

# Regional Spreadsheet Model: Hydrology

Presentation to SPLWG

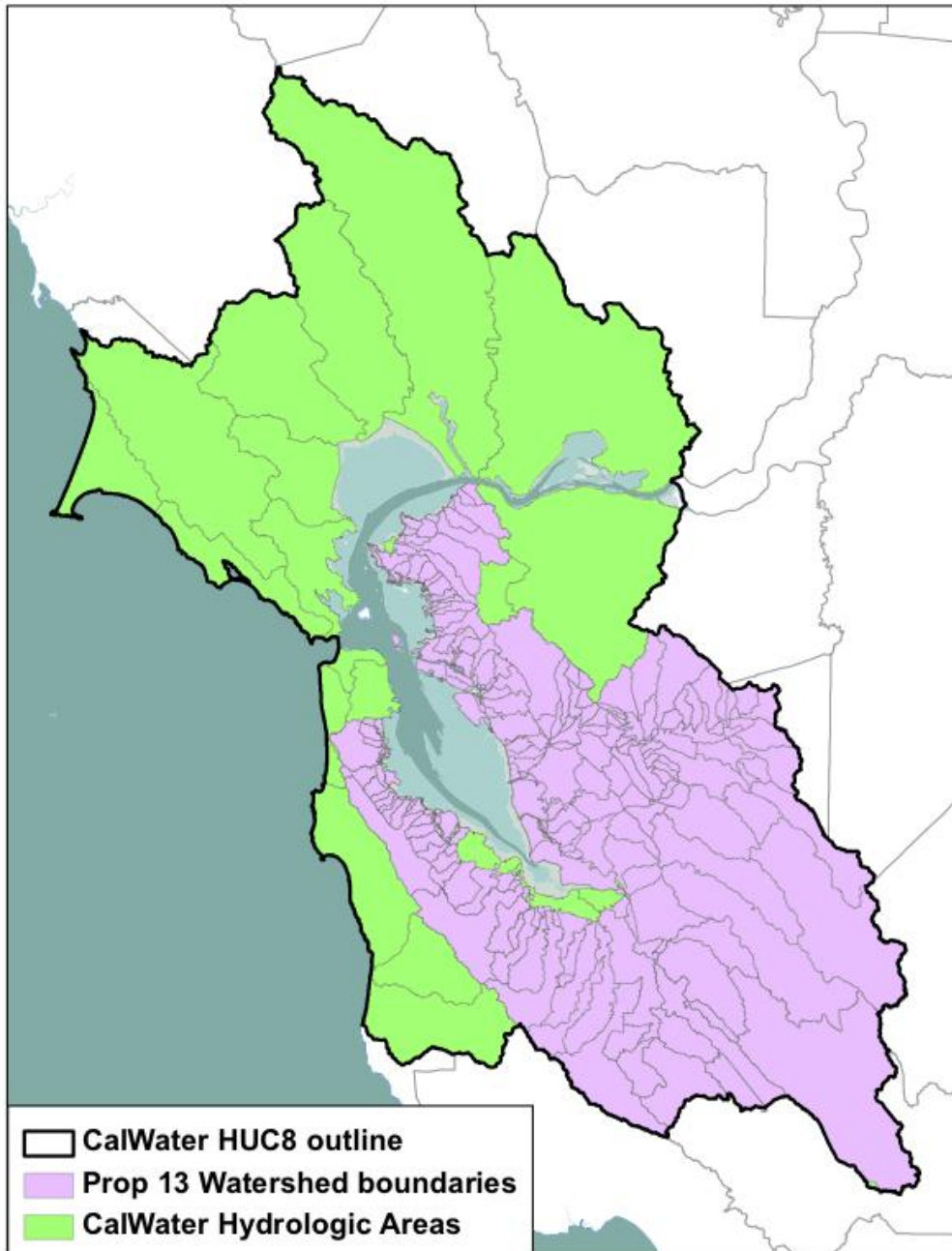
Oct. 25, 2011

# Overview of project

- Year 1:
  - Develop base rainfall-runoff model
  - Develop initial contaminant model (sediment, Hg, PCBs)
  - Lit. search on approaches and data availability for contaminant model
- Year 2:
  - Refine rainfall-runoff model

# Objective

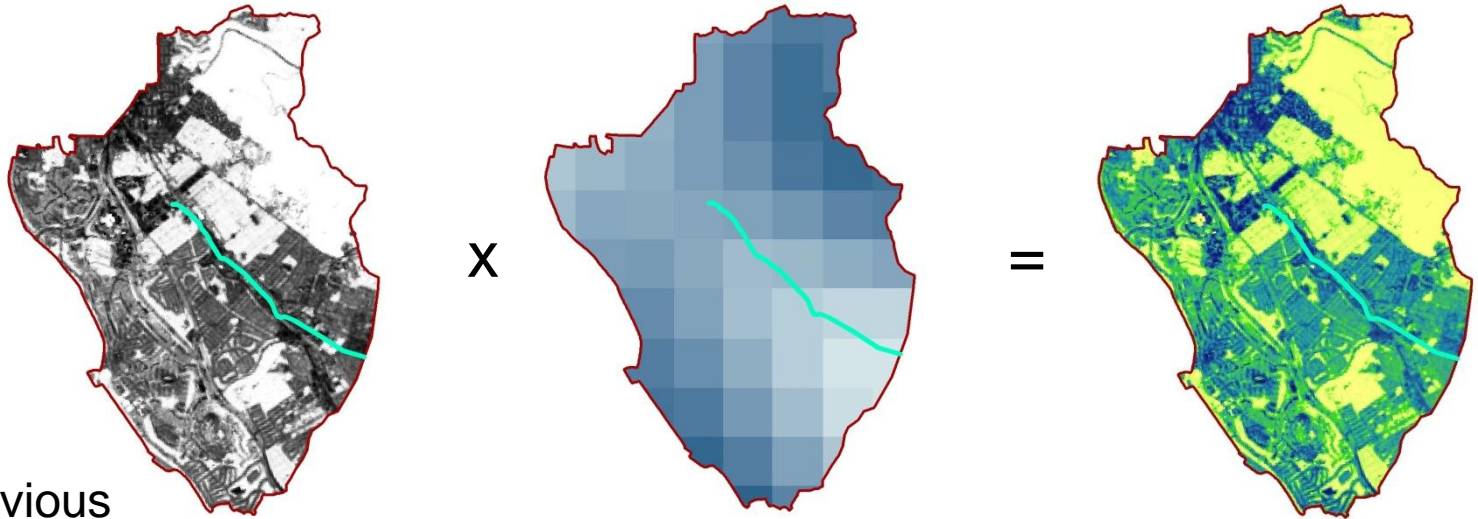
To develop spatially-based regional average runoff volumes and contaminant loads



