Forester Creek Restoration Project: How do you measure success?

- Chad Loflen
- Senior Environmental Scientist
- State of California Water Quality Control Board – San Diego Region


Carlton Hills
Mast Blvd
Riverwalk
San Diego River
Mast Park
Mission Gorge Rd
Santee
Cottonwood Estates
Prospect Glen
Sky Ranch
Jevilla St
Shadow Hill Rd
Woodside Ave
Cuyamaca St
N Magnolia Ave
Jeremy St
Pryor Dr
Fanita Dr
Valley Lake Dr
Swallow Dr
Cuyamaca
N Marsha Ave
Gillespie Field
W Bradley Ave
Graves Ave
Peppervilla Dr
Pepper Dr
Grossmont
Royal Rd
E Main St
Greenfield Dr
Fletcher Pkwy
Westfield Parkway Village Pkwy
Broadway
Bostonia
Naranca Ave
Joey Ave
Navajo Rd
N Johnson Ave
El Cajon
E Main St
E Lexington Ave
N 2nd St
Melody Ln
John F Kennedy Park
Granite Hills Dr
Jamacha Rd
Garrison Way
Granite Hills Village
Avocado Ave
Merrit Dr
Bartram Way
E Chase Ave
Old Chase Ave
Hillsdale
Grove Rd
Hidden Springs Dr
Horizon Hills Dr
Rolling Hills Dr
Hidden Mesa Rd
Calavo Gardens
Lorena Ln
Rancho San Diego
Jamacha Rd
E Chase Ave
67
52
125
8
54

Project Goals

- Improve Water Quality
- Improve Flood Control
- Improve Physical Habitat and Diversity

CALIFORNIA
Water Boards

Project Goals

- **Improve Water Quality**
- Improve Flood Control
- **Improve Physical Habitat and Diversity**

