

National Marine Sanctuaries
National Oceanic and Atmospheric Administration



NATIONAL MARINE
SANCTUARIES
—
MONTEREY BAY

AMERICA'S UNDERWATER TREASURES

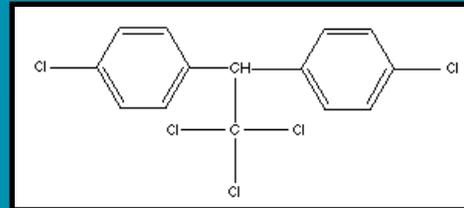
Beach Water Quality

- Current conditions
- Latest research
- Sanctuary programs

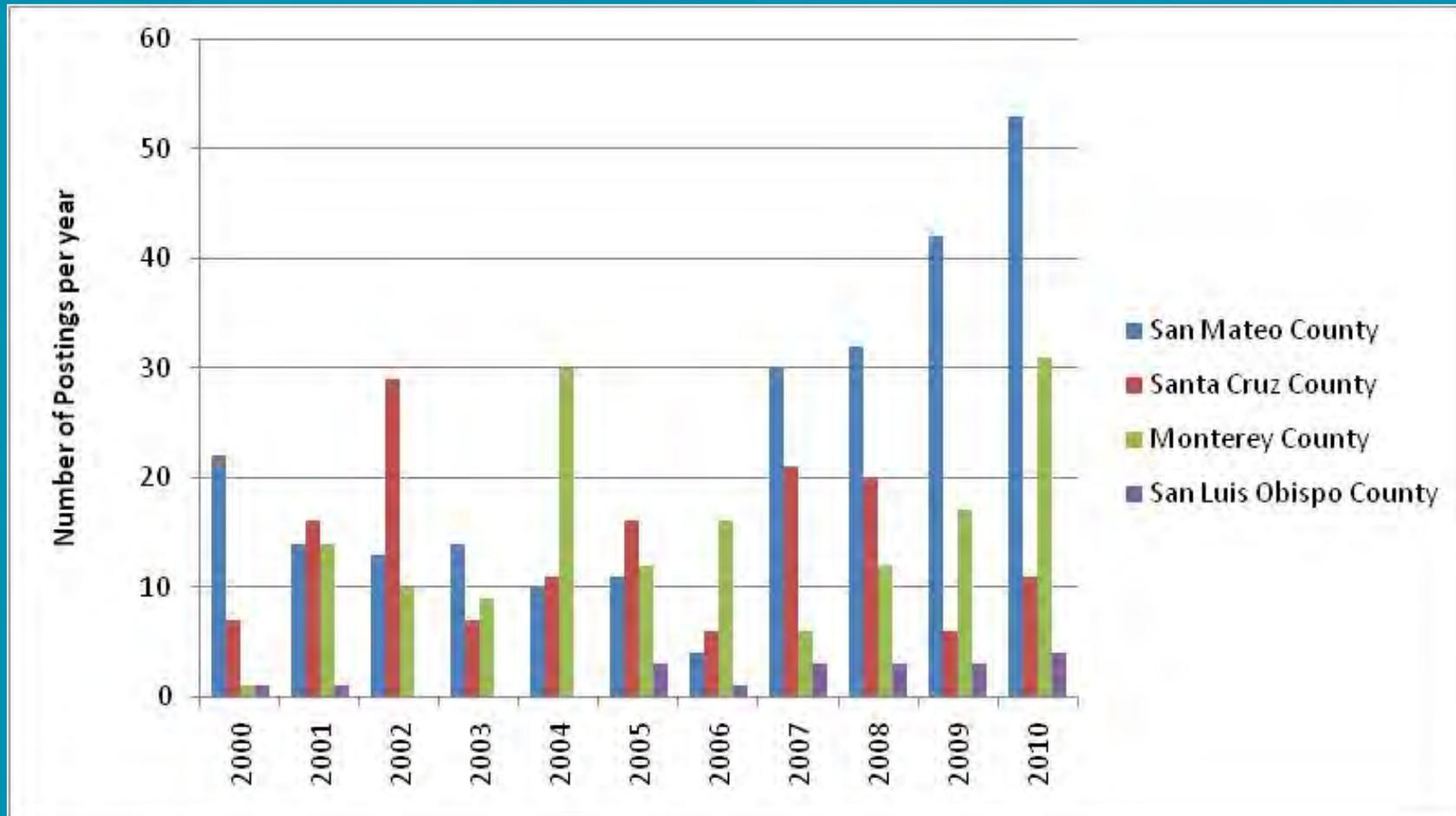


Water Quality Pollutants

- Sediments
- Nutrients
- Pesticides
- Pathogens
- Metals
- Detergents
- Industrial compounds

