharge water.

B. Receiving Water and Reference Monitoring

1. Receiving Water Monitoring
   Receiving water (receiving water = in the surf zone at the point of contact between runoff and the ocean) at 11 large storm water outfalls selected to represent worst-case conditions shall be sampled as follows:
   a. Samples shall be collected before and during 3 storms in each of 2 years;
   b. Each sample shall be analyzed for oil and grease, total suspended solids, fecal indicator bacteria, California Ocean Plan trace metals, polynuclear aromatic

hydrocarbons, organophosphorous pesticides, pyrethroid pesticides and nutrients (i.e., nitrate, ammonia, urea, orthophosphate);

c. Samples collected during storms shall be analyzed for critical life stage chronic toxicity with 3 marine species (sea urchin, mussel and giant kelp).

Specific locations of outfalls to be monitored are as follows:

>18"	>36"	Responsible Party	Location	Longitude	Latitude	Nearest SWRCB Site		
						ID	Longitude	Latitude
	X[a]	Marin County	Trailhead at Agate Beach	-122.71059	37.89749	DUX009	-122.71058	37.89757
X		San Mateo County	Maritime Walk	-122.517537	37.531153	FIT012	-122.51756	37.53115
X		San Mateo County	Juliana	-122.516679	37.529092	FIT015	-122.51667	37.52915
X		San Mateo County	Distillery	-122.513269	37.517706	FIT028	-122.51355	37.51789
X		San Mateo County	Madrone	-122.511592	37.514237	FIT029	-122.51067	37.51246
	X[a]	San Mateo County	Weinke Way	-122.516958	37.528645	FIT016	-122.5173	37.5282
X		California State Parks	Año Nuevo	-122.32181	37.11666	ANO012	-122.32181	37.11666
	X	California State Parks	Point Lobos	-121.93812	36.5187	PTL004	-121.93812	36.5187
	X[a]	California State Parks	Año Nuevo	-122.33662	37.13245	ANO027	-122.33662	37.13245
	X	California State Parks	Point Lobos	-121.94775	36.51524	PTL034	-121.94775	36.51524
	X	California State Parks	Julia Pfeiffer Burns	-121.68885	36.17192	PFE008	-121.68885	36.17192
	X	California State Parks	Julia Pfeiffer Burns	-121.68629	36.17072	PFE011	-121.68629	36.17072
	X	California State Parks	Julia Pfeiffer Burns	-121.68281	36.16924	PFE012	-121.68281	36.16924
	X	California State Parks	Julia Pfeiffer Burns	-121.6773	36.16634	PFE015	-121.6773	36.16634
	X	California State Parks	Julia Pfeiffer Burns	-121.6764	36.16569	PFE016	-121.6764	36.16569
	X	California State Parks	Julia Pfeiffer Burns	-121.66883	36.1553	PFE026	-121.66883	36.1553
	X	California State Parks	Julia Pfeiffer Burns	-121.66781	36.15469	PFE027	-121.66781	36.15469
	X[a]	Pacific Grove	Lover's at Ocean View	-121.91614	36.6246	PCG120	-121.91613	36.6246
X		Pacific Grove	Ocean View between Fountain Avenue and 15th Street	-121.914835	36.62381	PCG215	-121.91484	36.62378
	X[a b]	Pacific Grove	Ocean View between 12th Street and 13th Street	-121.913831	36.622873	PCG219	-121.91381	36.62281
	X	Pacific Grove	Ocean View at 15th Street	-121.91472	36.62339	PCG217	-121.91472	36.62339
X		Pacific Grove	Ocean View between Clyte Street and Naiad Street	-121.919561	36.627369	PCG069	-121.91955	36.62735
X		Pacific Grove	Northwest corner of Lover's Point Park at Ocean View Boulevard	-121.916596	36.626648	PCG098	-121.91657	36.6266
X		Pacific Grove	Grand Avenue at Ocean View	-121.914835	36.62381	PCG215	-121.91484	36.62378
X		Pacific Grove	8th Street at Ocean View	-121.910348	36.621624	PCG229	-121.91036	36.62162
X	X[a c]	Pacific Grove	Ocean View at the Hopkins Marine Laboratory Stanford University	-121.90305	36.61897	PCG257 PCG258	-121.90305	36.61897

>18"	>36"	Responsible Party	Location	Longitude	Latitude	Nearest SWRCB Site		
						ID	Longitude	Latitude
X		Pacific Grove	At Ocean View between 7th Street and 5th Street	-121.909634	36.621125	PCG230	-121.90995	36.62115
	X[a]	County of Monterey	Scenic Road (12")	-121.93286	36.54439	CAR029	-121.93286	36.54439
	X[a]	Carmel	4th Avenue	-121.93075	36.55610	CAR062	-121.93075	36.55605
X		Carmel	Ocean Avenue	-121.93030	36.55502	CAR061	-121.93033	36.55501
X		Carmel	8th Avenue	-121.92940	36.55250	CAR059	-121.92933	36.55275
X		Carmel	10h Avenue	-121.92898	36.55007	CAR050	-121.92904	36.55003
X		Carmel	11th Avenue	-121.92877	36.54883	CAR046	-121.92877	36.54881
X		Carmel	13th Avenue	-121.92903	36.54641	CAR037	-121.9291	36.5464
X		Carmel	parking lot at Del Mar near Ocean Avenue	-121.93003	36.55442	CAR060	-121.93006	36.55439
X		Carmel	9th Avenue	-121.92890	36.55117	CAR055	-121.92891	36.55117
X		Carmel	Scenic Road & Santa Lucia Avenue	-121.92962	36.54552	CAR093	-121.92968	36.54547
X		Carmel	12th Avenue	-121.92857	36.54765	CAR044	-121.92854	36.54767
X		Pebble Beach Company	Stillwater Pier	-121.942739	36.566625	CAR279	-121.94274	36.56655
X		Pebble Beach Company	18th Fairway PBGL	-121.948014	36.567247	CAR299	-121.94803	36.5672
X		Pebble Beach Company	18th Green PBGL / Lodge	-121.950131	36.567372	CAR221	-121.9501	36.56738
	X[a]	Pebble Beach Company	18th Green PBGL / Lodge	-121.950097	36.567383	CAR220	-121.95001	36.56741
	X	Pebble Beach Company	9th Green PBGL	-121.933397	36.560394	CAR076	-121.93337	36.5603
X[a]		Caltrans	Fitzgerald	-122.51771	37.53154	FIT011	-122.51771	37.53154
	X	Caltrans	Año Nuevo	-122.29297	37.10714	ANO035	-122.29297	37.10714
	X	Caltrans	Año Nuevo	-122.297	37.11084	ANO034	-122.297	37.11084
	X	Caltrans	Año Nuevo	-122.29764	37.1113	ANO032	-122.29764	37.1113
	X[a]	Caltrans	Año Nuevo	-122.29881	37.11202	ANO033	-122.29881	37.11202
	X	Caltrans	Año Nuevo	-122.30121	37.11334	ANO030	-122.30121	37.11334
	X	Caltrans	Carmel Bay	-121.9247	36.52453	CAR007	-121.9247	36.52453
X		Caltrans	Carmel Bay	-121.92457	36.52469	CAR026	-121.92457	36.52469

[a] = Sites selected for discharge receiving water monitoring
[b] = Monitoring of this site will be shared between the cities of Pacific Grove and Monterey
[c] = Monitoring of this site will be shared among Pacific Grove, Monterey Bay Aquarium and Hopkins Marine Station

2. Reference Site Monitoring
   Ocean water at 11 selected reference sites (reference site = in the surf zone at the mouth of a watershed with >90% open space and no listed water quality impairments) shall be sampled as follows:
   a. Samples shall be collected during 3 storms in each of 2 years;
   b. Each sample shall be analyzed for oil and grease, total suspended solids, fecal indicator bacteria, California Ocean Plan trace metals, polynuclear aromatic hydrocarbons, organophosphorous pesticides, pyrethroid pesticides and nutrients;
   c. Each sample shall be analyzed for of critical life stage chronic toxicity with 3 marine species (sea urchin, mussel and giant kelp).

   The proposed locations for reference sites span the study region. One reference site described below is not part of this Scope of Work, but is included because State Water Board staff requested that the Central Coast regional program determine the location of that reference site. Locations of sites south of Point Lobos were selected based upon a reconnaissance survey made on November 19, 2012. Several of these southern sites involve either substantial hikes, permission from property owners or special permission for vehicle access. Consequently, adjustments to site locations may be necessary. Moreover, access to at least one site will require crossing a creek to reach the beach at the creek mouth and extreme precautions will be necessary during storm events. The proposed reference locations for water quality monitoring are as follows:

Region	**Specific Site**
North of Point Reyes	Salmon Creek (USAF responsibility, not covered by this Scope of Work))
San Mateo County	Tunitas Creek
	Gazos Creek
South of Año Nuevo	Scott Creek
Non-urban shoreline in Monterey Bay	La Selva Beach
	Marina State Beach
South of Point Lobos	Malpaso Creek[a]
	Doud Creek
	Little Sur River[b]
Big Sur coast[a]	Big Sur River
	Sycamore Creek
	Big Creek
Total covered by the Scope of Work	11

[a] = Beach access to ocean requires crossing the creek.
[b] = Public access to be determined.

3. Biological Monitoring

Recent studies have examined whether rocky intertidal communities vary in response to storm water discharges. Initial results from southern California suggest that 2 out 11 discharge sites exhibited community composition and abundances that could be consistent with storm water discharges (Raimondi *et al*, 2012). Consequently, monitoring of rocky intertidal communities shall be part of this program. The community structure in rocky intertidal habitats shall be measured once at 6 sites near ASBS storm water discharges and at 2 reference sites. Sampling shall involve point-contact estimates of substrate coverage by species along transects from the high intertidal zone to the low intertidal zone. Biological monitoring sites have been selected in consultation among permittees and regulatory agencies with consideration for the locations of sites with existing data.

Rocky intertidal communities will be sampled at the following sites:

ASBS	Sampling Site Name
Año Nuevo Point and Islands ASBS	Año Nuevo
Carmel Bay ASBS	Stillwater
Duxbury Reef ASBS	Bolinas Point
James V. Fitzgerald Marine Reserve ASBS	Fitzgerald Marine Reserve
Pacific Grove ASBS	Hopkins
Point Lobos Ecological Reserve ASBS	Point Lobos
Reference	Santa Maria Creek
Reference	Pigeon Point

4. Bioaccumulation Monitoring

California mussels are known to accumulate concentrations of pollutants in their tissues to concentrations much higher that found in the surrounding water. Consequently, they have been widely applied in studies of water quality status and trends (e.g., CCLEAN, 2012; Davis *et al*, 1999). Consequently, concentrations of contaminants shall be measured in resident mussels from sites near ASBS storm water discharges and from reference sites distant from urbanized ASBS areas utilizing existing programs, wherever possible, as follows:

a. Population composites of mussels of roughly uniform shell length shall be collected from each of 7 sites.

b. Each composite shall be thoroughly homogenized and analyzed for polynuclear aromatic hydrocarbons, polychlorinated biphenyls, polybrominated diphenyl ethers, chlorinated pesticides, pyrethroid pesticides and Lomefloxacin. These analytes are slightly different from those measured in sections A and B and, except for pyrethroids and Lomefloxacin, are consistent with those measured by CCLEAN.

The following sites will be sampled for bioaccumulation:

Sites
Point Reyes
Scott Creek

Sites
Laguna Creek
41st Avenue, Capitola
Lovers Point
Fanshell Overlook, 17-Mile Drive
Carmel River Beach
Total = 7

. **C. Mooring Field Operations (Pebble Beach Company only)**

1. Receiving Water
   Ocean receiving water at the mooring facility shall be sampled as follows:
   a. Samples shall be collected monthly from May through October on a high use weekend in each month.
   b. Samples shall be analyzed for Ocean Plan indicator bacteria, residual chlorine, copper, zinc, grease and oil, methylene blue active substances (MBAS), and ammonia nitrogen.

2. Sediments
   Subtidal sediment shall be sampled, as follows:
   a. Samples shall be collected annually from within the mooring field and below the pier.
   b. Samples shall be analyzed for Ocean Plan Table 1 metals (for marine aquatic life beneficial use), acute toxicity (using *Eohaustorius estuaries)*, PAHs, and tributyltin.

. **D. General Requirements**

1. Ensure Data Quality
   a. All sampling and analysis shall conform to a Sampling and Analysis Plan (SAP) and to a Quality Assurance Program Plan (QAPP) that are consistent with requirements of the State of California Surface Water Ambient Monitoring Program (SWAMP). At a minimum, sampling shall be conducted so as to ensure that samples are representative of the site and matrix being sampled and to minimize the introduction of extraneous contamination into samples. Ultra-clean techniques shall be used for collection samples to be analyzed for organic contaminants and trace metals.
   b. Samples of the same type shall all be performed by the same laboratory and shall include appropriate lab blanks, certified reference materials, matrix spikes and matrix spike duplicates and reporting limits shall equal or be lower than those required by SWAMP.
   c. An audit will be prepared describing laboratory performance relative to data quality objectives prescribed in the QAPP.

2. Ensure data availability

All chemical data will be uploaded to the California Environmental Data Exchange Network annually.

3. Reporting
   Annual reports shall be delivered within 6 months of the completion of laboratory analyses. At a minimum, annual reports shall include a complete description of sampling methods, sites and analytical methods and analysis of data, including comparison of data from discharges and their respective receiving water sites with those from reference sites and the California Ocean Plan and shall be comparable to Schiff *et al* (2011). The annual report for the second year will be cumulative, including analysis of all data from both years to provide a characterization of storm water discharges and their effects on receiving water quality in Areas of Special Biological Significance.

4. Areas of Special Biological Significance Included
   Storm runoff from program participants flows into the following ASBS:
   - National Park Service, Point Reyes National Seashore
     - Point Reyes Headlands ASBS
     - Double Point ASBS
     - Duxbury Reef ASBS
   - County of Marin
     - Duxbury Reef ASBS
   - County of San Mateo
     - James V. Fitzgerald ASBS
   - California State Department of Parks and Recreation
     - Año Nuevo ASBS
     - Point Lobos ASBS
     - Julia Pfeiffer Burns ASBS
   - Monterey Bay Aquarium
     - Pacific Grove ASBS
   - Hopkins Marine Station
     - Pacific Grove ASBS
   - City of Monterey
     - Pacific Grove ASBS
   - City of Pacific Grove
     - Pacific Grove ASBS
   - City of Carmel
     - Carmel Bay ASBS
   - Pebble Beach Company
     - Carmel Bay ASBS
   - County of Monterey
     - Carmel Bay ASBS
   - Caltrans
     - James V. Fitzgerald ASBS
     - Año Nuevo ASBS

- Carmel Bay ASBS

D. Literature Cited

CCLEAN. 2012. Central Coast Long-term Environmental Assessment Network Annual Report, 2010–2011.

Davis, JA, Stephenson M, Hardin, D, Gunther AJ, Sericano J, Bell D, Scelfo GH, Gold J, Crick J. 1999. Long term bioaccumulation monitoring with transplanted bivavles in San Francisco Bay. Marine Pollution Bulletin. 38:170–181.

Raimondi, P., K. Schiff and D. Gregorio. 2012. Characterization of the rocky intertidal ecological communities associated with southern California Areas of Special Biological Significance. Southern California Coastal Water Research Project Technical Report 703 – May 2012. Costa Mesa, CA.

Schiff, K.C., B. Luk, D. Gregorio and S. Gruber. 2011. Southern California Bight 2008 Regional Monitoring Program: II. Areas of Special Biological Significance. Southern California Coastal Water Research Project. Costa Mesa, CA.

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CARMEL BAY AREA OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

DRAFT COMPLIANCE PLAN

APPENDIX C

SCOPE OF WORK

CENTRAL COAST ASBS REGIONAL MONITORING PROGRAM AND REFERENCE SITE MONITORING

Standard Operating Procedures

The Central Coast Areas of Special Biological Significance Regional Monitoring Program and Reference Site Monitoring

Monterey Regional Water Pollution Control Agency

Submitted by:

APPLIED marine SCIENCES

Version 1.1
May 15, 2013

Table of Contents

List of Acronyms

ADH	ADH Environmental
AMS	Applied Marine Sciences, Inc.
ASBS	Area of Special Biological Significance
ASTM	American Society for Testing and Materials
CCASBS	Central Coast ASBS Monitoring Project
CEDEN	California Environmental Data Exchange Network
CWA	Clean Water Act
DQO	Data Quality Objective
EDD	Electronic Data Deliverable
GC	Granite Canyon
IDL	Instrument Detection Limits
IDW	Investigation-Derived Waste
IM	Information Manager
LPM	Laboratory Project Manager
MBAS	Monterey Bay Analytical Services
MBNMS	Monterey Bay National Marine Sanctuary
MDL	Method Detection Limit
MPC	Monitoring Program Coordinator
MPSL	Marine Pollution Studies Laboratory
MQO	Measurement Quality Objective
NPDES	National Pollutant Discharge Elimination System
OC	Organochlorine
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PM	Program Manager
PPE	Personal Protective Equipment
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
RL	Method Reporting Limit
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SSC	Suspended Sediment Concentration
SWAMP	California Surface Water Ambient Monitoring Program
SWRCB	California State Water Resources Control Board
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UCSC	University of California at Santa Cruz
WPCL	Water Pollution Control Laboratory

Introduction

In the 1970s, the State Water Board (SWB) identified thirty-four Areas of Special Biological Significance (ASBS) along the California coast. These areas were so designated due to their unique biological assemblages, species, and geologic features, and were established to provide protection for species or biological communities from undesirable alterations of natural water quality. Together, the ASBS areas cover 500 miles of shoreline, or about 32 percent of the State's coast.

In 2013, Applied Marine Sciences, Inc. (AMS) was awarded two separate, but related, projects to monitor discharges into and receiving waters within designated ASBS. Parties implementing the sampling and analysis program will be under the direction of AMS. As the project lead, AMS will organize the monitoring and be responsible for analysis of samples and data, the maintenance of contracts with the analytical laboratories, and all report preparation.

As part of project implementation, AMS has developed Standard Operating Procedures (SOPs) that will guide Project participants in completion of their field sampling (FS)-related responsibilities. The purpose of these SOPs is to standardize the way sampling and sample handling methods are performed, and best ensure SWAMP comparability. These SOPs are intended to be used in combination with the Project Quality Assurance Project Plan and Sampling and Analysis Plan to guide all facets of Project implementation.

Standard Operating Procedures
For
Collection of Water Samples (SOP FS-1)

Introduction

This protocol describes the techniques used to collect water samples in the field in a way that neither contaminates, loses, or changes the chemical form of the analytes of interest. The purpose of this SOP is to best ensure consistency among field teams in a SWAMP comparable fashion. There are a variety of environmental conditions and analyte-specific requirements associated with the field sampling. The user should reference SOP FS-1, *Sample Container, Handling, and Chain of Custody Procedures*, for instructions on filling specific containers.

References to Existing SOPs

This SOP is adapted from information provided in the following SOPs:

- *Standard Operating Procedures (SOPs) for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in the Surface Water Ambient Monitoring Program (SWAMP), version 1.0*, released October 15, 2007 (SWAMP 2007).
- EOA, AMS, and ARC, 2012a. *BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures*. Version 1, March 1, 2012. (EOA et al. 2012)

Special Cautions and Considerations - Health and Safety

Proper gloves must be worn to both prevent contamination of the sample and to protect sampling personnel from environmental hazards. The user should wear at least one layer of gloves, but two layers help protect against leaks. All gloves must be powder-free. Disposable polyethylene, nitrile, or non-talc latex gloves are acceptable for many types of sampling; however, samples for metals and mercury analysis can only be collected and handled using pre-approved polyethylene or vinyl gloves as the outer layer.

When using chemical cleaners, as required as part of the equipment cleaning and decontamination protocols, always read the product label and adhere to all printed cautions and safety measures.

When using acid preservatives, if required for certain nutrient analytes (see SOP FS-3, Sample Container, Handling Cleaning Procedures), be extremely careful not to spill or splash acid. Wear gloves, long-sleeved clothing, and ANSI approved protective safety eyewear at all times when handling acid.

Sampling along the coastal environment can present a number of hazards. Field teams should always consist of a minimum of two qualified persons, with adequate training to recognize and address potential hazards (AMS 2013a). Additionally, driving to designated sample locations during storm events poses driving hazards and additional caution and care in driving should be employed. At no time shall sampling personnel sacrifice safety considerations in order to conduct sampling.

Methods/Procedures

These SOPs pertain to manual collection of water quality samples only.

Mobilization

At least one week prior to sample collection (or as weather forecasting dictates), the MPC shall contact the laboratories to notify them of the planned activity, order the necessary sample containers and analyte-free blank water provided by lab performing the analyses for blanks, and coordinate sample preservation and analysis for analytes with short holding times.

Following is a recommended list of equipment to be mobilized by field personnel in advance of sampling operations; field crews are able to modify this list to account for site- and event-specific conditions. This list assumes that sampling will be conducted via manual grab sampling techniques.

- Sampling containers (with labels)
- Cooler(s)
- Cube ice, with zip-top bags for double-bagging
- Zip-top bags for individual sample containers
- Sampling pole (if needed) with device to hold sample bottles
- Stainless steel bucket for sample collection (as required)
- Stainless bucket with teflon-coating (as required)
- Nylon rope (as required)
- Detergent (Micro™, Liqui-Nox™, or equivalent), if needed
- Reagents (2% HCL, methanol, both reagent-grade), if needed for field cleaning
- Aluminum foil
- Deionized water for rinsing of field equipment
- Analyte-free blank water provided by lab(s) performing the analyses, if needed
- Scrub brushes, minimum 2, if needed for cleaning
- Sample gloves (powder-free PE or vinyl)
- Dunnage material for protecting sample containers
- Transparent tape to cover labels
- Hand-held refractometer (or other means for measuring salinity), as required
- Containers for collecting liquid waste
- Spill control kit, including secondary containment for liquid waste receptacle
- Receptacle for collecting solid waste
- GPS
- Camera
- Cell phone
- Spare batteries for all electronics (GPS, cell phone, camera, etc.)
- Paperwork (sampling plan, SOPs, COCs, datasheets, maps, permits, etc. as required)

All equipment coming into contact with sample material should be pre-cleaned per protocols in SOP FS-2, Sampling Equipment Cleaning Procedures.

Sample Collection

Sample Container Labels. Label each sample container with the ID, sample code, matrix type, analysis type, project ID, and date and time of collection. To the extent feasible, pre-label containers prior to sampling, as it is difficult to write on labels once they are wet. When zip-top bags are used associated with sample containers, sampling personnel shall take precaution to ensure that labels will adhere throughout the handling process, by use of either Cryotags or securing with packing tape. See SOP FS-4 for sample identification and labeling protocols.

Sample Collection Methods. Sample collection methods will vary depending upon sampling type (i.e., discharge vs. receiving water) and environmental conditions present. Any deviations from the protocols described below shall be noted on the field datasheets and communicated to the Monitoring Program Coordinator.

Discharge (i.e., Outfall). Where possible, samples will be collected from stormwater runoff discharge points directly into pre-cleaned sample containers. In this case, the following steps shall be followed. Sample containers to be rinsed (i.e., unpreserved trace metals and conventional parameters) will be:

1. Uncapped, placed directly into the discharge, and filled with a small volume of water
2. Re-capped and shaken / swirled
3. Uncapped and contents drained

The above process shall be conducted three times prior to filling and re-capping bottles. Containers provided by the laboratories pre-preserved and containers intended for analysis of organic compounds shall not be rinsed prior to filling.

