California's Surface Water Ambient Monitoring Program

Building Partnerships for Water Quality Monitoring (Communication, Coordination, Collaboration)

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The Challenge: Assess all waterbodies for all beneficial uses

- **Waterbody types**
  - Lakes
    - >10,000 lakes
    - 1.6 million acres
  - Rivers
    - >200,000 miles
    - ~ 30% perennial
  - Bays, Harbors, Estuaries
    - >600,000 acres
  - Beaches
    - >3,000 miles of coastline
    - ~ 1000 beaches
  - Nearshore coastal zone
  - Wetlands?

- **Core Beneficial uses**
  - Safe to Drink?
  - Safe to Swim?
  - Safe to Fish?
  - Aquatic life protected?

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SWAMP expenditures in perspective

Annual SWAMP Expenditures

Regional Board Monitoring
11 PYs ($1.9M)

State Board Infrastructure
7 PYs ($1.5M)

EPA 106 Funds ($4.5M)

Report to Legislature (2000)

- 87 PYs to 132 PYs
- $59M to $115M

Other Statewide Monitoring Efforts

Beaches: BEACH	($ 6M)
Groundwater: GAMA	($10M)

Regional Monitoring Efforts

Southern California Coastal	($ 2M)
San Francisco Bay	($ 2M)
Central Coast	($0.4M)
Sacramento Bay Delta	($12M)

Permit-related monitoring

Wastewater	($50M)
Stormwater	($ 5M)

SWAMP Strategy	SPARC Review
1. Monitoring strategy	Need to coordinate
2. Objectives 3. Design	Find commonality Similar objectives, different scales Design must balance needs
4. Indicators 5. QA/QC 6. Database	Statewide consistency provides huge benefits (cost-savings)
7. Assessment 8. Reporting	Tailor reporting to needs of local and state audience
9. Program Evaluation 10. Program Support	If program supports needs, funding will follow

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Communication.
Basic Management Questions

1. What is the status of the waterbody relative to the beneficial uses?

2. Are there trends in water quality condition over time?

3. What are the stressors affecting beneficial uses of the waterbodies?

4. Are our management actions to protect the waterbodies effective?

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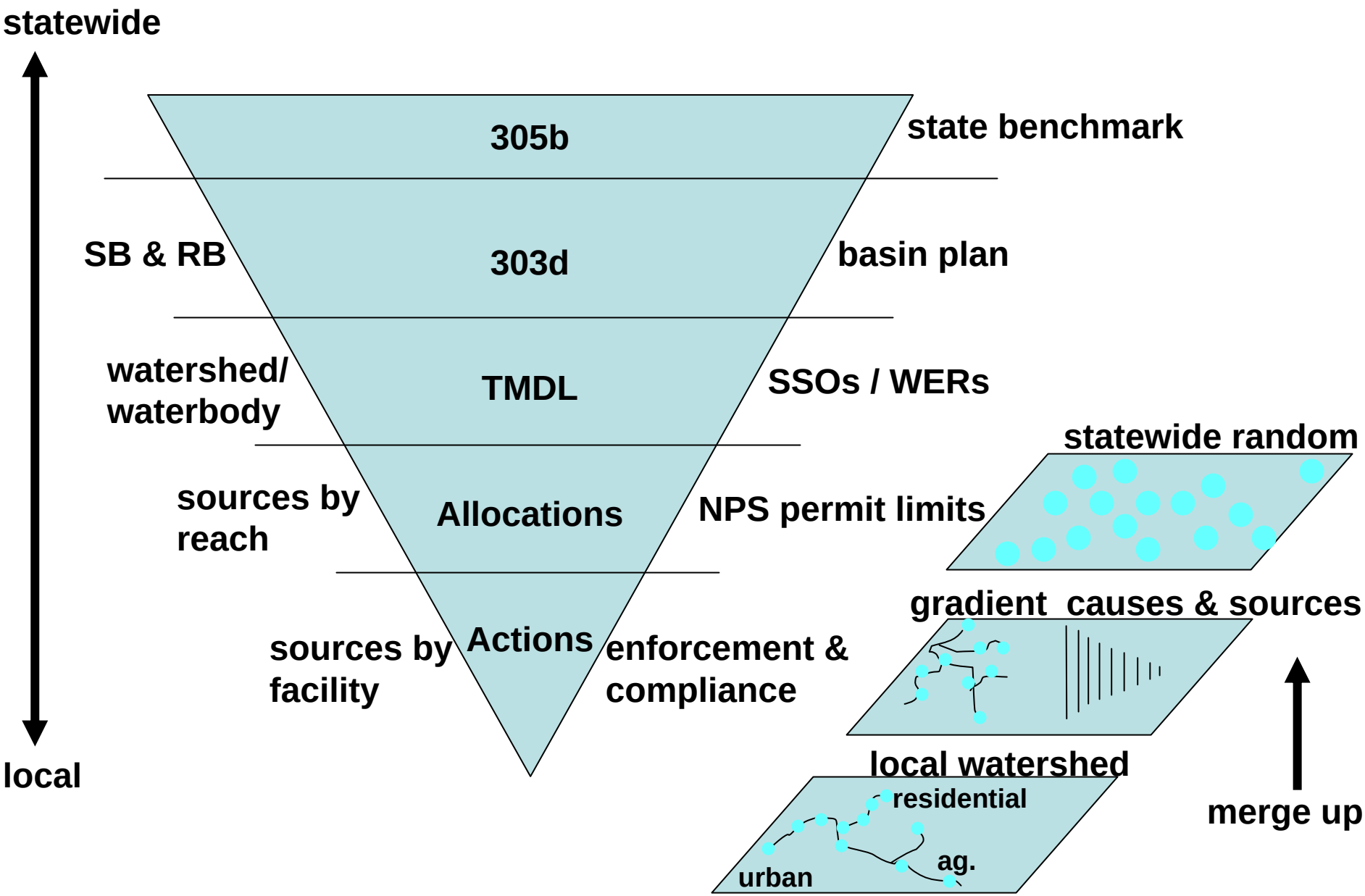
Communication

Common questions; a question of scale

	Statewide	Regional	Local
Status	Statewide by waterbody type	Watersheds and individual waterbodies	Individual waterbodies
Trends	Are things getting better overall?	Are conditions in the watershed doing better?	Are conditions in Reach 2 getting better?
Sources	What are the relative sources?	↔	Who's discharging and how much?
Effectiveness	How well are programs working overall?	Are we writing good permits?	Did the BMP work?

