

# Los Angeles County Watershed Management Modeling System

TAC Presentation

September 17, 2013



# Components of the WMMS

## Watershed Management Modeling System (WMMS)

**LSPC**

Loading Simulation  
Program C++

**“Model”**

**SUSTAIN**

System for Urban  
Stormwater Treatment  
and Analysis Integration

**“BMP  
Selection  
Tool”**

**NIMS**

**Regional  
Optimization**

# Components of the WMMS

## LSPC

### Data

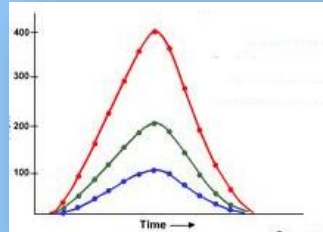
- Real Rainfall
- Stream Gage
- Monitoring
- Land Use
- Evaporation
- Infiltration
- Reservoir
- Spreading Ground
- Elevation
- Slopes

### MapWindows



### Results

Runoff  
Metals  
TSS  
Nutrients  
Bacteria\*

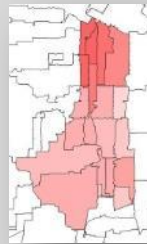


## SUSTAIN "BMP Selection Tool"

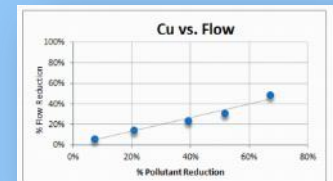


Large Scale  
BMP Results

REGIONAL  
OPTIMIZATION

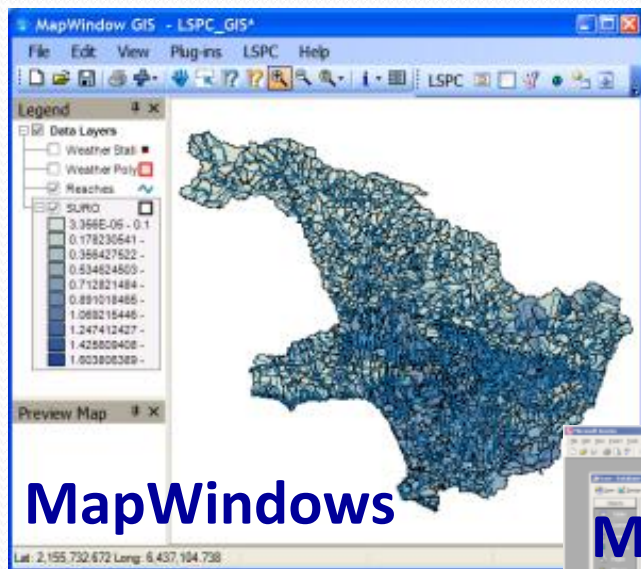


Subwatershed  
BMP Results



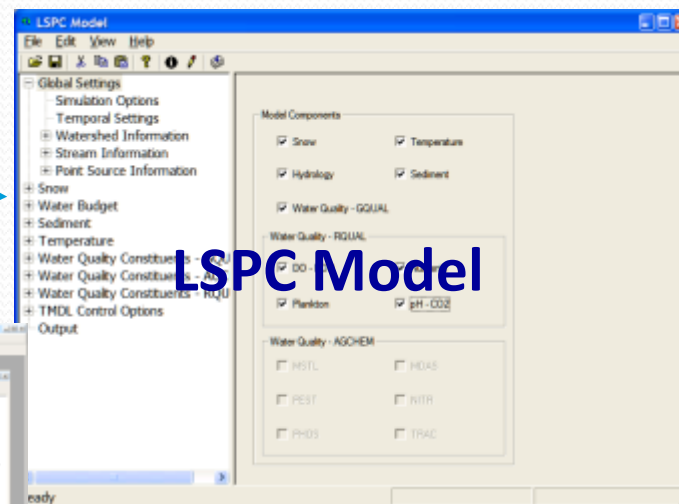
# Loading Simulation Program C++

## Components of LSPC

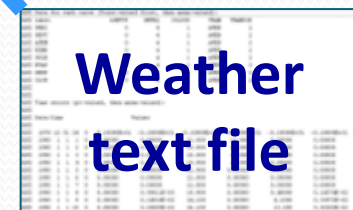
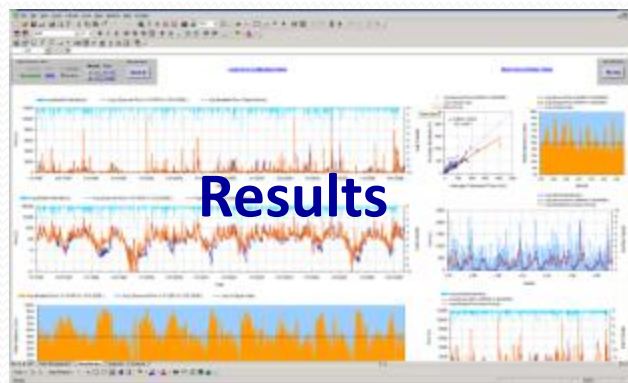


