

# Sources Pathways and Loadings Update

TRC Meeting

December 15, 2010

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# Loadings information development within the RMP

- SPLWG 1999 – present/ongoing
  - Regional scale estimates to support TMDLs and resulting policy (basin plan amendment, SSOs, MRP)
  - 5 main pathways
    - Atmospheric deposition (1999-2001)
    - Large rivers (2000-2006, 2010)
    - Small tributaries (incl. Guadalupe R.) (2001-2010)
    - Wastewater (Muni. and Ind.) (1999-2002)
    - In-Bay legacy erosion/re-suspension (2000, 2004, 2008)
- SPLWG will continue to meet once/twice annually

# Small Tributaries Loading Strategy (STLS)

- 2008- present/ongoing
- Focus on small tributaries to support improved management
- Premise
  - It is possible to identify small tributaries that exert a disproportionately large influence on loads and impacts
  - Control of Hg and PCBs will also help to control other particle bound POCs
- Bridge between RMP loads efforts and BASMAA effort in relation to provisions C8e, C11, and C12.
- Consistent with other RMP strategies
  - Mercury
  - Dioxins
  - Modeling
  - PCBs

# Overview of Strategy - Questions

- **Impairment:** Which are the “high-leverage” small tributaries that contribute or potentially contribute most to Bay impairment by pollutants of concern?
- **Loads:** What are the loads or concentrations of pollutants of concern from small tributaries to the Bay?
- **Trends:** How are loads or concentrations of pollutants of concern from small tributaries changing on a decadal scale?
- **Support for Management Actions:** What are the projected impacts of management actions on loads or concentrations of pollutants of concern from the high-leverage small tributaries and where should management actions be implemented in the region to have the greatest impact?

# Overview of Strategy – Deliverables



# 2010 Activities Update

## Meetings

- May SPLWG full meeting
- May Joint CTAG-TRC meeting (Ken and Lester presented)
- June STLS full meeting
- July STLS local meeting
- Multiple STLS local phone check-in meetings (thought the year)

## Projects

- Mallard Island loads
- Guadalupe River loads
- Zone 4 Line A loads
- Dioxin Loadings
- Spreadsheet Model
- Guadalupe R Model
- Watershed Categorization
- Sampling Optimization

## Products

- Watershed Categorization Report
- Sampling Optimization Report
- Guadalupe River Analysis and Hg Loads Report
- Mallard, Guadalupe, Zone 4 publications in progress

