California's Sophisticated State Bioassessment Program and the Challenge of Translating its Too into a Successful Citizen Monitoring Program

Jim Harrington
California Department of Fish and Game
WPCL Bioassessment Laboratory
jharring@ospr.dfg.ca.gov

SEAL OF THE GOVERNOR OF THE STATE OF CALIFORNIA
MDCCCXXXVIII

Angie Montalvo
Pete Ode
Andy Rehn
Shawn McBride
Jenn York
Nathan Mack
Dan Pickard
Doug Post
Brady Richards
Joe Slusark

Aquatic Bioassessment Laboratory
Rancho Cordova – Chico State University

California Department Of Fish and Game

Hot Creek Hatchery NPDES Permit

1993 in permit

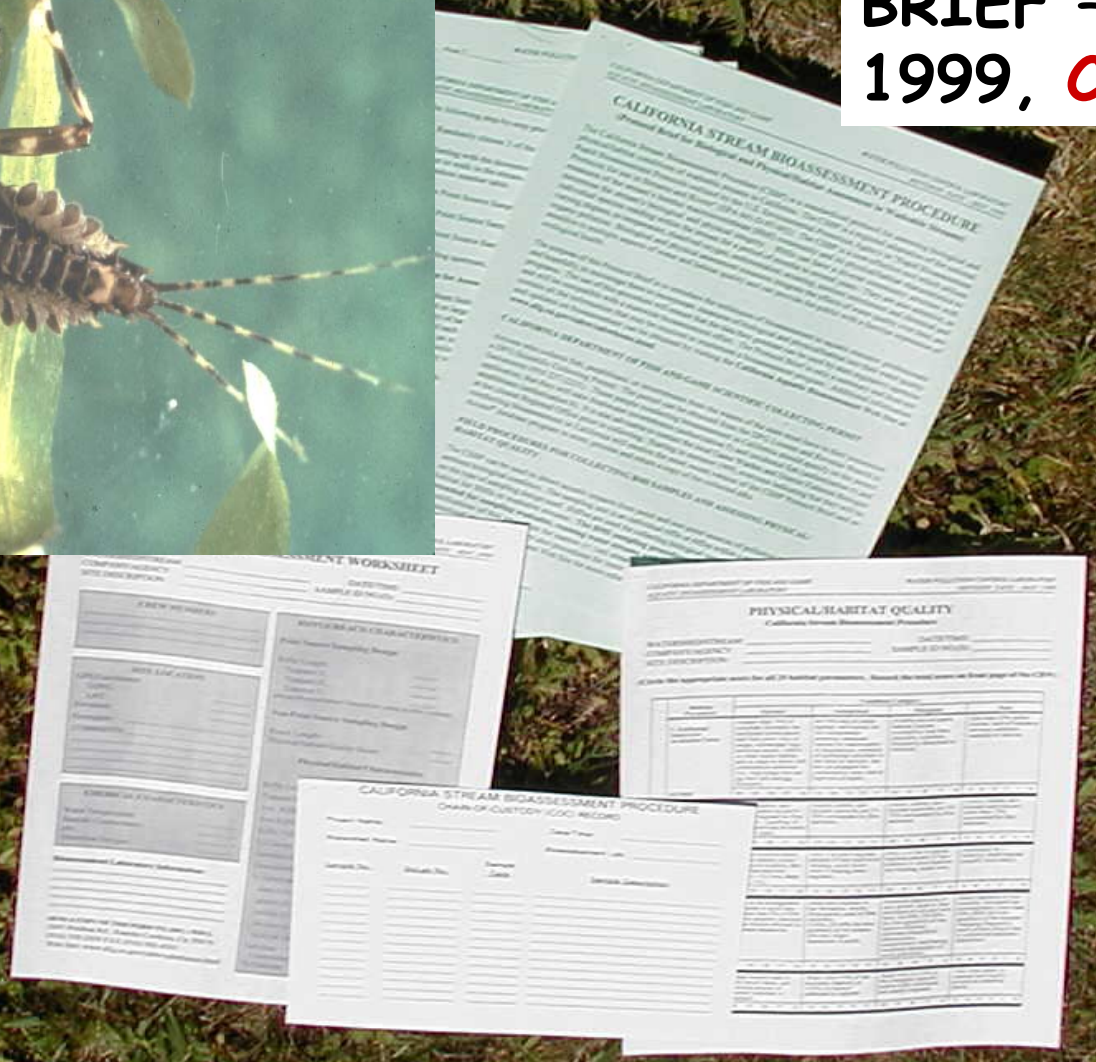
No response

1999-2004

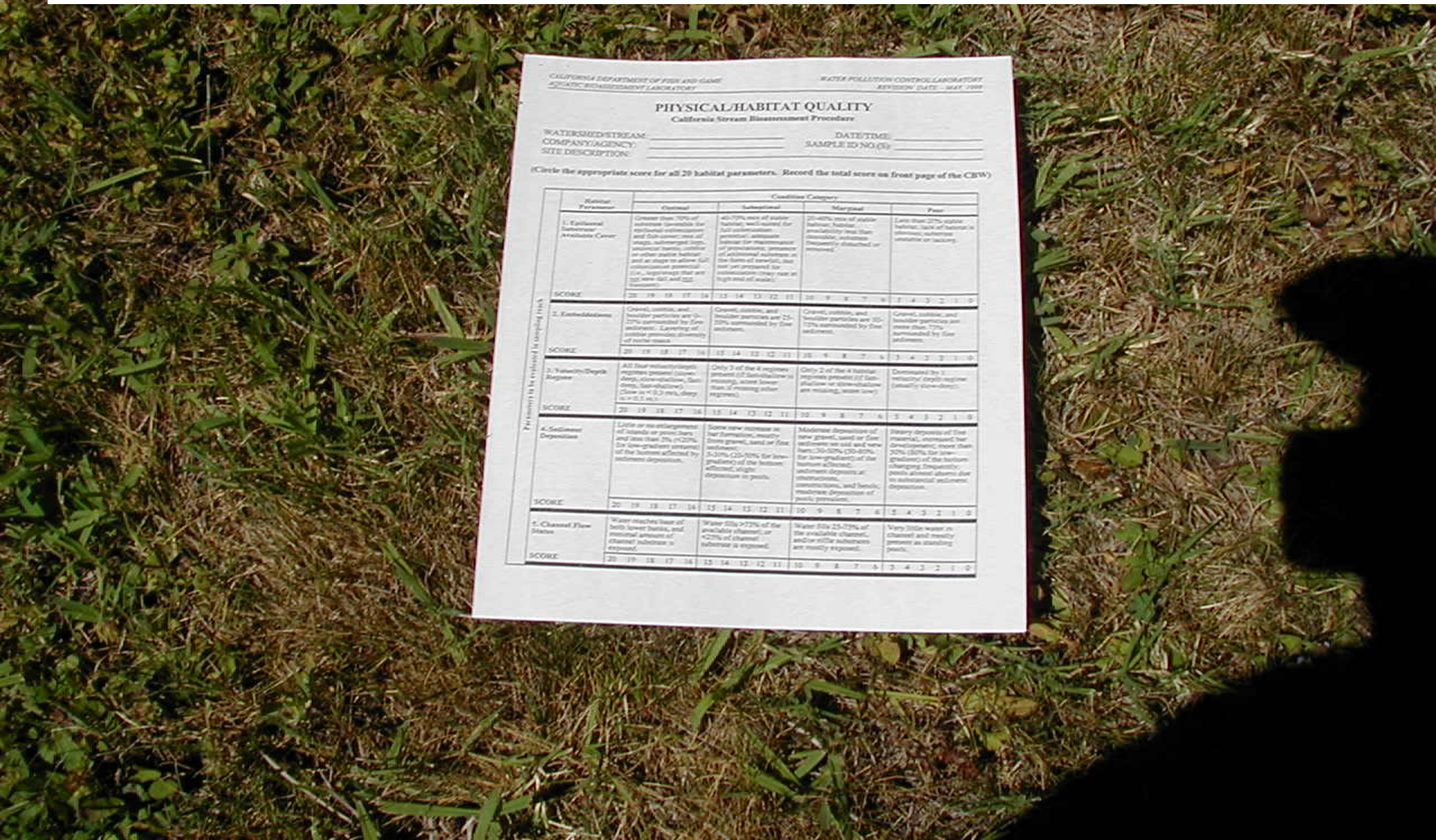
2005 SI process

Continue monitoring

CSBP PROTOCOL BRIEF – 1993, 1996, 1999, CSBP 2004



EPA (RBP) PHYSICAL/HABITAT QUALITY



CALIFORNIA DEPARTMENT OF FISH AND GAME
AQUATIC BIOASSESSMENT LABORATORY

WATER POLLUTION CONTROL LABORATORY
REVISION DATE – MAY 1999

PHYSICAL/HABITAT QUALITY

California Stream Bioassessment Procedure

WATERSHED/STREAM: _____ DATE/TIME: _____
COMPANY/AGENCY: _____ SAMPLE ID NO.(S): _____
SITE DESCRIPTION: _____

(Circle the appropriate score for all 20 habitat parameters. Record the total score on front page of the CBW)

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat; and at stable flow stages all habitat types are available (i.e., logjams that are not new fall and not flushed).	40-70% mix of stable habitat; habitat suitable for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate or cover but not to the extent that it can be prepared for colonization (may not be at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is <0.3 m/s, deep is >0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Enforcement of DFG Code 5650