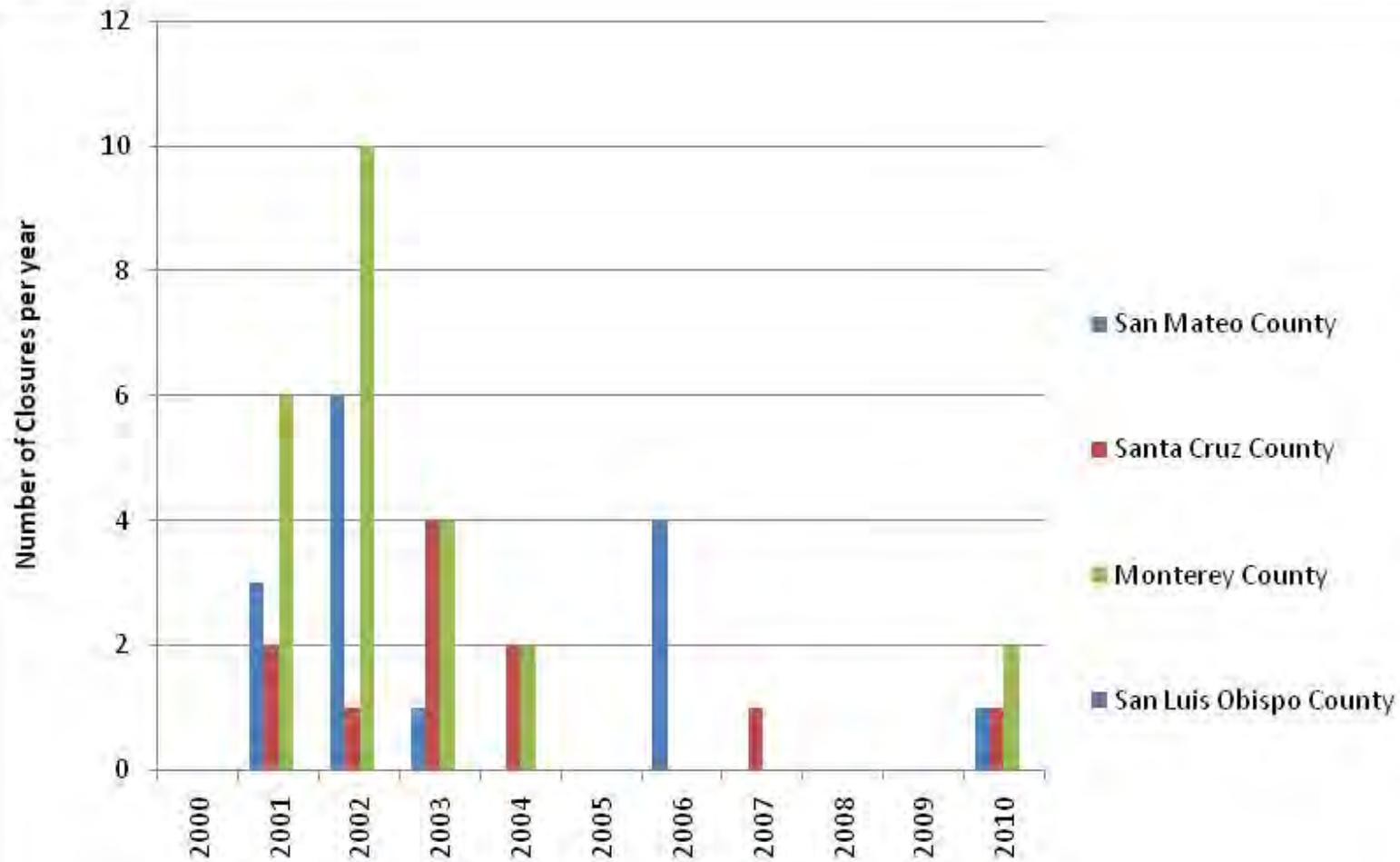


AB411 Monitoring at MBNMS Beaches



Source: http://beachwatch.waterboards.ca.gov/BeachWatch/cla_common/cla_login_bg.jsp
and Monterey Cty Dept of Env Health

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Heal the Bay Report Card (7 Year Average)

- San Mateo County-
 - Dry Weather - 86% received A or B
 - Pillar Pt only MBNMS beach to get poor grade (D)
 - Wet Weather – 51% received A or B
- Santa Cruz County
 - Dry Weather – 85% received A or B
 - Capitola and Cowell beach (F), Lifeguard Tower (D)
 - Wet Weather - 50% received A or B
 - Twin Lakes and Seacliff (A)

Note: State Average for wet weather A or B = 54%

Heal the Bay Report Card (7 Year Average)

- Monterey County-
 - Dry Weather – 96% received A or B
 - Lover's Pt beach (D) in 2010
 - Wet Weather – insufficient data
- SLO County
 - Dry Weather – 96% received A or B
 - Wet Weather - 71% received A or B
 - No D or F at MBNMS beaches

Note: State Average for wet weather A or B = 54%

WQPP Action Plans

Implementing Solutions to Urban Runoff



Regional Monitoring, Data Access, and Interagency Coordination (SAM)