When environmental conditions prevent direct filling, a pre-cleaned transfer container, selected based upon environmental conditions present and type of analysis conducted, will be used, either a stainless steel bucket, Teflon-coated stainless steel bucket, plastic bucket, or a disposable factory / lab cleaned sample container.[1] If the latter, samples collected from the discharge waters will be collected in certified clean 1-gallon glass jars (ESS part no. 3785-0010-PC or 3785-0010-QC).

Similar to ASBS monitoring efforts conducted in other regions of the State, containers filled via use of a transfer container will be proportionally subsampled in order to best ensure consistency in sampled water between different analyses and to encompass environmental variability present. Each container in turn is opened, rinsed (as required), partially filled (approximately 1/3 assuming three grabs of the transfer container are required), and closed. Transfer containers will be refilled as required to complete bottle rinsing and filling.

Receiving Water. Samplers shall target a sampling point that is at a wadeable depth at the point of contact between the discharge and/or reference stream and receiving water. If the target sampling point is not accessible for safety reasons, then the sampler should select a sampling location that is as

[1] Determination of appropriate transfer container(s) will be identified in the Sampling and Analysis Plan (SAP).

close to the target point that can be safely sampled. Field datasheets should note the final sampling location.

All sample containers will be filled by use of transfer containers, selected based upon environmental conditions present and type of analysis to be performed. As adapted from Hladik et. al. (2009), typical procedures for filling sample containers required to be rinsed will be as follows, identified by type of transfer container used:

1-gallon Wide-Mouth Glass Jar:

1. Uncap a new 1-gallon wide-mouth glass jar at the beach or location nearby to proposed sampling point and place the cap face up on a secure surface (native sand or rock above splash zone). Holding the container at arm's length, one member of the two-person sampling crew will enter the receiving water while the second waits onshore.
2. Rinse the transfer container three times with site water prior to use by plunging the transfer container into an incoming surge of water while facing the ocean (to prevent possible contamination from the sampler), swirling, and draining.
3. After completing three rinses, collect the sample as described previously and return to the beach and recap transfer container.
4. As quickly as possible, subsample from the transfer container by pouring into the individual laboratory sample bottles as follows (vigorously swirling the transfer container between fills):

    a. Using clean hands / dirty hands techniques (see below, with clean hands putting on clean gloves at the beginning of filling process), fill an appropriate proportion of the sample container, cap, and replace into sealed zip-top bags.
    b. Fill the remaining containers proportionally, including an extra container for post-sampling salinity measurement (as required). For a typical site, aliquots should fill approximately 1/3rd of each container. For QA sites where additional sample volume is required for MS/MSD analysis or field duplicates, aliquots will be proportionally smaller.

5. Repeat above steps until all sample bottles are full.
6. Record the salinity measurement on the field data sheet, and as required on individual lab COCs (by prior arrangement with labs).

Transfer Bucket:

In the case where site conditions do not allow safe entry into the surf zone on foot, the suggested alternative intermediate container is a protocol-cleaned, Teflon-coated stainless steel bucket and clean nylon rope.[2] The rope would be connected to the bucket for safe deployment into the surf zone in order to collect sample water. During sampling, a general QA/QC concern regarding the

[2] Rope should be free of visible contamination. If not, it should be cleaned by scrubbing with laboratory detergent and soaked overnight in freshwater.

use of the bucket and rope to collect samples is the potential for contamination from water draining from the rope and sampler's gloves during deployment and retrieval of the bucket. For this reason, it is recommended that gloves be changed between deployments, and that the bucket is protocol-cleaned prior to initial use and between sampling locations. Aside from these precautions, the sampling method using a bucket and rope would be the same as described above for the 1-gallon glass jar.

Clean-hands / Dirty-Hands Sampling for Analysis of Trace Metals. Sampling personnel should strive to use clean sampling techniques at all times. Samples to be analyzed for trace metals should, however, only be collected using "clean-hands / dirty-hands" technique. The specially-cleaned sample bottles should be received from the container cleaning facility (usually the analytical laboratory) double-bagged in zip-top plastic bags.

The "clean hands" person touches only the sample container and the inner bag; these items have had no contact with the environment. The "dirty hands" person touches the outer bag, cooler, etc. The dirty hands person opens the outer bag, and the clean hands person opens the inner bag around the bottle. The clean hands person then removes the bottle from the inner bag. If a sample can be collected directly into the bottle, then the clean hands person dips the bottle into the ambient water flow, rinses three times, and fills the bottle to the neck (to allow room for preservative as needed), placing the cap back on the bottle before being removed from the water. If the sample is collected as a subsample of from transfer container, then the clean hands person holds the bottle while the dirty hands person pours water into it from the transfer container. The lid on the sample bottle is then secured and the bottle is put back into the inner clean bag, which is sealed by the clean hands person. The dirty hands person then seals the outer bag, and places the double-bagged sample on ice in the cooler.

Sample Preservation. Samples analyzed for certain constituents (see SOP FS-3 for details) must be preserved in the field or in the laboratory. Preservative may be added to sample bottles in advance by the laboratory. When field preservation is not possible, deliver samples to lab as soon as possible on day of collection.

Demobilization. Before leaving the sampling site, field personnel should perform the following tasks:

- Review field datasheets to ensure they are complete and legible,
- Preserve samples as described in SOP FS-3, Sample Containers, Handling, and Chain of Custody Procedures,
- Ensure that all containers are capped tightly and stored in a cooler on double-bagged cubed ice as described in SOP FS-3, Sample Containers, Handling, and Chain of Custody Procedures,
- Verify that all sampling-related materials and equipment have been collected, and
- Clean sampling equipment as described in SOP FS-7, Sampling Equipment Cleaning Procedures, and decontaminate waders as needed by scrubbing to remove any mud from cracks and crevices, then rinsing with freshwater.

Quality Assurance/Quality Control

As identified in the Project QAPP (AMS 2013), field blank samples, when required, are collected in the same manner as the environmental samples. For grab samples, bottles full of analyte-free blank water provided by lab performing the analyses are poured directly into the blank sample container, or first into the collection device then into the sample container, depending on sampling technique used.

Field blanks (FBs) collected associated with analyses requiring clean hands / dirty hands protocols shall be collected in the same manner as the field samples. The containers shall be filled proportionally, with zip-top bags and containers opened and closed in the same sequence as done for collection of field samples.

Adherence to the procedures described above, along with adherence to referenced SOPs for cleaning sampling equipment and handling samples, will help ensure that water samples are collected in a manner that is representative of environmental conditions, and help ensure comparability of data with SWAMP and project requirements.

Review of field crews' performance in conduct of sampling will be performed associated with field audits.

References

Applied Marine Sciences, Inc., 2013. *Quality Assurance Project Plan for the Central Coast Areas of Special Biological Significance Regional Monitoring Program and Reference Site Monitoring*. Prepared for the Monterey Regional Water Pollution Control Agency and the Southern California Coastal Water Resource Project. Version 1, March 2013.

Applied Marine Sciences, Inc., 2013a. *Health and Safety Plan for the Central Coast Areas of Special Biological Significance Regional Monitoring Program and Reference Site Monitoring*. Prepared for the Monterey Regional Water Pollution Control Agency and the Southern California Coastal Water Resource Project. Version 1, March 2013.

EOA, AMS, and ARC, 2012. *BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures*. Prepared for Bay Area Stormwater Management Agencies Association. Version 1, March 1, 2012.

Hladik, M.L., Orlando J.L., and Kuivila, K.M., 2009. Collection of Pyrethroids in Water and Sediment Matrices: Development and Validation of a Standard Operating Procedure: U.S. Geological Survey Scientific Investigations Report 2009–5012, 22 p.

MPSL-DFG Field Sampling Team, 2007. *Standard Operating Procedures (SOPs) for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in SWAMP. Version 1.0.* October 15, 2007.

Standard Operating Procedures
For
Field Equipment Cleaning Procedures (SOP FS-2)

Introduction

Contaminant-specific decontamination and cleaning of field sampling equipment used in collection of samples for chemical and toxicological analysis is required as part of a quality assurance program to best ensure samples collected are representative of environmental conditions present, and not an artifact of the equipment used.

References to Existing SOPs

This SOP is adapted from information provided in the following SOPs:

- *Standard Operating Procedures (SOPs) for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in the Surface Water Ambient Monitoring Program (SWAMP), version 1.0*, released October 15, 2007 (SWAMP 2007).
- EOA, AMS, and ARC, 2012a. *BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures*. Version 1, March 1, 2012. (EOA et al. 2012)

Special Cautions and Considerations - Health and Safety

When using chemical cleaners, always read the product label and adhere to all printed cautions and safety measures. Proper gloves, clothing, and eye protection must be worn to both prevent contamination of the sample and to protect the sampler from environmental hazards (disposable polyethylene, nitrile, or non-talc latex gloves are recommended, however, metals and mercury sample containers can only be sampled and handled using pre-approved polyethylene or vinyl gloves as the outer layer). The user should wear at least one layer of gloves, but two layers help protect against leaks.

Methods/Procedures

Cleaning methods are determined by type of equipment used, media sampled, and constituent analyzed. Appropriate protocols are discussed below, by media:

Water Sampling

Water samples may be collected via direct immersion of sample container or by use of sampling equipment to collect water and transfer to sample containers. It is assumed that all water samples collected via direct immersion will make use of factory-clean containers; no additional equipment cleaning is required for these samples.

When sampling equipment is used as a transfer container, sampling personnel must ensure that equipment has been pre-cleaned. The standard cleaning protocol for sampling equipment is as follows:

- Wash equipment thoroughly with a dilute, non-phosphate, laboratory-grade detergent in tap or distilled water. A liquid detergent (e.g., Liqui-Nox™) is preferred over powder detergent due to its ability to dissolve more readily.
- Rinse the equipment three times with tap / distilled water.
- Rinse the equipment three times with dilute (approximately 2%) hydrochloric acid, reagent grade (skip this step for stainless steel buckets, which could be damaged by acid).
- Rinse the equipment three times with reagent-grade methanol.
- Rinse the equipment three times with distilled water.
- Place the cleaned equipment in a clean zip-top bag or cover with aluminum foil until use in the field.

Sediment Sampling

As required, sediment sampling equipment will be cleaned prior to sampling each site (pre-cleaned) by use of the following procedure:

- Rinse all surfaces with ambient (or tap) water
- Scrub all sediment sample contact surfaces with Micro™, Liqui-Nox™, or equivalent detergent
- Rinse all surfaces with ambient (or tap) water
- Rinse sediment sample contact surfaces with 2% HCl
- Rinse all sediment sample contact surfaces with reagent-grade methanol
- Wrap the sampling equipment in clean aluminum foil, with the dull side facing sampling equipment, and place into a clean zip-top bag until use in the field.

Biota Collections

There are no special cleaning procedures associated with mussel collections. Oyster knives, if used, should be visibly clean and rinsed with seawater before use.

Quality Assurance/Quality Control

Field crews should ensure that all sampling-derived wastes are contained and disposed of properly to best ensure against loss to the waterbody.

Consistent with the QAPP, reagents should be inspected upon receipt and usage to ensure that they are of appropriate grade (e.g., reagent-grade or better) for cleaning purposes.

References

EOA, AMS, and ARC, 2012. *BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures*. Prepared for Bay Area Stormwater Management Agencies Association. Version 1, March 1, 2012.

MPSL-DFG Field Sampling Team, 2007. *Standard Operating Procedures (SOPs) for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in SWAMP. Version 1.0.* October 15, 2007.

Standard Operating Procedures
For
Sample Container, Handling, and Chain of Custody Procedures (SOP FS-3)

Introduction

While there are a variety of different types of sampling conducted through the CCASBS, sample handling and chain of custody techniques are relatively consistent throughout. Following the recommended sample handling techniques is one method of maintaining consistency across components and field teams and ensuring consistency with SWAMP and the CCASBS QAPP (AMS 2013).

References to Existing SOPs

This SOP is adapted from information provided in the following SOPs:

- *Standard Operating Procedures (SOPs) for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in the Surface Water Ambient Monitoring Program (SWAMP), version 1.0*, released October 15, 2007 (SWAMP 2007).
- EOA, AMS, and ARC, 2012a. *BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures*. Version 1, March 1, 2012. (EOA et al. 2012)

Special Cautions and Considerations - Health and Safety

Sample preservation may require use of reagents or other hazardous materials (e.g. dry ice) posing an environmental health or human health concern. When using such chemicals or materials, always wear appropriate PPE, store reagents appropriately, read the product label, and adhere to all printed cautions and safety measures. If responsible for shipping any hazardous samples or using dry ice to ship samples, additional training is required in accordance to Department of Transportation (DOT) regulations.

Methods/Procedures

All samples will be handled, prepared, transported and stored in a manner so as to minimize bulk loss, analyte loss, contamination, or biological degradation of sample material. Appropriate safeguards should be implemented at the time of sample collection through shipping and receipt at the laboratory to ensure integrity of samples. Details associated with different phases of the sample handling process are described below:

Field Sampling

One member of each sampling team will be identified as "Team Lead", and will be responsible for overall collection and custody of samples during field sampling. Field crews should properly store and preserve samples as soon as possible after collection (see requirements, Attachment 1). Following any required preservation, but as soon as possible after sample collection, sample containers should be placed on crushed or cube ice in an insulated ice chest; ice should be placed into sealed, double-bagged zip-top bags prior to sampling to prevent any contamination of samples by meltwater. Sufficient ice will be needed to lower the sample temperature to ≤6°C within 45 min after time of collection. Sample temperature should be maintained at ≤6°C until delivered to the laboratory.

In addition, care is taken at all times during sample collection, handling and transport to prevent exposure of the sample to direct sunlight. Samples are preserved, if necessary, according to protocol for specific analysis (acidification in most cases). In the case of some samples, the sample preservative may be pre-loaded into the sample container by the laboratory. In these cases, care should be taken not to overfill the sample container and thereby spill preservative.

Sample Shipping

Sample transport should be arranged so that samples arrive at the laboratory well within hold time requirements (Attachments 1 and 2). For analytes with relatively short holding times, analytical laboratories should be informed in advance and reminded at time of sample delivery of the holding time requirements, so that required preservation or analyses are initiated as soon as possible. The following summarizes the packaging procedures that will be followed for low concentration samples that are to be shipped cold (i.e., not frozen).

- When ice is used, pack it in zip-top, double plastic bags. If applicable, seal the drain plug of the cooler with duct tape to prevent melting ice from leaking out of the cooler.
- The bottom of the cooler should be lined with bubble wrap to prevent breakage during shipment.
- Check screw caps for tightness.
- Ensure sample labels are securely fastened and legible.
- Wrap all glass sample containers in bubble wrap / bubble bags to prevent breakage.
- Place samples in a sturdy cooler(s). Enclose the appropriate COC(s) in a zip-top plastic bag affixed to the underside of the cooler lid.

Chain of Custody Procedures

Chain-of-custody (COC) procedures require that possession of samples be traceable from the time the samples are collected until completion and submittal of analytical results. The MPC will ensure that sampling personnel are provided COC forms as appropriate. COCs will be completed and sent with the samples for each laboratory and each shipment. If multiple coolers are sent to a single laboratory on a single day, form(s) will be completed and sent with the samples for each cooler, either placed in an envelope and taped to the inside of the top of the cooler, or placed into a zip-top bag and placed within the cooler.

The COC will identify the contents of each shipment and maintain the custodial integrity of the samples. Generally, a sample is considered to be in someone's custody if it is either in someone's physical possession, in someone's view, locked up, or kept in a secured area that is restricted to authorized personnel. Until the samples are shipped, the custody of the samples will be the responsibility of the field crew. The sampling team leader or designee will sign the COC in the "relinquished by" box and note date and time.

The shipping containers in which samples are stored (usually an ice chest) will be sealed with self-adhesive custody seals any time they are not in someone's possession or view before shipping. All custody seals will be signed and dated.

Each receiving laboratory has a sample custodian who examines the samples for correct documentation, proper preservation and holding times. Contract laboratories will follow sample custody procedures outlined in their QA plans. Contract laboratory QA plans are on file with each respective laboratory.

Quality Assurance/Quality Control

Field personnel should review shipping procedures as part of annual training conducted by Monitoring Coordinator.

References

EOA, AMS, and ARC, 2012. *BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures*. Prepared for Bay Area Stormwater Management Agencies Association. Version 1, March 1, 2012.

MPSL-DFG Field Sampling Team, 2007. *Standard Operating Procedures (SOPs) for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in SWAMP. Version 1.0.* October 15, 2007.

Attachment 1 – CCASBS Water Quality Monitoring Containers and Handling Requirements

Analyte	Analyte Group	Sample Container Material and Property	Minimum Container Amount	Preservative	Holding Time (at ≤6 C)
Oil & Grease	Conventional	1L amber glass	1L (3L for MS/MSD)	Cool to ≤6° C and store in the dark.	6 hrs (28 days if preserved with HCl to pH < 2).
TSS	Solids	1L PE	1L (3L for MS/MSD)	Cool to ≤6° C and store in the dark.	7 days
Fecal Coliform; Enterococcus	Conventional	100 mL sterile plastic	100 mL (225 mL for MS/MSD)	Sodium thiosulfate. Cool to ≤6° C and store in the dark.	6 hrs
Ammonia-N; Nitrate-N, Ortho-P	Conventional	250 mL PE	250 mL (750 mL for MS/MSD)	Cool to ≤6° C and store in the dark.	48 hours
Urea	Conventional	50 mL plastic	50 mL (allowing for headspace) (no extra for MS/MSD)	Leave headspace to allow for expansion when frozen at the lab. Cool to ≤6° C and store in the dark.	48 hours (6 months frozen)
Trace Metals	Conventional	60 mL PE, double bagged	60 mL (no extra for MS/MSD)	Discard 1% HNO_3 storage solution into liquid waste receptacle, rinse 3 times, fill bottle to neck. Cool to ≤6° C and store in the dark. Laboratory will preserve with HNO_3 to pH<2 within 48 hours and at least 24 hours prior to analysis.	6 months at room temperature following acidification
Hg	Conventional	250 mL glass, double bagged	250 mL (no extra for MS/MSD)	Discard 0.5% HCl storage solution into liquid waste receptacle, rinse 3 times, fill bottle to neck. Cool to ≤6° C and store in the dark. Laboratory will preserve with 0.5% v:v pre-tested 5% BrCl or 12N HCl within 48 hours	28 days at room temperature following acidification
Pyrethroids, OP Pesticides	Organics	1L amber glass	1L (2L for MS/MSD)	Cool ≤ 6 °C in the dark; samples must be extracted or preserved according to laboratory procedures with suitable preservative or extraction solvent within 72 hours of	7 days until extraction, 40 days after extraction

Analyte	Analyte Group	Sample Container Material and Property	Minimum Container Amount	Preservative	Holding Time (at ≤6 C)
				collection	
PAHs	Organics	1L amber glass	1L (2L for MS/MSD)	Cool to ≤6° C and store in the dark.	7 days until extraction, 40 days after extraction
Toxicity	Toxicity	4L amber glass	4L	Cool to ≤6° C and store in the dark.	36 hrs

Attachment 2 – CCASBS Sediment Quality Monitoring Containers and Handling Requirements

Analyte	Analyte Group	Sample Container Material and Property	Minimum Container Amount	Preservative	Holding Time (at ≤6 C)
Metals + Hg (total)	Inorganics	60 ml jar with Teflon lid	60 mL (allowing for headspace)	Place in zip-top bag. Cool to ≤6 °C within 24 hours, then freeze to ≤-20 °C	1 year; samples must be analyzed within 14 days of collection or thawing
PAHs	Organics	250 mL amber Glass with Teflon lid	500 mL	Place in zip-top bag. Cool to ≤6 °C within 24 hours, then freeze to ≤-20 °C	1 year; samples must be extracted within 14 days of collection or thawing and analyzed within 40 days of extraction
Butyltins	Organics	500 mL amber glass	500 mL	Place in zip-top bag. Cool to ≤6 °C within 24 hours, then freeze to ≤-20 °C	1 year; samples must be extracted within 14 days of collection or thawing and analyzed within 40 days of extraction
Toxicity	Toxicity	1 gallon wide-mouth plastic	2L	Cool to ≤6° C and store in the dark.	36 h preferred, 48 h max

Standard Operating Procedures
For
Site and Sample ID Naming Convention (SOP FS-4)

Introduction

The CCASBS sample ID naming convention is designed to ensure consistency across field, laboratory, data management, and interpretive efforts.

References to Existing SOPs

This SOP is adapted from information provided in the following SOPs:

- EOA, AMS, and ARC, 2012a. *BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures*. Version 1, March 1, 2012. (EOA et al. 2012)

Special Cautions and Considerations - Health and Safety

None

Methods/Procedures

The sample ID labeling system used for the CCASBS monitoring program is summarized below:

XXX-T-CC-MMDDYY

Where:

XXX	=	Three digit / letter site code
T	=	Media type (R for receiving water; D for discharge; S for sediment; B for biota)
CC	=	Contract (RG for regional monitoring; RF for reference site; IN for independent)
MMDDYY	=	Date (month, date, year format)

Field replicates and field blanks will be submitted to the laboratories blind, using "Q##" as a site code, with the number starting at "01" and incrementing with each successive QA sample. QA sample locations and IDs will be assigned by the MPC.

Quality Assurance/Quality Control

Sample container labels should be prepared to the extent possible prior to mobilizing for field work, and filled out completely prior to sample collection, as labels are much more difficult to complete when wet.

Before leaving a site, field crews will verify presence, accuracy, and legibility of sample labels employed for a particular sample. At the conclusion of sampling, prior to delivery of samples to labs, the sample labels must be checked against the completed chain of custody forms for accuracy and consistency.

References

EOA, AMS, and ARC, 2012. *BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures*. Prepared for Bay Area Stormwater Management Agencies Association. Version 1, March 1, 2012.

Standard Operating Procedures
For
Completion and Processing of Field Datasheets (SOP FS-5)

Introduction

In order to ensure consistency between field teams and sampling events, as well as SWAMP comparability, datasheets used associated with collection of CCASBS field samples and measurements will rely upon those developed and updated by Moss Landing for the SWAMP program.

References to Existing SOPs

This SOP is adapted from information provided in the following SOPs:

- *Standard Operating Procedures (SOPs) for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in the Surface Water Ambient Monitoring Program (SWAMP), version 1.0*, released October 15, 2007 (SWAMP 2007).
- EOA, AMS, and ARC, 2012a. *BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures*. Version 1, March 1, 2012. (EOA et al. 2012)

Special Cautions and Considerations - Health and Safety

None

Methods/Procedures

Field datasheets to be used are to be selected from available SWAMP-based products based upon the type of sampling conducted: (1) water quality measurement and sampling and (2) sediment / biota sampling. These are appended to this SOP as Attachments 1 and 2, respectively. Information for completing field datasheets is included both within the datasheets themselves.

Mobilization

As part of the mobilization process, field team leaders are responsible for ensuring an adequate number of the appropriate type of datasheets are mobilized for each field effort.

Field Sampling

As weather allows, all datasheets should be completed in blue or black ink. Any changes to field datasheets should be made by crossing out the relevant information with a single line and initialing beside the strikeout. As inclement weather dictates, field forms may also be printed on Rite in the Rain paper, with information completed in pencil.

The non-recording member of each field team should review the completed field datasheet(s) prior to leaving the sampling site to ensure completeness and legibility.