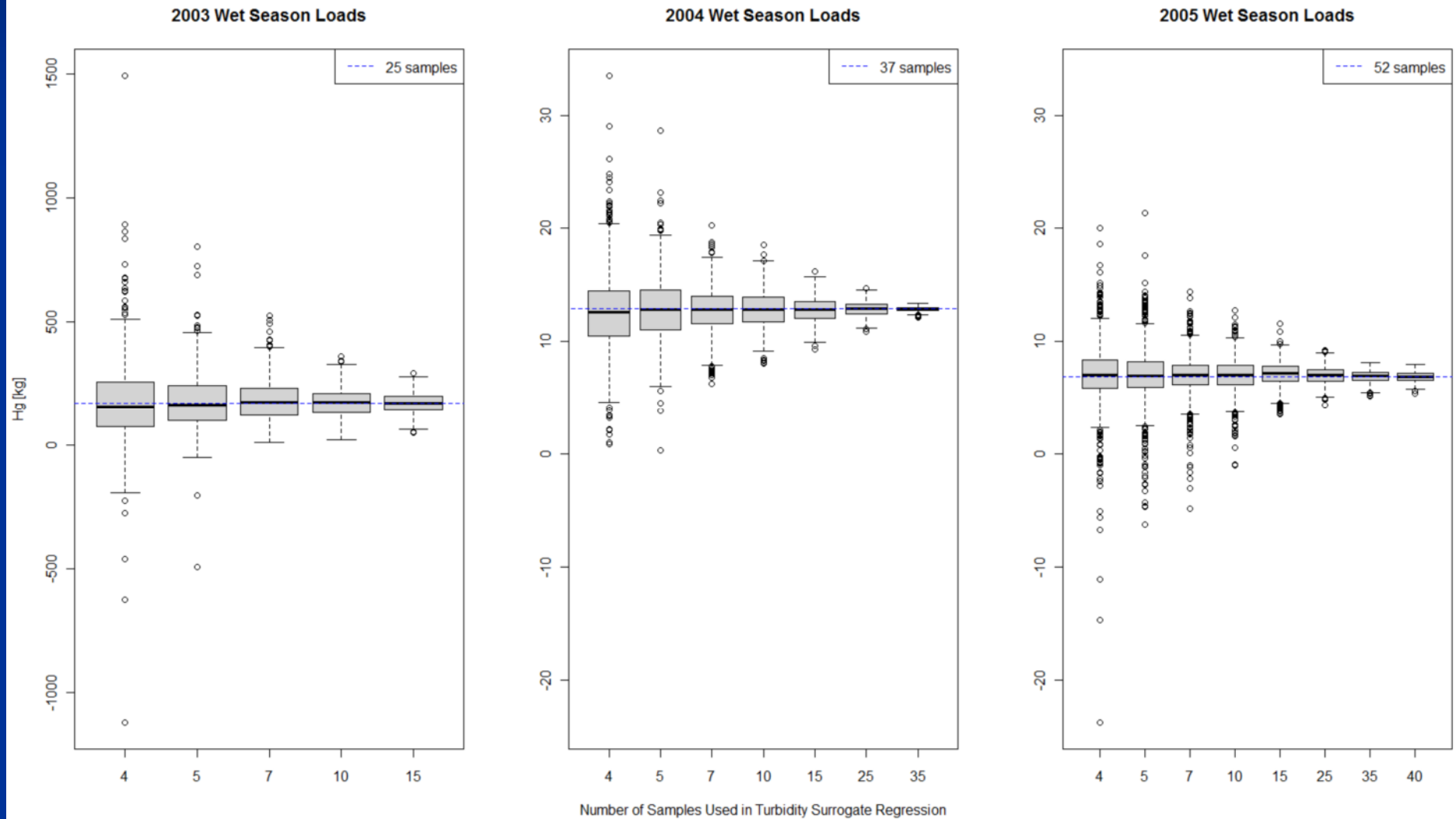
# Some highlights

# Watershed classification

Task	Description	Question	2008	2009	2010	2011	2012	2013	2014	2015
1	Guadalupe River Model (2008 and 2009)	3,4	75	75						
3	Develop Multi-year Watershed Loading Sampling Plan			80						
3a	Develop Criteria and Rank Watersheds	1,4		25						
3b	Optimize Sampling Methods for Loading and Trends	1,2,3,4		45						
3c	Develop/Update Spreadsheet model for Regional Loadings Estimates	2	40		35	20	20	20	20	TBD
4	POC Load Monitoring in Representative Watersheds	1,2,3			87	300	300	300	300	TBD
4a	Guadalupe Small Tributaries Loading Study (WYs 2003, 2004, 2005, 2006, 2010)	1,2			43					
4b, 2	Z4LA Small Tributaries Loading Study (WYs 2007, 2008, 2009, 2010)	1,2	100	100	151					
4c	Watersheds to Be Named Later (reconnaissance)				12					
4d	Pollutants of Concern Monitoring at Representative Land Use sites – Rationale Development and Reconnaissance	2,3,4			30					
4e	Pollutants of Concern Monitoring at Representative Land Use sites	2,3,4				20	80	100	100	TBD
5	Additional Dynamic Modeling in Selected Representative Watersheds	2,3,4					150	75		
	Total		325	325	358	340	550	495	420	TBD

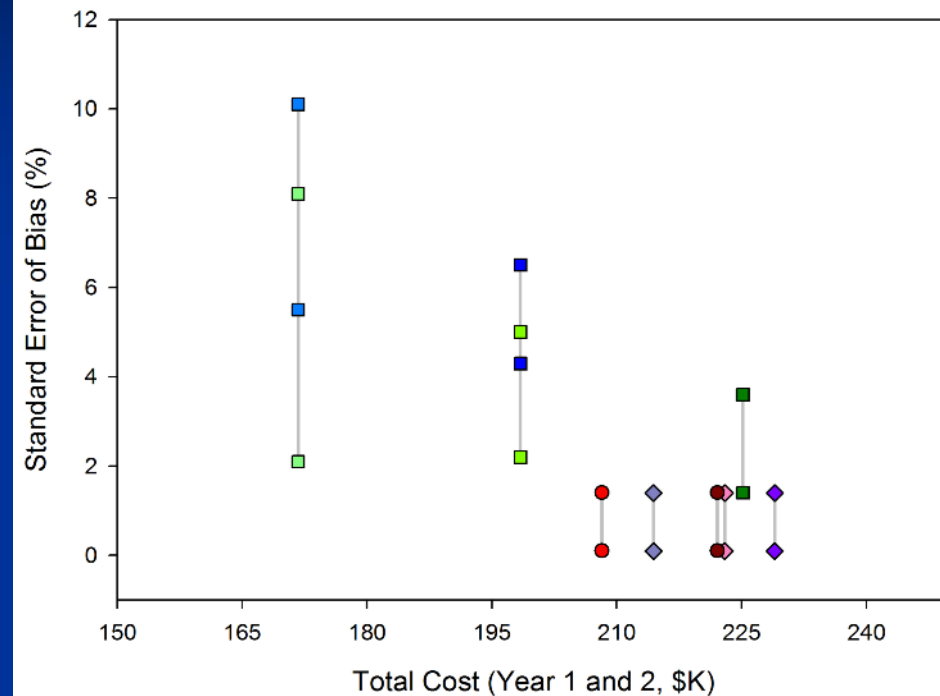


# Optimizing sampling for loads and trends



# Cost comparisons

- Carried out cost analysis of 40 scenarios
  - Only 12 fell within reasonable cost constraints set by BASMAA and Water Board
  - Discrete sampling using any estimator was found to be higher accuracy and precision
  - From a scientific perspective, turbidity surrogate method with 12-16 samples per year provided the best balance between cost and quality of data



