Highlights from SWAMP's Perennial Streams Assessment (PSA): 2000-2007

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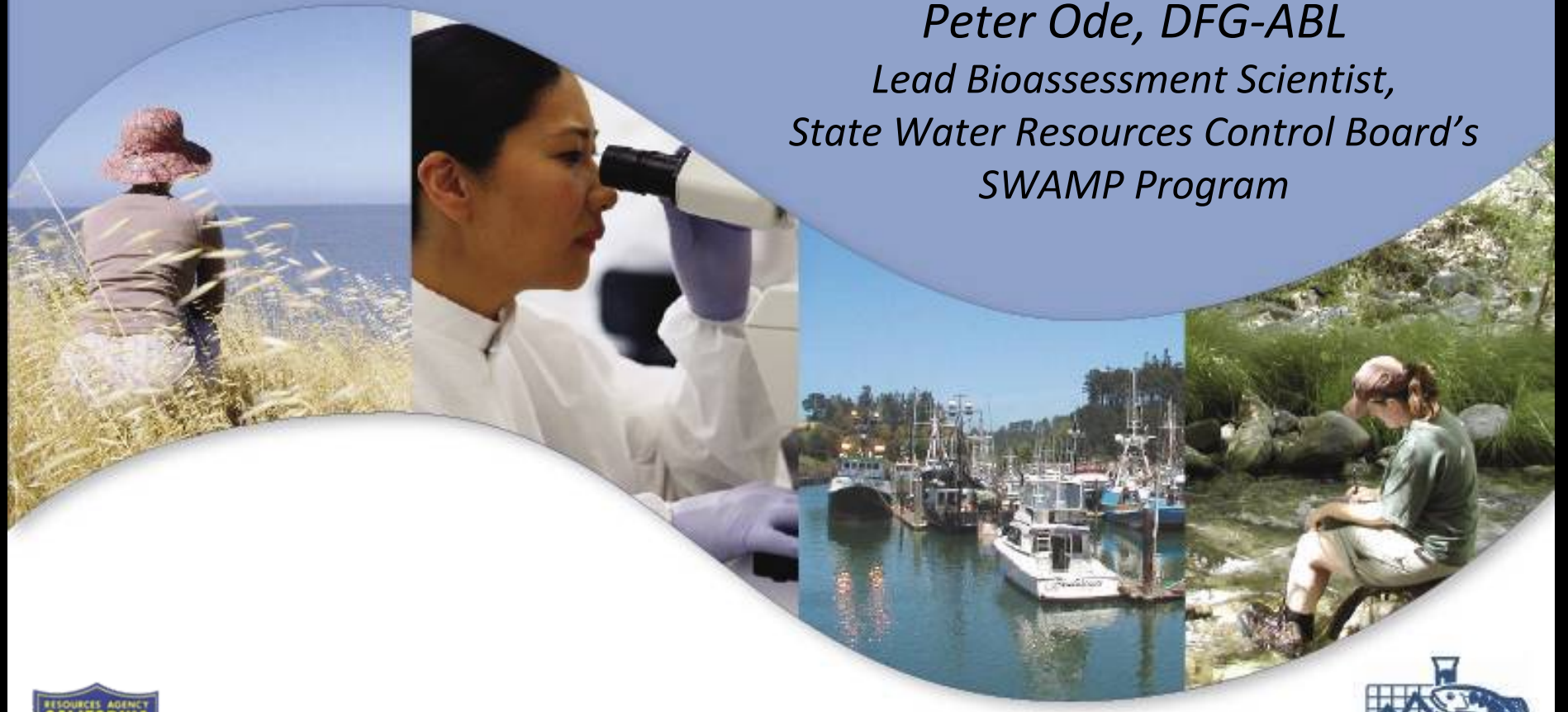

Aquatic Bioassessment Laboratory

Water Boards

SWAMP Surface Water Ambient Monitoring Program

The Perennial Streams Assessment (PSA):

a statistical survey designed to support and enhance statewide monitoring efficiency and effectiveness

- Background:
  - History
  - Technical overview
- Highlights from first 8 years
- Current and Future Efforts

SWAMP
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History: EPA's Environmental Monitoring and Assessment Program (EMAP)

In late 1980's, U.S. Congress expressed frustration that (despite billions spent on WQ monitoring programs) EPA couldn't answer basic questions about national aquatic resources:

- What is the condition of the nation's waters?"
- Is it getting better? Is it getting worse?
- Are we allocating $$$$ wisely?

EMAP strategy for optimizing efficient use of monitoring resources

1. Use probabilistic survey design to select sites

   Each site represents a known stream length with known statistical precision

   …. permits assessment of entire resource with limited sampling effort

2. Collect extensive biological, chemical and physical data

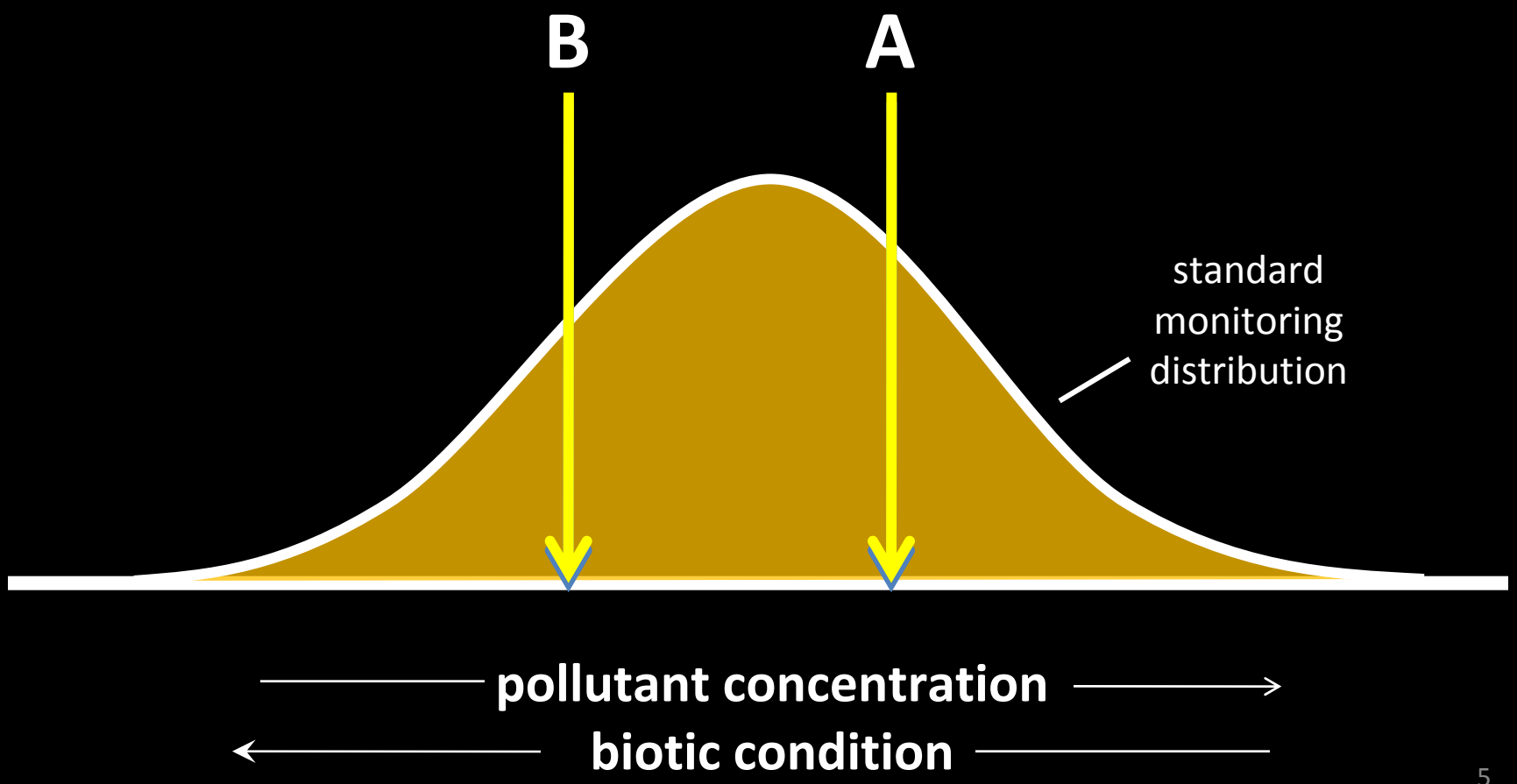
3. Analyze data to make objective condition assessments:

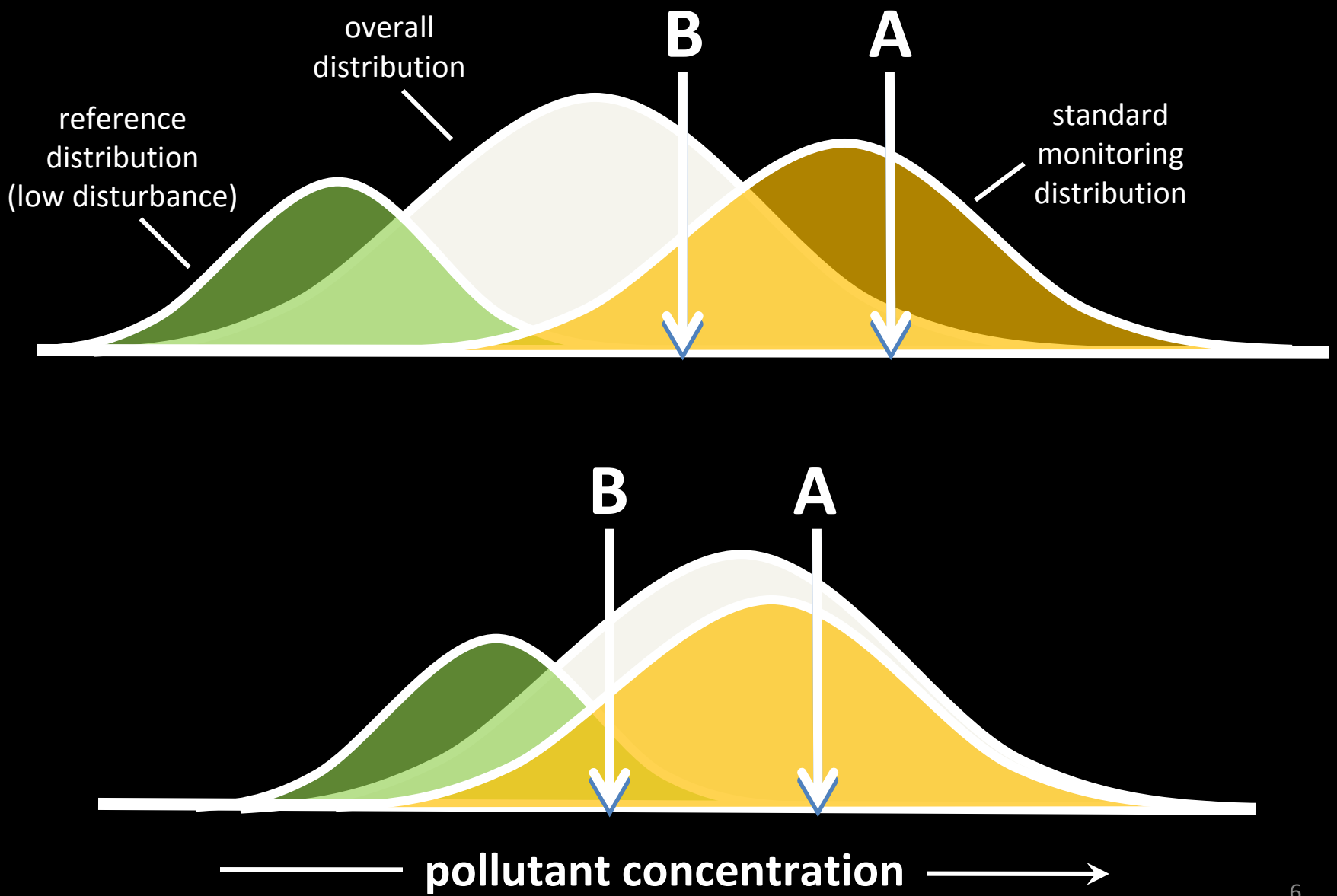
- *49 ±5% of CA streams have degraded invertebrate assemblages*
- *76 ±5% of biologically degraded north coast streams are also degraded by fine sediments*