Demobilization

As soon as possible after returning from the field, information from the field datasheets should be transferred to the MPC, who will be responsible for reviewing and making required corrections to field datasheets.

Quality Assurance/Quality Control

The MPC should distribute appropriate datasheets to field crews to ensure that datasheets employed by field personnel are current.

The IM will be responsible for entering information from field datasheets into electronic templates. The MPC will identify any deficiencies in field datasheets and return to the appropriate field crew for correction. The QAO will be responsible for ensuring compliance with programmatic DQOs.

Review of field crews' performance in completing field datasheets will be conducted associated with field audits.

References

EOA, AMS, and ARC, 2012. *BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures*. Prepared for Bay Area Stormwater Management Agencies Association. Version 1, March 1, 2012.

MPSL-DFG Field Sampling Team, 2007. *Standard Operating Procedures (SOPs) for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in SWAMP. Version 1.0*. October 15, 2007.

Attachment 1 – Water Quality Monitoring Field Datasheet

Attachment 2 – Sediment / Biota Sampling Field Datasheet

Standard Operating Procedures
For
Collection of Sediment Samples (SOP FS-6)

Introduction

This protocol describes the techniques used to collect sediment samples in the field in a way that neither contaminates, loses, or changes the chemical form of the analytes of interest. The purpose of this SOP is to best ensure consistency among field teams in a SWAMP comparable fashion.

References to Existing SOPs

This SOP is adapted from information provided in the following SOPs:

- *Standard Operating Procedures (SOPs) for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in the Surface Water Ambient Monitoring Program (SWAMP), version 1.0*, released October 15, 2007 (SWAMP 2007).
- EOA, AMS, and ARC, 2012a. *BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures*. Version 1, March 1, 2012. (EOA et al. 2012)

Special Cautions and Considerations - Health and Safety

Proper gloves must be worn to both prevent contamination of the sample and to protect sampling personnel from environmental hazards. The user should wear at least one layer of gloves. When using chemical cleaners, as required as part of the equipment cleaning and decontamination protocols, always read the product label and adhere to all printed cautions and safety measures. Use of powder-free nitrile gloves and protective eyewear is recommended for use with chemical reagents.

Sampling along the coastal environment can present a number of hazards. Field teams should always consist of a minimum of two qualified persons, with adequate training to recognize and address potential hazards (AMS 2013a). At no time shall sampling personnel sacrifice safety considerations in order to conduct sampling.

Methods/Procedures

These SOPs pertain to manual collection of sediment samples only.

Mobilization

A list of recommended sampling equipment is presented below. Appropriate sampling equipment is prepared in the laboratory a minimum of four days prior to sampling. Prior to sampling, all equipment will be thoroughly cleaned. Equipment is soaked (fully immersed) for three days in a solution of Alconox™, Liquinox™, or similar phosphate-free detergent and deionized water. Equipment is then rinsed three times with deionized water. Equipment is next rinsed with a dilute solution (2%) of hydrochloric acid, followed by a rinse with reagent grade methanol, followed by another set of three rinses with deionized water. All equipment is then allowed to dry in a clean place. The cleaned equipment is then wrapped in aluminum foil or stored in clean zip-top bags until used in the field.

Recommended Sampling Equipment

- SCUBA gear (wet / dry suit, BCD, weights, etc.)
- Factory-cleaned sample containers (with labels)
- Wet ice
- Coolers, as required
- Aluminum foil (heavy duty recommended)
- Protective packaging materials
- PPE for sampling personnel, including life preservers
- Gloves
- Field datasheets
- COC forms
- Shipping materials
- GPS

Sample Collection

Sample Container Labels. Label each sample container with the ID, sample code, matrix type, analysis type, project ID, and date and time of collection. To the extent feasible, pre-label containers prior to sampling, as it is difficult to write on labels once they are wet. When zip-top bags are used associated with sample containers, sampling personnel shall take precaution to ensure that labels will adhere throughout the handling process, by use of either Cryotags or securing with packing tape. See SOP FS-4 for sample identification and labeling protocols.

Sample Collection Methods. General sampling locations will be identified prior to conduct of sampling. Exact sediment sampling locations will be determined in the field based on site accessibility, weather, etc. Sediment sample locations and coordinates will be recorded on field datasheets as sampling is completed. If needed, a sketch of the sample location will be entered into the logbook/datasheet and any physical reference points will be labeled. If possible, distances to the reference points will be given.

Divers will collect the surface soil/sediment samples (approximately 5 cm deep) directly into sample containers by opening them underwater and repeatedly scooping sediment into the containers until they are filled, with special care being taken to minimize the loss of surficial fines. After they are filled, the caps will be replaced on the containers and they will be brought to the surface where they will be bagged and put onto ice for transport to the laboratories.

Sample Preservation. All soil/sediment samples for organics and metals analyses will be transferred to coolers containing double-bagged wet ice and chilled to 6°C immediately upon collection.

Demobilization

Before leaving the sampling site, field personnel should perform the following tasks:

- Review datasheets to ensure they are complete and legible,
- Preserve samples as described in SOP FS-3, Sample Containers, Handling, and Chain of Custody Procedures,
- Ensure that all containers are capped tightly and stored in a cooler on double-bagged cubed ice (per SOP FS-3, Sample Containers, Handling, and Chain of Custody Procedures),
- Verify that all sampling-related materials and equipment have been collected, and
- Clean sampling equipment as described in SOP FS-2, Field Equipment Cleaning Procedures before sampling at a different site.

Quality Assurance/Quality Control

Adherence to the procedures described above, along with adherence to referenced SOPs for cleaning sampling equipment, handling samples, and decontaminating field equipment, will help ensure that water samples are collected in a manner that is representative of environmental conditions, and help ensure comparability of data with SWAMP and project requirements.

Review of field crews' performance in conduct of sampling will be performed associated with field audits.

References

Applied Marine Sciences, Inc., 2013. *Quality Assurance Project Plan for the Central Coast Areas of Special Biological Significance Regional Monitoring Program and Reference Site Monitoring*. Prepared for the Monterey Regional Water Pollution Control Agency and the Southern California Coastal Water Resource Project. Version 1, March 2013.

Applied Marine Sciences, Inc., 2013a. *Health and Safety Plan for the Central Coast Areas of Special Biological Significance Regional Monitoring Program and Reference Site Monitoring*. Prepared for the Monterey Regional Water Pollution Control Agency and the Southern California Coastal Water Resource Project. Version 1, March 2013.

EOA, AMS, and ARC, 2012. *BASMAA Regional Monitoring Coalition Creek Status Monitoring Program Standard Operating Procedures*. Prepared for Bay Area Stormwater Management Agencies Association. Version 1, March 1, 2012.

MPSL-DFG Field Sampling Team, 2007. *Standard Operating Procedures (SOPs) for Conducting Field Measurements and Field Collections of Water and Bed Sediment Samples in SWAMP. Version 1.0.* October 15, 2007.

CARMEL BAY AREA OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS)

DRAFT COMPLIANCE PLAN

APPENDIX D

QUALITY ASSURANCE PROJECT PLAN

CENTRAL COAST ASBS REGIONAL MONITORING PROGRAM AND REFERENCE SITE MONITORING

Quality Assurance Project Plan

The Central Coast Areas of Special Biological Significance Regional Monitoring Program and Reference Site Monitoring

Prepared for:

Monterey Regional Water Pollution Control Agency

Submitted by:

APPLIED marine SCIENCES

Version 1.1
May 15, 2013

1. (A1) Title and Approval Sheet

Program Title Central California Coast Regional Monitoring Program

Lead Organization Applied Marine Sciences, Inc.
831-426-6326
Hardin@amarine.com

Primary Contact Dane Hardin

Effective Date July 1, 2013

Revision Number Version 1.1

1.1. Approval Signatures:

Table 1-1. Managing Organization:

Title	Name	Signature	Date
Director of Admin Services, MRWPCA	John Tiernan		
Project Coordinator, SCCWRP	Ken Schiff		
State Water Board	Mariela Paz Carpio-Obeso		
Project Manager, AMS	Dane Hardin		
QA Officer, AMS	Paul Salop		
Monitoring Coordinator, ADH	Christian Kocher		
Monitoring Coordinator, MBNMS	Lisa Emanuelson		
Lab Project Manager, Granite Canyon	Brian Anderson		
Lab Project Manager, MBAS	David Holland		
Lab Project Manager, MPSL	Autumn Bonnema		
Lab Project Manager, UCSC	Peter Raimondi		
Lab Project Manager, WPCL	Patricia Bucknell		

2. (A2) Table of Contents

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List of Acronyms

AMS	Applied Marine Sciences, Inc.
ASBS	Area of Special Biological Significance
ASTM	American Society for Testing and Materials
CCASBS	Central Coast ASBS Monitoring Project
CEDEN	California Environmental Data Exchange Network
CWA	Clean Water Act
DQO	Data Quality Objective
EDD	Electronic Data Deliverable
GC	Granite Canyon
IDL	Instrument Detection Limits
IDW	Investigation-Derived Waste
IM	Information Manager
LPM	Laboratory Project Manager
MBAS	Monterey Bay Analytical Services
MBNMS	Monterey Bay National Marine Sanctuary
MDL	Method Detection Limit
MPC	Monitoring Program Coordinator
MPSL	Marine Pollution Studies Laboratory
MQO	Measurement Quality Objective
NPDES	National Pollutant Discharge Elimination System
OC	Organochlorine
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PM	Program Manager
PPE	Personal Protective Equipment
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
RL	Method Reporting Limit
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SSC	Suspended Sediment Concentration
SWAMP	California Surface Water Ambient Monitoring Program
SWRCB	California State Water Resources Control Board
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UCSC	University of California at Santa Cruz
WPCL	Water Pollution Control Laboratory

3. (A3) Distribution List and Contact Information

The CCASBS QAPP was developed by the Project to be comparable with the SWAMP Quality Assurance Program Plan (QAPrP), Version 1.0 (SWAMP 2008).

Table 3-1. Project QAPP Distribution List

Title	Name	Telephone No.	QAPP #
Stormwater Program Manager, MRWPCA	Doug Dowden	831-645-4621	1
Project Director Reference Site Monitoring, SCCWRP	Ken Schiff	714-755-3202	2
State Water Board	Mariela Paz Carpio-Obeso	916-341-5858	3
Chair, Central Coast ASBS Management Committee	Sarah Hardgrave	831-648-5722	4
Project Manager, AMS	Dane Hardin	831-426-6326	5
QA Officer, AMS	Paul Salop	925-373-7142	6
Monitoring Coordinator, ADH	Christian Kocher	831-477-2003	7
Monitoring Coordinator, MBNMS	Lisa Emanuelson	831-647-4209	8
Lab Project Manager, Granite Canyon	Brian Anderson	831-624-0947	9
Lab Project Manager, MBAS	David Holland	831-375-6227	10
Lab Project Manager, MPSL	Autumn Bonnema	831-771-4175	11
Lab Project Manager, UCSC	Peter Raimondi	831-459-5674	12
Lab Project Manager, WPCL	Patricia Bucknell	916-358-4398	13

4. (A4) Project Organization

4.1. Involved Parties and Roles

In the 1970s, the California State Water Resources Control Board (Water Board) identified thirty-four Areas of Special Biological Significance (ASBS) along the California coast. These areas were so designated due to their unique biological assemblages, species, and geologic features, and were established to provide protection for species or biological communities from undesirable alterations of natural water quality. Together, the ASBS areas cover 500 miles of shoreline, or about 32 percent of the State's coast.

This QAPP covers monitoring associated with two separate but related projects: (1) reference site monitoring under contract to the Southern California Coastal Water Resources Project (SCCWRP) and (2) regional monitoring under contract to Monterey Regional Water Pollution Control Agency (MRWPCA).

Parties implementing the sampling and analysis program will be under the direction of Applied Marine Sciences, Inc. (AMS). As the project lead, AMS will organize the monitoring and be responsible for analysis of samples and data, the maintenance of contracts with the analytical laboratories, and all report preparation.

AMS will be supported in this effort by the Monterey Bay National Marine Sanctuary (MBNMS), ADH Environmental (ADH), Granite Canyon Laboratory (GC), Monterey Bay Analytical Services (MBAS), Marine Pollution Studies Laboratory at Moss Landing (MPSL), the University of California at Santa Cruz (UCSC) and the Water Pollution Control Laboratory in Rancho Cordova (WPCL). Responsibilities of each of the respective organizations are shown in Table 4-1, and an organization chart is presented in Figure 4-1.

Table 4-1. CCASBS Organizational Responsibilities

Organizational Affiliation	Responsibility
MBNMS	Field Sampling, Water Quality
ADH	Field Sampling, Water Quality
GC	Laboratory Analysis, Toxicity
MBAS	Laboratory Analysis, Conventional Water Quality
MPSL	Laboratory Analysis, Trace Metals
WPCL	Laboratory Analysis, Organics
UCSC	Rocky Intertidal Monitoring

4.2. Project Manager and Assistant Project Manager

The Project Manager (PM), with assistance from the Assistant Project Manager (APM), will be responsible for oversight of management level activities, including budgeting, reporting, and overall project implementation. In addition, the Program Manager will coordinate with the Project participants and key regional agencies, including the Water Board, and oversee preparation of required reports and data submittals.

4.3. Quality Assurance Officer Role

The Quality Assurance Officer's (QAO's) role is to establish the quality assurance and quality control procedures found in this QAPP as part of the sampling and analysis programs. The QAO will also work with the Laboratory Manager from the analytical labs by communicating all quality assurance and quality control issues contained in this QAPP.

The QAO will also review and assess all procedures during the life of the contract against QAPP requirements. The QAO will report all findings to the PM, including all requests for corrective action. The QAO may stop all actions, including those conducted by subcontractors, if there are significant deviations from required practices or if there is evidence of a systematic failure.

4.4. Monitoring Program Coordinator Role

The Monitoring Program Coordinator (MPC) will oversee the technical conduct of the field related components of the monitoring, including developing monitoring protocols and training field personnel.

4.5. Field Team Lead

Field Team Leads (FTLs) will be responsible for the activities of field personnel under their supervision. Activities will include ensuring that properly trained individuals are selected for field monitoring and that field personnel adhere to this QAPP.

4.6. Information Manager

The Information Manager (IM) will serve as the primary contact for communication with contract laboratory(ies). The IM will be responsible for reviewing field datasheets and, as applicable, ensuring correction of errors and providing feedback to FTLs. The IM will also receive and store laboratory electronic data deliverables (EDDs) and be responsible for their export to CEDEN.

4.7. Laboratory Project Manager

The Laboratory Project Manager (LPM) at the selected analytical laboratory(ies) will be responsible for ensuring that the laboratory's quality assurance program and standard operating procedures are consistent with this QAPP, and that laboratory analyses meet all applicable requirements or explain any deviations. The LPM will also be responsible for coordinating with the QAO as required for the Project.

Titles and contact information for the Project personnel responsibilities at central and local levels are provided in Table 4-2.

Table 4-2. ASBS Regional Monitoring Program Personnel Responsibilities

Name	Organizational Affiliation	Title	Contact Information (Telephone, fax, email)
Dane Hardin	AMS	PM	831-426-6326, 925-373-7834, hardin@amarine.com
Mine Berg	AMS	APM	831-426-6326, 925-373-7834, berg@amarine.com
Bryan Bemis	AMS	MPC, IM	925-373-7142, 925-373-7834, bemis@amarine.com
Paul Salop	AMS	QAO	925-373-7142, 925-373-7834, salop@amarine.com
Lisa Emanuelson	MBNMS	FTL	831-647-4209, 831-647-4250, Lisa.Emanuelson@noaa.gov
Christian Kocher	ADH	FTL	831-477-2003, 831-477-0895, ckocher@adhenvironmental.com
Brian Anderson	GC	LPM	831-624-0947, 831-626-1518, anderson@ucdavis.edu
Dave Holland	MBAS	LPM	831-375-6227, 831-641-0734, Montereybayanalytical@usa.net
Autumn Bonnema	MPSL	LPM	831-771-4175, 831-633-0805, bonnema@mlml.calstate.edu
Peter Raimondi	UCSC	LPM	831-459-5674, 831-459-3383, raimondi@ucsc.edu
Patricia Bucknell	WPCL	LPM	916-358-4398, 916-985-4301, pbucknell@ospr.dfg.ca.gov

4.8. Persons Responsible for QAPP Update and Maintenance.

Changes and updates to this QAPP may be made after a review of the evidence for change by the PM and QAO, and with the concurrence of SCCWRP, MRWPCA, and the Central Coast ASBS Management Committee. The PM will be responsible for making the changes, submitting drafts for review, preparing a final copy, submitting the final for signature, and distribution.

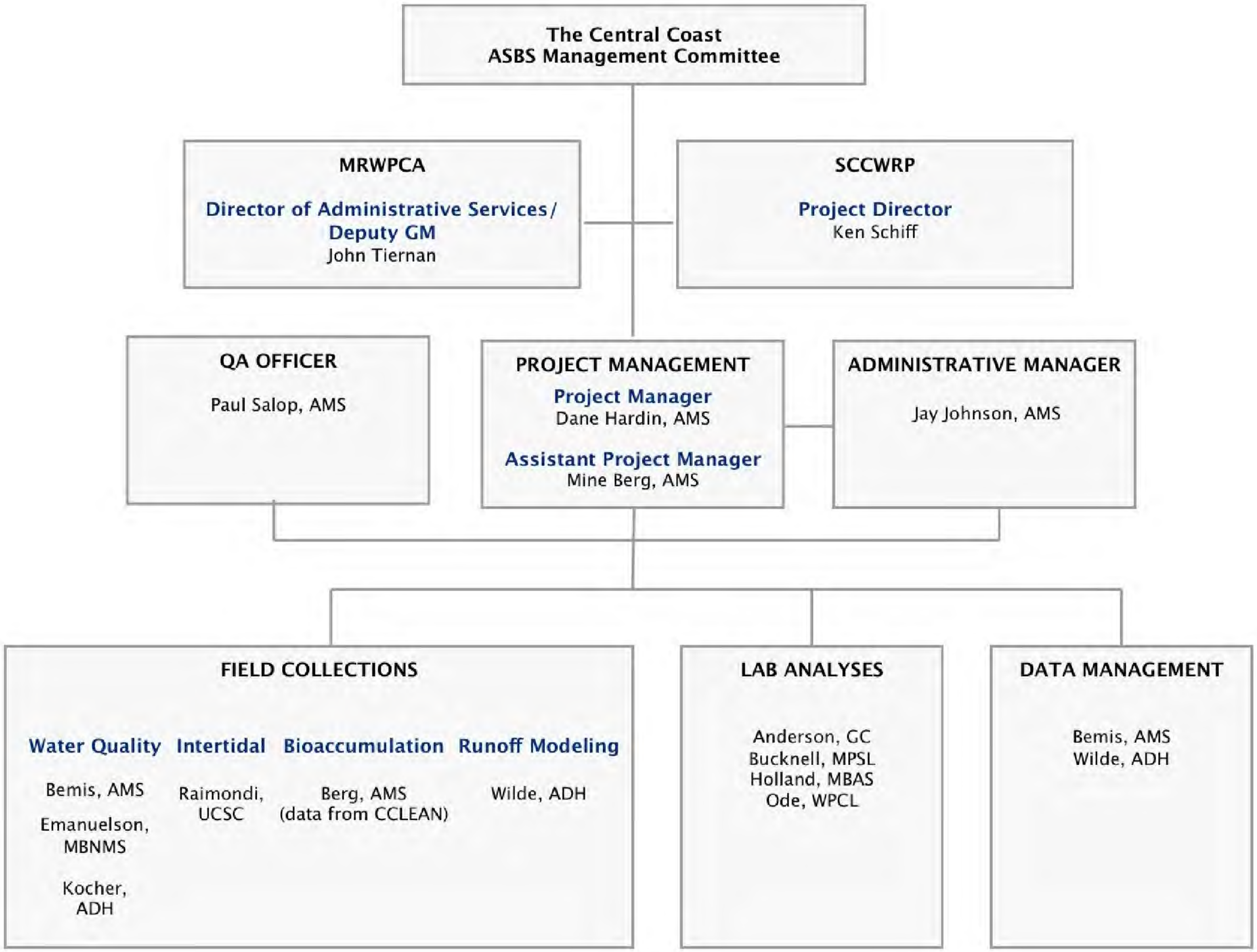

Figure 4-1. Organization Chart for Central Coast ASBS Monitoring Program

5. (A5) Problem Definition/Background

5.1. Problem Statement

The coastal environment of California is an important ecological and economic resource. It is home to diverse and abundant marine life and has some of the richest habitats on earth. The SWRCB has created 34 Areas of Special Biological Significance (ASBS) in order to preserve and protect these especially valuable biological communities.

California's coasts are also a repository for waste discharges from the State's ever-increasing population. Treated municipal and industrial wastewaters, urban runoff, and power generating station discharges all represent a number of risks to aquatic life from human activities. As a result, the SWRCB, in the California Ocean Plan (SWRCB 2009), has prohibited the discharge of waste to ASBS. All ASBS are State Water Quality Protection Areas that require special protection under state law.

A recent survey of ASBS has observed approximately 1,658 outfalls (SCCWRP 2003). As a result, the SWRCB initiated regulatory actions, establishing special protections through the Ocean Plan's exception process. The intent of these regulatory actions is to maintain natural water quality within the ASBS.

One large problem faced by both ASBS dischargers and regulators is a lack of information. The lack of information falls into at least four categories. First, it is uncertain what constitutes natural water quality. Second, it is uncertain which discharges exceed natural water quality limits. Third, it is uncertain what the extent and magnitude of natural water quality impacts are on a statewide basis. Finally, it is also uncertain whether the discharges are impacting marine life in a detrimental way.

5.2. Decisions or Outcomes

In response to the need for additional information, the SWRCB is working with ASBS dischargers to conduct a collaborative statewide ASBS monitoring program. The goal of this monitoring program is to answer two questions:

1) What is the range of natural conditions at reference locations?
2) How do conditions along ASBS coastline compare to the natural conditions at reference locations?

Answering question one will help translate the narrative standard to a numerical interpretation of natural water quality. Answering question two will help to assess if ASBS discharges are meeting the translated narrative standard.

5.3. Water Quality or Regulatory Criteria

There are two narrative criteria for ASBS discharges in the California Ocean Plan.

1) No discharge of waste
2) Maintenance of natural water quality

These narrative standards differ from typical NPDES ocean discharges that must meet numerical standards for a long list of constituents (Ocean Plan Table A, Table B). Standards for NPDES dischargers, which are based on toxicological studies to predict human health or aquatic health impacts, imply that some waste can be discharged so long as it is below levels that will result in adverse effects. No numerical standards for ASBS discharges currently exist.

6. (A6) Program/Task Description

6.1. Work Statement and Produced Products

This project will consist of three primary tasks including sampling, analysis, and reporting.

6.1.1. Sampling

Sampling will be focused on the water column for chemistry and toxicity analyses. In total, there will be 44 sites covered by this QAPP in Central California; 32 discharge sites, eight of which include receiving water, 11 reference sites and a mooring field site in Stillwater Cove. Site selection criteria are described in task-specific Sampling and Analysis Plans developed for each component (i.e., reference site monitoring, regional monitoring) The product for these tasks will be a sampling summary memo indicating sampling success during the field program.

6.1.2. Analysis

Analytical tasks will involve both laboratory and rocky intertidal data analysis. Laboratory analysis includes chemical measurements of end-of-pipe discharge, seawater, and mussel tissues. Laboratory analysis also includes critical life stage toxicity testing using three test species. Rocky intertidal analyses are identified in Appendix C. The product for this task will be a laboratory analysis summary memo indicating analytical success for all samples delivered to laboratory or rocky intertidal monitoring conducted.