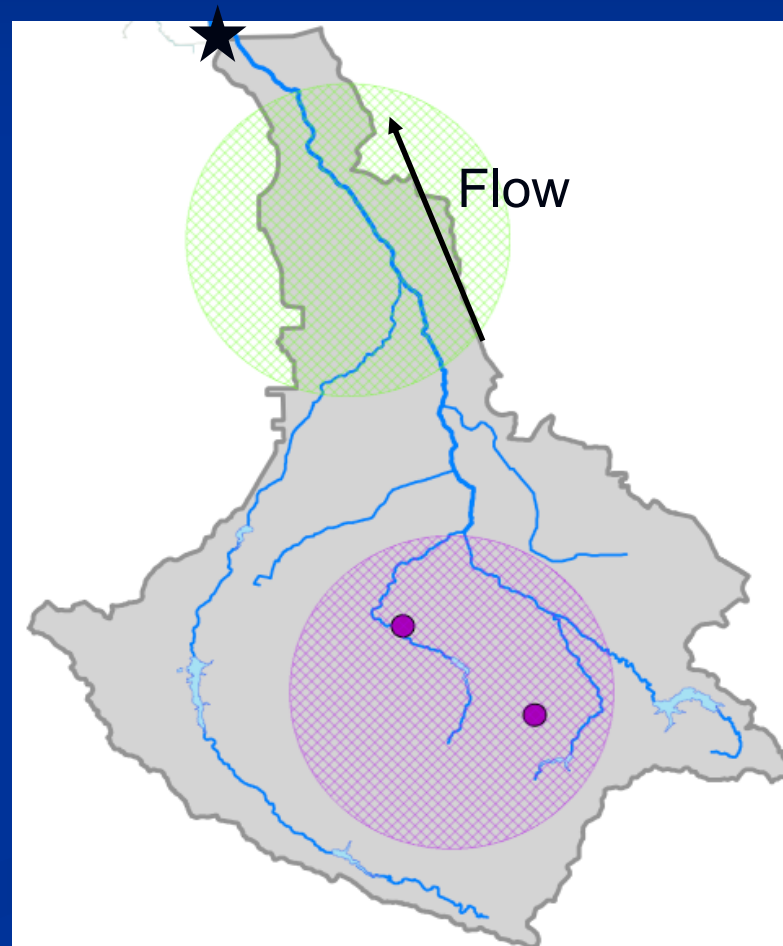
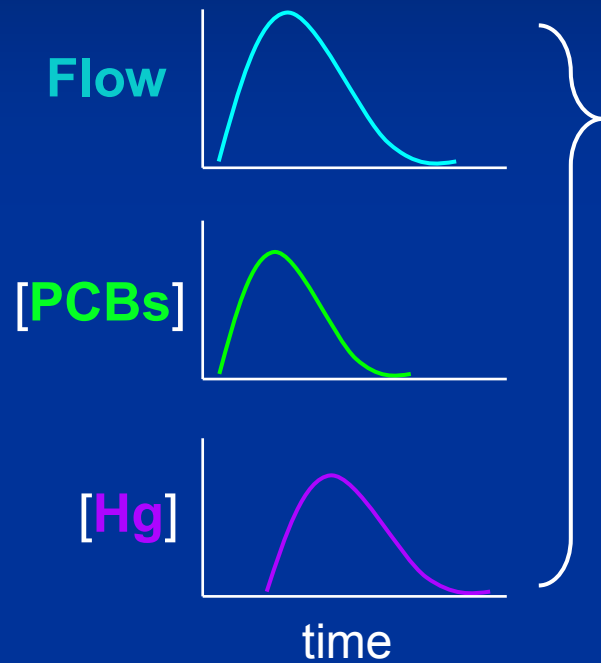
- Composite: 2 storms (first flush and largest storms, auto)
- Composite: 4 storms (first flush, largest, and 2 storms, auto)
- Composite: 6 storms (first flush, largest, and 4 storms, auto)
- Composite: 2 random storms (auto)
- Composite: 4 random storms (auto)
- Discrete: 2 storms (auto)
- Discrete: 4 storms (auto)
- Discrete: 6 storms (auto)
- Discrete: 2 storms (manual)
- Discrete: 4 storms (manual)
- Discrete: 6 storms (manual)