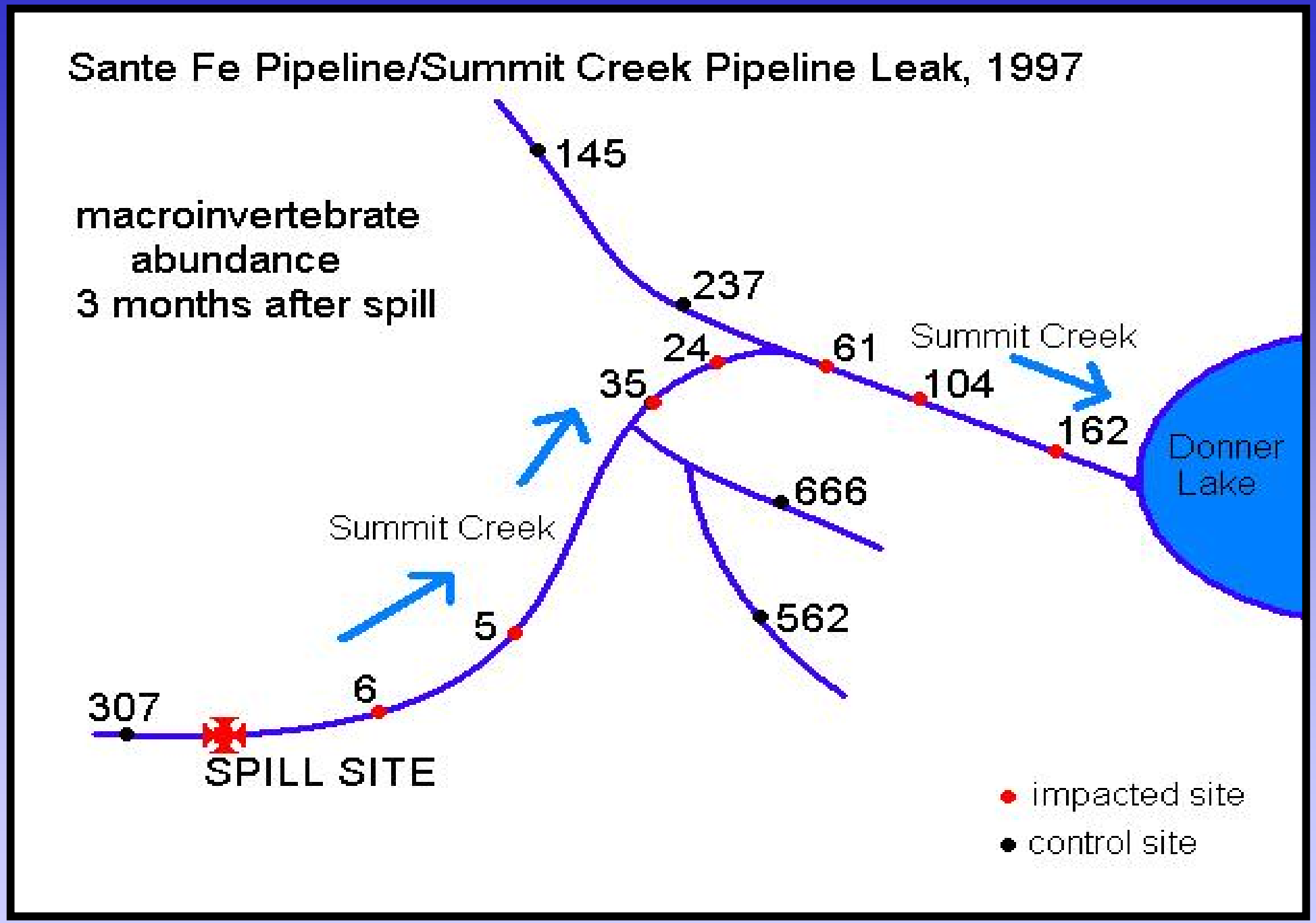
Spill Response

Potential Components of a Spill Settlement

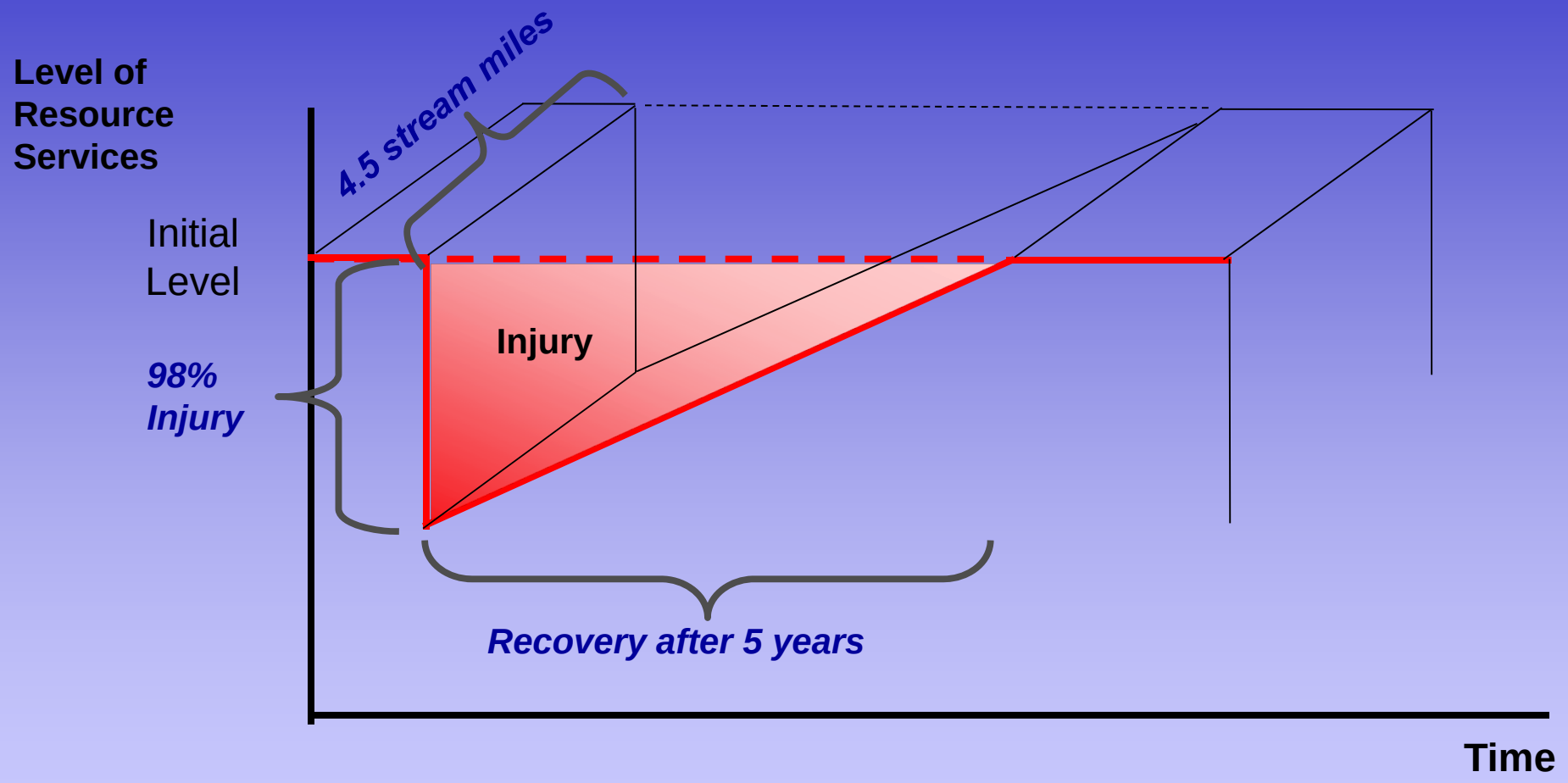
FINES, PENALTIES

OUTSTANDING RESPONSE COSTS

NATURAL RESOURCE DAMAGES


Sante Fe Pipeline/Summit Creek Pipeline Leak, 1997
macroinvertebrate
abundance
3 months after spill
145
237
24
61
Summit Creek
35
104
162
Donner
Lake
666
Summit Creek
562
5
6
307
SPILL SITE
impacted site
control site

Habitat/Resource Equivalency Analysis



Product of the Model X DFG Restoration Costs

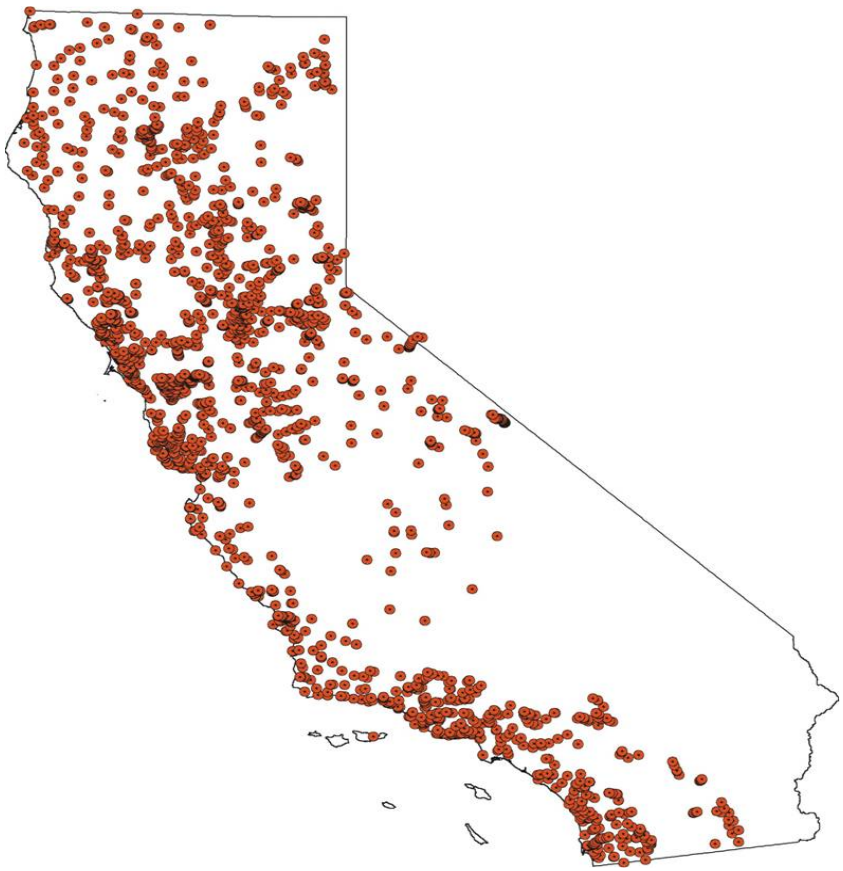
California Regional Water Quality Control Boards