MapWindows

MS Access Database



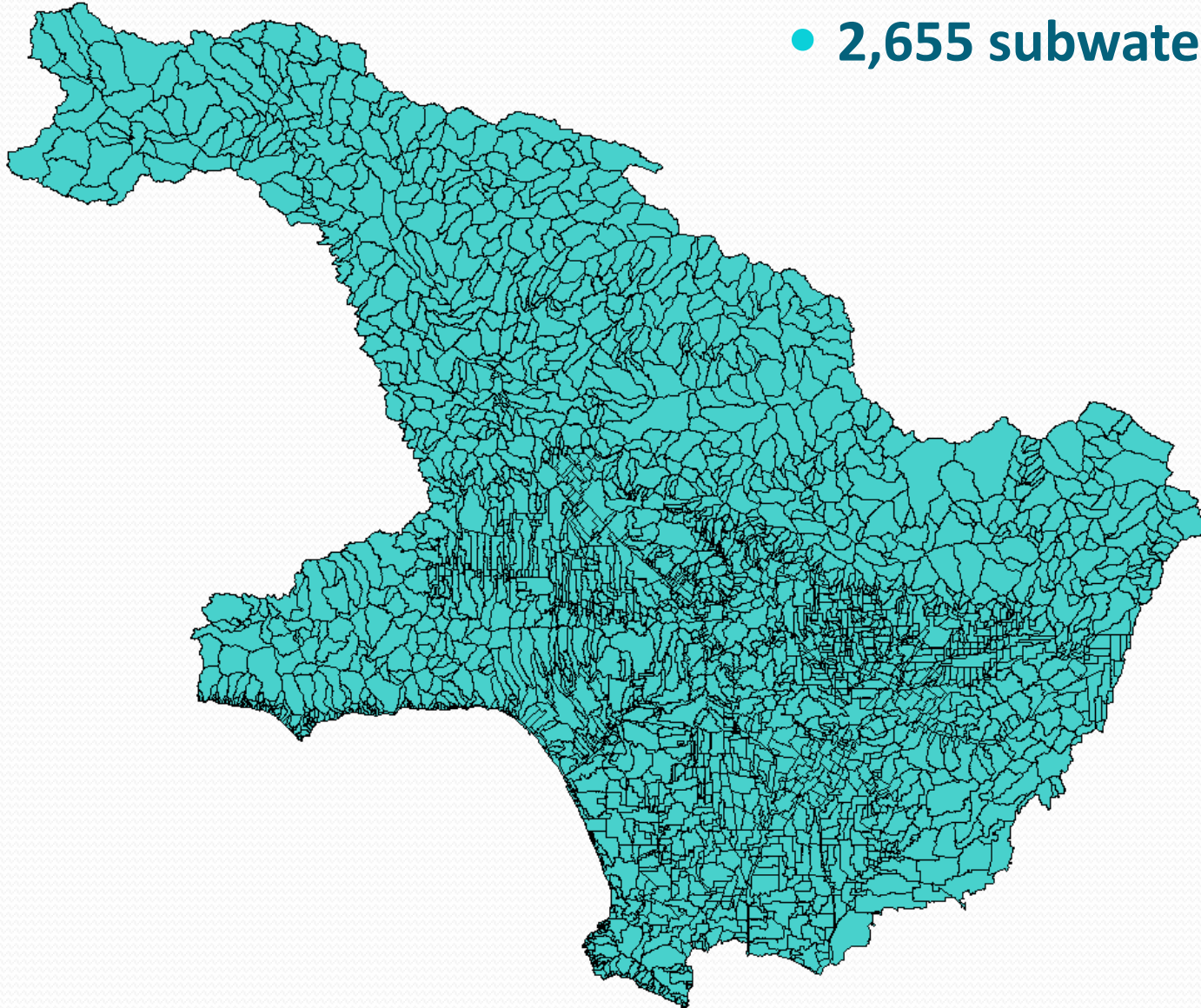
LSPC Model



# Subwatershed and Reach Representation

## WMMS Resolution

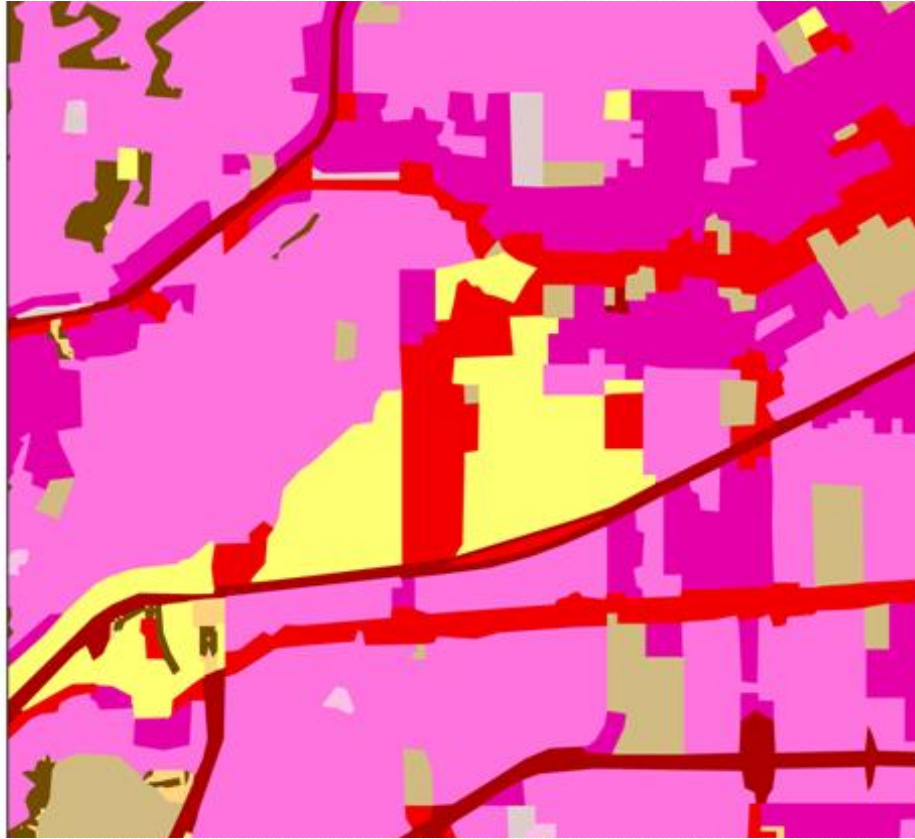
- 2,655 subwatersheds



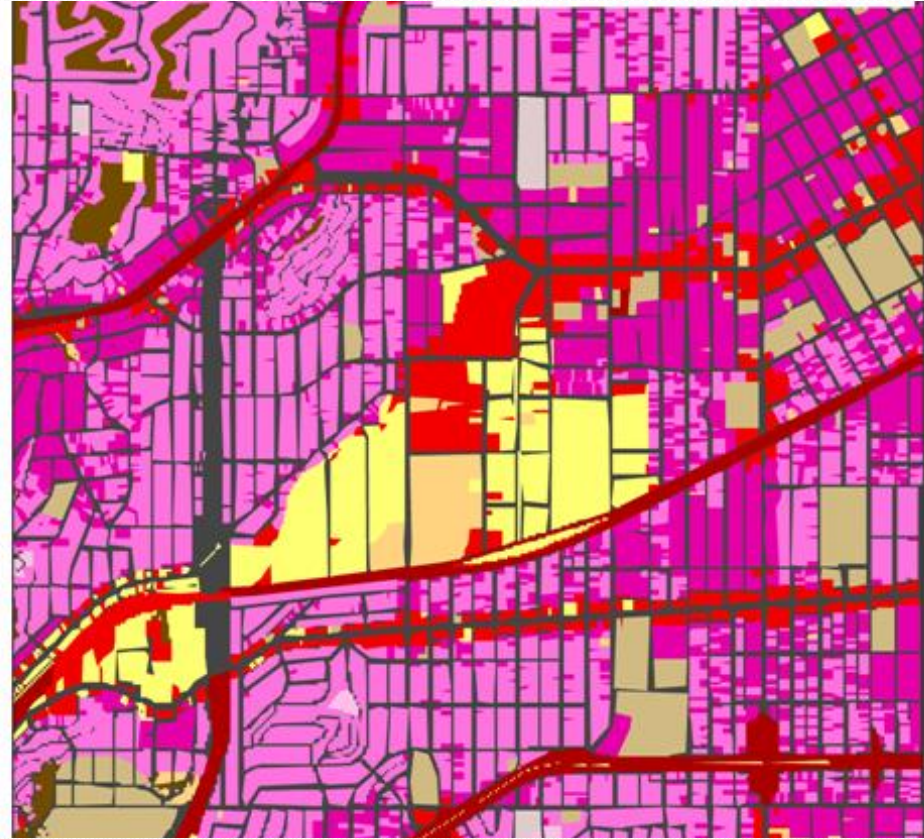


