Southern California Bight
2008 Regional Marine Monitoring Survey
(Bight'08)

Areas of Biological Significance (ASBS) Workplan

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I. INTRODUCTION

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 including forests of the giant kelp, *Macrocystis pyrifera.* The State Water Resources Control Board (SWRCB) has created 34 Areas of 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 2005), has prohibited the discharge of waste to ASBS. All ASBS are State Water Quality Protection Areas that require special protection under state law.

Despite the prohibition against waste discharges to ASBS, a recent survey of ASBS has observed approximately 1,658 outfalls (SCCWRP 2003). As a result, the SWRCB has 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 three categories. First, it is uncertain what constitutes natural water quality. Second, it is uncertain which discharges exceed natural water quality limits. Finally, it is uncertain what the extent and magnitude of natural water quality impacts are on a statewide basis.

II. STUDY DESIGN

A. Study Objectives

In response to the need for additional information, the SWRCB is working with ASBS dischargers to collaboratively conduct a statewide ASBS monitoring program. The goal of this monitoring program is to answer three 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?
3) How does the extent of natural conditions compare among ASBS with or without discharges?

B. Conceptual Approach

The conceptual approach integrates targeted and probabilistic surveys of water chemistry and biological conditions in receiving waters along the coastline of California. A targeted design will be used for defining natural water quality at reference sites. A targeted design will also be used for comparing individual ASBS to natural water quality in order to examine discharge-specific impacts. A probabilistic design will be used to answer the third question as it pertains to ASBS as a whole. In all designs, sampling for water chemistry will be focused on wet weather events. The biological samples, which are more integrative over time, will be collected during a preselected index period when communities are most stable.

A series of three analytical steps will be required to answer the monitoring questions. These include: 1) providing information used to define natural conditions; 2) compare ASBS to natural conditions; and 3) assess percent of shoreline-miles in ASBS that exceed natural conditions. Questions 1 and 2 will include chemistry, toxicity and biology, but question 3 focuses solely on chemistry. The first step is to generate information to help define natural water quality. In conjunction with the Natural Water Quality Committee[1], natural water quality will be defined as the ambient water quality in the vicinity of reference watersheds. A statistical approach (i.e., tolerance limits, reference envelope, population intervals, etc.) from this distribution of ambient water quality near reference watersheds will be used to define natural (See example Fig 1).

[1] The ASBS Natural Water Committee is a team of scientists commissioned by the State Water Resources Control Board.

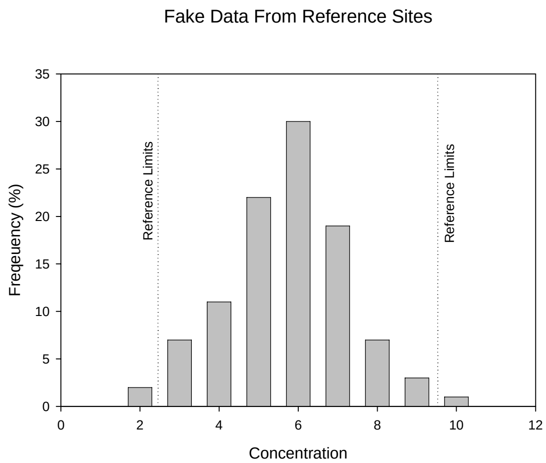

Figure 1. Developing a definition of natural water quality.

The second analytical step is to compare ASBS to natural water quality limits (Question 2). This can be done by simply comparing receiving water concentrations within individual ASBS to our definition of natural water quality (Fig 2). Maps are also convenient data analysis tools for stakeholders. The goal of this monitoring is to sample at locations in the immediate vicinity of the discharge to determine if natural water quality limits are exceeded in the presumed location of greatest impact.

