
CRAFTWATER
wsp
Council for Watershed Health
SGVCOG
Upper Los Angeles River Watershed Management Area Fire Effects Study

Agenda

- Study Overview
- Data Analysis
- Fire Effects Model
- Resilient BMP Design Implications
- Tools & Resources Available


Study
Overview

Fire Effects Study Recap: Pathway to Final Outcomes and Report Updates

Monitoring Plan & QAPP | Historical Database Compilation | New Monitoring | Data Analysis & Modeling | Reporting

Study Objectives

- **Understand** post-fire runoff contaminant loading
- **Compare** pollutant loads in burned vs. unburned areas
- **Identify** how long post-fire runoff effects persist

Historical Data

- **12** programs across the region
- **20+** years of data *(2001–2025)*
- **7** constituent categories

Field Sampling

- **3** specific fire events

  5 dry & 6 wet weather sampling events

- **49** post-fire samples collected

Data Analysis & Modeling

- **Summarized** new data sources, analyses
- **Expanded** watershed modeling scenarios
- **Considered** additional BMP performance components

Reports & Deliverables

- Field/Lab Reports
- *Watershed Model Report*
- *BMP Model Report*
- *Final Report*
- **Updated** Watershed, BMP & Final Reports (2026)

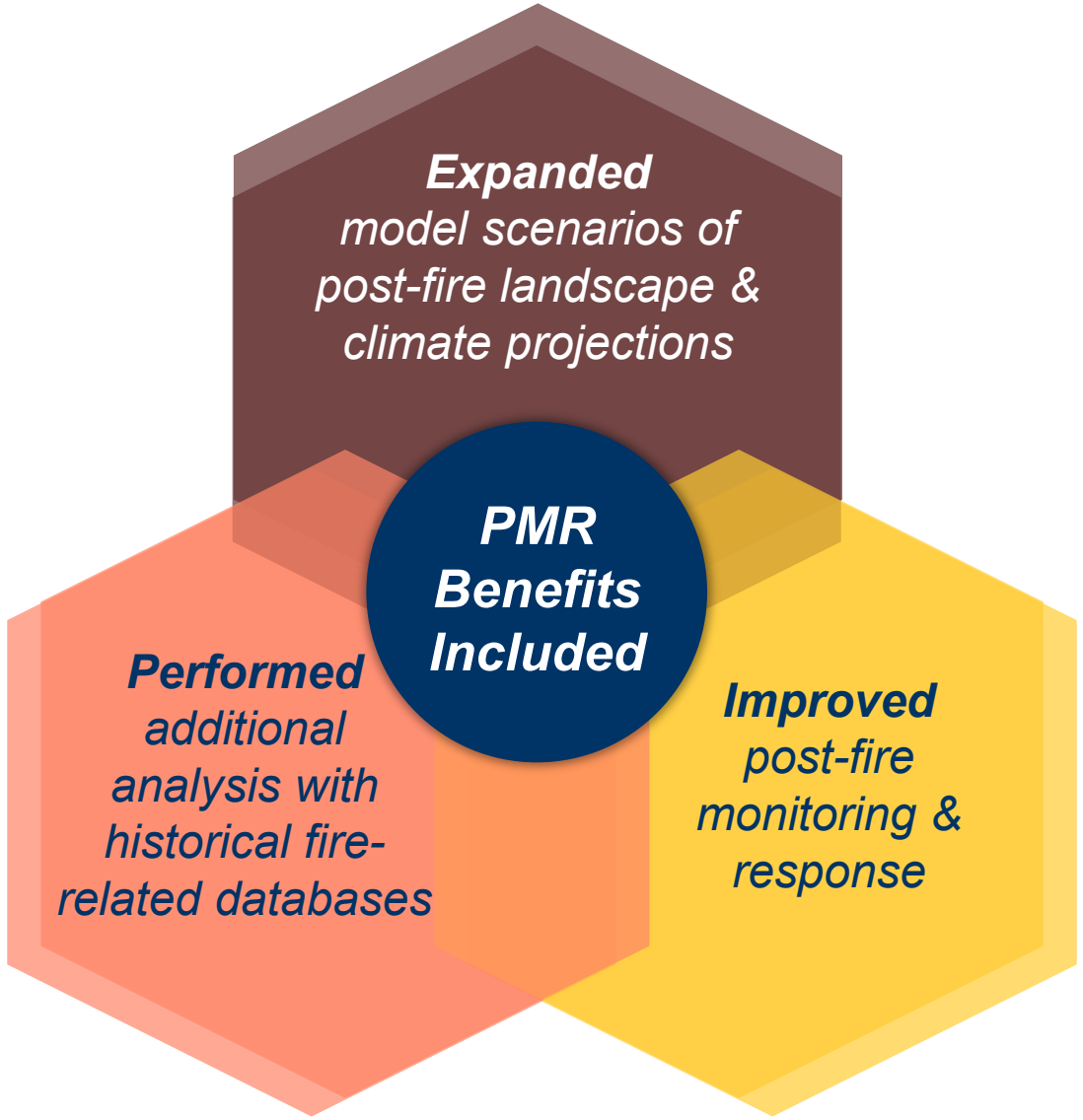
Benefits of the ULAR Fire Effects Study PMR

