Management Applications of SCCWRP's Bioassessment Science

Bioassessment Management Applications are Not New

- Dates back to the early 1970's: "balanced indigenous populations"
  - 301h waiver decisions
  - 419 Power plant entrainment/impingement
- Sediment Quality Objectives
  - One of three lines-of-evidence
- If it were easy, we would be done by now

Benefits and Challenges for Bioassessment Management?

- Bioassesment gets closer to the Beneficial Use than chemistry or toxicity
  - Integrative measurement
- Large diversity adds complexity
  - 100s of species, 1000s of individuals per sample
- Natural variability can confound assessments
  - Differentiating anthropogenic impacts

Recent Management Focus on Stream Bioassessment

- SWRCB started developing a biointegrity policy for streams in 2010
  - Spotlight on stream invertebrates
- Started seriously considering algae in 2015
- Have now combined the Biointegrity and Biostimulatory Plans

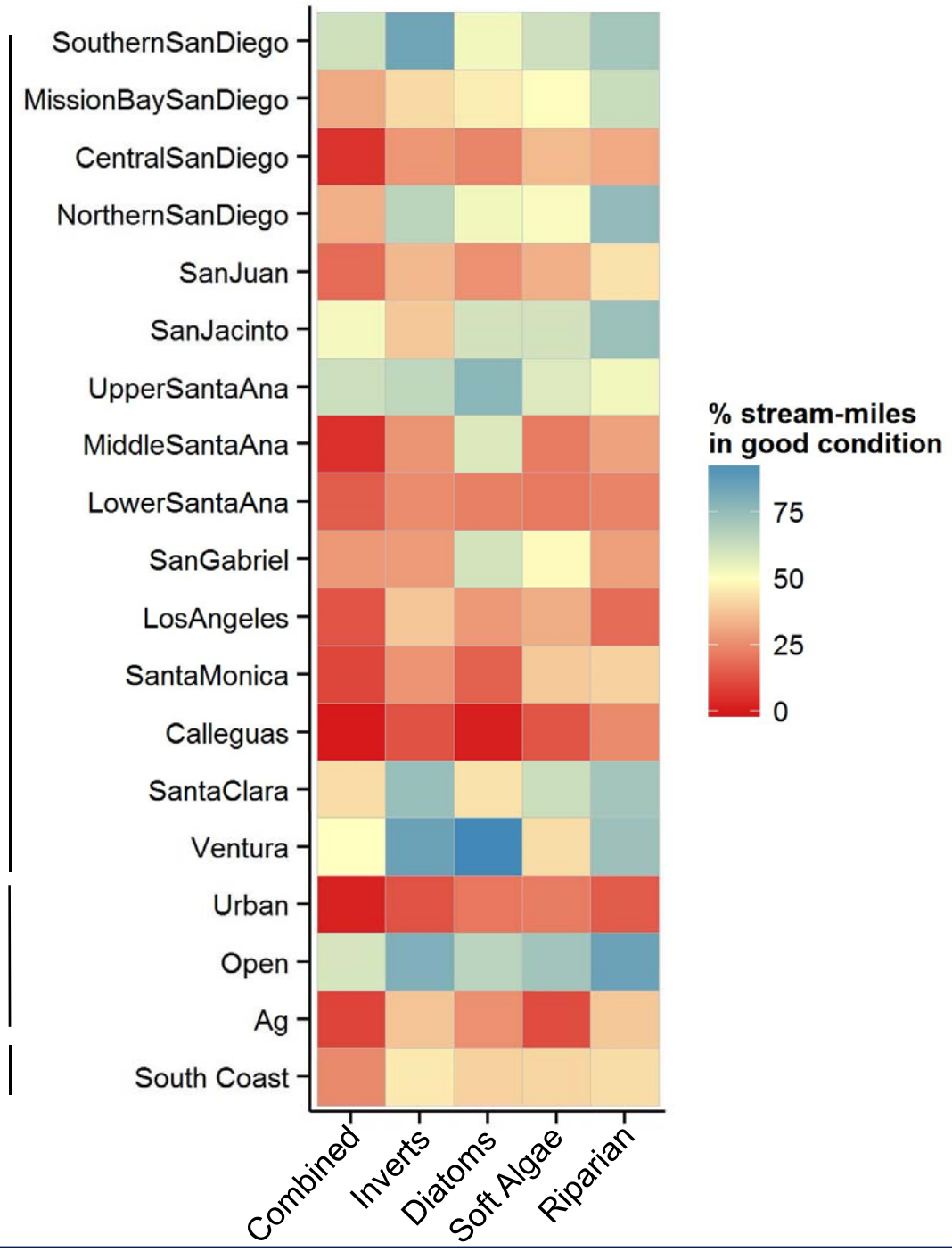
Current Stream Bioassessment Management Applications

- NPDES Permit monitoring requirements
- 303d listing of impaired waterbodies
- Watershed Management Plans
- SWRCB Plans and Policies

Permit Requirements

- 7 of SCCWRP's 8 regulated members have stream bioassessment monitoring requirements
  - Invertebrates, algae, riparian condition, but not fish
- Frequently includes stressors
  - chemistry, flow, physical habitat
- Management concern is building monitoring infrastructure
  - standardized, representative, high quality data

