Water Quality Conditions in the San Diego and San Mateo Watersheds

Chad Loflen and Betty Fetscher

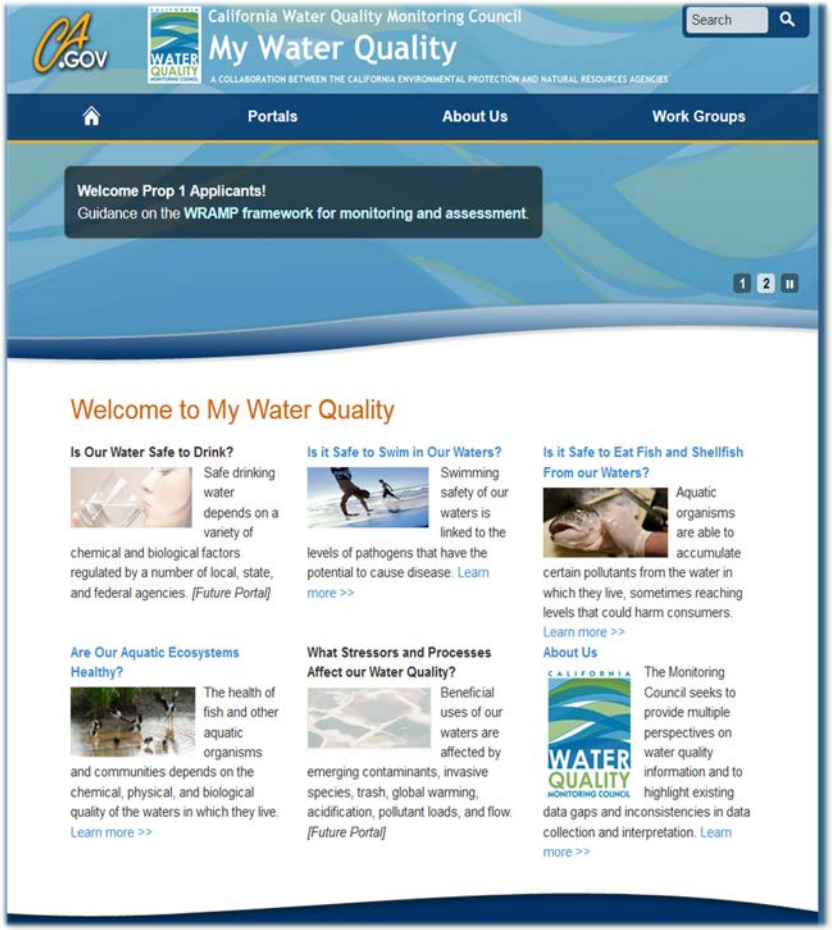
Overview

- Practical Vision and Monitoring Framework
- Primer on Biological Endpoints
- San Diego River Watershed
  - Ecosystem Health
  - Fish Tissue
- San Mateo River Watershed
  - Ecosystem Health

Practical Vision:
Monitoring & Assessment

To be strategic and effective in carrying out its mission of protecting and restoring the health of waters in the San Diego Region, the San Diego Water Board needs information that cannot be produced without appropriate monitoring and assessment

Core Beneficial Uses



Is Our Water Safe to Drink?

