Rainbow Creek Nutrient TMDL
Public Workshop #4

Presented by
Alan Monji and Benjamin Tobler
San Diego Regional Water Quality Control Board

November 17, 2004
Overview of Rainbow Creek Nutrient TMDLs

- TMDL Report (Alan Monji)
- Implementation Plan (Ben Tobler)
- Questions for the Regional Board

Workshop is being recorded
Rainbow Creek Nutrient TMDLs – Presentation Overview

- Project Update
- Site History
- Problem Statement
- Numeric Targets
- Source Assessment
- Linkage Analysis
- Allocations
- TMDL Calculations
Rainbow Creek TMDL – Update

- Revised TMDL Report (Since May 2002)
  - Background Nutrient Calculations
  - Economics Section (Ch 12)
  - Response to Comments (Ch 11, App M and N)
  - Caltrans (Ch 4 and 6)
  - Legal Authority, Implementation Action Plan and Implementation Monitoring (Ch 8, 9, 10)
Rainbow Creek TMDL – Update

- **Scientific Peer Review #2 (July 2004)**
  - Comments and Response to Comments
  - App N


- **Public Workshop #4 - Today**

- **Board Hearings (Dec 2004 and Feb 2005)**
Rainbow Creek TMDL – Brief History

- Historical Nitrogen concentrations in the creek
  - Prior to 1980s 0.99 mg nitrate as N/L
  - 1986: Average conc 48.7 mg nitrate as N/L
    » Agricultural Practices increase

- Santa Margarita River
  - Drinking water supply Camp Pendleton
  - Eutrophic conditions expected in river and lagoon
Rainbow Creek TMDL – Brief History

- **303 (d) list of Impaired Waterbodies**
  - 1996 - Eutrophic Conditions
  - 2002 – Total Nitrogen and Total Phosphorus (Nutrients)
  - USEPA approved update

- **Clean Water Act**
  - Priority Rankings
  - Establish TMDLs for impaired waterbodies
Overview of TMDL Process

- Problem Statement
- Numeric Targets
- Source Assessment
- Linkage Analysis
- Allocations
- TMDL Calculations
  - \( \text{TMDL} = \text{Sum LA} + \text{Sum WLA} + \text{MOS} \)
Problem Statement

- Elevated TN, TP, and NO₃ Above the WQO
- Beneficial Uses Affected
  - MUN, REC1, REC2, WARM, COLD, & WILD
- Occurrence of Excessive Algal Growth
Numeric Targets

- Biostimulatory Substances Objective
  - TN = 1.0 mg/L
  - TP = 0.1 mg/L

- Nitrate in Municipal Supply
  - NO$_3$-N = 10 mg/L
Figure A-3: Rainbow Creek sampling sites with topography and water courses.
Background Nutrient Levels

- **City of San Diego Data (background/reference):**
  - TN Mean = 0.47 mg/L, (SE = 0.09, n = 12)
  - TP Mean = 0.07 mg/L, (SE = 0.01, n = 12)
  - Chpt 4, App D and E

- **Biostimulatory Substances WQO**
  - TN = 1.0 mg/l
  - TP = 0.1 mg/l
Reference Streams In San Diego County

- Wilson Creek
- Pine Valley Creek
- Kitchen Creek
- San Vincente Reservoir
- Cottonwood Creek
- Conejos Creek
- Boulder Creek
- San Diego River
- Cedar Creek
- Bloomdale Creek
- Santa Ysabel Creek
Other Nutrient Criteria

- USEPA Recommended Nutrient Criteria:
  - TN = 0.5 mg/L and TP = 0.03 mg/L
  - Potential Reference Conditions

- Other Nutrient Studies

  Dodds 1998:
  - TN = 0.9 mg/L and TP = 0.04 mg/L

  Dodds & Welch 2000:
  - TN = <3 mg/L and TP = <0.4 mg/L
Regional Nutrient Criteria for Central and Southern Calif.

Adoption of New Nutrient Criteria
- TMDL recalculated
- Draft Basin Plan Amendment, Att. A

http://www.epa.gov/ost/standards/nutrient.html
## Source Assessment

<table>
<thead>
<tr>
<th>Source Type</th>
<th>Method of Estimation</th>
<th>Annual TN Load Estimate kg N/yr</th>
<th>Annual TP Load Estimate kg N/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Uses (surface runoff)</td>
<td>Export Coefficients ∈ Acreage</td>
<td>2,662</td>
<td>262</td>
</tr>
<tr>
<td>Caltrans I-15 (storm water runoff)</td>
<td>Runoff Volume ∈ Typical Highway Concentrations</td>
<td>187</td>
<td>12</td>
</tr>
<tr>
<td>Background (surface runoff)</td>
<td>Flow ∈ Regional Background Concentration</td>
<td>779</td>
<td>116</td>
</tr>
<tr>
<td>Septic Tank Disposal Systems (ground water)</td>
<td>Flow ∈ Baseflow Concentrations</td>
<td>200</td>
<td>N/A</td>
</tr>
<tr>
<td>Air Deposition (surface water)</td>
<td>Deposition Rate ∈ area of surface water</td>
<td>40</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>3,868</strong></td>
<td><strong>392</strong></td>
</tr>
</tbody>
</table>
Annual Total Nitrogen by Source Type