2015 Results From Southern California Regional Stream Monitoring



Stream Monitoring Infrastructure Is Largely Complete

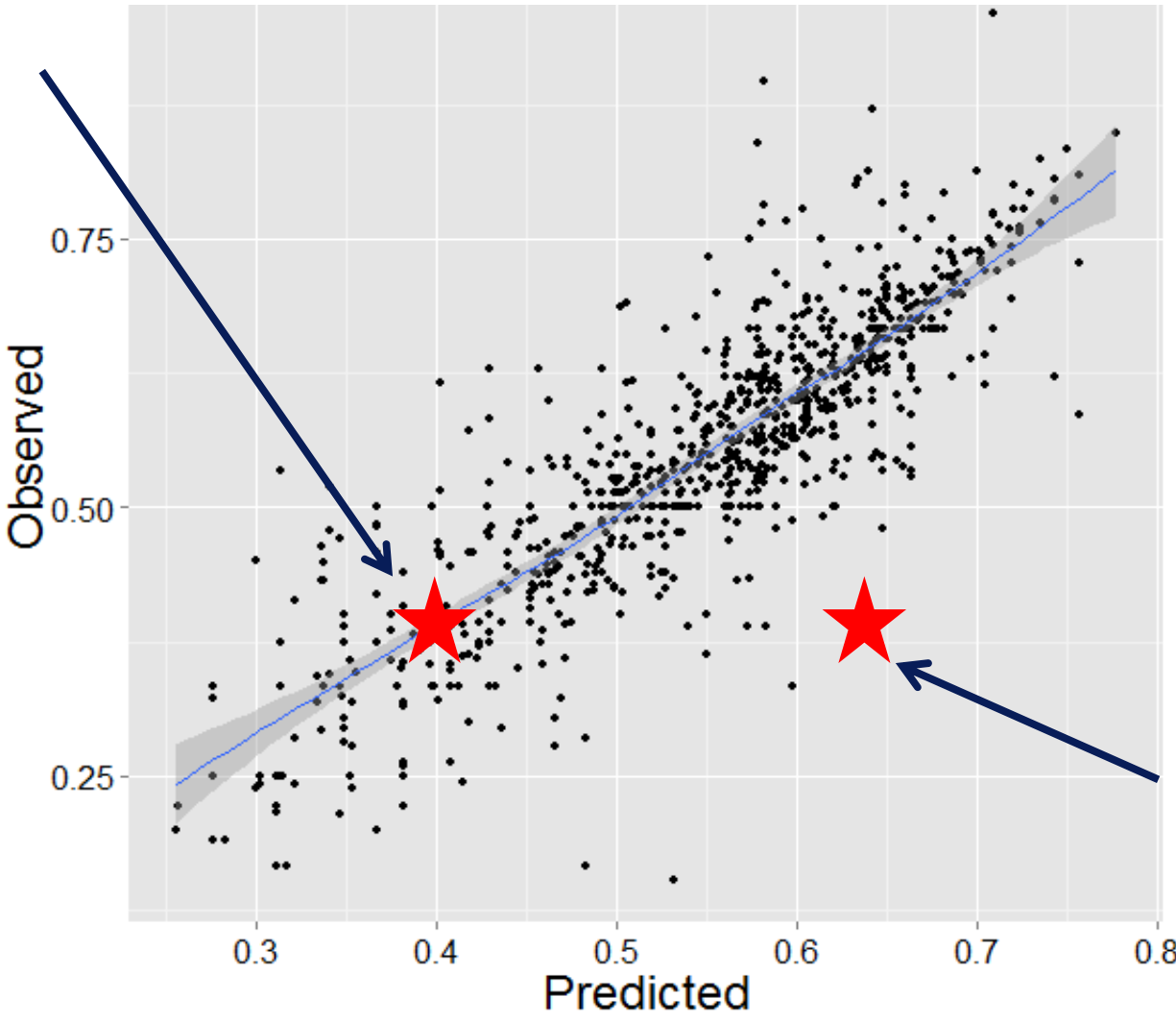
- Field protocols
- Quality Assurance Plans
- Training and auditing
- Data standards
  - Perhaps lacking a good system for storing and sharing data, producing information

Assessment Tools Are Key

- Translates complex biodiversity data into easy-to-understand information
  - Robust, quantitative, repeatable
- Based on biological expectations at reference sites
  - Landscape scale ecological models
- Statewide applicability for equity and site-specificity to account for natural differences
  - California Stream Condition Index (CSCI)
  - Algal Stream Condition Index (ASCI)

Example Biological metric (Percent predators)