Marinas and Boating



Agriculture and Rural Lands



Beach Closures and Microbial Contamination

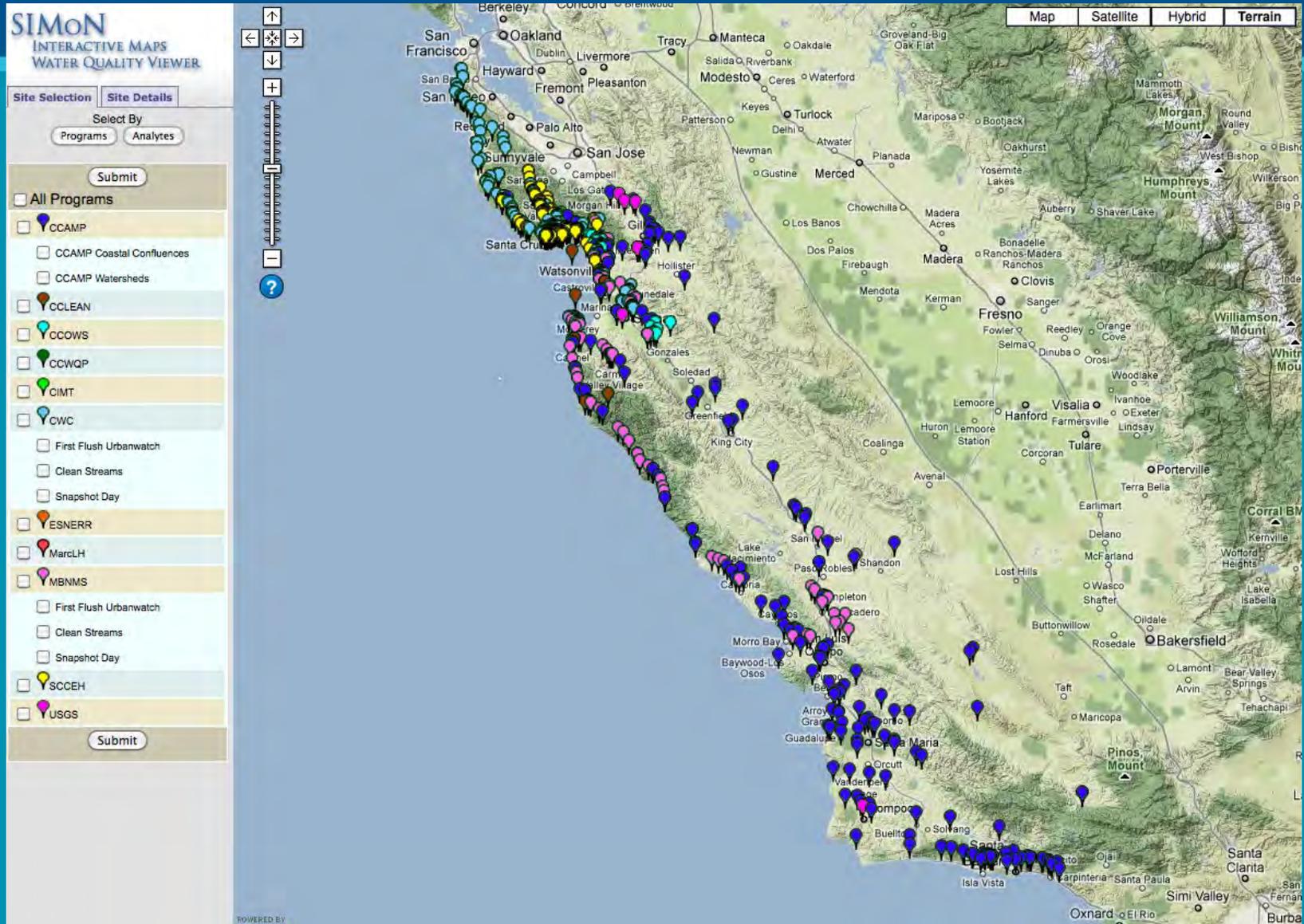


Beach Closures and Microbial Contamination Action Plan

(9 strategies, 29 activities)

1. Enhance Use of GIS
2. Expand Pathogen and Contamination Research
3. Increase Monitoring Network
4. Enhance Notification Program
5. Increase Source Control Program
6. Increase Technical Training for Industrial Professionals
7. Enhance Public Outreach of Sources and Solutions
8. Increase and Coordinate Enforcement
9. Improve Emergency Response Program

BC-1 Enhance Use of GIS



BC-2 Pathogen Research

- CCLEAN – Monitoring and Mitigation to Address Fecal Pathogen Pollution along the Central Coast
- Center for Ocean Solutions ESP

Monitoring and Mitigation to Address Fecal Pathogen Pollution along CA Coast

- Partnership with CCLEAN, UC Davis and DFG Marine Wildlife Vet. Care and Research Ctr.

Comprehensive research that addresses shortfalls in regulation and resource management



Photo Credit: SIMoN NOAA

Monitoring and Mitigation to Address Fecal Pathogen Pollution along CA Coast

Summary:

- Waste water influent and effluent tested qtrly for 2 years. *Significant reduction of pathogens*
- Ten coastal confluences monthly for 2 years. *Detection of FIB and pathogens prevalent in wet and dry seasons.*
- Qtrly testing of Tembladero Slough constructed wetland. *Pathogens common in source water and less frequent as it moved through the wetland.*
- Monitoring for FIB alone is not sufficient to minimize human risk. *Recommend a combination of FIB and pathogen assays.*

Monitoring and Mitigation to Address Fecal Pathogen Pollution along CA Coast

1. How can fecal pathogen loading be compared across inputs to the ocean (rivers, stormwater, wastewater)?
 - *Pathogens were prevalent in all sources.*
 - *Surface waters and stormwater is greater risk than offshore, deep water discharges from WWTPs*

Monitoring and Mitigation to Address Fecal Pathogen Pollution along CA Coast

2. What is the relationship between exceedences of FIB WQOs and fecal pathogen detection?

- *Only Cryptosporidium was significantly associated with Total coliform*
- *Cryptosporidium, Giardia, Salmonella and V. parahaemolyticus associated with fecal coliform*
- *Giardia and V. parahaemolyticus associated with enterococcus*