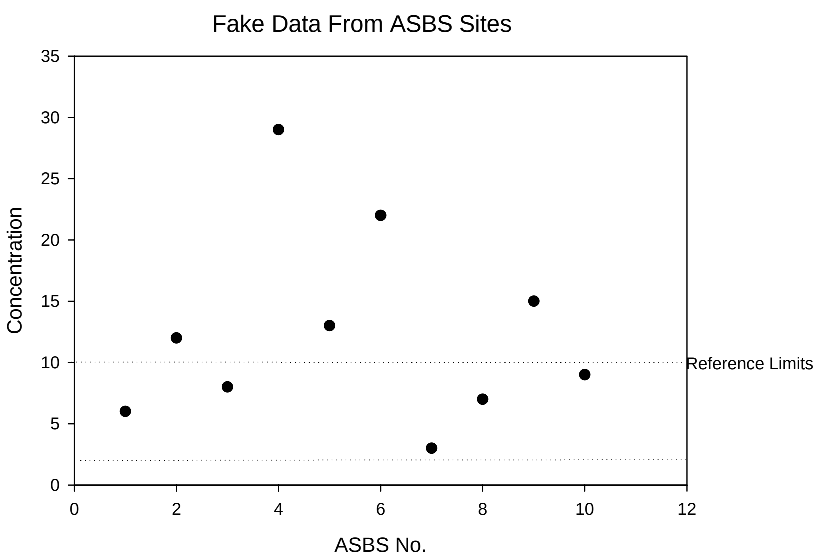

Figure 2. Comparing ASBS water quality to natural.

The third analytical step is an assessment of percent of shoreline-miles in ASBS that exceed natural water quality (Fig 3). ASBS areas with and without discharges will be stratified. This will take into account discharges outside of the ASBS that are impacting water quality inside the ASBS (i.e., a large river plume from upcoast or downcoast).

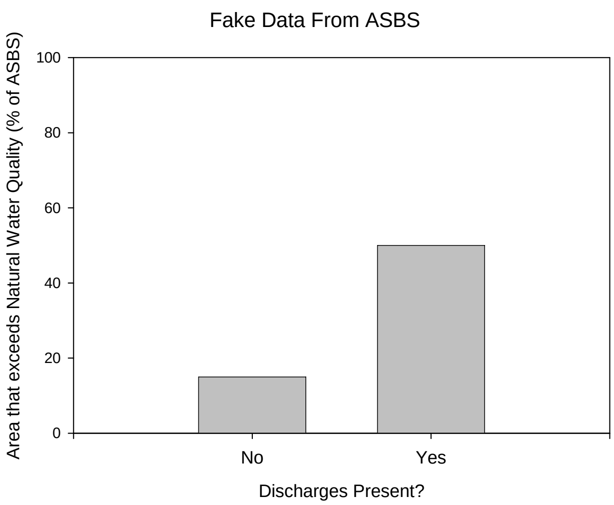

Figure 3. Extent of impact at ASBS.

The biological monitoring is best conceptualized by habitat. There are several habitats that could be evaluated and the Planning Committee has decided to prioritize on rocky intertidal and subtidal habitat (See Appendix 1). The sampling design to address biology will be very similar to the chemistry design (except for rocky habitat). The analysis will also look similar (i.e., substitute concentration on the y-axis for biodiversity or other biological endpoint on Fig 2). Comparisons between chemistry and biological responses will be conducted such as frequency of co-occurrence, correlations, or regressions. There is no direct cause-and-effect (water quality-to-biology) linkage implicit in this design. Rather, the monitoring design should be used as an adaptive trigger for indicating if additional, site-specific investigations need to be undertaken.

III. SPECIFIC APPROACH

A. Wet Weather Chemistry and Toxicity

1. Site Selection

Since there is little or no historic water quality data available in ASBS sites prior to anthropogenic discharges, reference sites will be selected that will be used to determine natural water quality and natural condition of marine life. The following primary criteria were established for reference sites:

- Located in receiving water at the mouth of watersheds with limited anthropogenic influences and with no offshore discharges in the vicinity.
- Limited anthropogenic influence defined as a minimum of 90% open space. Preferably, the few anthropogenic sources in a reference watershed will be well attenuated (e.g., natural space buffers between a highway and the high tide line).
- There should be no 303(d) listed waterbodies either in the reference watershed or in the coastal zone.

There are additional secondary criteria that are deemed important, but may not lead to complete exclusion:

- A range of reference watershed sizes that are inclusive of the ranges observed in watersheds that discharge to ASBS.
- A range of reference watershed geologies that are inclusive of the geologies observed in watersheds that discharge to ASBS
- A range of reference beach substrate that includes sand, cobble, and rock.
- Reference watersheds that include channel island and mainland sites.

