# Reasonable Assurance Analysis - Revisions for Six EWMPs:
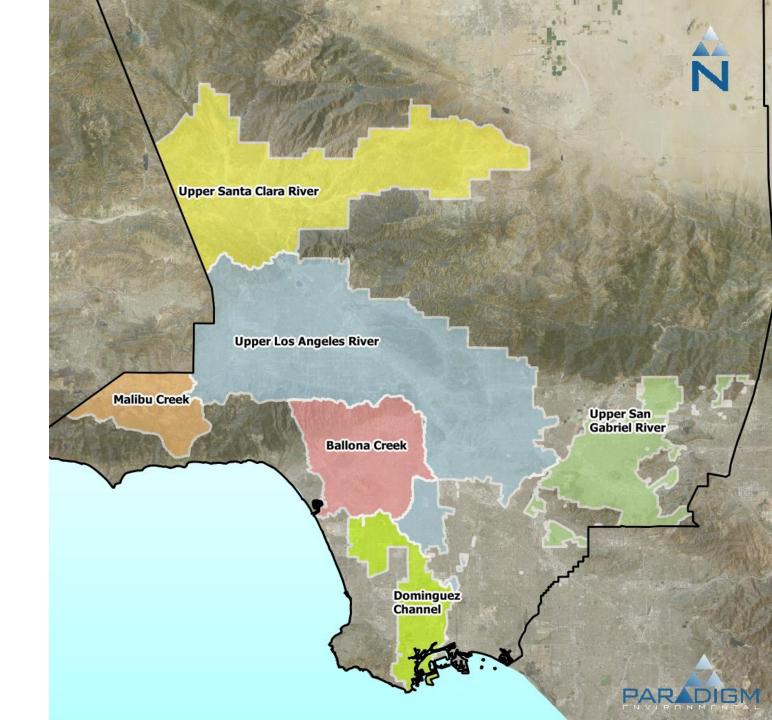## Upper Los Angeles River, Ballona Creek, Malibu Creek, Upper San Gabriel River and Upper Santa Clara River, and Dominguez Channel

Dustin Bambic, PH, Paradigm Environmental

PARADIGM
ENVIRONMENTAL

# EWMPs Covered

- Upper Los Angeles River
- Upper San Gabriel River
- Upper Santa Clara River
- Malibu Creek
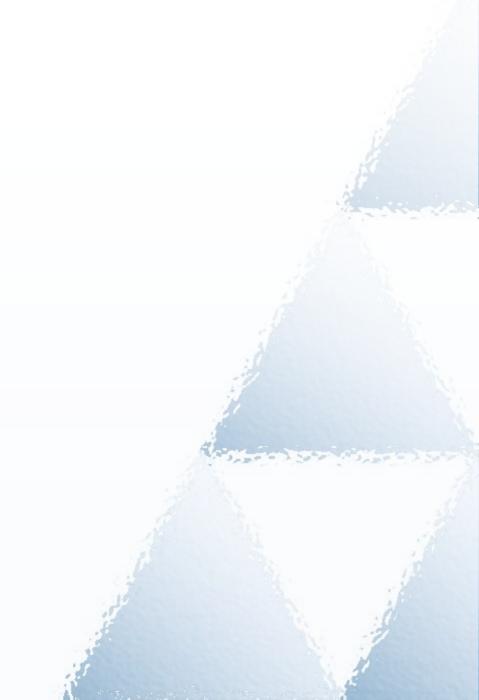- Ballona Creek
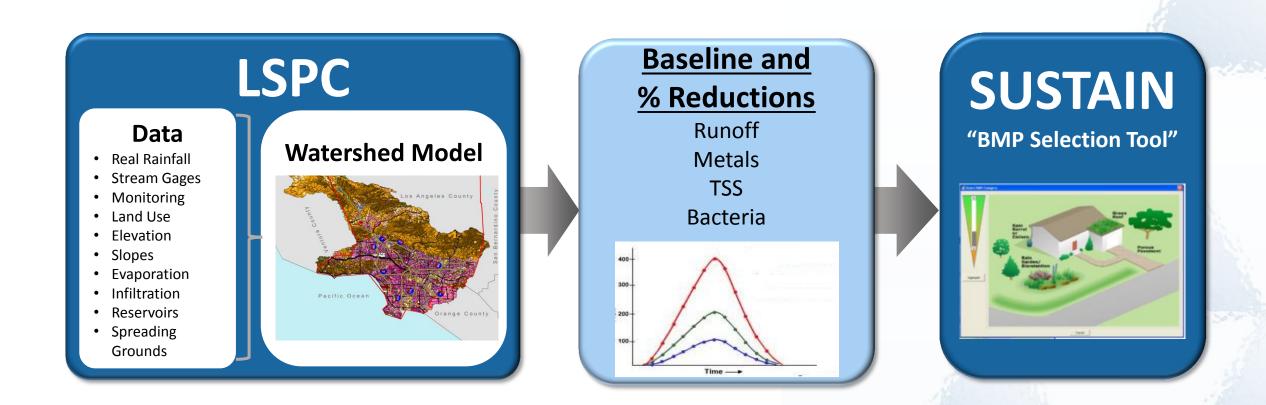- Dominguez Channel