30%: Meets expectation



30% Below expectation

Current 303d Listing Policy for Bioassessment

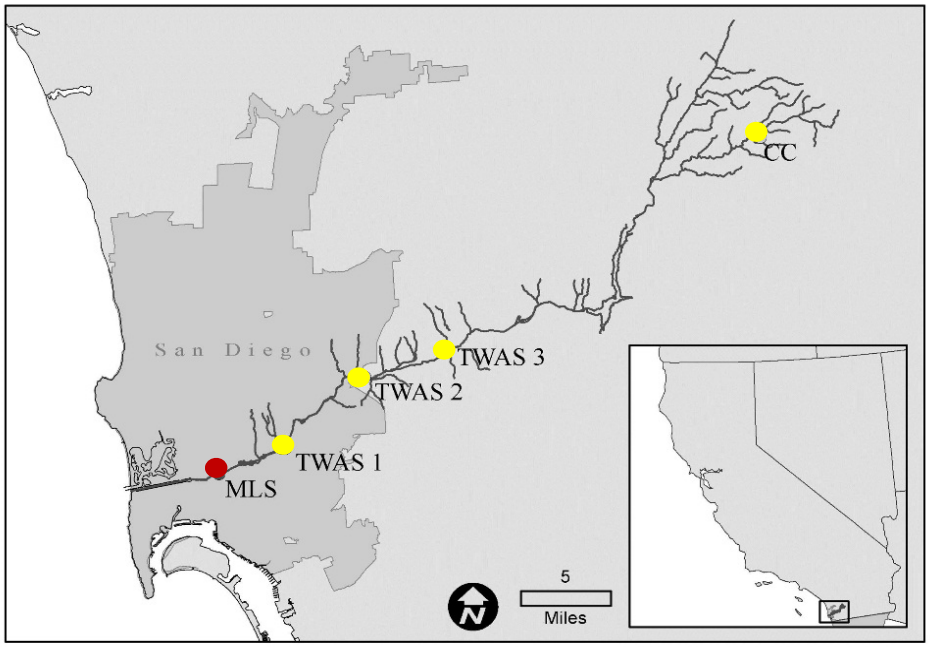
- Uses a chemistry paradigm
  - Cannot list on biology alone
- Causal assessment becomes the fulcrum
  - Causal assessment before or after listing?
- Management concerns revolve around two topics
  - Challenge of delisting
  - Ability to achieve TMDL compliance

303d listed Waterbodies for Bioassessment in Streams

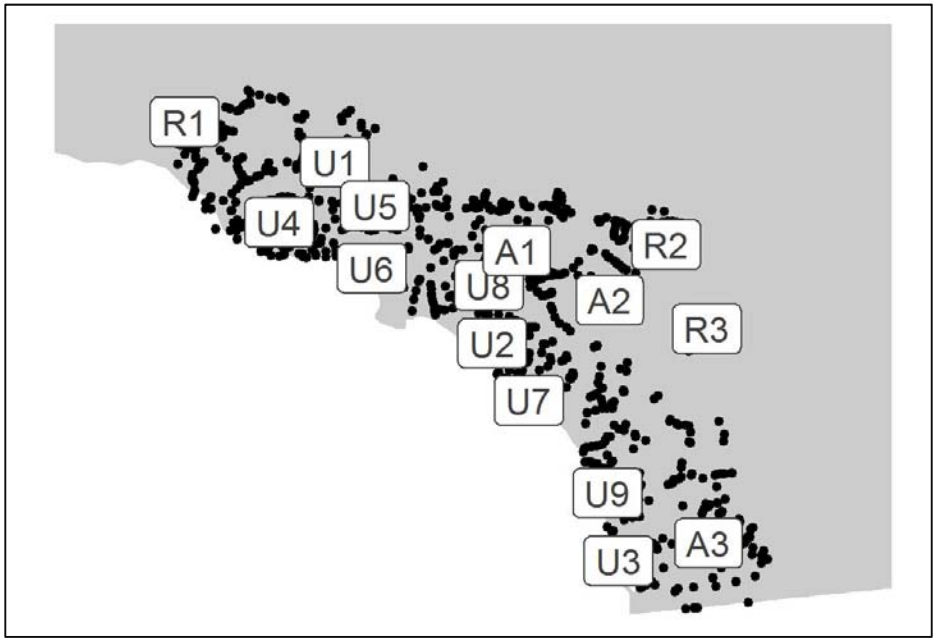
Regional Board	Current (2012) 303d List	Draft (2017) 303d List
Los Angeles	3	26
Santa Ana	0	4
San Diego	0	18

Causal Assessment

- What is causing the biology scores to be so low?
- We've evaluated the EPA toolkit (CADDIS)
  - It's not perfect
- So Cal has the regional data to build an improved toolkit
  - Screening tools to make it faster, more quantitative