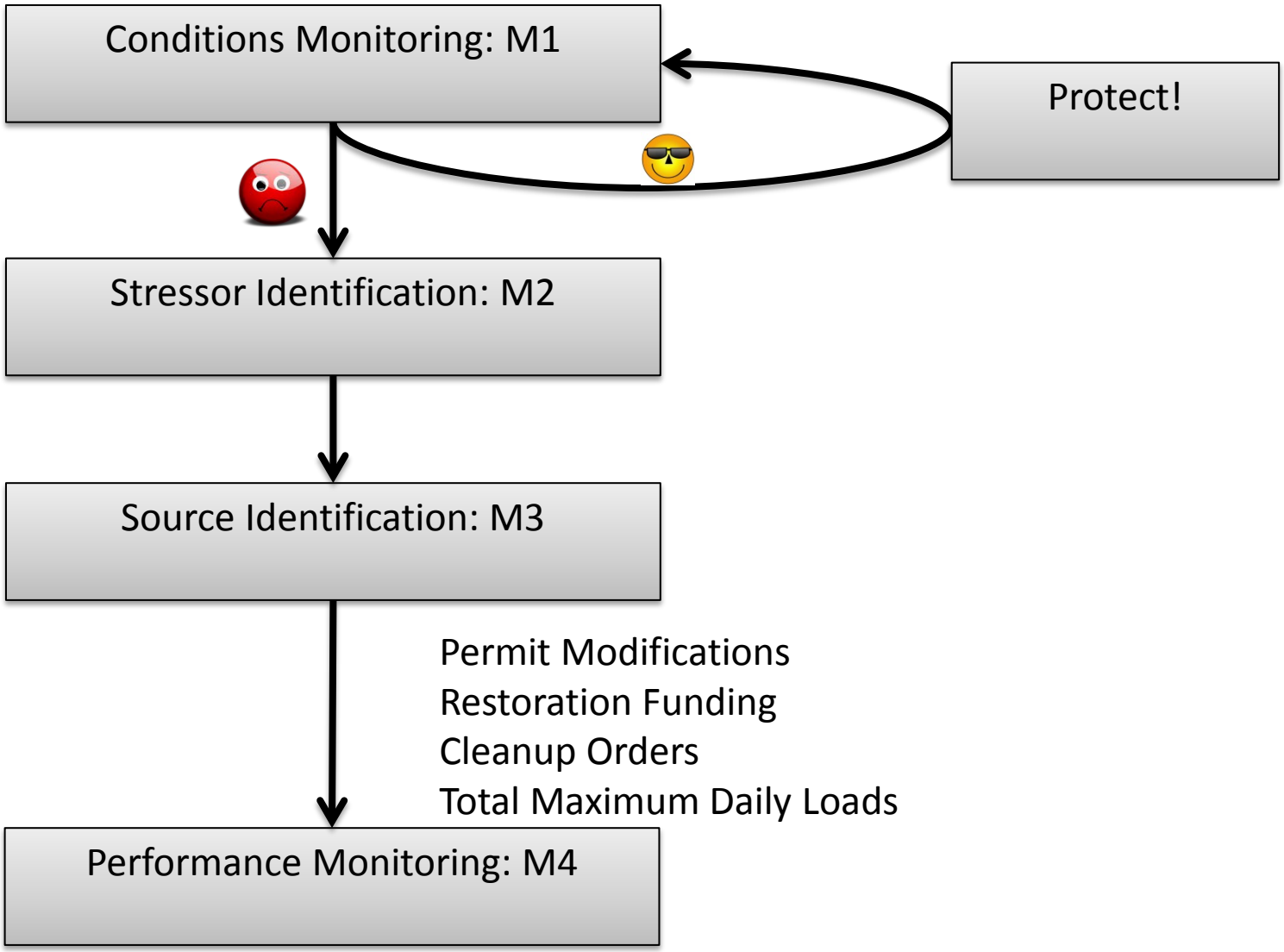
Is it Safe to Swim in Our Waters?

Is it Safe to Eat Fish and Shellfish?

Are Our Aquatic Ecosystems Healthy?

http://www.mywaterquality.ca.gov/index.html

Monitoring Framework




Are Habitats and Ecosystems Healthy?
Are Fish and Shellfish Safe to Eat?
Grab Samples?
STATE OF CALIFORNIA
SAN DIEGO REGION
REGIONAL WATER QUALITY CONTROL BOARD

Primer on Ecological Assessment Tools

Biological endpoints are *essential* to holistic assessment of water body condition:

- Provide direct evidence of aquatic life status
- Respond to many chemical stressors (including unanticipated ones)…help with diagnosis
- Incorporate measures of non-chemical stresses (e.g., fine sediments, hydromodification, invasive species)
- Integrate impacts over time/space (unlike water-chemistry grabs)

Primer on Ecological Assessment Tools

Complementary tools have been developed for assessing several classes of biological indicator in streams/wetlands in California:

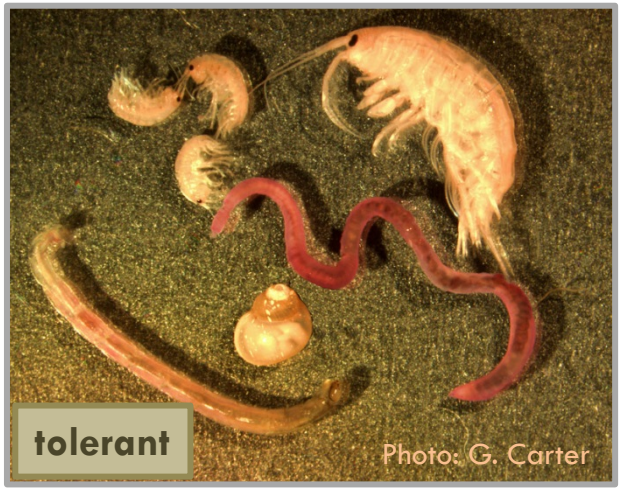
1. **benthic macroinvertebrate** community composition
   - "BMIs"/"bugs"; includes insects, snails, crustaceans
2. **benthic algae** community composition
   - diatoms
   - non-diatom ("soft") algae

   who's present reveals information about condition

3. **wetland habitat condition**
   - California Rapid Assessment Method (CRAM)