4. Use survey results to help interpret existing monitoring data and guide management of monitoring resources

Beyond Condition Assessments

Probability surveys provide context for targeted data

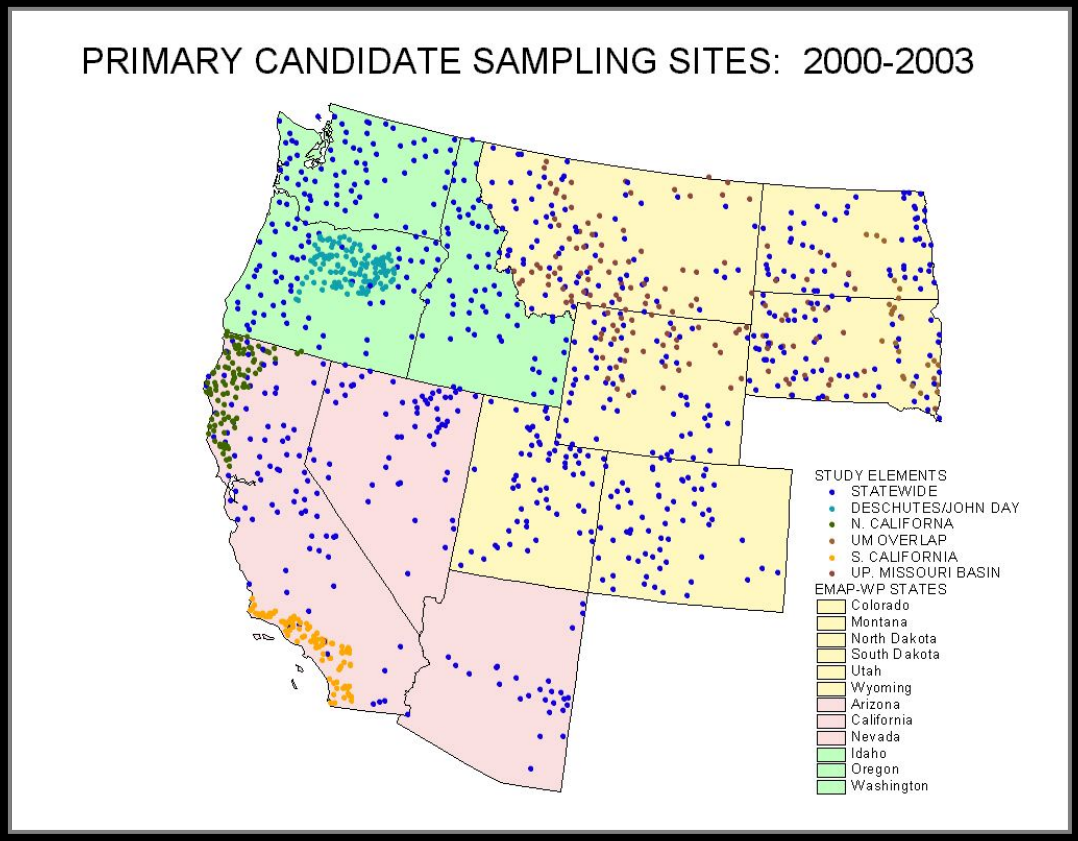



overall
distribution
B
A
reference
distribution
(low disturbance)
standard
monitoring
distribution
B
A
pollutant concentration

Probability surveys are widely adopted

- Adopted widely in US
  - ~35 states currently use in WQ programs
  - Used by several federal agencies
    - EPA, USFS, NPS
- Used for many different resources types:
  - Wetlands
  - Lakes
  - Rivers and Streams
  - Coastal Bays and Estuaries

The Beginning:
Western EMAP (2000-2003)



- ~ 200 sites in CA
- northern CA and southern CA intensification areas
- CA added another 30 in central coast in 2003

EMAP

2000 2001 2002 2003

Statewide

+ North Coast
South Coast
(Central Coast)*

CMAP

2004 2005 2006 2007

Statewide

+ integration with NPS program (stratified by land use)

+ modified channels

PSA

2008 2009 2010 2011

Statewide

+ 5 subregions
+ integration with NPDES (SMC, R2?)
+ link to reference plan
+ link to targeted sites?

STATUS
(+ stressor extent/ relative risk)

STATUS
(+ stressor extent/ relative risk)

STATUS
(+ stressor extent/ relative risk)

TRENDS

TRENDS

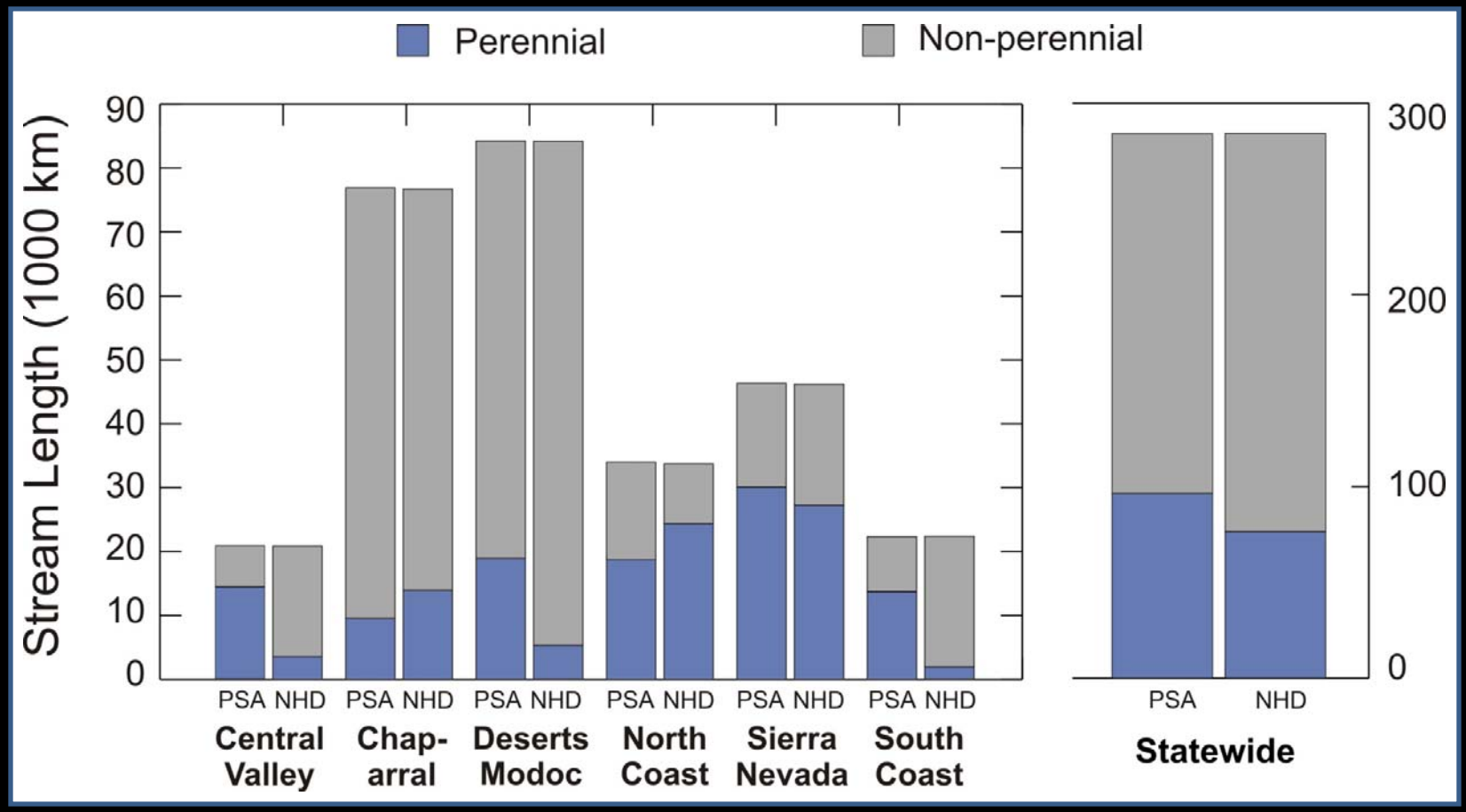
Landuse

Landuse
(modified)