Metrics: The Not-So-Distant Past

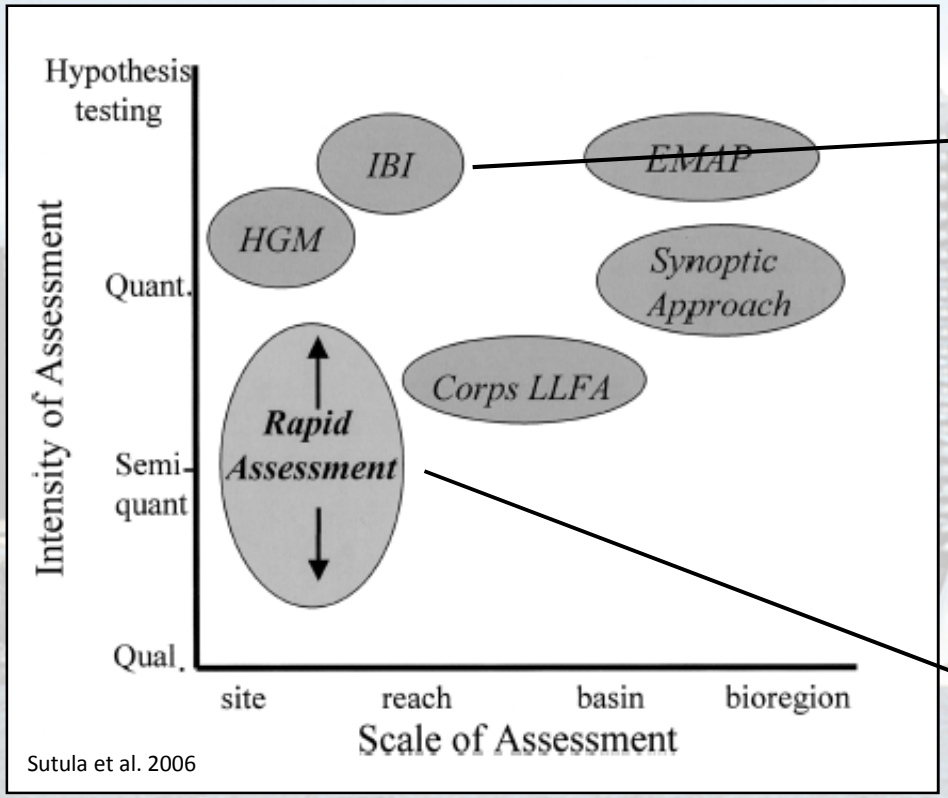
Table 11

Functional Indicator Targets For Riparian Mitigation

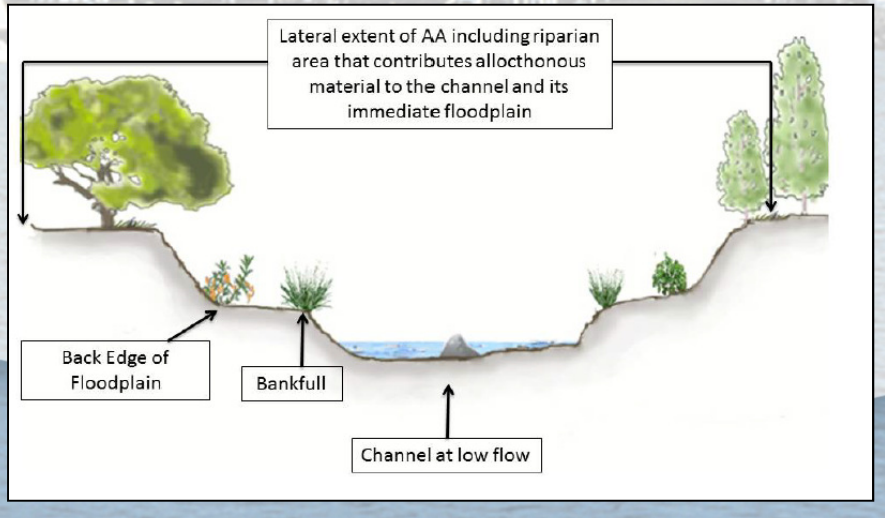
Evaluation Criterion	Interim Target	Ultimate Target
Habitat – Vegetative Structure	0.4	0.8
Habitat – Vegetative Cover	0.4	0.8
Habitat – Vegetative Diversity	0.6	0.8
Exotic, Invasive Vegetation	1.0	1.0