Western Pilot EMAP and CMAP

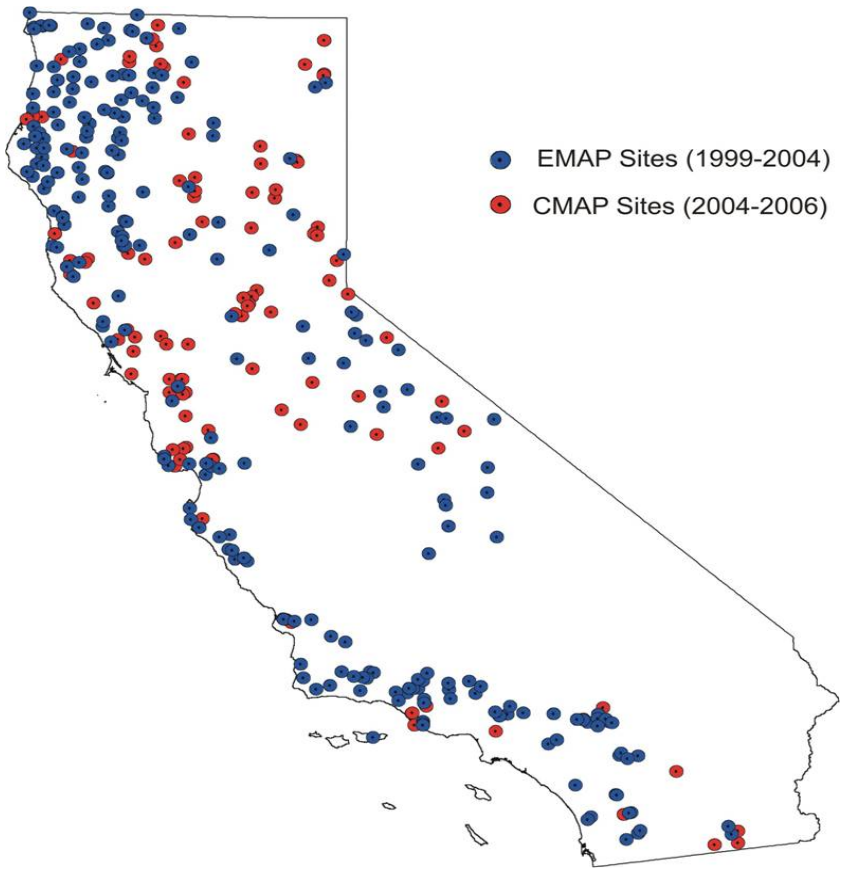
EMAP
2000-2004

CMAP
2005-2008

All ABL processed sites (1993-2006)



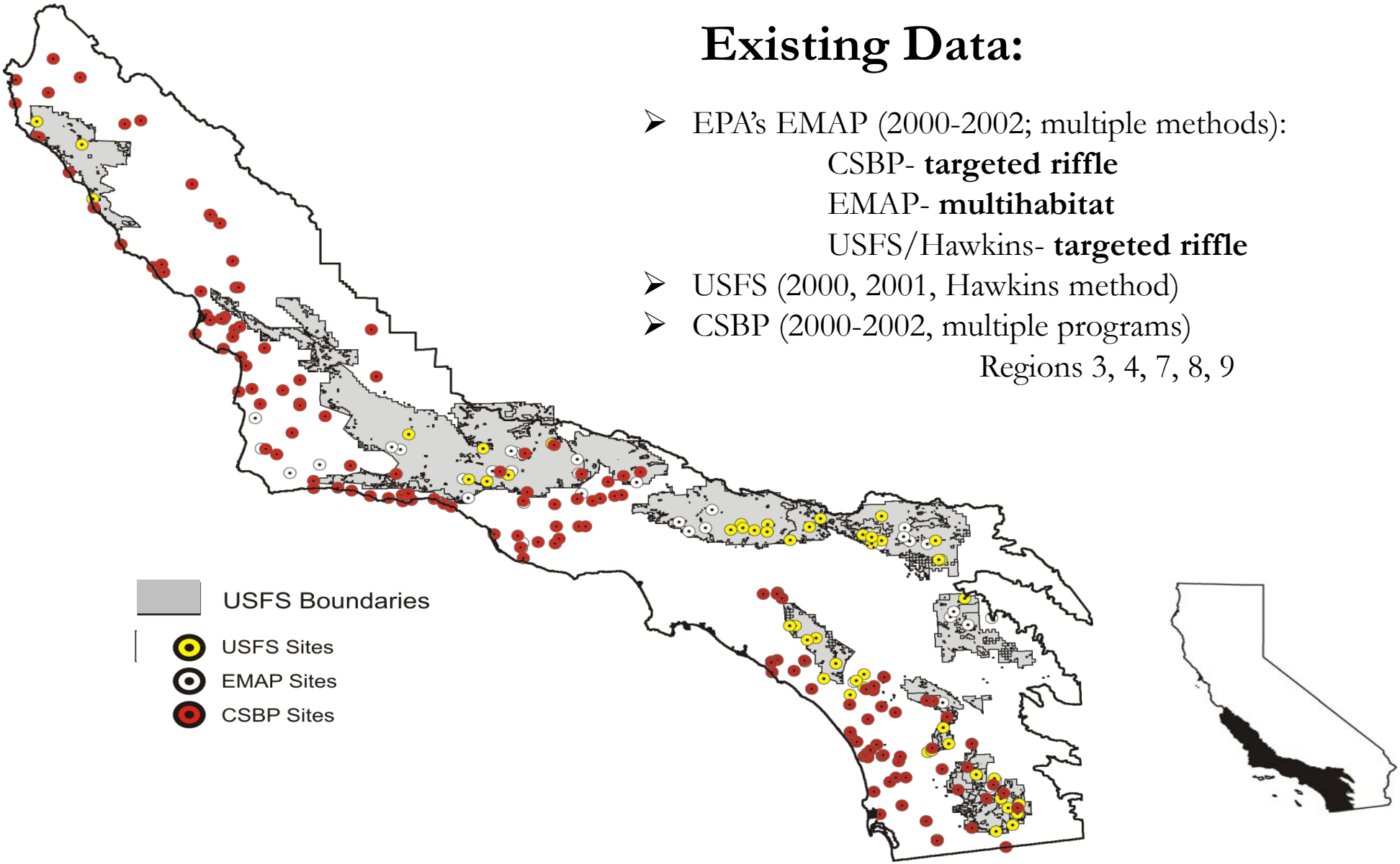
Probability survey sites (2000-2006)

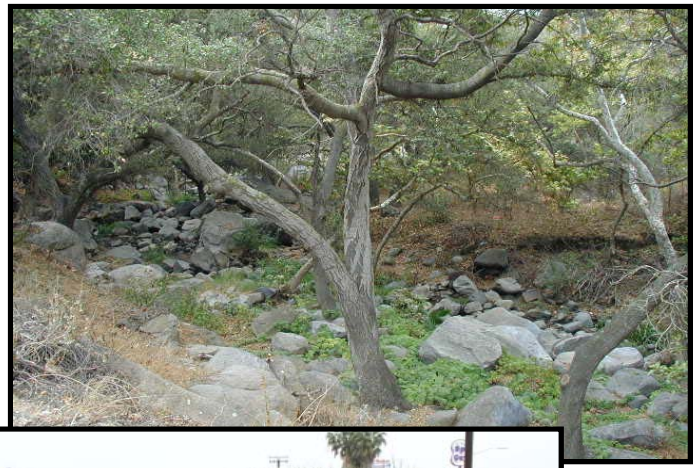


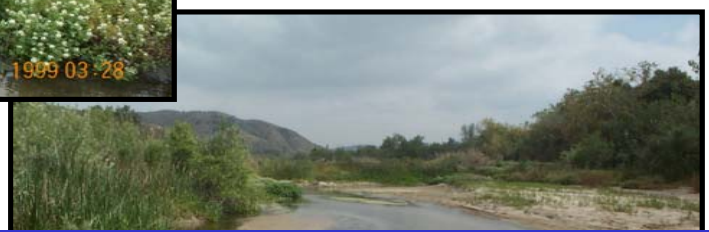
More than 17,000 sites as of 2010

Existing Data:

- EPA's EMAP (2000-2002; multiple methods):
  - CSBP- **targeted riffle**
  - EMAP- **multihabitat**
  - USFS/Hawkins- **targeted riffle**
- USFS (2000, 2001, Hawkins method)
- CSBP (2000-2002, multiple programs)
  - Regions 3, 4, 7, 8, 9







Application of a benthic invertebrate IBI to regional 305(b) reporting in southern California

Peter R. Ode, Andrew C. Rehn and Jason T. May

Aquatic Bioassessment Laboratory
Water Pollution Control Laboratory
California Department of Fish and Game
California State University, Chico

Ode, P.R., A.C. Rehn and J.T. May. 2005. A quantitative tool for assessing the integrity of southern coastal California streams. Environmental Management. 35:493-504

California RIVPACS O/E Model

Surface Water Ambient Monitoring Program (SWAMP)

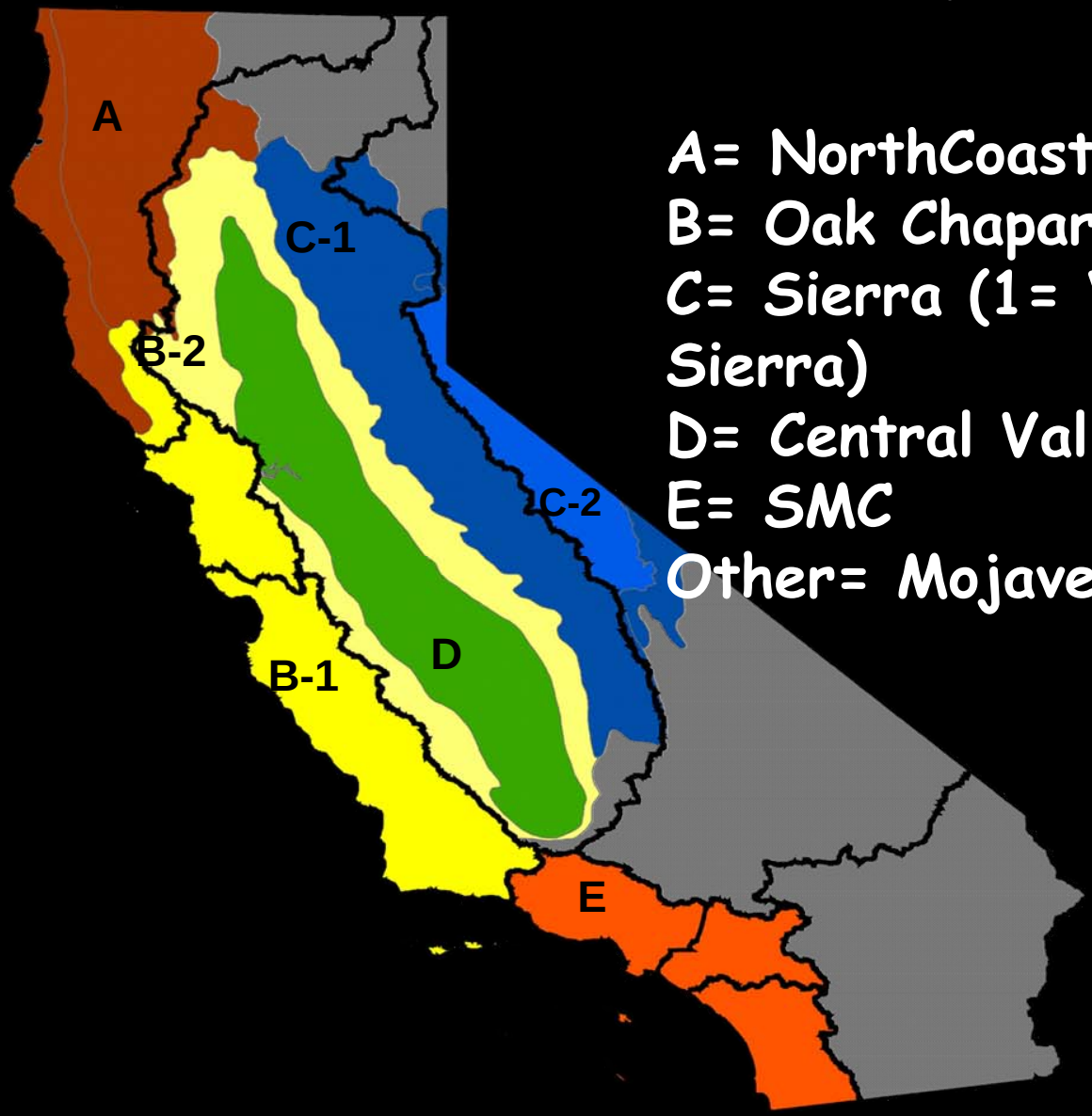
RESOURCES AGENCY CALIFORNIA DEPARTMENT FISH & GAME

