



# THE RESPONSE OF BENTHIC MACROINVERTEBRATES TO URBANIZATION IN THE LOS ANGELES AND SAN GABRIEL RIVERS WATERSHEDS, CALIFORNIA

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**Council for  
Watershed Health**

# Presentation Outline



- Watershed Descriptions
- Monitoring Questions, Design, & Indicators
- Results 2005 to 2010
- BMI stressor Identification

# Area of Interest

## Watershed Area

San Gabriel River: 679 sq. mi.  
Los Angeles River: 834 sq. mi.

## Population

San Gabriel River Watershed: 2.3 million  
Los Angeles River Watershed: 4.5 million





# Land Use

Type*	Residential	Commercial	Industrial	Agriculture	Recreation
% LA	37.2	8.54	10.8	0.59	42.87
% SG	29.7	8.27	5.51	3.28	48.76

\*2005 SCAG Land Use data

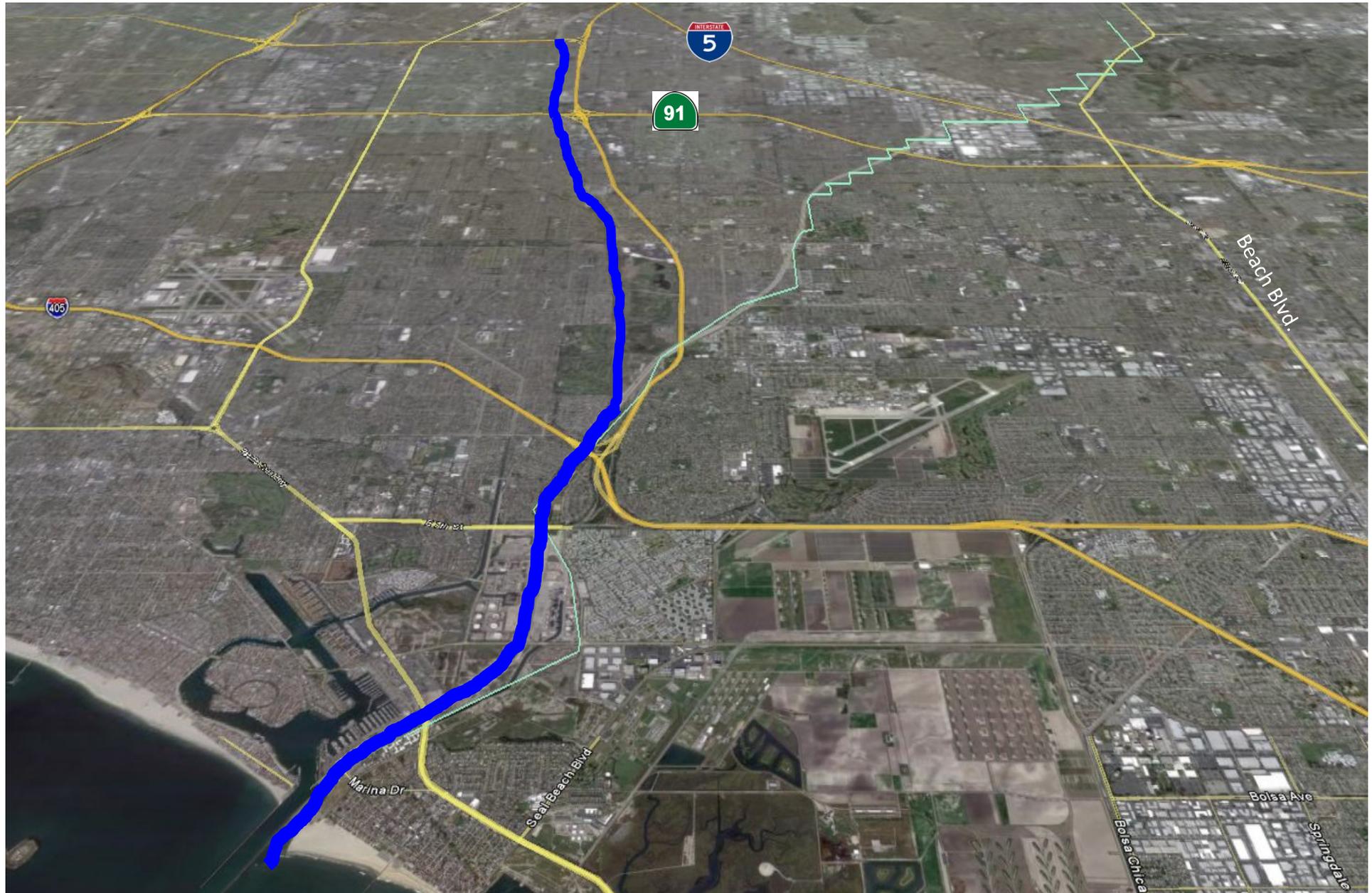
# Upper San Gabriel River Watershed



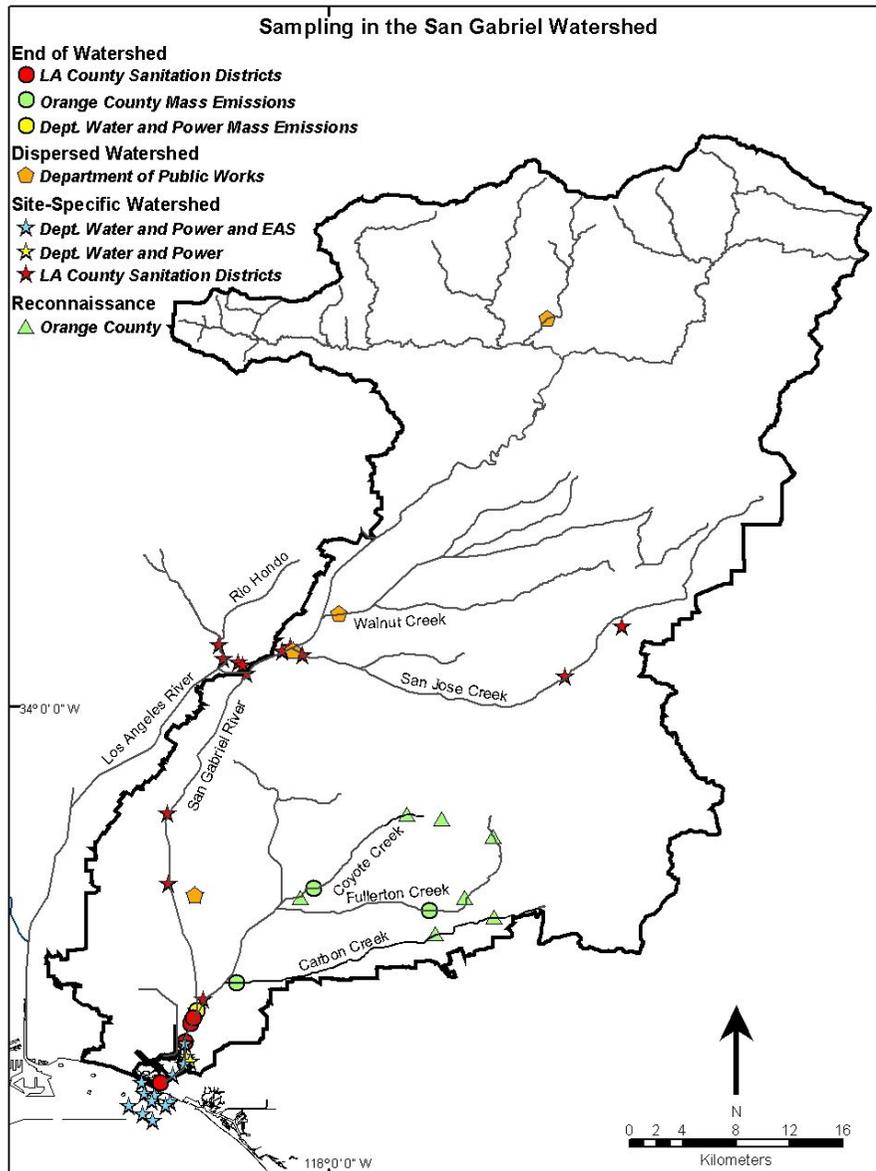