# Tested two approaches to Rainfall-Runoff Model...

Runoff Coefficient	x	Rainfall	=	Runoff
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Approach 1  
by % impervious



Approach 2  
by land use type



# Runoff coefficients tested

## Impervious-based

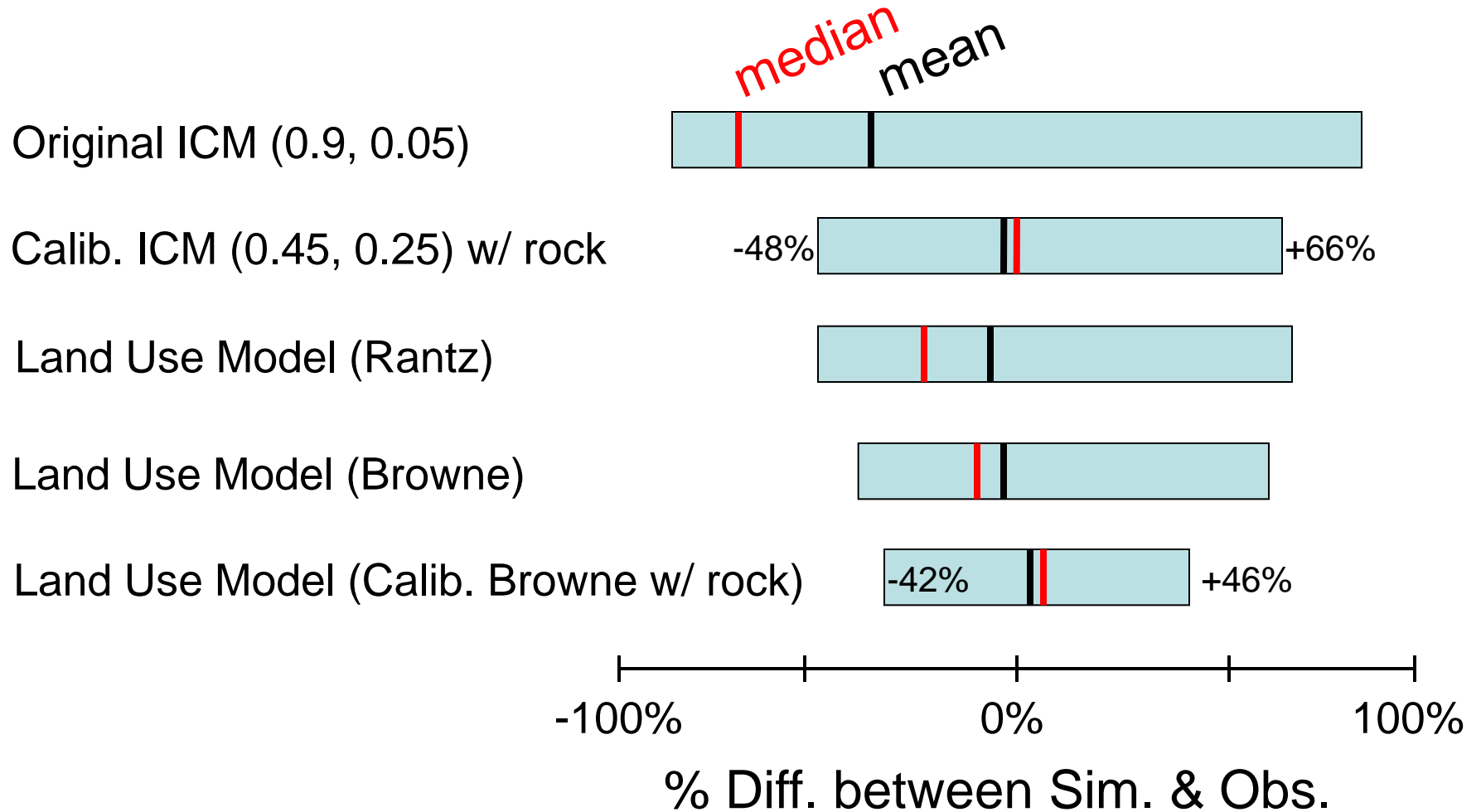
- Schueler, 2003
  - Developed for Chesapeake Bay area

## Land use-based

- Rantz, 1971
  - Developed for Bay Area
- Browne, 1991
  - Split out by slope and soil group