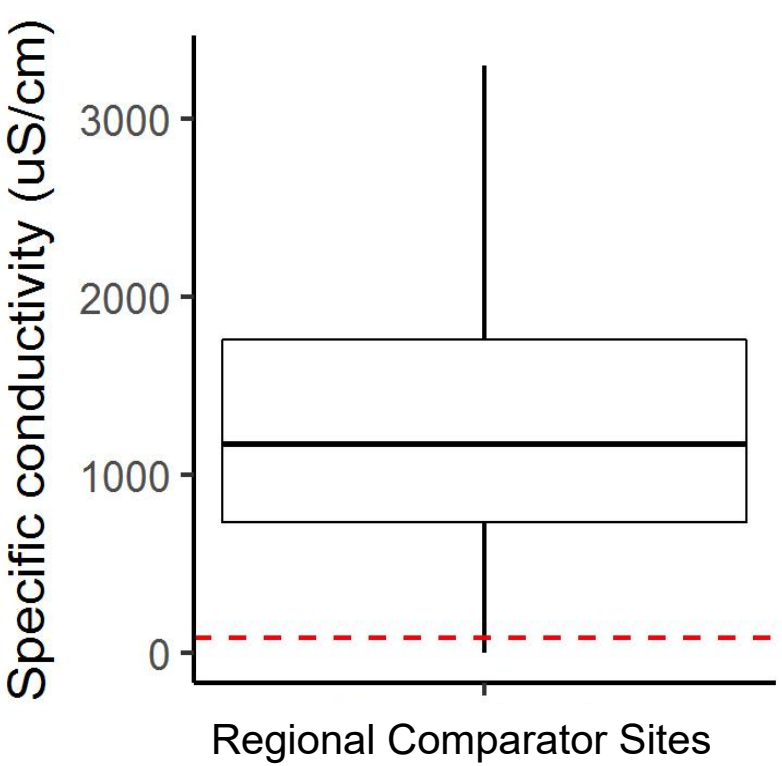


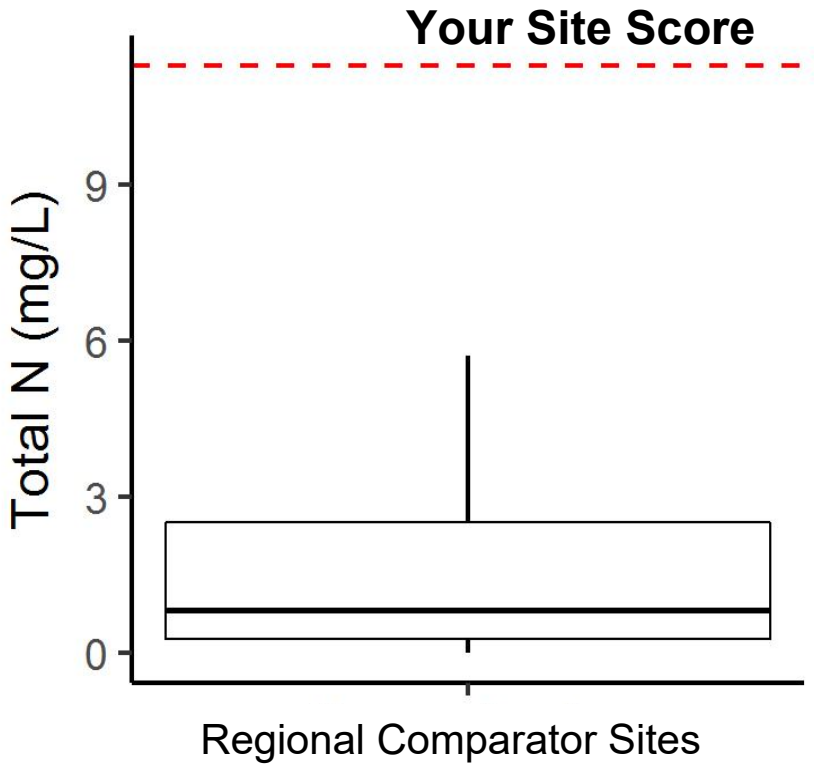
Traditional EPA Comparators (N=4)



Southern California Regional Comparators (N=200)

Screening Causal Assessment





Site: SMCXXYY

Condition Assessment

CSCI – 0.4
Expected range (0.39 – 0.63)
H20 – 32
Expected range (28 – 50)

Rapid Screening Bioassessment Dashboard

Causal Assessment

Stressor Class	Overall	BMI	Algae
Habitat		0/3/2	1/3/1
Eutrophication		4/1/0	4/1/0
Flow		4/1/0	0/2/3
Water Chemistry		0/1/5	4/1/1
Sediment Chemistry		0/0/6	0/1/5
Invasives		0/1/3	NA
Organic Matter		0/0/0	0/0/0

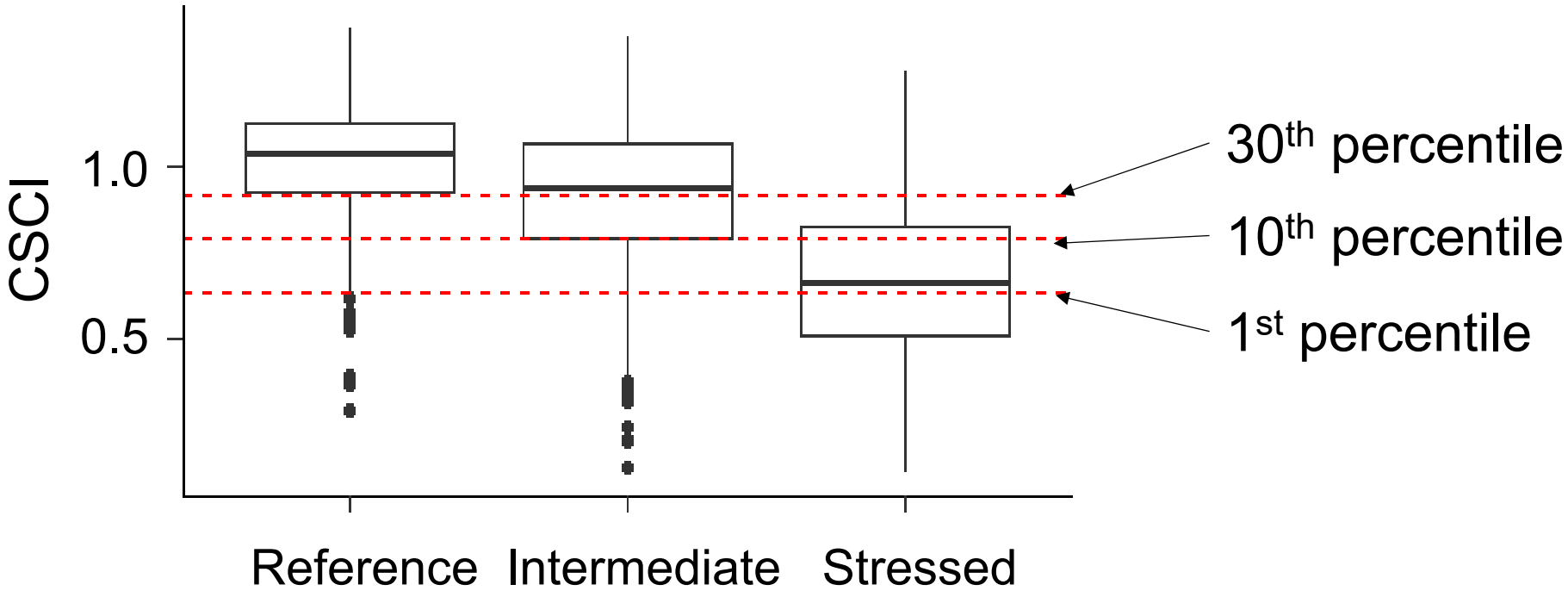
Likely Cause
Indeterminate Cause
Unlikely Cause

