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Systems Center
San Diego

Y0817 Program Review May 2004

Improved Monitoring Technologies for Storm Water Assessment

Technical POC:

Code 2362

619-553-5332

Management POC:

Code 23601

619-553-5403

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Introduction

Objectives:

1. Develop enhanced storm water monitoring technologies and protocols that directly quantify contaminant loading and biological impacts in receiving waters from storm discharges.
2. Transition the tools and techniques to facility managers to generate scientifically defensible storm water data in defending against overly conservative assumptions and "worst case" scenarios used in the absence of accurate data.

EQ Requirements:

2.II.02.c - Nonpoint source discharge identification (local and remote); "NPS pollution is a major contributor to poor water quality found in many waters of the United States. The determination of sources contributing NPS pollution to a water body is a critical step in solving water quality problems in a watershed." Urgency: 1-8 yrs.

2.II.01.k - Control/Treat nonpoint source discharge; "Nonpoint source (NPS) pollution is the leading remaining cause of water quality problems. Water quality impairment may result in loss of "fishable swimable" waters, and could impact natural resources such as fish, shellfish, marine mammals and birds." Urgency: 1-7 yrs.

2.II.02.b- Improved field analytical sensors, toxicity assays, methods, and protocols to supplement traditional sampling and laboratory analysis; "Failure to properly characterize wastes, runoffs or spills may result in discharge of hazardous or toxic contaminants to the environment." Urgency: 1-7 yrs.

EQ Priorities:

All EQ requirements are medium priority.

Storm water regulations vary with region, with Region SW and NW having an immediate need for improved storm water data.

Future Total Maximum Daily Load (TMDL) requirements will increase pressure for accurate loading data.

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Problem Statement/Drivers

Problem Statement:

- Storm water permits have already been put into place that have chemical performance goals and toxicity limits that cannot be met, and have requirements for diversion in the immediate future.
- Current storm water monitoring practices do not provide the type of data necessary to evaluate impacts to receiving water bodies and in the absence of data, regulators are forced to promulgate overly conservative requirements.
- The Navy is facing potentially very expensive requirements to divert storm water with limited or no knowledge of actual contaminant loading or its impact to receiving waters.
- Future storm water permits and implementation of TMDLs, in the absence of defensible data, are expected to be more stringent.

Technology Shortfalls:

- Current technology and techniques have focused on first-flush end-of-pipe measures providing worst-case estimates on contaminant loading, and therefore, a worst-case estimate of their impact on the receiving environment.

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Approach

Project Approach:

- Perform simultaneous full storm monitoring of outfalls and receiving waters to link storm water discharges to impacts in the receiving environment.

Technical Objectives:

- Test technology improvements to off-the-shelf onshore monitoring equipment.
- Compare toxicity and chemistry in first-flush to full-storm discharge samples.
- Evaluate spatial and temporal extent of impacts in the receiving environment before, during, and after storms.
- Link onshore measures to offshore impacts (magnitude and extent).

Measures of Success:

- Are the technology enhancements robust and provide improved measures of loading data.
- Is there acceptance of techniques in the scientific community (conferences, papers).
- Ultimately, is there acceptance of data by regulators and will that lead to an easing in permit requirements.

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Technology Description

The technology combines an enhanced discharge monitoring capability with direct receiving water measures to fully characterize impacts

- Discharge Monitoring Technology- Enhanced off-the-shelf automated samplers that provide remote real-time sensor monitoring and full-event sampling to better quantify contaminant loading (flow, contaminants, toxicity).

- Receiving Water Impacts Technology- Real-time plume mapping in receiving waters using MESC technology to quantify spatial and temporal impacts directly in the receiving environment (before, during, after storm evaluation of contaminants and toxicity).

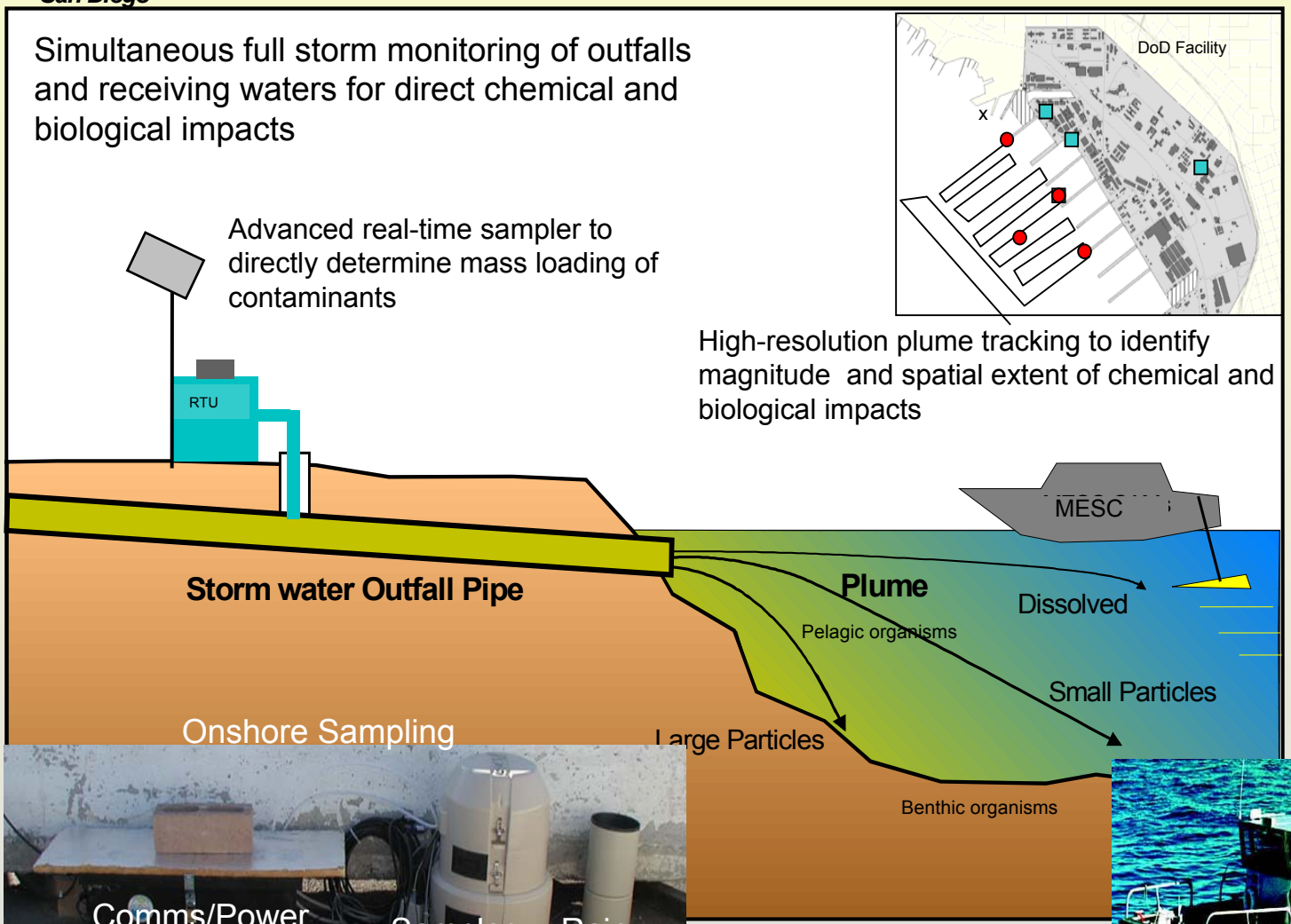
- Monitoring Techniques- Link onshore measures to offshore effects by evaluating first-flush vs. full storm discharges and post-storm vs. pre-storm receiving water conditions.