# Guadalupe Watershed Model

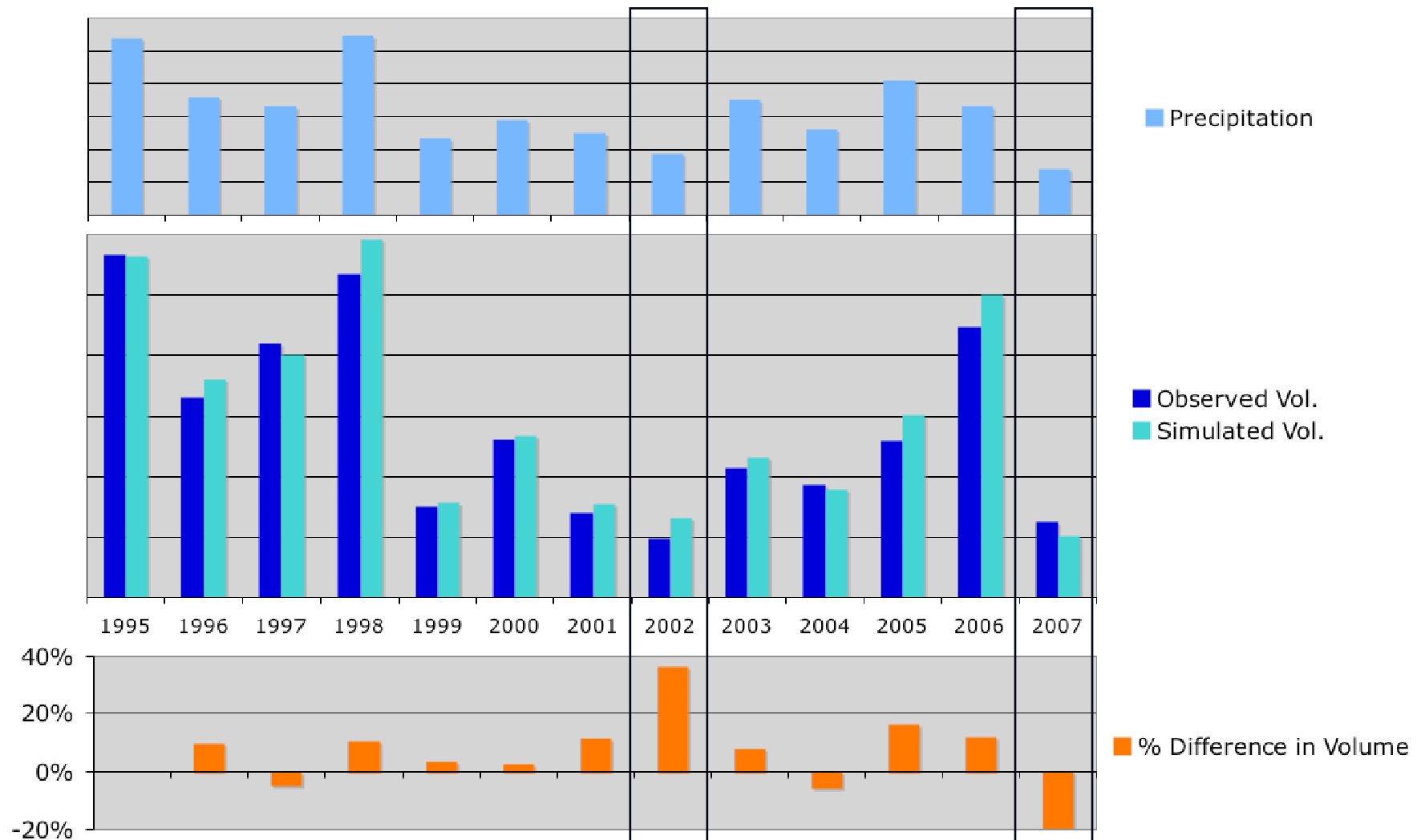
# Overview

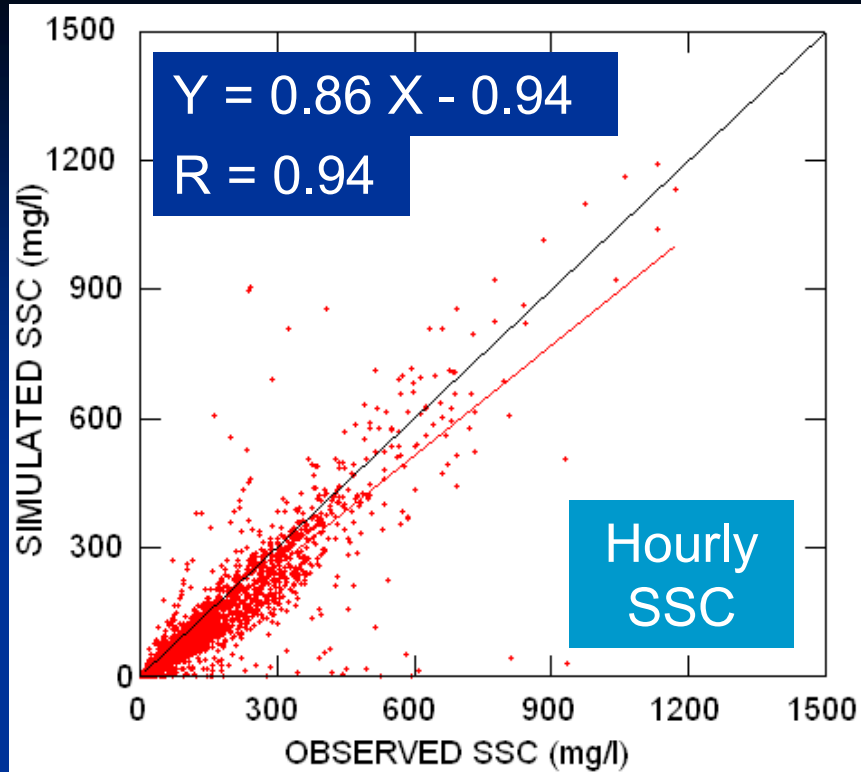
Tasks	Time frame	Status
Develop hydrology model	2008	Completed
Calibrate & validate hydrology model	2008	Completed
Phase I Report	2008	Completed
Refine hydrology model	2009	Completed
Develop sediment model	2010	Completed
Develop mercury model	2010	In progress
Develop PCBs model	2010	In progress
Calibrate & validate sediment, Hg, and PCBs models	2010	In progress
Phase II Report	Dec. 31, 2010	In progress