# Hydrologic Results

*Range of annual flow volume results shown for 18 watersheds*

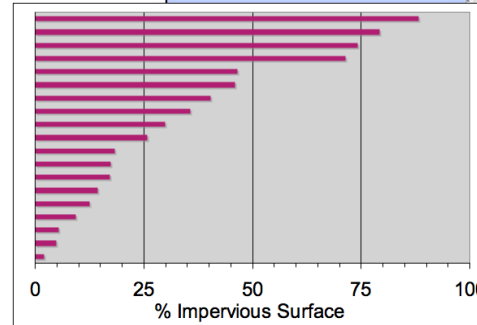
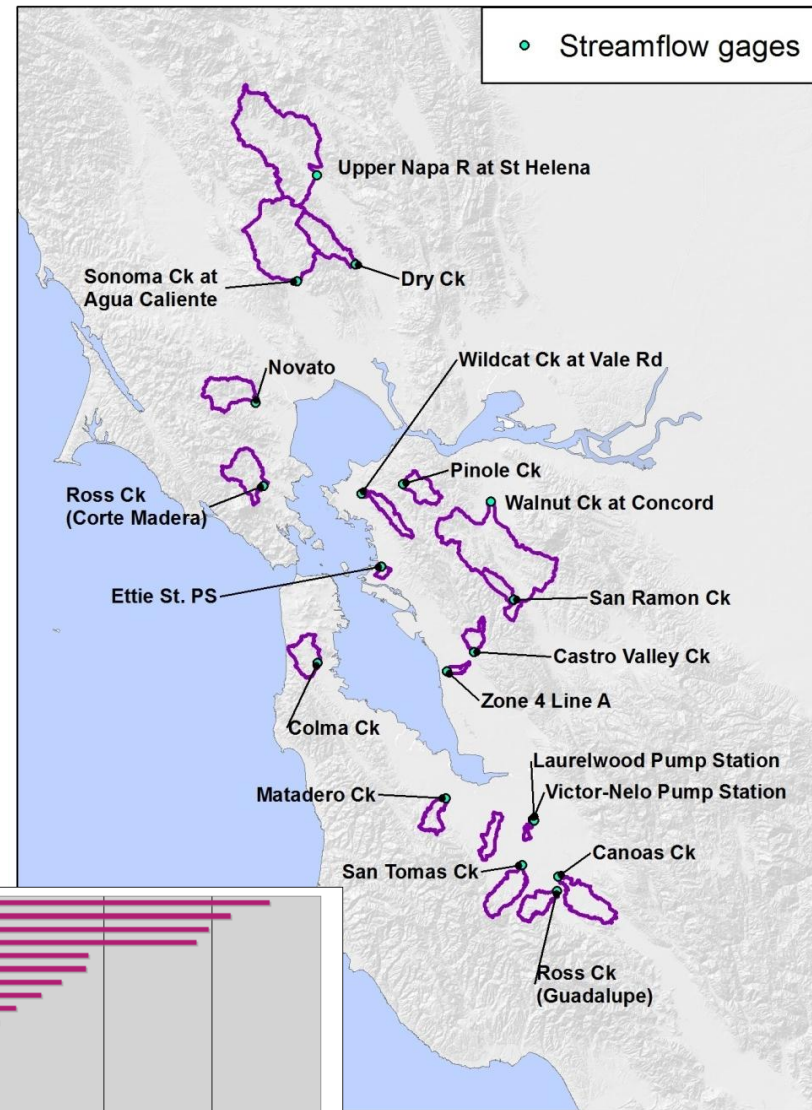
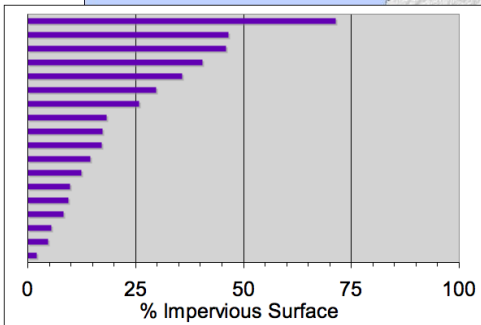
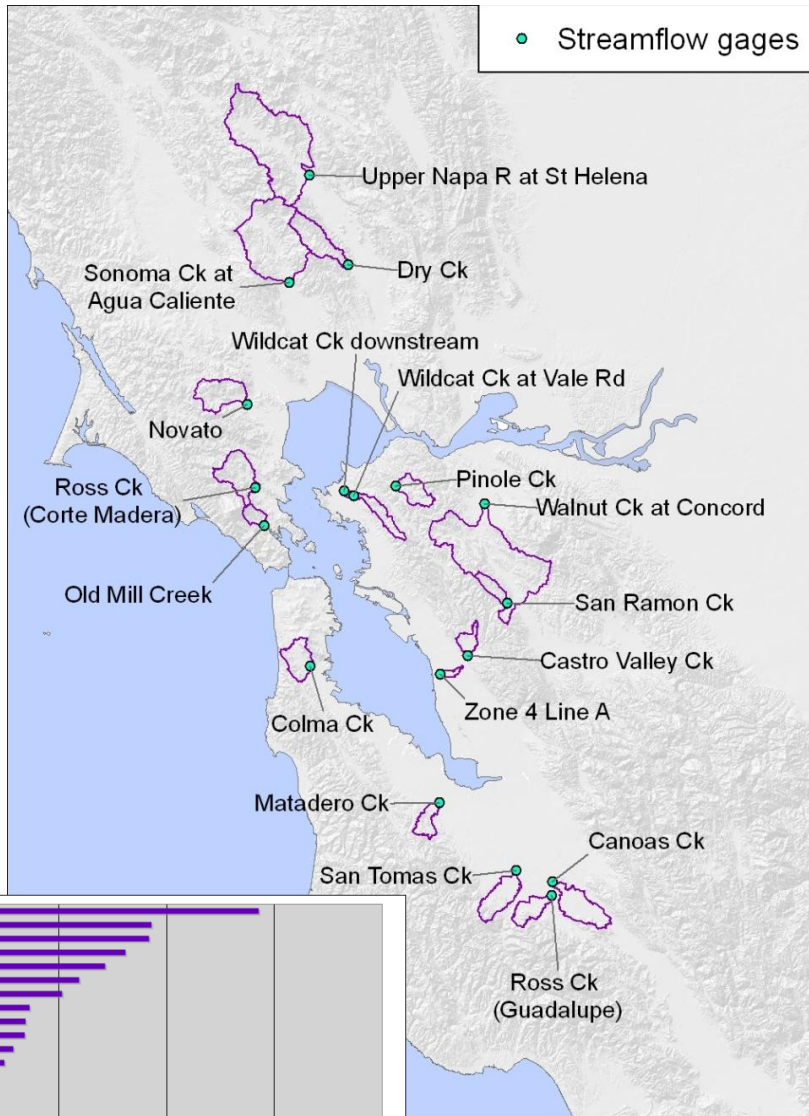