Resources to administer programs ← → **Running the program on the ground**

Communication: Integrating across scales



SWAMP Perennial Stream Assessment

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011

W-EMAP → C-EMAP → PSA

Status → *Status* → *Status*

Trends → *Trends*

Stressors

Statewide 305(b) Assessment

Added NPS Program

Stratify by land use

Integrate NPDES

Stratify by Region

+ reference sites

+ some targeted sites

An example of coordination and collaboration

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Non Point Source Questions

1. *What is the quality of water in California?*

2. *Is water quality getting better or worse?*

3. *What are the NP sources that are impairing or threatening water quality?*

4. *What is the extent of impairments associated with NP sources?*

5. *Are we investing NPS resources in the right places?*

6. *How effective are clean water projects and programs?*

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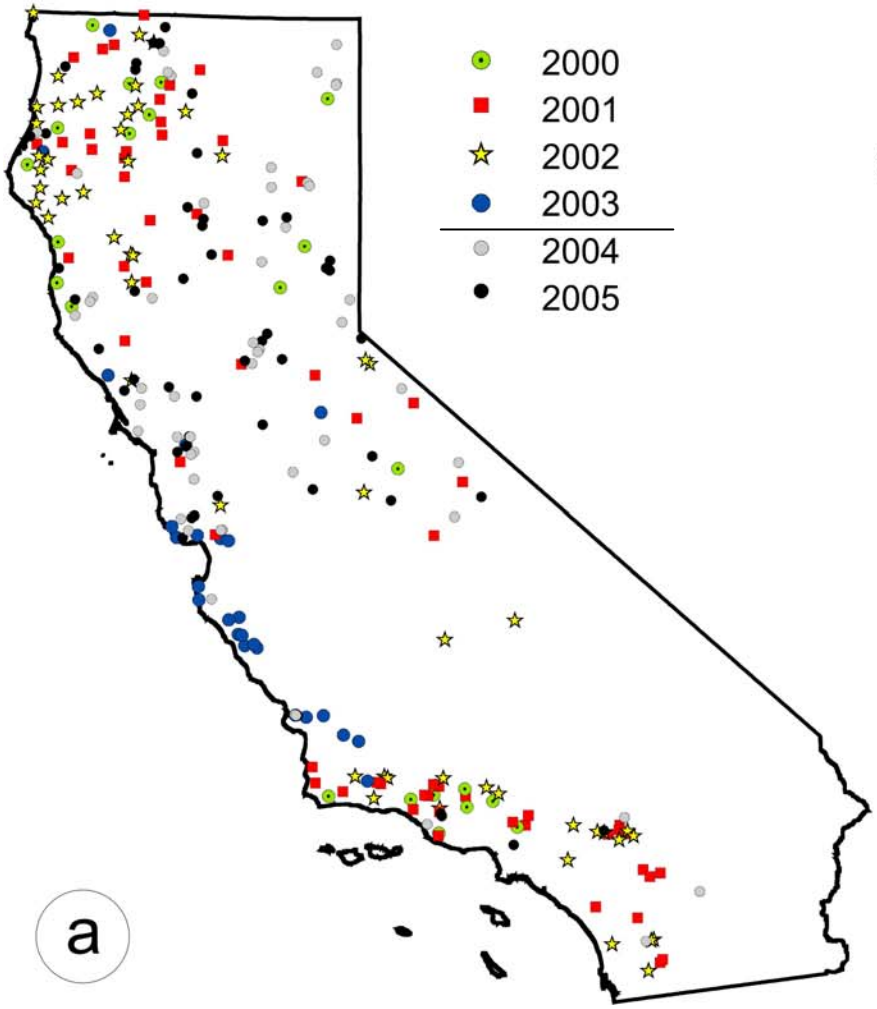
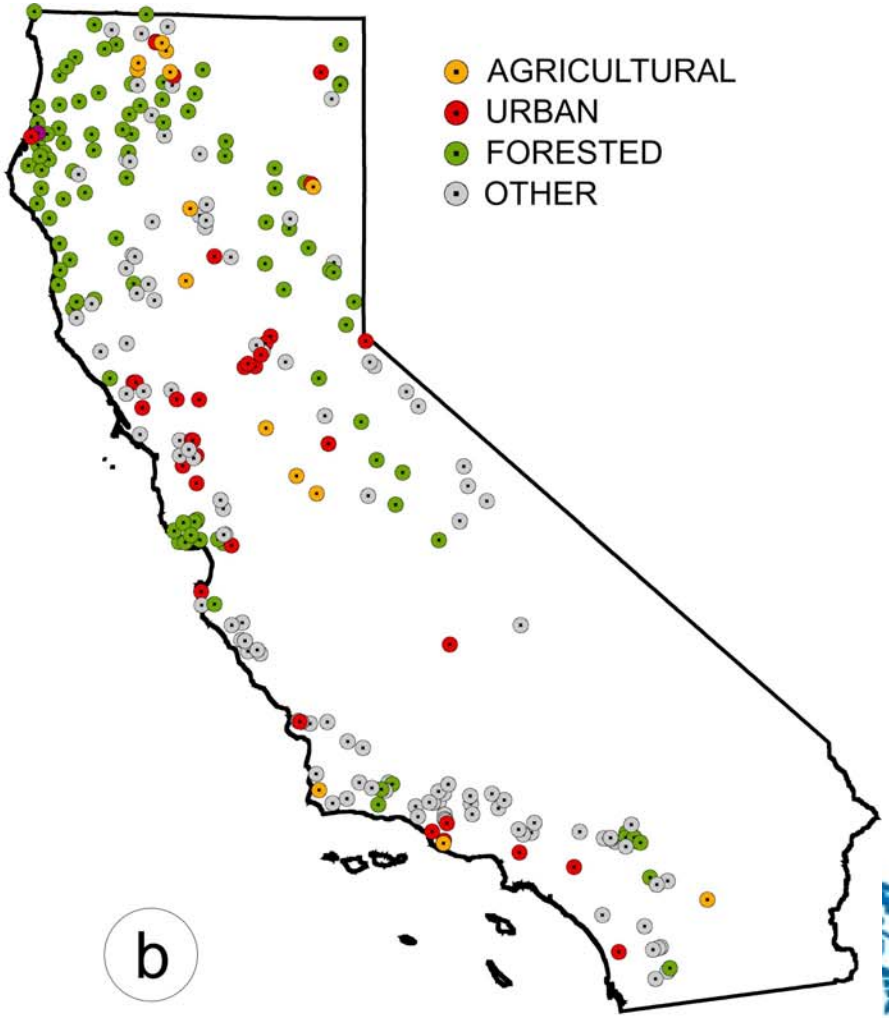
Nonpoint Source Condition Assessment





