

Pilot Study
Areas Of Special Biological Significance
Winter 2007-08

The goal of this pilot study is to investigate the study design elements and sampling techniques for wet weather sampling of receiving waters in Areas Of Special Biological Significance (ASBS). This pilot precedes an integrated, collaborative regional monitoring program being developed in southern California, Monterey Bay and on the Northern California Coast. The lessons learned as part of this pilot will be used when the regional programs are implemented in the winter of 2008-09.

For a full description of the Regional programs, including objectives, approach, and specific details, please see the Project workplan. In general, the regional program identifies three monitoring questions including: 1) what is the range of natural water quality at reference locations? 2) how does the range of concentrations at ASBS compare to this range of natural water quality? 3) How do ASBS with discharges compare to ASBS without discharges?

The pilot study will target eight sites. Four are located in southern California (two mainland and two island), two in Central California and two in Northern California (Table 1). These sites represent beaches that receive discharges from reference watershed catchments defined as >95% space, contains no 303d listed waterbodies, and discharge to open beaches with breaking waves. Samples will be collected in the receiving waters, immediately in front of discharges from the reference watershed. All sites will be collected during at least one storm event. Samples will be collected in less than 24 hr from the cessation of rainfall. The wet weather event should be no smaller than the mean of the long-term annual rainfall at the nearest rain gauge. Storm events between January 1 and April 15 will be targeted for sampling.

Samples will be collected for total suspended solids (TSS), trace metals, nutrients, polynuclear aromatic hydrocarbons (PAHs), organophosphorus and pyrethroid pesticides, and chlorinated hydrocarbons (table 2). The samples will be analyzed by a state-certified laboratory. The performance-based goals of the program should meet or exceed those defined by the Statewide Surface Water Ambient programs (SWAMP). All laboratory results shall be placed in a SWAMP-compatible electronic format.

Sampling will occur in water no deeper than 3 feet (waist depth) on an incoming wave. Samples will be collected in precleaned bottles. The size and type of bottle, including preservation and transport conditions is defined in Table 3.

A report describing the water quality results at pilot reference sites will be produced. In addition, the report will include recommendations for feasibility of sampling techniques and laboratory methods. The report will recommend modifications to the Workplan as necessary to improve implementation of the regional programs.

Table 1. Locations of Pilot Study sampling sites.

<i>ASBS Name</i>	<i>Number</i>	<i>Latitude</i>	<i>Longitude</i>
Northern Coast			
Wilson Creek or Nickel Creek/Del Norte County	ASBS 8		
Mussel Point/Bodega	ASBS 4		
Central Coast			
Partington Point/Big Sur	ASBS 18		
Point Lobos or south at Granite or Garapata	ASBS 16 (or immediately south)		
Southern California			
El Morro Canyon	ASBS 33		
Big Sycamore	ASBS 24		
S. California Islands			
Goat Harbor or Italian Gardens at Catalina Island ¹	(not in ASBS)		
North end of San Nicolas Island ²	ASBS 21		

1. Contingent on support for sampling from USC Wrigley Institute
2. Contingent on support for sampling from US Navy.

Table 2. Target analyte sensitivity and methods

Analyte	Project Quantitation Limit (units, wet or dry weight)	Analytical Method	
		Analytical Method/ SOP	Modified for Method yes/no
Total Suspended Solids	4 mg/L	EPA 160.2	No
pH	0 -14	probe	No
Ammonia	0.05 mg/L	SM 4500-NH3 G	No
Nitrite-N	0.05 mg/L	SM 4110 C	No
Nitrate-N	0.05 mg/L	SM 4110 C	No
Total P	0.05 mg/L	USGS I-4650-03	No
Toxicity (Sea Urchin fertilization)	NA	EPA/600/R-95/136	No
Arsenic	1.0 ug/L	EPA 200.8	No
Cadmium	1.0 ug/L	EPA 200.8	No
Chromium	1.0 ug/L	EPA 200.8	No
Copper	1.0 ug/L	EPA 200.8	No
Iron	10 ug/L	EPA 200.8	No
Lead	1.0 ug/L	EPA 200.8	No
Nickel	1.0 ug/L	EPA 200.8	No
Silver	1.0 ug/L	EPA 200.8	No
Zinc	1.0 ug/L	EPA 200.8	No
1-Methylnaphthalene	5 ng/L	8270	No
1-Methylphenanthrene	5 ng/L	8270	No
2,6-Dimethylnaphthalene	5 ng/L	8270	No
2,3,5-Trimethylnaphthalene	5 ng/L	8270	No
2-, Methylphenanthrene	5 ng/L	8270	No
Acenaphthene	5 ng/L	8270	No
Acenaphthylene	5 ng/L	8270	No
Anthracene	5 ng/L	8270	No
Benz[a]anthracene	5 ng/L	8270	No
Benzo[a]pyrene	5 ng/L	8270	No
Benzo[g,h,i]perylene	5 ng/L	8270	No
Benzo[k]fluoranthene	10 ng/L	8270	No
Biphenyl	10 ng/L	8270	No
Chrysene	5 ng/L	8270	No
Dibenz[a,h]anthracene	5 ng/L	8270	No
Fluoranthene	5 ng/L	8270	No
Fluorene	5 ng/L	8270	No
Methylanthracene	10 ng/L	8270	No
Indeno[1,2,3-c,d]pyrene	5 ng/L	8270	No
Naphthalene	5 ng/L	8270	No