# Year 1: Recommendations for improving base model

*...task list for Year 2*

- Improve hydrologic calibration data set
- Use more consistent resolution land use layer
- Refine land use categories underlying runoff coefficients

# Improved hydrologic calibration data set

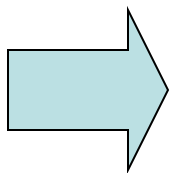
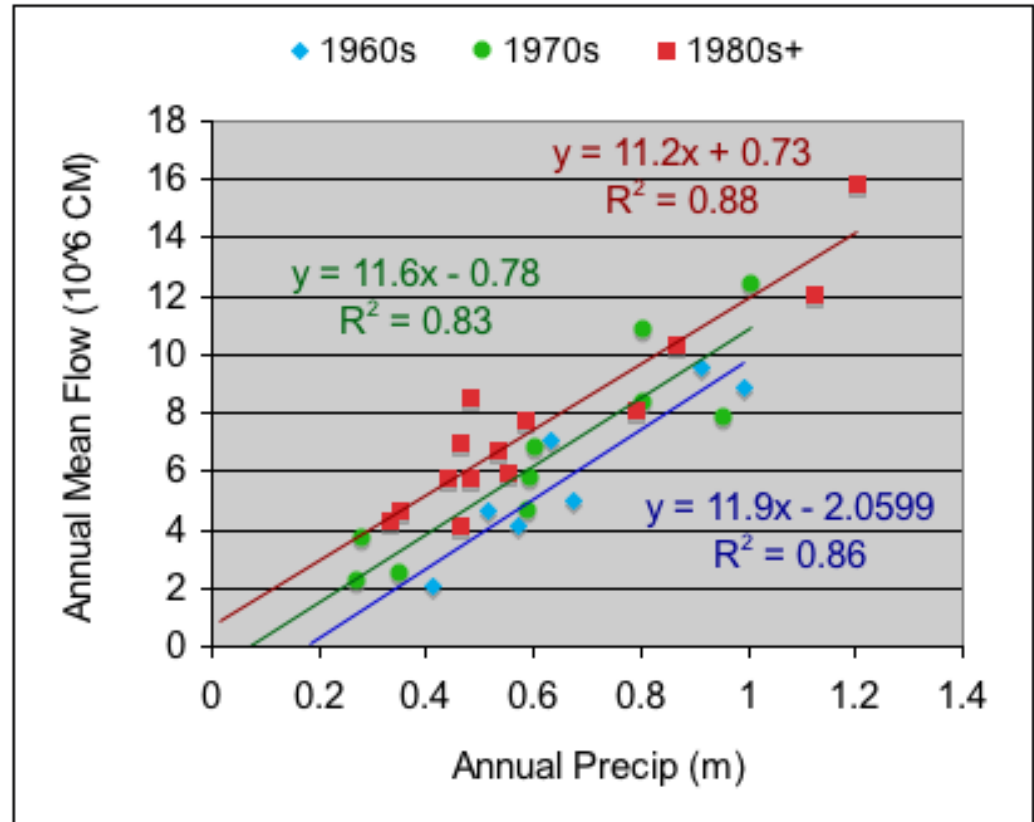