A total of nine reference sites have been selected for sampling as part of the regional monitoring survey (Table 1).

In addition to reference sites, receiving water sites near ASBS discharges will also be sampled (Table 2). These receiving water sites are located directly in front of discharges from regulated ASBS outfalls. The number of sites in ASBS was based on the following criteria:

- Minimum of 1 site/stakeholder/ASBS
- Sample receiving waters near at least 10% of all regulated outfalls in an ASBS ($\geq$ 18 inches opening)
- Discharge must reach receiving water (i.e., ocean)
- Approval by RWQCB and SWRCB

A total of 13 receiving water sites near discharges have been targeted for sampling. Additional sites may be selected for contingency measures due to impaired sampling logistics or limited rainfall. Appendix 2 lists the site and sampling responsibilities.

Table 1. List of receiving water reference sampling sites.

Site Name	ASBS Number	Latitude	Longitude
Southern California Mainland			
Arroyo Sequit	ASBS 24	34.04558	118.93336
Nicholas Canyon	ASBS 24	34.02310	118.54557
El Morro Canyon	ASBS 33	33.56050	117.82194
San Onofre Creek	(not in ASBS)	33.38056	117.57722
Southern California Islands			
Italian Gardens at Catalina Island	(not in ASBS)	33.41011	118.38176
Goat Harbor at Catalina Island	(not in ASBS)	33.41667	118.39583
North end of San Nicolas Island	ASBS 21	33.26797	119.50000
San Clemente Island	ASBS 23	32.97722	118.53404

Table 2. List of receiving water sampling sites near ASBS discharges.

Site Name	ASBS Number	Latitude	Longitude
Southern California Mainland			
Broad Beach	ASBS 24	34.02002	118.51028
Westward Beach	ASBS 24	34.01065	118.81670
Buck Gully (NEW018)	ASBS 32	33.58885	117.86750
Heisler Pk	ASBS 33	33.54227	117.78919
SIO Headwall	ASBS 31	32.85000	117.25750
Avenida De La Playa (SDL062)	ASBS 29	32.85465	117.25895
Southern California Islands			
Connolly Pacific	ASBS 28	33.32665	118.30458
Two Harbors	ASBS 26	33.44489	118.49325
Catalina Express Pier (TH1-SW)	ASBS 25	33.44194	118.49821
San Clemente Island (Outfall 27)	ASBS 23	33.00483	118.55641
San Clemente Island (Outfall 21)	ASBS 23	33.00540	118.55844
San Nicholas Island (Reverse Osmosis 2)	ASBS 21	33.24233	119.44475
San Nicholas Island (Barge Landing)	ASBS 21	33.21948	119.44761

2. Sample Size and Storm Selection

A total of three sample events will be collected during the wet season. The primary goal is to capture storms where discharge is sufficient to reach receiving waters. Especially at beaches with large sand berms, sampling receiving waters with direct discharges is not a certainty. In order to maximize the probability of capturing these events, small storms are discouraged. Receiving water samples will be collected immediately prior to (< 48 h) and immediately following (< 24 h) wet weather events. Surface water sampling can be performed from shore (grab samples) in the surf zone (0.5 – 1.0 m depth) at the mouth of a reference watershed stream. Sampling procedures should focus on direct bottle filling, but in the case of safety, a pre-cleaned intermediate container may be used. Sampling details can be found in the Bight'08 ASBS Field Standard Operating Procedure (See Appendix 2).

3. Target Analytes

The target analytes for this program focus on constituents that have natural and anthropogenic sources. Nine different analyte classes are targeted for analysis including:

- salinity
- total suspended solids (TSS)
- dissolved organic carbon
- total and dissolved trace metals
- nutrients (nitrate + nitrite, ammonia, total nitrogen, total phosphorus)
- polynuclear aromatic hydrocarbons (PAHs)
- chlorinated and organophosphorus pesticides
- toxicity (sea urchin fertilization test)