6.1.3. Reporting

The final task will be reporting. This task involves information management, data analysis, and a final report. Information management will ensure consistency with the State's California Environmental Data Exchange Network (CEDEN) database. Report writing will provide a description of all methods, tabulations of raw data, and interpretation of results. The product for this task will include a CEDEN compliant relational database for study results (including metadata) and a written final report.

6.2. Constituents to be Monitored and Measurement Techniques

For this element of the study, we will analyze oil & grease, total suspended solids, Ocean Plan Table B metals for protection of marine life, polynuclear aromatic hydrocarbons (PAHs), pyrethroid pesticides, organophosphorus pesticides, and nutrients (See Section 7, reference table). Toxicity will be measured using critical life stage chronic toxicity tests for a single species in discharge samples and for three species in ocean receiving water samples. The bioaccumulation of metals, PAHs and pesticides will be measured in mussel tissues.

6.3. Project Schedule

The proposed project schedule assumes that a full complement of storms is sampled in each of two years. In the event that sampling must be extended over three years, the schedule shown in Table 6-1 will be revised accordingly.

Table 6-1. Central Coast ASBS Project Schedule.

Activity	Anticipated date of completion	Deliverable	Deliverable due date
QAPP Production	6/15/13	QAPP	6/15/13
Sampling	4/15/14	Sampling Summary Memo	5/15/14
Laboratory Analysis	5/15/14	Laboratory Analysis Summary Memo	8/31/14
Draft Annual Report	9/30/14	Draft Report	9//30/14
Final Annual Report	10/31/14	Final report	10/31/14
Sampling	4/15/15	Sampling Summary Memo	5/15/15
Laboratory Analysis	5/15/15	Laboratory Analysis Summary Memo	8/31/15
Draft Annual Report	9/30/15	Draft Report	9//30/15
Final Annual Report	10/31/15	Final report	10/31/15

6.4. Geographic Setting

There are 34 ASBS located throughout California. Eleven ASBS are located within the range of Central California coastline covered by this program (Figure 6.1) Several of these, including Point Reyes Headland, Double Point, Farallon Islands, Año Nuevo, Point Lobos, Julia Pfeiffer Burns and the mouth of Salmon Creek contain stormwater discharges that are not covered by this program. The discharges in these seven ASBS are either the responsibility of entities not participating in this program or are being sampled be consultants hired by entities that are participating in other aspects of the program. Consequently, this QAPP applies specifically to the stormwater discharges in the Duxbury Reef, Fitzgerald, Pacific Grove/Hopkins and Carmel Bay ASBS, a mooring field site in Stillwater Cove and associated Reference Sites.

In central California, one publicly owned treatment works, Carmel Area Wastewater District (CAWD), discharges to ASBS. Two ASBS receive nonstormwater discharges; CAWD and the Carmel River discharge into Carmel Bay ASBS and Hopkins Marine Station and Monterey Bay Aquarium discharge waste seawater into the Pacific Grove ASBS. The remaining discharges are all stormwater discharges from urban, agricultural or roadway land uses.

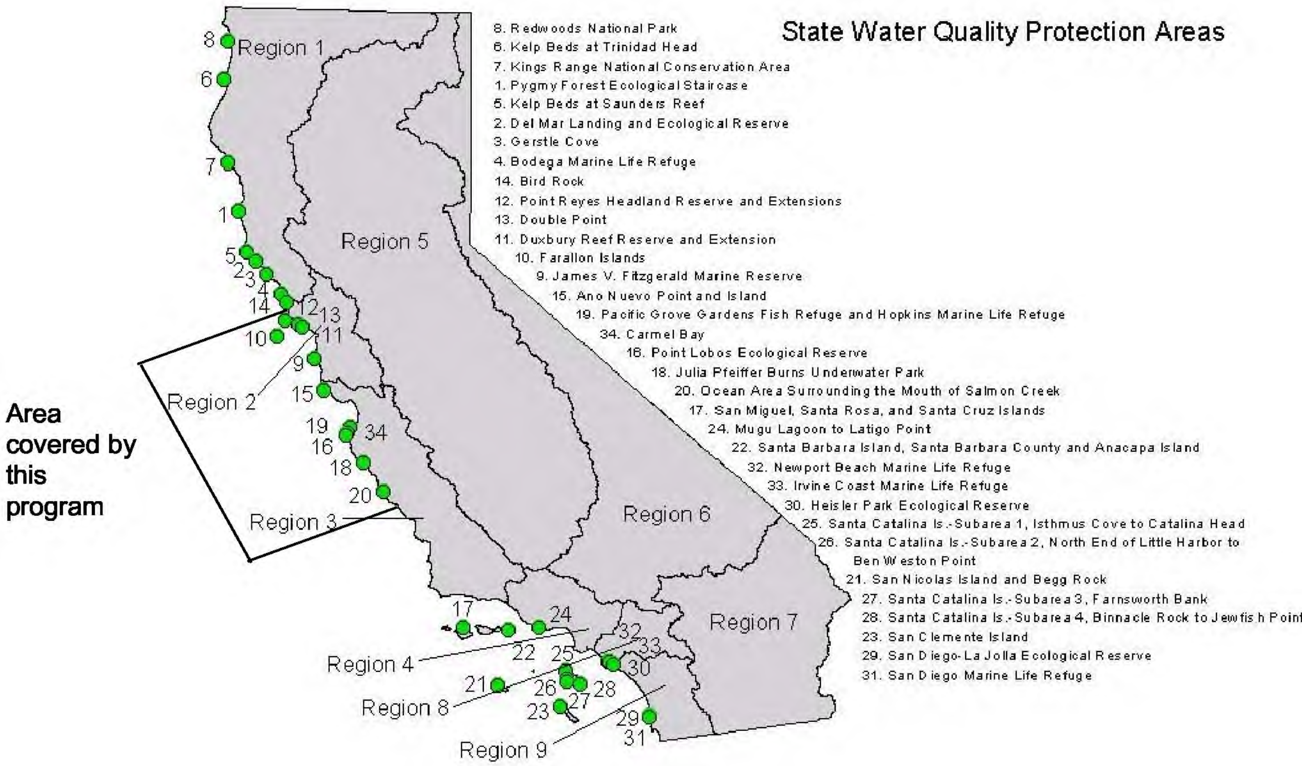

Figure 6-1. Location of Designated ASBS in California.

6.5. Constraints

There are three constraints identified for this study. The first constraint is the ability to capture the full range of reference conditions. All of the sites selected for sampling have met pre-established reference site criteria. The second constraint is sampling wet weather events. Three storms are required to be sampled at each reference site and eight large stormwater discharges, but sampling teams are at the mercy of the weather. Sampling teams will be properly informed by weather forecasting, storm activation, and minimization of false starts, but sampling teams have no control over drought conditions should they occur. The third constraint is sample transport. Some sampling sites are located in remote areas, and if unsafe travel conditions exist, samples may exceed holding times for those analyses that require 48 hr or less turnaround. This constraint will be minimized through the use of proper sample handling, preservatives where applicable, and optimizing sample transport options.

7. (A7) Quality Objectives and Criteria for Measurement Data

The quantitative measurements that estimate the true value or concentration of a physical or chemical property always involve some level of uncertainty. The uncertainty associated with a measurement generally results from one or more of several areas: (1) natural variability of a sample; (2) sample handling conditions and operations; (3) spatial and temporal variation; and (4) variations in collection or analytical procedures. Stringent QA and QC procedures are essential for obtaining unbiased, precise, and representative measurements and for maintaining the integrity of the sample during collection, handling, and analysis, as well and for measuring elements of variability that cannot be controlled. Stringent procedures also must be applied to data management to assure that accuracy of the data is maintained.

Data Quality Objectives (DQOs) are quantitative and qualitative statements that specify the tolerable levels of potential errors in the data and ensure that the data generated meet the standards for published data in the peer-reviewed literature. As defined in this plan, DQOs specify the quantity and quality of data required to support the study objectives. Each data quality category is described below. *Numerical DQOs for the constituents being sampled are listed in Appendix A.*

7.1. Representativeness

The representativeness of data is the ability of the sampling locations and the sampling procedures to adequately represent the true condition of the sample sites. Representativeness in this study is addressed at two scales: 1) multiple reference sites to cover a range of reference conditions; and 2) multiple storm events to cover a range of storm conditions.

Field personnel will strictly adhere to the field sampling protocols to ensure the collection of representative, uncontaminated samples. The most important aspects of quality control associated with chemistry sample collection are as follows:

- Field personnel will be thoroughly trained in the proper use of sample collection equipment and will be able to distinguish acceptable versus unacceptable samples in accordance with pre-established criteria.
- Field personnel are trained to recognize and avoid potential sources of sample contamination (e.g., dirty hands, insufficient field cleaning).
- Samplers and utensils that come in direct contact with the sample will be made of non-contaminating materials, and will be thoroughly cleaned between sampling stations.
- Separate samples will be collected for each analysis, thus avoiding the need for sub-sampling and sample splitting between labs.
- Sample containers will be pre-cleaned and of the recommended type.

7.2. Comparability

Comparability is the degree to which data can be compared directly to other relevant studies. All data collected through implementation of the Central Coast ASBS Monitoring Program will also be performed in a manner so that data is comparable with California Surface Water Ambient Monitoring Program (SWAMP) protocols and therefore with ASBS monitoring being conducted in other regions of the State.

7.3. Precision

7.3.1. Chemical Data

Precision describes how well repeated measurements agree. Overall precision usually refers to the degree of agreement for the entire sampling, operational, and analysis system. It is derived from reanalysis of individual samples (laboratory replicates) or multiple collocated samples (field replicates) analyzed on equivalent instruments and expressed as the relative percent difference (RPD) or relative standard deviation (RSD). Analytical precision can be determined from duplicate analyses of field samples, laboratory matrix spikes, and/or reference material samples. The analytical precision of duplicate measurements of samples or spikes will serve as the overall precision for the Program.

Analytical precision is expressed as the RPD for duplicate measurements.

RPD = ABS([X1 - X2] / [(X1 + X2) / 2]) *100

Where: X1 = the first sample result
X2 = the duplicate sample result.

In cases where more than one replicate is measured from a single sample or taken from a given site (on a scale presumed to be homogenous), rather than deriving RPDs for each pairwise combination, RSD can instead be calculated:

RSD = 100 * [stdev (X„X2 ,..XN)] / [average (X„ X2 , ..XN)]

Where: X1 = the first sample result
XN = each successive sample result

If the laboratory-reported RPD (or RSD) exceeds the target for over 30% of the parameters in an analysis, the analysis is rerun. If after rerunning the analysis, RPD (or RSD) for a substantial number of analytes still exceeds the target, the problem is further investigated to identify whether potential problems originate in field sampling or laboratory handling and analysis. Additional corrective actions including flagging of data or reanalysis of samples are taken where possible and as needed.

In cases where there is insufficient field sample to analyze both lab duplicates and matrix spike duplicates, a duplicate of the unspiked sample is generally preferred, due to the possibility of spiking too high, resulting in precision measurement for a concentration range not found in typical samples. Analyzing a laboratory replicate for a field sample different from that used for matrix spikes can alleviate a problem of insufficient sample material. In extreme cases where there is sufficient material for only a single analysis of each sample from the Program, other samples such as blank spikes, reference materials, or samples from another project may be used to evaluate analytical precision, again with caveats on the relevance of evaluations for samples with much higher concentrations.

7.4. Accuracy

Accuracy describes how close the measurement is to its true value. The accuracy of chemical measurements in this study applies to laboratory control standards (LCS) and matrix spike (MS) samples. The accuracy of chemical measurements is quantified as percent recovery. Accuracy objectives for toxicity measurements focus on reference toxicant results. Accuracy for toxicity measurements is quantified relative to the mean and standard deviation of previous reference toxicant exposures.

For the Project, analytical accuracy, characterized through the use of reference samples and laboratory matrix spikes in the laboratory operation, is considered acceptable for the overall accuracy of the Project. Accuracy is expressed as percent recovery for reference materials:

% Recovery = 100 * (MV / EV)

Where:	MV	=	the measured value
	EV	=	the true expected (reference) value.

For matrix spikes, recovery is calculated from the original sample result, the expected value (EV = native + spike concentration), and the measured value with the spike (MV):

% Recovery = [(MV-N) / (EV-N)] x 100%

Where:	MV	=	the measured value of the spiked sample
	EV	=	the true expected (reference) value (i.e., native + spike)
	N	=	the native, unspiked result

Surrogate standards are also spiked into samples for some analytical methods and used to correct for losses in the analytical process. Although recoveries on surrogates are to be reported, control limits for surrogates are method and laboratory specific, and no project specific recovery targets for surrogates are specified, so long as overall recovery targets for accuracy (with matrix spikes and reference materials) are achieved.

Recovery targets for Project analytes are shown in Appendix A. If a laboratory's reported recovery falls outside of this range for over 30% of reported parameters in analysis of reference materials, the problems need to be identified, corrected, and the instrument re-calibrated, and samples in that batch rerun if possible. If the recovery for a matrix spike/duplicate falls outside of target range, possible causes must be investigated, and the analysis needs to be rerun where possible. If the spike continues to fall outside of the target range, the analysis will be rerun if sufficient material is available, and/or other corrective actions such as data flagging may be taken in consultation with IM.

No individual analyte value shall exceed the target limits more than once in consecutive batches (or when an adverse trend is observed) without appropriate documentation and consultation with the IM and / or QAO. Additional leeway may be granted for analytes with reference but not certified values, or for those with 95% confidence intervals already outside the recovery targets. Due to the inherent variability in analyses near the method detection limit, control limit criteria for relative accuracy only apply to analytes with true values that are greater than the reporting limit.

In cases where Project field samples have insufficient material, the laboratory may instead spike a similar blank matrix (e.g., sand for sediment) or samples from other projects with similar expected concentrations. Spikes should be at least double the native concentrations in samples to allow quantitative assessment, but less than 100 times higher. If spiking concentrations are found too high in the first analyzed batch, additions in later analysis batches must be reduced. If expected native concentrations are unknown, spikes should be made at approximately 100 times the MDL or 10 times the quantification limit, and adjusted upward in later batches as needed.

7.5. Completeness

Completeness describes the success of sample collection and laboratory analysis, which should be sufficient to fulfill the statistical criteria of the project. Completeness is measured as the fraction of samples sampled and/or analyzed relative to the quantity targeted in the study design. While no specific statistical criteria have been established for this study, it is expected that 90% of all measurements could be taken when anticipated. This DQO accounts for adverse weather conditions, safety concerns, and equipment problems. A loss of 10% of the samples in this study would represent a minimal loss in statistical power to address the study objectives.

7.6. Bias

Bias describes the tendency for under or over prediction of sampled or measured values relative to the true value. Bias is typically assessed through the use of matrix spikes and reference materials. Commercially available proficiency samples spiked with known concentrations are tested annually by the analytical labs as part of their ELAP requirements. Bias will be assessed through negative controls (Blanks). Detectable quantities in the blank would indicate positive bias.

7.7. Contamination

Collected samples may inadvertently be contaminated with target analytes at many points in the sampling and analytical process, from the materials shipped for field sampling, to the air supply in the analytical laboratory. Blank samples evaluated at multiple points in the process chain help assure that pollutants measured in samples actually originated from the target matrix in the sampled environment and are not artifacts of the collection or analytical process.

Method blanks (also called laboratory reagent blanks, extraction blanks, procedural blanks, or preparation blanks) are used to assess laboratory contamination during all stages of sample preparation and analysis. The method blank will be processed through the entire analytical procedure in a manner identical to the samples. Method blanks should be less than the MRL. A method blank concentration greater than two times the MDL or 10% of the lowest reported sample concentration will require corrective action to identify and eliminate the source(s) of contamination before proceeding with sample analysis. If eliminating the blank contamination is not possible, all impacted analytes in the analytical batch shall be flagged. In addition, a detailed description of the likely contamination source(s) and the steps taken to eliminate/minimize the contaminants shall be included in narrative of the data report. If supporting data is presented demonstrating sufficient precision in blank measurement that the 99% confidence interval around the average blank value is less than MDL or 10% of the lowest measured sample concentration, then the average blank value may be subtracted.

A field blank is collected to assess potential sample contamination levels that occur during field sampling activities. Field blanks are taken to the field, transferred to the appropriate container, preserved (if required by the method), and treated the same as the corresponding sample type during the course of a sampling event. The inclusion of field blanks is dependent on the requirements specified in the relevant MQO tables or in the sampling method or SOP.

8. (A8) Special Training Needs / Certification

8.1. Specialized Training or Certification

All field crew will be required to take training in sampling procedures prior to participating in monitoring. Analytical laboratories are to be certified for the analyses conducted at each laboratory by ELAP, NELAP, or an equivalent accreditation program as approved by the PM.

8.2. Training and Certification Documents

All training materials, handouts, class rosters, and certification records related to the Project will be kept at the office of the Creek Status Monitoring Coordinator. All laboratories contracted through this Program are required to maintain their own training documents and certification records, and to make these available to the Project representatives as requested.

8.3. Training

All agencies, contractors, and participating laboratories must maintain rigorous field and laboratory training programs based on written, oral and performance-based guidelines. Training and performance are also evaluated on an ongoing basis based, in part, on the QA parameters defined in this plan. Standard Operating Procedures (SOPs) for field, laboratory, and data management tasks have been developed and shall be updated on a regular basis in order to maintain procedural consistency. The maintenance of an SOP Manual will provide Project personnel with a reference guide for training new personnel as well as a standardized information source that personnel can access.

9. (A9) Documents and Records

The PM will also ensure that all field measurements and laboratory analytical data are uploaded to the CEDEN database in a timely fashion and per the requirements outlined in the contracting documents. A discussion of some of the key parts of the documentation process is shown below.

9.1. Field Documentation

9.1.1. Sampling Plans, COCs, and Sampling Reports

MPC will be responsible for development and submission of field sampling plans and sampling reports to the PM. Field sampling crews will collect records for sample collection, and will be responsible for maintaining these records in an accessible manner. Samples sent to analytical laboratories will include standard Chain of Custody (COC) procedures and forms; field crews will maintain a copy of originating COCs at their individual offices, and will forward copies to the MPC as soon as possible following sampling events. Analytical laboratories will collect records for sample receipt and storage, analyses, and reporting. All records, except lab records, generated by this Project will be stored at the office of the PM. All laboratory records pertinent to this Program will be maintained by the IM.

9.1.2. Data Sheets

All field data gathered by this Program will be recorded on standardized field data entry forms, as described in more detail in the field SOPs (AMS 2013).

9.1.3. Field Logbooks

In addition to completing field data sheets, sampling personnel may record relevant information in bound logbooks. All information should be recorded in permanent ink. Any changes made to recorded information will be made using single strike-through and will be initialed and dated by the person making the change.

9.1.4. Photographic Documentation

Photographic documentation is an important part of sampling procedures. An associated photo log will be maintained documenting sites and subjects associated with photos. If an option, the date function on the camera shall be turned on. A copy of all photographs should be provided to the IM at the conclusion of sampling efforts and maintained for the duration of the Project.

9.2. Laboratory Documentation

Successful implementation of the Project requires specific actions to be taken by contract laboratories, including requirements for data deliverables, quality control, and on-site archival of Project-specific information. Each of these aspects is described below.

9.2.1. Data Reporting Format

Each laboratory will deliver electronic narrative reports and electronic data deliverables (EDDs) to the IM. The IM will maintain at least two back-up copies on compact disc or off-site storage.

The analytical laboratory will report the analytical data to the IM via an analytical report consisting of, at a minimum:

1. Letter of transmittal

2. Chain of custody information
3. Analytical results for field and quality control samples
4. Case narrative
5. Copies of raw data.

The QAO will review the data deliverables provided by the laboratory for review of QA/QC. In addition to the laboratory's standard reporting format, all results meeting data quality objectives and results having satisfactory explanations for deviations from objectives shall be reported in tabular format on electronic media, in a format consistent with SWAMP templates. The specific format and any needed templates for this electronic data deliverable (EDD) are to be agreed upon by the IM and each LPM prior to onset of any sampling activities related to that laboratory.

As they become available, and after internal laboratory QA/QC review, draft data produced from laboratory analyses are sent in electronic format. These draft data are not for distribution or application in any manner, other than for the initial review by QAO and IM. Upon completion of their preliminary review of the draft data, Project staff will provide any concerns / comments (if any) in writing to the respective laboratory and the PM. Project staff will notify the lab if it approves of this draft data in its current format. If there are any concerns regarding the draft data, the concerns must be addressed in writing by the analytical lab. After the concerns are addressed and corrective actions taken (such as reviewing for transcription errors, reanalysis, and data flagging), data will be resubmitted as draft data for re-review. After all concerns have been addressed, they will notify the laboratory and approve the data as final.

Documentation for analytical data is kept on file at the laboratories, or may be submitted with analytical results. These may be reviewed during external audits of the Project, as needed. These records include the analyst's comments on the condition of the sample and progress of the analysis, raw data, instrument printouts, and results of calibration and QC checks. Paper or electronic copies of all analytical data, field data forms and field notebooks, raw and condensed data for analysis performed on-site, and field instrument calibration notebooks are kept as part of the Project archives for a minimum period detailed in Table 9-1.

9.2.2.Other Laboratory QA/QC Documentation

All laboratories will have the latest version of the Project QAPP in electronic format. In addition, the following documents and information from the laboratories will be current, and they will be available to all laboratory personnel participating in the processing of Project samples:

1. Laboratory QA plan: Clearly defines policies and protocols specific to a particular laboratory, including personnel responsibilities, laboratory acceptance criteria, and corrective actions to be applied to the affected analytical batches, qualification of data, and procedures for determining the acceptability of results.

2. Laboratory SOPs: Contain instructions for performing routine laboratory procedures, describing exactly how a method is implemented in the laboratory for a particular analytical procedure. Where published standard methods allow alternatives at various steps in the process, those approaches chosen by the laboratory in their implementation (either in general or in specific

analytical batches) are to be noted in the data report, and any deviations from the standard method are to be noted and described.

3. Instrument performance information: Contains information on instrument baseline noise, calibration standard response, analytical precision and bias data, detection limits, scheduled maintenance, etc.

4. Control charts: Control charts are developed and maintained throughout the Program for all appropriate analyses and measurements for purposes of determining sources of an analytical problem or in monitoring an unstable process subject to drift. Control charts serve as internal evaluations of laboratory procedures and methodology and are helpful in identifying and correcting systematic error sources. Control limits for the laboratory quality control samples are ±3 standard deviations from the certified or theoretical concentration for any given analyte.

Records of all quality control data, maintained in a bound notebook at each workstation, are signed and dated by the analyst. Quality control data include documentation of standard calibrations, instrument maintenance and tests, and analyses of Certified Reference Materials (CRMs). Control charts of the data are generated by the analysts monthly or for analyses done infrequently, with each analysis batch. The laboratory quality assurance specialist will review all QA/QC records with each data submission, and will provide QA/QC reports to the IM with each batch of submitted field sample data.

9.3. Program Management Documentation

The IM is responsible for managing key parts of the Project information management system. These efforts are described below.

9.3.1. QAPP

All original QAPPs will be held by the IM. This QAPP and its revisions will be distributed to all parties involved with the Program, including FTLs and Water Board representative(s). Copies will also be sent to the each participating analytical laboratory's LPM for internal distribution.