Benthic Macroinvertebrates ("bugs")

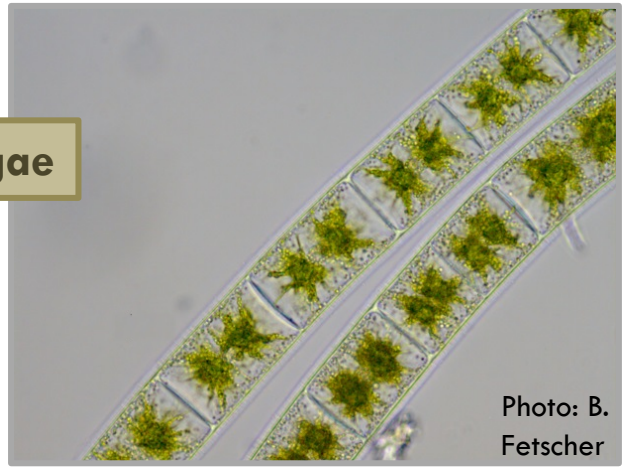
- most widely used freshwater bioindicator worldwide
- intermediate trophic level (1° & 2°)
- highly responsive to instream habitat quality, flows, dissolved oxygen, sedimentation
- California Stream Condition Index (Mazor *et al.* 2016)

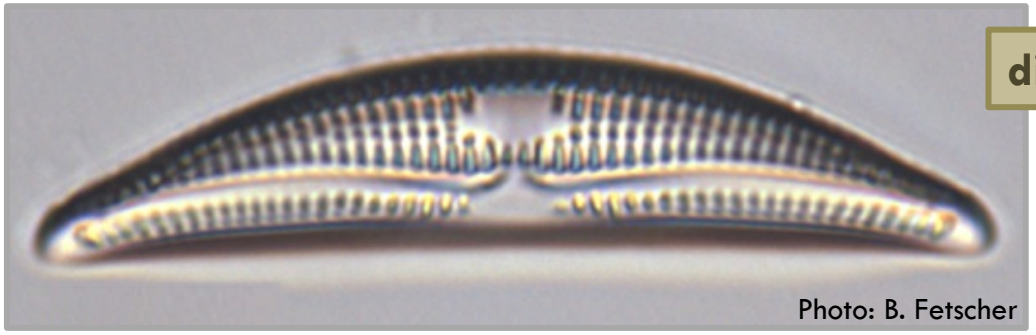


Benthic Algae

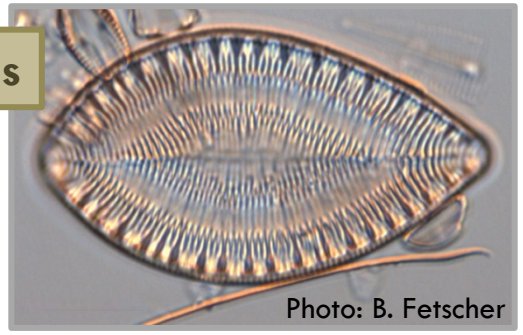
- primary producers
- highly responsive to water quality (esp. nutrients)
- community composition can shift quickly
- relatively unconstrained by microhabitats
- Indices of Biotic Integrity (Fetscher *et al.* 2014)

soft algae





diatoms



California Rapid Assessment Method (CRAM)

(L2 Committee/CWMW, 2013)