Technology Description

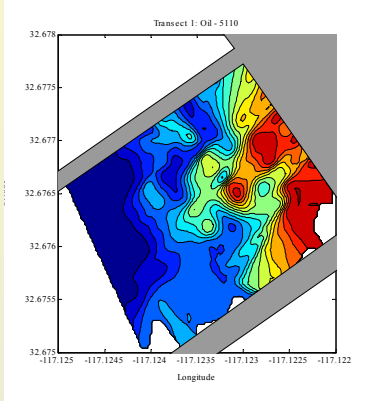
Simultaneous full storm monitoring of outfalls and receiving waters for direct chemical and biological impacts

High-resolution plume tracking to identify magnitude and spatial extent of chemical and biological impacts

Advanced real-time sampler to directly determine mass loading of contaminants



Receiving Water Data



Onshore Sampling

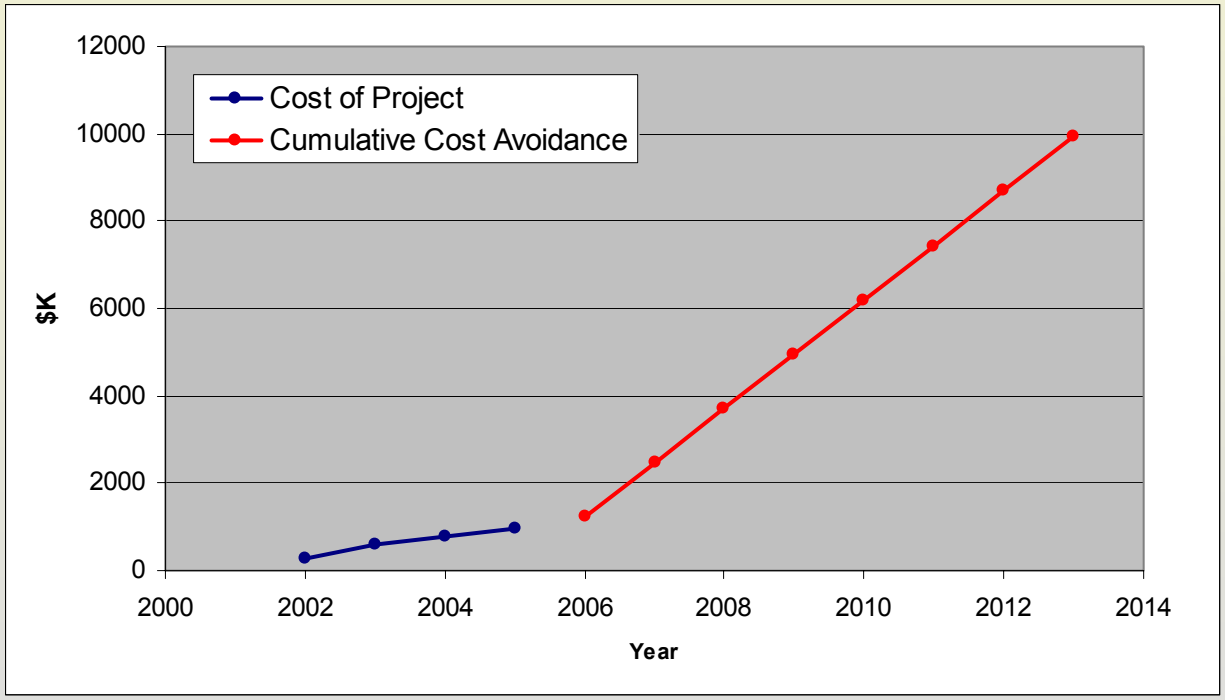
Offshore Sampling

Benefits/Payback

Benefits:

Benefits of this effort will be derived from cost avoidance. CNRSW estimate to divert first 0.25”of rainfall in San Diego Region (3 facilities) alone is $100M.

Estimated return on investment graph below is based on a conservative estimate of avoiding diversion requirements at 10% of facilities facing TMDLs linked to storm water impacts.



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Milestones and Deliverables

	FY02	FY02				FY03				FY04				FY05			
	Milestone	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
1	Purchase Onshore Samplers																
2	Install Sampling Units																
	Develop sampling plan																
3	Partial Demonstration																
	Baseline tide measures																
	Bioassay protocols																
4	Upgrade Sampling Units																
	Update sensor calibrations																
	Develop new communication software																
5	# Demonstration in San Diego*																
	Monitor 14 storm events																
	Full demonstration for 2 storm events																
6	San Diego Evaluation																
	Report on findings																
	# Presentations at scientific meetings																
7	# Demonstration Second Round+																
	Develop sampling plan																
	Sediment Trap monitoring																
	Floating lab study																
8	Second Round Evaluation																
	Report on findings																
	# Presentations at scientific meetings																
	# Peer review article																
9	# System transition																
	Users guide/newsletter/contacts																

* Demonstration delayed during record drought conditions

\+ Demonstration partially delayed-equipment unavailable, low rainfall

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Project Coordination

Project Manager: Chuck Katz, SSC-SD

On-shore systems coordinator: Ernie Arias, SSC-SD

On-shore systems hardware/software: Roman Kruchowy, NFESC

Off-shore systems coordinator: Chuck Katz, SSC-SD

Toxicity Analyses: Gunther Rosen SSC-SD; Scott Steinert CSC

Chemistry Contractor: Battelle Ocean Sciences and Marine Sciences Laboratories

Regulators: Paul Richter & Alan Monji, San Diego Regional Water Quality Control Board

Transition coordinator: Brian Swaidan, NFESC

Naval Base San Diego Demonstration: Brian Gordon & Rob Chichester, CNRSW

Transition Sites:

Naval Base Point Loma:	Brian Gordon & Rob Chichester, CNRSW
Naval Air Station North Island:	Brian Gordon & Rob Chichester, CNRSW
Puget Sound Naval Shipyard:	Gerry Sherrell & Bruce Beckwith, PSNS

Other: Technical Peer Review Team in place for transition projects in San Diego

Technical Accomplishments to Date

FY02

- Purchased automated samplers for onshore monitoring (NFESC)
- Integrated communications system for autosamplers (NFESC)
- Install onshore sampling systems at NAVSTA San Diego (NFESC)
- Developed sampling plan for NAVSTA Pier Area (303d site)
- Tested autosampler sensors under baseline tide and storm conditions
- Preliminary plume mapping with MESC
- Tested toxicity procedures for “salting-up” and preliminary discharge testing

FY03

- Completed in-lab sensor calibrations and upgrades
- Developed and installed real-time monitoring for on-shore samplers
- Evaluated alternate velocity sensor
- Monitored 14 storm events and tide baseline flows over six months
- Completed full onshore and offshore characterization of two storm events
- Constructed physical model of storm conveyance system and measured post-storm abstraction
- Submitted abstracts to scientific conferences (ERF, SETAC, AWRA, Shipyard Conference)

FY04

- Presented results at scientific conferences
- Transitioned techniques for use at Naval Base Point Loma
- Transitioned offshore techniques for use at Puget Sound Naval Shipyard
- Generated sampling plan for sediment trap and full-storm monitoring with flow-through laboratory at Naval Station San Diego
- Deployed and collected wet-weather sediment trap data
- Created storm water literature database
- Created Draft NFESC Tri-fold