Salinity and TSS are not necessarily toxic, but can serve as excellent markers of the stormwater plume as the turbid freshwater runoff mixes with ambient seawater. Organic carbon has natural sources such as terrestrial debris, but also arises from anthropogenic sources such as oil, grease, or gasoline spilled on roadways. Organic carbon can also serve as a sequestering agent binding trace metals and reducing their bioavailability. Trace metals are a natural component of the earth's crust and can be found in varying quantities in every geological formation. Anthropogenic sources of trace metals such as tire and break wear debris are also commonly found in urban stormwater runoff. While the total fraction is the required measurement for comparison to Ocean Plan thresholds, dissolved trace metals is considered bioavailable to marine life. It is also this dissolved bioavailable fraction that can potentially bind with dissolved organic carbon. PAHs have natural sources such as plants waxes or can be generated during wildfires. However, PAHs are abundant in fuel and are a common signature of combustion byproducts from vehicular traffic. Most pesticides are synthetic chemicals and by definition are man-made. However, the ubiquity of many persistent organic pesticides has led to their worldwide distribution including such remote areas as the Antarctic. We will measure these compounds to observe their distribution in ASBS. Toxicity serves a dual function. First toxicity is a tool to check for unmeasured constituents that could result in marine life impacts. Second, toxicity serves as a negative control reinforcing our selection of reference locations.

B. Biological Monitoring

Biological parameters are critical in the evaluation of natural water quality because marine life is the primary beneficial use being protected by state regulations. However, biological monitoring is expensive to collect and difficult to interpret. Therefore, the Bight'08 ASBS regional monitoring study is coordinating its efforts with existing large-scale monitoring programs; the Multi-Agency Rocky Intertidal network (MARINe) and the Bight'08 rocky reef regional monitoring program for subtidal habitats (B'08 Rocky). The following specific approaches are separated by habitat in order to delineate the interactions among these programs.

1. Rocky Intertidal

MARINe is a partnership of local, State, and Federal agencies, universities and private organizations that monitor 98 rocky intertidal sites along the coast of California, Channel Islands, and Oregon on a long-term basis. It represents the largest program of its kind on the west coast of the United States. Sites have been monitored consistently for periods up to 26 years, with 60 sites monitored for > 10 years.

MARINe and Bight'08 ASBS investigators worked together to identify what sampling design specifics would be needed to integrate the two programs. The needs fell into two categories; sampling protocol and site selection.

MARINe uses two different monitoring protocols; core monitoring and biodiversity monitoring. The Bight'08 ASBS Planning Committee has selected the biodiversity protocol for use during this survey. The biodiversity protocol is designed to be intensive and reef specific, utilizing a series of permanent transects running perpendicular to the shore. The biodiversity protocol has been used to map rocky intertidal habitats and derive comprehensive, field-identifiable species diversity and abundance data. These data are extremely useful for comparing species diversity and abundances across sites, detecting and assessing spatial changes in zonation and community composition as well as key species populations, and to perform robust analyses that can be extrapolated to the site-level. This data collection is mostly conducted by a MARINe partner, the Partnership for Interdisciplinary Study of Coastal Oceans (PISCO). Existing sites are sampled by a team of experienced biologists based at UC Santa Cruz. Sampling for ASBS monitoring would use this same team of biologists. If effects are observed, this may trigger additional work to identify linkages to water quality impacts.

There are 38 existing MARINe sites that monitor rocky intertidal areas using biodiversity protocols in the Southern California Bight (Figure 4). Of these, 25 are located in or near an ASBS. This provides a broad base of coverage as a starting point for the Bight'08 program. However, there are at least three data gaps that still exist: 1) additional sites to ensure coverage for every ASBS in southern California; 2) additional sites to ensure adequate coverage for reference locations; and 3) resource matching to ensure the existing sites can be used for ASBS purposes. In order to address the first data gap, tentatively two additional mainland sites (Irvine Coast ASBS, La Jolla ASBS) and five Channel Island sites (East end Catalina, San Clemente, San Nicolas) will need to be added to cover the remaining ASBS locations (Table 3)[2]. In order to address the second data gap, at least 3 additional mainland sites (Los Angeles/Ventura County line, Northern San Diego/Southern Orange Counties) and 3 additional Channel Island sites (Catalina, San Clemente, San Nicolas) will be needed to assess unsampled reference locations. Finally, the ASBS Planning Committee agreed to support nine of the existing MARINe sites to ensure these sites can be used for ASBS purposes.

None of the ASBS or reference rocky intertidal sites have been selected yet. This would be the first phase of activities for MARINe. Samples would be collected either in spring or fall, co-occurring with low tides.