- **Land Uses**: 69%
  - Background: 20%
  - Septic Tank Disposal Systems: 5%
- **Highway Runoff**: 5%
- **Air Deposition**: 1%
- **Background**: 20%

Nov 17, 2004 Rainbow Creek TMDL
TMDL Calculations

- **Low and Moderate-High Flows**: Numeric Target = TMDL
  - TN TMDL = 1,658 kg/yr
  - TP TMDL = 165 kg/yr

- **Very High Flows (≥ 40 cfs) Excluded**
  - Very high magnitude flows
  - Occur less than 2% of the time
Load Allocations

In summary, the TMDL equation is:

$$TMDL = \sum(WLA) + \sum(LA) + \text{Background} + \text{MOS}$$

<table>
<thead>
<tr>
<th></th>
<th>Total Nitrogen</th>
<th>Total Phosphorus</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\sum WLA$</td>
<td>82 kg N/yr</td>
<td>8 kg P/yr</td>
</tr>
<tr>
<td>$\sum LA$</td>
<td>714 kg N/yr</td>
<td>33 kg P/yr</td>
</tr>
<tr>
<td>Background</td>
<td>779 kg N/yr</td>
<td>116 kg P/yr</td>
</tr>
<tr>
<td>MOS (5%)</td>
<td>83 kg N/yr</td>
<td>8 kg P/yr</td>
</tr>
<tr>
<td>TMDL</td>
<td>1,658 kg N/yr</td>
<td>165 kg P/yr</td>
</tr>
</tbody>
</table>
## Total Nitrogen WLA and LA

<table>
<thead>
<tr>
<th>Source</th>
<th>Current Annual Load Kg N/Yr</th>
<th>Annual Load Kg N/Yr</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Point Sources</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caltrans Highway Runoff</td>
<td>187</td>
<td>49</td>
<td>74</td>
</tr>
<tr>
<td>Unidentified Sources and Future Point Sources</td>
<td></td>
<td>33</td>
<td></td>
</tr>
<tr>
<td><strong>Non Point Sources</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial Nurseries</td>
<td>507</td>
<td>116</td>
<td>77</td>
</tr>
<tr>
<td>Agricultural Fields</td>
<td>655</td>
<td>151</td>
<td>77</td>
</tr>
<tr>
<td>Orchards</td>
<td>790</td>
<td>182</td>
<td>77</td>
</tr>
<tr>
<td>Park</td>
<td>7</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>Residential</td>
<td>650</td>
<td>149</td>
<td>77</td>
</tr>
<tr>
<td>Urban Areas</td>
<td>53</td>
<td>27</td>
<td>50</td>
</tr>
<tr>
<td>Septic Tank Disposal Systems</td>
<td>200</td>
<td>46</td>
<td>77</td>
</tr>
<tr>
<td>Air Deposition</td>
<td>40</td>
<td>40</td>
<td>0</td>
</tr>
</tbody>
</table>
## Total Phosphorus WLA and LA

<table>
<thead>
<tr>
<th>Source</th>
<th>Current Annual Load Kg P/Yr</th>
<th>Annual Load Kg P/Yr</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Point Sources</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caltrans Highway Runoff</td>
<td>12</td>
<td>5</td>
<td>58</td>
</tr>
<tr>
<td>Unidentified Sources and Future Point Sources</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Non Point Sources</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial Nurseries</td>
<td>27</td>
<td>3</td>
<td>90</td>
</tr>
<tr>
<td>Agricultural Fields</td>
<td>35</td>
<td>4</td>
<td>90</td>
</tr>
<tr>
<td>Orchards</td>
<td>63</td>
<td>6</td>
<td>90</td>
</tr>
<tr>
<td>Park</td>
<td>0.2</td>
<td>0.1</td>
<td>50</td>
</tr>
<tr>
<td>Residential</td>
<td>125</td>
<td>12</td>
<td>90</td>
</tr>
<tr>
<td>Urban Areas</td>
<td>11</td>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>Air Deposition</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
Regulatory Framework

- **Point Source Discharges**
  - Caltrans
    - Storm water runoff from I-15
    - MS4 NPDES Storm Water Permit
  - Calif Dept of Forestry and Fire Protection
    - Rainbow Conservation Camp - wastewater treatment plant
    - Waste Discharge Requirements (WDR)
  - County of San Diego
    - Urban runoff
    - MS4 NPDES Storm Water Permit
Nonpoint Source Discharges

- CA Nonpoint Source Pollution Control Program, 1999
- CA Policy for Implementation and Enforcement of the NPS Control Program, 2004
  - Third-Party Regulatory Based Approach
  - MAA with County of San Diego
Nonpoint Source Discharges

- Commercial nurseries
- Agricultural fields
- Orchards
- Parks
- Residential
- Urban
- Septic tank disposal systems
Implementation Action Plan