# Lower San Gabriel River Watershed



# Mainstem San Gabriel River Watershed



# San Gabriel Watershed Example: Pre 2005



## A lot of existing monitoring

- 6 agencies
- 3 citizen groups

## Programs not coordinated

- Limited data comparability
- Lack of coordination on constituents sampled
- No coordinated QA, IM, etc.

## Inefficiencies

- Redundancies between monitoring programs
- Majority of the watershed not monitored

# Watershed Monitoring Program Approach



**2005: San Gabriel River Regional Monitoring Program (SGRRMP)**  
**2007: Los Angeles River Watershed Monitoring Program (LARWMP)**

# Monitoring Questions



1.

What is the health of streams ?



2.

Conditions at areas of unique importance ?



3.

Are regulated discharges meeting WQ objectives ?



4.

Is it safe to swim?



5.

Is it safe to eat fish ?

State of the Watershed

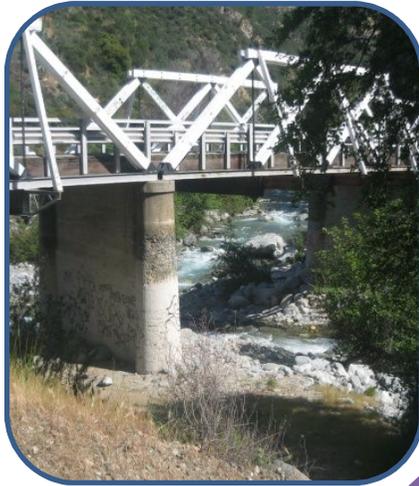
# Monitoring Questions



1.

What is the  
health of  
streams ?