# Why study *source, release, and transport* of Hg and PCBs in Guadalupe Watershed?



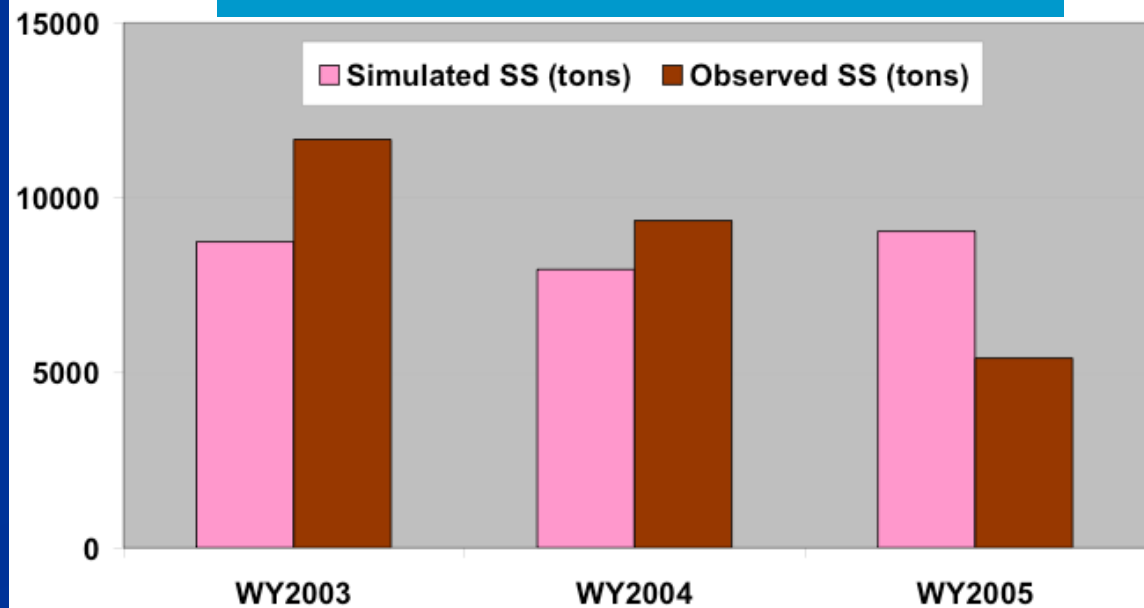
# Hydrologic Model Performance: Annual Flow Volumes for Guadalupe River



