Orange County – Report of Waste Discharge
Landscape Change

- 75% Surface Flow to Pipes
- 5% Interflow
- 15% Evaporation
- 5% Infiltration
- 30% Evapotranspiration
There are four interrelated but separable effects of land-use changes on the hydrology of an area: changes in peak flow characteristics, changes in total runoff, changes in quality of water, and changes in the hydrologic amenities.

Luna Leopold, 1968
Municipal Stormwater Permits

The federal Clean Water Act requires that stormwater permits for discharges from municipal storm sewers:

- may be issued on a system- or jurisdiction-wide basis;
- shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers; and
- shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants.
Report of Waste Discharge

Introduction

State of the Environment

- Bacteria
- Nutrients
- Toxicity
- Total Dissolved Solids

Controlling Pollutant Sources – Countywide Programs

Controlling Pollutant Sources - Watershed Programs

Program Development

Recommendations
State of the Environment

Four key questions:

• Is our water safe to drink?
• Is it safe to swim in our waters?
• Is it safe to eat fish and shellfish from our waters?
• Are our aquatic ecosystems healthy?
Prioritization

• Raw exceedance frequencies provide only partial information

• CCME water quality index\(^1\) integrates
  ▪ Percent of indicators with exceedances
  ▪ Percent of measurements/tests with exceedances
  ▪ Magnitudes of exceedances
  ▪ Index produces a score from 0 – 1 (or 0 – 100) with higher scores reflecting lower overall exceedances
  ▪ Used widely (e.g., Central Coast Regional Board)

CCME Index

The graph shows the mean CCME Index for different categories: Bacteria, Nutrient, Dissolved Solids, Pesticides, and Metals, during dry weather and storm event conditions.
BACTERIA
Bacteria: Report Card Grades

Beach report card grades consistently high in dry weather
Bacteria: Beach Closures

Number of Beach Closures due to Sanitary Sewer Overflows

Year

# of SSO
Bacteria: Beach Advisories

Beach Mile Days of Postings Due to AB411 Exceedances 2000 - 2013

- Percentage of Beach Available for Recreational Use - 2002
  (3,354 Total BMD/year)
  - 91.9% Available for Recreational Use
  - 8.1% Posted Due to AB411 Standards Violations

- Percentage of Beach Available for Recreational Use - 2013
  (3,354 Total BMD/year)
  - 99.6% Available for Recreational Use
  - 0.4% Posted Due to AB411 Standards Violations
Bacteria: Sanitary Sewer Overflows

Number of Sanitary Sewer Overflows Reported

# of SSO


Year
<table>
<thead>
<tr>
<th>Incident Triggering CASC Activation</th>
<th>Receiving Waters</th>
<th>Date</th>
<th>Type</th>
<th>Volume Diverted to Sanitary Sewer (Gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanitary sewer force main rupture</td>
<td>Tijeras Creek/San Juan Creek/Doheny Beach</td>
<td>March 23, 2010</td>
<td>SSO (public)</td>
<td>2,500,000</td>
</tr>
<tr>
<td>Mobile home community, Lake Forest</td>
<td>Aliso Creek</td>
<td>June 25, 2010</td>
<td>SSO (private)</td>
<td>2,400</td>
</tr>
<tr>
<td>Sanitary sewer force main rupture</td>
<td>Buck Gully Creek/Little Corona Beach</td>
<td>July 2, 2010</td>
<td>SSO (public)</td>
<td>710,000</td>
</tr>
<tr>
<td>Manufacturer corporate HQ, Irvine</td>
<td>Peters Canyon Channel</td>
<td>January 13, 2011</td>
<td>Other (fountain discharge)</td>
<td>100,000</td>
</tr>
<tr>
<td>Residential apartment complex, Anaheim</td>
<td>Santa Ana River</td>
<td>April 12, 2012</td>
<td>SSO (private)</td>
<td>1,900</td>
</tr>
<tr>
<td>Residential apartment complex, Anaheim</td>
<td>Santa Ana River</td>
<td>April 18, 2012</td>
<td>SSO (private)</td>
<td>77,500</td>
</tr>
<tr>
<td>Packaging products manufacturer, Buena Park</td>
<td>Fullerton Creek/Coyote Creek/San Gabriel River</td>
<td>July 25, 2012</td>
<td>Other (clarifier discharge)</td>
<td>355,000</td>
</tr>
<tr>
<td>Ammonia refrigeration leak, Santa Ana</td>
<td>Santa Ana Delhi Channel</td>
<td>February 4, 2013</td>
<td>Other (ammonia discharge)</td>
<td>200</td>
</tr>
<tr>
<td>Industrial chemical facility fire, Santa Ana</td>
<td>Greenville-Banning Channel</td>
<td>August 28, 2013</td>
<td>Other (fire suppression runoff)</td>
<td>~3,000,000</td>
</tr>
<tr>
<td>Sanitary sewer pump station failure, Newport Beach</td>
<td>Santa Ana-Delhi Channel/Upper Newport Bay</td>
<td>August 31, 2013</td>
<td>SSO (public, mixed with channel water)</td>
<td>45,000</td>
</tr>
<tr>
<td>Hotel facility HVAC system discharge</td>
<td>Lane Channel</td>
<td>December 16, 2013</td>
<td>Other (HVAC discharge w/ dye)</td>
<td>140,000</td>
</tr>
</tbody>
</table>