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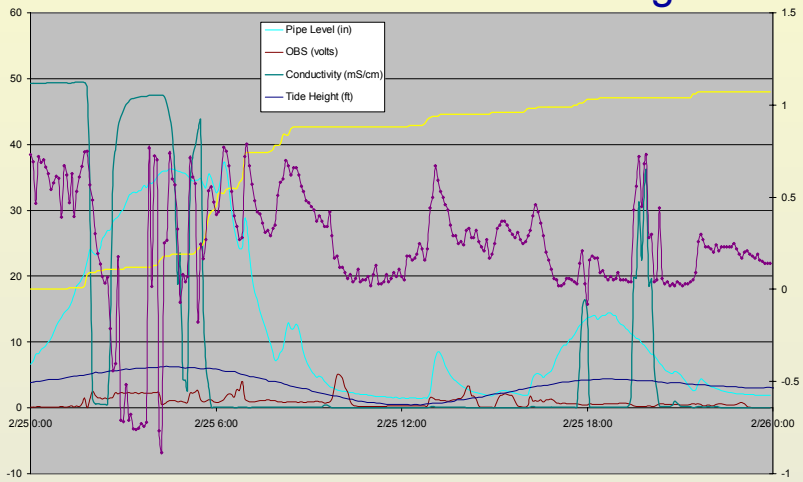
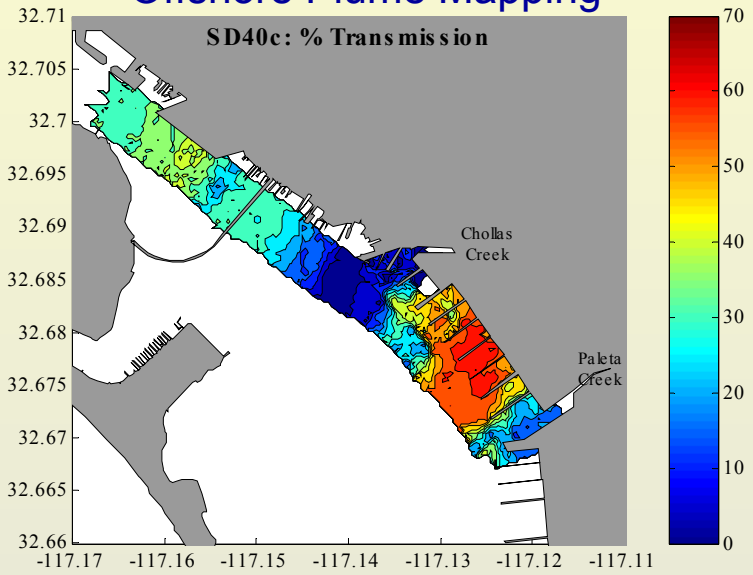
FY02-03 Demonstration

DEPARTMENT OF THE NAVY
Environmental Program

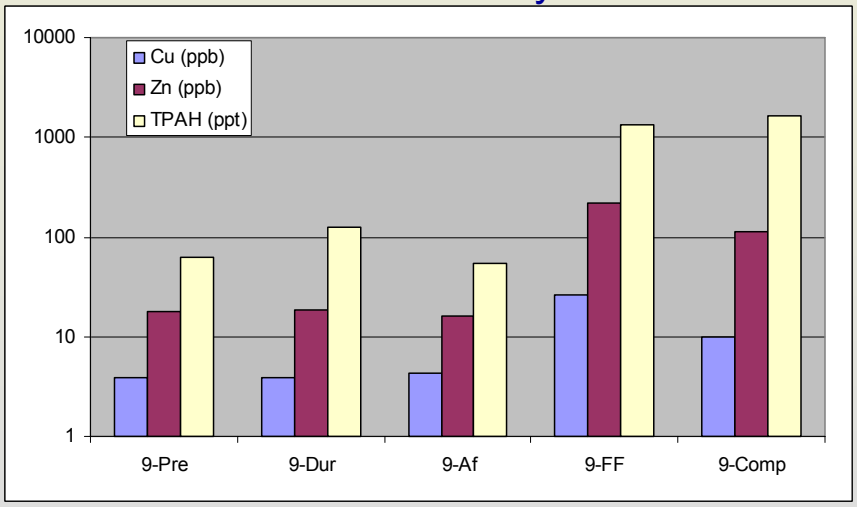
Onshore Full Storm Monitoring



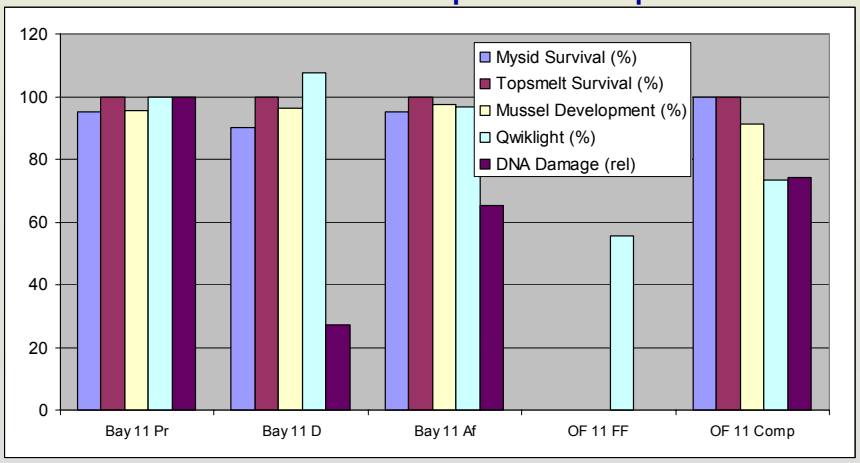
Offshore Plume Mapping



Onshore chemistry data



Onshore-Offshore Impact Comparisons



Particle Contaminant Monitoring using Sediment Traps FY04

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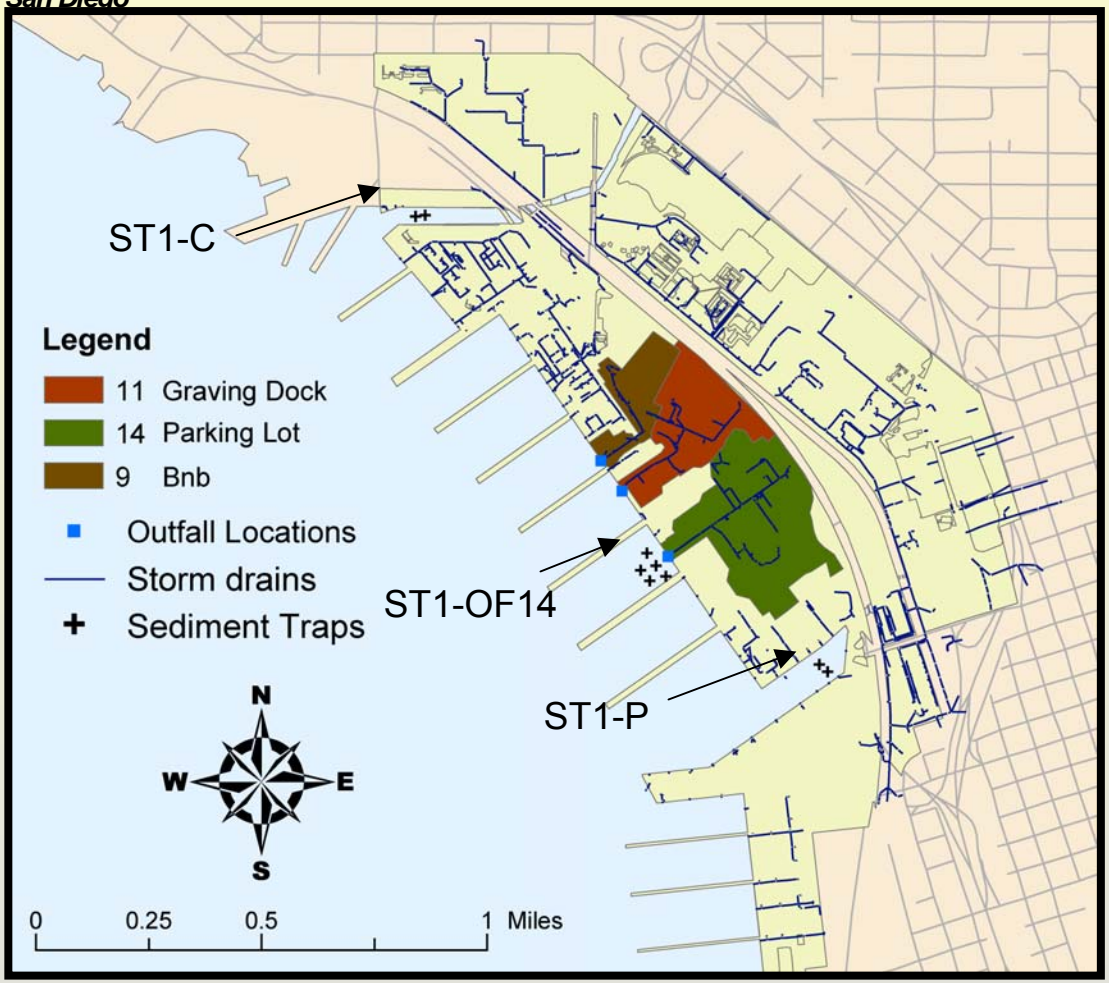