# Land Use Determination

## Parcel Level Land Use Resolution



2005 SCAG Land Use



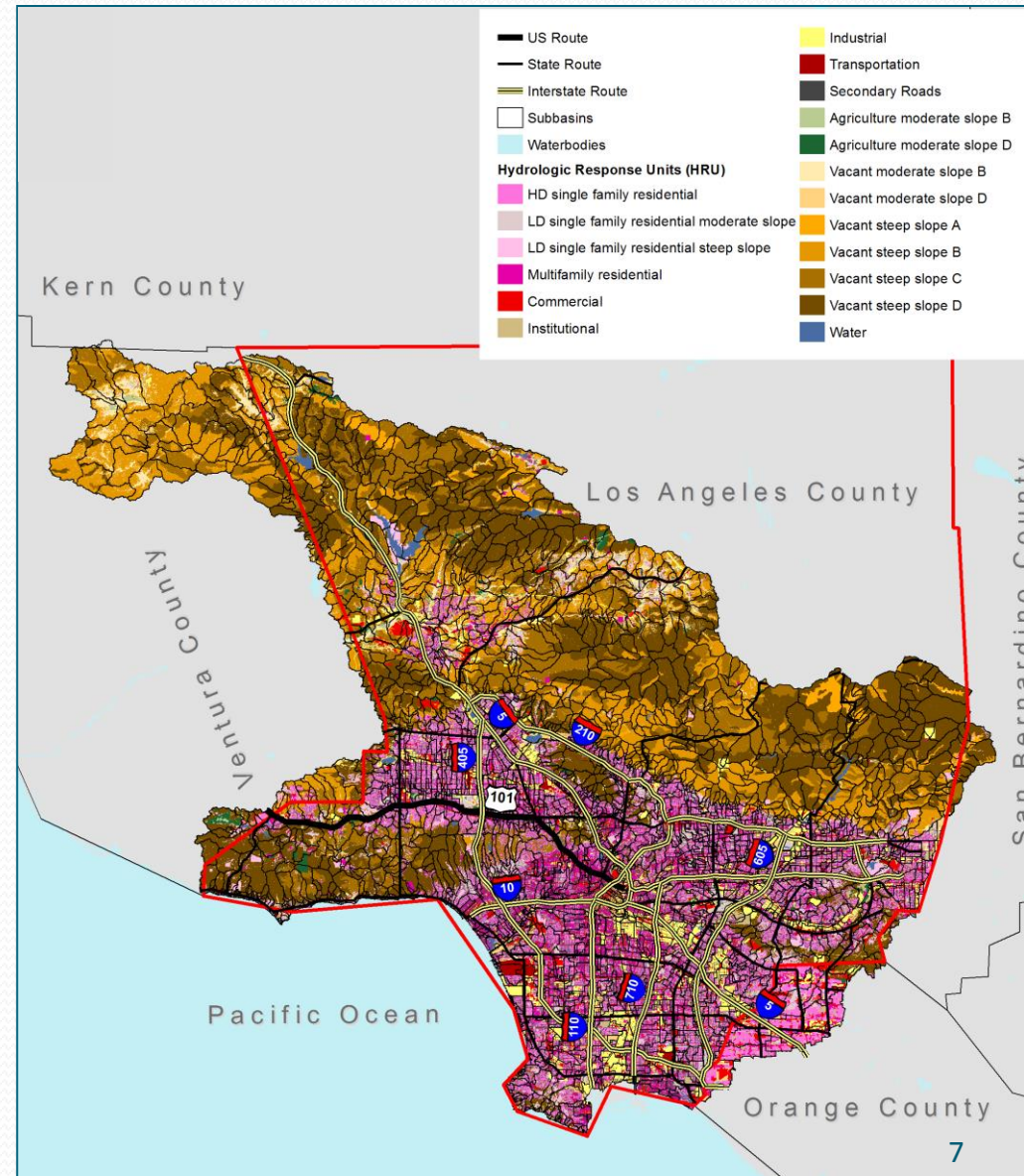
2008 WMMS Update Land Use

# Hydrologic Response Unit (HRU)

HRU is the “C” in  $Q = CIA$   
which incorporates

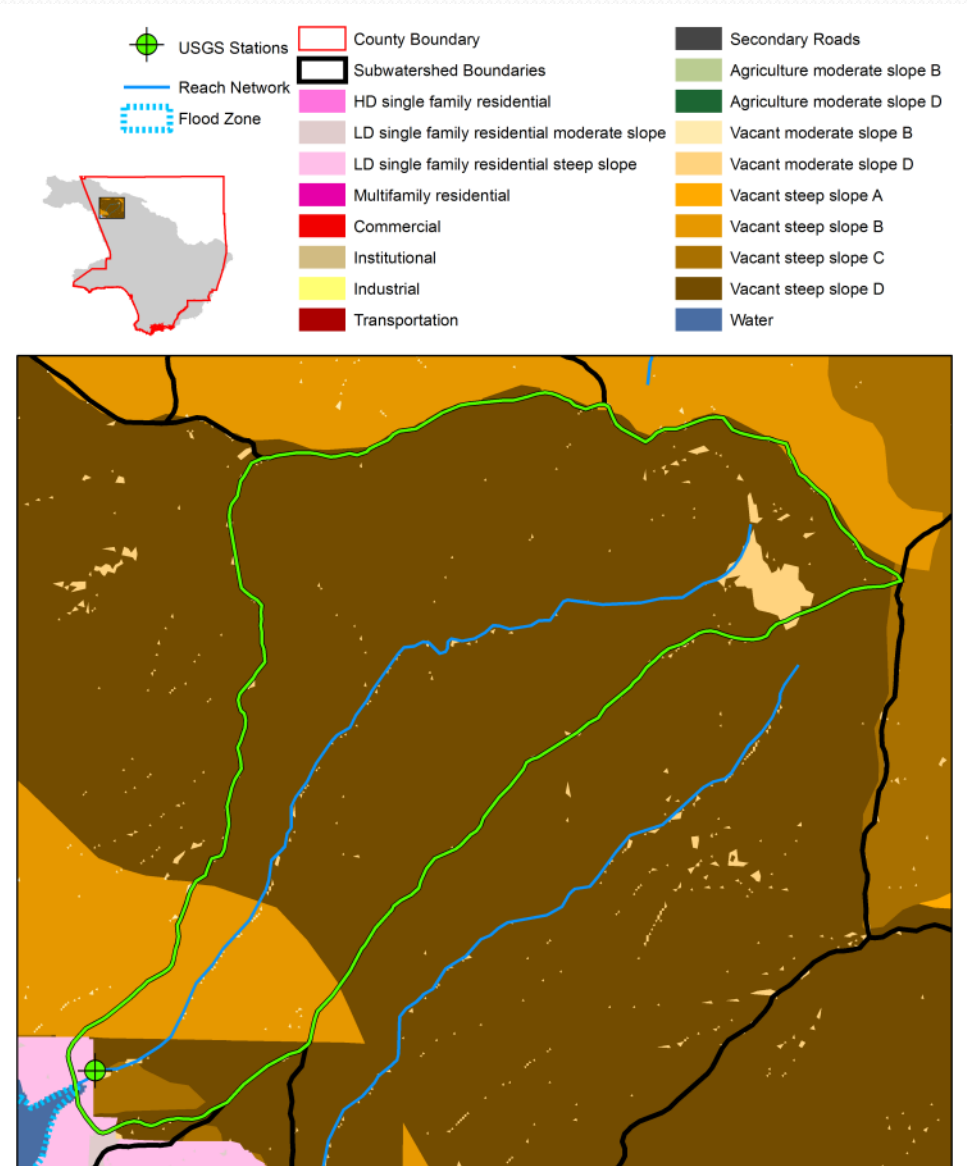
- Land Use
- Slope (elevation)
- Soil Type