LOE summary: # of likely/# of indeterminate/# of unlikely

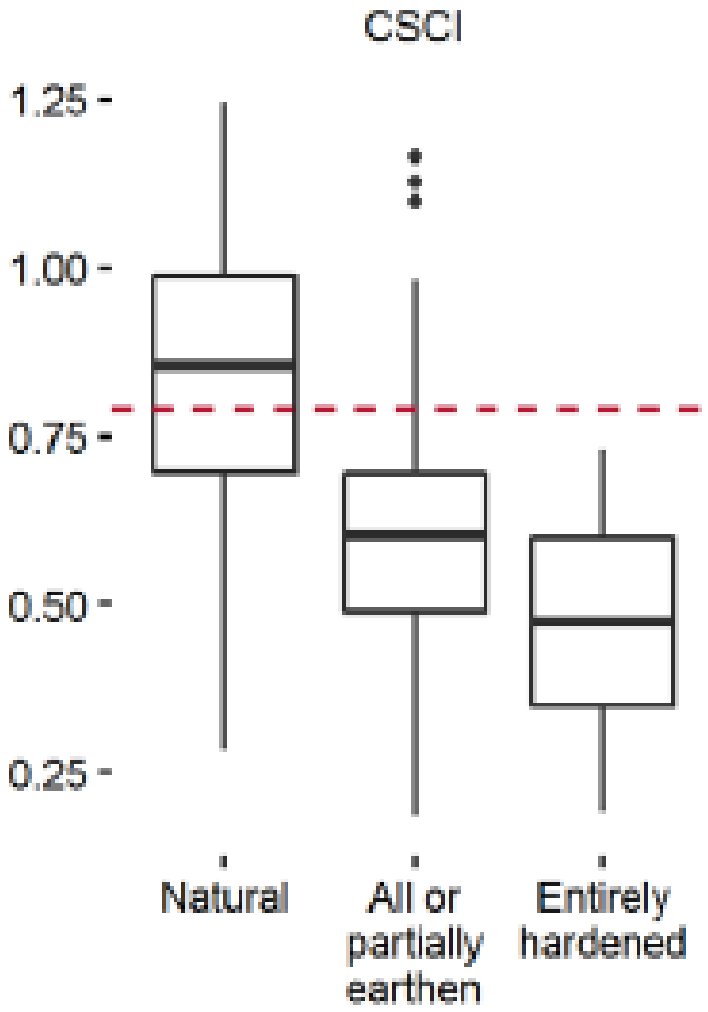
303d Listing Concerns – Modified Systems

- **What is an appropriate biological expectation** [CSCI score] **for modified systems?**
- **Current** [non-regulatory] **thresholds are based on undeveloped reference streams**
- **It is clear that modified systems may never reach reference like levels**
  - **Restoration investments**
  - **Use attainability analysis**

Choosing a Threshold is Not Entirely Technical



Index Scores in Modified Systems



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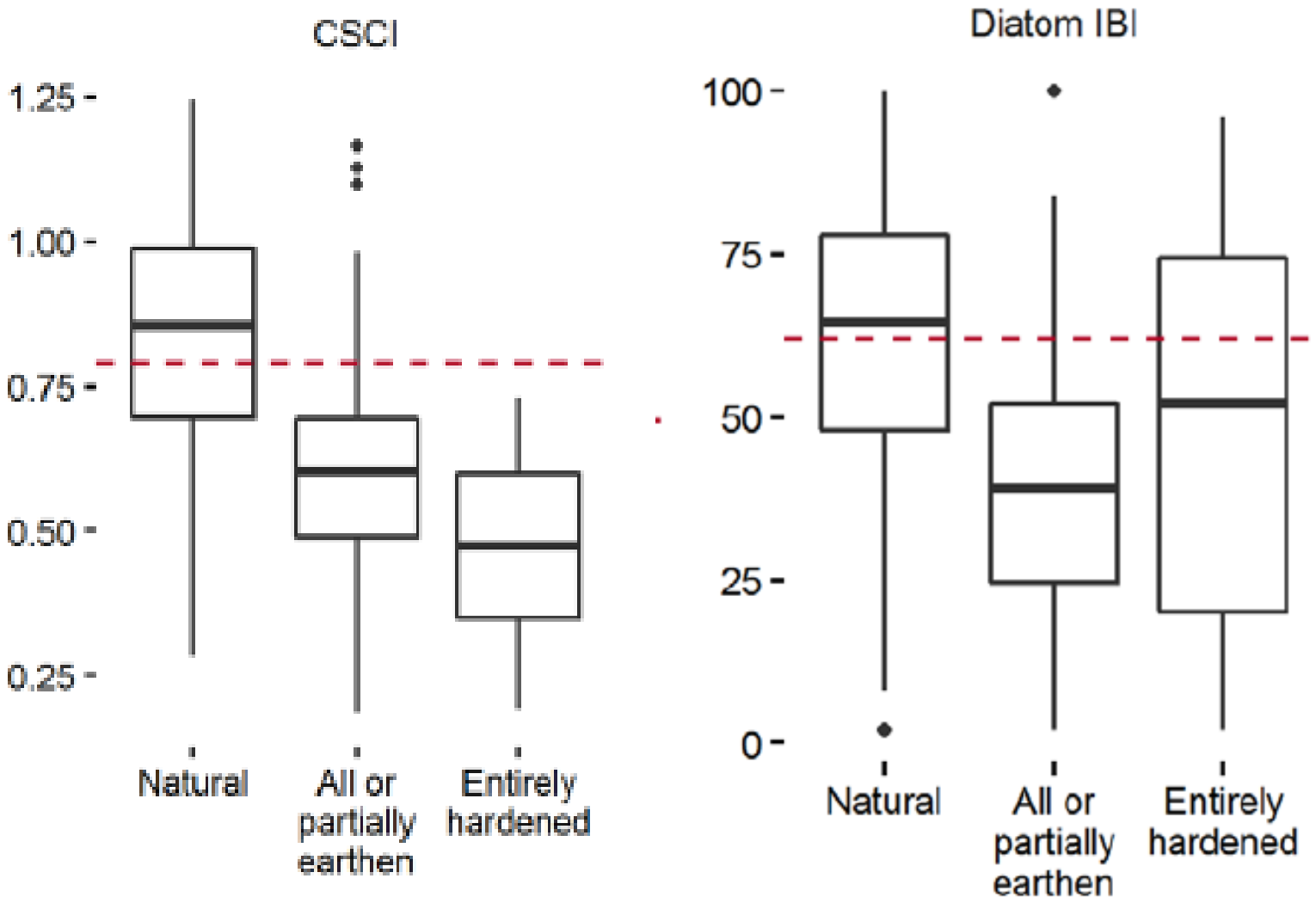