Wetland Condition

Landscape

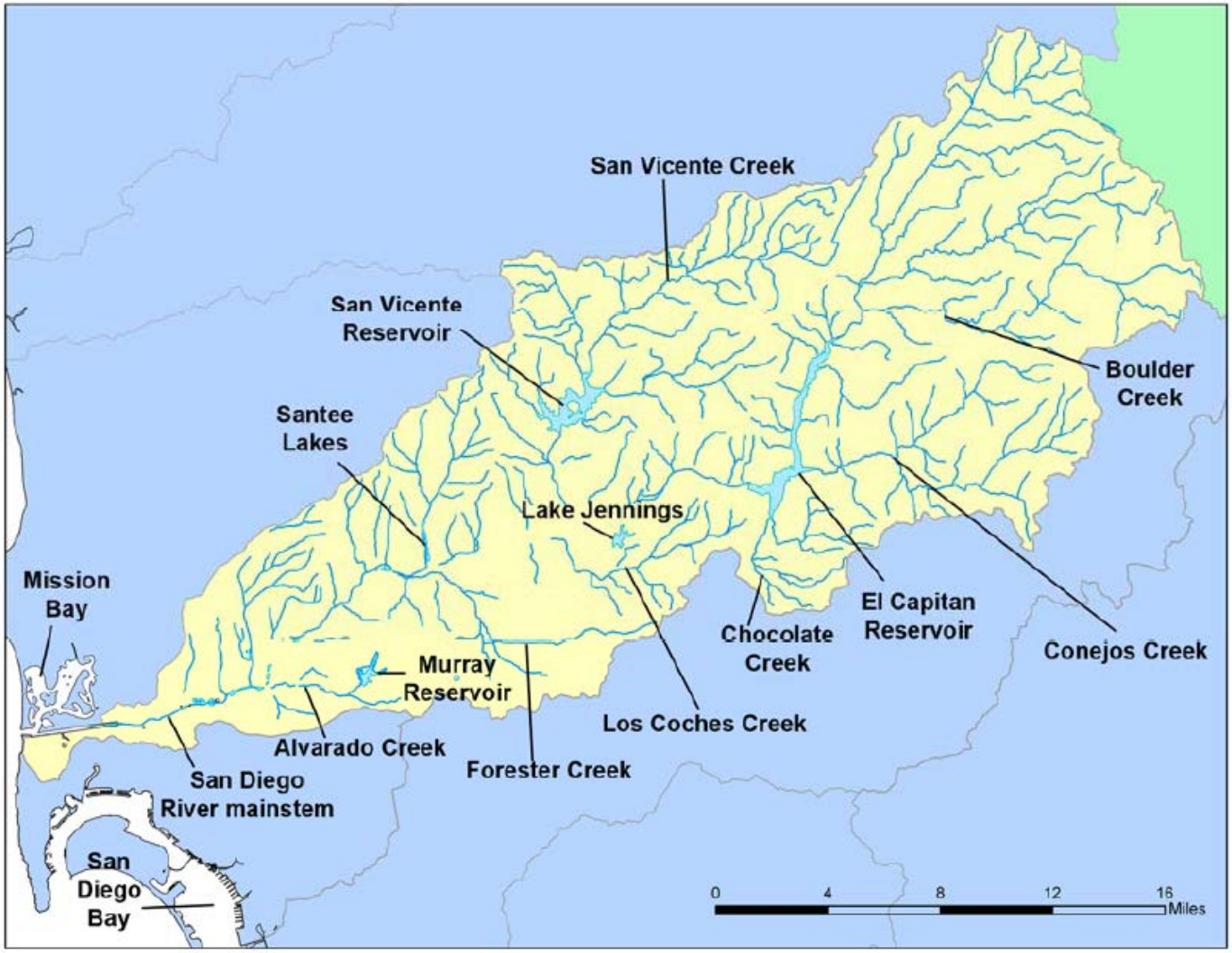
Hydrology

Physical Structure

Biotic Structure

Stressor Check List

San Diego River Watershed

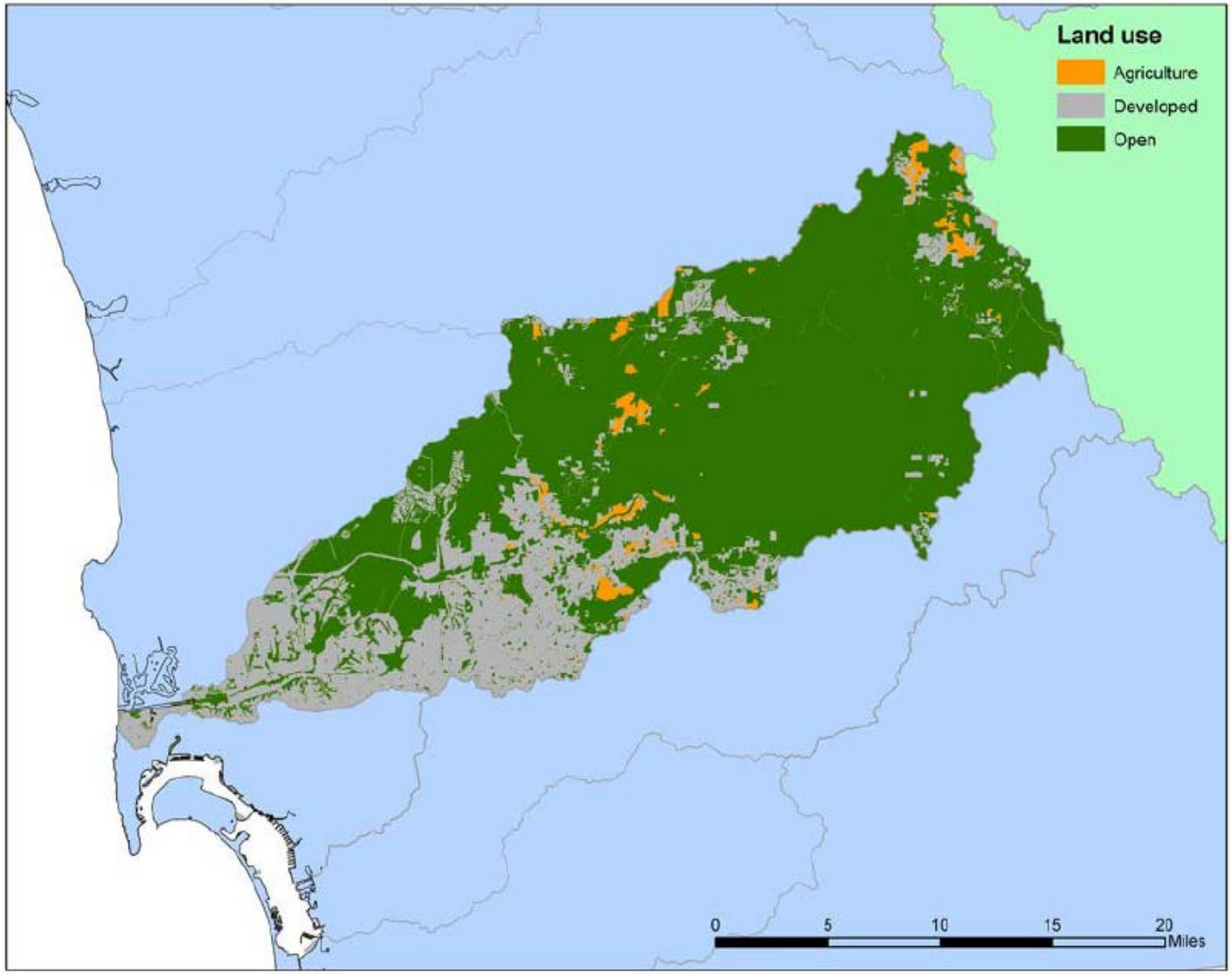


440 Square Miles

3 Major Surface Water Reservoirs

