First Flush 2015: Midcoast Storm Drains
What is First Flush?

- First big rain of the season
- Freshwater runoff enters storm drains
- High pollution
- Sampled at outfall to ocean
- Nov 2\textsuperscript{nd}: 0.64 in
Objectives

- Better understand pollutant loads during the first significant rain of the season
- Identify what pollutants are of greatest concern and where
- Provide information to support water quality improvements
- Establish a continuous and consistent water quality dataset
2015 Sample Sites

202-MOSD-01: 7th Street
202-MOSD-02: Vallemar Street
202-MBSD-01: Weinke Way
202-MBSD-05: San Vicente Creek Mouth
202-MBSD-04: West Point
202-EGSD-04: Vassar Street
202-EGSD-03: Capistrano Street
*202-PPSD-09: Deer Creek
202-EGSD-01: El Granada
202-EGSD-02: Surfers Beach
202-HMB-03: Frenchmans Creek
202-HMB-02: Pilarcitos Creek (Mouth)
202-HMB-01: Pilarcitos Creek (Main Street Bridge)
202-HMB-04: Arroyo Canada Verde Creek

* Did not sample due to tidal inundation.
## What are we testing?

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Potential Sources</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fecal Indicator Bacteria</strong> (E. Coli, Enterococcus)</td>
<td>Feces of warm blooded animals</td>
<td>Indicator for human pathogens</td>
</tr>
<tr>
<td><strong>Nutrients (Nitrate, Orthophosphate)</strong></td>
<td>Fertilizers, pesticides, detergents, human waste</td>
<td>Eutrophication/harmful algal blooms-ecosystem and recreation impacts</td>
</tr>
<tr>
<td><strong>Metals (Copper, Zinc, Lead)</strong></td>
<td>Brake pads, tires, streets, industrial waste, roofs, gutters, downspouts</td>
<td>Impacts to aquatic organisms and human health</td>
</tr>
<tr>
<td><strong>Total Suspended Solids</strong></td>
<td>Construction sites, erosion, agricultural runoff</td>
<td>Sedimentation, respiratory effects in organisms</td>
</tr>
</tbody>
</table>
Physical Tests

- Transparency—daylight hours only
- pH
- Electrical conductivity
- Water temperature
- Observations: trash, odor, bubbles, scum, oil
Train and Mobilize Volunteers

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Data Analysis

- **Dry Run vs. First Flush**
- **13 SMC sites in 2015**
- **9 were historic sites (2008–2015)**
  - Analyzed over time
  - Note no data for 2013
- **Qualitative Location Comparison**
- **Water Quality Objectives (WQOs)**
## First Flush Precipitation History

<table>
<thead>
<tr>
<th>Dates</th>
<th>Actual Rainfall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 1, 2008</td>
<td>0.42 in</td>
</tr>
<tr>
<td>Oct 13, 2009</td>
<td>2.86 in</td>
</tr>
<tr>
<td>Oct 17, 2010</td>
<td>0.52 in</td>
</tr>
<tr>
<td>Oct 5, 2011</td>
<td>0.88 in</td>
</tr>
<tr>
<td>Oct 22, 2012</td>
<td>0.71 in</td>
</tr>
<tr>
<td>Oct 31, 2014</td>
<td>0.14 in</td>
</tr>
<tr>
<td>Nov 2, 2015</td>
<td>0.64 in</td>
</tr>
</tbody>
</table>
## Dry Run vs First Flush
### San Vicente Creek Mouth