# Improved hydrologic calibration data set

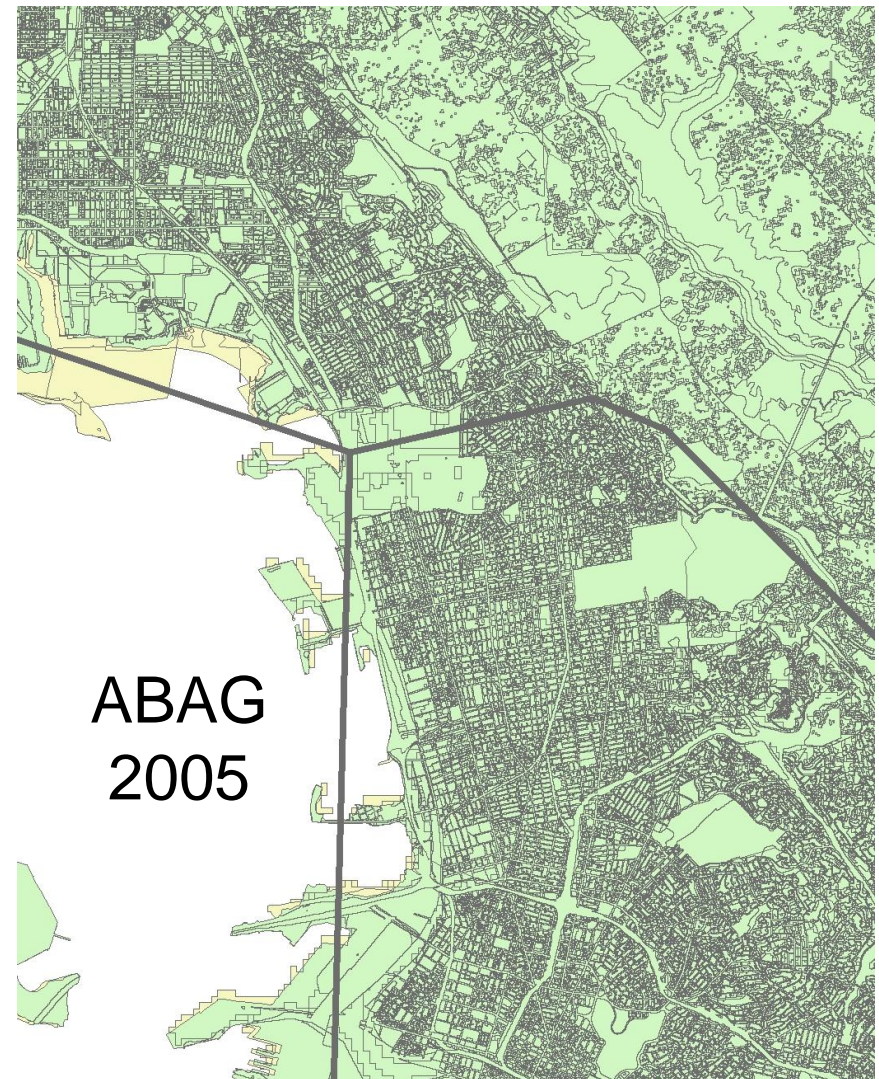
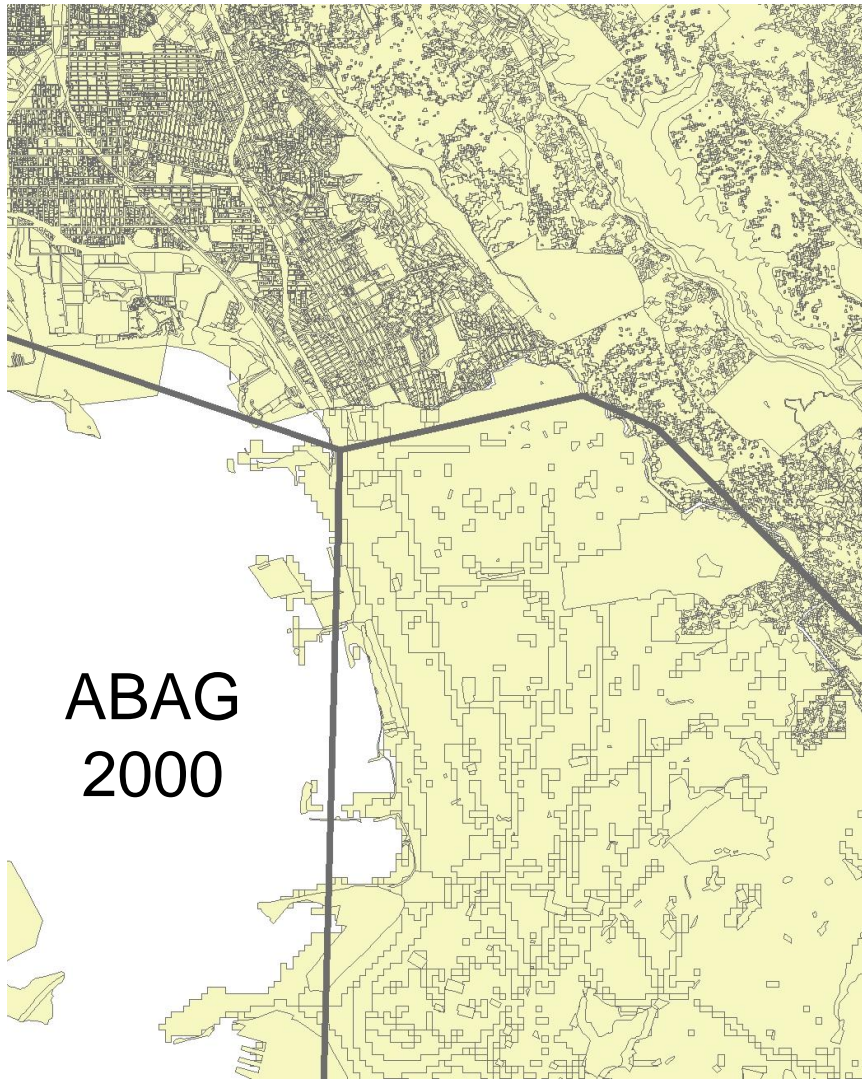
- Issue of land use layer poorly representing development conditions during gage period

Example:  
Colma Creek Watershed



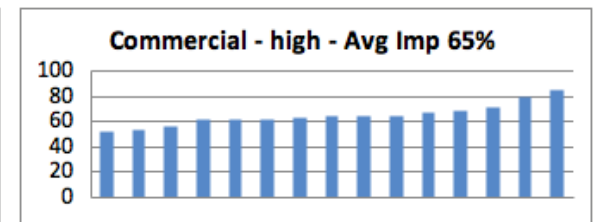
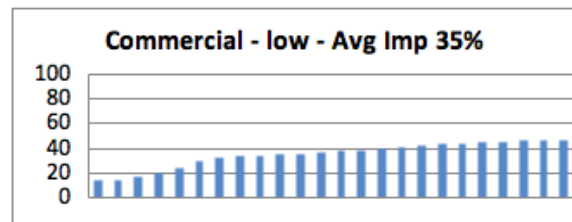
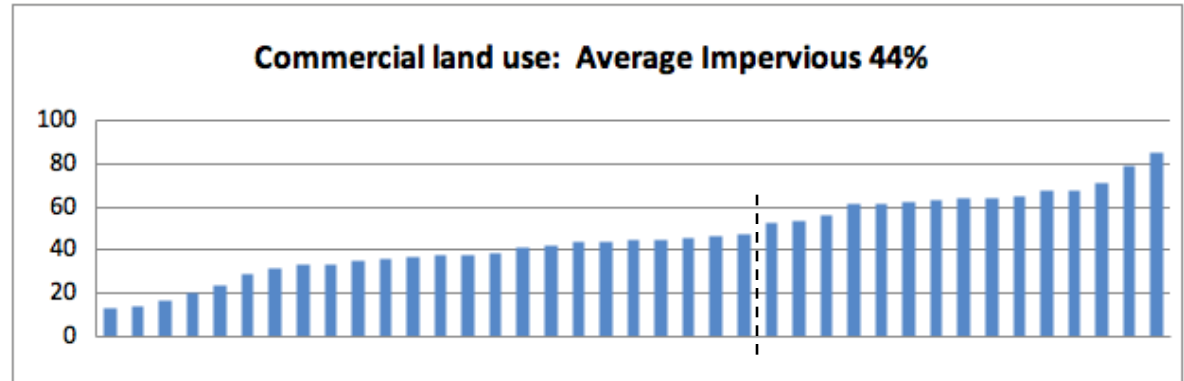
Removed early portions of several records  
and completely removed a couple records