This study expansion:

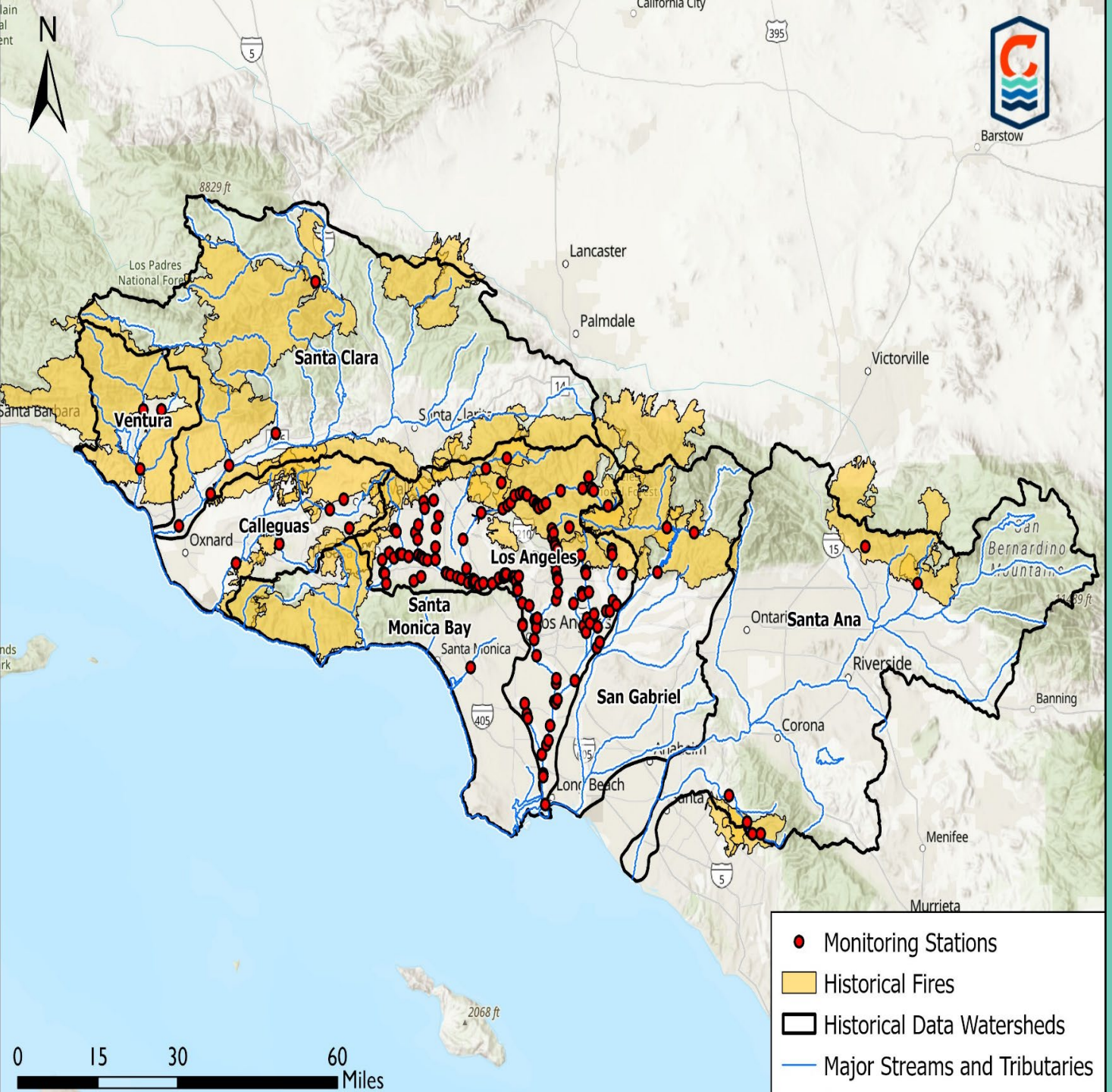
Augmented fire-related databases via monitoring