Monitoring and Mitigation to Address Fecal Pathogen Pollution along CA Coast

3. Are mussels better indicators of ocean microbial water quality than seawater?
 - *Only during and after storms*
 - *Cryptosporidium were detected in 26% of water samples and 6% of mussels.*
 - *Campylobacter and Salmonella were detected in seawater but not in mussels.*

Monitoring and Mitigation to Address Fecal Pathogen Pollution along CA Coast

4. Which of the 3 microbial source tracking methods is most promising and what are the trends in human vs. animal sources?
 - *Bacteroidales host specific is much more effective than enterococcus gene assay or the total:fecal coliform ratios.*
 - *Bacteroidales can provide source*
 - *Human was more prevalent than dog or livestock*

Monitoring and Mitigation to Address Fecal Pathogen Pollution along CA Coast

5. What are the patterns and risk factors for fecal pathogen shedding between terrestrial and marine animals?
 - *Of 808 fecal samples, 28% positive for one or more target pathogens.*
 - *Many of the same pathogens detected in sea otters.*
 - *Giardia most frequent in 15% of animal types*

Monitoring and Mitigation to Address Fecal Pathogen Pollution along CA Coast

6. Are wetlands effective in reducing pathogen loading in surface waters?
 - *Controlled lab tests found that the presence of vegetation removed oocysts at fast and slow flow rates.*
 - *Both distance from source of contamination and rainfall (flow rates) influence efficiency of pathogen reduction in natural systems.*

In situ Environmental Sample Processor

- Stanford, MBARI and Center for Ocean Solutions collaboration
 - Deployment at SC wharf scheduled for late September before First Flush
 - FIB and human bacteroidales assays
 - Some HAB analysis