# Improved land use layer



# Refined categories for runoff coefficients

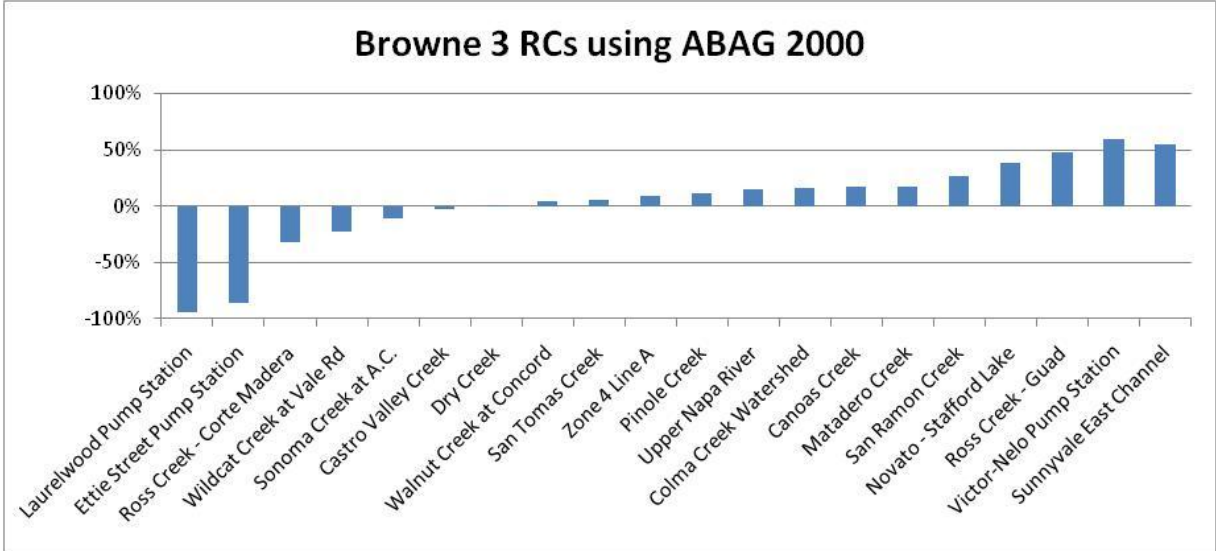
Prior Categories	Revised Categories
Agriculture	Agriculture
Open	Open
	Open- compacted
Residential	Residential rural
	Residential low
	Residential med
	Residential high
Commercial	Commercial - low
	Commercial - high
Industrial	Industrial
Transportation	Transportation
Water	Water
	Water- runoff



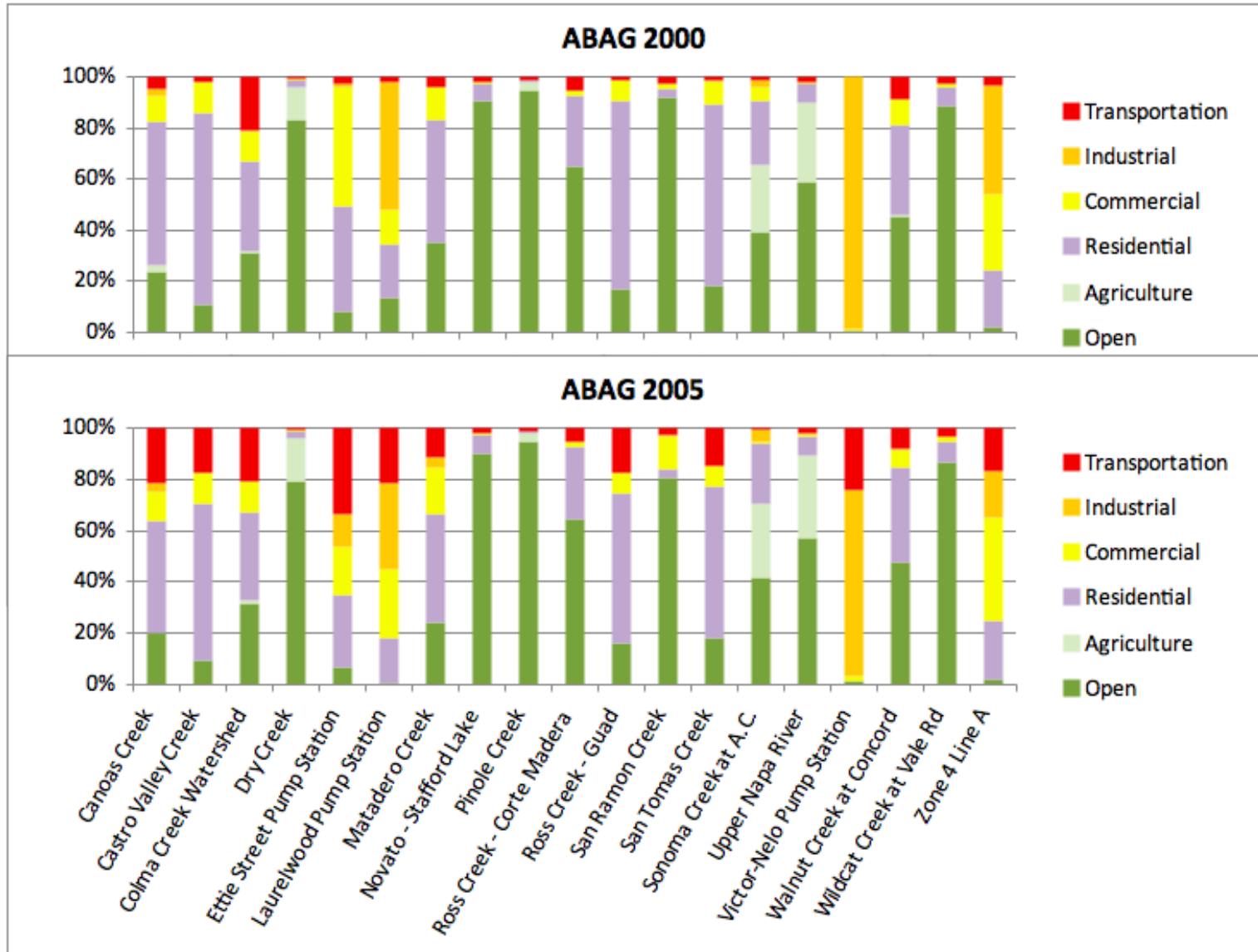
# Results of changing calibration data set