Aquatic Bioassessment Laboratory

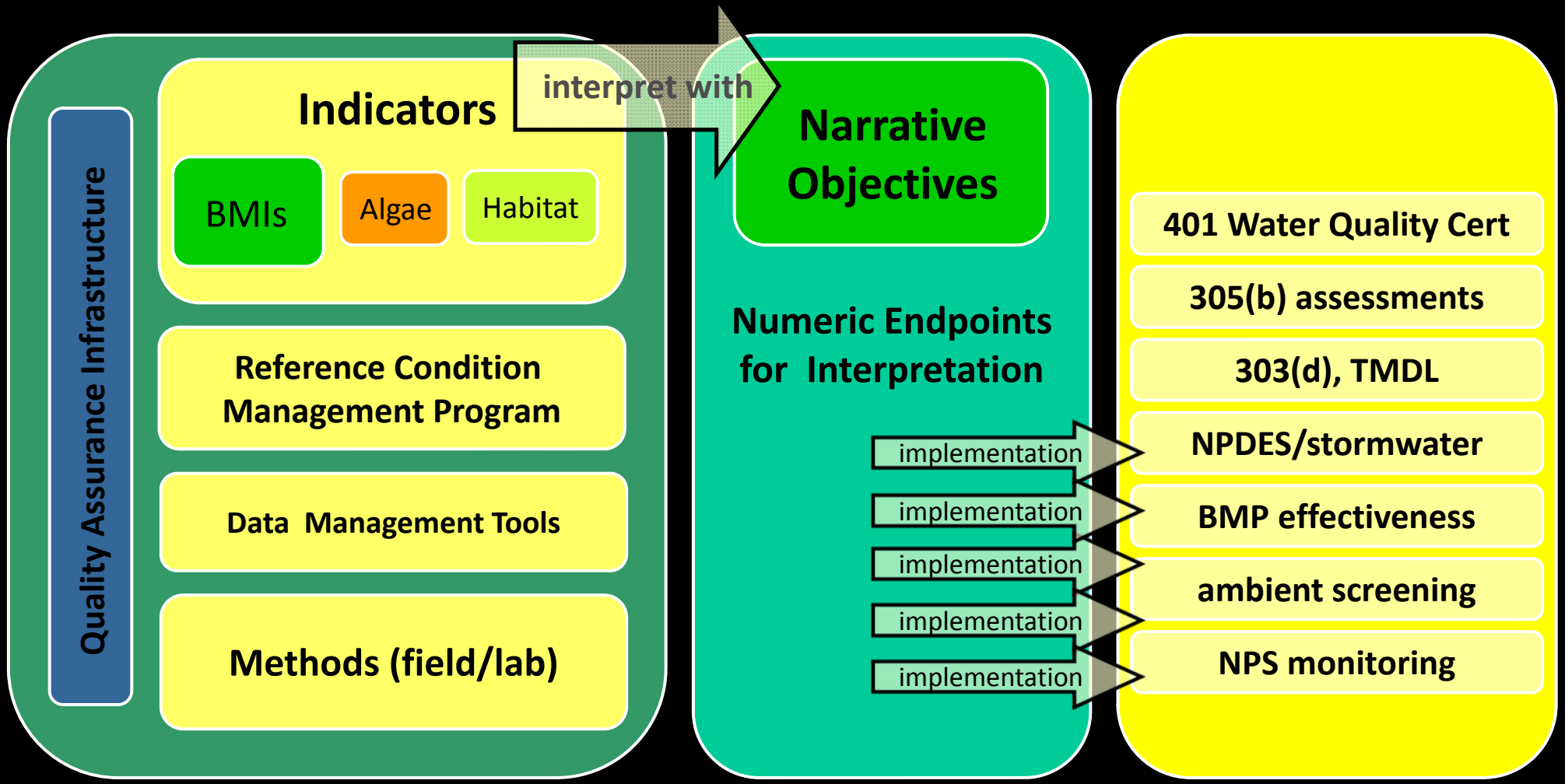
Water Boards

SWAMP Surface Water Ambient Monitoring Program

Perennial Stream Assessment (PSA)



A= NorthCoast
B= Oak Chaparral (1= coastal, 2=interior)
C= Sierra (1= West Sierra, 2= East Sierra)
D= Central Valley
E= SMC
Other= Mojave/Sonora + Modoc Plateau



Technical Infrastructure

Regulatory Framework (Objective + Implementation Plan)