# Overview

- Recap of Process

- Key topics:
  - Comparisons to RAA Guidelines
  - Validation demonstration
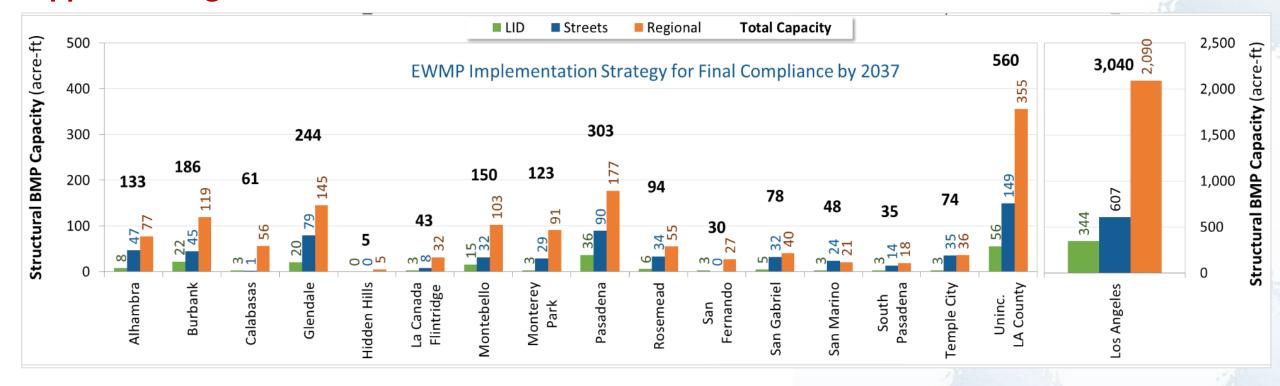
# Recap of RAA Process

# Watershed Management Modeling System (WMMS)

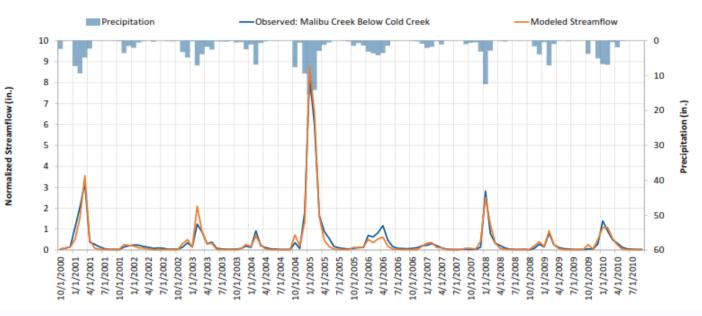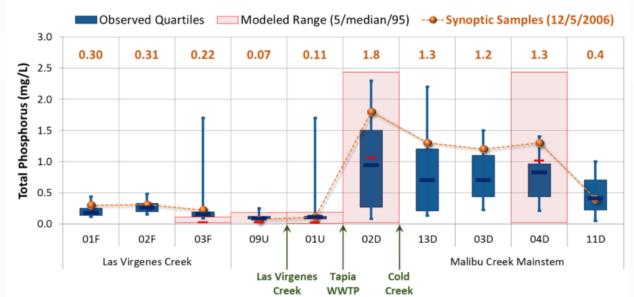# EWMP Implementation Strategy