CALIFORNIA
Water Boards

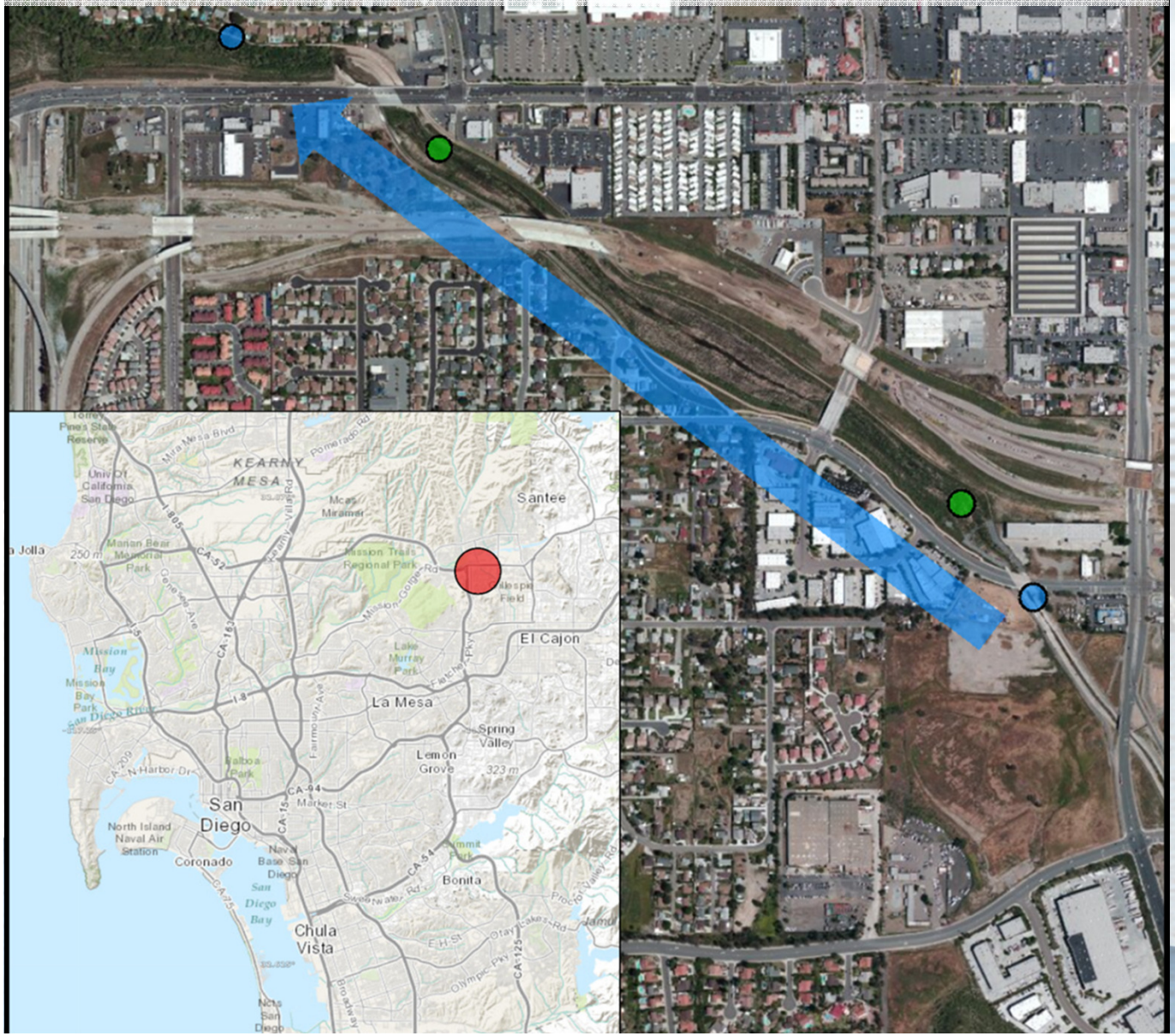
Metrics: Which to Use?



Sutula et al. 2006



Pre and Post Project Sampling
Paired Upstream/Downstream Samples



- Chemistry
- Bioassessment

CALIFORNIA
Water Boards

Water Quality: Impairments

- Total Phosphorous
- Selenium
- Total Dissolved Solids (TDS)
- High pH
- Indicator Bacteria: Fecal Coliform