Modeled post-fire water quality impacts

Informed more resilient BMP design




Data Analysis



Historic Fires Analyzed

5
Previous Monitoring Programs

7
Added Monitoring Programs

Linked monitoring data with fires

Evaluated downstream hydrology and water quality

Identified trends for model development

General Analysis Approach

Processed & Integrated
Old & New Data

Analyzed
Spatial Data of Historical Fires & Data Drainage Areas

Evaluated
Water Quality Data Relative to Supplemental Characteristics

Analyzed
Spatial and Water Quality Data to Determine Trends

Supplemental Characteristics:

Constituent Concentration Trends Post-Fire

PRE- & POST-FIRE COMPARISON

Analyzed across (4) fire recovery periods:

- 0 - 1
- 1 - 2
- 2 - 10
- > 10 *

years after a fire

EVALUATED

- Statistical Strength of Trends
- Water Quality Across Constituent Groups
- Constituent Trends Over Time Since Fire Occurrence

RESULTS

SEDIMENT & NUTRIENTS:
Modest post-fire concentration decreases**

METALS:
Stronger post-fire concentration decreases**
(specifically total metals)

BACTERIA & INORGANICS:
Bacteria concentration decreases**; Inorganic trends inconclusive

** or unburned, assuming recovery within 10 years*

***with time from the fire occurrence*

Statistical Analysis

Linear Regression

Strength & direction of linear trends

Generalized Linear Mixed Model

Water quality predictors by **linear** relationships

Generalized Additive Mixed Model

Water quality predictors by **non-linear** relationships

Statistical Analysis

Linear Regression

TSS: **No Strong** Correlation

NO3 & NO2: **Strong** Correlation

Land Use Characteristics

Phosphorus: **Inconclusive** Trends

Metals: **Strong** Correlation

Wildland-Urban Interface & Soil Class D

Bacteria: **Weak** Correlations

Organics: **Strong** Correlations

Days Since Ignition, Slope, & Land Use Characteristics

Generalized Linear Mixed Model

Top characteristics with most linear correlations:

(1) Days Since Ignition
(2) Fire Rank
(3) Wet Weather Total Precipitation
(4) Total Daily Precipitation on Sample Date
(5) Land Use: Deciduous Forest