Associated with each update to the QAPP, the PM will notify Project participants of the updated QAPP, with a cover memo compiling changes made. After appropriate distributions are made to affected parties, these approved updates will be filed and maintained by the QAO for the Program. Upon revision, the replaced QAPPs will be discarded.

9.3.2. Program Information Archival

The PM will oversee the actions of all personnel with records retention responsibilities, and will arbitrate any issues relative to records retention and any decisions to discard records. Each analytical laboratory will archive all analytical records generated for this Program. The IM will be responsible for archiving all other records associated with implementation of the Project. The PM will be responsible for archiving all management-level records.

Persons responsible for maintaining records for this Program are shown in Table 9-1.

Table 9-1. Document and Record Retention, Archival, and Disposition.

Type	Retention (yrs)	Archival	Disposition	Responsible Party
Field Notebooks	5	Paper	Maintain indefinitely	MPC
Field Datasheets	5	Paper, electronic	Maintain indefinitely	IM
COC Forms	5	Paper, electronic	Maintain indefinitely	IM
Calibration Logs	5	Paper, electronic	Recycle / delete	LPM
Raw Analytical Data	5	Paper, electronic	Recycle / delete	LPM
Lab QC Records	5	Paper, electronic	Recycle / delete	LPM
EDDs	Indefinite	Electronic	Maintain indefinitely	IM, LPM
Reports	Indefinite	Electronic	Maintain indefinitely	PM
Field Audits	Indefinite	Electronic	Maintain indefinitely	QAO

The PM will oversee the actions of all personnel with records retention responsibilities, and will arbitrate any issues relative to records retention and any decisions to discard records. As discussed previously, each analytical laboratory will archive all analytical records generated for this Program. The IM will be responsible for archiving all other records associated with implementation of the Project.

10. (B1) Sampling Process Design

A total of 44 sites will be sampled for this study. Eleven sites are reference receiving water locations, 32 are ASBS discharge sites, with eight of these also including receiving water sampling. In addition, one mooring field will be sampled. Site selection criteria are listed in the Sampling and Analysis Plan (SAP, AMS 2013). Different sampling frequencies and methods will apply to different sites. At all stormwater outfalls ≥18 inches in diameter, discharges from a single storm will be sampled each year. Discharges from outfalls where receiving water is sampled will be sampled during three storms per year. Receiving water samples will be collected at wading depth in the ocean directly in front of the discharge <48 hours before and <24 hours after each of three storms per storm season. All pre- and post-storm samples will be analyzed for chemistry. Toxicity will be analyzed from post storm samples only. Mooring field sampling will occur mainly during the summer period of high usage.

10.3. Sampling Uncertainty

There are multiple sources of potential sampling uncertainty associated with the Project, including: (1) measurement error; (2) natural (inherent) variability; (3) sample misrepresentation (or poor representativeness); and (4) sampling bias (statistical meaning). Measures incorporated to address these areas of uncertainty are discussed below:

(1) Measurement error combines all sources of error related to the entire sampling and analysis process (i.e., to the measurement system). All aspects of dealing with uncertainty due to measurement error have been described elsewhere within this QAPP.

(2) Natural (inherent) variability occurs in any environment monitored, and is often much wider than the measurement error. This will be taken into consideration when interpreting results of the various lines of inquiry.

(3) Sample misrepresentation happens at the level of an individual sample or field measurement where an individual sample collected is a poor representative for overall conditions encountered. To address this situation, the Project will be developing and implementing a number of QA-related measures, including development of training protocols, Standard Operating Procedures (SOPs), and auditing of field crews to ensure their proper implementation.

(4) Sampling bias relates to the sampling design employed and whether the appropriate statistical design is employed to allow for appropriate understanding of environmental conditions. To a large degree, the sampling design is judgmental, which will therefore incorporate an unknown degree of sampling bias into the Project.

11. (B2) Sampling Methods

The Project has developed SOPs to support Project implementation, including methods for field collection, sample preparation, sample equipment cleaning, sample handling, and sample labeling. Those are described in the sections that follow and summarized in Table 11-1.

Table 11-1. List of Relevant SOPs Governing Methods Employed for ASBS Discharge and Receiving Water Monitoring

SOP #	SOP	Source
FS-1	Collection of Water Samples	RMP
FS-2	Field Equipment Cleaning Procedures	RMP
FS-3	Sample Container, Handling, and Chain of Custody Procedures	RMP
FS-4	Site and Sample Naming Convention	RMP
FS-5	Completion and Processing of Field Datasheets	RMP
FS-6	Collection of Sediment Samples	RMP

11.1. Discharge Monitoring

Sampling outfalls requires the manual collection of grab samples by direct bottle filling, where possible. Sampling methods were developed based upon those employed for southern California ASBS monitoring (SCCWRP 2012). This complete sampling SOP appears in AMS (2013).

Sample containers and preservatives are identified in the field sampling SOP. Appropriate pre-cleaned sample containers will be used. Sample bottles and caps will be protected from contact with solvents, dust, or other contaminants. Sample bottles for this project will not be reused.

The FTL and MPC have responsibility for assessing the safety of sampling teams. A two-person team will conduct all sampling, and the sampling team will have access to a cellular phone in order to alert rescue agencies should an accident occur. Sampling will be postponed if the sampling team determines that the conditions are unsafe.

Failure to collect a sample due to safety concerns or technical issues will be documented in the field (narrative and photographic) promptly reported to the PM, who will determine if any corrective action is needed and make arrangements to collect a replacement sample (if possible). The QAO will document sampling failures and the effectiveness of corrective actions.

11.2. Receiving Water Monitoring

Sampling receiving waters requires the manual collection of grab samples, typically through use of a transfer container. When not possible, an alternative technique will be employed. Sampling methods were developed based upon those employed for southern California ASBS monitoring (SCCWRP 2012). The complete sampling SOP appears in AMS (2013).

Sample containers and preservatives are identified in the field sampling SOP. Appropriate pre-cleaned sample containers will be used. Sample bottles and caps will be protected from contact with solvents, dust, or other contaminants. Sample bottles for this project will not be reused.

The FTL and MPC have responsibility for assessing the safety of sampling teams. A two-person team will conduct all sampling, and the sampling team will have access to a cellular phone in order to alert rescue agencies should an accident occur. Sampling will be postponed if the sampling team determines that the conditions are unsafe.

Failure to collect a sample due to safety concerns or technical issues will be promptly reported to the PM, who will determine if any corrective action is needed and make arrangements to collect a replacement sample (if possible). The QAO will document sampling failures and the effectiveness of corrective actions.

11.3. Mooring Field Monitoring

Mooring Field monitoring involves collection of both receiving water and sediment samples. Ocean receiving water samples will be collected monthly from May through October on a high use weekend in each month using a watercraft to access the sampling site. Sampling receiving waters requires the manual collection of grab samples by direct bottle filling, where possible. Sampling methods were developed based upon those employed for southern California ASBS monitoring (SCCWRP 2012). This complete sampling SOP appears in AMS (2013). Sediment samples will be collected annually from within the mooring field and below the pier in Stillwater Cove.

11.4. Rocky Intertidal Monitoring

Methods to be employed for conducting rocky intertidal monitoring are summarized in Appendix C.

11.5. Field Preparation

Samples will be prepared in the field as needed to conform to USEPA and/or SWAMP requirements, to ensure sample integrity from time of sample collection to delivery at the analytical laboratory. Detailed information on sample containers, required preservation, holding times, and sample volumes is shown in SOP FS-3, Sample Container, Handling, and Chain of Custody Procedures.

11.6. Sampling Containers

The Project will implement standard methods associated with sample container, handling and chain of custody procedures that is identified in Project SOP FS-3. Collection of pathogens in water requires the use of sterilized sample containers. Containers will be provided by contracted laboratories pre-sterilized. Individual laboratories will be responsible for the integrity of containers provided. No other containers required for collection of Project samples will require sterile containers.

All sampling containers used for the ASBS water quality analysis will be provided pre-cleaned by contracted analytical laboratories. The individual laboratories will be responsible for ensuring integrity of the containers. Should sampling containers lose their integrity during the sampling process, they will be discarded and replaced with a pre-cleaned container. A list of sampling containers required for Project implementation is compiled in SOP FS-3, Sample Container, Handling, and Chain of Custody Procedures.

11.7. Sample ID Numbers

Every sample must have a unique sample number so that the analytical results from each sample can be differentiated from every other sample. This information should follow the sample through the COC, analytical, and interpretation and reporting processes. As described in SOP FS-4, Site and Sample Naming Convention, samples collected will adopt a naming convention that is consistent throughout Project implementation.

11.8. Sample Equipment Cleaning

Cleaning techniques required for sampling equipment will vary depending on the media sampled and analyte measured. Cleaning techniques to be used are described in SOP FS-2, Equipment Cleaning Procedures, and individual SOPs associated with the relevant type of sampling to be conducted.

11.9. WASTE DISPOSAL

Proper disposal of all waste is an important component of field activities. At no time will any waste be disposed of improperly. The proper methods of waste disposal are outlined below:

11.9.1. Routine Garbage

Regular garbage (paper towels, paper cups, etc.) is collected by sampling personnel in garbage bags or similar. It can then be disposed of properly at appropriate intervals.

11.9.2. Detergent Washes

Any detergents used or detergent wash water should be collected in the field in a water-tight container and disposed of appropriately.

11.9.3. Chemicals

Solvents, acids, and formalin are hazardous materials and should be disposed of by following all appropriate regulations. They should always be collected when sampling and never be disposed in the field.

11.10. Responsibility and Corrective Actions

If monitoring equipment fails, sampling personnel will first attempt possible repairs in the field or use backup equipment if available. If unable to repair or replace, sampling personnel will report the problem in the comments section of their field notes and will not record data values for the variables in question. Actions will be taken to replace or repair broken equipment prior to the next field use. Under no condition will data be entered into the SWAMP database that were known to be collected with faulty equipment.

12. (B3) Sample Handling and Custody

The QAO will be responsible for overall quality assurance associated with field sampling conducted. The MPC responsible for identifying and ensuring appropriate qualifications and training for all sampling personnel.

One member of each sampling team will be identified as "Team Lead", and will be responsible for overall collection and custody of samples during field sampling. Field crews will keep a field log, which will consist of sampling forms for each sampling event. SOPs for Field Sample Collection, identified in Table 11-1 will be followed, and include instruction for field documentation. In the field log, the following items will be recorded: time of sample collection, sample identification numbers, results of any field measurements and the time that they were made, qualitative descriptions of relevant water and weather conditions at the time of sample collection, and a description of any unusual occurrences associated with the sampling event (especially those that could affect sample or data quality).

The field crews will have custody of samples during field sampling and chain-of-custody (COC) forms will accompany all samples to the analyzing laboratory. COC procedures require that possession of samples be traceable from the time the samples are collected until completion and submittal of analytical results. A detailed description of COC procedures is included in SOP FS-3, Sample Container, Handling, and Chain of Custody Procedures. Each contracted analytical laboratory will maintain custody logs sufficient to track each sample submitted and to analyze or preserve each sample within specified holding times. Each analytical laboratory has a sample custodian who examines the samples for correct documentation, proper preservation and holding times. Each laboratory will follow sample custody procedures as outlined in its QA plans.

In general, all non-biological samples will be packed in wet ice during shipment, so that they will be kept at approximately $4 \pm 2°$ C. When used, wet ice will be double bagged in Zip-top bags to prevent contamination via meltwater. Where appropriate, samples may be frozen to prevent biological degradation. If samples are to be shipped frozen on dry ice, then appropriate handling procedures will be followed, including ensuring use of appropriate packaging materials and appropriate training for shipping personnel.

Additional detail on sample handling procedures is presented in SOP FS-3, Sample Container, Handling, and Chain of Custody Procedures.

12.1. Shipping Containers

All samples will be handled, prepared, transported, and stored in a manner so as to minimize bulk loss, analyte loss, contamination, or biological degradation. Sample containers will be clearly labeled with an indelible marker. All caps and lids will be checked for tightness prior to shipping. Ice chests will be sealed with packing tape before shipping. Samples will be placed in the ice chest with enough ice or frozen ice packs to completely fill the ice chest. COC forms will be placed in a zip-top bag and placed inside of the ice chest. Additional detail on sample handling is included in SOP FS-3, Sample Container, Handling, and Chain of Custody Procedures.

12.2. Commercial Vehicle Transport

Transport of samples to the contracted laboratories will be by commercial carriers. As required, pickup will be pre-arranged with the carrier and all required shipping forms will be completed prior to sample pickup by the commercial carrier.

12.3. Sample Hold Times

Information on sampling containers, preservation techniques, and hold times are shown in SOP FS-3, Sample Container, Handling, and Chain of Custody Procedures.

13. (B4) Method Selection

13.1. Method Reporting Limits

Target method reporting limits (MRLs), or Reporting Limits (RLs), applicable for the Project are presented in Appendix C. It is understood that all targets may not be achievable by laboratories in each media, especially where interferences present may elevate MRLs.

13.2. Performance Based Measurement System

Multiple analytical laboratories will provide analytical services. Contracted laboratories will be encouraged to use a Performance Based Measurement System (PBMS). A performance-based approach permits the use of any scientifically appropriate method that demonstrates the ability to meet established method performance criteria (e.g., accuracy, sensitivity, bias, precision) and complies with specified data quality needs or requirements. Using PBMS the data quality needs, mandates, or limitations of the program or project are specified. These will serve as criteria for selecting measurement processes (i.e, methods), which will meet those needs in a cost-effective manner, rather than the use of a mandated method.

13.3. PBMS Methods Validation

Each analytical laboratory should adhere to its individual QA program for method validation techniques for specific methods. Individual QA plans should be maintained on-site and be made available to Project representatives upon request. When using the PBMS, the labs will have to follow all PBMS procedures related to obtaining quality data, but the labs are not required to submit the results to anyone except upon request. The results are to be kept on file by each individual lab.

13.4. Method Failures

The PM will be responsible for any corrective actions that may be needed in the event that methods fail to produce SWAMP-comparable data. If a method fails to provide SWAMP-comparable data for any reason, including analyte or matrix interferences, instrument failures, etc., then the involved samples will be analyzed again if possible. The laboratory in question's SOP for handling these types of problems will be followed. When a method fails to provide SWAMP-comparable data, then the laboratory's SOP for documenting method failures will be used to document the problem and what was done to rectify it.

Corrective actions are taken when an analysis is deemed suspect for some reason. These reasons include exceeding accuracy ranges and/or problems with sorting and identification. The corrective action will vary on a case-by-case basis, but at a minimum involves the following:

- A check of procedures.
- A review of documents and calculations to identify possible errors.
- Correction of errors based on discussions among taxonomists.
- A complete re-identification of the sample.

The field and laboratory coordinators shall have systems in place to document problems and make corrective actions. All corrective actions will be documented to the PM.

13.5. Sample Disposal

After analysis of the Project samples have been completed by the laboratory and results have been accepted by the IM, they will be disposed by each laboratory of in compliance with all federal, state, and local regulations. The laboratory has standard procedures for disposing of its waste, including left over sample materials

13.6. Laboratory Sample Processing

Field samples sent to the laboratories will be processed within their recommended hold time (SOP FS-3) using methods agreed upon method between the PM and LPMs. Each sample may be assigned unique laboratory sample identification (ID) numbers for tracking processing and analyses of samples within the laboratory. This laboratory sample ID (if differing from the field team sample ID) must be included in the data submission, within a lookup table linking the field sample ID to that assigned by the lab.

Samples arriving at the laboratory are to be stored under conditions appropriate for the planned analytical procedure(s), unless they are processed for analysis immediately upon receipt. Samples to be analyzed should only be removed from storage when laboratory staff is ready to proceed.

14. (B5) Quality Control

Concentrations of pollutants in environmental samples are often low. Therefore, a quality-assurance program for the chemical analysis of samples requires stringent laboratory conditions and careful control over all aspects of the analyses. Each step in the analytical process is a potential source of contamination and must be consistently monitored to ensure that the final measurement is not adversely affected by any processing steps. Various aspects of the Project quality control program are summarized below.

14.1. Laboratory Quality Control

Laboratories providing analytical support to the Project will have the appropriate facilities to store, prepare, and process samples in an ultra-clean environment, and will have appropriate instrumentation and staff to perform analyses and provide data of the required quality within the time period dictated by the Program. The laboratories are expected to satisfy the following:

1. Demonstrate capability through pertinent certification and satisfactory performance in inter-laboratory comparison exercises.
2. Provide qualification statements regarding their facility and personnel.
3. Maintain a program of scheduled maintenance of analytical balances, laboratory equipment and instrumentation.
4. Conduct routine checking of analytical balances using a set of standard reference weights (American Society of Testing and Materials Class 3, NIST Class S-1, or equivalents). Analytical balances are serviced at six-month intervals or when test weight values are not within the manufacturer's instrument specifications, whichever occurs first.
5. Check fresh calibration standards against second source standards to verify composition and concentration.
6. Record all analytical data in bound (where possible) logbooks, with all entries in ink, or electronically.
7. Monitor and document the temperatures of cold storage areas and freezer units on a continuous basis.
8. Verify the efficiency of fume/exhaust hoods.
9. Have a source of reagent water meeting specifications described in Section 8.0 available in sufficient quantity to support analytical operations.
10. Label all containers used in the laboratory with date prepared, contents, initials of the individual who prepared the contents, and other information as appropriate.
11. Date and safely store all chemicals upon receipt. Proper disposal of chemicals when the expiration date has passed.
12. Have QAPP, SOPs, analytical methods manuals, and safety plans readily available to staff.
13. Have raw analytical data readily accessible so that they are available upon request.

In addition, laboratories involved in the Project are required to demonstrate capability continuously through the following protocols:

1. Strict adherence to routine QA/QC procedures.
2. Routine analysis of CRMs, if available.
3. Regular participation in annual certification programs.

4. Satisfactory performance at least annually in the analysis of blind Performance Evaluation Samples and/or participation in inter-laboratory comparison exercises.

Laboratory QC samples must satisfy SWAMP measurement quality objectives (MQOs) and frequency requirements. MQOs are specified in Appendix A. Frequency requirements are provided on an analytical batch level. The Project defines an analytical batch as 20 or fewer samples and associated quality control that are processed by the same instrument within a 24-hour period (unless otherwise specified by method). Details regarding sample preparation are method- or laboratory SOP-specific, and may consist of extraction, digestion, or other techniques.

14.2. Calibration and Working Standards

All calibration standards must be traceable to a certified standard obtained from a recognized organization. If traceable standards are not available, procedures must be implemented to standardize the utilized calibration solutions (e.g., comparison to a certified reference material (CRM – see below). Standardization of calibration solutions must be thoroughly documented, and is only acceptable when pre-certified standard solutions are not available. Working standards are dilutions of stock standards prepared for daily use in the laboratory. Working standards are used to calibrate instruments or prepare matrix spikes, and may be prepared at several different dilutions from a common stock standard. Working standards are diluted with solutions that ensure the stability of the target analyte. Preparation of the working standard must be thoroughly documented such that each working standard is traceable back to its original stock standard. Finally, the concentration of all working standards must be verified by analysis prior to use in the laboratory.

14.3. Instrument Calibration

Prior to sample analysis, utilized instruments must be calibrated following the procedures outlined in the relevant analytical method or laboratory SOP. Each method or SOP must specify acceptance criteria that demonstrate instrument stability and an acceptable calibration. If instrument calibration does not meet the specified acceptance criteria, the analytical process is not in control and must be halted. The instrument must be successfully recalibrated before samples may be analyzed.

Calibration curves will be established for each analyte covering the range of expected sample concentrations. Only data that result from quantification within the demonstrated working calibration range may be reported unflagged by the laboratory. Quantification based upon extrapolation is not acceptable. Data reported outside of the calibration range must be flagged as "Detected not Quantified". Alternatively, if the instrumentation is linear over the concentration ranges to be measured in the samples, the use of a calibration blank and one single standard that is higher in concentration than the samples may be appropriate. Samples outside the calibration range will be diluted or concentrated, as appropriate, and reanalyzed.

14.4. Initial Calibration Verification

The initial calibration verification (ICV) is a mid-level standard analyzed immediately following the calibration curve. The source of the standards used to calibrate the instrument and the source of the standard used to perform the ICV must be independent of one another. This is usually achieved by the purchase of standards from separate vendors. Since the standards are obtained from independent sources and both are traceable, analyses of the ICV functions as a check on the accuracy of the standards used to calibrate the instrument. The ICV is not a requirement of all SOPs or methods, particularly if other checks on analytical accuracy are present in the sample batch.

14.5. Continuing Calibration Verification

Continuing calibration verification (CCV) standards are mid-level standards analyzed at specified intervals during the course of the analytical run. CCVs are used to monitor sensitivity changes in the instrument during analysis. In order to properly assess these sensitivity changes, the standards used to perform CCVs must be from the same set of working standards used to calibrate the instrument. Use of a second source standard is not necessary for CCV standards, since other QC samples are designed to assess the accuracy of the calibration standards. Analysis of CCVs using the calibration standards limits this QC sample to assessing only instrument sensitivity changes. The acceptance criterion and required frequency for CCVs are detailed in Appendix A, Measurement Quality Objectives. If a CCV falls outside the acceptance limits, the analytical system is not in control, and immediate corrective action must be taken.

Data obtained while the instrument is out of control is not reportable, and all samples analyzed during this period must be reanalyzed. If reanalysis is not an option, the original data must be flagged with the appropriate qualifier and reported. A narrative must be submitted listing the results that were generated while the instrument was out of control, in addition to corrective actions that were applied.

14.6. Laboratory Blanks

Laboratory blanks (also called extraction blanks, procedural blanks, or method blanks) are used to assess the background level of target analyte resulting from sample preparation and analysis. Laboratory blanks are carried through precisely the same procedures as the field samples. For both organic and inorganic analyses, a minimum of at least one laboratory blank must be prepared and analyzed in every analytical batch. Some methods may require more than one laboratory blank with each analytical run. Acceptance criteria for laboratory blanks are detailed in Appendix A, Measurement Quality Objectives. Blanks that are too high require corrective action to bring the concentrations down to acceptable levels. This may involve changing reagents, cleaning equipment, or even modifying the utilized methods or SOPs. Although acceptable laboratory blanks are important for obtaining results for low-level samples, improvements in analytical sensitivity have pushed detection limits down to the point where some amount of analyte will be detected in even the cleanest laboratory blanks. The magnitude of the blanks must be evaluated against the concentrations of the samples being analyzed and against Program objectives.

14.7. Reference Materials and Demonstration of Laboratory Accuracy

Evaluation of the accuracy of laboratory procedures is achieved through the preparation and analysis of reference materials with each analytical batch. Ideally, the reference materials selected are similar in matrix and concentration range to the samples being prepared and analyzed. The acceptance criteria for reference materials are listed in Appendix A, Measurement Quality Objectives. The accuracy of an analytical method can be assessed using CRMs only when certified values are provided for the target analytes. When possible, reference materials that have certified values for the target analytes should be used. This is not always possible, and often times certified reference values are not available for all target analytes. Many reference materials have both certified and non-certified (or reference) values listed on the certificate of analysis. Certified reference values are clearly distinguished from the non-certified reference values on the certificate of analysis.