## Upper Los Angeles River EWMP

# Key Topics:
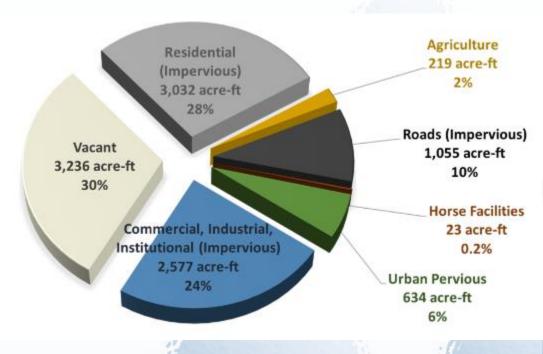
## Comparisons to RAA Guidelines

# Detailed Calibration Efforts





## Malibu Creek EWMP

# Calibration Criteria

| Model parameters | % Difference between simulated and observed values | | |
|---|---|---|---|
| | Very Good | Good | Fair (lower bound, upper bound) |
| Hydrology/Flow | <10 | 10-15 | 15-25 |
| Sediment | <20 | 20-30 | 30-45 |
| Water Temperature | <7 | 8-12 | 13-18 |
| Water Quality/Nutrients | <15 | 15-25 | 25-35 |
| Pesticides/Toxics | <20 | 20-30 | 30-40 |

Based on HSPF experience by A.S. Donigian, Jr., prepared for USEPA (2000)

**From Regional Board RAA Guidelines**

# Calibration Metrics

**Upper LA River EWMP**

| Location | Model Period | Hydrology Parameter | Modeled vs. Observed | RAA Guidelines Performance Assessment |
|---|---|---|---|---|
| Los Angeles River at Wardlow Avenue | 10/1/2002 – 9/30/2011 | Total Annual Volume | 20.1% | Fair |
| | | Highest 10% of Flows | 6.0% | Very Good |
| | | Annual Storm Volume | 19.6% | Fair |
| Los Angeles River at Tujunga Wash | 10/1/2002 – 9/30/2011 | Total Annual Volume | 5.2% | Very Good |
| | | Highest 10% of Flows | -22.1% | Fair |
| | | Annual Storm Volume | -2.8% | Very Good |
| Los Angeles River at Arroyo Seco | 10/1/2002 – 9/30/2011 | Total Annual Volume | 17.9 | Fair |
| | | Highest 10% of Flows | -3.8% | Very Good |
| Santa Anita Wash at Longdem Avenue | 10/1/2002 – 9/30/2011 | Total Annual Volume | -7.3% | Very Good |
| | | Highest 10% of Flows | -22.9% | Fair |
| | | Annual Storm Volume | -1.4% | Very Good |
| Arcadia Wash Below Grand Avenue | 10/1/2002 – 9/30/2011 | Total Annual Volume | 3.5% | Very Good |
| | | Annual Storm Volume | -8.5% | Very Good |
| Eaton Wash Below Grand Avenue | 10/1/2002 – 9/30/2011 | Total Annual Volume | 7.9% | Very Good |
| | | Annual Storm Volume | 7.5% | Very Good |
| Verdugo Wash at Estelle Avenue | 10/1/2002 – 9/30/2011 | Total Annual Volume | -5.8% | Very Good |
| | | Highest 10% of Flows | -9.0% | Very Good |
| Burbank Western Channel at Riverside Drive | 10/1/2002 – 9/30/2011 | Total Annual Volume | -16.6% | Fair |
| | | Annual Storm Volume | 0.4% | Very Good |
| Compton Creek Near Spring Street | 10/1/2002 – 9/30/2011 | Total Annual Volume | 0.8% | Very Good |
| | | Highest 10% of Flows | -14.2% | Good |
| | | Annual Storm Volume | -4.8% | Very Good |