# Health of streams ?



**Probability-based design**

**Sites randomly allocated:**

Upper WS  
Lower WS  
Mainstem

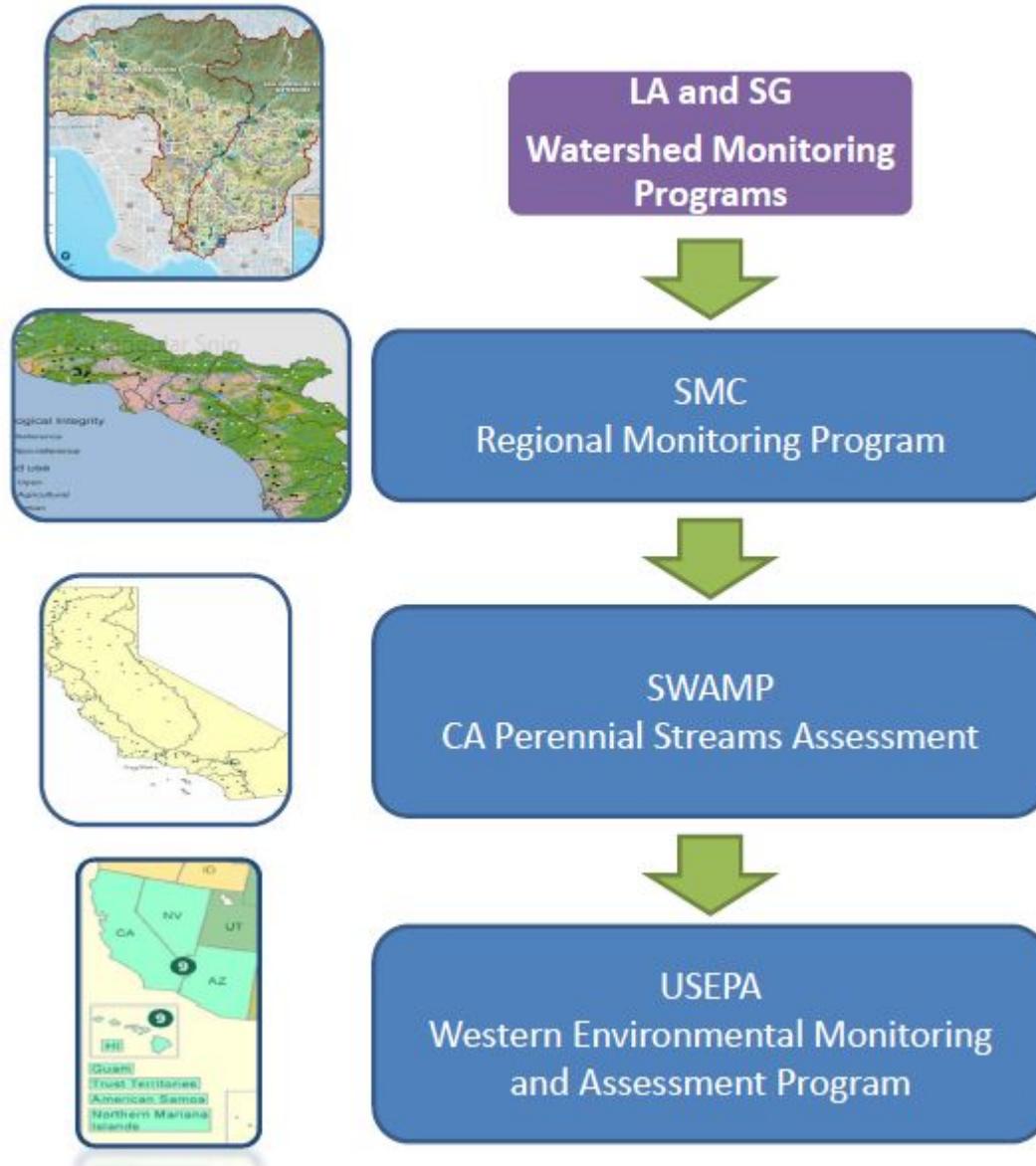


**Multiple indicators (MLOE)**

**Annual surveys  
Dry Weather sampling (May – July)**

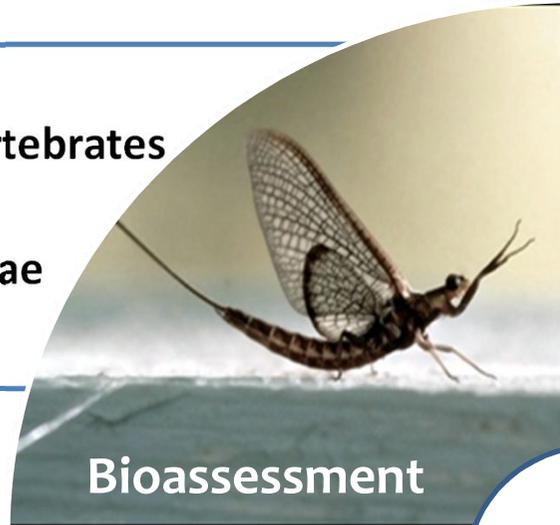


# Integrated Monitoring Programs



# Health of streams ?

- Benthic Macroinvertebrates
- Benthic Algae



Bioassessment

- General Constituents
- Metals
- Nutrients
- Organics
- Indicator Bacteria

Water Chemistry

Condition?