14.8. Reference Materials vs. Certified Reference Materials

The distinction between a reference material and a certified reference material does not involve how the two are prepared, rather with the way that the reference values were established. Certified values are determined through replicate analyses using two independent measurement techniques for verification. The certifying agency may also provide "non-certified or "reference" values for other target analytes. Such values are determined using a single measurement technique that may introduce bias. When available, it is preferable to use reference materials that have certified values for all target analytes. This is not always an option, and therefore it is acceptable to use materials that have reference values for these analytes. Note: Standard Reference Materials (SRMs) are essentially the same as CRMs. The term "Standard Reference Material" has been trademarked by the National Institute of Standards and Technology (NIST), and is therefore used only for reference materials distributed by NIST.

14.9. Laboratory Control Samples

While reference materials are not available for all analytes, a way of assessing the accuracy of an analytical method is still required. Laboratory control samples (LCSs) provide an alternate method of assessing accuracy. An LCS is a specimen of known composition prepared using contaminant-free reagent water or an inert solid spiked with the target analyte at the midpoint of the calibration curve or at the level of concern. The LCS must be analyzed using the same preparation, reagents, and analytical methods employed for regular samples. If an LCS needs to be substituted for a reference material, the acceptance criteria are the same as those for the analysis of reference materials. These are detailed in Appendix A, Measurement Quality Objectives.

14.10. Prioritizing Certified Reference Materials, Reference Materials, and Laboratory Control Samples

Certified reference materials, reference materials, and laboratory control samples all provide a method to assess the accuracy at the mid-range of the analytical process. However, this does not mean that they can be used interchangeably in all situations. When available, the Project requires the analysis of one certified reference material per analytical batch. Certified values are not always available for all target analytes. If no certified reference material exists, reference values may be used. If no reference material exists for the target analyte, an LCS must be prepared and analyzed with the sample batch as a means of assessing accuracy. The hierarchy is as follows: analysis of a CRM is favored over the analysis of a reference material, and analysis of a reference material is preferable to the analysis of an LCS. Substitution of an LCS is not acceptable if a certified reference material or reference material is available.

14.11. Matrix Spikes

A matrix spike (MS) is prepared by adding a known concentration of the target analyte to a field sample, which is then subjected to the entire analytical procedure. Matrix spikes are analyzed in order to assess the magnitude of matrix interference and bias present. Because matrix spikes are analyzed in pairs, the second spike is called the matrix spike duplicate (MSD). The MSD provides information regarding the precision of the matrix effects. Both the MS and MSD are split from the same original field sample. In order to properly assess the degree of matrix interference and potential bias, the spiking level should be approximately 2-5x the ambient concentration of the spiked sample. To establish spiking levels prior to sample analysis, laboratories should review any relevant historical data. In many instances, the laboratory will be spiking samples blind and will not meet a spiking level of 2-5x the ambient concentration. In addition to the recoveries, the relative percent difference (RPD) between the MS and MSD is calculated to evaluate how matrix affects precision. The MQO for the RPD between the MS and MSD is the same regardless of the method of calculation. These are detailed in Appendix A: *Measurement Quality Objectives*. Recovery data for matrix spikes provides a basis for determining the prevalence of matrix effects in the samples collected and analyzed for SWAMP. If the percent recovery for any analyte in the MS or MSD is outside of the limits specified in Appendix A, Measurement Quality Objectives, the chromatograms (in the case of trace organic analyses) and raw data quantitation reports should be reviewed. Data should be scrutinized for evidence of sensitivity shifts (indicated by the results of the CCVs) or other potential problems with the analytical process. If associated QC samples (reference materials or LCSs) are in control, matrix effects may be the source of the problem. If the standard used to spike the samples is different from the standard used to calibrate the instrument, it must be checked for accuracy prior to attributing poor recoveries to matrix effects.

14.12. Laboratory Duplicates

In order to evaluate the precision of an analytical process, a field sample is selected and prepared in duplicate. Specific requirements pertaining to the analysis of laboratory duplicates vary depending on the type of analysis. The acceptance criteria for laboratory duplicates are specified in Appendix A, Measurement Quality Objectives.

14.13. Laboratory Duplicates vs. Matrix Spike Duplicates

Although the laboratory duplicate and matrix spike duplicate both provide information regarding precision, they are unique measurements. Laboratory duplicates provide information regarding the precision of laboratory procedures. The matrix spike duplicate provides information regarding how the matrix of the sample affects both the precision and bias associated with the results. It also determines whether or not the matrix affects the results in a reproducible manner. Because the two concepts cannot be used interchangeably, it is unacceptable to analyze only an MS/MSD when a laboratory duplicate is required.

14.14. Replicate Analyses

The Project will adopt the same terminology as SWAMP in defining replicate samples, wherein replicate analyses are distinguished from duplicate analyses based simply on the number of involved analyses. Duplicate analyses refer to two sample preparations, while replicate analyses refer to three or more. Analysis of replicate samples is not explicitly required.

14.15. Surrogates

Surrogate compounds accompany organic measurements in order to estimate target analyte losses during sample extraction and analysis. The selected surrogate compounds behave similarly to the target analytes, and therefore any loss of the surrogate compound during preparation and analysis is presumed to coincide with a similar loss of the target analyte. Surrogate compounds must be added to field and QC samples prior to extraction, or according to the utilized method or SOP. Surrogate recovery data is to be carefully monitored. If possible, isotopically labeled analogs of the analytes are to be used as surrogates.

14.16. Internal Standards

To optimize techniques coupled with mass spectrometers, internal standards (also referred to as "injection internal standards") may be added to field and QC sample extracts prior to injection. Use of internal standards is particularly important for analysis of complex extracts subject to retention time shifts relative to the analysis of standards. The internal standards can also be used to detect and correct for problems in the GC injection port or other parts of the instrument. The analyst must monitor internal standard retention times and recoveries to determine if instrument maintenance or repair or changes in analytical procedures are indicated. Corrective action is initiated based on the judgment of the analyst. Instrument problems that affect the data or result in reanalysis must be documented properly in logbooks and internal data reports, and used by the laboratory personnel to take appropriate corrective action. Performance criteria for internal standards are established by the method or laboratory SOP.

14.17. Dual-Column Confirmation

Due to the high probability of false positives from single-column analyses, dual column confirmation should be applied to all gas chromatography and liquid chromatography methods that do not provide definitive identifications. It should not be restricted to instruments with electron capture detection (ECD).

14.18. Dilution of Samples

Final reported results must be corrected for dilution carried out during the process of analysis. In order to evaluate the QC analyses associated with an analytical batch, corresponding batch QC samples must be analyzed at the same dilution factor. For example, the results used to calculate the results of matrix spikes must be derived from results for the native sample, matrix spike, and matrix spike duplicate analyzed at the same dilution. Results derived from samples analyzed at different dilution factors must not be used to calculate QC results.

14.19. Reference Toxicants

The health of organisms used for toxicity testing can be impacted by how the animals were collected, handled or shipped. To increase precision as a result of test exposure variability, environmental parameters are kept to a strict range of temperature, pH, salinity, light intensity, photoperiod, and dissolved oxygen. To ensure that a particular batch of organisms is not overly sensitive or tolerant, concurrent reference toxicant tests are conducted using known concentrations of a contaminant in laboratory dilution water. Copper will be used as the reference toxicant in this study. The results of these reference toxicity tests are compared with the mean response for the same organism from previous tests conducted in the toxicity laboratory. Acceptable reference toxicants limits are achieved if the results are within 2 standard deviations of the grand mean calculated for the laboratory's control chart.

14.20. Laboratory Corrective Action

Failures in laboratory measurement systems include, but are not limited to: instrument malfunction, calibration failure, sample container breakage, contamination, and QC sample failure. If the failure can be corrected, the analyst must document it and its associated corrective actions in the laboratory record and complete the analysis. If the failure is not resolved, it is conveyed to the respective supervisor who should determine if the analytical failure compromised associated results. The nature and disposition of the problem must be documented in the data report that is sent to the PM. SWAMP comparable corrective actions are detailed in Appendix C.

14.21. Field Quality Control

Field QC results must meet the MQOs and frequency requirements specified in Appendix A, Measurement Quality Objectives, where frequency requirements are provided on a sample batch level. The Project defines a sample batch as 20 or fewer field samples prepared and analyzed with a common set of QC samples. Specific field quality control samples may also be required by the method or SOP selected for sample collection and analysis. If Project MQOs conflict with those prescribed in the utilized method or SOP, the more rigorous of the objectives must be met.

14.22. Equipment Blanks

Equipment blanks will be generated and collected by the personnel responsible for cleaning the sampling equipment before the equipment is shipped to the sampling site. In order to accommodate any necessary corrective action, equipment blank results should be available well in advance of the sampling event. To ensure that sampling equipment is contaminant-free, water known to be low in the target analyte(s) must be processed though the equipment as during sample collection. The specific type of water used for blanks is selected based on the information contained in the relevant sampling or analysis methods. The water must be collected in an appropriate sample container, preserved, and analyzed for the target analytes (in other words, treated as an actual sample). The inclusion of field blanks is dependent on the requirements specified in the relevant MQO tables, or in the sampling method or SOP. Typically, equipment blanks are collected from new equipment, equipment that has been cleaned after use at a contaminated site, or when equipment that is not dedicated for surface water sampling is used. An equipment blank must be prepared for dissolved metals in water samples whenever a new lot of filters is used.

14.23. Field Blanks

A field blank is collected to assess potential sample contamination levels that occur during field sampling activities. Field blanks are taken to the field, transferred to the appropriate container, preserved (if required by the method), and treated the same as the corresponding sample type during the course of a sampling event. The inclusion of field blanks is dependent on the requirements specified in the relevant MQO tables or in the sampling method or SOP. Field blanks for other media and analytes should be conducted upon initiation of sampling. If field blank performance is acceptable, further collection and analysis of field blanks should be performed on an as-needed basis. Acceptable levels for field blanks are specified in Appendix A, Measurement Quality Objectives. The water used for field blanks must be free of target analyte(s) and appropriate for the analysis being conducted.

14.24. Field Duplicates

Field samples collected in duplicate provide precision information as it pertains to the sampling process. The duplicate sample must be collected in the same manner and as close in time as possible to the original sample. This effort is to attempt to examine field homogeneity as well as sample handling, within the limits and constraints of the situation.

14.25. Field Corrective Action

The field organization is responsible for responding to failures in their sampling and field measurement systems. If monitoring equipment fails, personnel are to record the problem according to their documentation protocols. Failing equipment must be replaced or repaired prior to subsequent sampling events. It is the combined responsibility of all members of the field organization to determine if the performance requirements of the specific sampling method have been met, and to collect additional samples if necessary.

14.26. Collection of Background Samples

Background samples provide a comparison between the concentrations or levels of the target parameters in the Program's environmental samples with samples from a nearby location that is known or believed to be uncontaminated (i.e., to contain the target parameters at "natural" concentrations or levels. This is necessary in order to differentiate between the project on-site contribution and the off-site natural contribution to the parameter's concentrations or levels.

14.27. Field Sampling Representativeness

Field sampling accuracy is ensured by evaluating if the sample event occurred at the nominal coordinates, within the index period, and within the nominal stratum. Site location shall be measured by global positioning system (GPS) and must be within 10 seconds (~300 m) of the nominal latitude and longitude. All samples must be collected within the established index period and within the nominal stratum.

15. (B6) Instrument/Equipment Testing, Inspection and Maintenance

15.1. Field Equipment

Individual SAPs list all equipment to be used for sampling for those associated efforts. Sampling equipment shall be checked prior to departure. Duplicate or back-up equipment shall be taken where possible

15.1. Laboratory Equipment

All laboratories providing analytical support for chemical or biological analyses will have the appropriate facilities to store, prepare, and process samples. Moreover, appropriate instrumentation and staff, to generate data of the required quality within the schedule required by the program, are also required. Laboratory operations must include the following procedures:

- A program of scheduled maintenance of analytical balances, microscopes, laboratory equipment, and instrumentation.
- Routine checking of analytical balances using a set of standard reference weights (American Society of Testing and Materials (ASTM) Class 3, NIST Class S-1, or equivalents).
- Checking and recording the composition of fresh calibration standards against the previous lot, wherever possible. Acceptable comparisons are < 2% of the previous value.
- Recording all analytical data in bound (where possible) logbooks, with all entries in ink, or electronic format.
- Monitoring and documenting the temperatures of cold storage areas and freezer units once per week.
- Verifying the efficiency of fume hoods.
- Having a source of reagent water meeting ASTM Type I specifications (ASTM, 1984) available in sufficient quantity to support analytical operations. The conductivity of the reagent water will not exceed 18 megaohms at 25°C. Alternately, the resistivity of the reagent water will exceed 10 mmhos/cm.
- Labeling all containers used in the laboratory with date prepared, contents, initials of the individual who prepared the contents, and other information, as appropriate.
- Dating and safely storing all chemicals upon receipt. Proper disposal of chemicals when the expiration date has passed.
- Having QAPP, SOPs, analytical methods manuals, and safety plans readily available to staff.
- Having raw analytical data, such as chromatograms, accessible so that they are available upon request.

Laboratories will maintain appropriate equipment per the requirements of individual laboratory SOPs and will be able to provide information documenting their ability to conduct the analyses with the required level of data quality. Such information might include results from interlaboratory comparison studies, control charts and summary data of internal QA/QC checks, and results from certified reference material analyses.

16. (B7) Instrument/Equipment Calibration and Frequency

16.1. Laboratory Analyses

16.1.1. In-house Analyses

There are no in-house laboratory-based analyses planned for this project.

16.1.2. Contract Laboratory Analyses

The procedures for and frequency of calibration will vary depending on the chemical parameters being determined. Equipment is maintained and checked according to the standard procedures specified in each laboratory's instrument operation instruction manual.

Upon initiation of an analytical run, after each major equipment disruption, and whenever on-going calibration checks do not meet recommended DQOs (see Appendix A), analytical systems will be calibrated with a full range of analytical standards. Immediately after this procedure, the initial calibration must be verified through the analysis of a standard obtained from a different source than the standards used to calibrate the instrumentation and prepared in an independent manner and ideally having certified concentrations of target analytes of a CRM or certified solution. Frequently, calibration standards are included as part of an analytical run, interspersed with actual samples.

Calibration curves will be established for each analyte and batch analysis from a calibration blank and a minimum of three analytical standards of increasing concentration, covering the range of expected sample concentrations. Only those data resulting from quantification within the demonstrated working calibration range may be reported by the laboratory. Alternatively, if the instrumentation is linear over the concentration ranges to be measured in the samples, the use of a calibration blank and one single standard that is higher in concentration than the samples may be appropriate. Samples outside the calibration range will be diluted or concentrated, as appropriate, and reanalyzed.

The calibration standards will be prepared from reference materials available from the EPA repository, or from available commercial sources. The source, lot number, identification, and purity of each reference material will be recorded. Neat compounds will be prepared weight/volume using a calibrated analytical balance and Class A volumetric flasks. Reference solutions will be diluted using Class A volumetric glassware. Individual stock standards for each analyte will be prepared. Combination working standards will be prepared by volumetric dilution of the stock standards. The calibration standards will be stored at -20° C. Newly prepared standards will be compared with existing standards prior to their use. All solvents used will be commercially available, distilled in glass, and judged suitable for analysis of selected chemicals. Stock standards and intermediate standards are prepared on an annual basis and working standards are prepared every three months.

Sampling and analytical logbooks will be kept to record inspections, calibrations, standard identification numbers, the results of calibrations, and corrective action taken. Equipment logs will document instrument usage, maintenance, repair and performance checks. Daily calibration data will be stored with the raw sample data.

17. (B8) Inspection/Acceptance for Supplies and Consumables

Glassware, sample bottles, and collection equipment will all be inspected prior to their use for chips, cracks, leaks, contamination, and other deformities that can affect the outcome of the study results. Sampling bottles will be obtained from analytical laboratories or purchased directly from a vendor. Supplies will be examined for damage as they are received. Precleaned containers will be used for sampling. Toxicity test organisms will be collected by the analytical laboratory. The MPC and FTLs will be responsible for acquisition and inspection of sampling containers. The chemistry manager will be responsible for acquisition and inspection of chemical supplies including standards.

Inspection requirements for sampling consumables and supplies are summarized in Table 17-1.

Table 17-1. Inspection / Acceptance Testing Requirements for Consumables and Supplies

Project-related Supplies	Inspection / Testing Specifications	Acceptance Criteria	Frequency	Responsible Person Sampling Containers
Sampling supplies	Visual	Appropriateness; no evident contamination or damage; within expiration date	Each purchase	FTL

18. (B9) Non Direct Measurements, Existing Data

This study will not incorporate existing data or other non-direct measurements. Weather forecasting information will be obtained from the National Weather Service (http://www.wrh.noaa.gov/lox/).

19. (B10) Data Management

As previously discussed, Project data management will conform to protocols dictated by relevant SOPs (Table 11-1). A summary of specific data management aspects is provided below.

19.1. Field Data Management

All field data will be reviewed for legibility and errors as soon as possible after the conclusion of sampling. All field data that is to be entered electronically will be hand-checked at a rate of 10% of entries as a check on data entry. Any corrective actions required will be documented in correspondence to the QAO.

19.2. Laboratory Data Management

The management of water quality and toxicological data will be initiated with the use of field and laboratory data sheets. Analytical results will be electronically sent to the PM following the completion of quality control checks by each of the laboratories. Data will be screened for the following major items:

- A 100 percent check between electronic data provided by the laboratory and the hard copy reports
- Conformity check between the Chain-of-Custody Forms and laboratory reports
- A check for laboratory data report completeness
- A check for typographical errors on the laboratory reports
- A check for suspect values

The analytical laboratories will provide data in electronic format, encompassing both a narrative and electronic data deliverable (EDD). The required form of electronic submittals will be provided to the laboratories to ensure the files can be imported into the Project database with a minimum of editing. The data will be managed in a manner to expedite efficient upload into the California Environmental Data Exchange Network (CEDEN) database. The PM will be responsible for ensuring that data are entered into the database.

Following the initial screening, a more complete QA/QC review process will be performed, which will include an evaluation of holding times, method and equipment blank contamination, and analytical accuracy and precision. Accuracy will be evaluated by reviewing MS/MSD and LCS recoveries; precision will be evaluated by reviewing MSD and laboratory sample duplicate RPDs.

20. (C1) Assessments and Response Actions

The PM will be responsible for the day-to-day oversight of the Project. The QAO will conduct systematic reviews of the data for the specified DQOs every time data packets are delivered and entered into the Project database, prior to uploading to CEDEN. Any problems will be relayed to the PM. The QAO has the power to halt all sampling and analytical work if the deviation(s) noted are considered detrimental to data quality. Problems that cannot be corrected, will be documented by the QAO, flagged in the database, and acknowledged in the final report.

21. (C2) Reports to Management

The status of data collection during this project will be reported by the PM to the Contract Manager with each invoice and continuing until the completion of the Project. A draft final Project report will be filed no later than six months following the completion of sampling. The project schedule may require adjustment if insufficient storms can be sampled in a given water year. The Project QA Officer has complete access to the PM on an ongoing basis. Any QA deviations will be detailed in the sample event summary report and draft/final report.

This information is additionally summarized in Table 21-1 below. Reporting schedules may be adjusted, as might be required due to insufficient rainfall for sampling in the early part of 2013.

Table 21-1. Reports to Management

Type of Report	Projected Delivery Dates(s)	Person(s) Responsible for Report Preparation	Report Recipients
Quarterly progress reports	2/15/13 and quarterly thereafter	PM	Contract Manager
Draft Report	2/28/14	PM	Contract Manager
Final report	4/30/14	PM	Contract Manager
Lab data QA report	7/31/13	QAO	Contract Manager
Electronic database, CEDEN comparable	7/31/13	RP	Contract Manager

22. (D1) Data Review, Verification, and Validation

Defining data review, verification, and validation procedures helps to ensure that Program data will be reviewed in an objective and consistent manner. Data review is the examination process to ensure that the data have been recorded, transmitted, and processed correctly.

Validation and verification of the data generated is the responsibility of the respective laboratory. Laboratories will conduct a 100 percent raw data versus electronic data audit before delivering results to SCCWRP. The LPM will maintain analytical reports in a database format as well as all QA/QC documentation for the laboratory.

AMS will review all data packages received for adherence to guidelines set forth in this QAPP. This includes checking that all technical criteria have been met, documenting any problems that are observed and, if possible, ensuring that deficiencies noted in the data are corrected. COC forms will be reviewed to ensure adherence to collection, transport, and receipt requirements, including test initiation within the required holding time. Data generated by Program activities will be reviewed against method quality objectives (MQOs) that were developed and documented in Element 7. This will ensure that the data will be of acceptable quality and that it will be SWAMP-comparable with respect to minimum expected MQOs.

QA/QC requirements were developed and documented in Elements 14, 15, 16, and 17 and the data will be checked against this information. Checks will include evaluation of field and laboratory duplicate results, field and laboratory blank data, matrix spike recovery data, and laboratory control sample data pertinent to each method and analytical data set. This will ensure that the data will be SWAMP-comparable with respect to quality assurance and quality control procedures.

If data validation issues arise, the corrective action process will include: 1) review of original field or laboratory procedures or documents (i.e., field sheets or laboratory bench sheets); 2) severity determination of field or laboratory deviation on resulting data and its impact on the study conclusions; 3) resampling and/or reanalysis of sample(s) as necessary. All deviations will be documented by the PM within the quarterly and/or final reports to the contract manager. Deviations in field sampling or laboratory analysis shall be noted on the field or laboratory sheets and in the Project database.

Data will be separated into three categories for use with making decisions based upon it. These categories are: (1) data that meets all acceptance requirements, (2) data that has been determined to be unacceptable for use, and (3) data that may be conditionally used and that is flagged as per US EPA specifications.

23. (D2) Verification and Validation Methods

Defining the methods for data verification and validation helps to ensure that Program data are evaluated objectively and consistently. For the proposed Program many of these methods have been described in Element 22. Additional information is provided below.

23.1. Field Data

Data collected in the field will be validated and verified initially by the MPC. All data records for the proposed Program will be checked visually and will be recorded as checked by the checker's initials as well as with the dates on which the records were checked. The QAO will perform an independent re-check of at least 10% of these records as the validation methodology. Reconciliation and correction will be the responsibility of the PM.

23.2. Laboratory Data

Laboratory validation and verification of the data generated is the responsibility of the laboratory. Each laboratory supervisor maintains analytical reports in electronic format as well as all QA/QC documentation for the laboratory. The QAO will perform checks to ensure that laboratory validation and verification process is consistent with this QAPP

The PM is responsible for oversight of data collection and the initial analysis of the raw data obtained from the field and the contracted laboratory. The PM responsibilities also include the generation of rough drafts of quarterly and final reports. The PM has final oversight on the submission of quarterly and final reports.

Any data that is discovered to be incorrect or missing during the verification or validation process will immediately be reported to the PM. If errors involve laboratory data then this information will also be reported to the LPM. Each laboratory's QA manual details the procedures that will be followed by laboratory personnel to correct any invalid or missing data. The IM will be responsible for reporting and correcting any errors that are found in the data during the verification and validation process.

If there are any data quality problems identified, the CQAO will try to identify whether the problem is a result of Project design issues, sampling issues, analytical methodology issues, or QA/QC issues (from laboratory or non-laboratory sources). If the source of the problems can be traced to one or more of these basic activities then the person or people in charge of the areas where the issues lie will be contacted and efforts will be made to immediately resolve the problem. If the issues are too broad or severe to be easily corrected then the appropriate people involved will be assembled to discuss and try to resolve the issue(s) as a group. The QAO has the final authority to resolve any issues that may be identified during the verification and validation process.