Note: for each station, at least one of the following calibration metrics achieved an assessment of "Fair" or better: Total Annual Volume, Highest 10% of Flows or Annual Storm Volume.

# Future Refinements during Adaptive Management

- Monitoring data from Coordinated Integrated Monitoring Programs

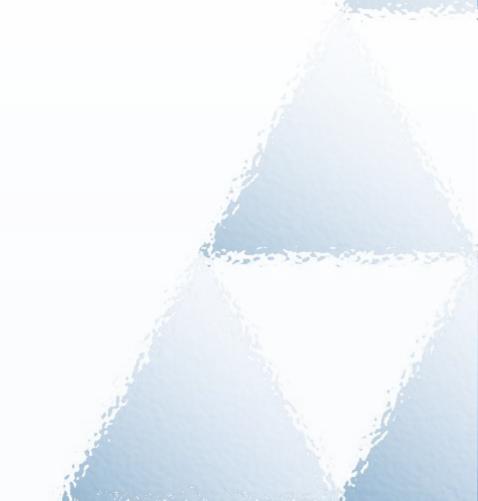- Monitoring data collected by other programs (e.g., POTWs)

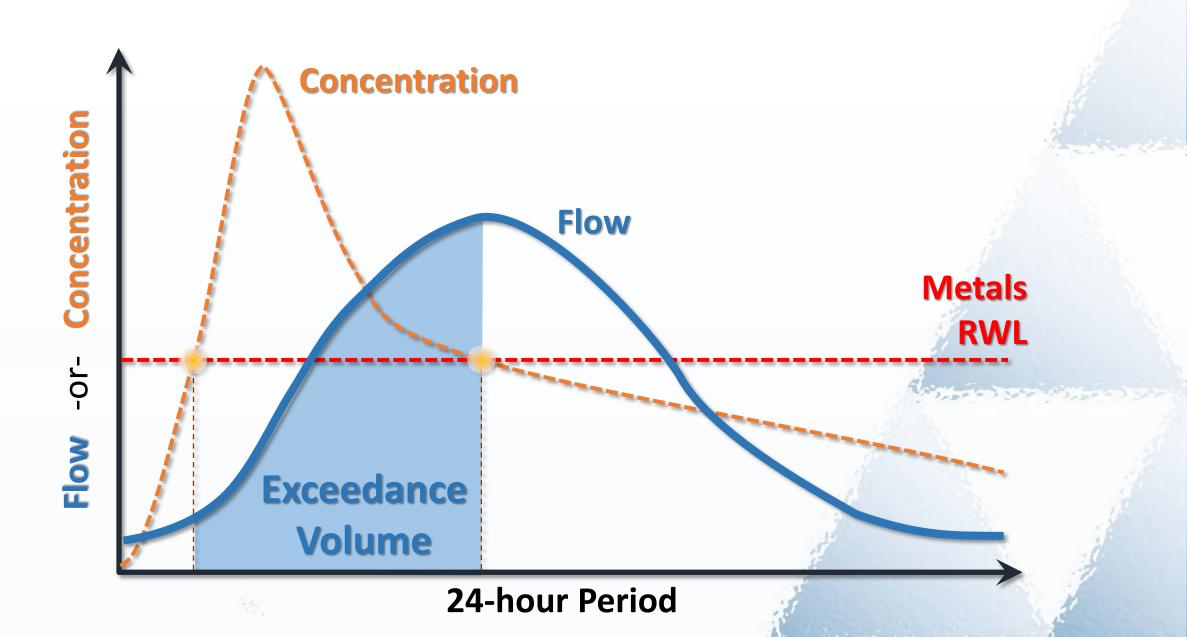- Hydrologic data for releases impoundments / dams
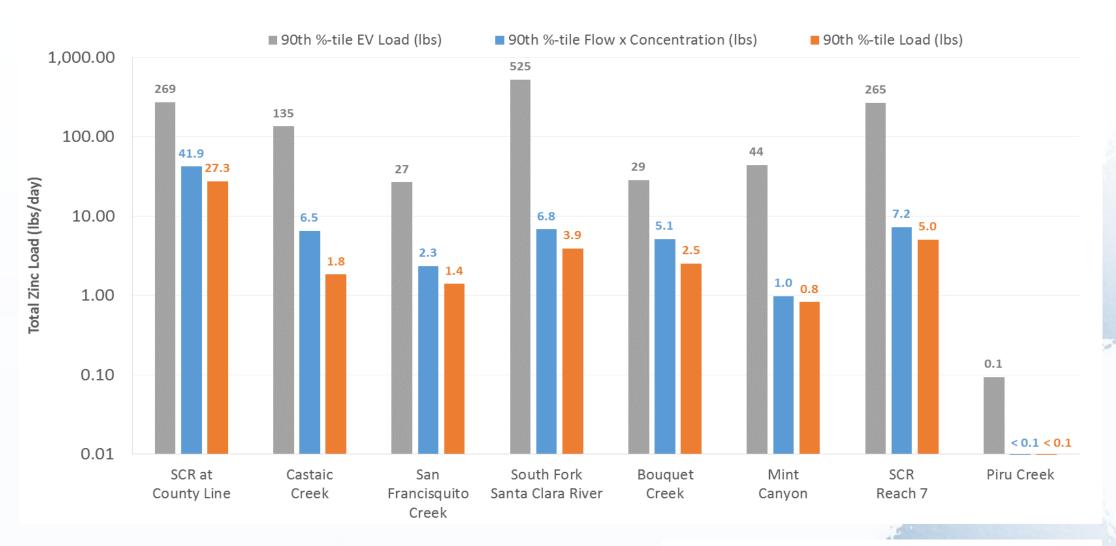
# Key Topics:

Validation Demonstration
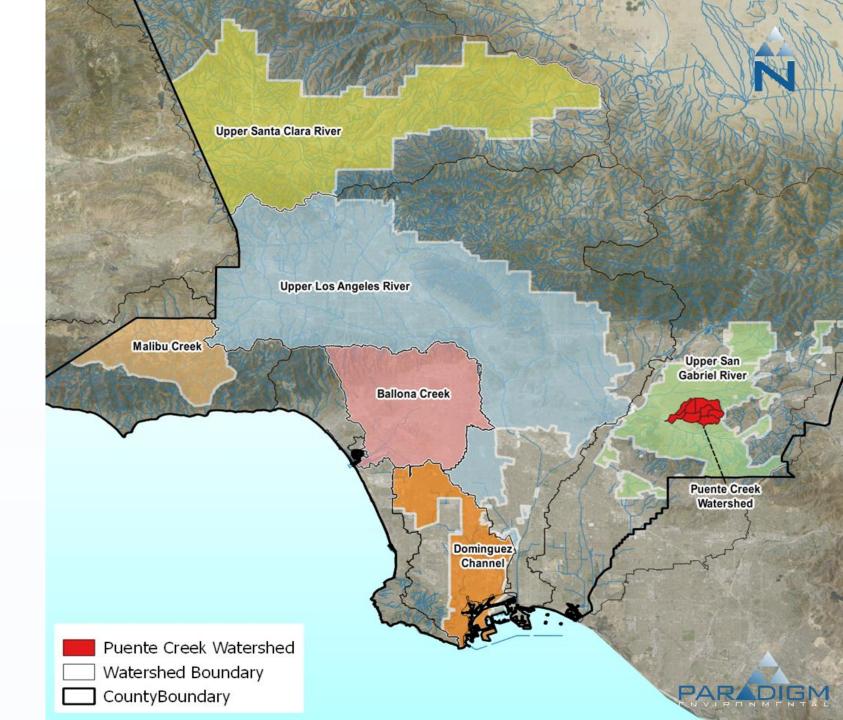
# Exceedance Volume: Comparison to RAA Guideline Metrics