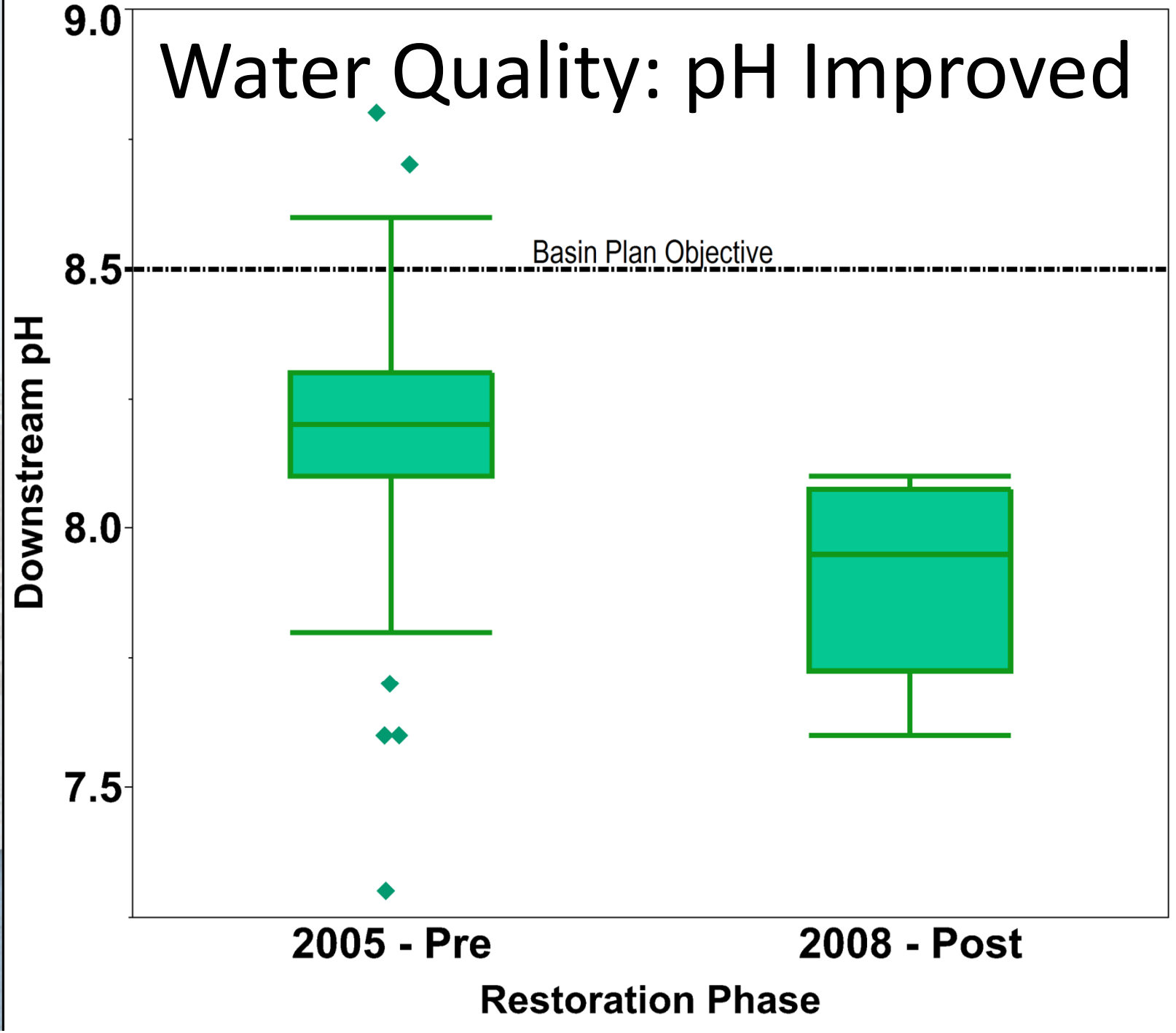
CALIFORNIA
Water Boards

Water Quality: Impairments

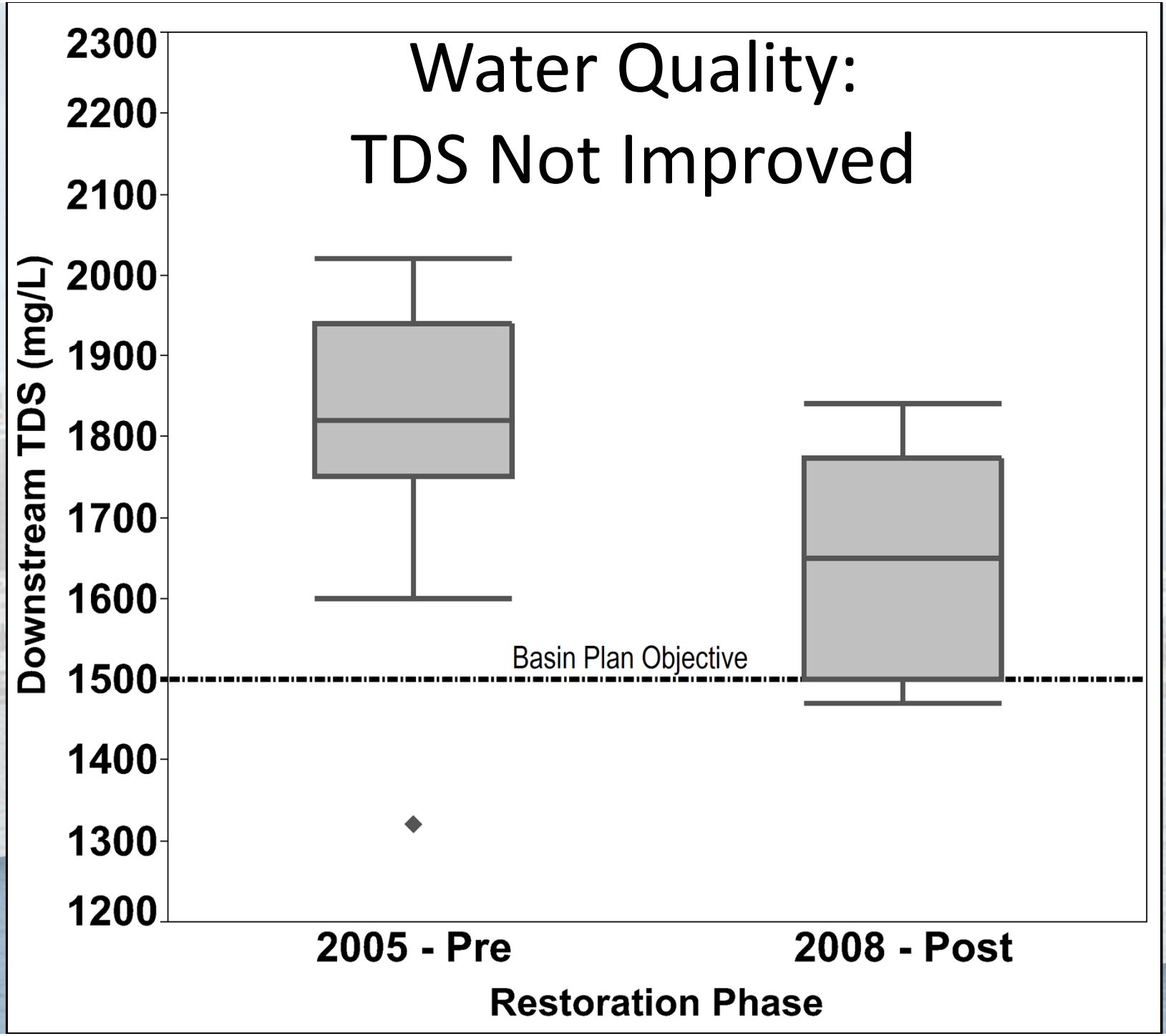
- ~~Total Phosphorous~~
- ~~Selenium~~
- Total Dissolved Solids (TDS)
- High pH
- Indicator Bacteria: Fecal Coliform

CALIFORNIA
Water Boards

Water Quality: pH Improved



Water Quality:
TDS Not Improved



Project Goals

- **Improve Water Quality**
- Improve Flood Control
- **Improve Physical Habitat and Diversity**