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Dry Run</th>
<th>First Flush</th>
<th>Water Quality Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E. Coli (MPN/100 mL)</strong></td>
<td>1595</td>
<td>6867</td>
<td>&lt;235 MPN/100 mL</td>
</tr>
<tr>
<td><strong>Enterococcus (MPN/100 mL)</strong></td>
<td>149</td>
<td>12033</td>
<td>&lt;104 MPN/100 mL</td>
</tr>
<tr>
<td><strong>NO$_3$-N (mg/L)</strong></td>
<td>0.1</td>
<td>0.5</td>
<td>&lt; 2.25 mg/L</td>
</tr>
<tr>
<td><strong>O-PO$_4$-P (mg/L)</strong></td>
<td>ND</td>
<td>ND</td>
<td>&lt;0.12 mg/L</td>
</tr>
<tr>
<td><strong>Copper (µg/L)</strong></td>
<td>ND</td>
<td>5</td>
<td>&lt;30 µg/L</td>
</tr>
<tr>
<td><strong>Lead (µg/L)</strong></td>
<td>ND</td>
<td>ND</td>
<td>&lt;30 µg/L</td>
</tr>
<tr>
<td><strong>Zinc (µg/L)</strong></td>
<td>ND</td>
<td>11</td>
<td>&lt; 200 µg/L</td>
</tr>
<tr>
<td><strong>TSS (mg/L)</strong></td>
<td>ND</td>
<td>473</td>
<td>&lt;500 mg/L</td>
</tr>
</tbody>
</table>

* Red indicates exceedance of water quality objectives
E. coli 2015

Detection Limit: 24,196 MPN/100 mL
WQO<235 MPN/100 mL
E. Coli: San Mateo County 2008-2015

MPN/100 mL

Year

WQO < 235 MPN/100 mL

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Copper: San Mateo County 2008-2015

- 7th Street
- Vallemar
- Weinke Way
- San Vicente Creek Mouth
- West Point
- Vassar
- Captistrano Street
- El Granada SD
- Surfer’s South

WQO<30 µg/L

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Zinc (Zn) 2015

WQO < 200 µg/L

San Mateo County Resource Conservation District
San Mateo County Resource Conservation District

Zinc: San Mateo County 2008 - 2015

WQO < 200 µg/L
Lead (Pb) 2015

- WQO < 30 ng/L

Sites:
- 7th Street
- Vallemar
- Weinke Way
- San Vicente Creek Mouth
- West Point
- Vassar
- Capistrano St
- El Granada
- Surfers
- Frenchmans Creek
- Piñonitos Creek Mouth
- Piñonitos Creek Main Bridge
- Arroyo Canada Verde Creek
Nitrate (NO₃-N) 2015

WQO < 2.25 mg/L
Orthophosphate (O-PO4) 2015

![Bar chart showing orthophosphate levels at various sites.](chart.png)

- WQO \leq 0.12 \text{ mg/L}

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O-PO4-P: San Mateo County 2008-2015

WQO < 0.12 mg/L
Total Suspended Solids 2015

mg/L

Site

San Mateo County Resource Conservation District

WQO < 500 mg/L

Year

7th Street
Vallemar
Weinke Way
San Vicente Creek Mouth
West Point
Vassar
El Granada SD
Captistrano
Surfer’s South

mg/L

SMC Results Summary

2015 summary (13 sites):
- Bacteria: 100% exceedance
- O-PO4: 85% exceedance
- Cu: 23% exceedance (West Point, Vassar, Vallemar)
- Zn: 15% exceedance (West Point, Vassar)
- Pb, NO3-N, TSS: 0% exceedance

2008-2015 summary (9 historic sites)
- Bacteria: 100% exceedance
- O-PO4: 67% exceedance. El Granada every year
- Cu: 47% exceedance. Vassar every year
- Zn: 16% exceedance. West Point exceeded most often
- TSS: 2% exceedance
- Pb, NO3-N: 0% exceedance
Historic Location Summary

- **Metals & Nutrients:** Lower nitrate and metals but similar O-PO4 to Monterey and Santa Cruz County

- **Bacteria:** SMC likely similar to Monterey County and Santa Cruz County?  
  - Different detection limits
Next Steps

- **Implement Best Management Practices**
  - Vegetated swales, permeable surface, education/outreach

- **Continue program**
  - 7 years in San Mateo vs 16 years in Santa Cruz and Monterey Counties
  - Make comparisons over time

- **Multi-year funding for cost-effectiveness**
Thank you!

Questions?

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