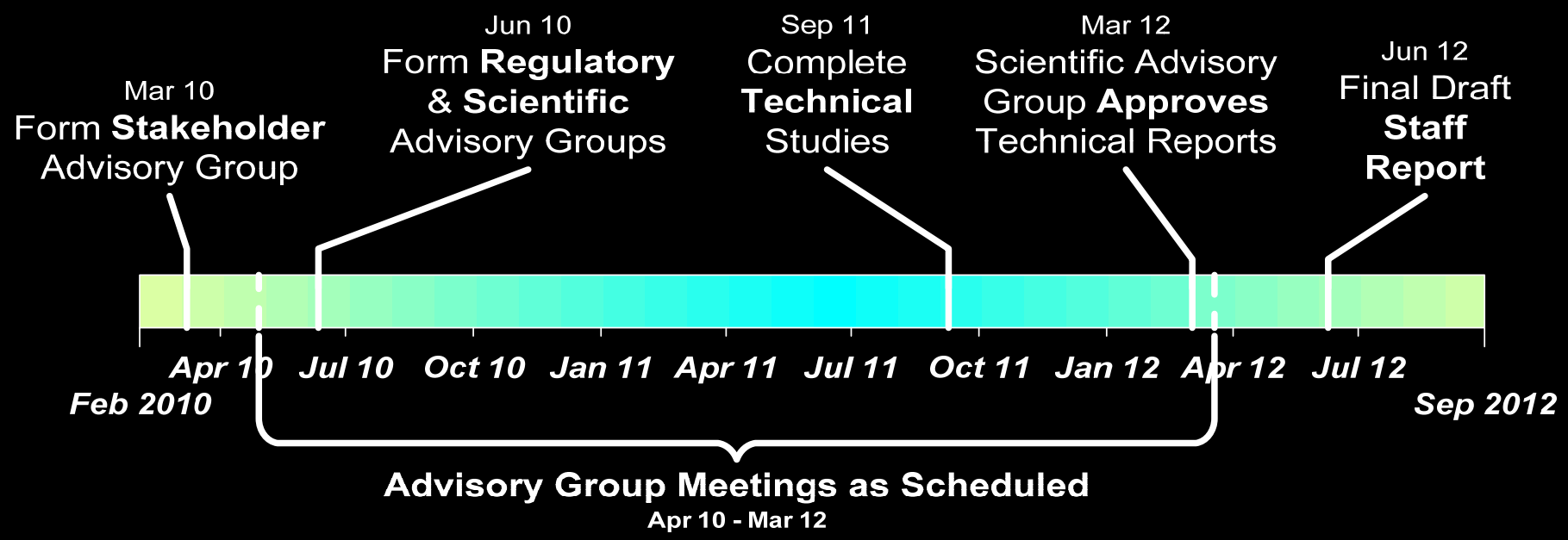
Regulatory Applications

SWAMP

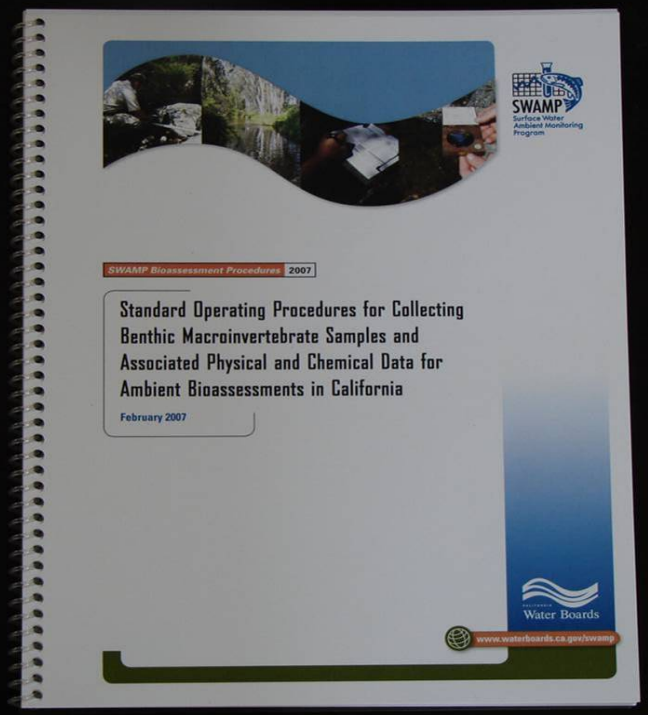
Standards

Regulatory Programs

Timeline of BioObjectives

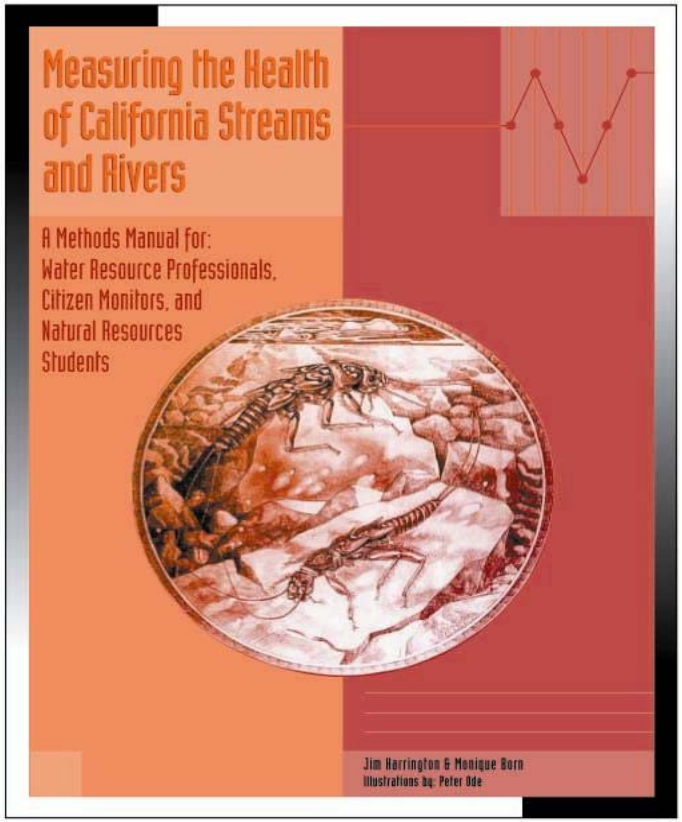


Rapid Biological Assessment
2007 SWAMP Procedures