Indicators

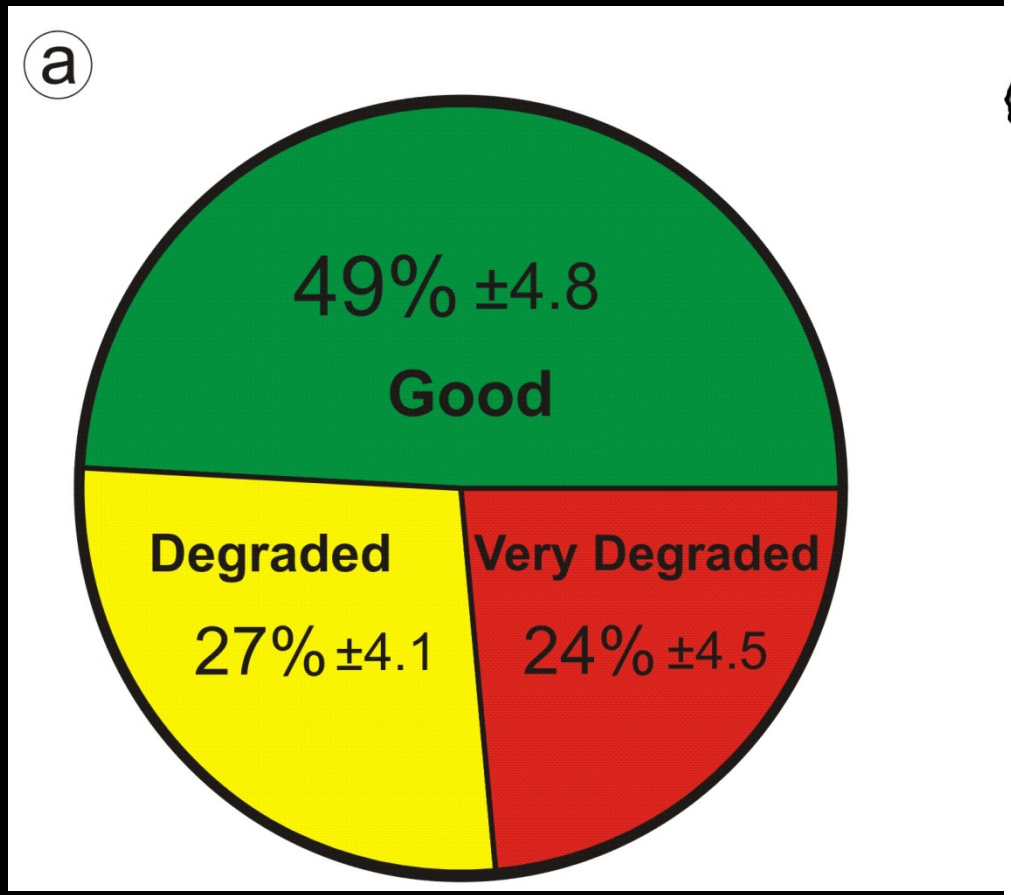
		EMAP	CMAP	PSA
Physical Habitat	Instream habitat condition	**x**	**x**	**x**
	Riparian vegetative condition	**x**	**x**	**x**
	Human activities within reach	**x**	**x**	**x**
Biological Indicators	Benthic macroinvertebrates	**x**	**x**	**x**
	Algae	**x**	**x**	**x**
	Fish	**x**	**-**	**-**
	CRAM Wetland Condition	**-**	**-**	**x**
Chemical Indicators/ Stressors	SSC/TSS, turbidity, pH, conductance, DO	**x**	**x**	**x**
	Major ions (Cl^-, SO_4)	**x**	**x**	**x**
	Nutrients (N, P, Si)	**x**	**x**	**x**
	DOC	**x**	**x**	**x**