Generalized Additive Mixed Model

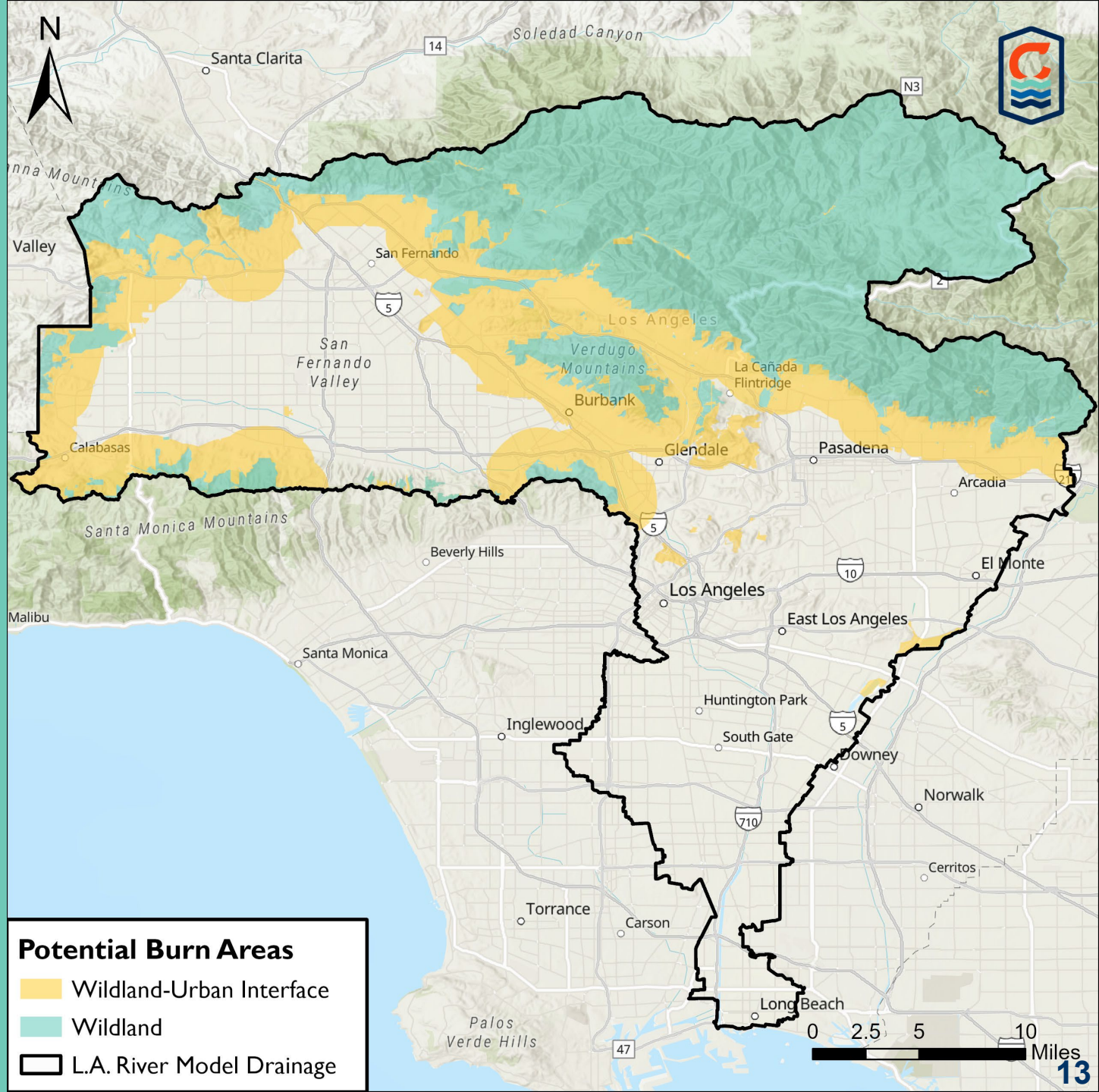
Top characteristics with most influence on constituent concentrations:

(1) Days Since Ignition
(2) Slope
(3) Burned Area Ratio
(4) Ignition Date
(5) Percent Drainage Area Burned