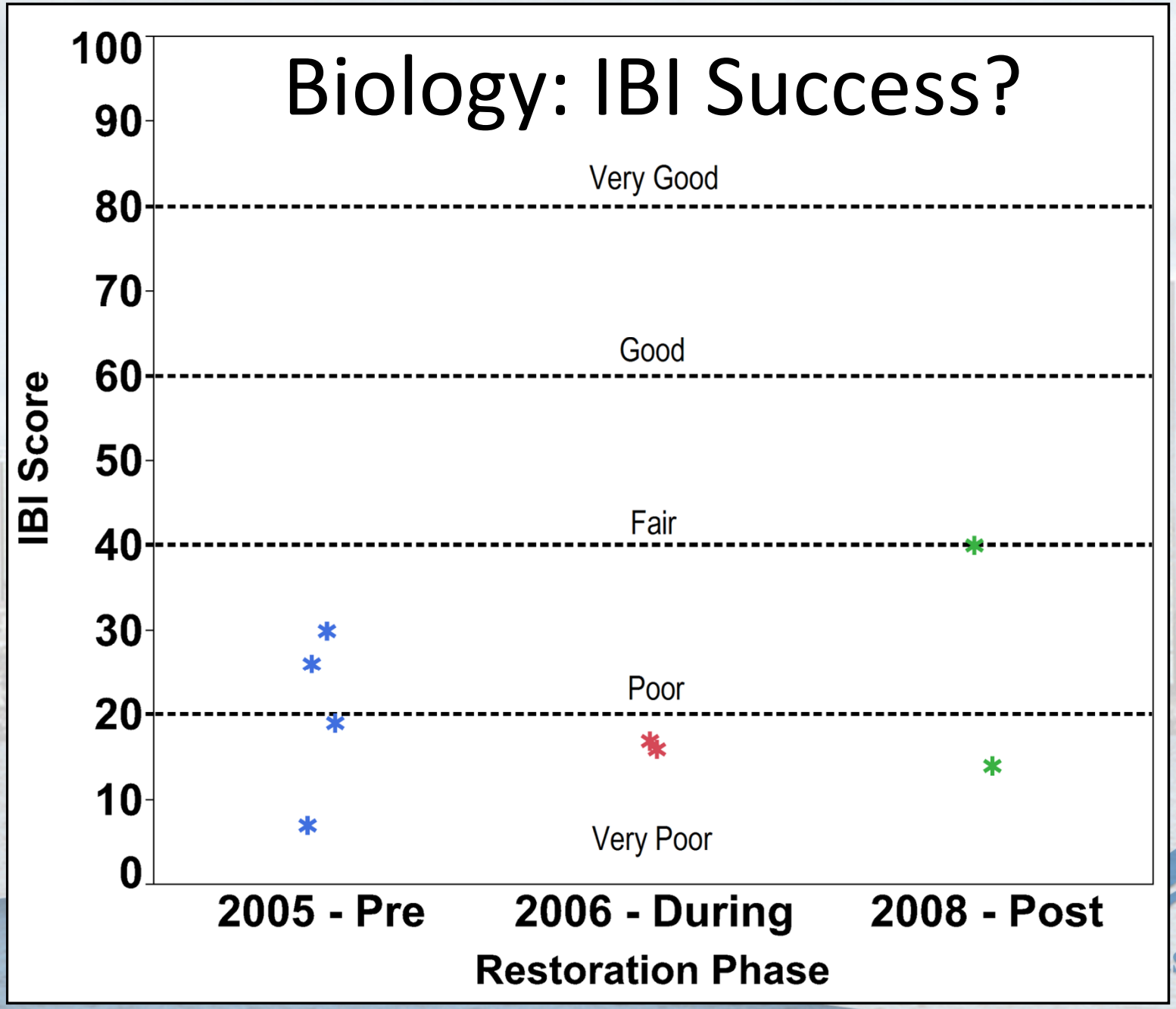
CALIFORNIA
Water Boards

Physical Habitat and Biodiversity: Stream Bioassessment

- In-stream Physical Habitat Scores
- Benthic Macroinvertebrate IBI

CALIFORNIA
Water Boards

Habitat: Too Soon!