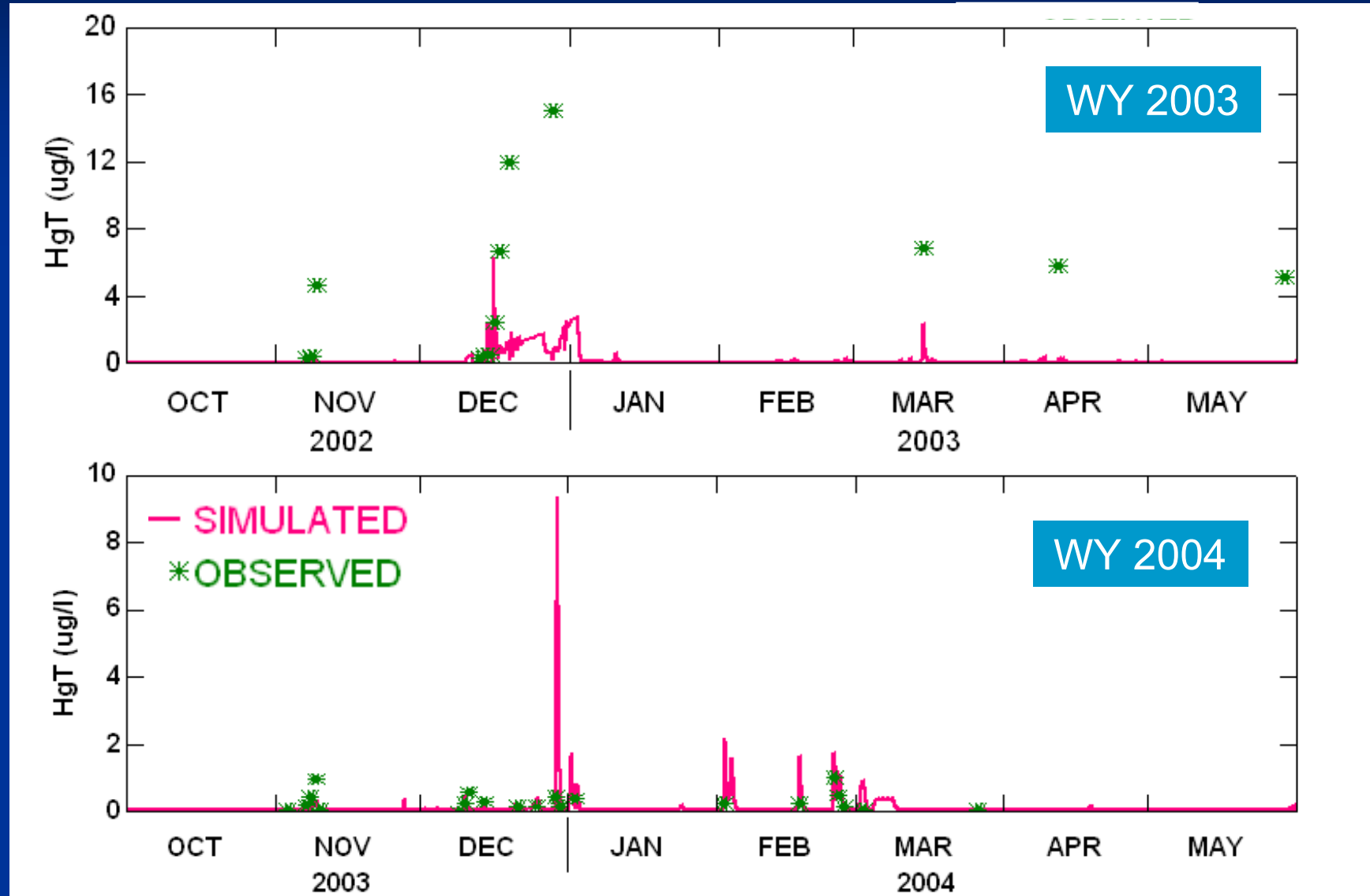


# Calibrated Sediment Results

## Wet Season Sediment loads



# Mercury initial calibration results





# Next steps

- Finish developing PCBs model
- Jointly calibrate PCBs and mercury models
- Complete report

# Regional Spreadsheet Model & Land-Use Specific EMCs

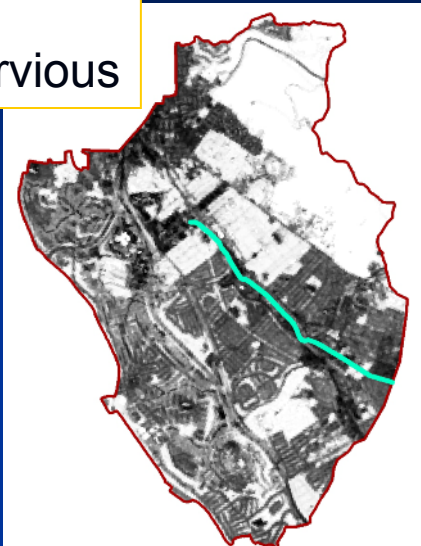
# Overview

Phase 1 Tasks	Time frame	Status
Compile GIS layers	Summer 2010	Completed
Develop base rainfall-runoff model	Fall 2010	Completed
Literature review on land-use specific EMCs & source characterization	Winter 2010-11	In progress
Add in initial POCs (SSC, Hg, PCBs)	Winter 2010-11	Upcoming
Report	February 2011	Upcoming

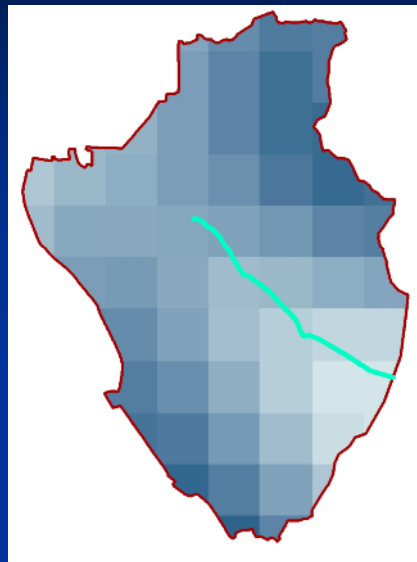
Phase 2 Tasks	Time frame	Status
Calibrate/optimize rainfall-runoff model	2011	Upcoming
Add in more POCs, as EMC data is available (rest of MRP POCs)	2011	Upcoming
Develop BMP modeling	2011	Upcoming
Internal documentation	2011	Upcoming