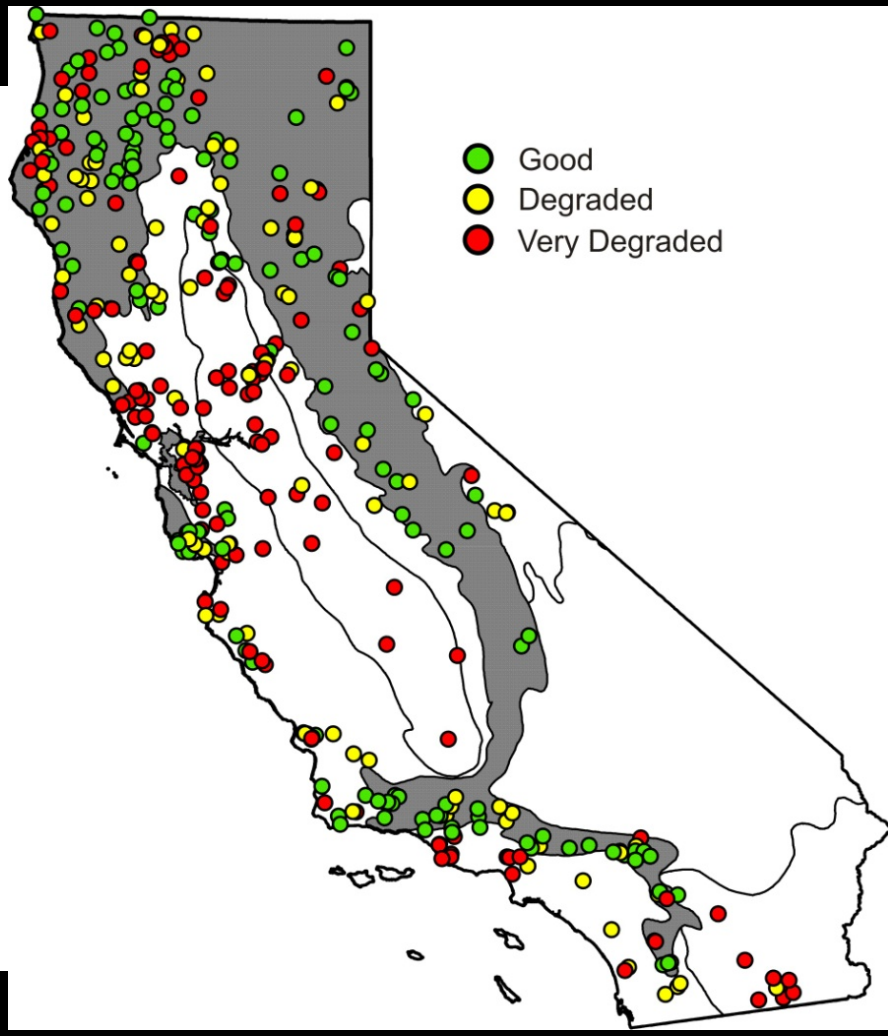
Resource Extent Estimates



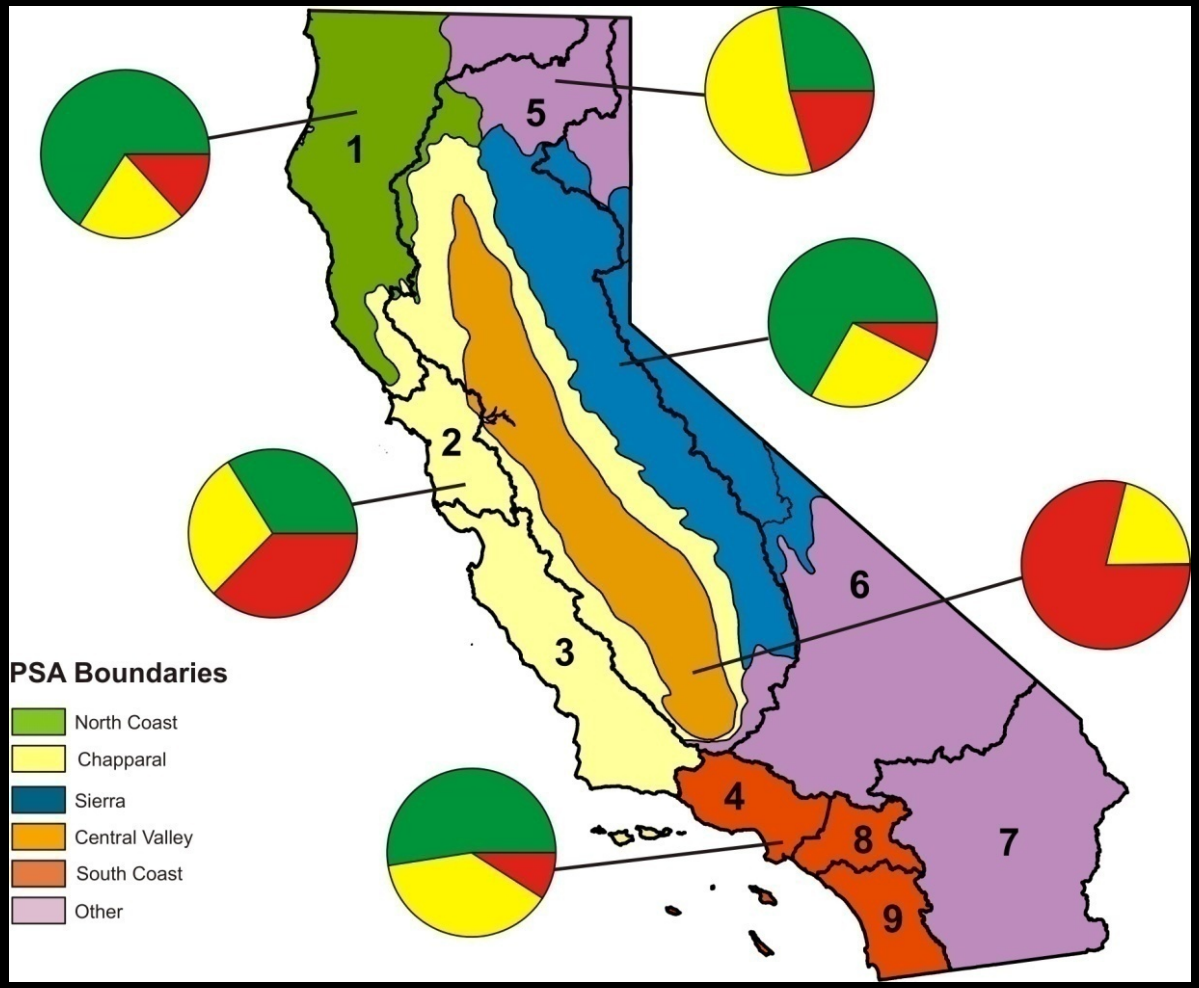
- ~75% of CA stream length is non-perennial = a neglected target for monitoring and protection
- Current maps of perennial/non-perennial streams (NHD) are very inaccurate