- Compare wet-weather and dry-weather particle contaminant fluxes
- Compare creek inputs to storm water outflows from central pier area of Naval Station San Diego to evaluate source magnitude to the sediments

Sediment Trap Analysis

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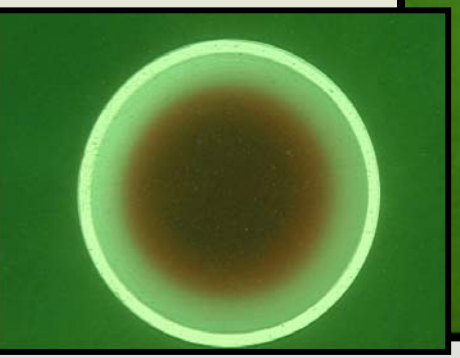
Added real-time instrumentation to traps t monitor time history of particle flux and seawater conditions.

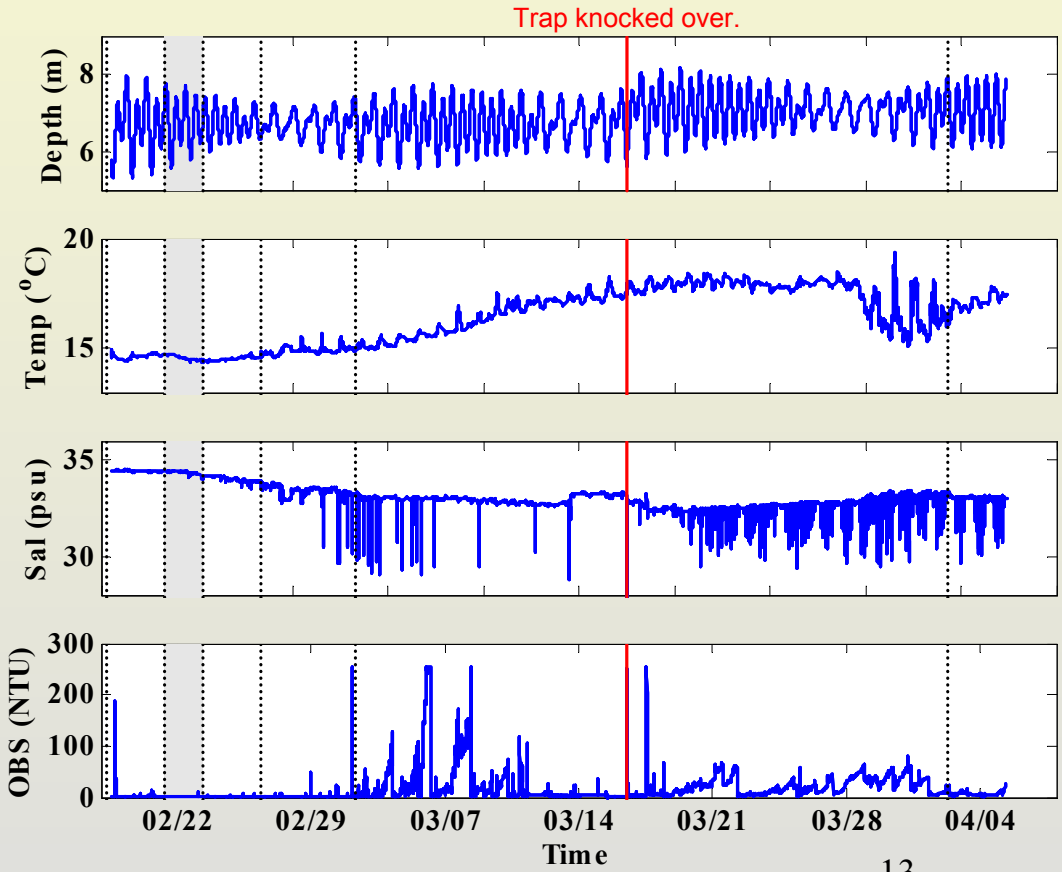
Wet weather particle chemistry analysis underway.

Trap deployed by divers

Real-time instrument package attached to trap

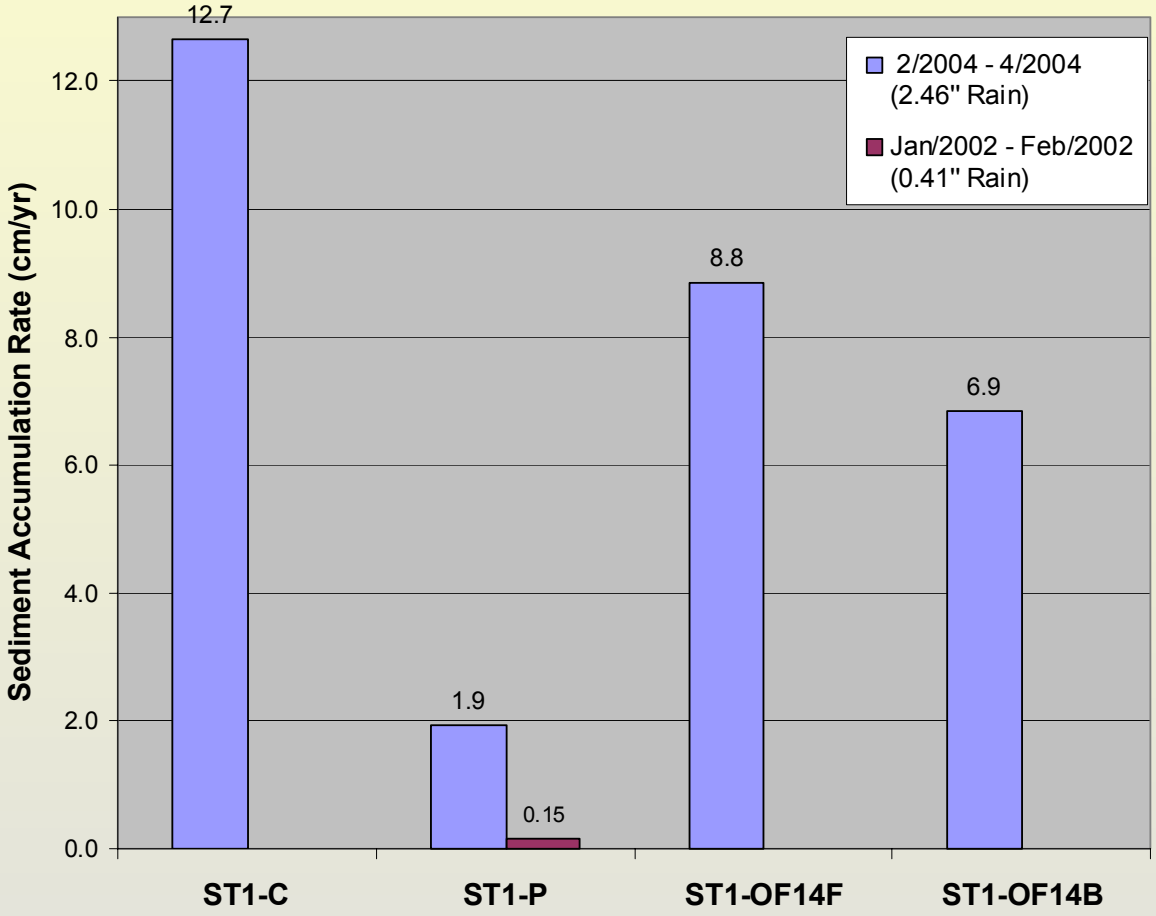


Dense brine layer (dyed with rhodamine) in bottom of trap



Wet weather monitoring

Sediment Trap Analysis



- Wet weather accumulation rates at storm water outfall 14 lies between the two creek rates.
- Sediment accumulation rates are clearly dependent on rainfall.