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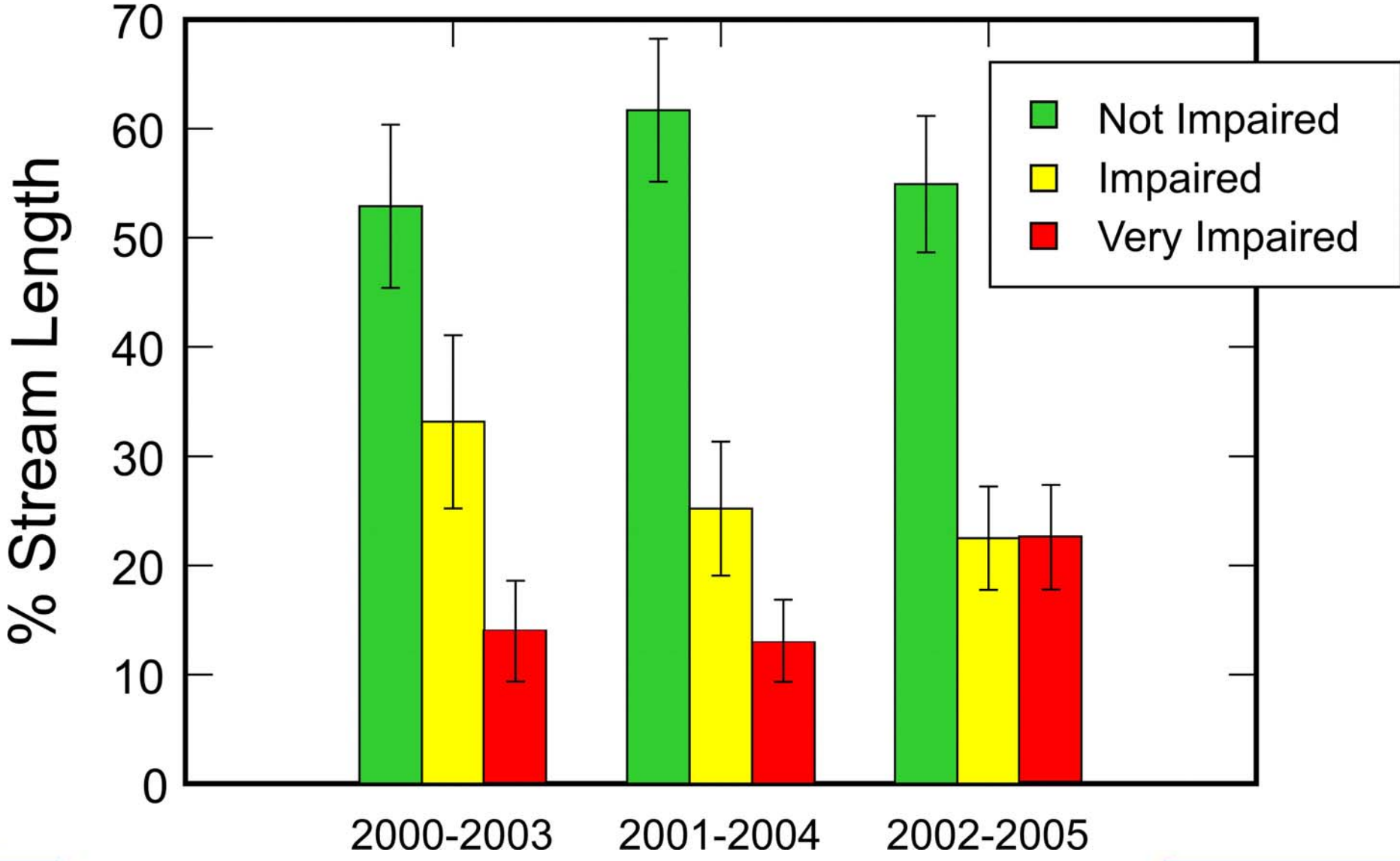
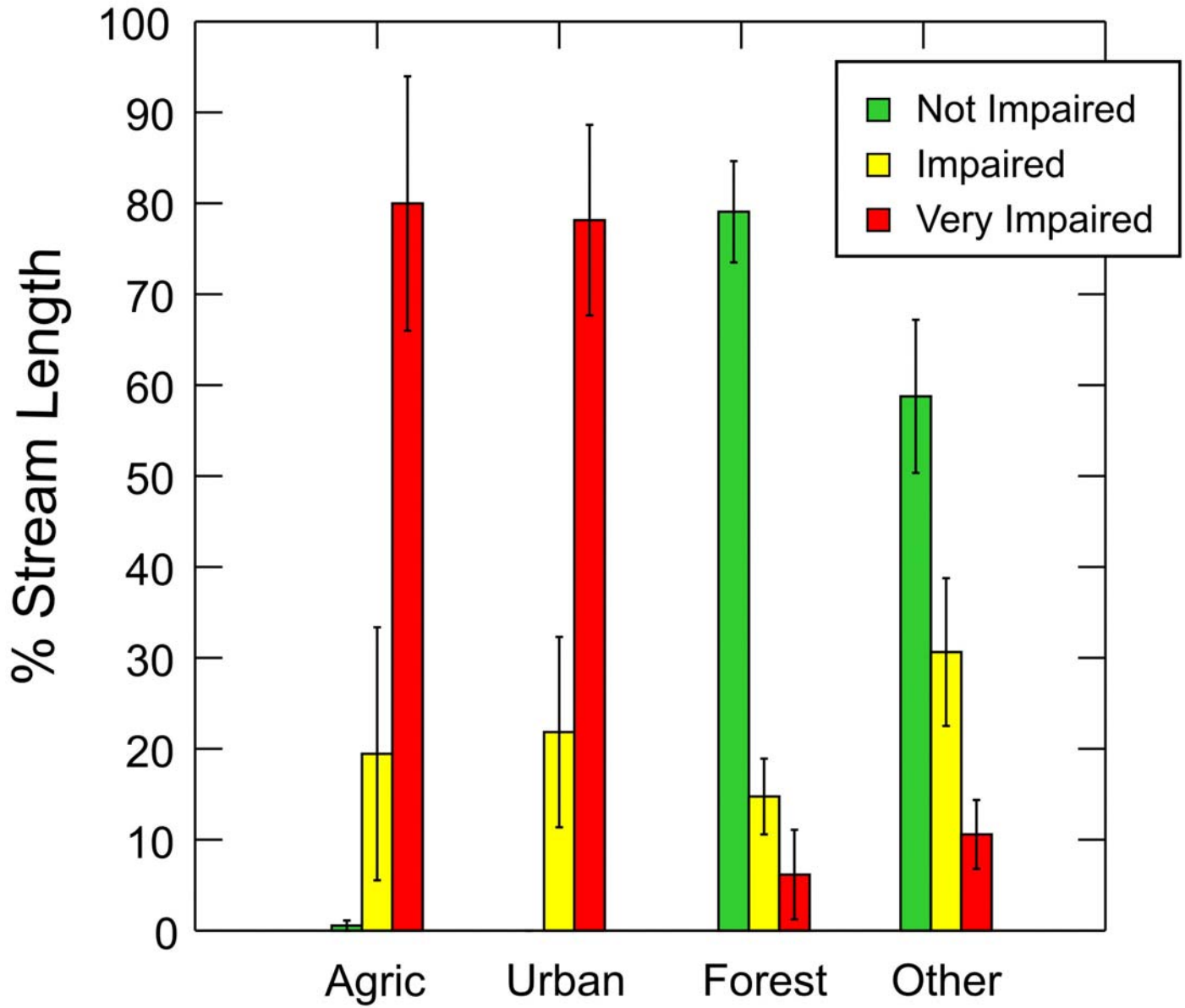
Trends in Statewide condition (4-year averages)



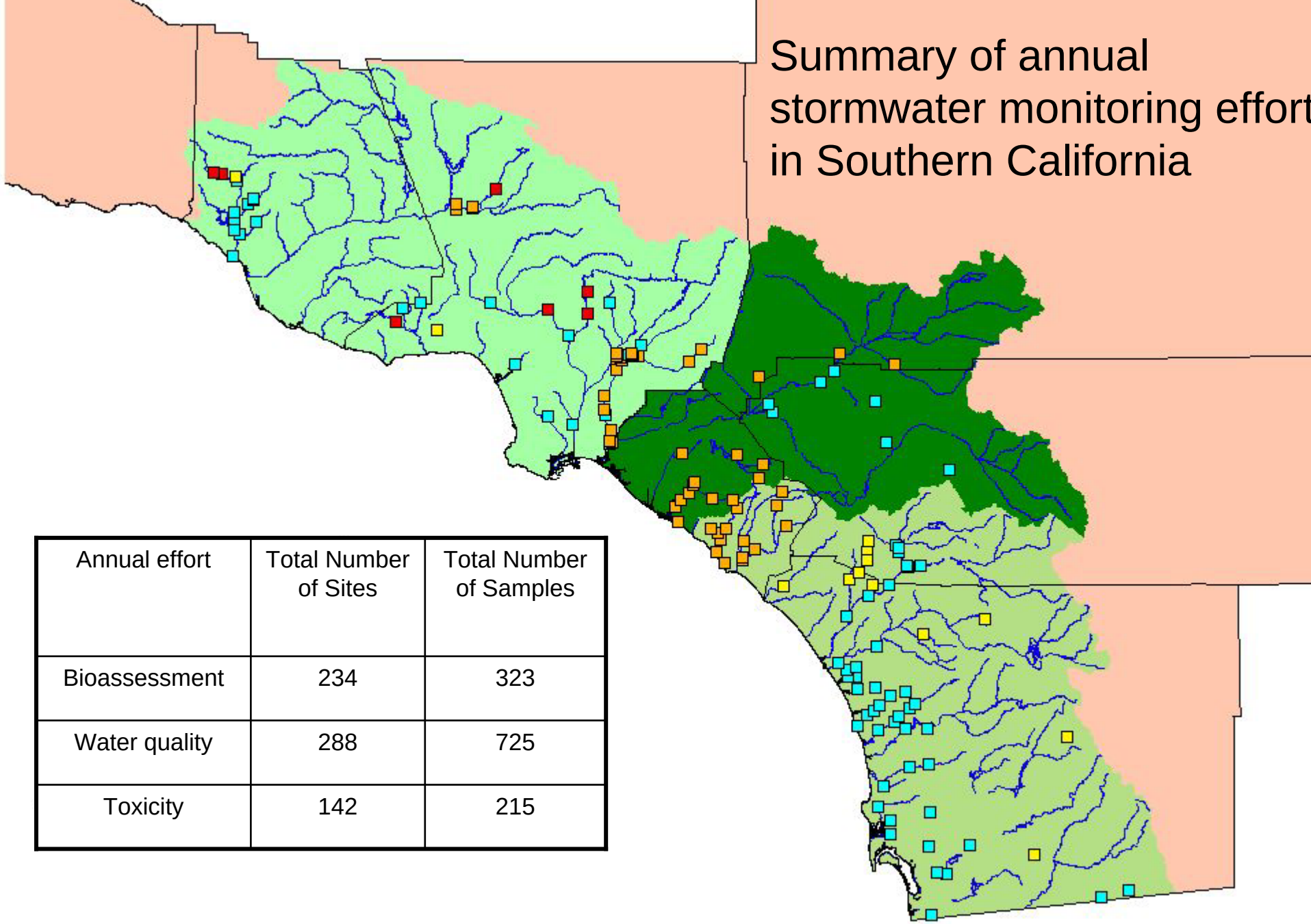
Extent of impairment by four land use classes