Physical Habitat



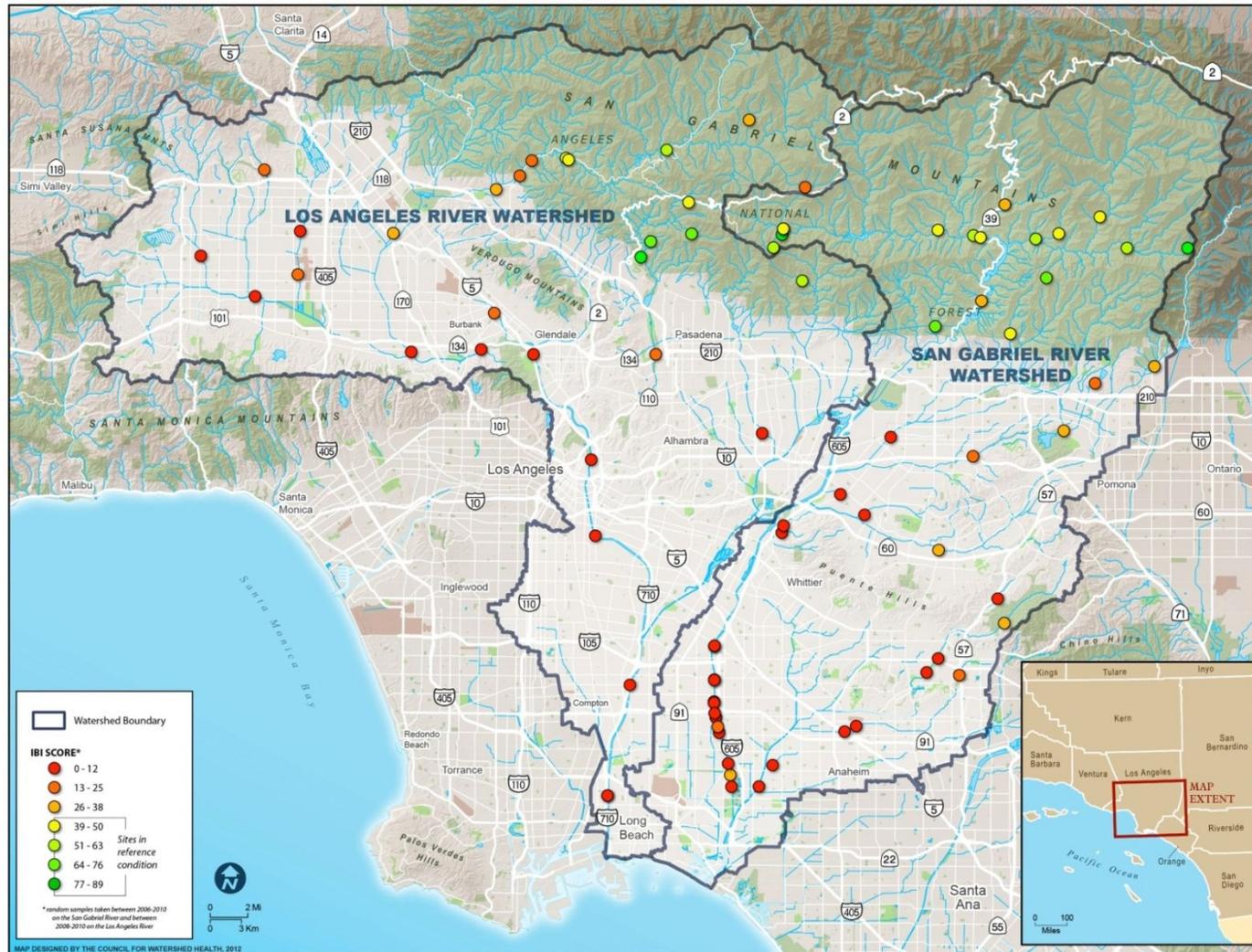
Surveys: SWAMP and CADF&G  
California Rapid Assessment Method (CRAM)

Toxicity

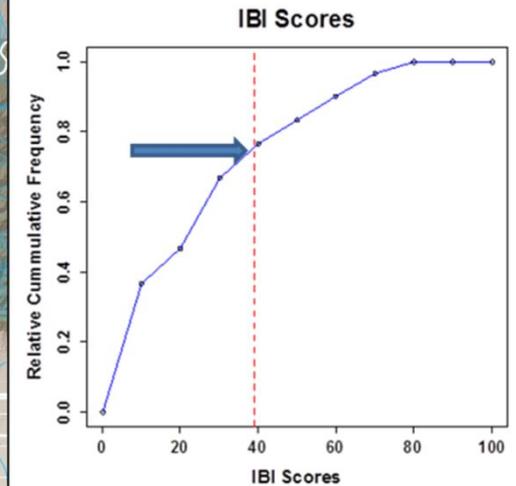


7-day Ceriodaphnia test

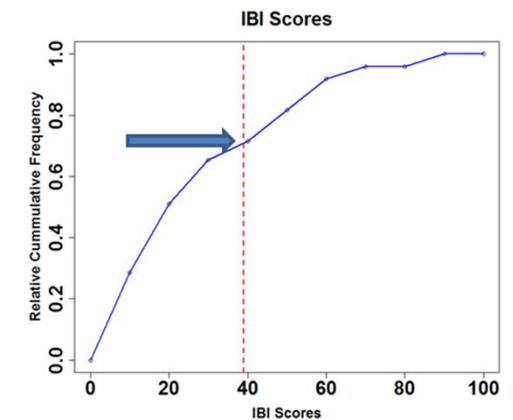
# BMI Community Condition Along an Urbanization Gradient