Total: 6,932,000
Bacteria: Wet Weather Challenges

- Poorer conditions
- Larger flows
- Potential for new methods
  - Wet weather epidemiology study
  - Source tracking tools, including for in situ virus detection
Bacteria: TMDL Programs

- Bacteria TMDL Programs
  - Seeing significant dry weather progress through BMPs and water conservation/flow reduction efforts
  - Focus shifting to isolate source of remaining dry weather exceedances and on wet weather load reductions
    - Watershed Special Studies
      - Comprehensive Load Reduction Plan (CLRP)
      - BMP Effectiveness Study
      - Microbial Source Tracking
Bacteria: CLRP BMP Effectiveness Study

⇒ Horno Retarding Basin (2003)
  • Designed to reduce peak flows from ~1,800 acres of the Ladera Ranch Planned Community
  • Includes Water Quality Detention Basin (~8 acres) to treat dry weather and first-flush flows (up to 265 cfs)

⇒ Narco Channel Restoration (2005)
  • 1000ft of existing rock/earthen channel dredged and widened and revegetated with native plants
Bacteria: CLRP BMP Effectiveness Study

BMP Effectiveness - Bacteria Reductions (Enterococci)
Bacteria: Summary

- BMPs and overall flow reductions resulting in significant reductions in dry weather
- Successful dry weather bacteria BMPs appear ineffective in providing meaningful wet weather reductions
- Microbial source tracking may be a useful tool to assist with isolating remaining bacteria sources causing exceedances
- Overall reduction in the number of sewage spills correlates with a lower number of beach closures and increased recreational water use. (Countywide Area Spill Control Program – CASC)
- Decrease in the total number of beach mile days posted due to AB411 standards violations has increased beneficial use. Example: Doheny
NUTRIENTS
Exceedances widespread
Algal overgrowth less so but occurs in undeveloped areas as well
May contribute to harmful algal blooms
Nonpoint and diffuse sources such as leaching from upland soils and intrusions from shallow groundwater are increasingly important.

Nutrients can be readily transported in and out of various reservoirs (e.g., sediments, groundwater) and undergo complex biological transformation and cycling, making traditional pollutant control strategies less effective for nutrients.

Improved management strategies may contribute to further progress, particularly in streams and channels, by accounting for site-specific conditions, promoting Low Impact Development, and accounting for broader regional sources.
TOXICITY
Regional Toxicity Patterns

- Toxicity widespread but sporadic and at low levels
- No apparent trends over time

<table>
<thead>
<tr>
<th></th>
<th>% Stream Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceriodaphnia Reproduction</td>
<td>Open</td>
</tr>
<tr>
<td>Toxic</td>
<td>63.0</td>
</tr>
<tr>
<td>Nontoxic</td>
<td>37.0</td>
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</table>
Pesticides Most Likely Cause
Source Control: Pesticides

Summary of Toxicity - California Watersheds – SWRCB – 2010

• Of the 992 sites, 48% had at least 1 sample which exhibited toxicity
• With the exception of ammonia, all evaluations implicated pesticides, primarily OPs and more recently pyrethroids.

Analysis by U.C. Davis of new DPR rule making suggests that the regulations will largely--but not completely--end widespread water and sediment toxicity from pyrethroids in California's urban watersheds (Kelly Moran pers.comm.).
Pesticides are contributing to chronic toxicity;
Need to improve information on pesticide use.
Support source control approaches.
Metals are not an issue.
Geochemistry.
DISSOLVED SOLIDS
Persistent and widespread exceedances of total dissolved solids occur in channels and at discharge outfalls.
Natural sources in regional groundwater represent a large portion of elevated dissolved solids.