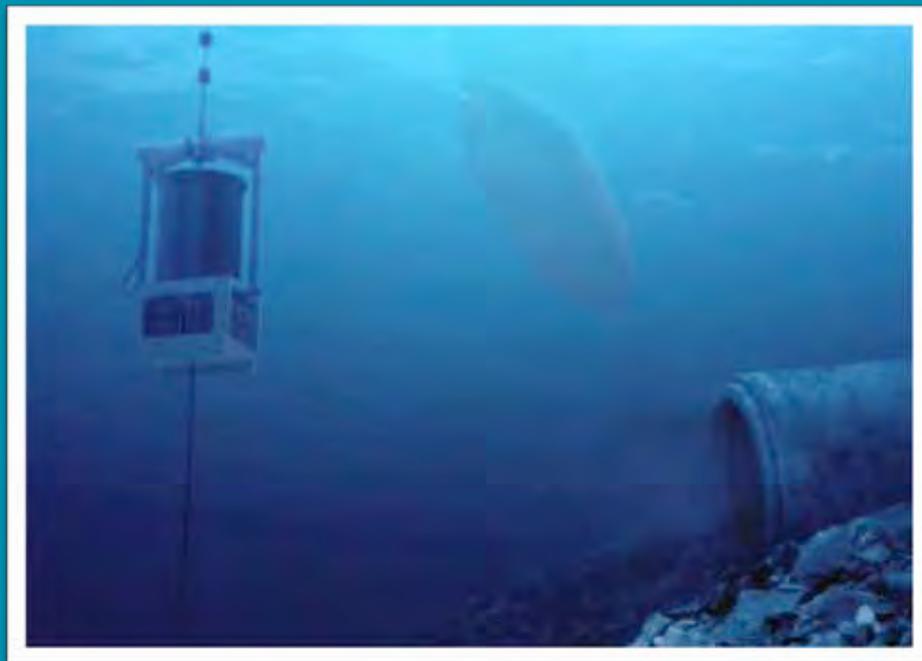


Photo credit: MBARI

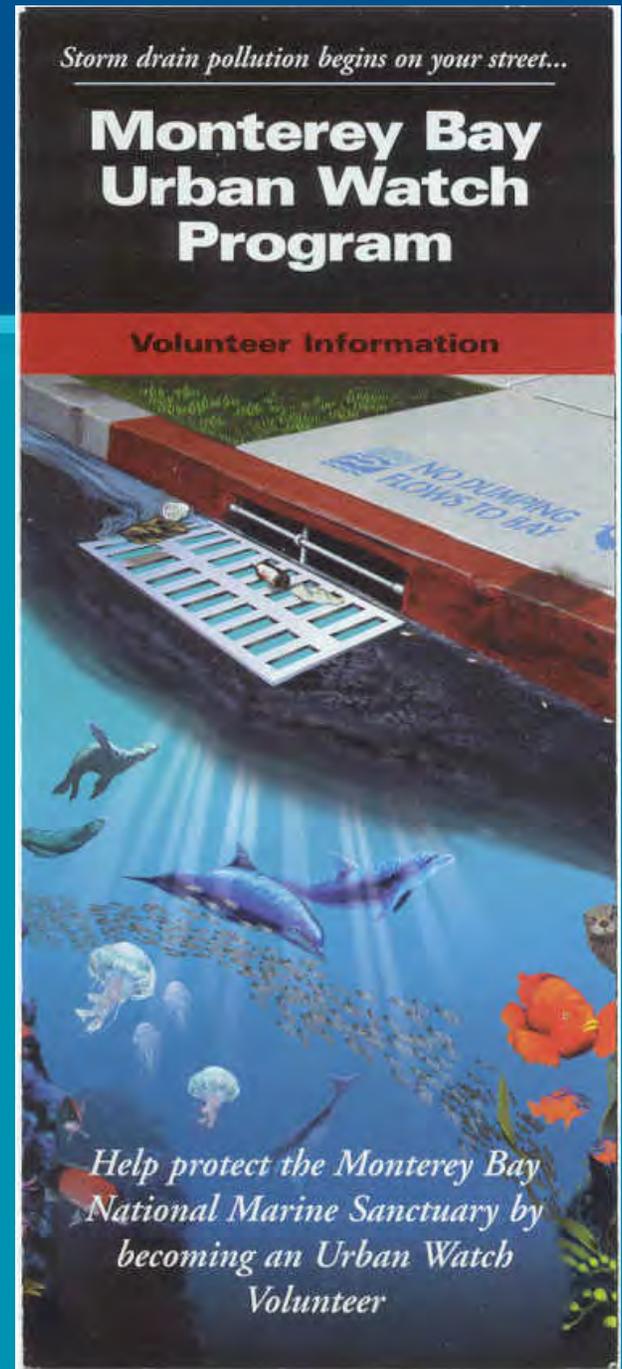
BC-3 Increase Monitoring Network

- Current Monitoring
 - Urban Watch Program
 - Monterey Regional Stormwater Monitoring
 - First Flush program
 - 3 dry weather events
 - Source tracking using QPCR



Urban Watch

- Dry weather outfall monitoring
- Began in 1996
- Volunteers monitor urban runoff in 3 cities
- EPA Pollution Detection Kit and Hach meters:
 - chlorine
 - pH
 - temperature
 - conductivity
 - trash
 - detergents
 - orthophosphate
 - ammonia



Lover's Point Study



First Flush

- Program began in 2001
- First major rain of the season
- ~50 storm drain outfalls in 7 cities
- Samples are analyzed in a lab for:
 - Zinc, copper, lead
 - Hardness
 - Nitrate, urea, orthophosphate
 - Total suspended solids
 - E. coli, enterococcus
 - Field measurements



MRSWMP Monitoring

- All outfalls >18” flowing to ocean or 303d listed water body.
 - 23 outfalls on Monterey Peninsula
- Use First Flush protocols
 - 3 dry weather events
 - First Flush