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Storm Water Literature Database

Programs | Studies | Projects | Reports | Downloads | Journals | Other

Federal

EPA The Stormwater Manager's Resource Center
(includes: Library, Slideshows, Manual, Ordinance, Monitor/Assess, Program Resouces, Fact Sheets)

The Stormwater Manager's Resource Center is designed specifically for stormwater practitioners, local government officials and others that need technical assistance on stormwater management issues. Created and maintained by the Center for Watershed Protection, the SMRC has everything you need to know about stormwater in a single site.

Overview of the Storm Water Program EPA 1996
The 1972 amendments to the Federal Water Pollution Control Act (FWPCA, also referred to as the Clean Water Act or CWA) prohibit the discharge of any pollutant to waters of the United States from a point source unless the discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. Efforts to improve water quality under the NPDES program traditionally have focused on reducing pollutants in discharges of industrial process wastewater and from municipal sewage treatment plants. Past efforts to address storm water discharges under the NPDES program have generally been limited to certain industrial categories with effluent limitations for storm water.

Southern California Coastal Water Research Project Authority (SCCWRP) Web Site

SCCWRP is a joint powers agency focusing on marine environmental research. A joint powers agency is one that is formed when several government agencies have a common mission that can be better addressed by pooling resources and knowledge. In our case, the common mission is to gather the necessary scientific information so that our member agencies can effectively, and cost-efficiently, protect the Southern California marine environment.

Local

State Water Resources Control Board Water Quality
(includes: Caltrans, Construction, Contacts, Databases, Industrial, Municipal, Links, Training)

City of San Diego Storm Water Pollution Prevention Program
(includes: Overview, Why Think Blue, Program Obligations, Web Sections, Contact Information)

*Report Urban Runoff Management
*Stormwater Standards Manual

County of San Diego Watershed Pr
(includes: About, Services, Commis

Caltrans StormWater Management
(includes: Annual Report, Applied S

Evaluating Drain Inlet Cleaning as a
There is concern that flows in the drainage
dry weather, sediments, vegetation, and lo
before it enters receiving waters. In respon
cleaning of more than 21,000 drain inlets i
objective of the DICE Study is to evaluate
analyzed to determine if there is a differen
constituents analyzed include hardness, p

National

City of Albuquerque Department of
(includes: Hydrology, Storm Water,
Construction)

Minnesota Pollution Control Agenc
(includes: Construction, Industrial, M

Impact of Storm Water Outfalls on Sediment Quality in Corpus Christi Bay, Texas
To determine the quality of sediments and extent of contaminant impacts, a Sediment Quality Triad (SQT) study was conducted at 36 sites in the Corpus Christi Bay water outfalls, but 13 other sites (i.e., industrial and domestic outfalls, oilfield produced water discharges, dredging activity) and 8 reference sites were also evalu physical-chemical characteristics, contaminant concentrations (metals, PAHs, PCBs and pesticides), toxicity (amphipod and mysid solid-phase tests, and sea urchi tests) and a benthic index of biotic integrity (BIBI) comprised of 10 independent metrics calculated for each site.

Effluent Management Sewage Overflow Abatement Project (CRC-SOAP): Lota Creek Pilot Study
The Coastal CRC is divided into five themes. The Effluent Management project sits within the Planning and Management theme. A general meeting of the Effluent M at the Natural Science Precinct, Indooroopilly, Brisbane, Qld., Australia. At that meeting we agreed that the major effort of the Effluent Management project would Council (Brisbane Water) as a part of their Sewage Overflow Abatement Project. The investigation has started in Lota Creek (a coastal suburb east of Brisbane Cit the ecological and public health of the receiving waters during wet weather events. We refer to the project as the CRC-SOAP.

Evaluating the Potential for Infiltration-Based Storm Water Management in Urban Areas
There is little doubt that humans have caused significant impacts on the natural environment, including alterations to watersheds and the hydrologic cycle through made less pervious, either through impervious covers or by disturbance of established soil structure. This has the effect of changing the local water balance by incre components. This problem has been exacerbated by traditional storm water management schemes, which seek to remove runoff from the site as quickly as possible, flooding, channel degradation, and a host of other problems.

Storm Surges in Estuaries
During autumn and winter storms over the North Sea may cause storm surges in the estuaries along the German Bight of Ems, Jade/Weser and Elbe. The appearance interaction of different parameters and processes. Development and intensity of storm surges are determined by water levels at the boundary to the North Sea, the h water discharge during the storm period and the local wind field over the estuary. In order to get a better understanding of the importance of these processes modi two different historical storm surges is investigated. As an example of storm surges with different characteristics the storm surge of January 3rd 1976 (SP76: steep s 1994 (SP94: broad surge and high fresh water discharge) are chosen. (The surge is defined as observed water level minus astronomical tide).

Evaluation of Impact from Storm Water Discharges Associated with Road Construction Activities on Receiving Streams pdf
In order to justify the costs involved in installing and maintaining Storm Water Pollution Prevention Plans in road construction activities, a tidal tributary (Cow Bayou), that served as a final receptor of runoff from a road construction, was monitored for a period of 1-1/2 years. Physical and biological data were collected. A benthic bioassessment method and a Microtox sediment testing technique were used. Reduction in total tuna up to 50% in the downstream sampling station at the beginning of the construction suggests that the current measures provide little protection during the early stages of construction. A reduction in total tuna up to 55% in the downstream sampling station during or right after a major rainfall event suggests that these plans provide little relief from the immediate effects of rainstorm. The Microtox basic solid phase test showed little sensitivity to the type of sediments and pollution levels encountered in this research.

URBAN STORM WATER IMPACTS ON A COLDWATER RESOURCE html
The Kinnickinnic River in west-central Wisconsin is a state "outstanding resource water" and a premiere Midwest trout stream, with a self-sustaining brown trout population of 1,500 to 7,500 fish per mile. The City of River Falls, (population 10,500), located in the heart of the Kinnickinnic River watershed, is developing rapidly because of its proximity to the Minneapolis/St. Paul, MN metropolis. Although the current condition of the coldwater resource is good, there is a growing concern about the stormwater impacts of current and future development. These impacts include higher stream flows, thermal pollution, and sedimentation, all of which pose threats to trout and aquatic habitat.

Particle Size Distribution (PSD) in Stormwater Runoff
Atmospheric deposition and traffic activities deposit solids on roads and parking lots which are available for transport into the storm drain system during rain events. These solids vary in size from fine gravel to clays. The variation in particle size is due to site conditions, vehicular activity, wind patterns, rainfall/runoff characteristics and the application of winter de-icing materials. (references)

An Introduction to Stormwater Indicators pdf
Municipal officials are increasingly asked to protect/treat/enhance water resources in the face of urban growth pressures. While municipalities, industries, and governments have all developed technologies to treat human sewage and industrial wastes (i.e., point source discharges), and have developed scientifically accepted methods to monitor the success of these treatment strategies, the ability to successfully treat urban stormwater and measure the effectiveness of these treatments is still several levels below the "point source control" field.