Calibration data set	Mean	Median	Minimum	Maximum
Old	+2%	+3%	-42%	+46%
New	+1%	+9%	-95%	+60%

Suggests that RCs may have been over-calibrated to data set

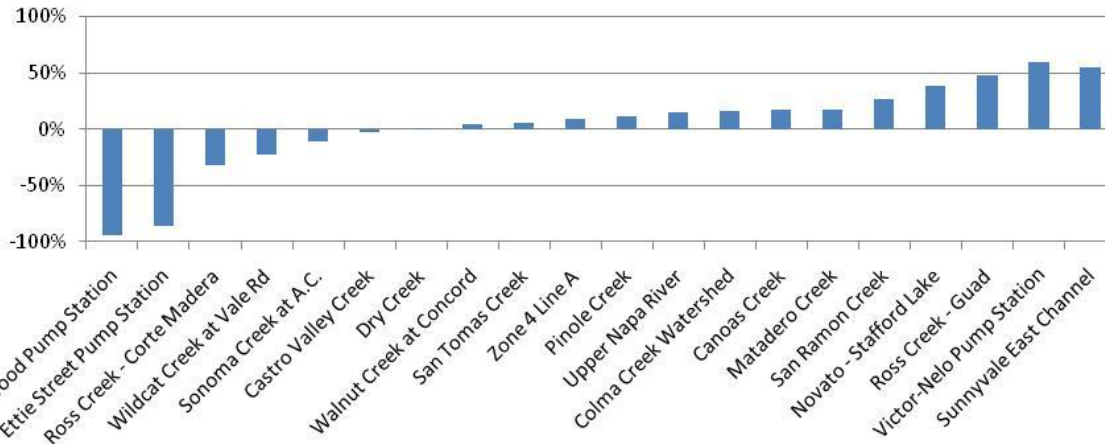


# Results of changing land use data set: *Watersheds' land use distribution*



# Results of changing land use data set: *Model performance*

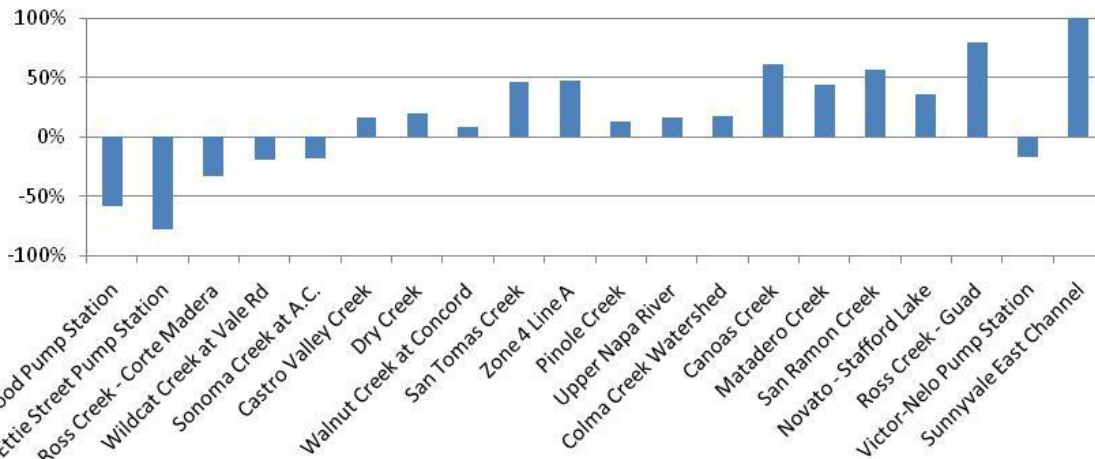
**Browne 3 RCs using ABAG 2000**



**Browne 3 (ABAG 2000)**

Mean	1%
Median	9%
Max	60%
Min	-95%

**Browne 3 RCs using ABAG 2005**

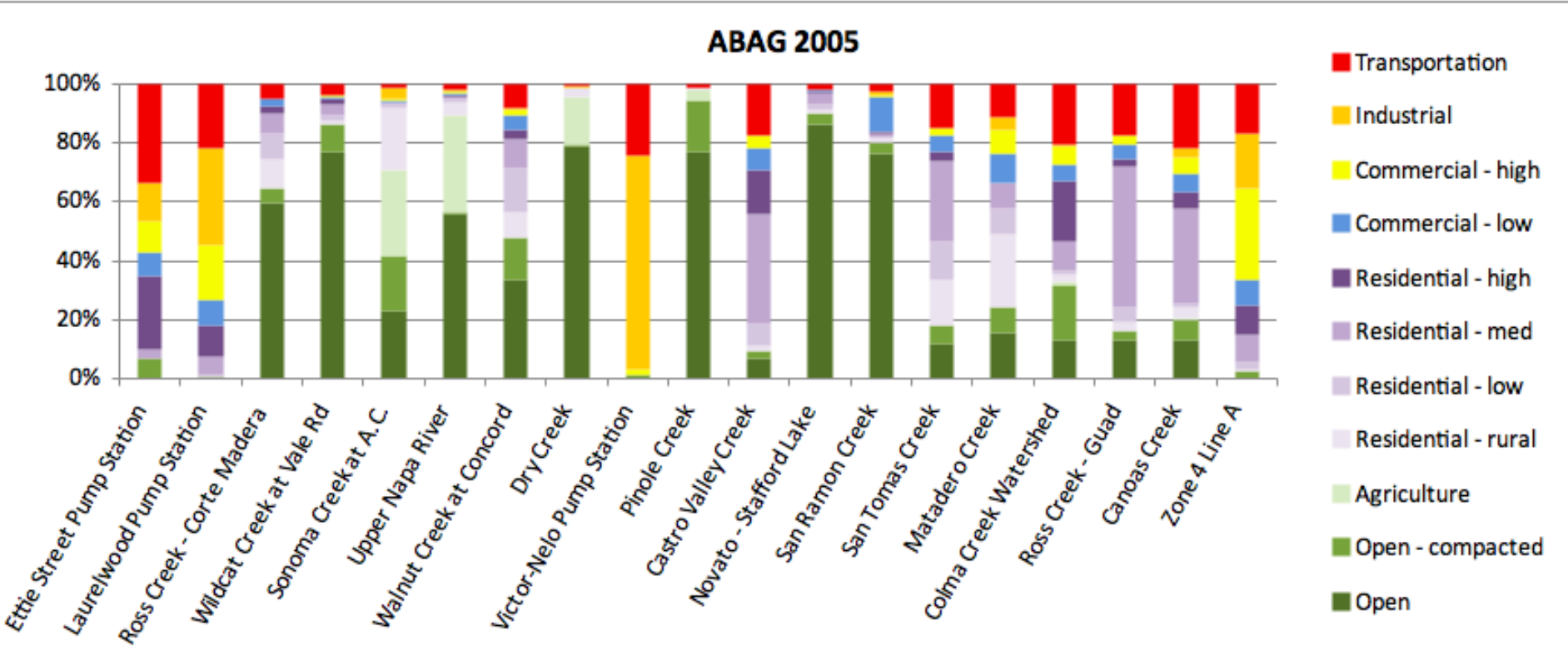