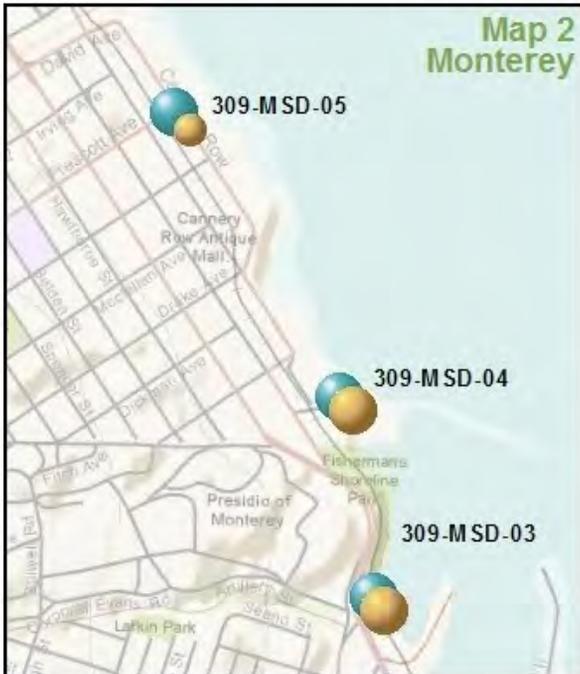
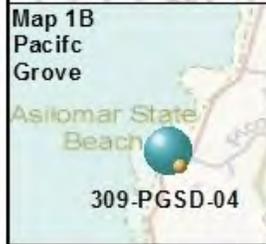
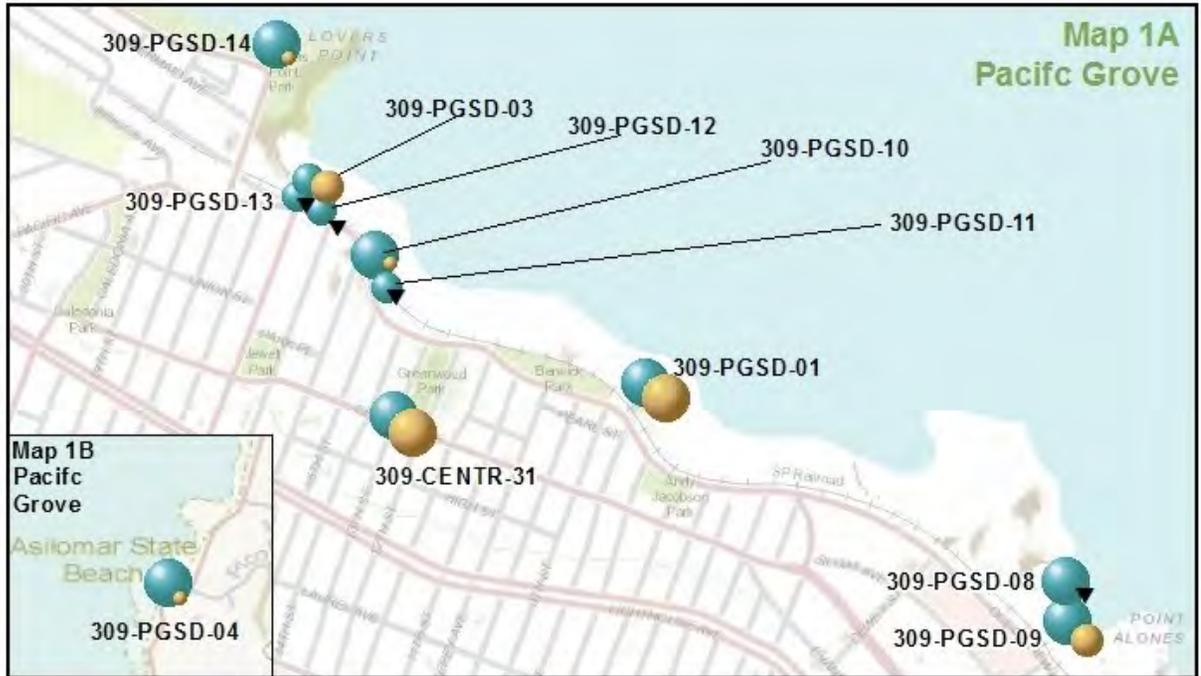
MRSWMP Monitoring 2010-2011

Map 4
Watsonville

E. coli (MPN/ 100 ml)



- Map 1 A Pacific Grove
- Map 1 B Pacific Grove
- Map 2 Monterey
- Map 3 Carmel
- Map 4 Watsonville
- Map 5 Seaside



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Thank you for your time!

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