Regulating Water Quality Impacts of Port and Harbor Stormwater Runoff1 pdf
The waters of ports and harbors are subject to a variety of potential pollutant sources including boat and ship antifoulants, boat hull cleaning, and other releases and discharges from boats, wastewater discharges from municipalities and industrial facilities, stormwater runoff from municipal, industrial (including shipyards) and agricultural activities, groundwater and the atmosphere. These sources of potential pollutants can degrade the water quality-beneficial uses of the waters through causing aquatic life toxicity and excessive food web bioaccumulation, as well as causing other impairments of the waterbody's beneficial uses. For some ports and harbors municipal stormwater runoff is one of the most important, if not the most important, sources of a variety of potential pollutants in the water column and waterbody sediments. There is considerable confusion and unreliability in regulating stormwater runoff water quality impacts. Typical US EPA water quality criteria and state water quality standards tend to overregulate stormwater runoff-associated constituents, for which there are water quality criteria/standards. There is underregulation of potential pollutants, for which there are no criteria/standards. The regulation of potential pollutants that accumulate in sediments is even more unreliable since there is no relationship between the total concentration of a constituent in sediments and water quality impacts. This paper discusses the problems in current regulatory approaches for urban

Reports

State Water Resources Control Board Water Quality
Annual Report Documents

Natural Resources Defense Council - Clean Water & Oceans: Water Pollution
Stormwater Strategies

This May 1999 report from the Natural Resources Defense Council documents some of the most effective strategies being employed by co among the top sources of water contamination in the county today. The collection of 100 case studies compiled and evaluated here is inte and environmental activists, it is also a resource for citizens concerned about the quality of their local environment. Added in October 200 simple, effective and economical stormwater strategy that also carries a broader aesthetic appeal.

A Comprehensive Approach to Urban Stormwater Impact Assessment
Stormwater monitoring has been conducted in Greensboro, North Carolina, since April 1994 as required by the NPDES municipal stormwater perm NPDES permits is the storm event sampling. Municipalities larger than 100,000 persons (NPDES Phase I stormwater regulations) sample runoff fro locale. However, these data do not provide relevant information on the impact to the receiving waters. In order to characterize impacts to the recei Greensboro, the Storm Water Services Division is examining many facets of its stream and aquatic environment to monitor and quantify the impacts developed to mitigate those impacts

MONITORING AND MODELING OF WATER QUALITY IN THE TIJUANA RIVER WATERSHED pdf
The purpose of this study was to determine the concentration of heavy metals and fecal indicator bacteria in stormwater associated with a variety of phase of a larger effort to use GIS-based modeling in a predictive fashion to estimate mass loading of stormwater pollutants to the Estuary under a

Geographic Information System (GIS) Characterization of Metal Loading in the Binational Tijuana River Watershed
This paper describes a GIS-based, land use-runoff model which estimates the annual mass emission of copper (Cu), lead (Pb) and zinc (Zn) from the urbanized portion of the city of Tijuana, Mexico accounted for 27-47% of the actual downstream loading of these metals to the Tijuana Estuary and the same (31-44%), even though this land use comprised about 90% of the total watershed area. Modeled estimates of the annual mass emission of especially for Zn (within about 10%), thereby suggesting that GIS-based modeling may be useful for predicting non-point source pollutant loading

Urban Stormwater: A Hidden Problem
We often think of rainwater as being "pure" and "natural". Standing in a spring shower, or watching rivulets bubble into a stream after a storm, it publications, studies, etc.

Water Quality Analysis Report County of Santa Barbara, California September 2001 pdf
During Fiscal Year 1999-2000, Project Clean Water staff designed a water quality sampling program with two basic objectives: 1) to screen storm pollution sources and transport mechanisms under low flow conditions. This information was intended to be the basis for source reduction and mea pollution in selected urbanized watershed in the County. Long term, some of this data may serve as a baseline with which to measure progress of

Characteristics of Stormwater Runoff from Caltrans Facilities pdf
Stormwater runoff from 50 sites representing five different types of the California Department of Transportation (Caltrans) facilities (highways, main zones) were monitored by Caltrans during the 2000-01 monitoring season. This study was conducted by Caltrans to generate sufficient water quali assessment and modeling, watershed planning, and statistical data quantification. Both flow-paced composite samples collected using automated sa total of 337 storm events. Results obtained during the first year characterization study indicate that: (i) analytic data collected during the 2 earlier, (ii) highway sites, in general, have above average concentrations of most constituents, (iii) acceleration/deceleration sites, in general, have and rides, rest areas, and maintenance stations, in general, have below average concentrations of most constituents; and (v) the data display a high sample mean.

First Flush Report - Monterey Bay Sanctuary Citizen Watershed Monitoring Network pdf
In the early morning hours of Tuesday, October 10, 2000 the Monterey Bay Sanctuary Citizen Watershed Monitoring Network conducted a First Flu The term, "First Flush", is used to describe the first significant rain of the season in which months of accumulated contaminants are washed into co sediment, and numerous other chemicals that are discarded onto parking lots, streets and yards.
***Includes Data, Methods, Results