21 Different HRU



# Hydrological Calibration Location

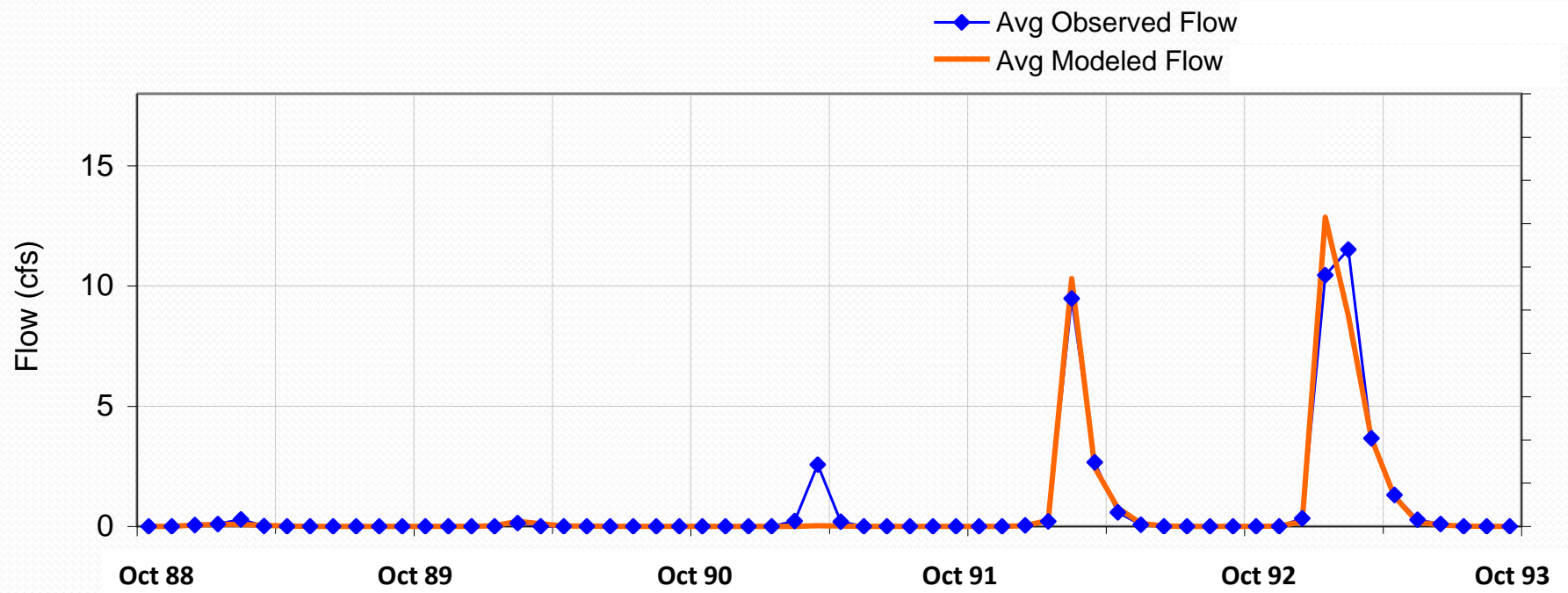
## Vacant Steep Slope D





# Hydrological Calibration Location

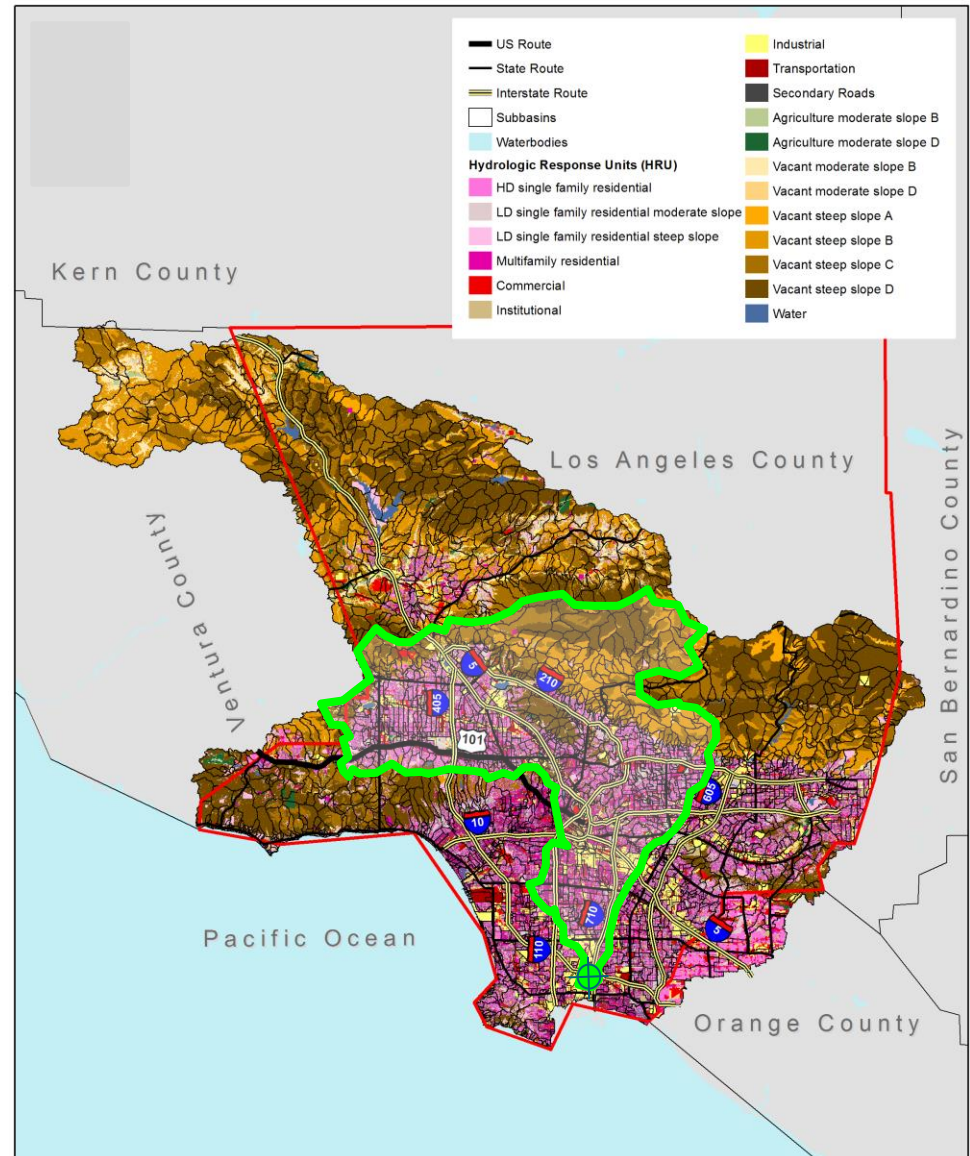
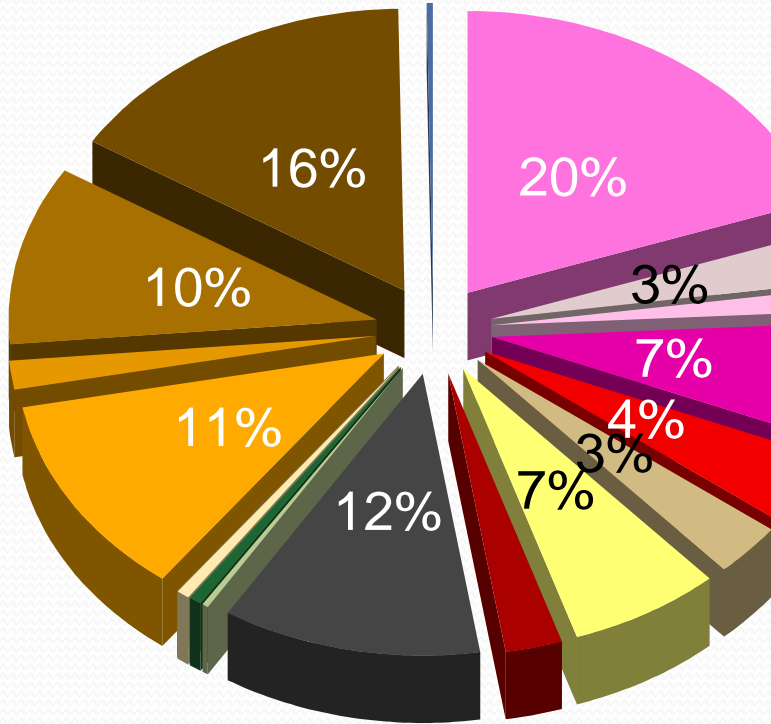
## Vacant Steep Slope D



Observed vs. Modeled Flow

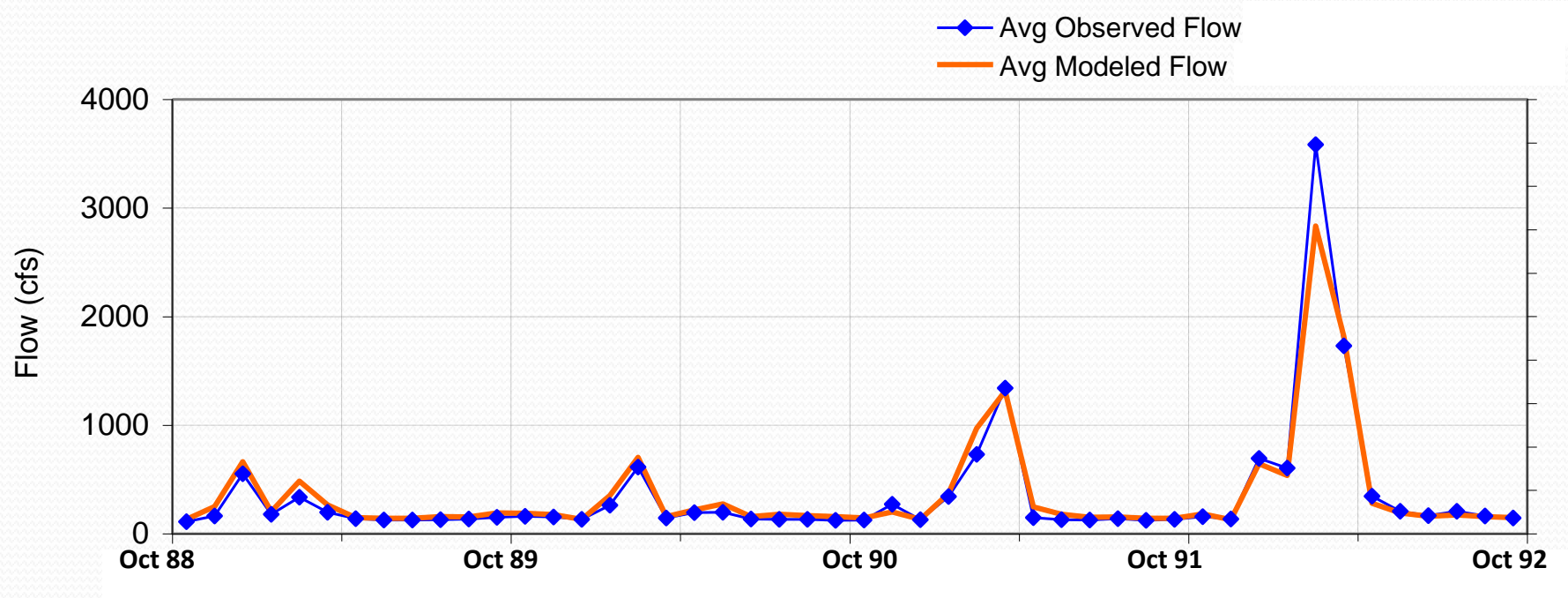
# Hydrological Validation Location

## Los Angeles River above Long Beach



# Hydrological Validation Location

## Los Angeles River above Long Beach



Modeled Flow vs. Observed Flow

# Components of the WMMS

## Watershed Management Modeling System (WMMS)

**LSPC**

Loading Simulation  
Program C++

**“Model”**

**SUSTAIN**

System for Urban  
Stormwater Treatment  
and Analysis Integration

**“BMP  
Selection  
Tool”**

**NIMS**

**Regional  
Optimization**



# SUSTAIN

## BMP Selection Tool

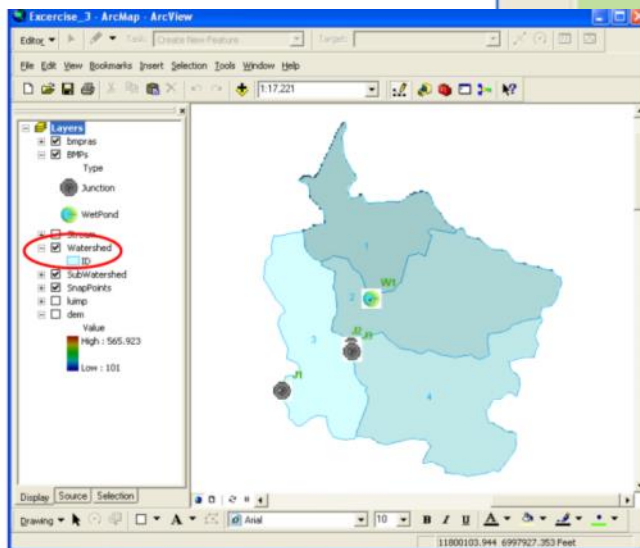
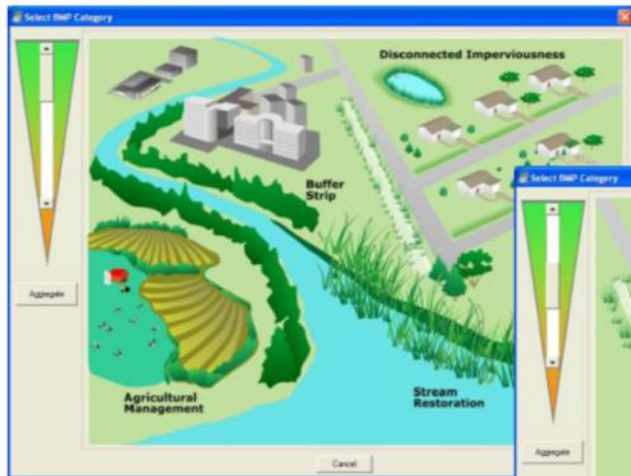
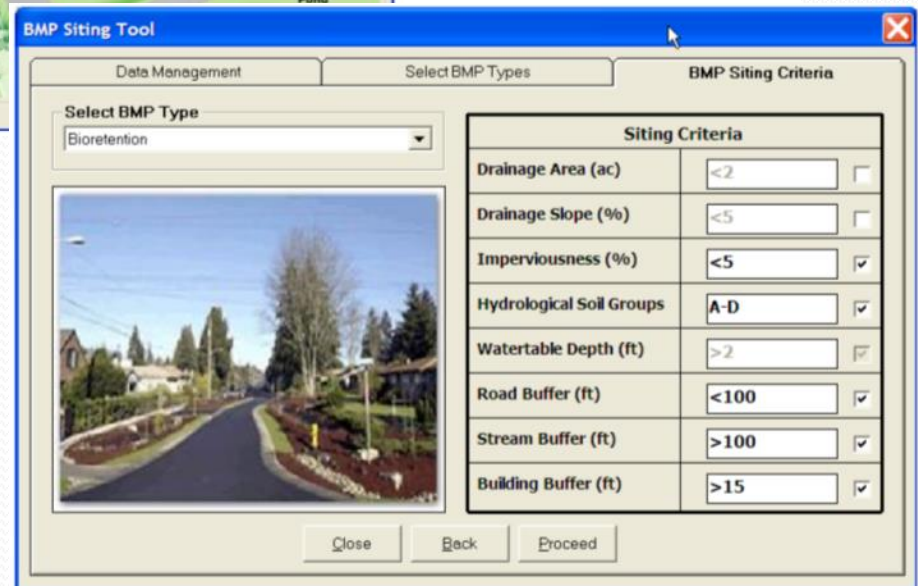