Stressor extent by landuse category (percent stream miles above EMAP thresholds)

Stressors	Agriculture	Urban	Forested	Other
High Nitrogen	>70%	>50%	>30%	>30%
High Phosphorus	>70%	>40%	<10%	<10%
High Chlorides	>30%	>70%	>10%	>20%
High Riparian disturbance	>70%	>60%	>10%	>20%
Low Habitat Complexity	>70%	>60%	>10%	>10%
High % fines	>60%	>40%	<10%	<10%
Excess fines (lrbs)	>60%	<10%	>10%	>30%

Summary of annual stormwater monitoring effort in Southern California



Annual effort	Total Number of Sites	Total Number of Samples
Bioassessment	234	323
Water quality	288	725
Toxicity	142	215

Regional Monitoring Questions
Southern California Stormwater Monitoring Coalition

- *Status.* What is the health of watersheds in the So Cal Region?
  - Probabilistic design
  - Stratified by watershed by landuse
  - Multiple indicators (benthos, algae, wetland condition)

- *Trends.* Are conditions at targeted sites getting better or worse?
  - Trends in mass loading at targeted stations
  - Trends in biological condition at targeted sites

- *Stressors.* What are the major stressors to aquatic life?
  - Multiple stressors (chemistry, toxicity, physical, landuse)
  - Associations stressors with biological indicators.

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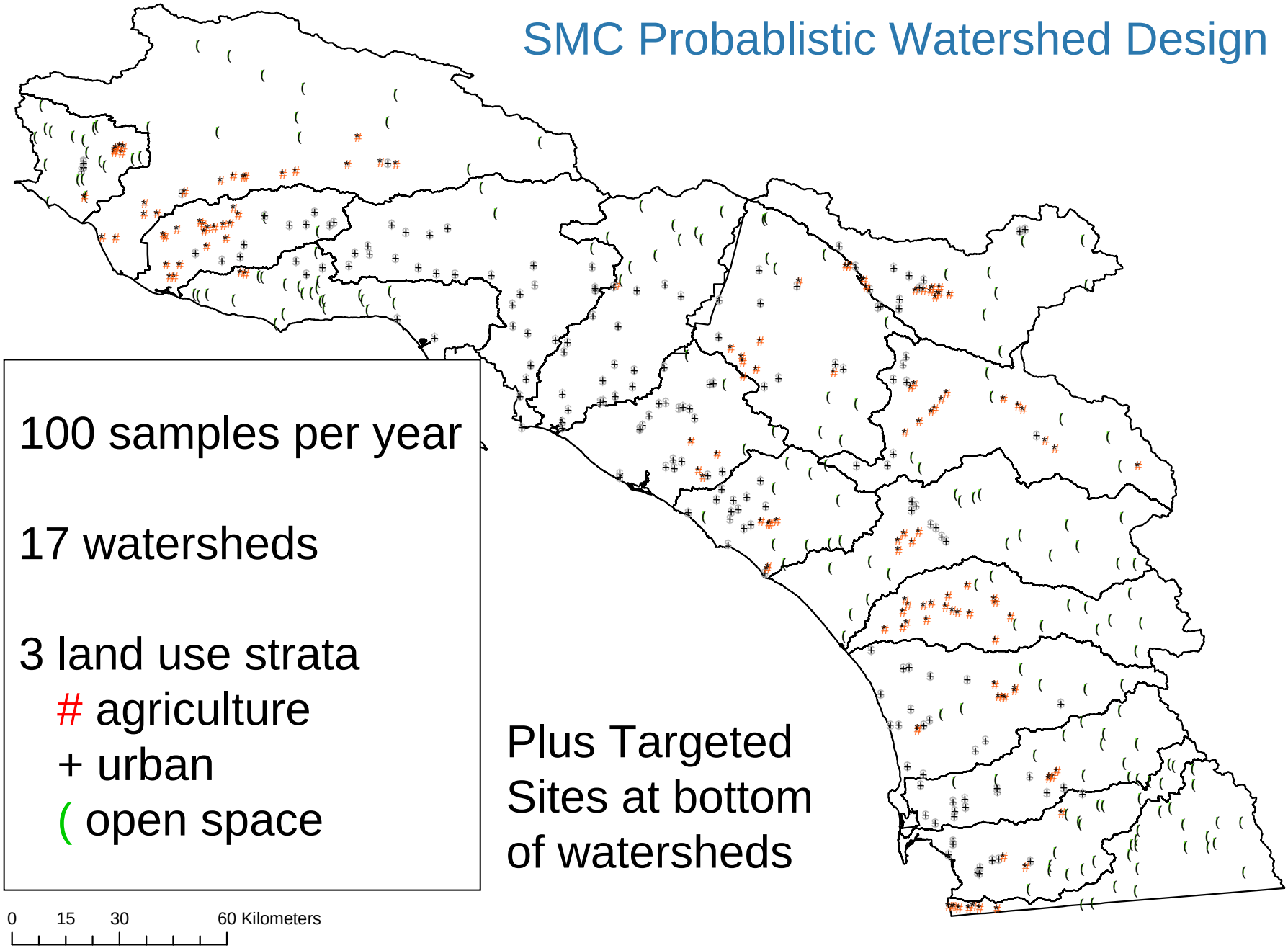
SMC Probablistic Watershed Design