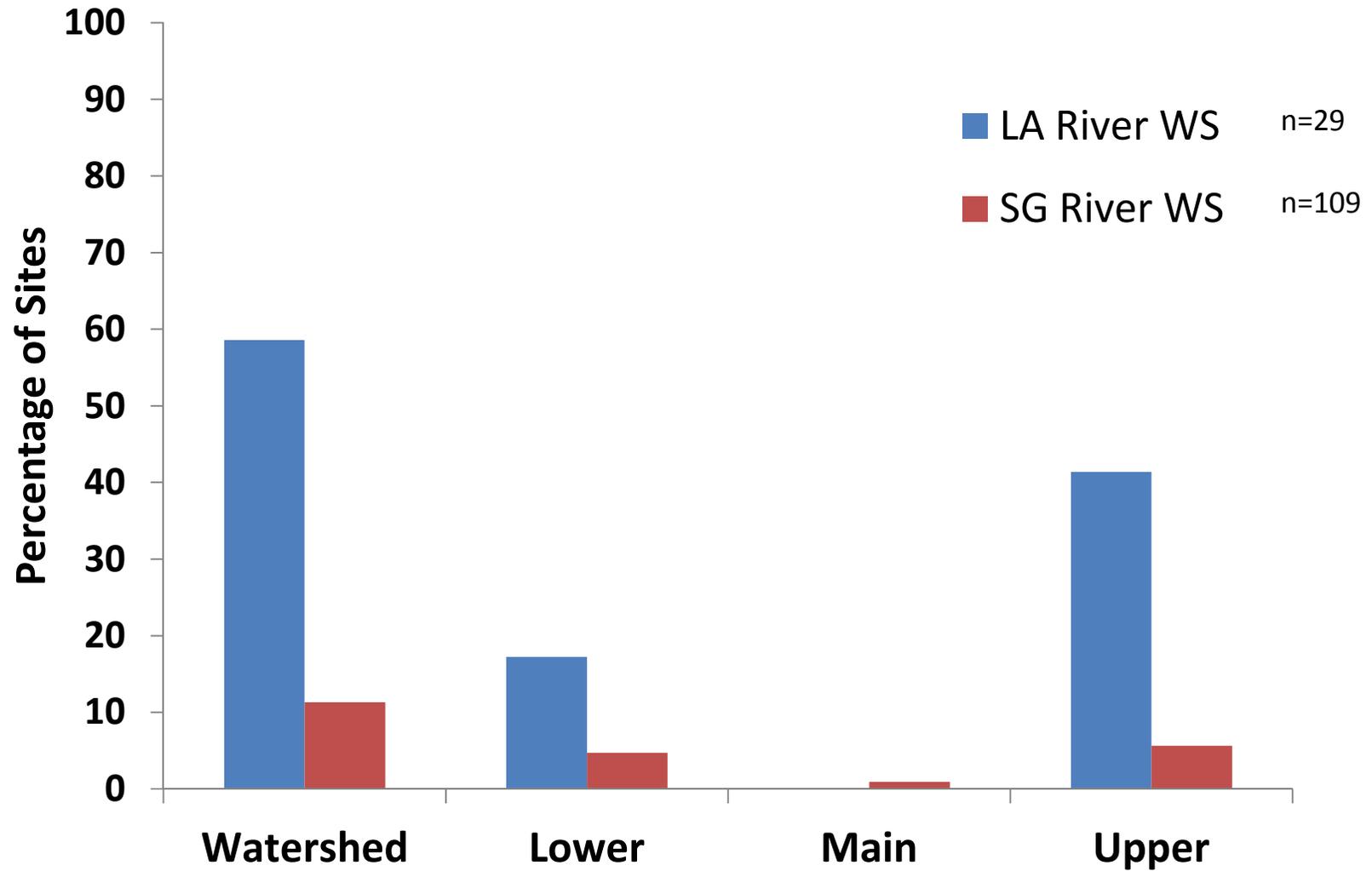
Los Angeles River Watershed



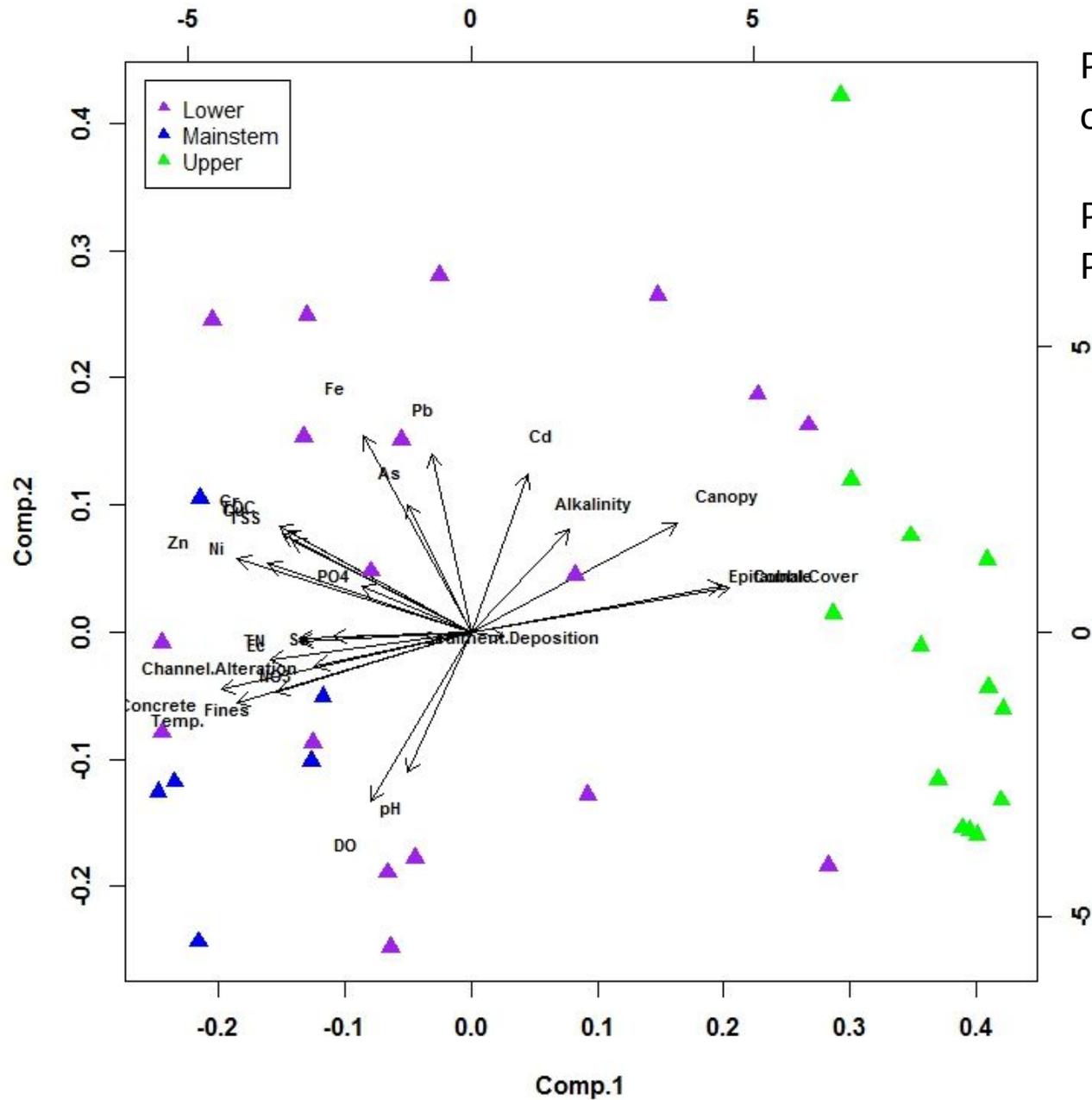
Sab Gabriel River Watershed



# Chronic Toxicity



# San