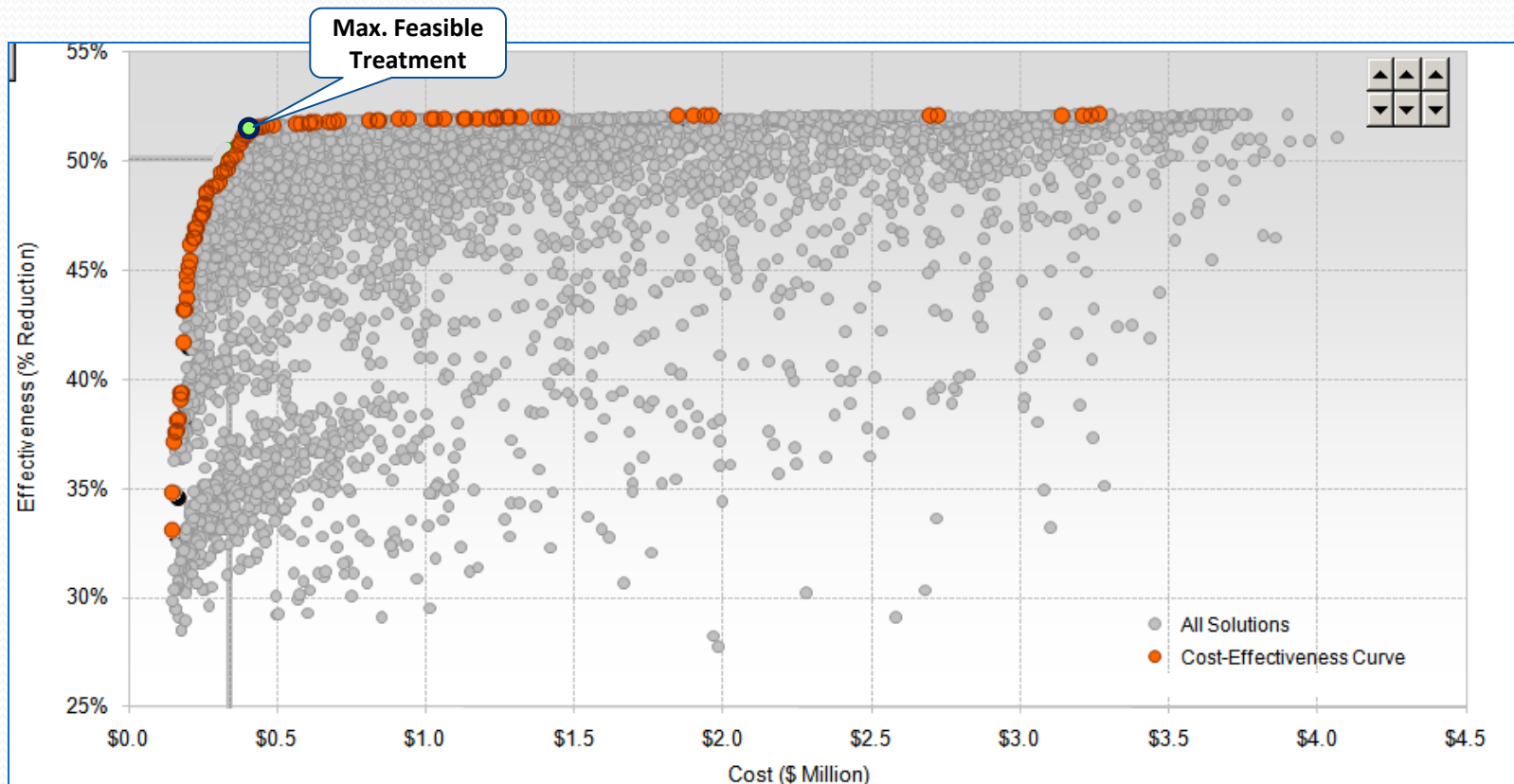
Figure 4.8. ArcMap Showing the Result of Automatic Delineation



# SUSTAIN

## Cost-Effectiveness Curve

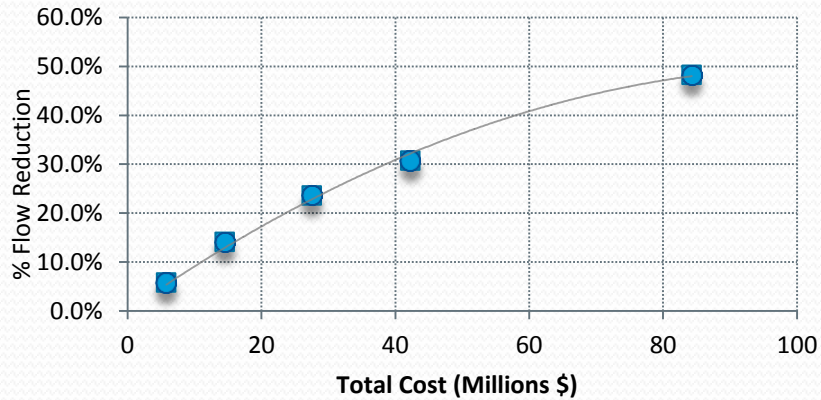
- The WMMS Post Processor calculates the most cost-effective set of BMPs for all possible BMP scenarios for each subwatershed