100 samples per year

17 watersheds

3 land use strata
- # agriculture
- + urban
- (open space

Plus Targeted Sites at bottom of watersheds

Perennial Stream Assessment

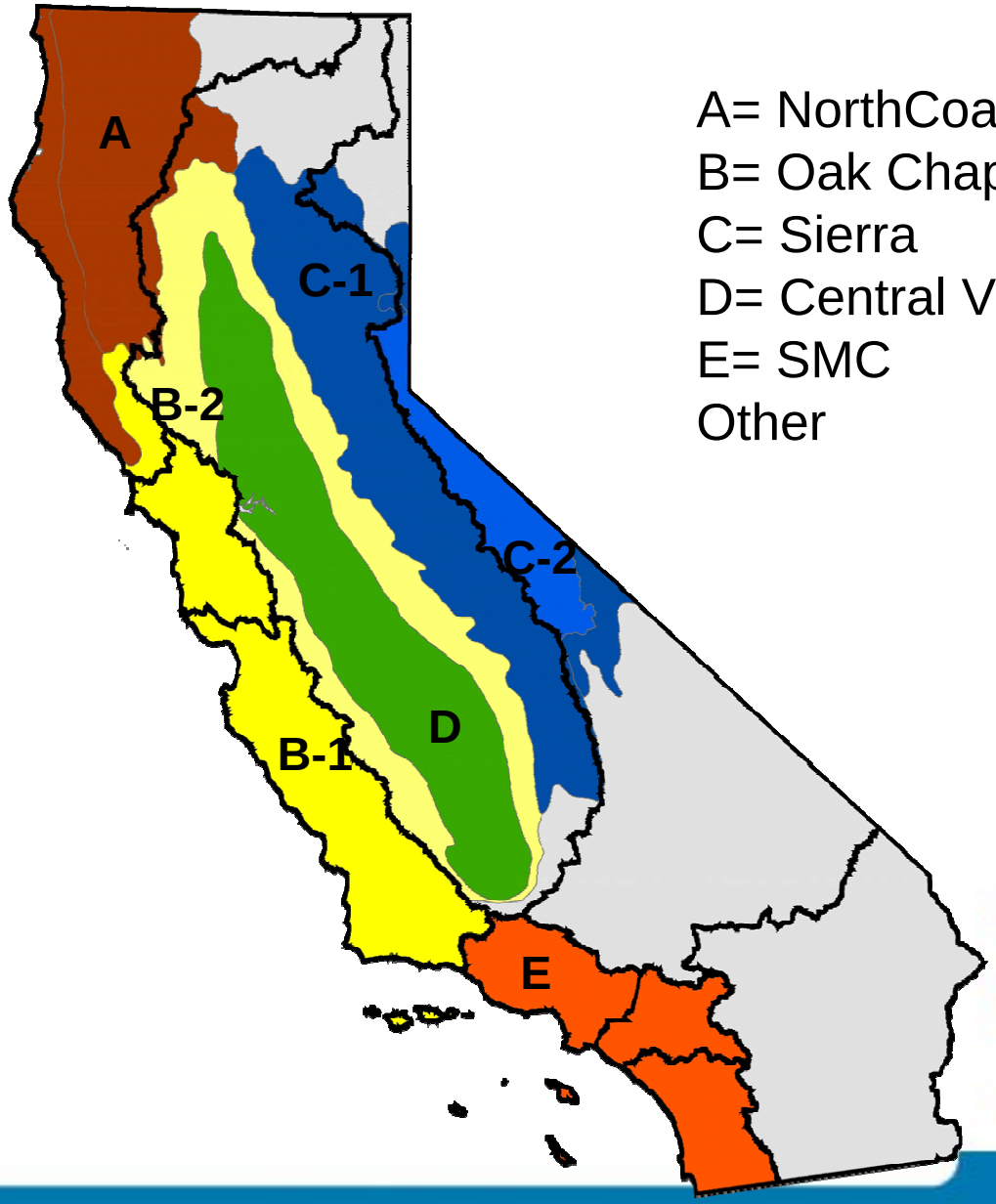
200 Samples per year

5 Ecoregions

4 Landuse categories
- Agriculture
- Urban
- Forested
- Other

Plus targeted samples at bottom of watersheds (100 per year)

Plus reference condition Program (75 per year)



A= NorthCoast
B= Oak Chaparral
C= Sierra
D= Central Valley
E= SMC
Other

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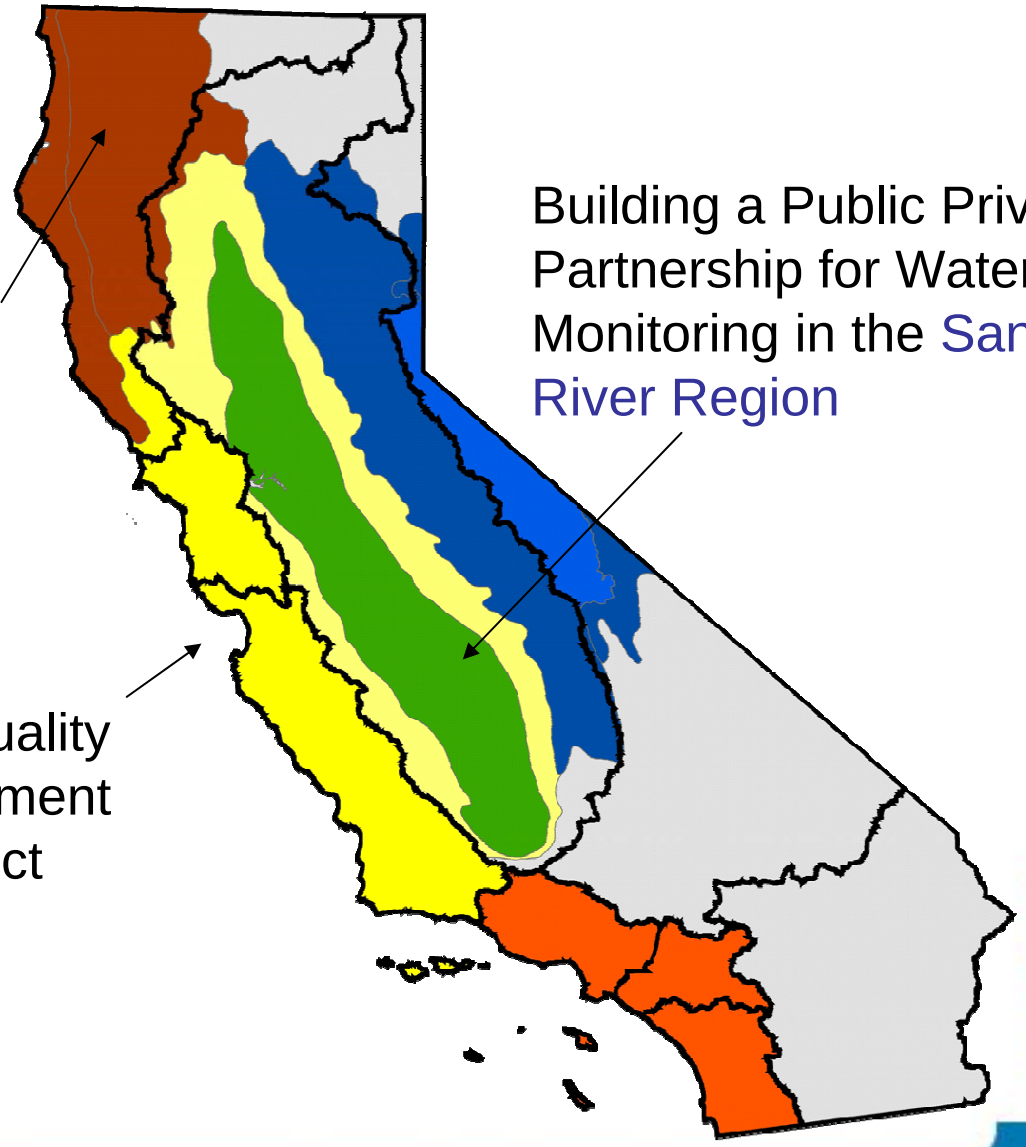
Communication

3 Projects to Enhance Regional Monitoring Efforts

Collaborative Regional Monitoring Program for the Klamath River Basin

Building a Public Private Partnership for Water Quality Monitoring in the San Joaquin River Region