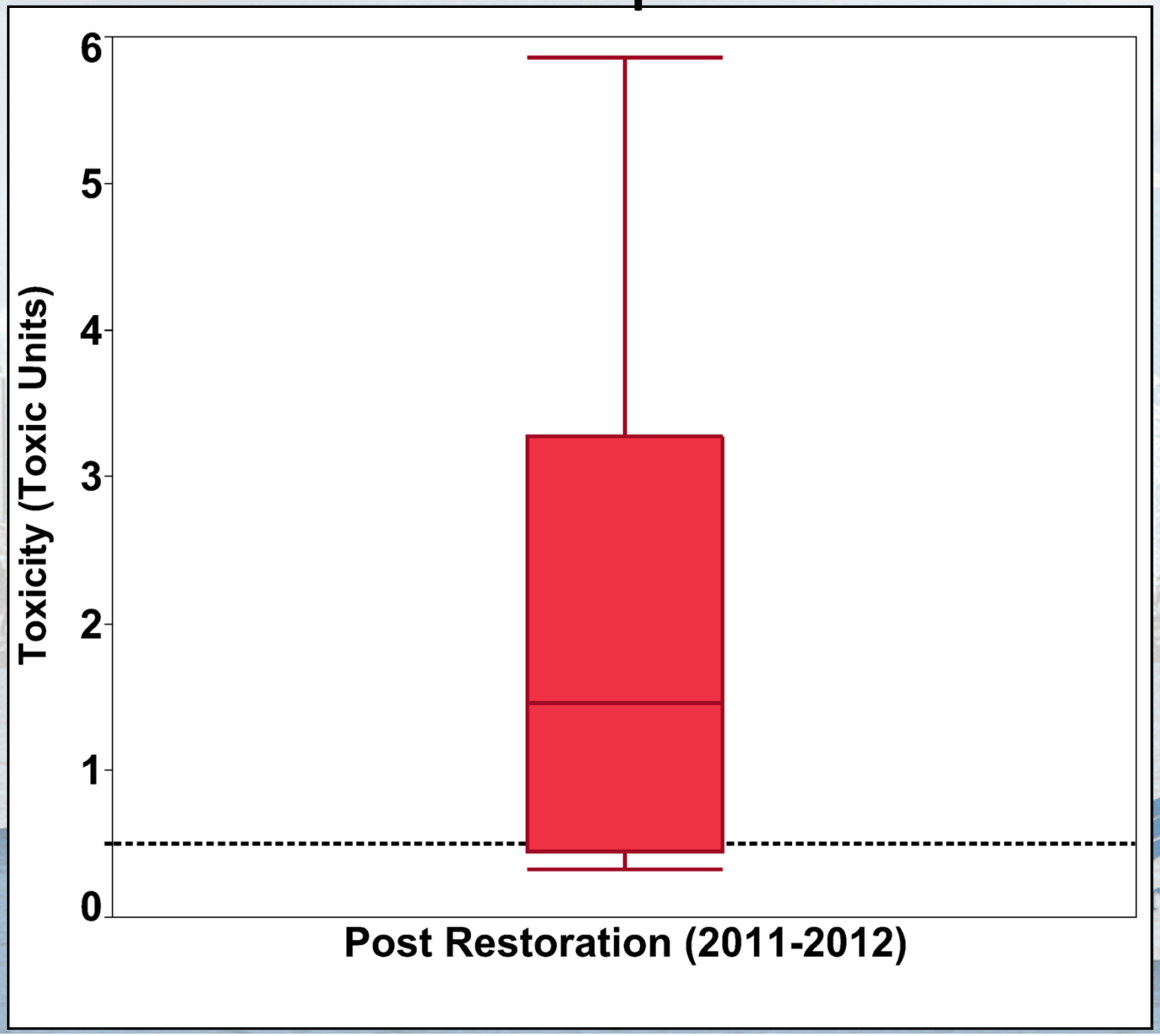
"Statistically significant increase (or at least no statistically significant decrease) in benthic macroinvertebrate biodiversity"

Same Spot!

2008

2012

Sediments: Samples are Toxic!



CRAM Scores: Improvements!