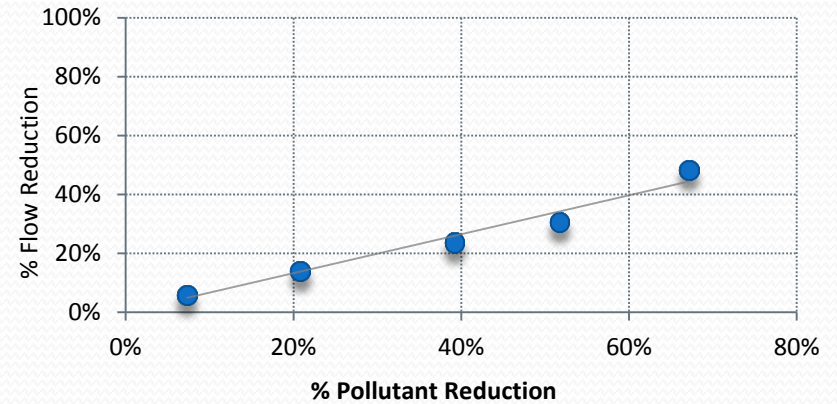
# WMMS

## Sample Reduction Results – BMP Selection Tool

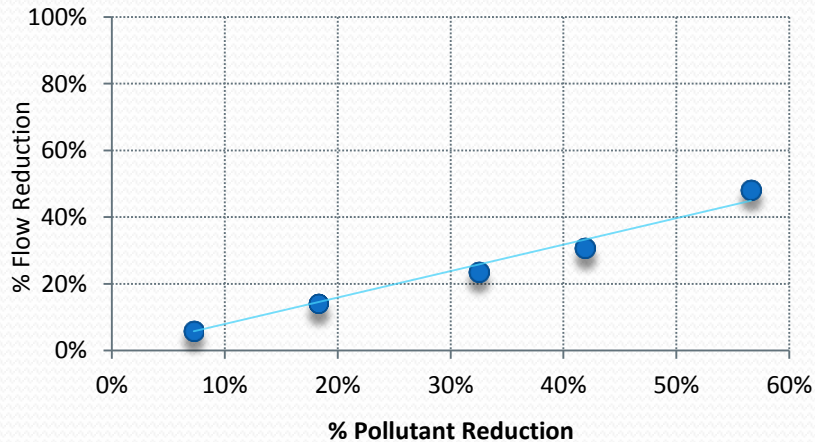
### Cost vs. Flow



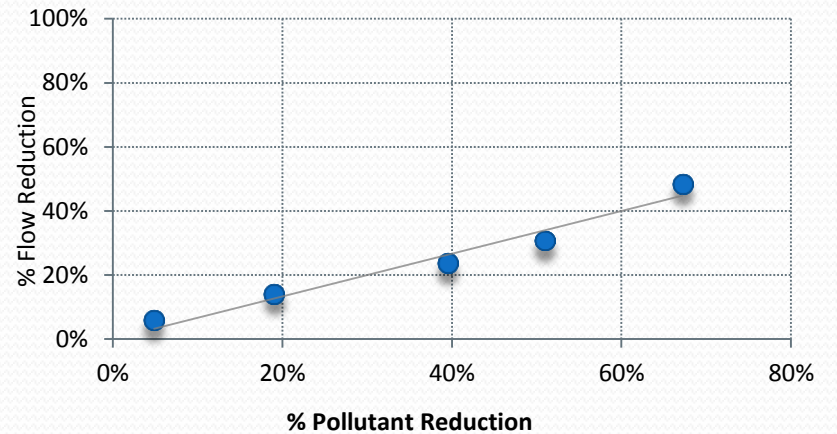
### Cu vs. Flow



### TN vs. Flow



### Pb vs. Flow



# WMMS

## Sample Reduction Results – BMP Selection Tool

Subwatershed				
Land Use	Impervious Area (ac)	BMP Type	# of Units	Capacity (ac-ft)
<i>Residential</i>	238.41	Rain Barrel	0	0.00
		Bioretention	214	11.98
<i>Commercial Industrial Institutional</i>	276.31	Porous Pavement	142	8.03
		Bioretention	41	2.16
<i>Transportation</i>	159.07	Bioretention	158	8.72
<b>Total Treatment Capacity (acre-ft)</b>				<b>30.89</b>



# Components of the WMMS

## Watershed Management Modeling System (WMMS)

**LSPC**

Loading Simulation  
Program C++

**“Model”**

**SUSTAIN**

System for Urban  
Stormwater Treatment  
and Analysis Integration

**“BMP  
Selection  
Tool”**

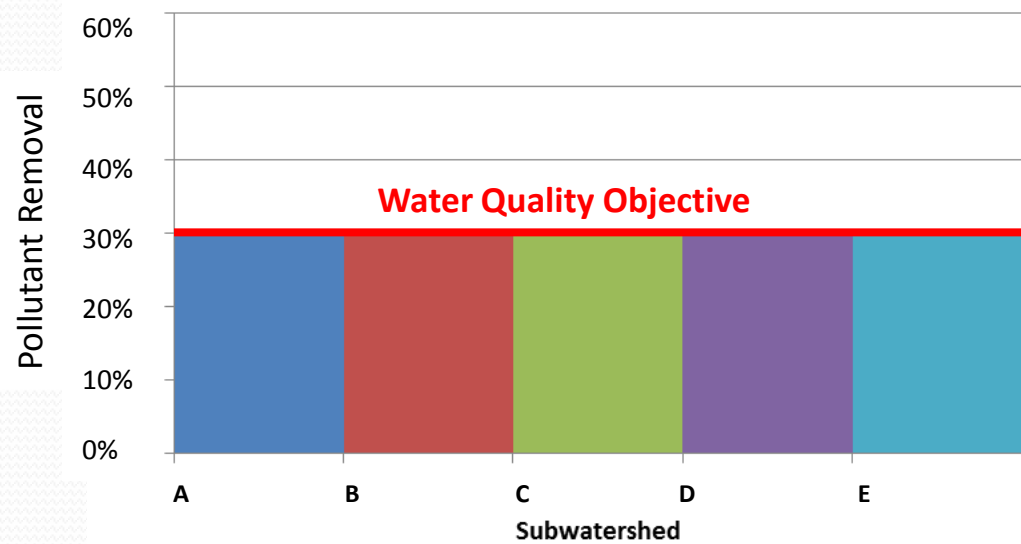
**NIMS**

**Regional  
Optimization**

# Regional Optimization

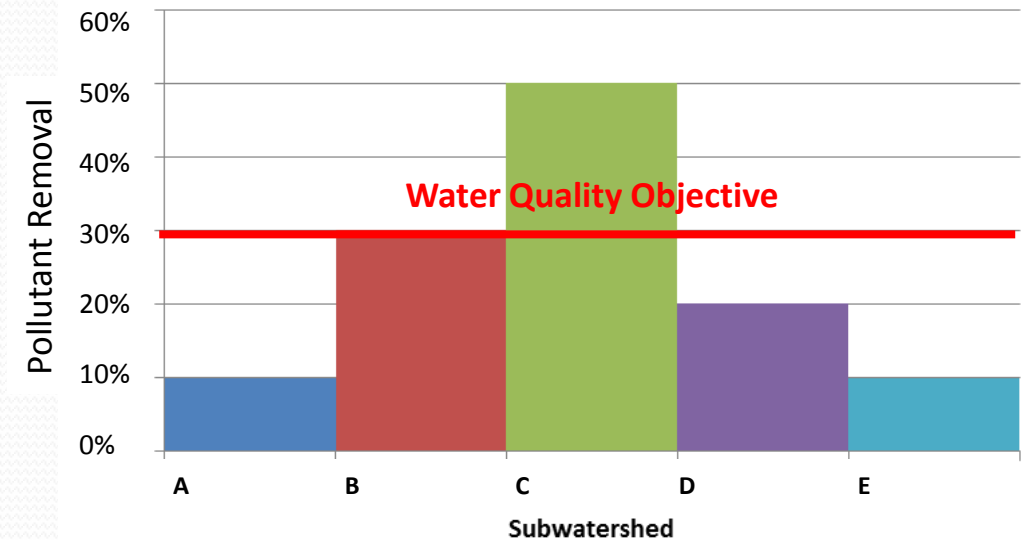
## Proportional

Attain Water Quality Objective



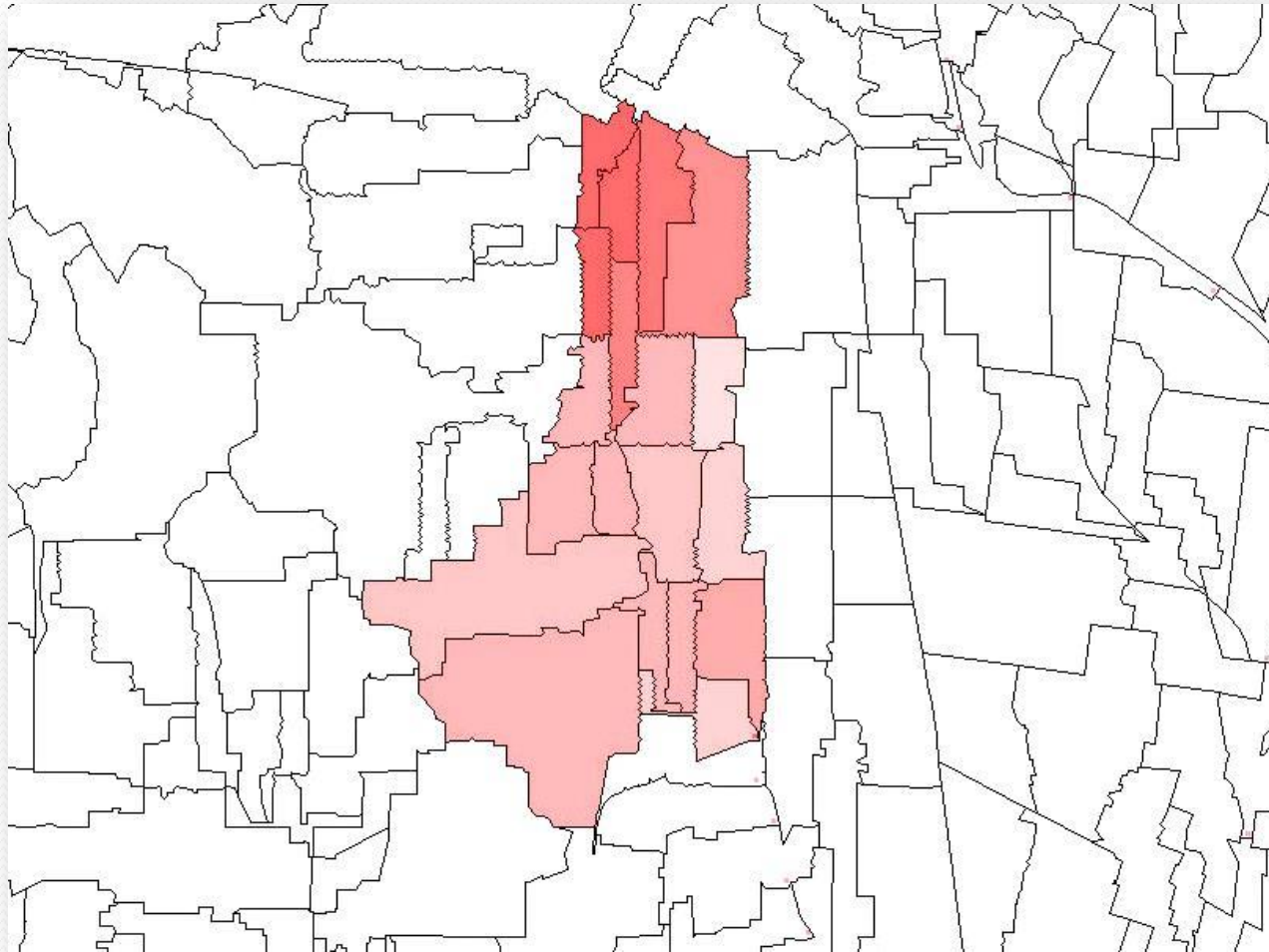
## Targeted

Attain Water Quality Objective  
At Lower Total Cost



# Regional Optimization

## Management Level Optimization Results



# WMMS

## Customization & Updates

### LSPC

- Updating Weather Data
- Updating Land Use
- Jurisdictional Based / Non-Regional Project Modeling
- Hydrology/Water Quality Calibration