Central Coast Water Quality Data Synthesis Assessment and Management Project



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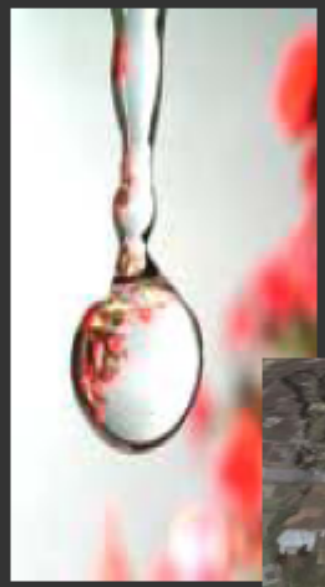
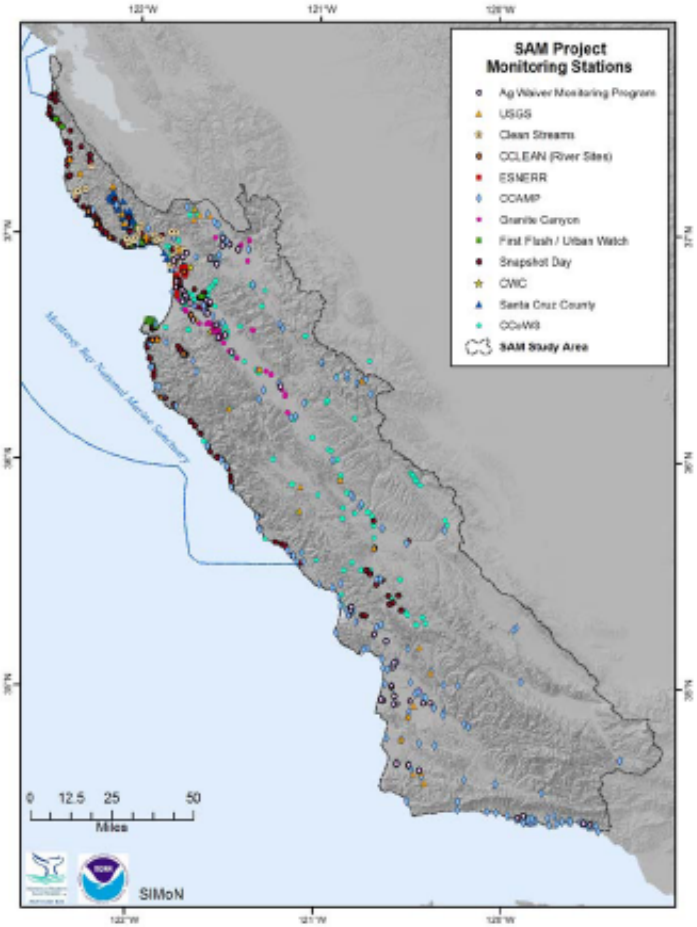
Central California Water Quality Data Synthesis, Assessment and Management (SAM) Project



California Environmental Protection Agency
CENTRAL COAST REGIONAL
WATER QUALITY CONTROL BOARD

The SAM Database (SAMdb)

- Includes ~**203,000 measurements**
- Of **63 parameters**
- From **993 stations**
- Representing **13 monitoring programs (12 shown)**
- SWAMP compatible formats



Central Coast Data Analysis

1. *Status.* What is the extent and location of impaired, threatened and high quality waters on the Central Coast?

2. *Trends*. Can we detect statistically significant temporal trends in water quality parameters?

3. *Stressor.* Are there relationships between land use and water quality?

4. *Stressor.* How do impairments from non-point source pollutions compare with those impairments that result from point source pollution?

5. *Effectiveness.* Is there evidence that implementation of NPS agricultural and urban management practices are related to changes in water quality?

6. *Effectiveness.* Are measurements in NPS pollution reduction consistent with water quality problems?

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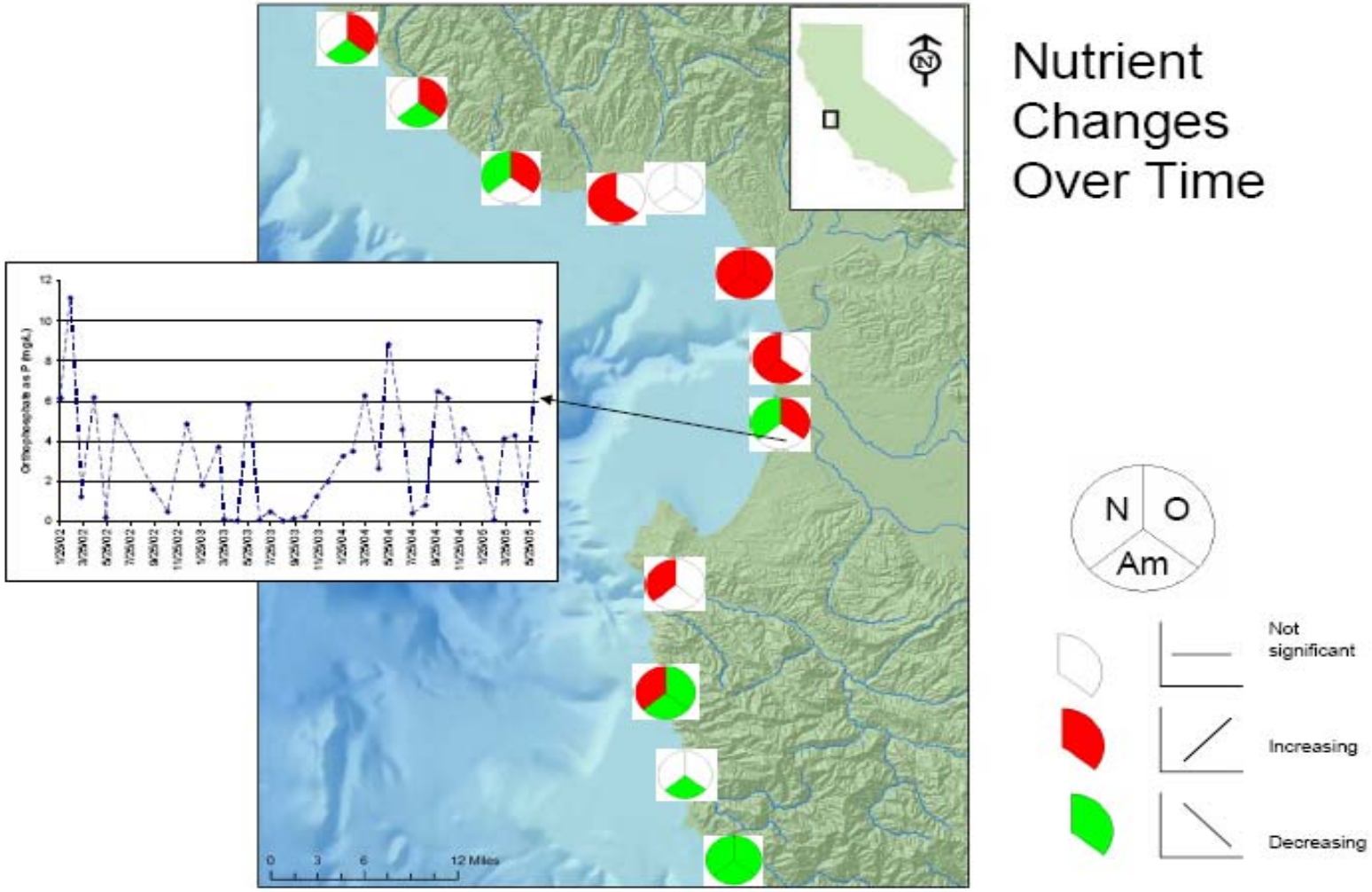
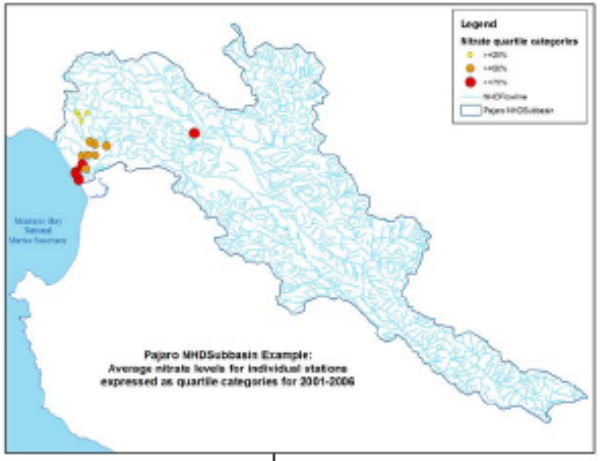
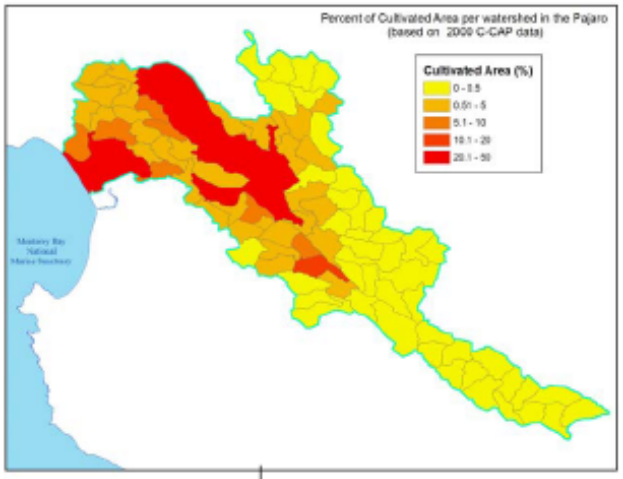
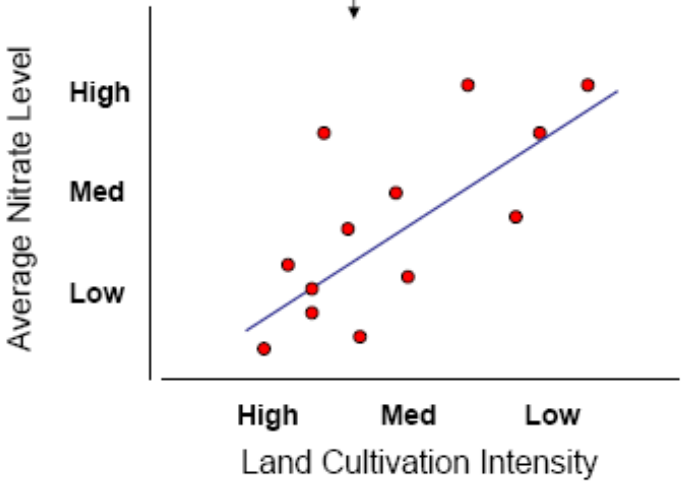
Q2. Trends. Can we detect statistically significant temporal trends in water quality parameters?