Understanding local geology is key to understanding sources of dissolved solids and the pathways they travel in the watershed.

While the flood control system provides one pathway for dissolved solids in groundwater to reach the surface, other natural pathways (such as artesian springs) exist and there is evidence of historically elevated dissolved solids levels in surface water in the region.

Determine significance of TDS as a stressor.

Investigate feasibility of mass balance study.
DRY WEATHER
RECONNAISSANCE & ID/IC
ID/IC Complaints & Enforcement

- Enforcement Actions:
  - 2008-09: 3,500
  - 2009-10: 3,581
  - 2010-11: 3,183
  - 2011-12: 2,877
  - 2012-13: 1,853

- Breakdown of Enforcement Actions:
  - Educational Letter
  - Cease and Desist Order
  - Notice of Non-compliance
  - Misdemeanor
  - Administrative Compliance Order
  - Infraction
  - Issuance of Citation
  - Other

Years:
- 2008-09: 658, 884, 216, 226, 26, 1, 12, 47
- 2009-10: 871, 1,116, 123, 332, 6, 13, 12
- 2010-11: 555, 1037, 56, 423, 12
- 2011-12: 442, 994, 76, 221, 0, 8, 51
- 2012-13: 452, 837, 57, 221, 2, 34
### NALs vs. Als (Dry Weather)

<table>
<thead>
<tr>
<th>Constituent</th>
<th># of NAL Exceedances</th>
<th>% of NAL Exceedances</th>
<th># of Reconnaissance Action Level Exceedances</th>
<th>% of Reconnaissance Action Level Exceedances</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
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<tr>
<td>TDS</td>
<td>42</td>
<td>93</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Dissolved Oxygen</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Turbidity</td>
<td>3</td>
<td>7</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Surfactants</td>
<td>3</td>
<td>7</td>
<td>14</td>
<td>5</td>
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<tr>
<td>Total Coliforms</td>
<td>24</td>
<td>53</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Fecal Coliforms</td>
<td>19</td>
<td>42</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Enterococcus</td>
<td>42</td>
<td>93</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Unionized Ammonia</td>
<td>3</td>
<td>7</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Total Nitrogen</td>
<td>41</td>
<td>91</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Total Phosphate</td>
<td>38</td>
<td>84</td>
<td>11</td>
<td>4</td>
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<tr>
<td>Cadmium</td>
<td>13</td>
<td>28</td>
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<td>0</td>
</tr>
<tr>
<td>Copper</td>
<td>1</td>
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<td>0</td>
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<td>Nickel</td>
<td>7</td>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Zinc</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total # of Site Visits</strong></td>
<td><strong>45</strong></td>
<td></td>
<td><strong>274</strong></td>
<td></td>
</tr>
</tbody>
</table>
NALs Program Summary:

- The current NALs program has made achievements in reducing anthropogenic sources of NALs constituents, but lacks the flexibility to re-prioritize sites or reach definitive endpoints.
- Source investigation resources are therefore confined to a limited number of outfall sites Countywide.
- Groundwater, geologic conditions, and other related discharge sources are an ongoing challenge to meeting the NALs utilizing the current Basin Plan Objectives.
- The current NALs program does not account for evaluating impacts to receiving waters, which could be utilized in a potential site prioritization program.
Dry Weather: Recommendation

**NALs Program Summary:**
- Reinstate Dry Weather Reconnaissance Program
Hydromodification
Hydromodification

Expansion in channel capacity needed to make the River’s surface area 70-percent green. The approximately “5 times the current width” illustration is meant to illustrate the width that could be necessary if only the channel were widened.
Hydromodification: Recommendation

➜ Implement an approach to hydromodification that is (pre)informed by a watershed analysis and channel-specific protection goals.

➜ Pending completion of the analysis, land development projects discharging to engineered channels are exempted from requirements.
Runoff Retention - Soils
LID Hierarchy: Recommendation

- Incorporate Integrated Water Resource Management (IRWM) element into land planning.
- Modify LID Hierarchy to establish equivalency of “On-Site BMP” and “Off-Site BMP” solutions.
Receiving Water Limitations (RWL)
RWL: Recommendation

A.1 Discharge Prohibition
A.2 Receiving Waters Limitation
B.3.c Compliance Option
Questions (?)