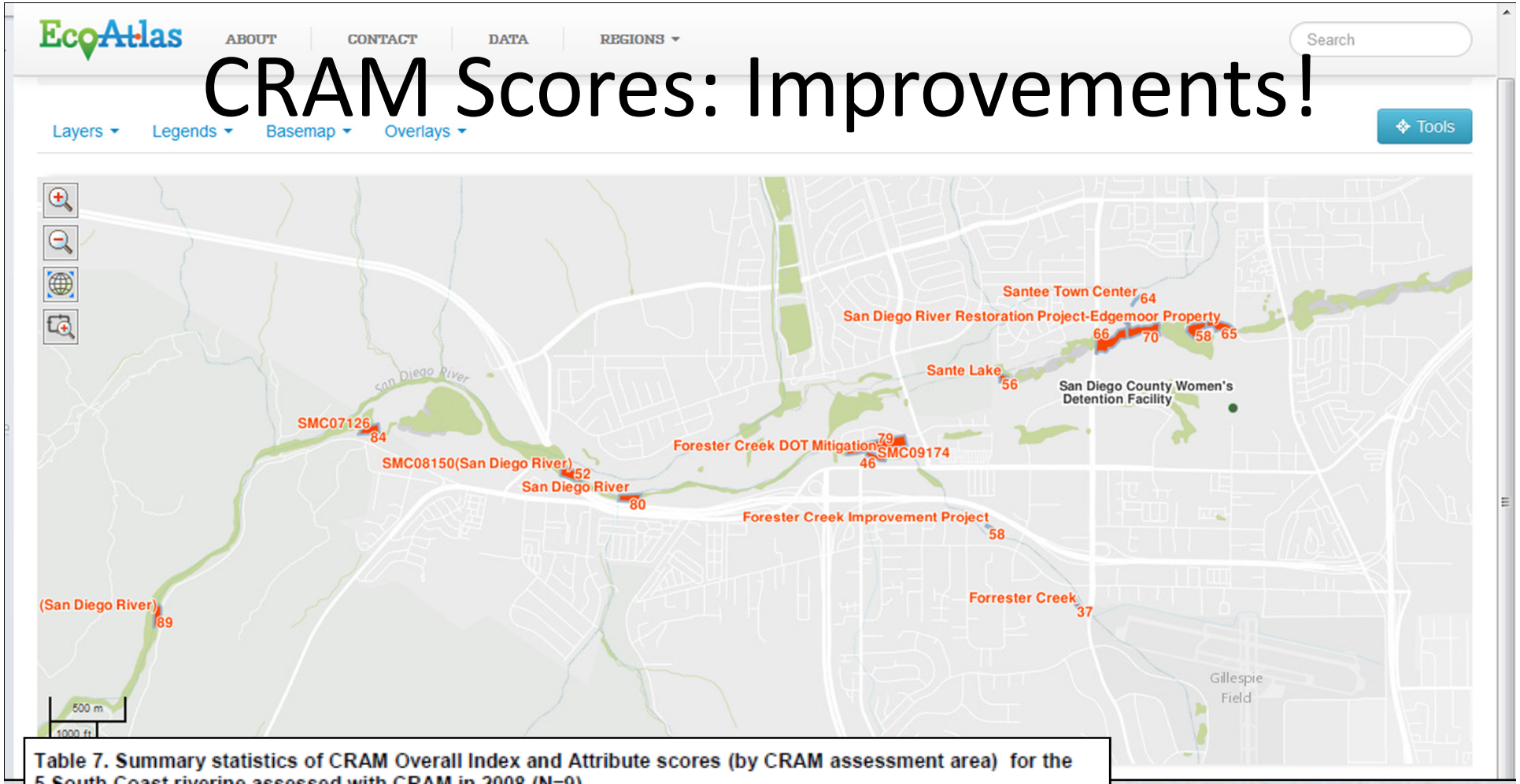


Table 7. Summary statistics of CRAM Overall Index and Attribute scores (by CRAM assessment area) for the 5 South Coast riverine assessed with CRAM in 2008 (N=9).

CRAM Index and Attribute	Mean	Median	SE	SD	Maximum	Minimum
Overall Index Score	73	66	4	11	89	62
Landscape and Buffer Context	73	73	7	20	93	38
Hydrology	67	67	3	8	83	58
Physical Structure	81	88	6	19	100	50
Biotic Structure	73	78	5	15	94	56

*Solek and Stein 2012

CALIFORNIA Water Boards

Healthy Streams Need Healthy Watersheds

- **Improve Water Quality: New Stormwater Permits**
- **Improve Physical Habitat and Diversity:**
  - **Wetland Vegetation (Yes)**
  - **Biology: IBI, Toxicity (Eventually)**

Success?

- Chad Loflen
- 619-521-3370
- chad.loflen@waterboards.ca.gov