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[2] The final location of sites will be decided following a review of existing intertidal monitoring data being conducted by the University of California Santa Cruz.

Table 3. Listing of existing and additional sites located in or near ASBS needed for rocky intertidal (MARINe) and rocky subtidal (Bight'08 Rocky) monitoring.

ASBS	ASBS Number	MARINe		Bight'08 Rocky	
		Existing	Needed	Existing	Needed
Malibu/Latigo	ASBS 24	2	-	2	
Irvine Coast	ASBS 32	-	1	1	-
Robert Bedham	ASBS 33	1	-	-	1
Heisler Park	ASBS 30	1	-	-	1
La Jolla	ASBS 29	-	1	-	1
San Diego-Scripps	ASBS 31	1	-	No reef	-
Northern Channel Islands					
San Miguel	ASBS 17	2	-	2	-
Santa Rosa	ASBS 17	5	-	5	-
Santa Cruz	ASBS 17	6	-	6	-
Anacapa	ASBS 22	3	-	2	-
Santa Barbara	ASBS 22	2	-	2	-
Southern Channel Islands					
Santa Catalina West End	ASBS 25	2	-	2	-
Santa Catalina East End	ASBS 26	-	1	-	1
San Clemente	ASBS 23	-	2	-	2
San Nicholas	ASBS 21	-	2	-	2
TOTAL		**25**	**7**	**22**	**8**