Management Challenges Outnumber Technical in Modified Systems

- Choose a regulatory approach
  - Tiered Aquatic Life Use (TALU) and tiered objectives
  - Antidegradation
- Prioritizing future restoration efforts
  - Focus on really poor sites
  - Fair sites that are just below the threshold

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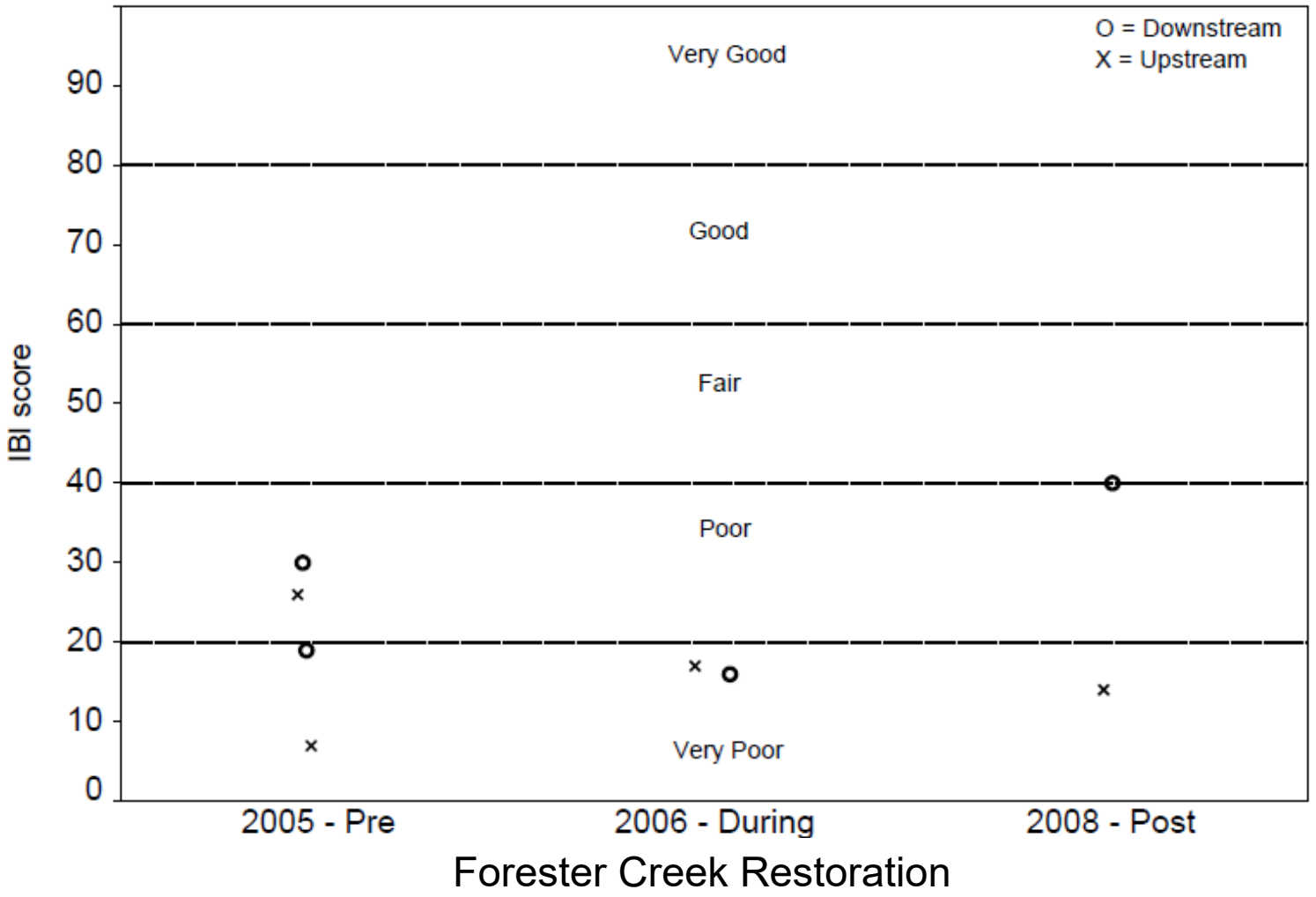
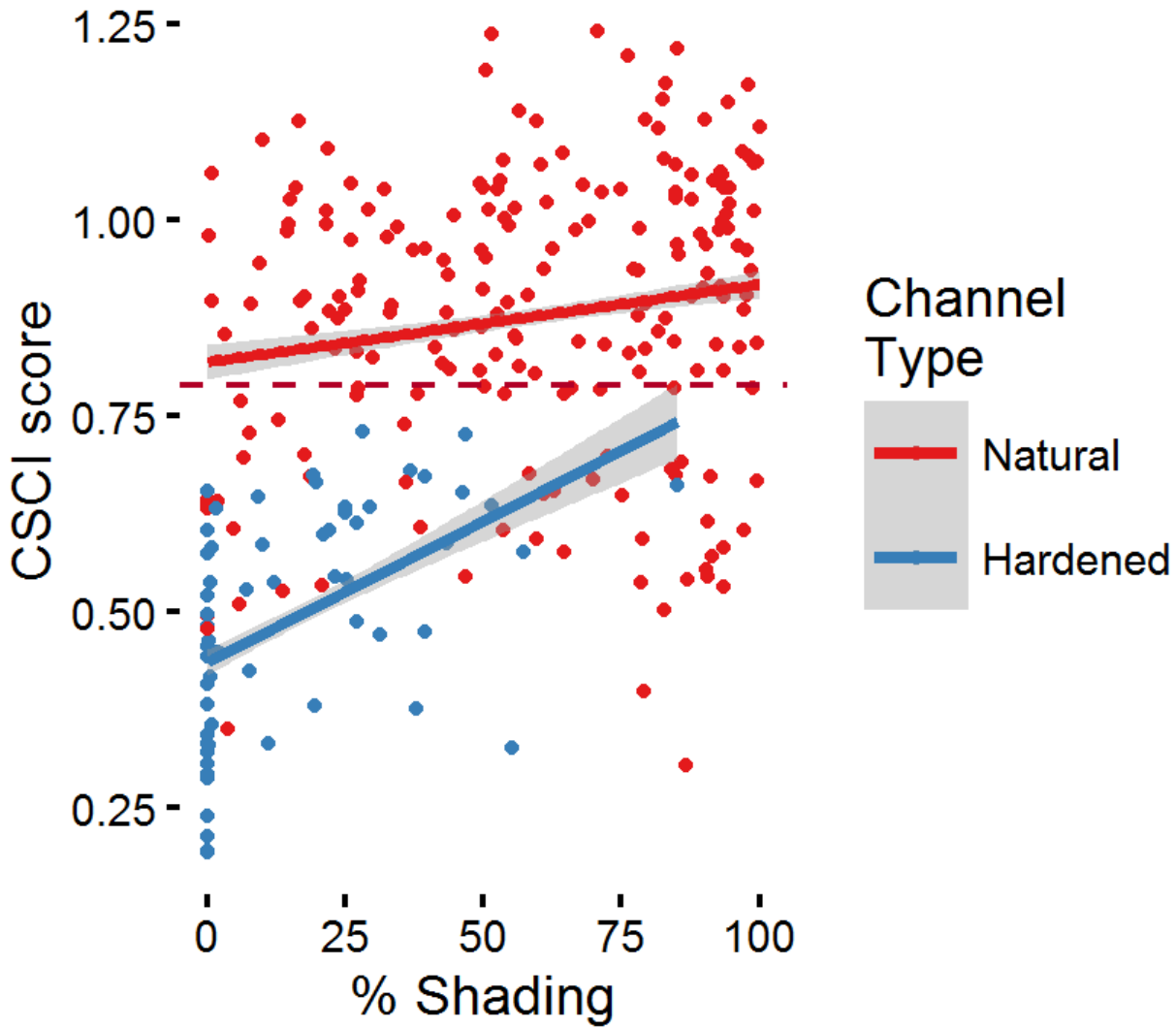
Watershed Management Plans

- Watershed Plans beginning to use biology as success metrics
  - Malibu Creek for nutrients and suspended sediment
  - Rainbow Creek and Santa Margarita River for nutrient concentrations
  - San Juan Creek for flow alteration
- San Diego RWQCB has made stream restoration a key element of their long-term vision
- Management concerns focus on ability to succeed
  - Independent applicability
  - Uncertain how local vs watershed activities influence stream biology