Fire Effects
Model

Expanded Modeling Framework

- **Severity**
- **Burned Area & Land Use**
- **Proximity to Assessment Points**
- **Atmospheric Deposition**
- **Critical Weather Profiles**



Critical Weather Profiles

WY 2010-2019
Historic Period

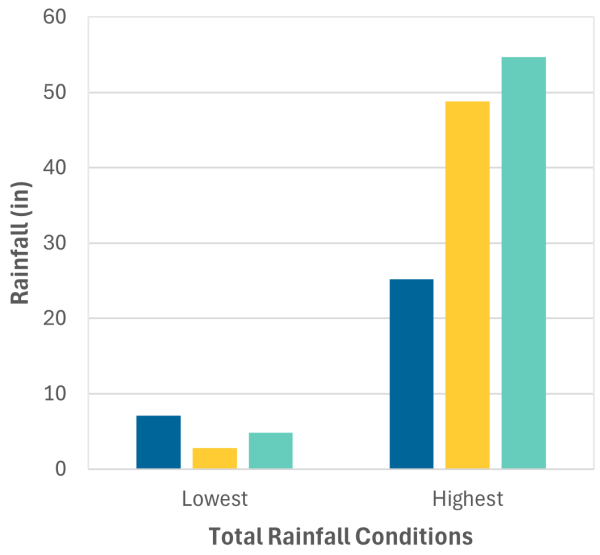
+

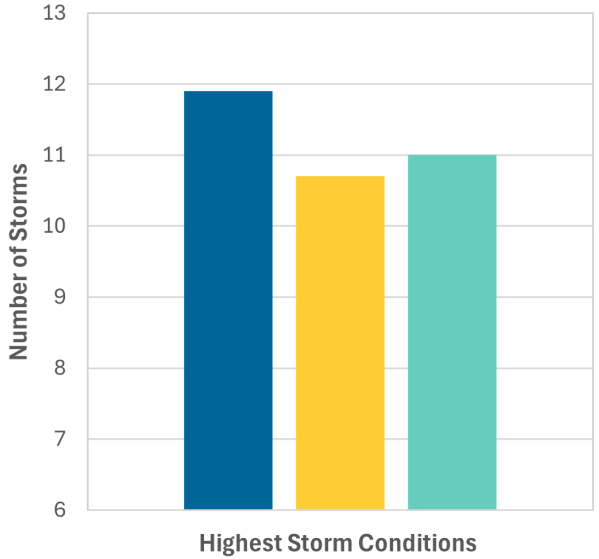
8
Climate Models

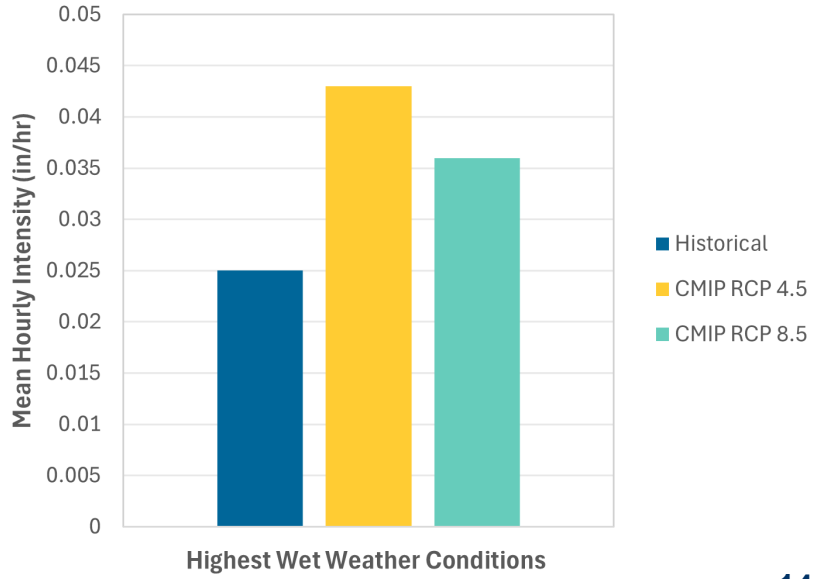
WY 2025-2054
Climate Projection Period

Selected Water Year with:

- **Lowest & Highest** Total Rainfall
- **Greatest** # of Storms
- **Greatest** Mean Hourly Rain Intensity







Average Annual
Historic Period

Critical Weather Years
From Historic Period &
8 Climate Projection Scenarios
(range across critical conditions)

Runoff Response

1.2 x

Average Increase

1.5 x

Worst Case Scenario

Runoff Response

1.2 - 1.5 x

Average Increase

1.3 - 8.6 x

Worst Case Scenario

Average Annual
Historic Period

Runoff Response

1.2 x

Average Increase

1.5 x

Worst Case Scenario

Sediment Response

3.8 x

Average Increase

6.2 x

Worst Case Scenario

Critical Weather Years
From Historic Period &
8 Climate Projection Scenarios
(range across critical conditions)

Runoff Response

1.2 - 1.5 x

Average Increase

1.3 - 8.6 x

Worst Case Scenario

Sediment Response

2.9 - 4.5 x

Average Increase

8.8 - 31 x

Worst Case Scenario


Resilient BMP
Design
Implications

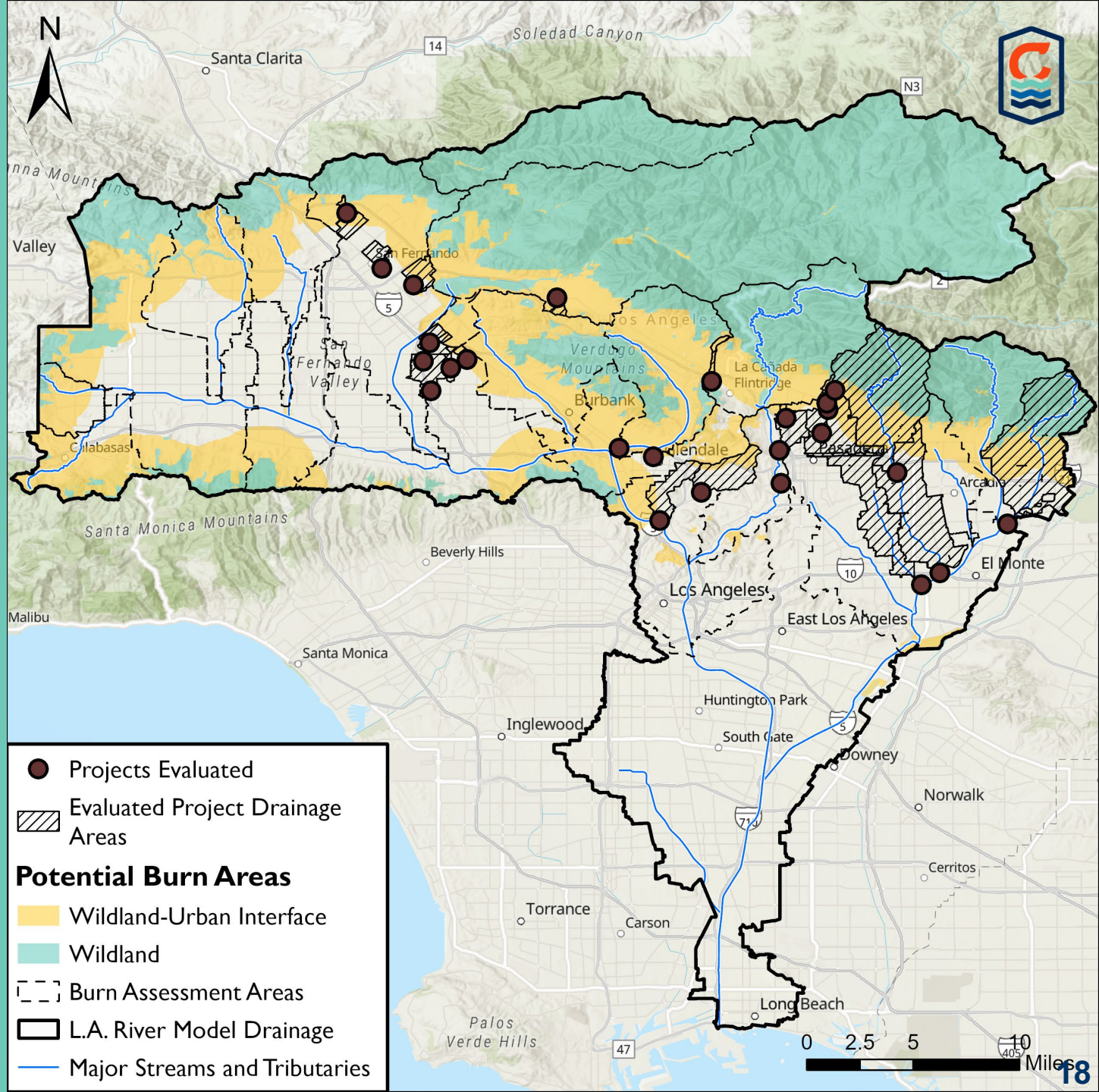
BMP Modeling Framework

Includes funded projects from **SCW Regional Infrastructure Program**

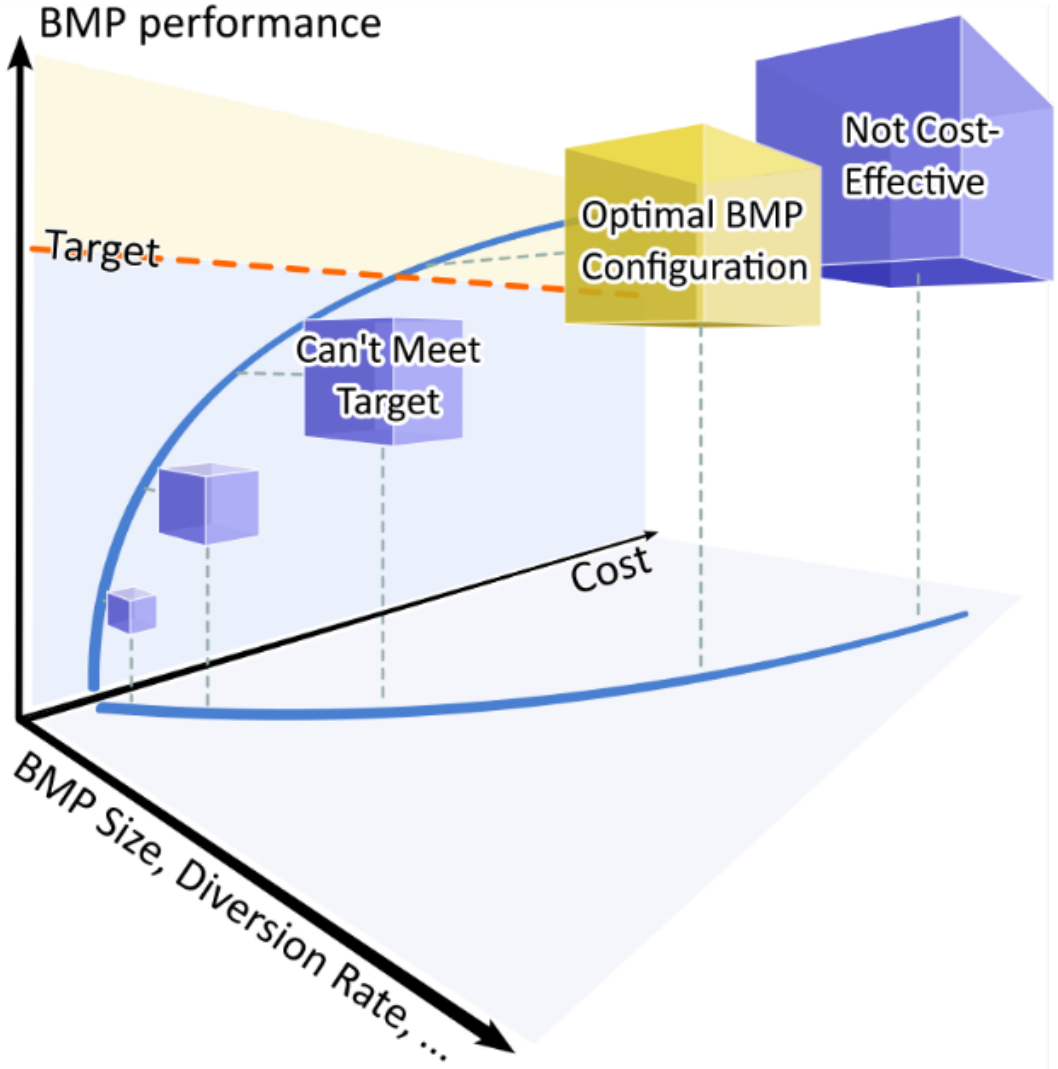
25
Total BMP Projects

23
Infiltration

2
Sewer Diversion



Resilient BMP Designs



Re-optimize BMPs with diminishing performance based on cost-effectiveness

43%

Increase in ***diversion rates***

99%