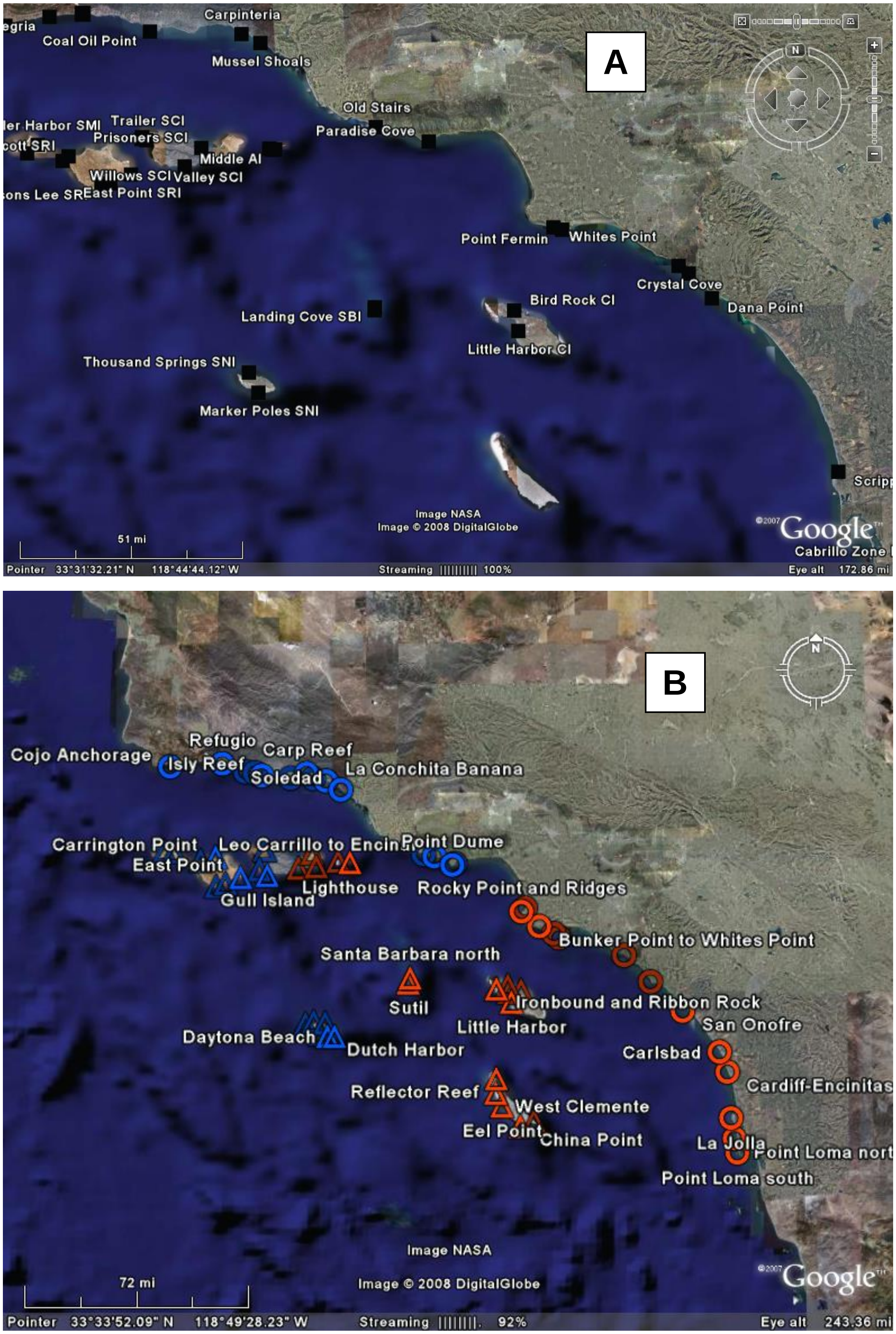

Figure 4. Map of existing sampling sites: MARINe biodiversity (A) and Bight'08 Rocky (B).

2. Rocky Subtidal

The southern California Bight 2008 Regional Monitoring Program for subtidal rocky reefs (B'08 Rocky) consists of 24 university, local, state, and federal agency programs located between Santa Barbara and San Diego. This cooperative research program currently monitors approximately 150 sites annually in the Southern California Bight using similar protocols established by the Cooperative Research Assessment of Nearshore Ecosystems (CRANE), a Department of Fish and Game program conducted in 2003-2004. B'08 Rocky constitutes the reorganization of CRANE and is focused on integrating with SCCWRP's bight wide assessment and continuing the long-term cooperative monitoring and research of rocky reefs in California.

The B'08 Rocky regional monitoring program is focused on assessing the status of biological communities associated with rocky subtidal reefs located between 1 and 30 m (3 and 90 feet) depth. High and low relief substrates, nearshore and offshore reefs, as well as areas of persistent kelp are all included in this regional monitoring program. For the B'08 Rocky program to assess the spatial distribution among reefs, a probabilistic sampling design is used that consists of 60 sites stratified by mainland vs. islands and warm temperature vs. cold temperature marine habitats. The sampling methodology utilizes a modified PISCO/CRANE style biodiversity protocol that is conducted using trained scuba divers. The protocols include transects and unified point contact grids to quantify invertebrate, algal and vertebrate species assemblages.

B'08 Rocky and Bight'08 ASBS investigators worked together to identify what sampling design specifics would be needed to integrate the two programs. Since the Bight'08 Rocky program is already a portion of the Bight Regional Survey, the primary data gap was site selection. Other important design specifics, such as sampling methods, have already been developed for the survey.

While 60 sites are targeted for the Bight'08 Rocky program, many have yet to be sampled (Table 3). In fact, approximately 40 sites are currently being sampled (Figure 4). Of these, 22 are located in or near an ASBS. This provides a broad base of coverage as a starting point for the Bight'08 ASBS program. Like the rocky intertidal program, there are at least three data gaps that still exist: 1) additional sites to ensure coverage for every ASBS in southern California; 2) additional sites to ensure adequate coverage for reference locations; and 3) resource matching to ensure the existing sites can be used for ASBS purposes. In order to address the first data gap, at least three additional mainland sites (Robert Bedham ASBS, Heisler Park ASBS, La Jolla ASBS) and five Channel Island sites (East end Catalina, San Clemente, San Nicolas) will need to be added to cover the remaining ASBS locations (Table 3). In order to address the second data gap, at least 2 additional mainland sites (Santa Barbara/Ventura Counties, Northern San Diego/Southern Orange Counties) and 3 additional Channel Island sites (Catalina, San Clemente, San Nicolas) will be needed to assess unsampled reference locations. Finally, the ASBS Planning Committee agreed to support nine of the existing Bight'08 Rocky sites to ensure these sites can be used for ASBS purposes.