$$\text{Runoff Coefficient} \times \text{Rainfall} = \text{Runoff}$$

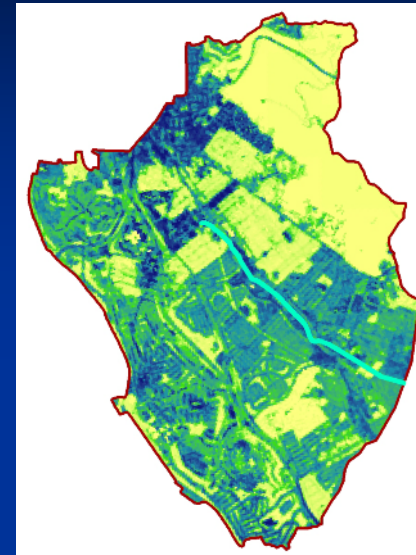
By %  
Impervious



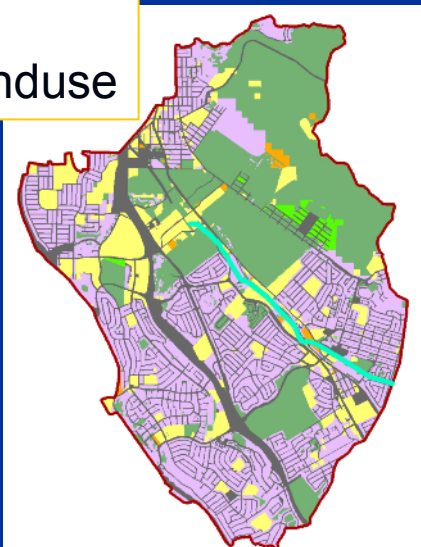
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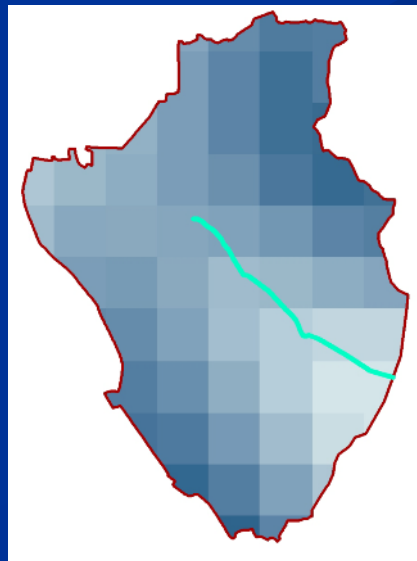
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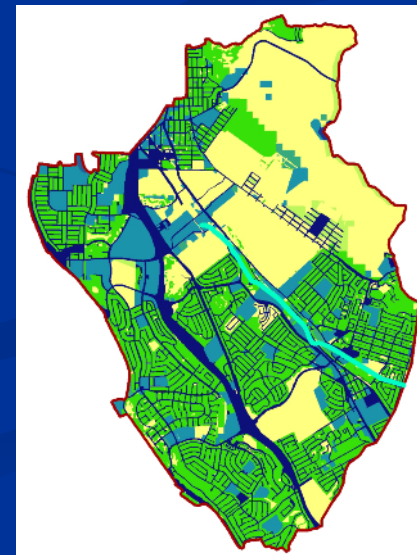
By  
Landuse



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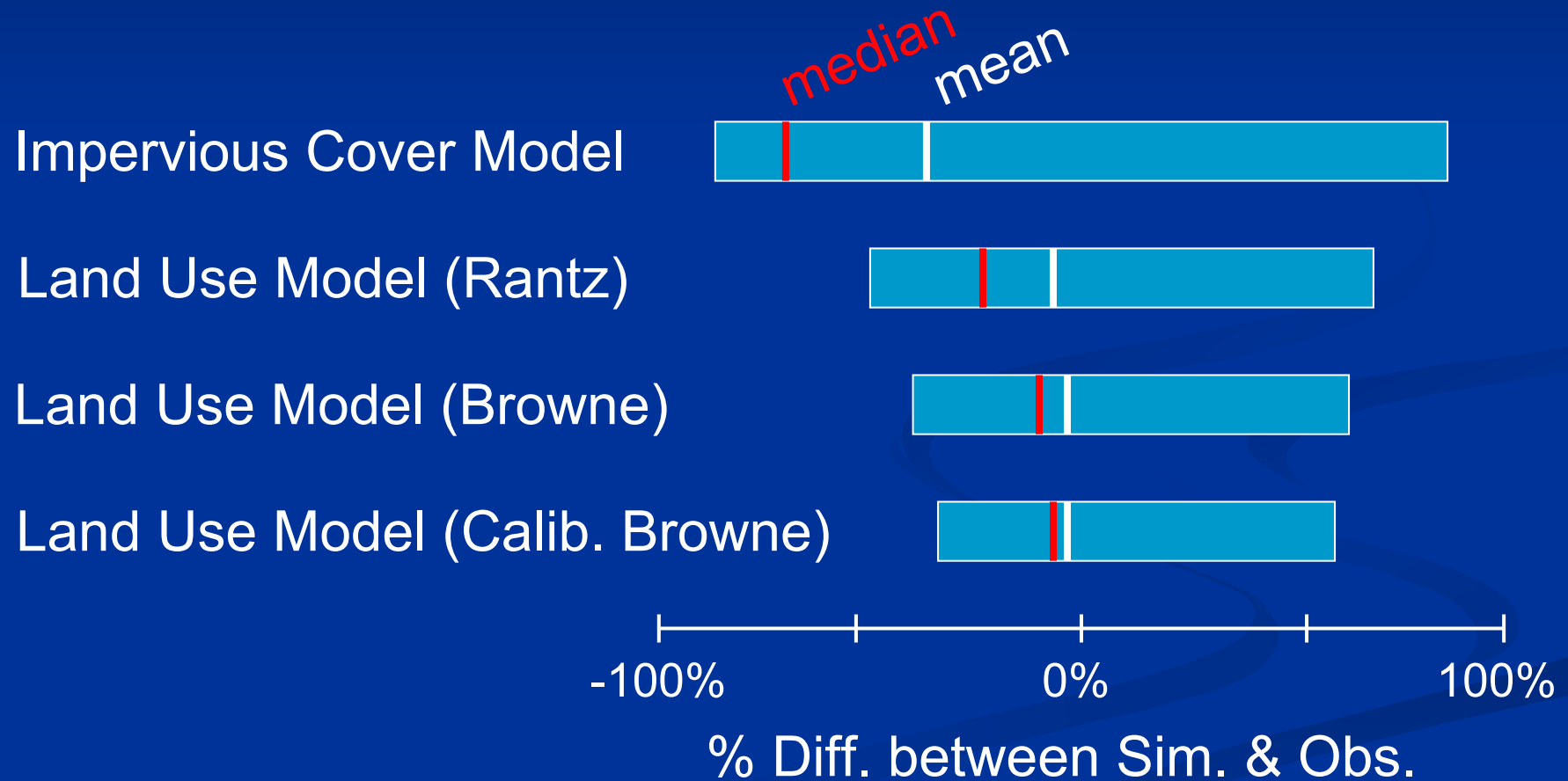