**Upper Santa Clara River EWMP**

# Pollutant Reductions by BMPs

| Assessment Area | Scenario | Runoff Volume (ac-ft) | *E. coli* (MPN) | Total Lead (lbs) | Total Zinc (lbs) | % Total Zinc Reduction |
|---|---|---|---|---|---|---|
| Dominguez Channel | Baseline | 756.0 | 9.3E+15 | 32.0 | 517.1 | 86.8% |
| | with BMPs | 216.1 | 2.6E+15 | 4.1 | 68.4 | |
| Dominguez Channel Estuary | Baseline | 614.6 | 1.2E+16 | 21.4 | 401.2 | 87.6% |
| | with BMPs | 169.8 | 3.2E+15 | 2.4 | 49.6 | |
| Los Angeles Harbor | Baseline | 374.7 | 6.1E+15 | 9.9 | 197.3 | 84.1% |
| | with BMPs | 137.1 | 2.1E+15 | 1.5 | 31.3 | |
| Machado Lake | Baseline | 117.5 | 1.5E+15 | 4.4 | 73.2 | 10.1% |
| | with BMPs | 105.8 | 1.3E+15 | 4.0 | 65.8 | |
| Wilmington Drain | Baseline | 160.6 | 1.8E+15 | 6.8 | 108.3 | 49.6% |
| | with BMPs | 84.8 | 1.0E+15 | 3.4 | 54.6 | |
| Upper Los Angeles River | Baseline | 8.9 | 2.5E+14 | 0.2 | 5.6 | 77.2% |
| | with BMPs | 3.2 | 8.6E+13 | 0.1 | 1.3 | |

**Dominguez Channel EWMP**

Regional Instream Validation Example:
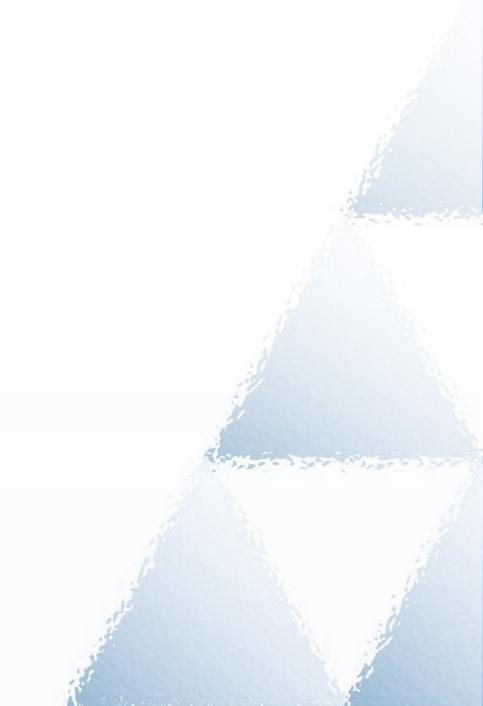
Puente Creek

# Regional Validation:  EWMP Effectiveness



**Puente Creek**

# Conclusions

# Conclusions

- EWMP RAAs are the most advanced stormwater quality modeling efforts conducted to date, anywhere

- Review by Regional Board staff was comprehensive
    - Many additional outputs provided
    - Commitments to refine models in future
    - First-of-its-kind validation example

- Look forward to moving into EWMP implementation phase