IV. TIMELINE

This project will take at least 24 months to complete (Table 4). The first task is planning, which includes milestones such as training, site reconnaissance, and this workplan. The second task is subtidal biological sampling. The Bight'08 Rocky subtidal sampling window extends from July to Dec 2008, so subtidal sampling should occur during the 3^{rd} and 4^{th} quarters of 2008. The third task is intertidal biological sampling. The MARINe sampling window is during the spring or fall when tides are lowest. Therefore, sampling will occur during the 2^{nd} and 3^{rd} quarters of 2009. The third task is water chemistry sampling. The sampling window for chemistry sampling will occur during the 4^{th} and 1^{st} quarter 2008-09 since it is focused on wet weather. Laboratory analysis of the chemistry sampling will occur immediately following the wet season during the 2^{nd} quarter of 2009. Reporting will take nearly a full year and be completed by the end of the 2^{nd} quarter 2010. Reporting will include a final assessment report as well as a compiled database with metadata.

Table 4. Timeline for project activities.

Task	**2008**		**2009**				**2010**	
	3^{rd} Q	4^{th} Q	1^{st} Q	2^{nd} Q	3^{rd} Q	4^{th} Q	1^{st} Q	2^{nd} Q
Planning	■							
Subtidal Biology Sampling		■						
Intertidal Biology Sampling				■	■			
Chemistry Sampling		■	■					
Lab Analysis				■				
Reporting					■	■	■	■

V. REFERENCES

SWRCB. 2005. California Ocean Plan. State Water Resources Control Board. Sacramento, CA.

SCCWRP. 2003. Final Report: Discharges into State Water Quality Protection Areas. Prepared for State Water Resources Control Board. Sacramento, CA. Contract 01-187-250. Southern California Coastal Water Research Project. Westminster, CA.

APPENDIX 1

ASBS Biological Assessment Options

Habitat	Approach	Measures	Pros	Cons	Estimated Cost	Comments
Intertidal Rocky Reef	Various techniques: quadrat and/or transect counts of species to determine diversity and abundance.	Community condition focused on benthic invertebrates and algae.	Creates site-specific baseline data and allows comparison over a wide geographic area to other program datasets (e.g. MARINe/PISCO).	Field protocol / species identification training may be required. High amount of natural variation in rocky intertidal areas, potentially making data difficult to interpret.	$3,000-7,000 per site	Additional species and/or sample techniques may be used to detect a variety of anthropogenic impacts to sites (i.e. trampling from public use). Replicate sample sites may be distributed within ASBS to assess impacts from discharges or other site-specific sources.
Subtidal Rocky Reef	Coordinate with Bight '08 Rocky Reef Group.	Community condition of benthic invertebrates, algae and fish.	Receiving water for discharges to ASBS. Allows assessment of full ASBS community Relevant to MPAs.	Field sampling requires specialized training/equipment. High amount of natural variation in subtidal habitats, potentially making data difficult to interpret.	Being developed by Rocky Reef Group.	Being developed by Rocky Reef Group.
Intertidal and Subtidal Soft Bottom	Replicate sediment core samples along transects.	Community condition for macrofaunal composition >0.5mm.	EPA support for analysis techniques of benthic macroinvertebrate data in freshwater and coral reef systems. EPA-defined processes may be applied to temperate marine systems. Additional samples may be collected and archived with minimal effort	Widespread historical datasets not readily available. Laboratory sample processing effort can be somewhat significant.	$2,000-3,000 per site- field sampling $1,000-2,000 per replicate-laboratory processing	A variety of data analysis techniques can be applied (species presence/absence, diversity indices, length and weight measurements, and biotic indices based on pollution tolerance). Replicate sample sites may be distributed within ASBS to assess impacts from discharges or other site-specific sources.