Q3. Stressor. Are there relationships between land use and water quality?







Test relationships for ordinal variables

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Water Quality Monitoring in the San Joaquin

Monitoring challenges posed by stakeholders

- There is no overall mechanism to coordinate
  Uncertain that monitoring is answering the right questions.

- Data are collected using different methods, at varying locations, and on different time scales, with data maintained at a number of locations and in different formats.

- Data integration and interpretation is limited.

- Improved coordination and integration of Central Valley water quality monitoring would increase the efficiency and usefulness of data.

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San Joaquin Monitoring and Assessment Strategy

Develop a strategy to:

1. Enhance sampling coordination
2. Standardize methods and quality assurance
3. Increase data sharing
4. Enhance analysis and interpretation of data
5. Overcome constraints to implementation (both funding and institutional)

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MONITORING DIRECTORY

DISCLAIMER: the site is under development and the monitoring listed is still being validated.

The San Joaquin Basin Water Quality Monitoring Directory provides access to surface water monitoring program and metadata information to facilitate monitoring coordination and integration. A database access tool allows searches of monitoring information with a modular search form and an interactive map viewer.

San Joaquin Basin Monitoring Directory

Listing of monitoring programs reported to the Monitoring Directory. Browse by listings or search the monitoring directory by using keyword fields or drop-down lists to retrieve program information, metadata, contacts and links, and sampling locations.

View Directory

San Joaquin Basin Monitoring Map Viewer

A navigable map showing monitoring locations in the San Joaquin Basin reported to the Monitoring Directory. Display monitoring sites and information selectively by program, sampling location, or parameter. The viewer can also be used to retrieve program and metadata information by sampling location.

View Map

MONITORING DIRECTORY

Search text

Narrow List

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Information on 16 water monitoring programs in the San Joaquin River Basin.

Add new program

Program	Agency/Organization	Sub-Basins	Updated
Surface Water Ambient Monitoring Program (SWAMP)	Central Valley Regional Water Quality Control Board	Eastside, Grasslands, Northeast, San Joaquin River, South Delta, Upper San Joaquin River, Westside	2007
Grasslands Bypass Project	Central Valley Regional Water Quality Control Board	Grasslands, San Joaquin River	2007
Subsurface Agricultural Drainage Monitoring Program	Central Valley Regional Water Quality Control Board	Grasslands, San Joaquin River, Upper San Joaquin River	2007
Stockton Stormwater Monitoring	City of Stockton	Northeast (Calaveras & Mokelumne Rivers), South Delta	2004
Subsurface Agricultural Drainage Monitoring Program	Department of Water Resources	Grasslands, San Joaquin River, Upper San Joaquin River	2005
State Water Project Water Quality Monitoring	Department of Water Resources	Grasslands, South Delta	2007

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MONITORING DIRECTORY

LINKS

EVENTS

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View Map

TUTORIAL (Power Point slides) for using the monitoring directory and map viewer

FEEDBACK

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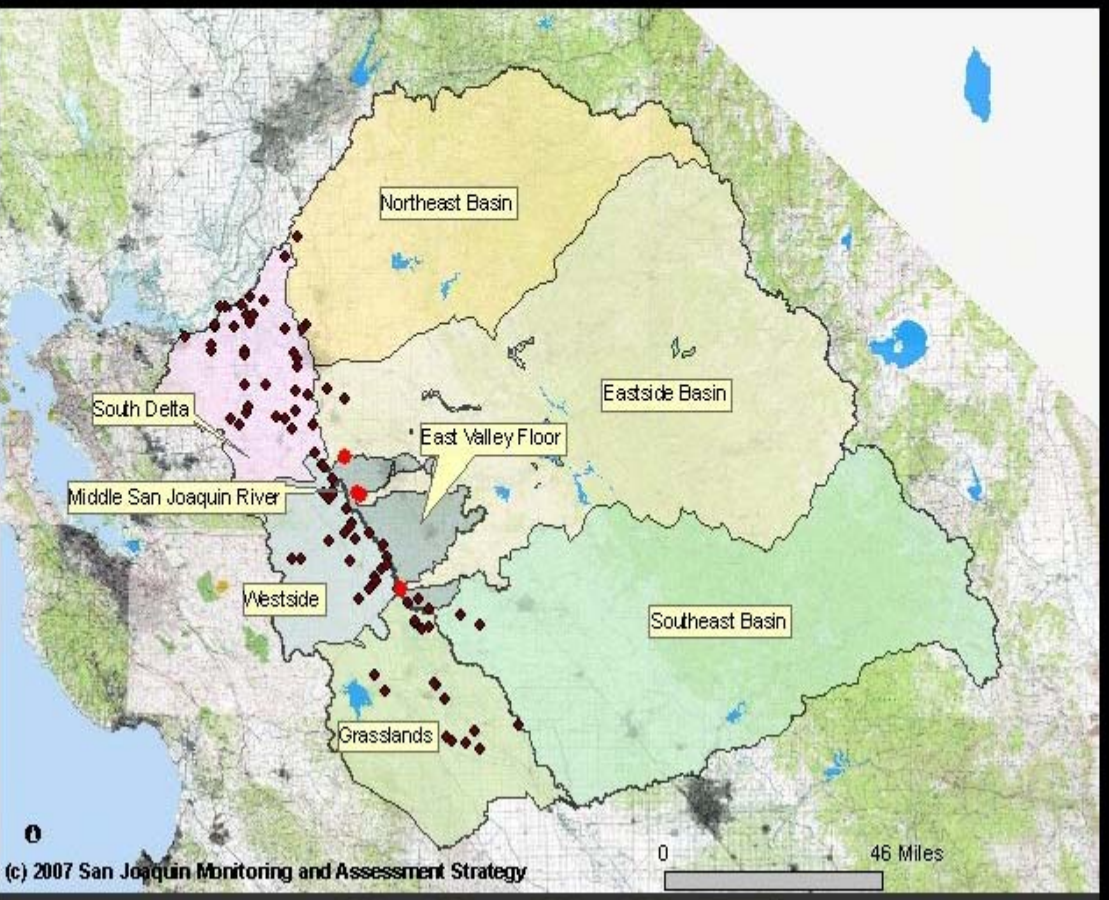
File Edit View History Bookmarks Tools Help

http://www.sanjoaquinmonitoring.org/maps/

San Joaquin River Monitoring an... | San Joaquin River Monitoring

SAN JOAQUIN RIVER
Monitoring & Assessment Strategy



Map | Agencies | Stations | Parameters | Help

Click on a basin to list the monitoring stations:

- South Delta more info
- Northeast Basin more info
- Eastside Basin more info
  - Farmington Drainage Basin
  - Lower East Valley Floor
  - Merced River
    - ☑ 106 Merced R @ Hatfield Park
  - Stanislaus River
    - ☑ 28 Stanislaus R @ Caswell Park
  - Tuolumne River
    - ☑ 24 Tuolumne R @ Shiloh Fishing Access
- Middle San Joaquin River more info
- Westside more info
- Grasslands more info
- Southeast Basin more info

search

Print | Excel

Eastside

Merced River

- Merced R @ Hatfield Park (MER546 show)

Parameter Group	Parameter	Sample Type	Frequency	Agency/Organi

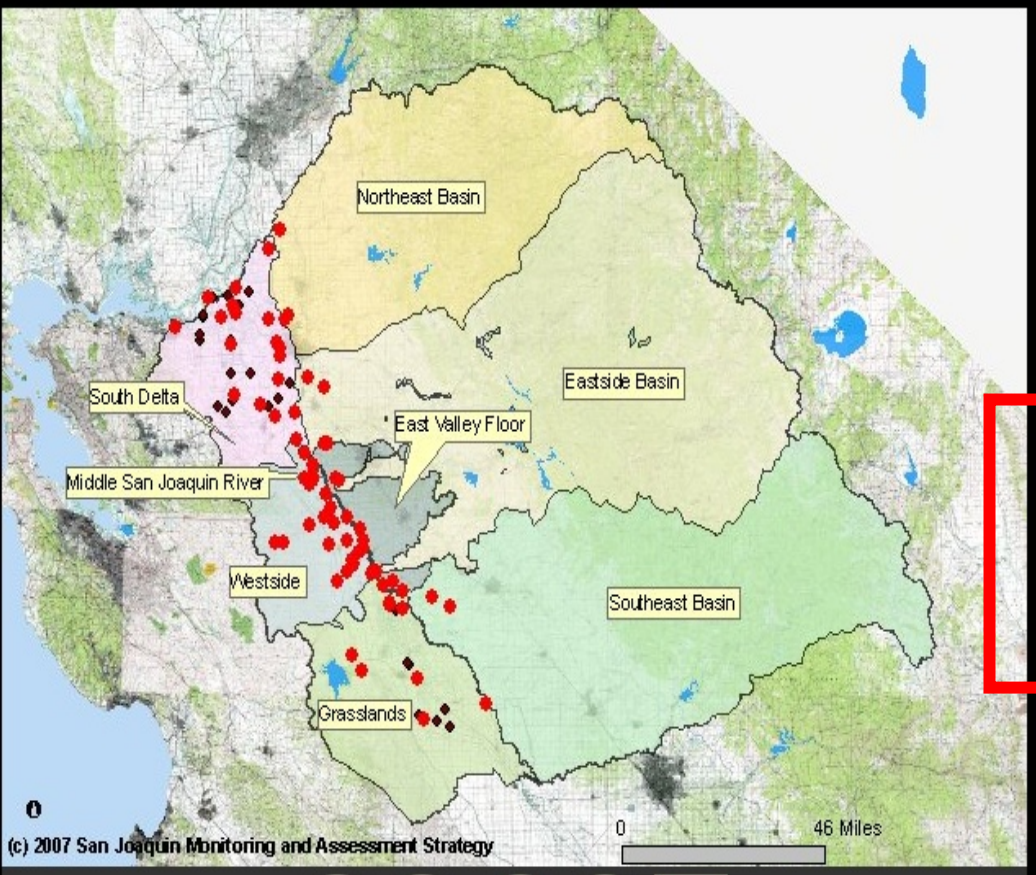
San Joaquin River Monitoring - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.sanjoaquinmonitoring.org/maps/

San Joaquin River Monitoring an... | San Joaquin River Monitoring

SAN JOAQUIN RIVER
Monitoring & Assessment Strategy



Map | Agencies | Stations | Parameters | Help

Click on a parameter group to list the parameters:

- Biological Community
- Disinfection Byproducts
- Field Measurements
- Ions and Minerals
- Mercury
- Nutrients
- Organics
  - ☐ **Dissolved Organic Carbon (DOC)**
  - ☐ Organochlorine compounds
  - ☐ PBDEs
  - ☐ Pharmaceuticals/personal care products
  - ☐ Semivolatile organic compounds
  - ☑ **Total Organic Carbon (TOC)**
  - ☐ Volatile organic compounds
  - ☐ Organics - other
  - ☐ PAHs
  - ☐ PCBs
  - ☐ Polyfluorinated compounds
  - ☐ Soluble organic chemicals
  - ☐ Total petroleum hydrocarbons
- Others
- Pathogens
- Pesticides
- Physical Parameters
- Radioactivity
- Toxicity, acute
- Toxicity, chronic
- Trace Elements & Metals

search

Print

Legislation for Statewide Monitoring (SB 1070)

"… redundant monitoring activities can occur because of a lack of basic information relative to the scope of monitoring activities throughout the state.

For example, there are 100 water quality monitoring efforts underway in the Central Valley alone, and coordination is minimal."

(from Senate Bill 1070)

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SB1070 (Legislative Findings)

- Water Boards and EPA need WQ data
  - Status of waters
  - Effectiveness of programs
- Resources for monitoring lacking
  - Budgets small and unstable
  - Need to coordinate (consistency issues)
- Information not accessible to agencies or public
  - Multiple agencies collecting data
  - No single place to access data

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SB 1070 Overview:
A coordinated, integrated, cost-effective, comprehensive statewide monitoring program

- California Water Quality Monitoring Council
  - MOU CalEPA and Resources Agency (Dec 2007)
  - Monitoring Inventory (April 2008)
  - Monitoring Recommendations (Dec 2008)

- Public Information Program (Water Boards)
  - Water Quality Data
  - Programmatic Information

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Monitoring Council Coordination

- *"All State Agencies shall cooperate with Monitoring Council"*
  - State and Regional Boards
  - Department of Water Resources
  - Department of Fish and Game
  - California Coastal Commission
  - State Lands Commission
  - Department of Parks and Recreation
  - Department of Forestry and Fire Protection
  - Department of Pesticide Regulation
  - Department of Health Services

- Other
  - Federal Government, Local Government, Academia, Regulated Community, Citizen Monitoring Community

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Mapping SB1070 to SWAMP

1. Monitoring strategy – *Need to coordinate*
2. Objectives
3. Design
4. Indicators
5. QA/QC – *QA program to ensure valid data*
6. Database – *User friendly electronic database*
7. Assessment – *Methodology for analyzing and integrating*
8. Reporting – *Timely reports on water quality*
9. Program Evaluation – *Assess monitoring needs*
10. Program Support – *Cost of implementation*

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