<i>Analyte</i>	<i>Project Quantitation Limit (units, wet or dry weight)</i>	<i>Analytical Method</i>	
		<i>Analytical Method/ SOP</i>	<i>Modified for Method yes/no</i>
Perylene	10 ng/L	8270	No
Phenanthrene	5 ng/L	8270	No
Pyrene	5 ng/L	8270	No
Dieldrin	1 ng/L	8081/8082	Yes
Lindane	1 ng/L	8081/8082	Yes
Total DDT (o,p and p,p isomers of DDT, DDE, DDD)	1 ng/L	8081/8082	Yes
Chlordane	1 ng/L	8081/8082	Yes
Total PCB (PCB18,28,37,44,49,52,66,70,74,77,81,87,99,101,105,110,114,118,119,123,126,128,138,149,151,153,156,157,158,167,168,169,170,177,,180,183,187,189,194,201,206)	1 ng/L	8081/8082	Yes

Table 2. Sampling requirements

Analyte	Bottle Type	Volume	Preservation	Holding Time
Total Suspended Solids	500 ml amber glass jar	1000 ml (two jars)	Cool to 4°C, dark	7 days at 4°C, dark
Nitrate, Nitrite, Ammonia	250 mL HDPE	200 mL	Cool to 4°C, dark	48 hr
Total P	250 mL HDPE	200 mL	Cool to 4°C, dark	48 hr
Toxicity	1-L I-Chem 200-series amber glass bottle, with Teflon lid-liner (per each sample type)	1000 ml (one container)	Cool to 4°C, dark	48 Hr
Metals (total recoverable)	200 ml HDPE, pre-cleaned in lab using HNO ₃	60 ml	Cool to 4°C, dark, acidify in lab within 48 hrs with HCl to <math>pH < 2</math>	180 days
PAHs	1-L I-Chem 200-series amber glass bottle, with Teflon lid-liner (per each sample type)	1000 ml (one container)	Cool to 4°C, dark	Keep at 4°C, dark, up to 7 days. Extraction must be performed within the 7 days; analysis must be conducted within 40 days.
Chlorinated Hydrocarbons	2-L I-Chem 200 series amber glass bottle with Teflon lid liner (per each sample type)	2000 ml	Cool to 4°C, dark	Keep at 4°C, dark, up to 7 days. Extraction must be performed within the 7 days; analysis must be conducted within 40 days.

Table 3. Data quality objectives.

Group	Parameter	Accuracy	Precision	Recovery	Target Reporting Limits	Completeness
Conventional Constituents in stormwater and Estuary waters	TSS	Standard Reference Materials (SRM, CRM) within 95% CI stated by provider of material. If not available then with 80% to 120% of true value	Laboratory duplicate, Blind Field duplicate, or MS/MSD 25% RPD Laboratory duplicate minimum.	Matrix spike 80% - 120% or control limits at ± 3 standard deviations based on actual lab data.	0.5 mg/L	90%
Synthetic Organic Analytes in Stormwater	1-Methylnaphthalene	Standard Reference Materials (SRM, CRM) within 95% CI stated by provider of material. If not available then with 50% to 150% of true value	Field replicate or MS/MSD $\pm 25\%$ RPD. Field replicate minimum.	Matrix spike 50% - 150% or control limits at ± 3 standard deviations based on actual lab data.	0.5 ng/L	90%
	2,6-Dimethylnaphthalene				0.5 ng/L	
	2,3,5-Trimethylnaphthalene				0.5 ng/L	
	2-Methylphenanthrene				0.5 ng/L	
	Acenaphthene				0.5 ng/L	
	Acenaphthylene				0.5 ng/L	
	Anthracene				0.5 ng/L	
	Benz[a]anthracene				0.5 ng/L	
	Benzo[a]pyrene				0.5 ng/L	
	Benzo[g,h,i]perylene				0.5 ng/L	
	Benzo[k]fluoranthene				1.0 ng/L	
	Biphenyl				1.0 ng/L	
	Chrysene				0.5 ng/L	
	Dibenz[a,h]anthracene				0.5 ng/L	
	Fluoranthene				0.5 ng/L	
	Fluorene				0.5 ng/L	
	Methylanthracene				1.0 ng/L	
	Indeno[1,2,3-c,d]pyrene				0.5 ng/L	
Naphthalene	0.5 ng/L					
Perylene	1.0 ng/L					
Phenanthrene	0.5 ng/L					
Pyrene	0.5 ng/L					
Trace Metals in stormwater	Arsenic	Standard Reference Materials (SRM, CRM, PT) 75% to 125%.	Field replicate, laboratory duplicate, or MS/MSD $\pm 25\%$ RPD. Laboratory duplicate minimum.	Matrix spike 75% - 125%.	1.0 $\mu\text{g/L}$	90%
	Cadmium				1.0 $\mu\text{g/L}$	
	Chromium				1.0 $\mu\text{g/L}$	
	Copper				1.0 $\mu\text{g/L}$	
	Iron				10 $\mu\text{g/L}$	
	Lead				1.0 $\mu\text{g/L}$	
	Nickel				1.0 $\mu\text{g/L}$	
	Silver				1.0 $\mu\text{g/L}$	
	Zinc				1.0 $\mu\text{g/L}$	
	Mercury				0.1 $\mu\text{g/L}$	
Chlorinated hydrocarbons	Chlordane (alpha, gamma)	70-130%	0-30%		1.0ng/L	
	Total PCB (PCB18,28,37,44,49,52,66,70,74,77,81,87,99,101,105,110,114,118,119,123,126,128,138,149,151,153,156,157,158,167,168,169,170,177,,180,183,187,189,194,201,206)	70-130%	0-30%		1.0ng/L	
	Lindane	70-130%	0-30%		1.0ng/L	