EMAP/NSRA Light

Professional and Citizen Bioassessment Training Since 1996



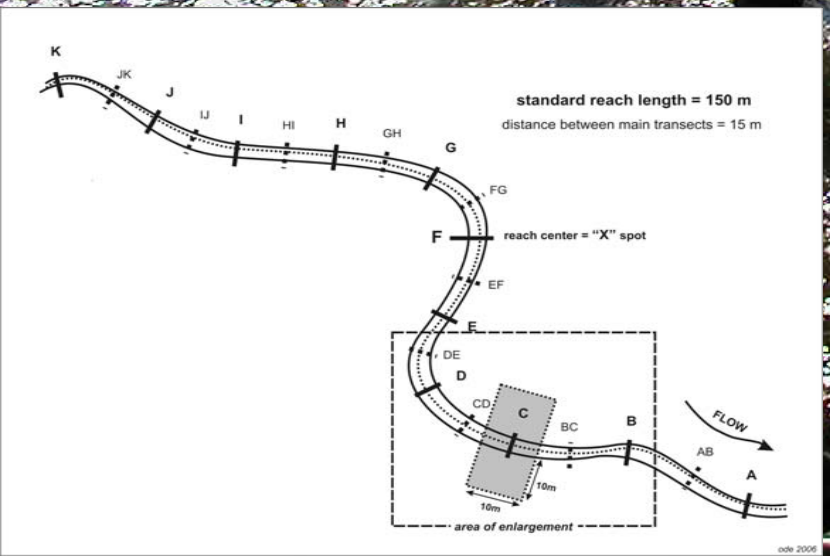
Fall 2004 Started Teaching New SWAMP P/Hab Protocols

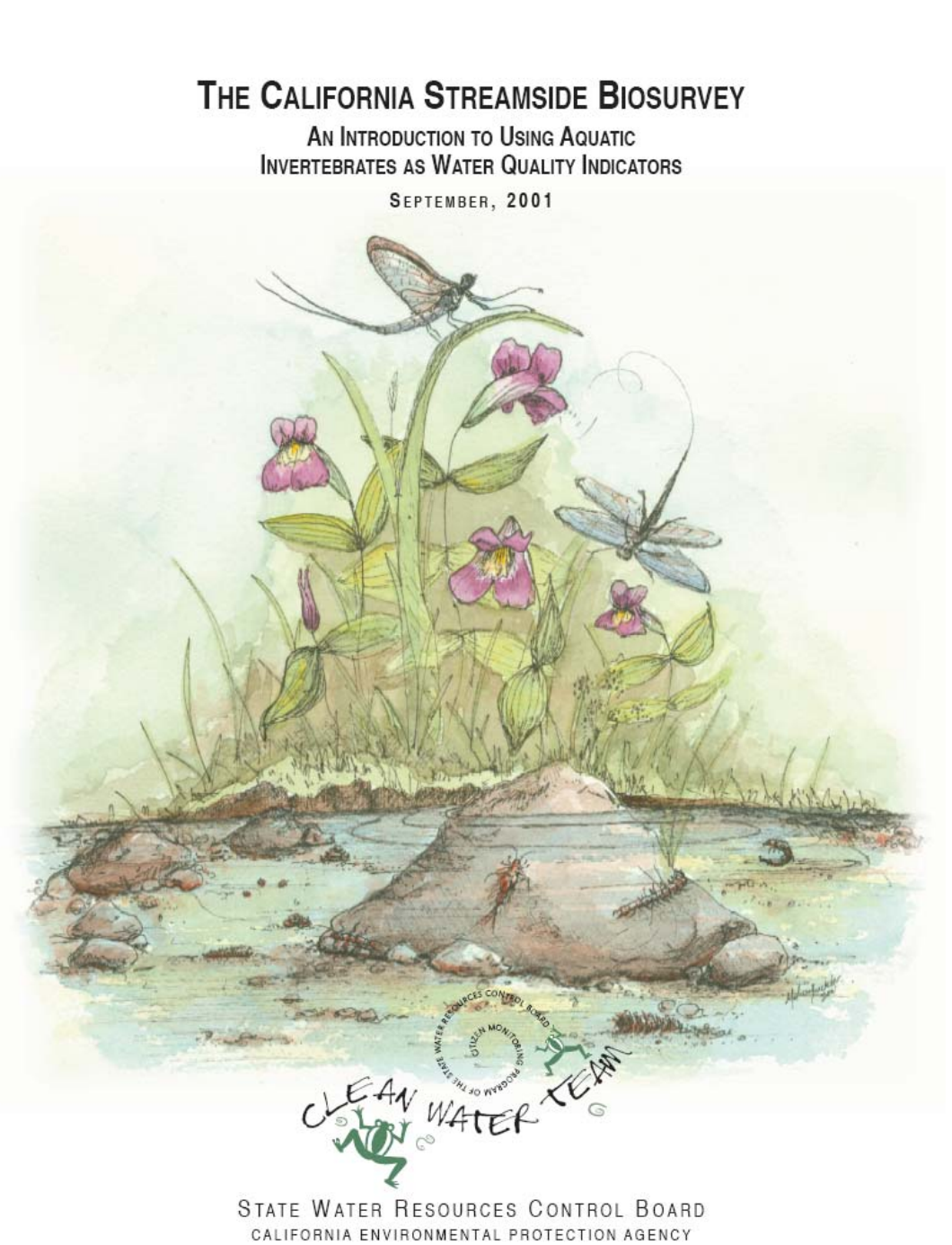
Professional Level
Municipalities, Stormwater