24. (D3) Reconciliation with User Requirements

Data generated through Project implementation will be used to answer the Project questions identified in Section 5.2. These data can be used directly by the SWRCB for assessment of ASBS conditions. These data can also be used by SWRCB in their assessment of California's waterbodies by inclusion in the State's 305(b) report. Data analysis will address study uncertainty (see Section 6.4).

Information from field data reports, laboratory data reviews, reviews of data versus DQOs, reviews against Quality Assurance and Quality Control (QA/QC) requirements, data verification reports, data validation reports, independent data checking reports, and error handling reports will be used to determine whether or not the Program's objectives have been met.

The reports produced by this project will describe some of the limitations of the data. This includes constraints (Section 6.5) and ability to meet Project DQO's (Section 7.0). For data that do not meet DQOs, management has two options:

1. Retain the data for analytical purposes, but flag these data for QA deviations.
2. Do not retain the data and exclude them from all calculations and interpretations.

The choice of option is the decision of the PM. If qualified data are to be used, then it must be made clear in the final report that these deviations do not alter the conclusions of the study.

25. References

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26. Appendix A. Measurement Quality Objectives for Project Analytes

Table 26-1. Quality Control: Conventional Parameters in Fresh and Marine Water

Laboratory Quality Control	Frequency of Analysis	Measurement Quality Objective
Calibration Standard	Per analytical method or manufacturer's specifications	Per analytical method or manufacturer's specifications
Calibration Verification	Per 10 analytical runs	80-120% recovery
Laboratory Blank	Per 20 samples or per analytical batch, whichever is more frequent	<RL for target analyte
Reference Material	Per 20 samples or per analytical batch, whichever is more frequent	80-120% recovery
Matrix Spike	Per 20 samples or per analytical batch, whichever is more frequent (n/a for chlorophyll a and pheophytin a)	80-120% recovery
Matrix Spike Duplicate	Per 20 samples or per analytical batch, whichever is more frequent (n/a for chlorophyll a and pheophytin a)	80-120% recovery; RPD<25% for duplicates
Laboratory Duplicate	Per 20 samples or per analytical batch, whichever is more frequent (chlorophyll a/pheophytin a: per method)	RPD<25% (n/a if native concentration of either sample<RL)
Internal Standard	Accompanying every analytical run as method appropriate	Per method
Field Quality Control	**Frequency of Analysis**	**Measurement Quality Objective**
Field Duplicate[2]	5% of total project sample count	RPD<25% (n/a if native concentration of either sample<RL)
Field Blank, Travel Blank, Equipment Blank	Per method	<RL for target analyte

[1] Unless method specifies more stringent requirements

[2] Field duplicate relative percent differences are not calculated for chlorophyll a analyses for bioassessment

Table 26-2. Quality Control[1]: Solid Parameters in Fresh and Marine Water

Laboratory Quality Control	Frequency of Analysis	Measurement Quality Objective
Laboratory Blank[2]	Per 20 samples or per analytical batch, whichever is more frequent	<RL for target analyte
Laboratory Duplicate[3]	Per 20 samples or per analytical batch, whichever is more frequent	RPD<25% (n/a if native concentration of either sample<RL)
Field Quality Control	**Frequency of Analysis**	**Measurement Quality Objective**
Field Duplicate	5% of total project sample count	RPD<25% (n/a if native concentration of either sample<RL)
Field Blank, Equipment Blank	Per method	<RL for target analyte

[1] Unless method specifies more stringent requirements
[2] Not applicable to volatile suspended solids
[3] Applicable only to total suspended solids, total dissolved solids, and ash-free dry mass

Table 26-3. Quality Control* – Conventional Analytes in Water - Pathogens

Laboratory Quality Control	Frequency of Analysis	Measurement Quality Objective
Calibration	Check temperatures in incubators twice daily with a minimum of 4 hours between each reading	Per analytical method or manufacturer's specifications
Media Sterility Check	Per lot of media	No growth in media
Laboratory Blank	Per batch of samples	No growth in media
Reference Material	Annual	Within 95% confidence interval, as reported by independent proficiency testing company
Positive Control	Per analytical batch	Growth in media
Negative Control	Per analytical batch	No growth or inhibited growth in media
Laboratory Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	RPD<25% (n/a if native concentration of either sample<RL)
Field Quality Control	**Frequency of Analysis**	**Measurement Quality Objective**
Field Duplicate	5% of total Project sample count (coliforms: one per 25 tube dilution tests)	Coliforms: within 95% confidence interval
Field Blank	Not required for Project analytes	Blanks<RL for target analyte

*Unless method specifies more stringent requirements

Table 26-4. Quality Control[1]: Inorganic Analytes in Fresh and Marine Water

Laboratory Quality Control	Frequency of Analysis	Measurement Quality Objective
Calibration Standard	Per analytical method or manufacturer's specifications	Per analytical method or manufacturer's specifications
Calibration Verification	Per 10 analytical runs	80-120% recovery
Laboratory Blank	Per 20 samples or per analytical batch, whichever is more frequent	<RL for target analyte
Reference Material[2]	Per 20 samples or per analytical batch, whichever is more frequent	75-125% recovery (70-130% for MMHg)
Matrix Spike	Per 20 samples or per analytical batch, whichever is more frequent	75-125% recovery (70-130% for MMHg)
Matrix Spike Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	75-125% recovery (70-130% for MMHg); RPD<25%
Laboratory Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	RPD<25% (n/a if native concentration of either sample<RL)
Internal Standard	Accompanying every analytical run when method appropriate	60-125% recovery
Field Quality Control	**Frequency of Analysis**	**Measurement Quality Objective**
Field Duplicate	5% of total project sample count	RPD<25% (n/a if native concentration of either sample<RL), unless otherwise specified by method
Field Blank, Equipment Blank	Per method	Blanks<RL for target analyte

1 Unless method specifies more stringent requirements
2 Not applicable to selenium speciation

Table 26-5. Quality Control[1, 2]: Synthetic Organic Compounds in Fresh and Marine Water[3]

Laboratory Quality Control	Frequency of Analysis	Measurement Quality Objective
Tuning[4]	Per analytical method	Per analytical method
Calibration	Initial method setup or when the calibration verification fails	• Correlation coefficient (r^2 >0.990) for linear and non-linear curves • If RSD<15%, average RF may be used to quantitate; otherwise use equation of the curve • First- or second-order curves only (not forced through the origin) • Refer to SW-846 methods for SPCC and CCC criteria[4] • Minimum of 5 points per curve (one of them at or below the RL)
Calibration Verification	Per 12 hours	• Expected response or expected concentration ±20% • RF for SPCCs=initial calibration[4]
Laboratory Blank	Per 20 samples or per analytical batch, whichever is more frequent	<RL for target analytes
Reference Material	Per 20 samples or per analytical batch (preferably blind)	70-130% recovery if certified; otherwise, 50-150% recovery
Matrix Spike	Per 20 samples or per analytical batch, whichever is more frequent	50-150% or based on historical laboratory control limits (average±3SD)
Matrix Spike Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	50-150% or based on historical laboratory control limits (average±3SD); RPD<25%
Surrogate	Included in all samples and all QC samples	Based on historical laboratory control limits (50-150% or better)
Internal Standard	Included in all samples and all QC samples (as available)	Per laboratory procedure
Field Duplicate	5% of total project sample count	Per method
Field Blank, Travel Blank, Equipment Blank	Per method	<RL for target analytes

[1] Unless method specifies more stringent requirements; ELISA results must be assessed against kit requirements.
[2] Pyrethroids quality control guidelines are presented in Table 2 immediately below.
[3] All detected analytes must be confirmed with a second column, second technique, or mass spectrometry.
[4] Mass spectrometry only

Table 26-6. Quality Control[1]: Inorganic Analytes in Freshwater Sediment and Marine Sediment

Laboratory Quality Control	Frequency of Analysis	Measurement Quality Objective
Calibration Standard	Per analytical method or manufacturer's specifications	Per analytical method or manufacturer's specifications
Calibration Verification	Per 10 analytical runs	80-120% recovery
Laboratory Blank	Per 20 samples or per analytical batch, whichever is more frequent	<RL for target analyte
Reference Material	Per 20 samples or per analytical batch, whichever is more frequent	75-125% recovery (70-130% for methylmercury)
Matrix Spike	Per 20 samples or per analytical batch, whichever is more frequent	75-125% recovery (70-130% for methylmercury)
Matrix Spike Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	75-125% recovery (70-130% for methylmercury); RPD<25%
Laboratory Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	RPD<25% (n/a if native concentration of either sample<RL)
Internal Standard	Accompanying every analytical run when method appropriate	60-125% recovery
Field Quality Control	**Frequency of Analysis**	**Measurement Quality Objective**
Field Duplicate	5% of total project sample count	RPD<25% (n/a if native concentration of either sample<RL), unless otherwise specified by method
Field Blank, Equipment Blank	Per method	Blanks<RL for target analyte

[1] Unless method specifies more stringent requirements

Consistent with SWAMP QAPP and as applicable, percent moisture should be reported with each batch of sediment samples. Sediment (and tissue) data must be reported on a dry weight basis.

Table 26-7. Quality Control[1, 2]: Synthetic Organic Compounds in Freshwater Sediment and Marine Sediment[3]

Laboratory Quality Control	Frequency of Analysis	Measurement Quality Objective
Tuning[4]	Per analytical method	Per analytical method
Calibration	Initial method setup or when the calibration verification fails	• Correlation coefficient (r^2 >0.990) for linear and non-linear curves • If RSD<15%, average RF may be used to quantitate; otherwise use equation of the curve • First- or second-order curves only (not forced through the origin) • Refer to SW-846 methods for SPCC and CCC criteria[4] • Minimum of 5 points per curve (one of them at or below the RL)
Calibration Verification	Per 12 hours	• Expected response or expected concentration ±20% • RF for SPCCs=initial calibration[4]
Laboratory Blank	Per 20 samples or per analytical batch, whichever is more frequent	<RL for target analytes
Reference Material	Per 20 samples or per analytical batch (preferably blind)	70-130% recovery if certified; otherwise, 50-150% recovery
Matrix Spike	Per 20 samples or per analytical batch, whichever is more frequent	50-150% or based on historical laboratory control limits (average±3SD)
Matrix Spike Duplicate	Per 20 samples or per analytical batch, whichever is more frequent	50-150% or based on historical laboratory control limits (average±3SD); RPD<25%
Surrogate	Included in all samples and all QC samples	Based on historical laboratory control limits (50-150% or better)
Internal Standard	Included in all samples and all QC samples (as available)	Per laboratory procedure
Field Quality Control	**Frequency of Analysis**	**Measurement Quality Objective**
Field Duplicate	5% of total project sample count	Per method
Field Blank, Travel Blank, Equipment Blank	Per method	<RL for target analytes

[1] Unless method specifies more stringent requirements; ELISA results must be assessed against kit requirements
[2] Pyrethroid quality control guidelines are presented in Table 2 immediately below
[3] All detected analytes must be confirmed with a second column, second technique, or mass spectrometry
[4] Mass spectrometry only

Consistent with SWAMP QAPP and as applicable, percent moisture should be reported with each batch of sediment samples. Sediment (and tissue) data must be reported on a dry weight basis.

Table 26-8. Quality Control[1]: Chronic Marine Water Toxicity Testing

Negative Controls	Frequency of Analysis	Control Limits
Laboratory Control Water	Laboratory control water consistent with Section 7 of the appropriate EPA method/manual must be tested with each analytical batch.	Laboratory control water must meet all test acceptability criteria (please refer to Section 7 of the appropriate EPA method/manual) for the species of interest.
Conductivity/Salinity Control Water	A conductivity or salinity control must be tested when these parameters are above or below the species tolerance.	Follow EPA guidance on interpreting data and refer to tables below for tolerance ranges.
Additional Control Water	Additional method blanks are required whenever manipulations are performed on one or more of the ambient samples within each analytical batch (e.g., pH adjustments, continuous aeration).	There must be no statistical difference between the laboratory control water and each additional control water within an analytical batch.
Sediment Control	Sediment control consistent with Section 7 of the appropriate EPA method/manual must be tested with each analytical batch of sediment toxicity tests.	Sediment control must meet all data acceptability criteria (please refer to Section 7 of the appropriate EPA method/manual) for the species of interest.
Positive Controls	**Frequency of Analysis**	**Control Limits**
Reference Toxicant Tests	Reference toxicant tests must be conducted monthly for species that are raised within a laboratory, or per analytical batch for commercially-supplied or field-collected species.	Last plotted data point (LC50 or EC50) must be within 2 SD of the cumulative mean (n=20). Reference toxicant tests that fall outside of recommended control chart limits are evaluated to determine the validity of associated tests. An out of control reference toxicant test result does not necessarily invalidate associated test results. More frequent and/or concurrent reference toxicant testing may be advantageous if recent problems have been identified in testing.
Field Quality Control	**Frequency of Analysis**	**Control Limits**
Sample Duplicate	5% of total project sample count	Recommended acceptable RPD<20%
Field Blanks	Based on project requirements	No statistical difference between the laboratory control water (or sediment control) and the field blank within an analytical batch
Bottle Blanks	Based on project requirements	No statistical difference between the laboratory control water and the equipment blank within an analytical batch

[1]Unless method specifies more stringent requirements.

In special cases where the criteria listed in the above tables cannot be met, EPA minimum criteria may be followed. The affected data should be flagged accordingly.

Test data are reviewed to verify that the test acceptability criteria for a valid test have been met. Any test not meeting the minimum test acceptability criteria is considered invalid. All invalid tests should be repeated with the newly collected sample. If this is not possible, the test should be repeated with an archived sample and all tests must be properly flagged.

Deviations from the summary of recommended test conditions must be evaluated on a project-specific basis to determine the validity of test results. Depending on the degree of the departure and the objective of the test, deviations from recommended conditions may or may not invalidate a test result. Before rejecting or accepting a test result as valid, the reviewer should consider the degree of the deviation and the potential or observed impact of the deviation on the test result. For example, if dissolved oxygen is measured below 4.0 mg/L in one test chamber, the reviewer should consider whether any observed mortality in that test chamber corresponded with the drop in dissolved oxygen.

Table 26-9. Chronic Marine Water Testing: 48-Hour Germination and Germ-Tube Length *Macrocystis pyrifera* Test

Method Recommendation	
EPA/600/R-95/136 (Test Method 1009.0) or validated and SWAMP-approved alternative method	
Data Acceptability Requirements	
Parameter	*Criteria*
Test Acceptability Criteria[1]	≥70% germination in the controls, ≥10 µm germ-tube length in the controls
Data Qualification	
Test Conditions	*Required*
Test Type	Static non-renewal
Age at Test Initiation	n/a
Replication at Test Initiation	5
Organisms/Replicate	Add 7500 spores/mL of test solution
Food Source	Do not feed
Renewal Frequency	None
Test Duration	48 h
Endpoints	Germination and germ-tube length
Test Conditions	*Recommended* [2]
Salinity	34 ± 2‰
Temperature Range	15 ± 1.0 °C (±3 °C required)
Light Intensity	50 ± 10 µE/m^2/s
Photoperiod	16 hours of ambient laboratory light, 8 hours dark
Test Chamber Size	600 mL
Replicate Volume	200 mL
Feeding Regime	Do not feed
Laboratory Control Water	Dilution water should be 1-µm filtered natural seawater or hyper-saline brine prepared from uncontaminated natural seawater plus reagent water
Minimum Sample Volume	2 L for one-time grab sample
Sensitivity	*Performance Criteria*
Reference Toxicant Testing	If the LC50 exceeds +/- two standard deviations of the running mean of the last 20 reference toxicant tests, the test should be flagged.
Water Chemistry	
Test Parameter	*Required Frequency*
Initial Water Chemistry	One DO, pH, salinity, ammonia, and temperature measurement per sample
Final Water Chemistry	One DO, pH, salinity, and temperature measurement per sample
Test Parameter	*Recommended Criteria*
Initial DO Range	4.0 mg/L - 100% Saturation
Salinity Control	Include appropriate controls if salinity is less than 32 or greater than 36 ppt.
Sample Handling/Collection	
Test Parameter	*Recommended Conditions*
Relevant Media	Water column
Sample Container Type	Amber glass
Sample Preservation	Wet or blue ice in field, 0 - 6 °C refrigeration in laboratory, dark at all times
Sample Receipt Temperature	0 - 6 °C
Holding Time	< 48 hours@ 0 - 6 °C; dark

[1]Test data are reviewed to verify that test acceptability criteria (TAC) requirements for a valid test have been met. Any test not meeting these criteria is considered invalid. All invalid tests must be repeated with a newly collected sample.

[2]Deviations from the summary of recommended test conditions must be evaluated on a project-specific basis to determine the validity of test results. Depending on the degree of the departure and the objective of the test, deviations from recommended conditions may or may not invalidate a test result.

Table 26-10. Chronic Marine Water Testing: 48-hour Embryo-Larval Development *Mytilus galloprovincialis* and *M. spp.* Test

Method Recommendation	
EPA/600/R-95/136 or validated and SWAMP-approved alternative method	
Data Acceptability Requirements	
Parameter	*Criteria*
Test Acceptability Criteria[1]	≥50% survival, ≥90% of those must have normal shell development
Data Qualification	
Test Conditions	*Required*
Test Type	Static non-renewal
Age at Test Initiation	Within 4hours of fertilization
Replication at Test Initiation	4 (minimum)
Organisms/Replicate	150 – 300 (15-30/mL)
Food Source	Do not feed
Renewal Frequency	None
Test Duration	48 h
Endpoints	Survival of normal live prossidoconch larvae
Test Conditions	*Recommended* [2]
Salinity	28 - 34 ± 2‰
Temperature Range	15 ± 1.5 °C (±3 °C required)
Light Intensity	10 – 20 $\mu E/m^2/s$ or 50 – 100 ft-c
Photoperiod	16 hours of ambient laboratory light, 8 hours dark
Test Chamber Size	20 mL
Replicate Volume	10 mL
Feeding Regime	Do not feed
Laboratory Control Water	Dilution water should be 1-µm filtered natural seawater or hyper-saline brine prepared from uncontaminated natural seawater plus reagent water
Minimum Sample Volume	1L for one-time grab sample
Sensitivity	*Performance Criteria*
Reference Toxicant Testing	If the LC50 exceeds +/- two standard deviations of the running mean of the last 20 reference toxicant tests, the test should be flagged.
Water Chemistry	
Test Parameter	*Required Frequency*
Initial Water Chemistry	One DO, pH, salinity, ammonia, and temperature measurement per sample
Final Water Chemistry	One DO, pH, salinity, and temperature measurement per sample
Test Parameter	*Recommended Criteria*
Initial DO Range	4.0 mg/L - 100% Saturation
Salinity Control	Include appropriate controls if salinity is less than 28 or greater than 36 ppt.
Sample Handling/Collection	
Test Parameter	*Recommended Conditions*
Relevant Media	Water column, pore water
Sample Container Type	Amber glass
Sample Preservation	Wet or blue ice in field, 0 - 6 °C refrigeration in laboratory, dark at all times
Sample Receipt Temperature	0 - 6 °C
Holding Time	<48 hours@ 0 - 6 °C; dark

[1]Test data are reviewed to verify that test acceptability criteria (TAC) requirements for a valid test have been met. Any test not meeting these criteria is considered invalid. All invalid tests must be repeated with a newly collected sample.

[2]Deviations from the summary of recommended test conditions must be evaluated on a project-specific basis to determine the validity of test results. Depending on the degree of the departure and the objective of the test, deviations from recommended conditions may or may not invalidate a test result.

Table 26-11. Chronic Marine Water Testing: 20-Minute Fertilization *Strongylocentrotus purpuratus* Test

Method Recommendation	
EPA/600/R-95/136 or validated and SWAMP-approved alternative method	
Data Acceptability Requirements	
Parameter	*Criteria*
Test Acceptability Criteria[1]	≥70% egg fertilization and appropriate sperm counts in controls
Data Qualification	
Test Conditions	*Required*
Test Type	Static non-renewal
Age at Test Initiation	n/a
Replication at Test Initiation	4 (minimum)
Organisms/Replicate	~1,120 eggs
Food Source	Do not feed
Renewal Frequency	None
Test Duration	40 min (20 min plus 20 min)
Endpoints	Fertilization of egg
Test Conditions	*Recommended*[2]
Salinity	34 ± 2‰
Temperature Range	12 - 15 ± 1.0 °C (±3 °C required)
Light Intensity	10 – 20 μE/m^2/s or 50 – 100 ft-c
Photoperiod	16 hours of ambient laboratory light, 8 hours dark
Test Chamber Size	20-30 mL
Replicate Volume	5 mL
Feeding Regime	Do not feed
Laboratory Control Water	Dilution water should be 1-μm filtered natural seawater or hyper-saline brine prepared from uncontaminated natural seawater plus reagent water
Minimum Sample Volume	250 m L for one-time grab sample
Sensitivity	*Performance Criteria*
Reference Toxicant Testing	If the LC50 exceeds +/- two standard deviations of the running mean of the last 20 reference toxicant tests, the test should be flagged.
Water Chemistry	
Test Parameter	*Required Frequency*
Initial Water Chemistry	One DO, pH, salinity, ammonia, and temperature measurement per sample
Test Parameter	*Recommended Criteria*
Initial DO Range	4.0 mg/L - 100% Saturation
Salinity Control	Include appropriate controls if salinity is less than 32 or greater than 36 ppt.
Sample Handling/Collection	
Test Parameter	*Recommended Conditions*
Relevant Media	Water column, interstitial water
Sample Container Type	Amber glass
Sample Preservation	Wet or blue ice in field, 0 - 6 °C refrigeration in laboratory, dark at all times
Sample Receipt Temperature	0 - 6 °C
Holding Time	<48 hours@ 0 - 6 °C; dark

[1]Test data are reviewed to verify that test acceptability criteria (TAC) requirements for a valid test have been met. Any test not meeting these criteria is considered invalid. All invalid tests must be repeated with a newly collected sample.

[2]Deviations from the summary of recommended test conditions must be evaluated on a project-specific basis to determine the validity of test results. Depending on the degree of the departure and the objective of the test, deviations from recommended conditions may or may not invalidate a test result.

Table 26-12. Quality Control[1]: Marine Sediment Toxicity Testing

Negative Controls	Frequency of Analysis	Control Limits
Laboratory Control Water	Laboratory control water consistent with Section 7 of the appropriate EPA method/manual must be tested with each analytical batch.	Laboratory control water must meet all test acceptability criteria (please refer to Section 7 of the appropriate EPA method/manual) for the species of interest.
Conductivity/Salinity Control Water	A conductivity or salinity control must be tested when these parameters are above or below the species tolerance.	Follow EPA guidance on interpreting data and refer to tables below for tolerance ranges.
Additional Control Water	Additional method blanks are required whenever manipulations are performed on one or more of the ambient samples within each analytical batch (e.g., pH adjustments, continuous aeration).	There must be no statistical difference between the laboratory control water and each additional control water within an analytical batch.
Sediment Control	Sediment control consistent with Section 7 of the appropriate EPA method/manual must be tested with each analytical batch of sediment toxicity tests.	Sediment control must meet all data acceptability criteria (please refer to Section 7 of the appropriate EPA method/manual) for the species of interest.
Positive Controls	**Frequency of Analysis**	**Control Limits**
Reference Toxicant Tests	Reference toxicant tests must be conducted monthly for species that are raised within a laboratory, or per analytical batch for commercially-supplied or field-collected species.	Last plotted data point (LC50 or EC50) must be within 2 SD of the cumulative mean (n=20). Reference toxicant tests that fall outside of recommended control chart limits are evaluated to determine the validity of associated tests. An out of control reference toxicant test result does not necessarily invalidate associated test results. More frequent and/or concurrent reference toxicant testing may be advantageous if recent problems have been identified in testing.