Condition of California's Wadeable Perennial Streams

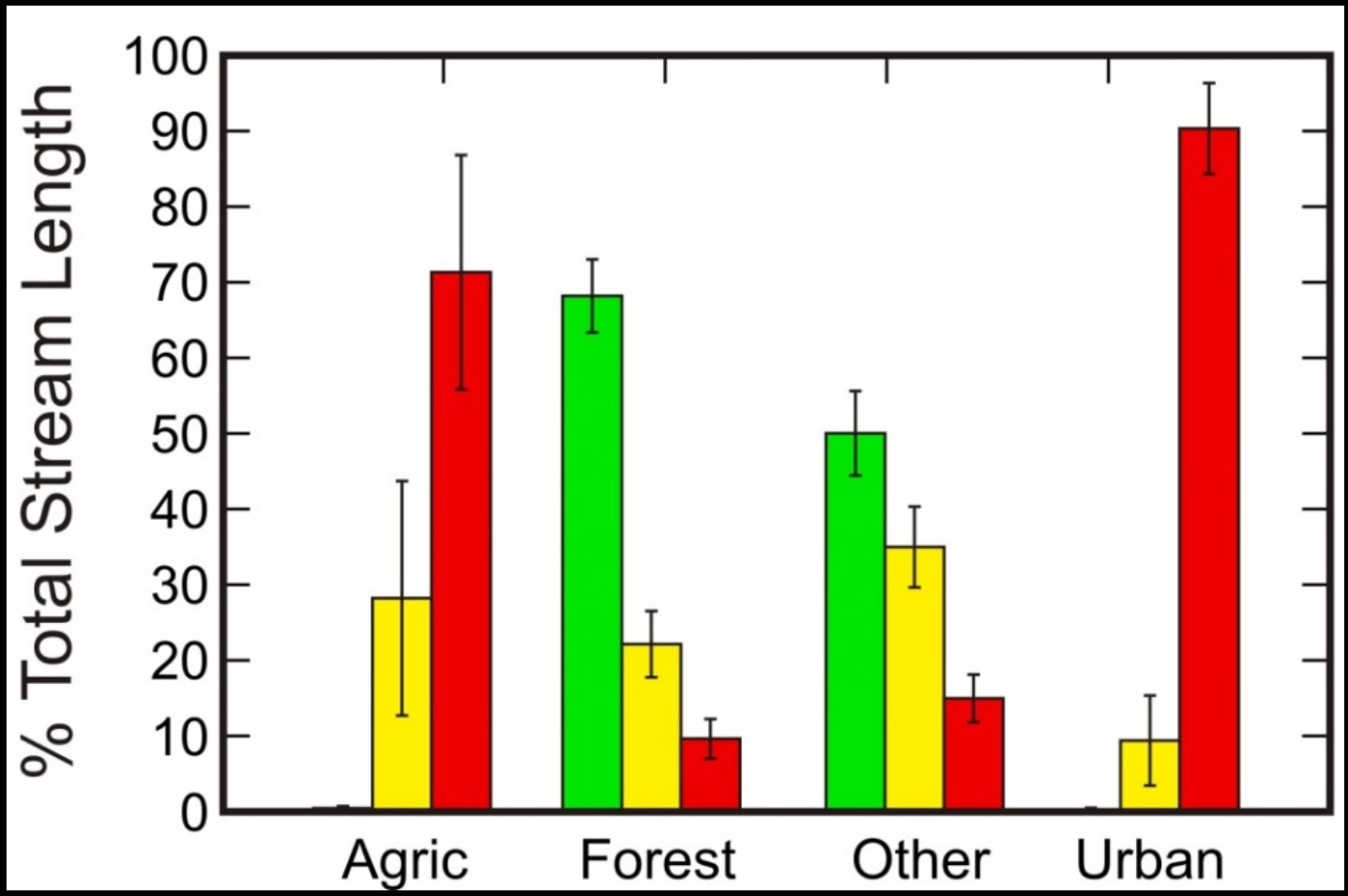




Condition Assessments by Region (8 years)

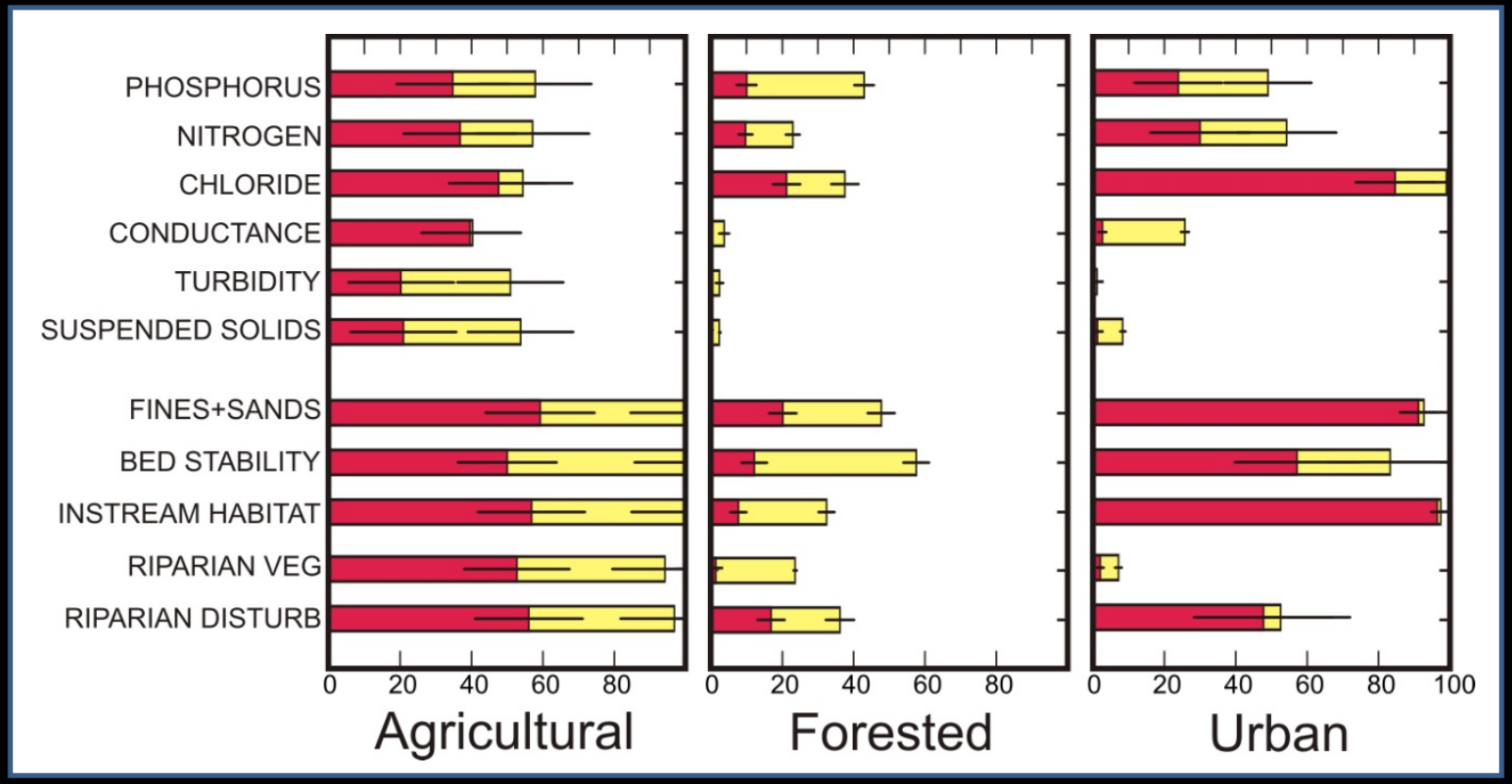


Condition Assessments by Landuse



Stressor Extent Estimates by Landuse:

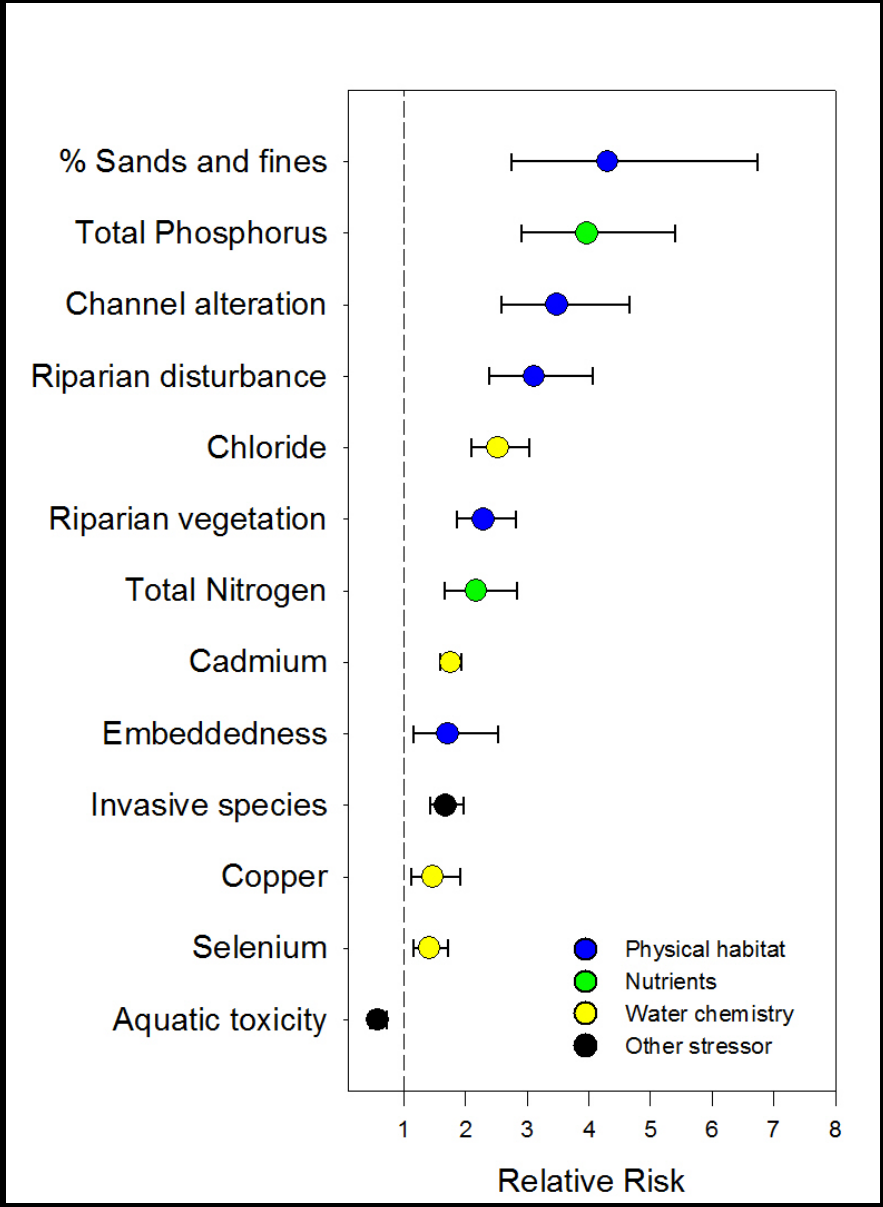
% of stream length with high (red) or moderate (red + yellow) levels of various stressors



Relative Risk

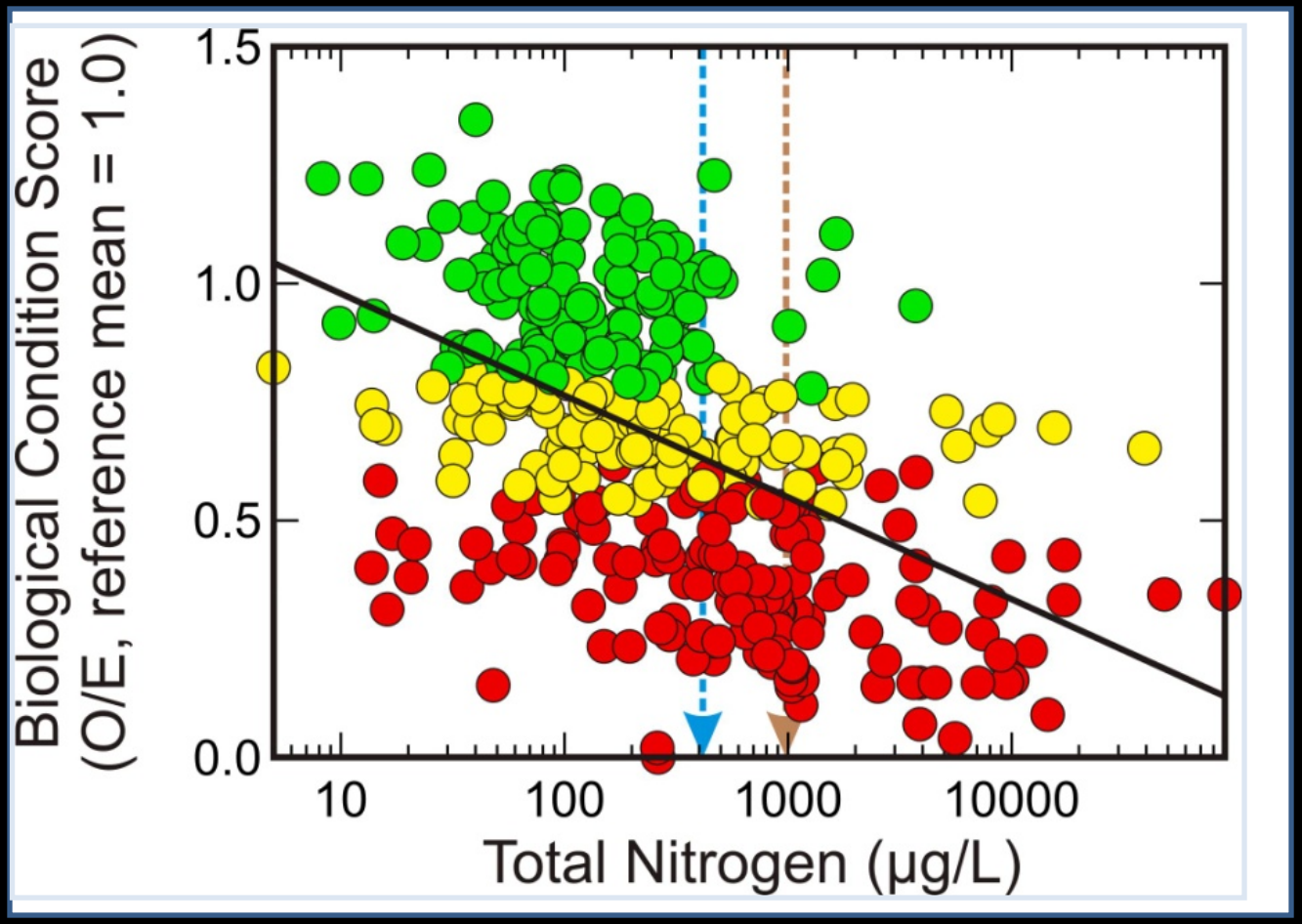
Increased risk of biological impairment in presence of high stressor levels (analogous to medical risk assessments)

Data from SMC probability survey (Mazor et al. 2011)