**Browne 3 (ABAG 2005)**

Mean	13%
Median	17%
Max	79%
Min	-78%

May be related to  
transportation  
land use...

# Increased resolution of land use categories



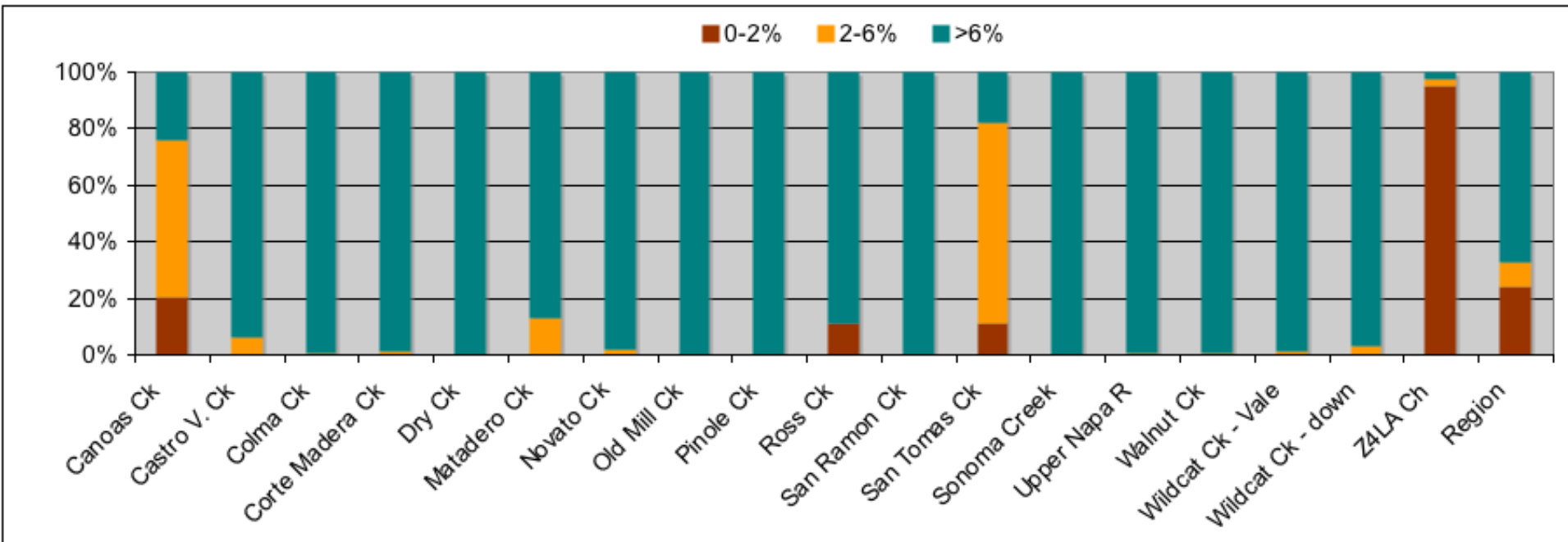
# New (preliminary) calibrated results

New model (ABAG 2005 with LU++)	Mean	Median	Minimum	Maximum
Uncalibrated	+1%	+9%	-95%	+60%
Calibrated	+1%	+3%	-75%	+70%

- Performance doesn't look as good as before, BUT much more confidence in calibration data set representing region



# Refine slopes?



- Could design slope binning to be specific to Bay Area