### SUSTAIN

- BMP Assumptions (Effectiveness, Cost, Type)
- Cost Effectiveness Analysis

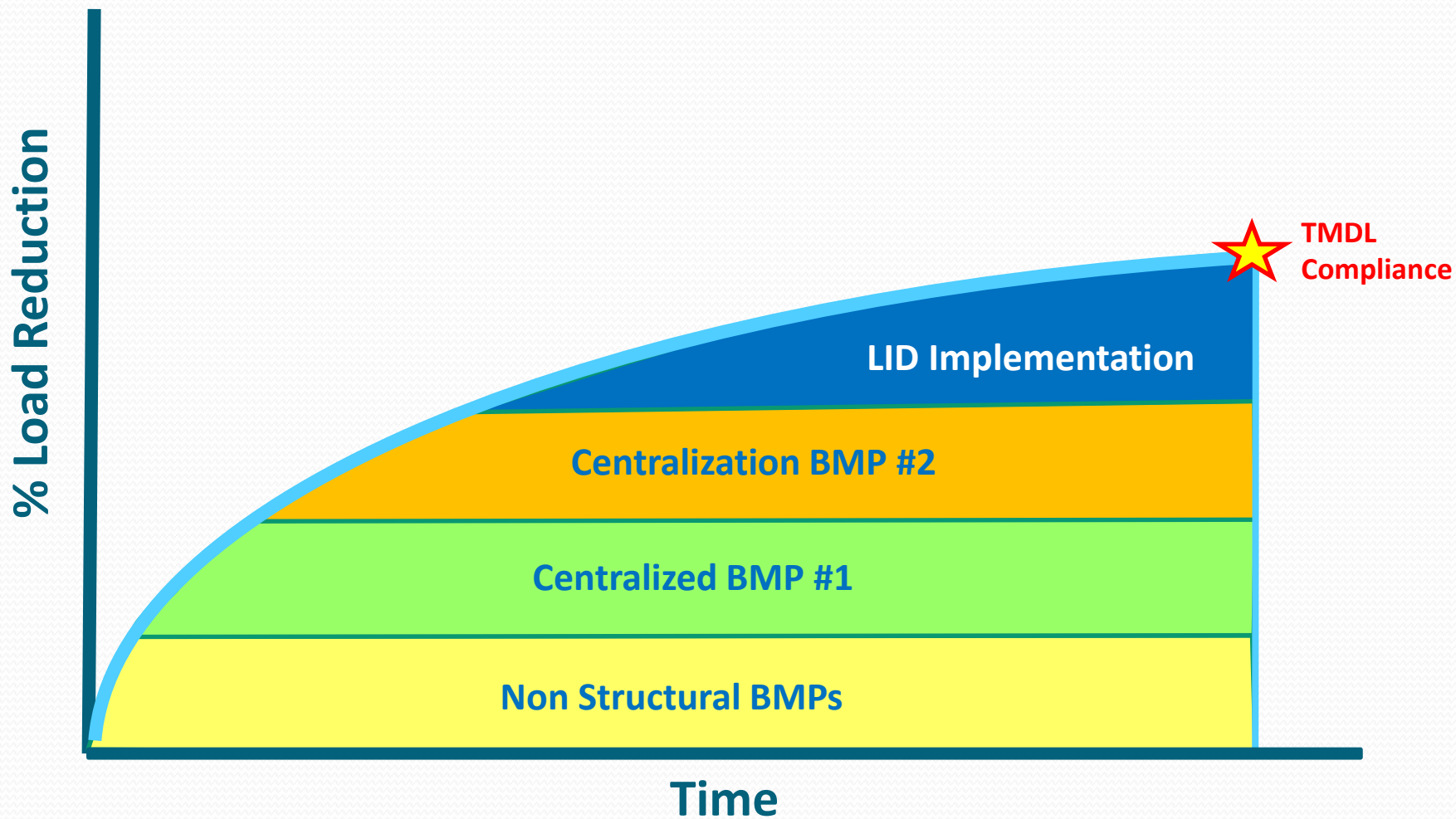
### Regional Optimization

- Adjusting Compliance Targets
- Adding additional pollutants



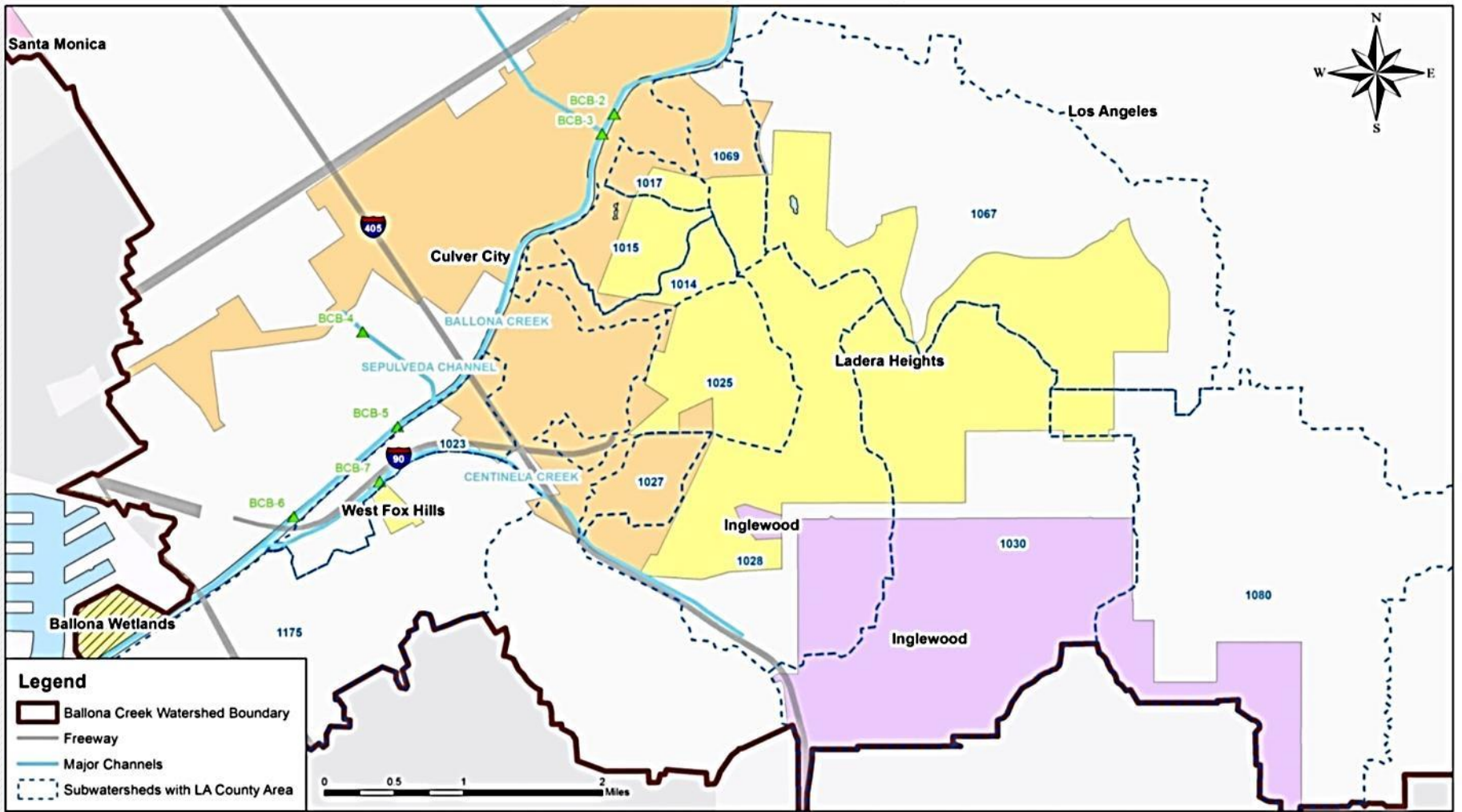
# Reasonable Assurance Analysis

## Example Timeline



# WMMS - LSPC

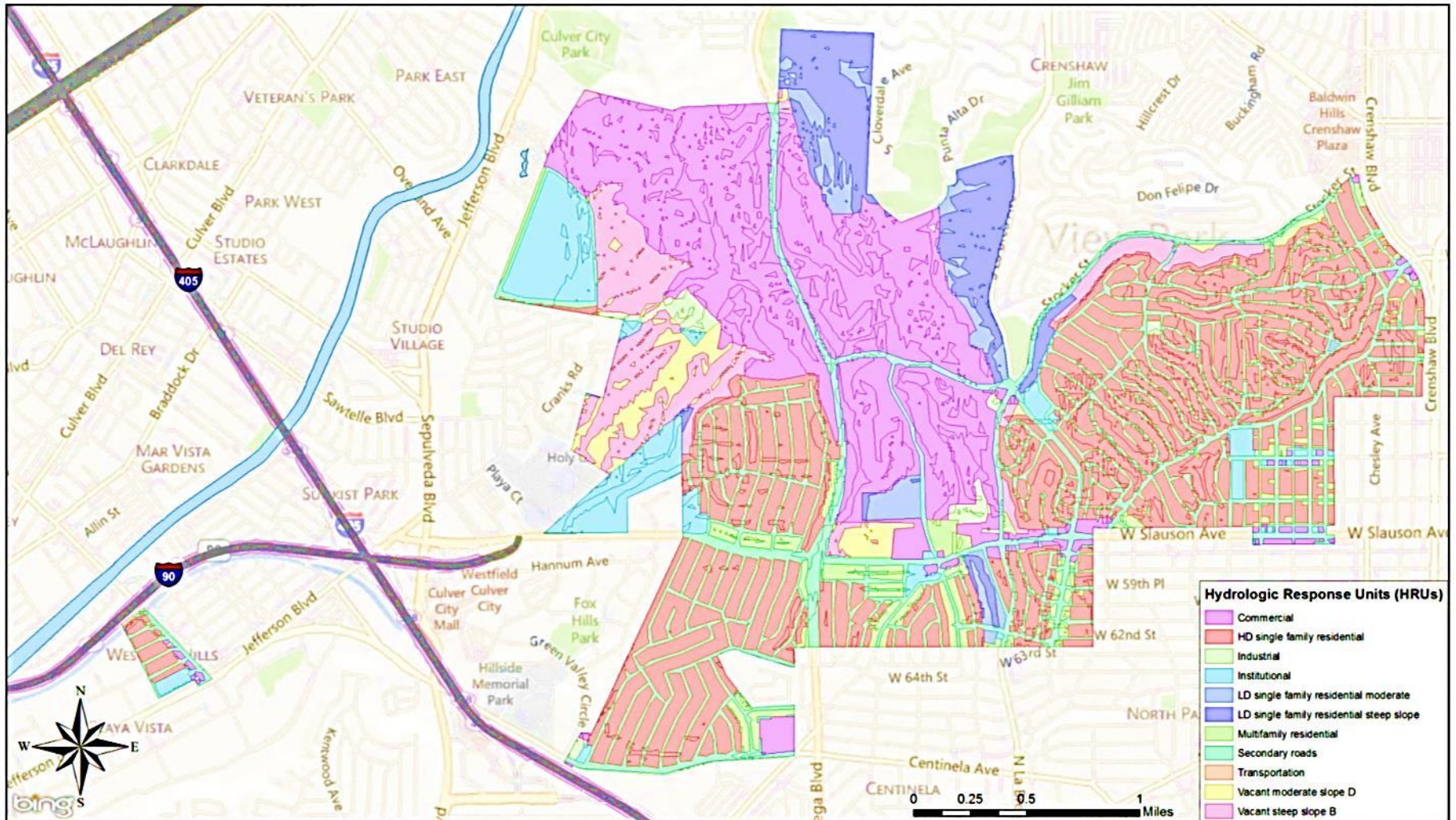
## Sample Reasonable Assurance Analysis Ballona Creek – County of Los Angeles





# WMMS - LSPC

## Sample Reasonable Assurance Analysis Ballona Creek – County of Los Angeles



# WMMS - LSPC

## Sample Reasonable Assurance Analysis Ballona Creek – County of Los Angeles

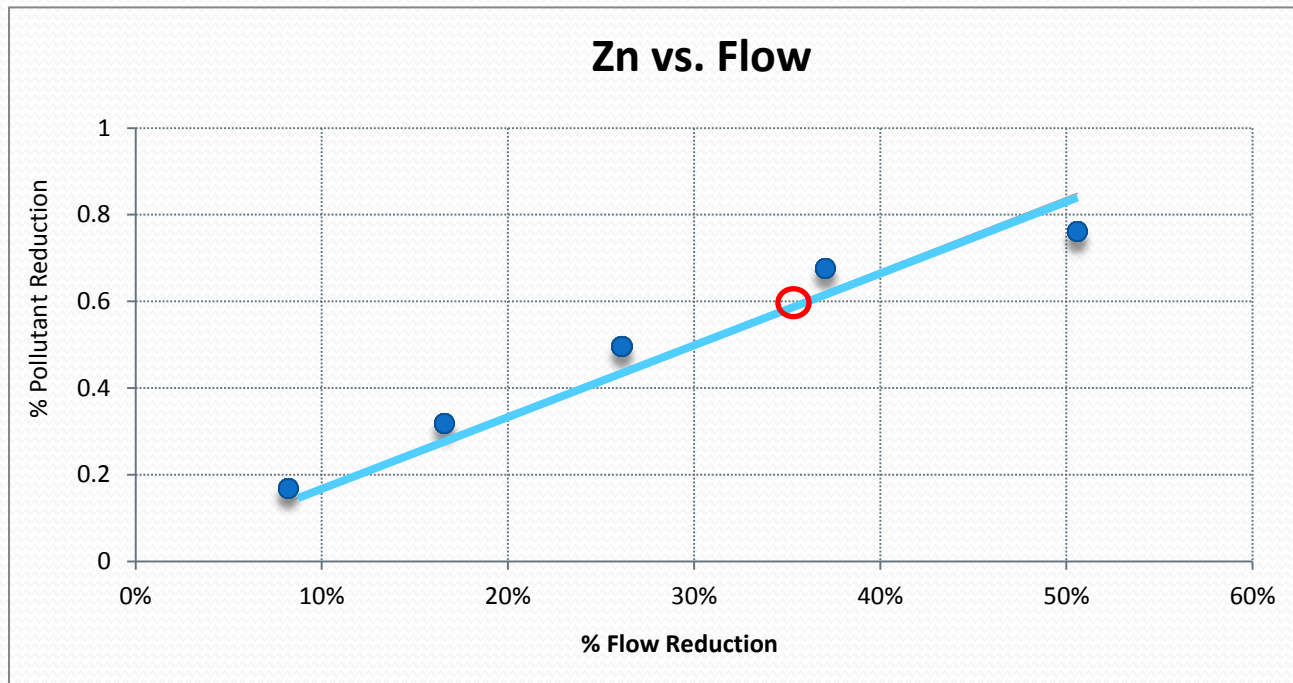
<b>Ballona Creek Watershed</b>	<b>78,442 acres</b>
County of Los Angeles	3,109 acres
<b>County Percent of Watershed</b>	<b>4%</b>

<b>Ballona Creek Watershed</b>	<b>Zinc</b>
TMDL Allowable Load	1003 kg/yr
TMDL Allowable County Load	40 kg/yr
<b>County Modeled Load</b>	<b>270 kg/yr</b>
<b>Required Percentile Reduction</b>	<b>85%</b>