Citizen Monitor Level
Friends of…, others

Bug Sampling No Problem

Reach-Wide Benthos





SWRCB Volunteer Monitoring Program

SWAMP Clean Water Team – Eric Burres

250 Volunteer Groups
25+ Bioassessment

2007 SWAMP SOP Basic Option

Basic Chemistry

Channel Dimensions

Canopy Cover

EPA RBP Phab

Table 1. Summary of physical habitat and water chemistry monitoring methods standardization, and proposal for basic, full, and optional levels of effort.

Survey Task	Parameter(s)	Basic	Full	Option	Comments
REACH DELINEATION and WATER QUALITY [Conducted before entering stream to sample BMIs or conduct any habitat surveys]	Layout reach and mark transects, record GPS coordinates	X	X		Use 150-m reach length if wetted width ≤10 m; Use 250-m reach length if wetted width > 10 m
	Temperature, pH, specific conductance, DO, alkalinity	X	X		Multi-meter (e.g., YSI, Hydrolab, VWR Symphony)
	Turbidity, Silica			X	Use test kit or meter
	Notable field conditions	X	X		Recent rainfall, fire events, dominant local landuse
CROSS-SECTIONAL TRANSECTS BASIC Measurements at main 11 transects only FULL Measurements at 11 main transects (A, B, C, D, E, F, G, H, I, J, K) or 21 transects (11 main plus 10 inter-transects) for substrate size classes only	Wetted width	X	X		Stadia rod is useful here
	Flow habitat delineation	X	X		Record proportion of habitat classes in each inter-transect zone
	Depth and Pebble Count + CPOM		X		5-point substrate size, depth and CPOM records at all 21 transects
	Cobble embeddedness		X		All cobble-sized particles in pebble count. Supplement with "random walk" if needed for 25
	Slope (%)	See reach scale	X		Average slope calculated from 10 transect to transect slope measurements. Use autolevel for slopes ≤ 1%; clinometer OK for steeper gradients
	Sinuosity		X		Record compass readings between transect centers
	Canopy cover	X	X		Four densiometer readings at center of channel (facing L bank R bank, Upstream +Downstream)
	Riparian Vegetation		X		Record % or categories
	Instream Habitat		X		
	Human Influence		X		
	Bank Stability	X	X		eroded/ vulnerable/ stable
	Bankfull Dimensions		X		10 measurements of at a representative transect
	Excess Sediment Transect Measures (optional)				
	Bankfull width and height, bank angles			X	
	Large woody debris counts			X	Tallies of woody debris in several size classes
	Thalweg profile			X	100 equidistant points along thalweg

2007 SWAMP SOP Measures to Add

Substrate Comp.

Embeddedness

Sinuosity

RV/IH/HI

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	Human Influence		X		
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	Bankfull Dimensions		X		10 measurements of at a representative transect
	Excess Sediment Transect Measures (optional)				
	Bankfull width and height, bank angles			X	
	Large woody debris counts			X	Tallies of woody debris in several size classes
	Thalweg profile			X	100 equidistant points along thalweg

Friends of Deer Creek
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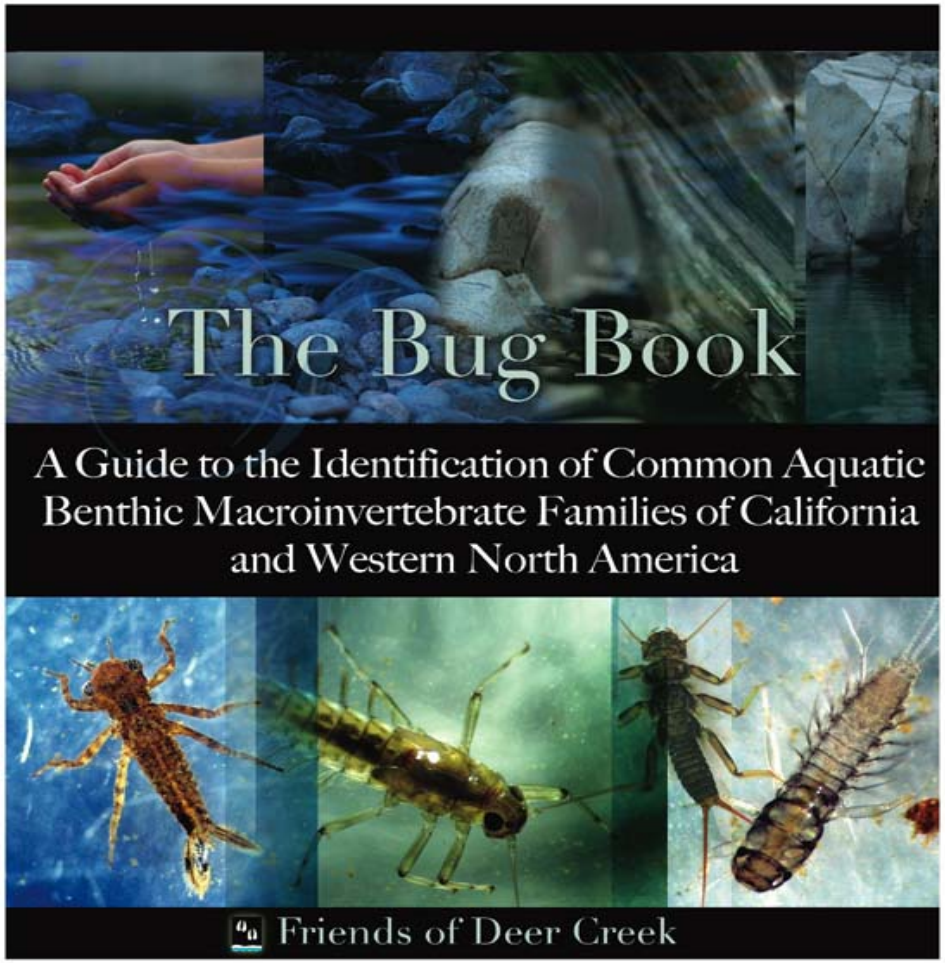

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So, Yes There Should Always be an Element of Fun With Volunteer Biomonitoring
But, by Building a Professional Level Volunteer Program, You Will Help Them Help You in Starting and Maintaining a Successful State WQM Program

Just Let Them
Have Fun
Make Sure They Stick with
Standard Protocols, But
Give Them an Easier Option

Thanks for Listening