CharacterizationUrbanStormwater.pdf	432 KB	Adobe Acrobat Doc...	3/10/2004 2:11 PM
ConstructiveSolution.pdf	465 KB	Adobe Acrobat Doc...	3/10/2004 3:04 PM
DevelopmentHighRies.pdf	703 KB	Adobe Acrobat Doc...	3/10/2004 2:53 PM
DevelopmentMinimalRunoff.pdf	206 KB	Adobe Acrobat Doc...	3/10/2004 2:40 PM
EasternAustralianRegion.pdf	1,414 KB	Adobe Acrobat Doc...	3/10/2004 3:05 PM
EffectGeomorphologic.pdf	1,305 KB	Adobe Acrobat Doc...	3/10/2004 2:22 PM
EffectSoil.pdf	1,117 KB	Adobe Acrobat Doc...	3/10/2004 4:00 PM
EffectSurfaceRoughness.pdf	510 KB	Adobe Acrobat Doc...	3/10/2004 3:59 PM
EnsfunRunnoLosses.pdf	42 KB	Adobe Acrobat Doc...	3/10/2004 2:13 PM
EstimationToxicContaminant.pdf	199 KB	Adobe Acrobat Doc...	3/10/2004 1:16 PM
FactorsAffectingDistributionBenthic.pdf	307 KB	Adobe Acrobat Doc...	3/10/2004 3:03 PM
FloodFrequencyEst.pdf	264 KB	Adobe Acrobat Doc...	3/10/2004 2:17 PM
IdentificationLandUse.pdf	217 KB	Adobe Acrobat Doc...	3/10/2004 2:55 PM
IdentificationRainfall.pdf	479 KB	Adobe Acrobat Doc...	3/10/2004 2:26 PM
ImpactsStormwaterDischarge.pdf	891 KB	Adobe Acrobat Doc...	3/10/2004 1:19 PM
ImportanceSingleEventsAnd.pdf	408 KB	Adobe Acrobat Doc...	3/10/2004 3:06 PM
InterceptionRunoff.pdf	665 KB	Adobe Acrobat Doc...	3/10/2004 3:07 PM
LongTermStormwaterQuantity.pdf	140 KB	Adobe Acrobat Doc...	3/10/2004 2:51 PM
MechanisticModelRunoff.pdf	4,471 KB	Adobe Acrobat Doc...	3/10/2004 3:03 PM
MethodsCombining.pdf	1,308 KB	Adobe Acrobat Doc...	3/10/2004 3:40 PM
ModelingEffect.pdf	1,486 KB	Adobe Acrobat Doc...	3/10/2004 2:39 PM
ModificationRainfallRunoff.pdf	530 KB	Adobe Acrobat Doc...	3/10/2004 2:47 PM
MTBE_AromaticHydrocarbons.pdf	179 KB	Adobe Acrobat Doc...	3/10/2004 2:11 PM
NonLinearRainfallRunoff.pdf	916 KB	Adobe Acrobat Doc...	3/10/2004 2:49 PM
NonpointSource.pdf	837 KB	Adobe Acrobat Doc...	3/10/2004 3:07 PM
OrginStormwaterRunoff.pdf	540 KB	Adobe Acrobat Doc...	3/10/2004 2:10 PM
ParticleAssociatedMicroganisms.pdf	143 KB	Adobe Acrobat Doc...	3/10/2004 2:09 PM
PollutantConcentrations.pdf	225 KB	Adobe Acrobat Doc...	3/10/2004 1:15 PM
PredictingRunoff.pdf	342 KB	Adobe Acrobat Doc...	3/10/2004 3:39 PM
RainfallRunoff.pdf	627 KB	Adobe Acrobat Doc...	3/10/2004 2:27 PM
RecurrenceIntervalRainfall_Intensity.pdf	164 KB	Adobe Acrobat Doc...	3/10/2004 1:26 PM
RepresentationNaturalHeterogeneity.pdf	357 KB	Adobe Acrobat Doc...	3/10/2004 3:43 PM
RiversRunoffReefs.pdf	491 KB	Adobe Acrobat Doc...	3/10/2004 2:43 PM
RunoffCoefficient.pdf	202 KB	Adobe Acrobat Doc...	3/10/2004 2:20 PM
RunoffGeneration.pdf	1,276 KB	Adobe Acrobat Doc...	3/10/2004 3:38 PM
RunoffLossesOfSoil.pdf	683 KB	Adobe Acrobat Doc...	3/10/2004 2:46 PM
RunoffRatesChemical.pdf	207 KB	Adobe Acrobat Doc...	3/10/2004 3:42 PM
SemiDistributedRainfall.pdf	616 KB	Adobe Acrobat Doc...	3/10/2004 3:05 PM
SimulationCentury.pdf	1,132 KB	Adobe Acrobat Doc...	3/10/2004 3:52 PM
SolidPhaseMicroextration.pdf	485 KB	Adobe Acrobat Doc...	3/10/2004 3:01 PM
SoluteDynamics.pdf	561 KB	Adobe Acrobat Doc...	3/10/2004 2:29 PM
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SpatialCharacteristicThunderstorm.pdf	2,034 KB	Adobe Acrobat Doc...	3/10/2004 3:02 PM
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ThermalEnhancement.pdf	678 KB	Adobe Acrobat Doc...	3/10/2004 2:06 PM
ToxicityAssessment.pdf	286 KB	Adobe Acrobat Doc...	3/10/2004 1:18 PM
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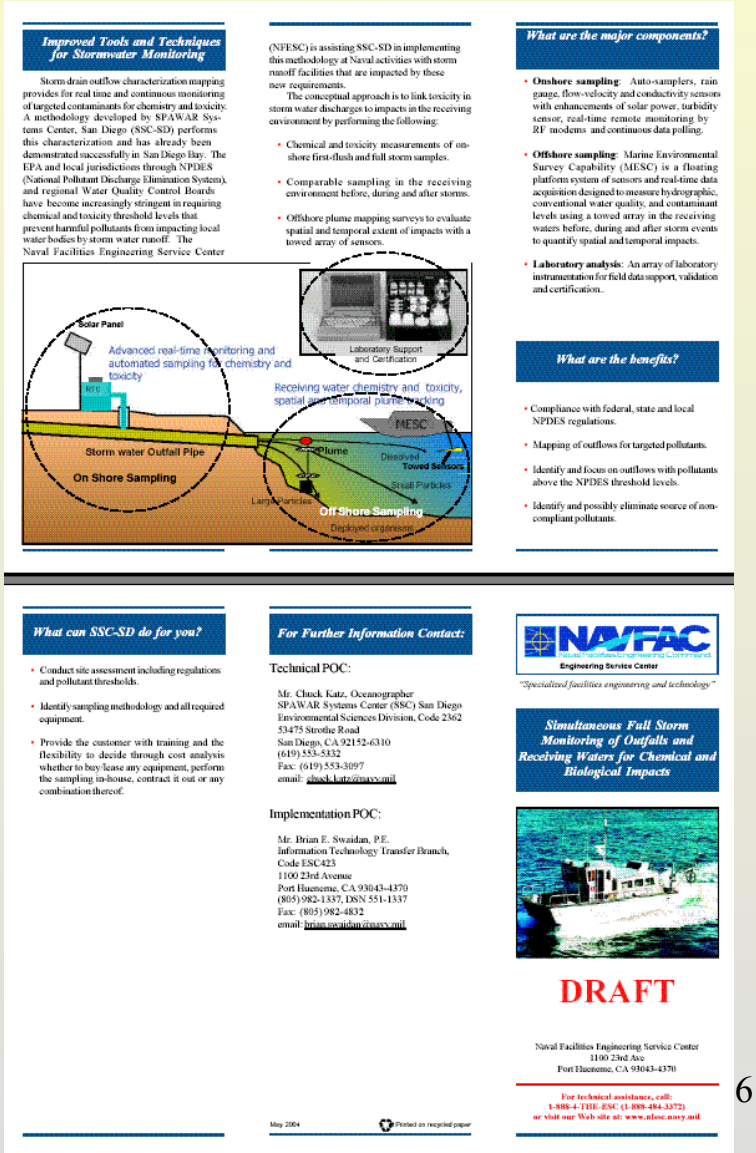
WatershedModeling.pdf	182 KB	Adobe Acrobat Doc...	3/10/2004 3:02 PM
ZincToxicityStormwater.pdf	449 KB	Adobe Acrobat Doc...	3/10/2004 2:05 PM

Transition Efforts

In collaboration with Brian Swaidan at NFESC:

Planning to produce:

- Currents newsletter article
- Add to the Storm Water BMP Website
- NFESC Tri-Fold (Draft)
- Environmental Quality Initiative Fact Sheet
- Contacts with water managers
- Other- equipment loans, training, project planning and execution



Improved Tools and Techniques for Stormwater Monitoring

Storm drain outflow characterization mapping provides for real time and continuous monitoring of targeted contaminants for chemistry and toxicity. A methodology developed by SPAWAR Systems Center, San Diego (SSC-SD) performs this characterization and has already been demonstrated successfully in San Diego Bay. The EPA and local jurisdictions through NPDES (National Pollutant Discharge Elimination System), and regional Water Quality Control Boards have become increasingly stringent in requiring chemical and toxicity threshold levels that prevent harmful pollutants from impacting local water bodies by storm water runoff. The Naval Facilities Engineering Service Center (NFESC) is assisting SSC-SD in implementing this methodology at Naval activities with storm runoff facilities that are impacted by these new requirements.

The conceptual approach is to link toxicity in storm water discharges to impacts in the receiving environment by performing the following:

- Chemical and toxicity measurements of on-shore first-flush and full storm samples.
- Comparable sampling in the receiving environment before, during and after storms.
- Offshore plume mapping surveys to evaluate spatial and temporal extent of impacts with a towed array of sensors.

What are the major components?

- **Onshore sampling**: Auto-samplers, rain gauge, flow-velocity and conductivity sensors with enhancements of solar power, turbidity sensor, real-time remote monitoring by RF modems and continuous data polling.
- **Offshore sampling**: Marine Environmental Survey Capability (MESC) is a floating platform system of sensors and real-time data acquisition designed to measure hydrographic, conventional water quality, and contaminant levels using a towed array in the receiving waters before, during and after storm events to quantify spatial and temporal impacts.
- **Laboratory analysis**: An array of laboratory instrumentation for field data support, validation and certification.

What are the benefits?

- Compliance with federal, state and local NPDES regulations.
- Mapping of outflows for targeted pollutants.
- Identify and focus on outflows with pollutants above the NPDES threshold levels.
- Identify and possibly eliminate source of non-compliant pollutants.

What can SSC-SD do for you?