[1]Unless method specifies more stringent requirements.

In special cases where the criteria listed in the above tables cannot be met, EPA minimum criteria may be followed. The affected data should be flagged accordingly.

Test data are reviewed to verify that the test acceptability criteria for a valid test have been met. Any test not meeting the minimum test acceptability criteria is considered invalid. All invalid tests should be repeated with the newly collected sample. If this is not possible, the test should be repeated with an archived sample and all tests must be properly flagged.

Deviations from the summary of recommended test conditions must be evaluated on a project-specific basis to determine the validity of test results. Depending on the degree of the departure and the objective of the test, deviations from recommended conditions may or may not invalidate a test result. Before rejecting or accepting a test result as valid, the reviewer should consider the degree of the deviation and the potential or observed impact of the deviation on the test result. For example, if dissolved oxygen is measured below 4.0 mg/L in one test chamber, the reviewer should consider whether any observed mortality in that test chamber corresponded with the drop in dissolved oxygen

Table 26-13. Marine Sediment Testing: 10-Day Survival *Eohaustorius estuarius* Sediment Toxicity Test

Method Recommendation	
EPA/600/R-94/025 or validated and SWAMP-approved alternative method	
Data Acceptability Requirements	
Parameter	*Criteria*
Test Acceptability Criteria[1]	≥90% survival in controls
Data Qualification	
Test Conditions	*Required*
Test Type	Whole sediment, static
Size at Test Initiation	3 – 5 mm (no mature males of females)
Replication at Test Initiation	4 (minimum)
Organisms/Replicate	20 (minimum)
Food Source	Do not feed
Renewal Frequency	None
Test Duration	10 days
Endpoints	Survival
Test Conditions	*Recommended* [2]
Salinity	20-34 ± 2‰
Temperature Range	15 ± 1.0 °C (±3 °C required)
Light Intensity	10 – 20 μE/m^2/s or 50 – 100 ft-c
Photoperiod	Continuous luminance
Test Chamber Size	1 L
Replicate Volume	Sediment volume 175 mL (~2 cm); Overlying water volume 800 mL
Feeding Regime	Do not feed
Laboratory Control Water	Clean natural seawater or reconstituted water
Sediment Control	Clean sediment from organism collection site (sieved through 500 μm screen)
Minimum Sample Volume	3L for one-time grab sample
Sensitivity	*Performance Criteria*
Reference Toxicant Testing	If the LC50 exceeds +/- two standard deviations of the running mean of the last 20 reference toxicant tests, the test should be flagged.
Water Chemistry	
Test Parameter	*Required Frequency*
Initial Overlying Water Chemistry	One DO, pH, salinity, ammonia, and temperature measurement per sample
Initial Interstitial Water Chemistry	One pH, ammonia, and salinity measurement per sample
Daily Water Chemistry	One temperature measurement per sample
Final Overlying Water Chemistry	One DO, pH, salinity, ammonia, and temperature measurement per sample
Final Interstitial Water Chemistry	One pH, ammonia, and salinity measurement per sample
Test Parameter	*Recommended Criteria*
Initial DO Range	90 - 100% Saturation
Sample Handling/Collection	
Test Parameter	*Recommended Conditions*
Relevant Media	Sediment
Sample Container Type	Amber glass recommended but clear glass or plastic (polyethylene or polycarbonate) acceptable
Sample Preservation	Wet or blue ice in field, 0 - 6 °C refrigeration in laboratory, dark at all times
Sample Receipt Temperature	0 - 6 °C
Holding Time	<14 days (recommended) or <8 weeks (required) @ 0 - 6 °C; dark; Do not freeze

[1]Test data are reviewed to verify that test acceptability criteria (TAC) requirements for a valid test have been met. Any test not meeting these criteria is considered invalid. All invalid tests must be repeated with a newly collected sample.

[2]Deviations from the summary of recommended test conditions must be evaluated on a project-specific basis to determine the validity of test results. Depending on the degree of the departure and the objective of the test, deviations from recommended conditions may or may not invalidate a test result.

27. Appendix B. Rocky Intertidal Monitoring Method Summary

Comprehensive sampling of ecological communities on rocky intertidal habitats will be done using protocols developed by the coastal biodiversity surveys (http://cbsurveys.ucsc.edu/). This approach was (and is being) used in Southern California in both phase 1 and 2 of rocky intertidal ASBS assessment (Raimondi, Schiff and Gregorio 2012). The general approach is described below.

Site selection: Discharge and Reference – Based on the operational definition of natural water quality described above, along with the regulations prohibiting discharge in ASBS, we select sites as follows. Sites are selected within ASBS that (1) have sufficient rocky intertidal habitat to be suited for sampling (as described below) and, (2) are located near to active discharge. Reference sites are selected following guideline (1) but instead of requiring proximity to an active discharge, we only used sites that are not near an active discharge. In addition we matched reference sites to discharge sites to control for spatial variance

The sampling procedure used is identical to that used by the coastal biodiversity survey (CBS) program housed at UCSC and administered by Peter Raimondi. In order to be cost-efficient, data from sites previously sampled by the CBS program are used in the analyses. New sampling will be done to supplement existing data.

Selecting an appropriate location within a site **-** Within a site, the ideal location to do a CBS is on a bench that 1) is at least 30m wide, 2) gently slopes from the high to low zone, and most importantly 3) contains a representative sample of the intertidal community of the entire site. If it is not possible to find a contiguous 30m stretch of coastline, the survey can be split between two adjacent benches. When this is done, the survey should be divided as evenly as possible between the two benches.

Set-Up - Once an appropriate area of shoreline is selected, it is sampled using a series of parallel transect lines extending from the high zone to the low zone. To facilitate the setup of these lines, two permanent 30m horizontal baselines (parallel to the ocean) are first established. The upper baseline is placed in the high zone above the upper limit of the organisms, while the lower baseline, which should be parallel to the upper baseline, is established farther down the shore. Depending on the amount of beach traffic or site regulations, the ends of these lines are permanently marked with either hex or carriage bolts.

Once these two baselines are established, parallel transect lines are run down the shore every three meters along the upper base line. To insure that these lines are parallel, they should intersect the appropriate meter mark on the lower baseline. In general the transect lines are allowed to follow the contours of the bench. When necessary, rocks are placed along the lines to prevent them from being shifted by heavy winds. It is noted where each transect crossed the lower baseline.

To facilitate resurveys of the site, a map is drawn of the site showing the location of the bolts relative to notable landmarks or other, pre-existing permanent plots. Photographs are also taken that include prominent visual reef characteristics for orientation (e.g. a large crack). The distance and bearing between the baseline endbolts are measured. When possible, measurements are also taken between the endbolts and any pre-existing permanent plots. Other pertinent information, such as the compass heading of the vertical transects, the sampling interval, weather conditions, site complications, and problems with taxonomic identification, is also recorded. All such information is used to make the mapping of the site more spatially explicit.

In addition to the spatial information described above, we also collected information about the site including bench type, relief, slope, extent of habitat and characteristics of surrounding coast. This information can be used to provide a spatial context for the site.

Point-Contact Surveys - Each vertical transect is sampled using the point intercept method. An average of 100 points are sampled on each transect line. Hence, for example the interval between points would be 20cm for a 20m long transect, and 10cm for a 10m long transect. The basis of this design is to ensure that there is a similar density of sampled points per vertical unit of tidal elevation for all sites. For each point two types of data are collected: data that are used to determine relative abundance (% cover), and data that are used to describe spatial distributions. The relative abundance data are collected by identifying all taxa that fell directly under each point, including rock, sand, and tar. If there is layering of species, the taxa occupying the different layers are identified and assigned a letter; A for the top layer, B for the second layer, and C for the third. (Note: each layer must be a different taxa). If the point fell on an epibiont living on a host species, the epibiont is noted. Also recorded is whether the species under the point is in a pool, on cobble, or on boulders. A total of up to three taxa are identified under each point.

If fewer than three taxa are recorded under a point, then the next one or two species closest to that point are also noted. These 'nearby' species have to differ from those found under the point, and must fall within a circle centered over the point with a radius half the length of the sampling interval.

Mobile Invertebrate Surveys - Although point-contact surveys are good at determining the abundance of spatially common species, particularly sessile species, they do not sample rare or spatially uncommon species very well. Because most mobile species are not spatially common, their abundances are sampled in 50 x 50 cm quadrats placed at three locations along each transect. Each transect is first divided into three zones; the low zone, defined as the area below the mussel zone, the mid-zone (including mussels and rock weeds, and the high zone (usually dominated by barnacles and littorines). Within each zone a quadrat is randomly placed on the transect, and all mobile species found within the quadrat are identified and counted. Sub-sampling is used when there are more than one hundred individuals of one species in a quadrat. If a quadrat landed in a deep pool or in an area dominated by sand, a new location within the defined zone is selected.

Vouchers–We collect field vouchers for all species that could not be identified in the field. Voucher samples are labeled with the date, site, name of sampler, transect line on which it is found.

Specific hypotheses tested - The general goal of this project is to compare the ecological communities in discharge and reference locations. To do this we developed the following specific (null) hypotheses

1. Species richness will not vary as function of site type (Discharge, Reference)
2. Community composition of sessile species will not vary as a function of site type
3. Community composition of mobile species will not vary as a function of site type
4. An integrated assessment of both mobile and sessile species will not identify particular sites as being substantially different from the expectation based on all sites. This is a way to look at specific sites rather than site types.

For questions 1-3 two forcing (independent) variables are used in the statistical approaches. First – whether the sites is considered to be a discharge site or a reference site (that could also be in an ASBS). Second – we imposed a geographical group structure to match discharge sites with appropriate reference sites. Point contact (mainly sessile or sedentary organisms) and Quadrat data (mobile organisms) are evaluated using a PERMANOVA approach to compare communities between discharge and reference sites after accounting for geography. Species Richness is assessed using ANOVA. For hypotheses 1-3 we set the critical p-value at 0.05 (null hypothesis not rejected unless $p<0.05$).

For hypothesis 4 we generated site similarity matrices (using Bray Curtis values) then calculated Mahalanobis distances using values from the two matrices. Mahalanobis distances are the distance from a multivariate centroid accounting for the covariance structure among variables. Small values indicate that that sample is similar to a hypothetical typical sample, while large distances indicate samples very different from the hypothetical typical sample. Prediction limits (of the Mahalanobis distance) are used to assess the likelihood of inclusion of samples. For example, an 80% prediction limit would contain 80% of samples drawn from a pool of samples coming from the same population. This differs from confidence limits, which are used to assess the inclusion likelihood of means of samples from a population.

28. Appendix C. Target MRLs

Table 28-1. Project Target MRLs for Conventional Analytes.

Analyte	MRL (mg/L)
Ammonia (as N)	0.1
Nitrate (as N)	0.1
Orthophosphate (as P)	0.1
Oil & Grease	5.0
Total Suspended Solids (103-105 ˚C)	2.0
Urea (as N)	0.01

Table 28-2. Project Target MRLs for Inorganic Analyses.

Analyte	Saline Water (µg/L)	Fresh Water (µg/L)	Sediment (mg/kg) DW
Arsenic	0.3	0.06	0.3
Cadmium	0.16	0.03	0.1
Chromium	0.21	0.30	1.0
Copper	0.16	0.10	1.5
Lead	0.16	0.03	0.50
Mercury	0.0002	0.0002	0.012
Nickel	0.11	0.03	0.40
Selenium	0.66	1.00	1.0
Silver	0.02	0.04	0.20
Zinc	0.33	0.70	10.0

Table 28-3. Project Target MRLs for Pathogen Indicators.

Analyte	MRL (MPN/100 mL)
Pathogens –Fecal Coliform	2
Pathogens – Enterococcus	2

Table 28-4. Project Target MRLs for PAHs

Analyte	Water (µg/L)	Sediment ng/g DW
Acenaphthene	0.01	20
Acenaphthylene	0.01	20
Anthracene	0.01	20
Benz(a)anthracene	0.01	20
Benzo(a)pyrene	0.01	20
Benzo(b)fluoranthene	0.01	20
Benzo(e)pyrene	0.01	20
Benzo(g,h,i)perylene	0.01	20
Benzo(k)fluoranthene	0.01	20

Analyte	Water (µg/L)	Sediment ng/g DW
Biphenyl	0.01	20
Chrysene	0.01	20
Dibenz(a,h)anthracene	0.01	20
Dibenzothiophene	0.01	20
Dimethylnaphthalene, 2,6-	0.01	20
Dimethylphenanthrene, 3,6-	0.01	20
Fluoranthene	0.01	20
Fluorene	0.01	20
Indeno(1,2,3-c,d)pyrene	0.01	20
Methylnaphthalene, 1-	0.01	20
Methylnaphthalene, 2-	0.01	20
Methylphenanthrene, 1-	0.01	20
Methyldibenzothiophene, 4-	0.01	20
Methylfluoranthene, 2-	0.01	20
Methylfluorene, 1-	0.01	20
Naphthalene	0.01	20
Perylene	0.01	20
Phenanthrene	0.01	20
Pyrene	0.01	20
Trimethylnaphthalene, 2,3,5-	0.01	20

Table 28-5. Project Target MRLs for OP Pesticides

Analyte	Water (µg/L)
Chlorpyrifos	0.04
Chlorpyrifos methyl	0.04
Diazinon	0.04
Dichlofenthion	0.04
Ethion	0.04
Fenchlorphos	0.10
Fenitrothion	0.04
Fonofos	0.04
Malathion	0.10
Parathion, Ethyl	0.04
Parathion, Methyl	0.10
Ethoprop	0.10
Sulfotep	0.04
Thionazin	0.04
Tokuthion	0.10
Trichloronate	0.04

Table 28-6. Project Target MRLs for Pyrethroids

Analyte	Water (ng/L)
Bifenthrin	10
Cyfluthrin	10
Total Cypermethrin	10
Total Deltamethrin/Tralomethrin	10
Total Esfenvalerate/ Fenvalerate	10
Total Lambda-cyhalothrin	10
Total cis-Permethrin	10
trans-Permethrin	10
Fenpropathrin	10

Table 28-7. Project Target MRLs for Organotins

Analyte	Water (µg/L)	Sediment and Tissue (µg/kg)
Tributyltin as Sn	0.1	2

29. Appendix D. Corrective Actions

Table 29-1. Corrective Action – Laboratory Analysis of Conventional Analytes (Water)

Laboratory Quality Control	Corrective Action
Calibration Standard	Affected samples and associated quality control must be reanalyzed following successful instrument recalibration.
Initial/Continuing Calibration Verification	The analysis must be halted, the problem investigated, and the instrument recalibrated. All samples after the last calibration verification must be reanalyzed.
Laboratory Blank	The sample analysis must be halted, the source of the contamination investigated, the samples along with a new laboratory blank prepared and/or re-extracted, and the sample batch and fresh laboratory blank reanalyzed. If reanalysis is not possible due to sample volume, flag associated samples as estimated.
Reference Material	Affected samples and associated quality control must be reanalyzed following instrument recalibration.
Matrix Spike	The spiking level should be approximately 2-5 times the ambient concentration of the spiked sample. Appropriately spiked results should be compared to the matrix spike duplicate to investigate matrix interference. If matrix interference is suspected, the matrix spike result must be qualified.
Matrix Spike Duplicate	The spiking level should be approximately 2-5 times the ambient concentration of the spiked sample. Appropriately spiked results should be compared to the matrix spike duplicate to investigate matrix interference. If matrix interference is suspected and reference material recoveries are acceptable, the matrix spike duplicate result must be qualified.
Laboratory Duplicate	For duplicates with a heterogeneous matrix or ambient levels below the reporting limit, failed results may be qualified. Other failures should be reanalyzed as sample volume allows.
Internal Standard	As method requires. The instrument must be flushed with rinse blank. If, after flushing, the responses of the internal standards remain unacceptable, the analysis must be terminated and the cause of drift investigated.
Field Quality Control	**Corrective Action**
Field Duplicate	For duplicates with a heterogeneous matrix or ambient levels below the reporting limit, failed results may be qualified. All failures should be communicated to the project coordinator, who in turn will follow the process detailed in the method.
Field Blank, Travel Blank, Equipment Blank	If contamination of the field blanks and associated samples is known or suspected, the laboratory should qualify the affected data, and notify the project coordinator, who in turn will follow the process detailed in the method.

Table 29-2. Corrective Action - Conventional Analytes (Total Solids, Suspended Sediment Concentration, and Percent Lipids)

Laboratory Quality Control	Corrective Action
Calibration Standard	n/a
Initial/Continuing Calibration Verification	n/a
Laboratory Blank	Please refer to method requirements.
Reference Material	Please refer to method requirements.
Matrix Spike	n/a
Matrix Spike Duplicate	n/a
Laboratory Duplicate*	For duplicates with a heterogeneous matrix or ambient levels below the reporting limit, failed results may be qualified. Other failures should be reanalyzed as sample volume allows. A matrix spike duplicate may not be analyzed in place of a laboratory duplicate.
Internal Standard	n/a
Field Quality Control	**Corrective Action**
Field Duplicate	For duplicates with a heterogeneous matrix or ambient levels below the reporting limit, failed results may be qualified. All failures should be communicated to the project coordinator, who in turn will follow the process detailed in the method.
Field Blank, Travel Blank, Equipment Blank	n/a

*Not applicable to suspended sediment concentration analyses

Table 29-3. Corrective Action - Inorganic Chemistry

Laboratory Quality Control	Corrective Action
Calibration Standard	Affected samples and associated quality control must be reanalyzed following successful instrument recalibration
Initial/Continuing Calibration Verification	The analysis must be halted, the problem investigated, and the instrument recalibrated if necessary. If deemed appropriate, all samples after the last acceptable continuing calibration verification may be reanalyzed.
Laboratory Blank	The sample analysis must be halted, the source of the contamination investigated, the samples along with a new laboratory blank prepared and/or re-extracted, and the sample batch and fresh laboratory blank reanalyzed. If reanalysis is not possible due to sample volume, flag associated samples as estimated.
Reference Material	If deemed appropriate, affected samples and associated quality control may be reanalyzed following instrument recalibration.
Matrix Spike	The spiking level should be approximately 2-5 times the ambient concentration of the spiked sample. Appropriately spiked results should be compared to the matrix spike duplicate to investigate matrix interference. If matrix interference is suspected, the matrix spike result must be qualified.
Matrix Spike Duplicate	The spiking level should be approximately 2-5 times the ambient concentration of the spiked sample. Appropriately spiked results should be compared to the matrix spike duplicate to investigate matrix interference. If matrix interference is suspected and reference material recoveries are acceptable, the matrix spike duplicate result must be qualified.
Laboratory Duplicate	For duplicates with a heterogeneous matrix or ambient levels below the reporting limit, failed results may be qualified. Other failures should be reanalyzed as sample volume allows.
Internal Standard	As method requires. The instrument must be flushed with rinse blank. If, after flushing, the responses of the internal standards remain unacceptable, the analysis must be terminated and the cause of drift investigated.
Field Quality Control	**Corrective Action**
Field Duplicate	For duplicates with a heterogeneous matrix or ambient levels below the reporting limit, failed results may be qualified. All failures should be communicated to the project coordinator, who in turn will follow the process detailed in the method.
Field Blank, Equipment Blank	n/a

Table 29-4. Corrective Action - Organic Chemistry

Laboratory Quality Control	Corrective Action
Calibration Standard	Affected samples and associated quality control must be reanalyzed following successful instrument recalibration.
Initial/Continuing Calibration Verification	The analysis must be halted, the problem investigated, and the instrument recalibrated. All samples after the last acceptable continuing calibration verification must be reanalyzed.
Laboratory Blank	The sample analysis must be halted, the source of the contamination investigated, the samples along with a new laboratory blank prepared and/or re-extracted, and the sample batch and fresh laboratory blank reanalyzed. If reanalysis is not possible due to sample volume, flag associated samples as estimated.
Reference Material	Affected samples and associated quality control must be reanalyzed following instrument recalibration.
Matrix Spike	The spiking level should be approximately 2-5 times the ambient concentration of the spiked sample. Appropriately spiked results should be compared to the matrix spike duplicate to investigate matrix interference. If matrix interference is suspected, the matrix spike result must be qualified.
Matrix Spike Duplicate	The spiking level should be approximately 2-5 times the ambient concentration of the spiked sample. Appropriately spiked results should be compared to the matrix spike duplicate to investigate matrix interference. If matrix interference is suspected and reference material recoveries are acceptable, the matrix spike duplicate result must be qualified.
Laboratory Duplicate	For duplicates with a heterogeneous matrix or ambient levels below the reporting limit, failed results may be qualified. Other failures should be reanalyzed as sample volume allows.
Internal Standard	Analyze as appropriate per method. Troubleshoot as appropriate. If, after trouble-shooting, the responses of the internal standards remain unacceptable, the analysis must be terminated and the cause of drift investigated.
Surrogate	Analyze as appropriate per method. All affected results should be qualified. The analytical method or quality assurance project plan must detail procedures for updating surrogate measurement quality objectives.
Field Quality Control	**Corrective Action**
Field Duplicate	For duplicates with a heterogeneous matrix or ambient levels below the reporting limit, failed results may be qualified. All failures should be communicated to the project coordinator, who in turn will follow the process detailed in the method.
Field Blank, Travel Blank, Equipment Blank	n/a

Table 29-5. Corrective Action - Toxicity Testing

Negative Controls	Corrective Action
Laboratory Control Water	If tested with in-house cultures, affected samples and associated quality control must be retested as soon as is feasible after determination of test failure (dependent upon procurement of test species). If commercial cultures are used, they must be ordered within 16 hours of test failure for earliest possible receipt, and retests must be initiated within 8 hours of receipt. The laboratory should try to determine the source of contamination, document the investigation, and document steps taken to prevent recurrence.
Conductivity Control Water	Affected samples and associated quality control must be qualified.
Additional Control Water	A water sample that has similar qualities to the test sample may be used as an additional control based on the objectives of the study. Results that show statistical differences from the laboratory control should be qualified. The laboratory should try to determine the source of contamination, document the investigation, and document steps taken to prevent recurrence. This is not applicable for TIE method blanks.
Laboratory Control Sediment	Affected samples and associated quality control must be re-tested within 24 hours of test failure if tested with in-house cultures. If commercial cultures are used, they must be ordered within 16 hours of test failure for earliest possible receipt, and re-tests must be initiated within 8 hours of receipt. The laboratory should try to determine the source of contamination, document the investigation, and document steps taken to prevent recurrence.
Additional Control Sediment	A sediment sample that has similar qualities to the test sample may be used as an additional control based on the objectives of the study. Results that show statistical differences from the laboratory control should be qualified. The laboratory should try to determine the source of contamination, document the investigation, and document steps taken to prevent recurrence.
Positive Controls	**Corrective Action**
Reference Toxicant Tests	If LC50 exceeds +/- two standard deviations of the running mean of the last 20 reference toxicant tests, the test should be qualified.

Table 29-6. Corrective Action - Field Measurements

Field Quality Control	Corrective Action
Depth, Dissolved Oxygen, pH, Salinity, Specific Conductance, Temperature, Turbidity, Velocity	The instrument should be recalibrated following its manufacturer's cleaning and maintenance procedures. If measurements continue to fail measurement quality objectives, affected data should not be reported and the instrument should be returned to the manufacturer for maintenance. All troubleshooting and corrective actions should be recorded in the calibration and field data logbooks.