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# Initial Hydrologic Results

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



# Next steps

- Further hydrologic calibration
  - Multi-variable regression optimization?
- Apply pollutant concentrations to generate loads:

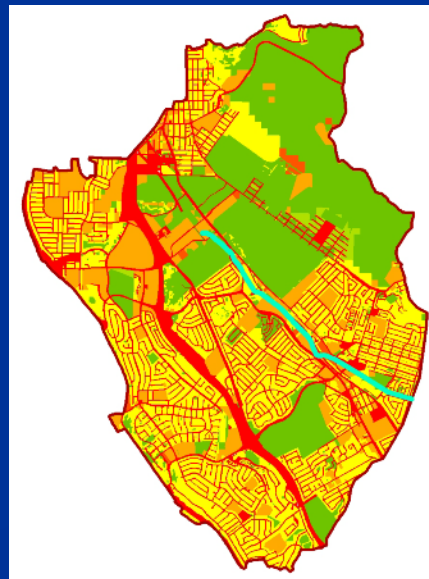
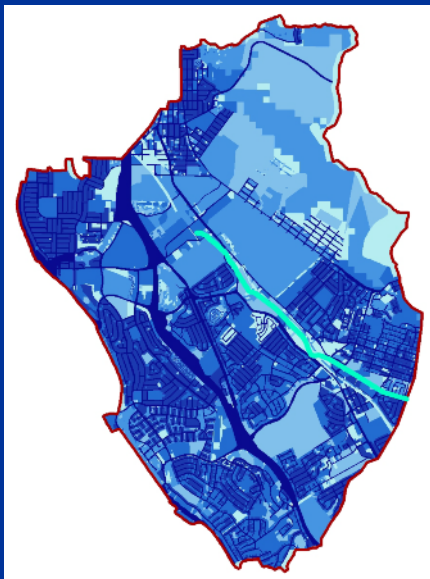
Runoff volume

x

EMC

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Load



# SPLWG/ STLS Products for 2011

- Regional loadings spreadsheet model (\$20k) (workplan Page 41)
  - Complete literature review of LU and source area based EMCs (with existing STLS budget)
  - Complete runoff optimization
  - Expand the model from runoff, SSC, Hg and PCBs to include other MRP Cat 1 (copper and nutrients) and Cat 2 analytes (Se, PBDE, PAH, pesticides) (based on the results of the literature review)
- Small tribs loads in representative watersheds - Wet season reconnaissance sampling to support watershed selection (\$300k) (Page 43)
  - STLS group review of all characterization data and make provisional final site selection by April (or sooner if lab results can be completed) BASMAA MYMP draft due Apr 29
- STLS management support (\$20k, \$4k to support expert review) (Page 47)
  - Cost scenario write-up including all assumptions (Due Jan 15)
  - STLS group firm up monitoring strategy (methods, general site selection criteria and approach)
  - Discussion and implications for outcomes of the spreadsheet model, LU and source areas lit. rev.
  - Initial site reconnaissance of LU sites



# WY 2011 Monitoring

- Started out with 30 potential watersheds
- Developed GIS and other attributes
- Completed reconnaissance
- Confirmed analyte list
- Developed cost estimates for several scenarios
- STLS team narrowed list to 16 watersheds based on answering loadings questions





# WY 2011 Monitoring

## Analytes

### ALL SITES

- HgT, MeHgT
- PCBs
- SSC
- TOC
- PFCs

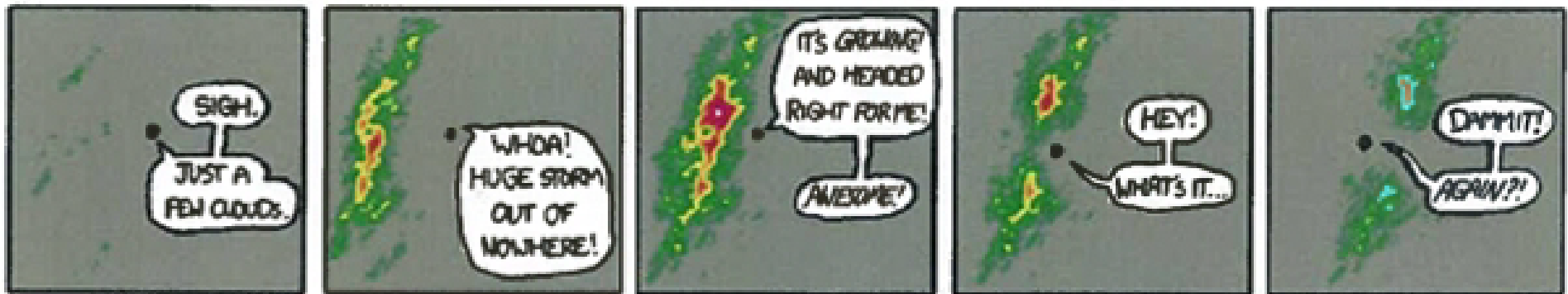
### SOME SITES

- PBDEs
- PAHs
- SeT, SeD



# WY 2011 Monitoring progress to-date

- Are we crazy?



- San Leandro Creek
- Santa Fe channel