Objectives

- **Mandate point source waste load reductions in NPDES Permits**
- **Mandate NPS nutrient load reductions from the 7 land use areas**
- **Promote establishment of a MAA between RB and County**
Implementation Action Plan
Objectives - Continued

- *Promote establishment of a MOU between RB and other agencies, organizations, and universities*
- *Establish mechanisms to track management measures*
Implementation Schedule

- **Phased Load Reduction**
  - 20% Reduction Every 4 Years for 12 Years
  - 14% Reduction in final 4 Years
  - 16 Years Total Duration
## Implementation Schedule (TN)

<table>
<thead>
<tr>
<th>Source</th>
<th>Annual Total Nitrogen Load Allocations</th>
<th>-20% 2009 kg/yr</th>
<th>-20% 2013 kg/yr</th>
<th>-20% 2017 kg/yr</th>
<th>-14% 2021 kg/yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Load Allocations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caltrans highway runoff</td>
<td></td>
<td>122</td>
<td>49</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>Unidentified &amp; future point sources</td>
<td></td>
<td>33</td>
<td>33</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>Load Allocations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial nurseries</td>
<td></td>
<td>396</td>
<td>315</td>
<td>202</td>
<td>116</td>
</tr>
<tr>
<td>Agricultural fields</td>
<td></td>
<td>511</td>
<td>405</td>
<td>261</td>
<td>151</td>
</tr>
<tr>
<td>Orchards</td>
<td></td>
<td>617</td>
<td>480</td>
<td>315</td>
<td>182</td>
</tr>
<tr>
<td>Park</td>
<td></td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Residential areas</td>
<td></td>
<td>507</td>
<td>401</td>
<td>260</td>
<td>149</td>
</tr>
<tr>
<td>Urban areas</td>
<td></td>
<td>40</td>
<td>27</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Septic tank disposal systems</td>
<td></td>
<td>200</td>
<td>100</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>Air deposition</td>
<td></td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Background</td>
<td></td>
<td>779</td>
<td>779</td>
<td>779</td>
<td>779</td>
</tr>
<tr>
<td>MOS (not allocated)</td>
<td></td>
<td>83</td>
<td>83</td>
<td>83</td>
<td>83</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3,333</td>
<td>2,715</td>
<td>2,098</td>
<td>1,658</td>
</tr>
</tbody>
</table>
Implementation Actions

- Regional Board
- County of San Diego
- Caltrans
- CA Dept. Forestry & Fire Protection
Regional Board Actions

- Request SWRCB amend Caltrans permit to incorporate nutrient WLA
- Issue 13225 to County to submit NRMP
- Establish Management Agency Agreement (MAA) with County
- Issue 13225 to County for groundwater investigation
Regional Board Actions (continued)

- **CA Dept. of Forestry**
  - Issue 13267 for investigation of their discharge

- **Establish MOU with other Agencies or Organizations as needed**
  - US Dept. of Agriculture
  - Mission Resource Conservation District
  - UC Cooperative Extension
Regional Board Actions (continued)

- *Issue WDRs, Waivers, and Discharge Prohibitions*
- *Take Enforcement Actions*
- *Review and Revise Existing WDRs*
- *Recommend High Priority for Grants*
- *Incorporate WC Section 13291 Regulations in Basin Plan*
County of San Diego Actions

- Control MS4 Discharges
- Submit & Implement Nutrient Reduction Management Plan (§13225)
- Submit GW Investigation Workplan and Report (§13225)
- Establish MAA with Regional Board
Caltrans

- **Meet Waste Load Allocations**
  - *NPDES Permit (Order No. 99-06-DWQ)*
- **Submit Progress Reports**
CA Dept. Forestry & Fire Protection
– Rainbow Conservation Camp

- Investigate Percolation Ponds and Report to Regional Board (§13267)
  - Evaluate discharges
  - Estimate nutrient loads from groundwater originating from septic systems and ponds
# Economic Considerations

<table>
<thead>
<tr>
<th>Item</th>
<th>First Year Cost(^1)</th>
<th>Subsequent Annual Cost(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop/Revise NRMP</td>
<td>$10,000 - $50,000</td>
<td>$2,000 - $10,000</td>
</tr>
<tr>
<td>Surface Water Monitoring Program(^2)</td>
<td>$70,600 - $125,000</td>
<td>$70,600 - $125,000</td>
</tr>
<tr>
<td>Ground Water and Septic Investigation Program(^3)</td>
<td>$54,000 - $102,500</td>
<td>$31,000 - $58,000</td>
</tr>
<tr>
<td>Equipment and Outreach(^4)</td>
<td>$45,500 - $66,000</td>
<td>$9,000 - $20,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$180,100 - $343,500</strong></td>
<td><strong>$112,600 - $213,000</strong></td>
</tr>
</tbody>
</table>
Contact Information

Alan Monji
858-637-7140
Amonji@waterboards.ca.gov

Benjamin Tobler
858-467-2736
Btobler@waterboards.ca.gov
Rainbow Creek Nutrient TMDLs

- Technical TMDLs
- Implementation Plan
- Questions?