There's Limited Empirical Data for Restoration Effectiveness

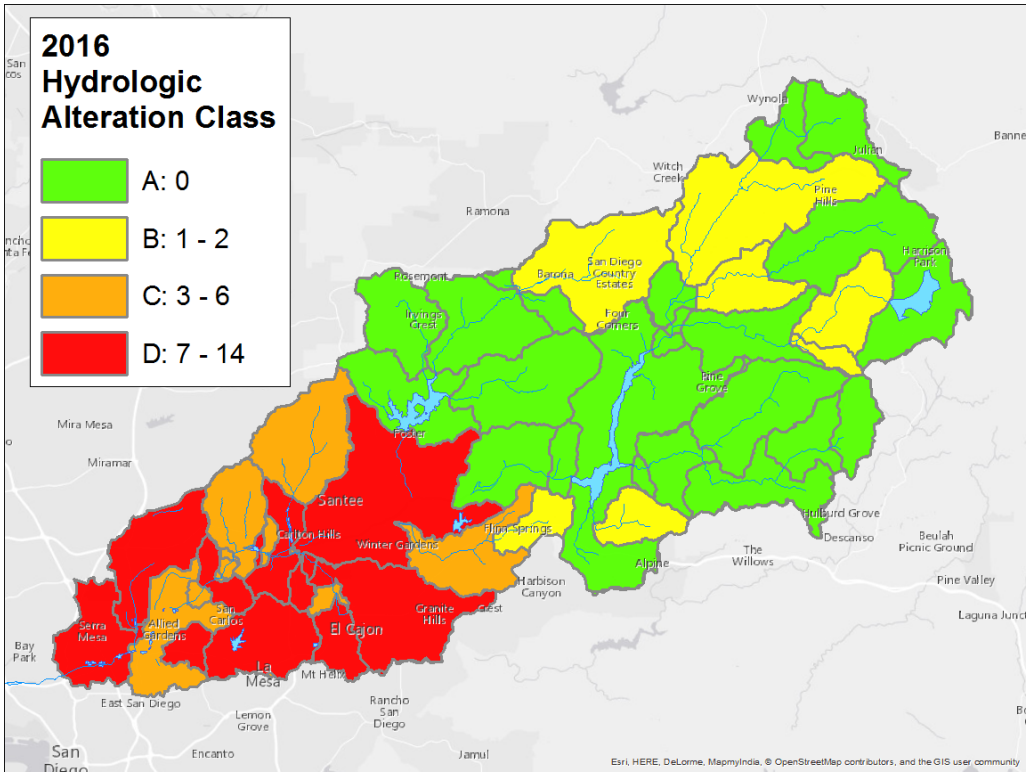


Predicting Response to Management Actions

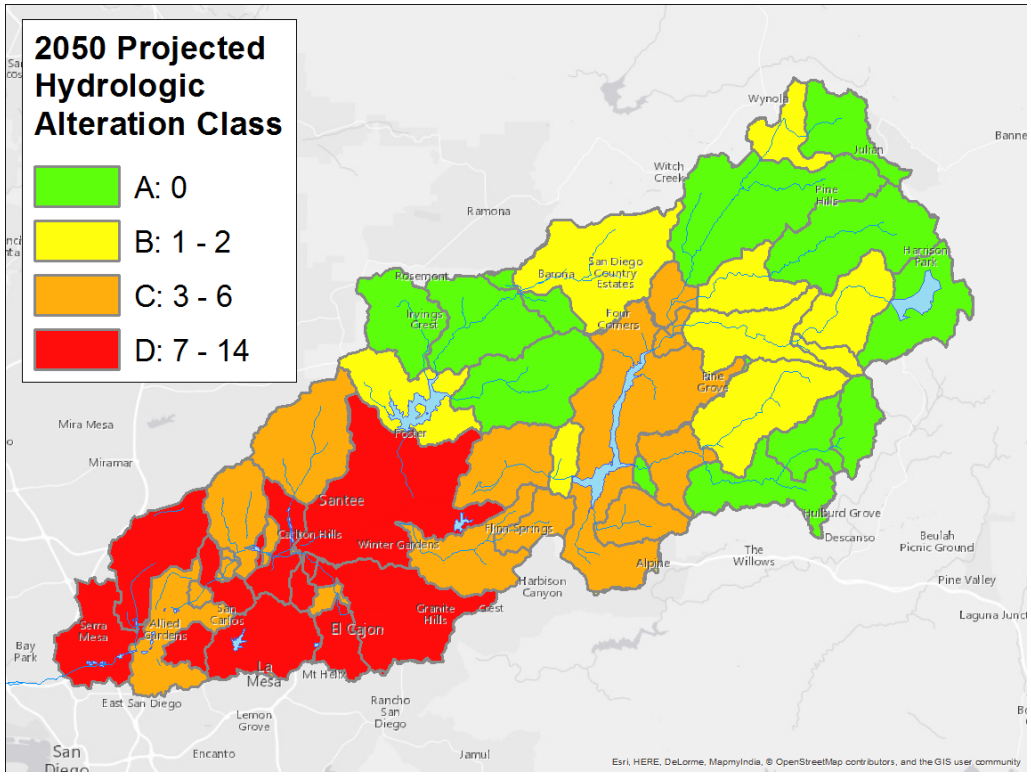


Mapping Vulnerability to Future Growth

Flow ecology in the San Diego River



Current



2050

SWRCB Combined Biointegrity and Biostimulatory Plan

- Established three goals for updating the Inland Surface Water Plan for bioassessment
- Protect high quality streams
- Restore degraded streams
- Utilize numeric guidance

Tentative SWRCB Schedule

Task	Example Product	Target Dates
Project Initiation	Focus groups, Regulatory and Stakeholder Advisory Groups, CEQA	Nov 2017
Staff Report	Draft Biostimulatory Substances/Biological Integrity Amendment language	Winter 2018
Public Hearing	Public Hearing to receive oral comments	Summer 2019
Board Adoption	Board meeting to consider adoption	Winter 2019