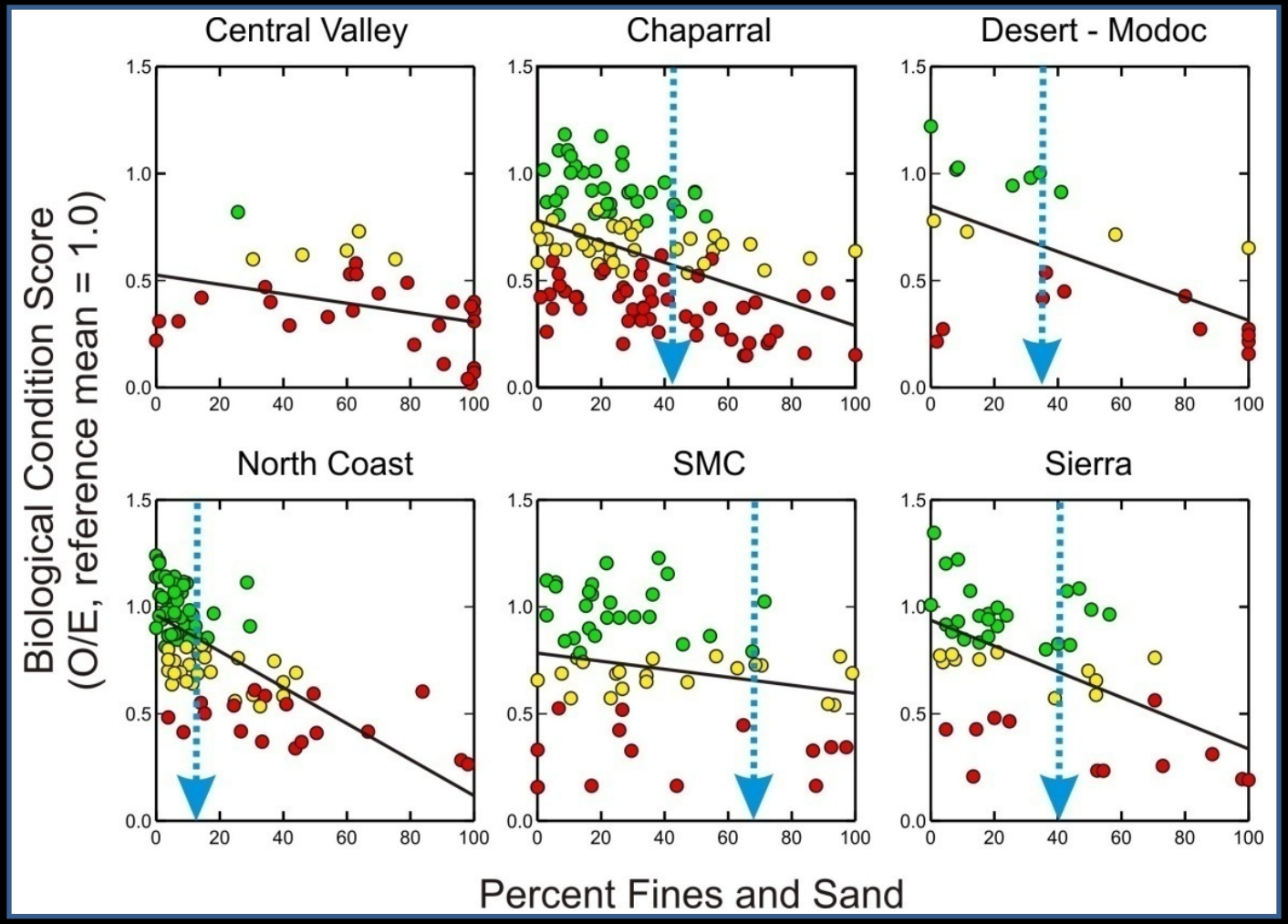


Other Applications

Biology-based stressor thresholds



Biology-based stressor thresholds



Regionally relevant thresholds

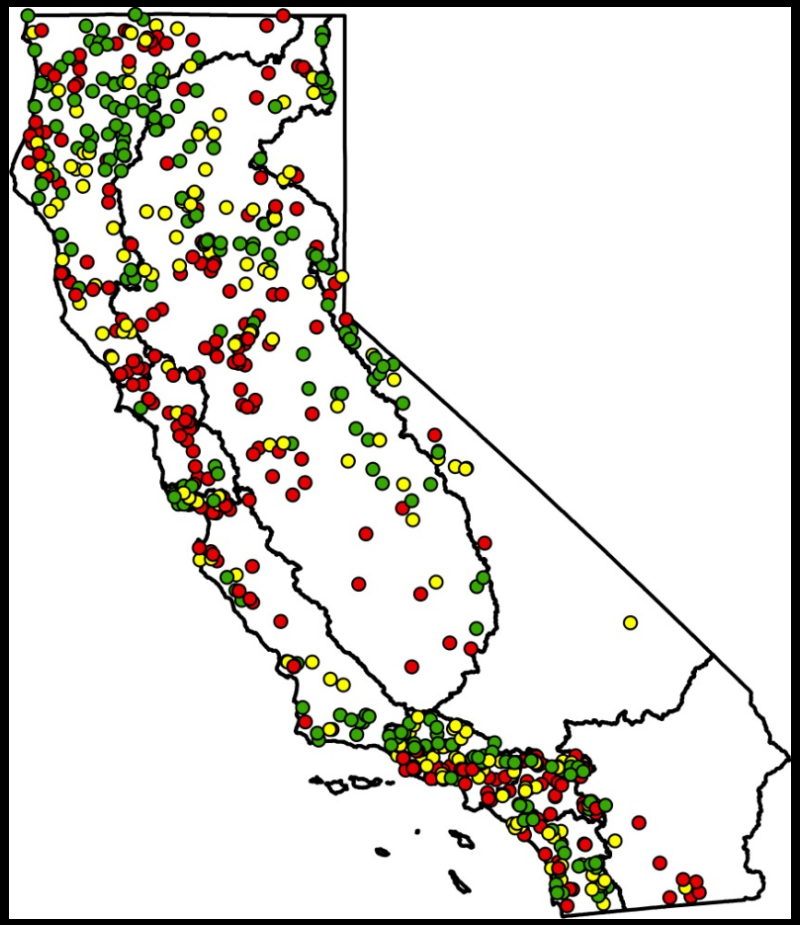
Current Focus and Future of PSA

Combine multiple surveys for next report (~800 sites)

Emphasize statewide and regional distribution curves and stressor extent estimates

Expand focus to non-perennial streams

Expand cost-sharing partnerships (e.g., SoCal-SMC, BayArea-RMC, NRSA, USFS, TRPA)



Take Home Messages

• Probability surveys provide critical perspective that can't be obtained from traditional survey designs … results will support more efficient and effective use of monitoring dollars

• Multiple benefits beyond general condition assessments

• Partnerships can greatly extend value

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