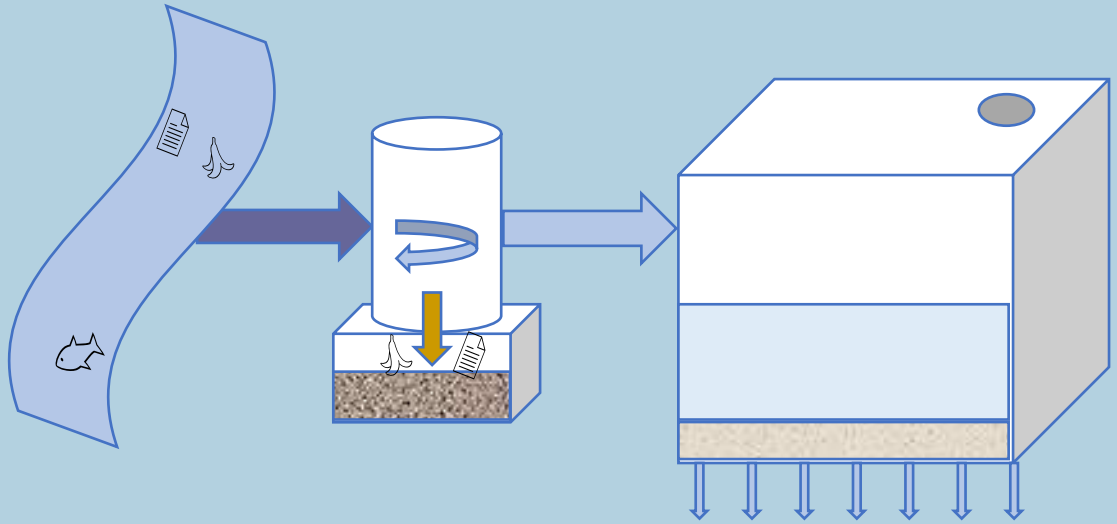
Increase in ***storage volumes***

Resilient BMP O&M

ASSUMPTIONS

Pretreatment devices **remove 80%** of **suspended sediment**

Other **20%** goes to **underground storage gallery**; Needs O&M at 1.5% capacity



2.7x

Increase in ***pretreatment & storage facility maintenance frequency***

Tools & Resources

Fire Effects Model Framework

- Model Methods
- Post-Fire Parameterization

Fire Effects Model Outputs

- Spreadsheet Summaries
- Plots

Fire Effects Reports

- Watershed Model Report
- BMP Model Report
- Lab Reports
- Final Report

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