- Conduct site assessment including regulations and pollutant thresholds.
- Identify sampling methodology and all required equipment.
- Provide the customer with training and the flexibility to decide through cost analysis whether to buy/lease any equipment, perform the sampling in-house, contract it out or any combination thereof.

For Further Information Contact:

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or visit our Web site at: www.nfesc.navy.mil

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San Diego

Implementation Strategy

5) Demonstration site Naval Station San Diego

FY02- purchase/installation/upgrades/testing of onshore samplers.

FY03- data collection.

6) Naval Station Evaluation

FY04- presentation of results at scientific conferences (SETAC, ERF, AWRA, Shipyard).

7) Second Round Demonstration

FY04- demonstration of particle bound contaminant transport.

FY04-05- full-storm monitoring with flow-through bioassay.

8) Second Round Evaluation

FY04-05-presentations at scientific conferences, peer review article.

9) System Transition

FY05- newsletters, storm water website, tri-fold, Environmental Quality Initiative Fact Sheets, contacts with water managers-rental/service, users guide and future demonstrations (ESTCP).

SPAWAR
Systems Center
San Diego

Implementation Strategy

CNRSW and PSNS Support for FY04 ESTCP proposal

Chuck,

Your [ESTCP] proposal would help CNRSW Environmental develop its Alternative Monitoring Plan. This Alternative Monitoring Plan is required by the Naval Base Point Loma, Naval Base San Diego, and Naval Base Coronado Complex NPDES Permits. These permits state the Navy has 4 years to conduct a toxicity study of storm water runoff from Submarine Base San Diego, Naval Station San Diego, Naval Air Station North Island, and Naval Amphibious Base San Diego.

This study will identify what pollutant level in storm water discharges causes toxicity in the receiving water. If at the end of the 4 year period, the Navy can not convince the San Diego Regional Water Quality Control Board that the toxicity discharge standard it has developed during its study is protective of the receiving water, than a 90% Acute Toxicity limit must be met for all storm water discharges at the 4 Navy facilities listed above. It is generally agreed that storm water discharges will not consistently meet a 90% Acute Toxicity limit. Your study is a key component to the Alternative Monitoring Plan.

vr,

Rob Chichester
CNRSW Environmental
Water Program Manager
email

Dear Mr Katz

Thank you for allowing us to review your [SERDP] proposal to develop Improved Technologies for Storm Water Monitoring. If successful, the outcome your proposed research would be very useful to PSNS Project ENVVEST in assessing the ecological significance of storm water runoff contamination in Sinclair and Dyes Inlets, WA. Of particular interest would be the biological availability and toxicity of run off contaminants, especially metals such as Cu, Hg, As, Pb, and Zn.

This technology may also have value in helping PSNS comply with storm water sampling and analysis requirements expected in our next NPDES permit.

We would be very interested in assisting with storm event sampling or providing other information on the ecology and geochemistry of Sinclair and Dyes Inlets.

Please keep us appraised of your progress and accomplishments in this important area of research.

GM Sherrell
Water & Special Projects Branch Head
Puget Sound Naval Shipyard
Bremerton WA
email

The main barrier to implementation is that some regions/facilities do not face an immediate compliance requirement to make the type of measures performed under this project (2 yrs ago, no facilities had these requirements!). It is critical to develop a knowledge base to negotiate more realistic requirements.

Implementation Strategy

The tools and techniques developed under this project are currently being implemented at Naval Base Point Loma and will be implemented at Naval Air Station North Island and Naval Amphibious Base next year.

The offshore techniques were also planned for Puget Sound Naval Shipyard this year under the ENVVEST program though lack of rainfall limited the effort.

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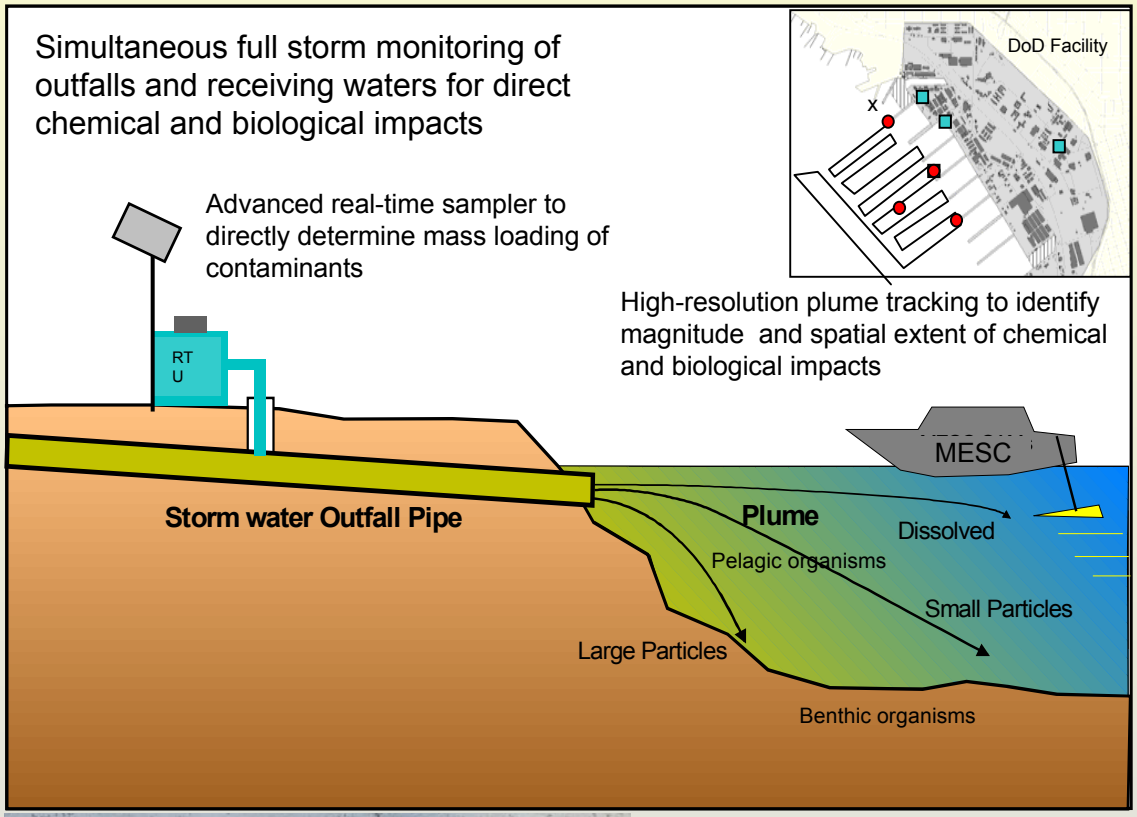
San Diego

Logic Model for Improved Storm Water Monitoring Technologies

Navy Benefits	The Navy obtains the ability to defend against overly stringent regulations that are imposed in the absence of data. The potential outcome is a significant reduction in cost of compliance.
Customer Capability	The customer can use these tools and techniques to collect scientifically defensible data on mass loading of contaminants and directly measure their impacts on receiving waters. The customer can then use these data to defend against overly stingent permits or waste load allocations under the TMDL program.
Products	Enhanced onshore samplers- comms, rt monitoring, robust power Onshore techniques-tidally influenced data collection, rt measures Offshore assessment techniques-magnitude and extent of impacts
Project Milestones	Technology demonstration at Naval facility MS5, 3Q FY03 Second demonstration at Naval facility MS7, 4Q FY04 System transition MS9, 2Q, FY05

Improved Storm Water Monitoring Project Summary

SPAWAR
Systems Center San Diego



Goal:

To develop enhanced storm water monitoring technologies and protocols that directly quantify contaminant loading and biological impacts in receiving waters from storm discharges.

Benefits:

The Navy obtains the ability to defend against overly stringent regulations that are imposed in the absence of data. The potential outcome is a significant reduction in cost of compliance.