Gabriel River Watershed



PC 1 and 2 explain 58% of variance

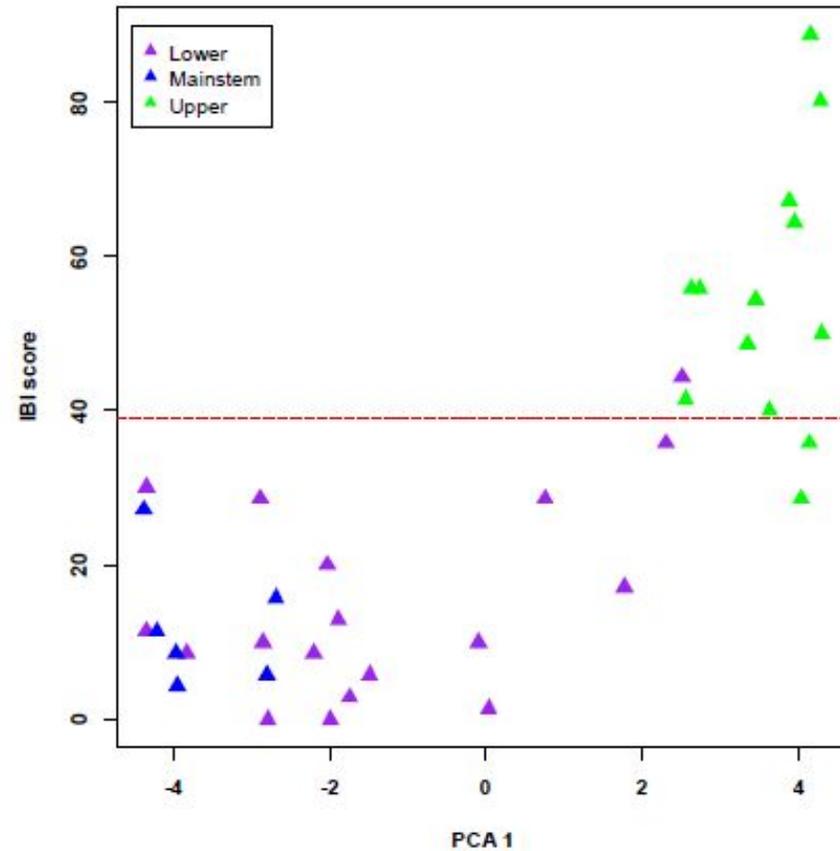
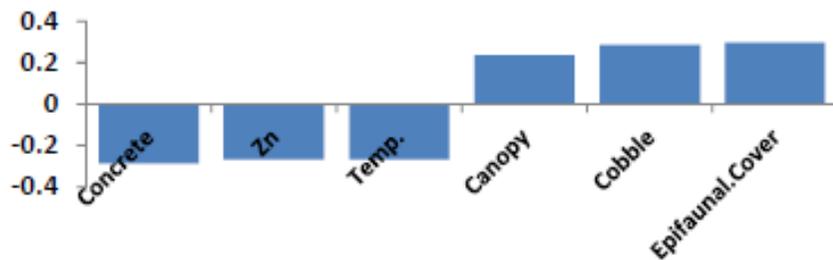
PC 1: 46% (pHab var)