# WMMS – BMP Selection Tool

## Sample Reasonable Assurance Analysis Ballona Creek – County of Los Angeles

<b>County Required Reduction</b>	<b>85%</b>
Non-Structural Reduction*	25%
<b>Remaining Reduction Required</b>	<b>60%</b>





# WMMS – BMP Selection Tool

## Sample Reasonable Assurance Analysis Ballona Creek – County of Los Angeles

BMPs associated with 60% Reduction from BMP Selection Tool

Land Use	BMP Type	Total Volume (ac-ft)
Residential	Rain Barrel	0.98
Residential	Bioretention	28.9
Commercial/Industrial/Institutional	Bioretention	10.8
Commercial/Industrial/Institutional	Porous Pavement	7.5
Transportation	Bioretention	16.9

# WMMS – Regional Optimization

## Sample Reasonable Assurance Analysis

### Targeted Method

Sample Watershed	A	B	C
Required Percentile Reduction to Meet Compliance	70%	40%	20%
<b>BMPs</b>	<b>Percentile Reduction</b>		
Non Structural BMPs	20%	20%	20%
BMP Selection Tool	50%	20%	0%

# Questions

[www.LACountyWMMS.com](http://www.LACountyWMMS.com)

[wmms@dpw.lacounty.gov](mailto:wmms@dpw.lacounty.gov)