Habitat	Approach	Measures	Pros	Cons	Estimated Cost	Comments
Subtidal (<5m) Sandy Substrate	Bongo nets and seines	Community condition for fish and plankton (zooplankton and ichthyo-plankton).	Samples can be archived with relatively minimal effort. Comparative data is readily available from previous studies within the region.	Hard to interpret, since fish and plankton communities are transient. Potential avoidance issues by highly mobile species.	\$3,000-5,000 per site- field sampling \$2,000-4,000 per site-laboratory processing	A variety of data analysis techniques can be applied (species presence/ absence, diversity indices, length and weight measurements). Replicate sample sites may be distributed within ASBS to assess impacts from discharges or other site-specific sources.
Subtidal (>5m) Sandy Substrate	Possible coordination with Coastal Ecology Group.	Community condition of benthic infauna and fishes.	Creates site-specific baseline data and allows comparison over a wide geographic area to other program datasets.	Sampling protocol for Coastal Ecology Group is not currently targeted for ASBS.	\$5,000-6,000 per site	A variety of data analysis techniques can be applied (species presence/ absence, diversity indices, length and weight measurements, and biotic indices based on pollution tolerance).
Intertidal and/or Subtidal	Bioaccum-ulation	Water quality trends.	Creates site-specific baseline data and allows comparison over a wide geographic area to other datasets (NOAA Mussel Watch).	Sand crab data is difficult to interpret due to patchy distribution of organisms and gravid conditions.	\$6,000-8,000 per site-mussels	Mussel work being conducted separately by SCCWRP/NOAA. Replicate sample sites may be distributed within ASBS to assess impacts from discharges or other site-specific sources.

APPENDIX 2

Sample Site Assignments

Site Name	***ASBS Number***	***Latitude***	***Longitude***	***Mainland or Island***	***Reference or Discharge***	***No. Storm samples (preStorm)***	***Responsible Agency***	***Sampling Team***	***Chemistry***	***Toxicity***
Arroyo Sequit	24	34.04558	118.93336	M	R	3 (3)	LACDPW	Mactec	CRG	Nautilus
Nicholas Canyon	24	34.02310	118.54557	M	R	3 (3)	City Malibu	ABC	CRG	ABC
Broad Beach	24	34.02002	118.51028	M	D	3 (3)	City Malibu	ABC	CRG	ABC
Westward Beach	24	34.01065	118.81670	M	D	3 (3)	LACDPW	Mactec	CRG	Nautilus
Buck Gully	32	33.58885	117.86750	M	D	3 (3)	City Newport	Weston	CRG	Weston
El Morro Canyon	33	33.56050	117.82194	M	R	3 (3)	City Newport	Weston	CRG	Weston
Heisler Pk	33	33.54227	117.78919	M	D	3 (3)	City Laguna		CRG	Nautilus
San Onofre Creek	-	33.38056	117.57722	M	R	3 (1)	City San Diego	Weston	CRG	Weston
Avenida De La Playa	29	32.85465	117.25895	M	D	3 (1)	City San Diego	Weston	CRG	Weston
SIO Headwall	31	32.85000	117.25750	M	D	3 (1)	SIO	Weston	CRG	Weston
Two Harbors	26	33.44489	118.49325	I	D	3 (3)	USC	Wrigley	CRG	Nautilus
Catalina Express Pier (TH1-SW)	25	33.44194	118.49821	I	D	3 (3)	SCICo	Wrigley	CRG	Nautilus
Goat Harbor at Catalina Island	-	33.41667	118.39583	I	R	3 (3)	USC/SCICo/ConPacific	Wrigley	CRG	Nautilus
Italian Gardens at Catalina Island	-	33.41011	118.38176	I	R	3 (3)	USC/SCIC/ConPacific	Wrigley	CRG	Nautilus
Connolly Pacific	28	33.32665	118.30458	I	D	3 (3)	ConPacific	Wrigley	CRG	Nautilus
North end of San Nicolas Island	21	33.26797	119.50000	I	R	2 (2)	US Navy	ABC	CRG	ABC

Site Name	***ASBS Number***	***Latitude***	***Longitude***	***Mainland or Island***	***Reference or Discharge***	***No. Storm samples (preStorm)***	***Responsible Agency***	***Sampling Team***	***Chemistry***	***Toxicity***
San Nicholas Island (Reverse Osmosis 2)	21	33.24233	119.44475	I	D	2 (2)	US Navy	ABC	CRG	ABC
San Nicholas Island (Barge Landing)	21	33.21948	119.44761	I	D	2 (2)	US Navy	ABC	CRG	ABC
San Clemente Island (Outfall 21)	23	33.00540	118.55844	I	D	3 (3)	US Navy	Mactec	CRG	Nautilus
San Clemente Island (Outfall 27)	23	33.00483	118.55641	I	D	3 (3)	US Navy	Mactec	CRG	Nautilus
San Clemente Island	23	32.97722	118.53404	I	R	3 (3)	US Navy	Mactec	CRG	Nautilus