PC 2: 12% (diss. metals)

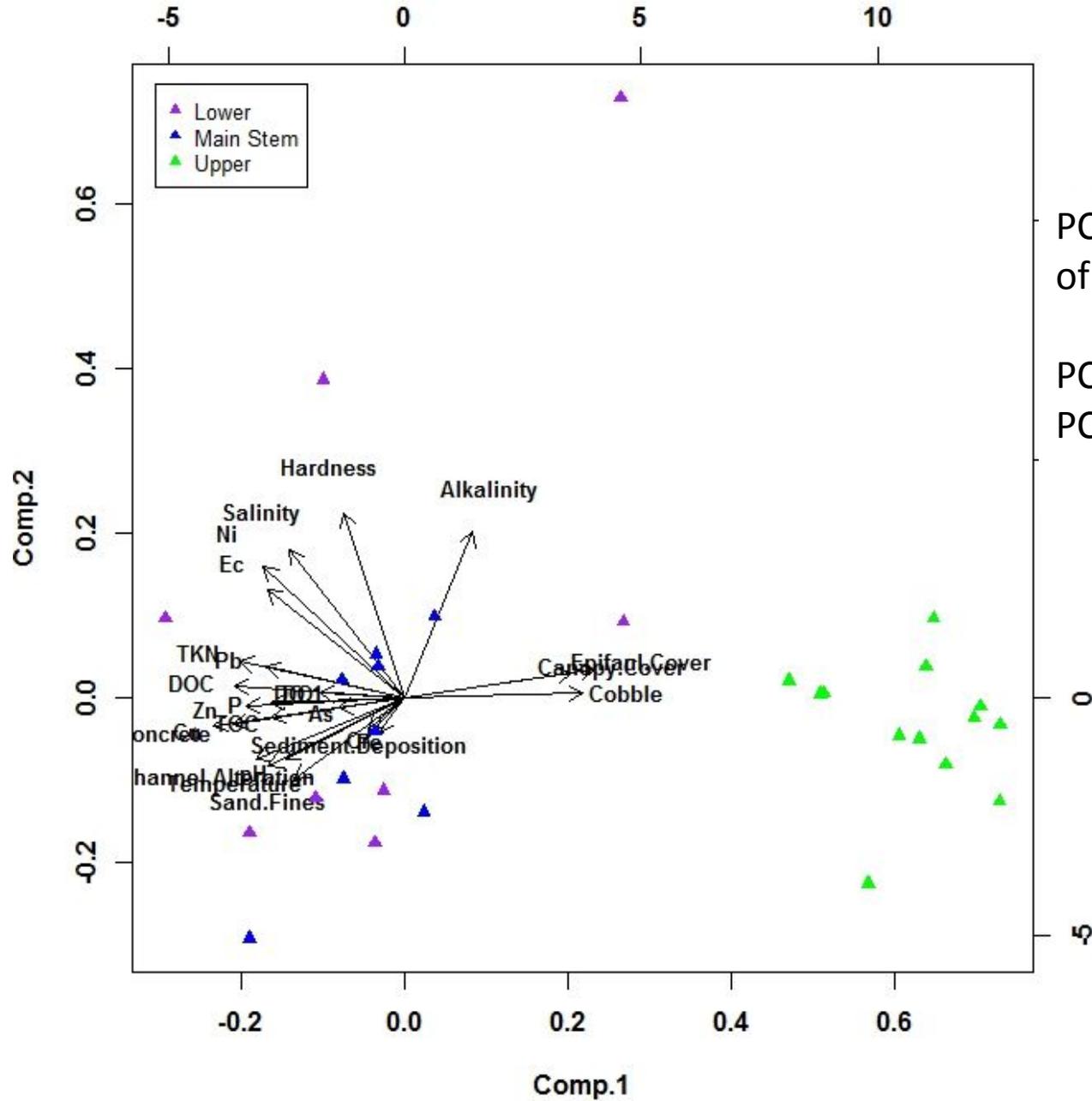
n = 69

# San Gabriel River Watershed

Relationship b/w Measured Environmental Variables and IBI Scores



# Los Angeles River Watershed



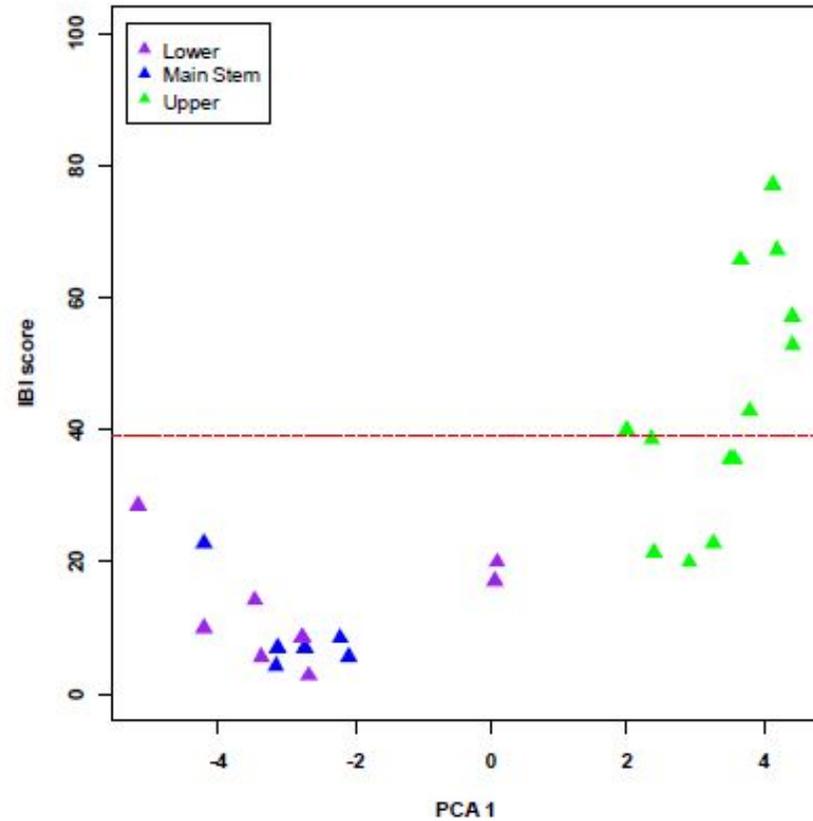
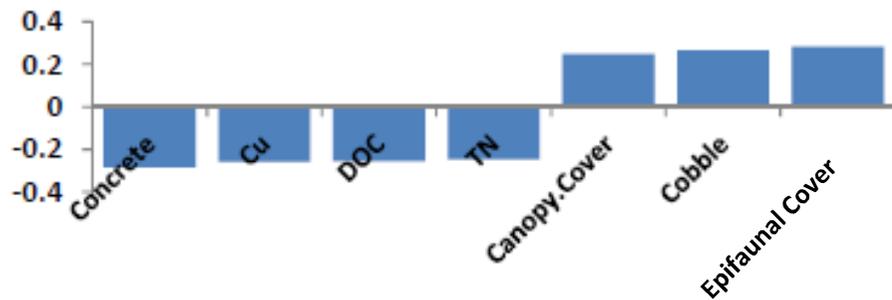
PC 1 and 2 explain 60% of variance

PC 1: 48% (pHab var)

PC 2: 12% (diss. ions)

# Los Angeles River Watershed

Relationship b/w Measured Environmental Variables and IBI Scores



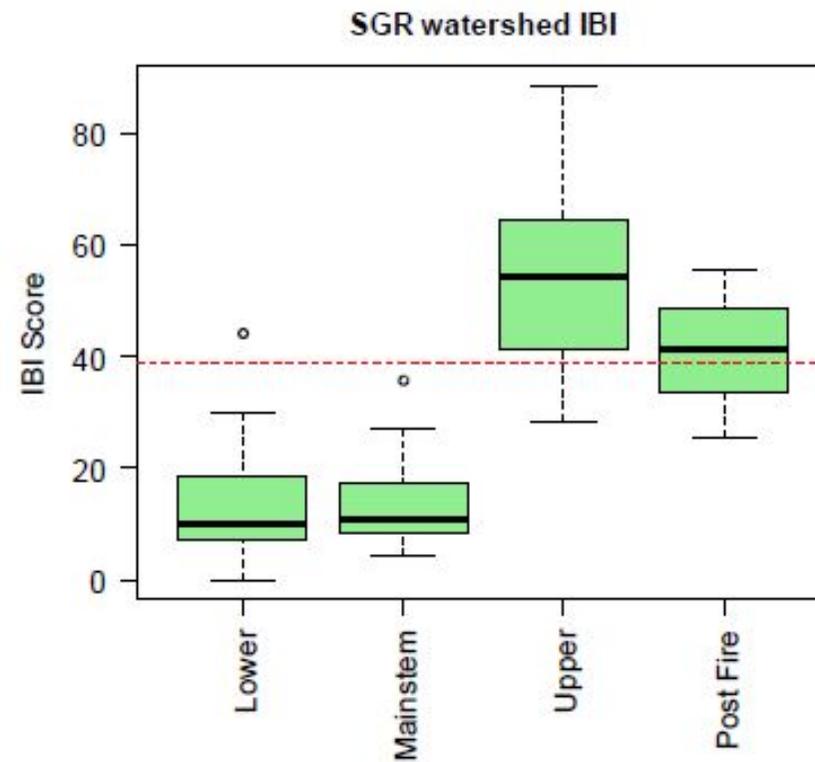
# Conclusions

- BMI communities vary across an urbanization gradient
  - clear relationship between IBI Scores and the known degree of urban pressure
- Physical habitat conditions biggest stressor to BMIs
- Opportunities for conservation of green areas

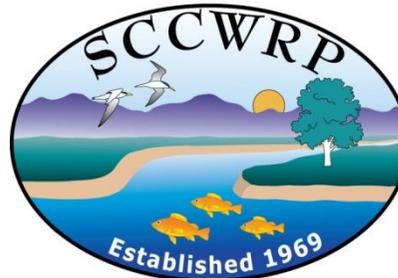
# Next Steps: Post-fire Recovery

2009 Station Fire: LA River Watershed

2009 Morris Fire: San Gabriel River Watershed



# Acknowledgement of Program Partners



**Brock Bernstein: Consultant**

# Questions



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