Cuyamaca Peak = 6512 feet

San Diego River Watershed



Cities:
-San Diego
-La Mesa
-Santee
-El Cajon

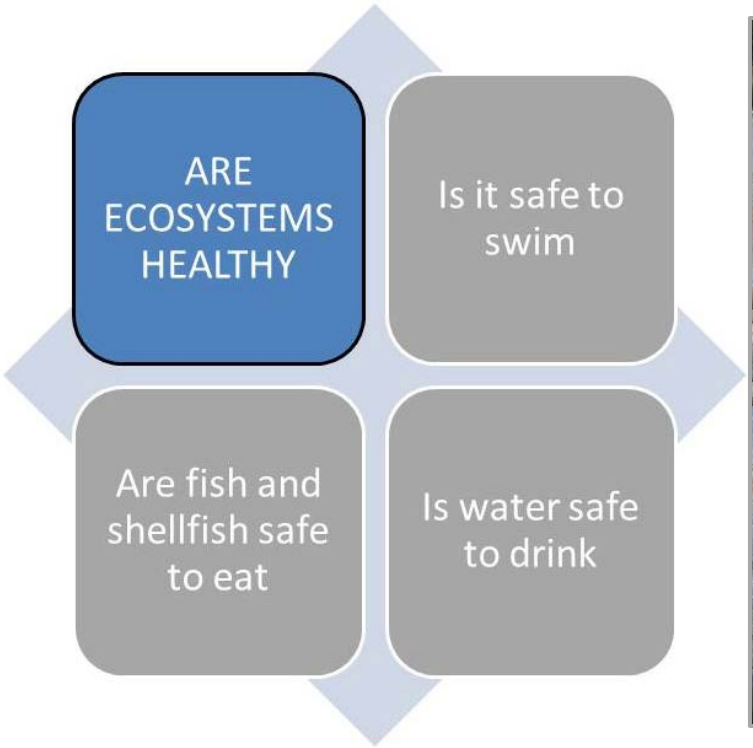
County of San Diego
-Alpine
-Lakeside
-Julian

Barona
Capitan Grande
Inaja & Cosmit

Cleveland National Forest

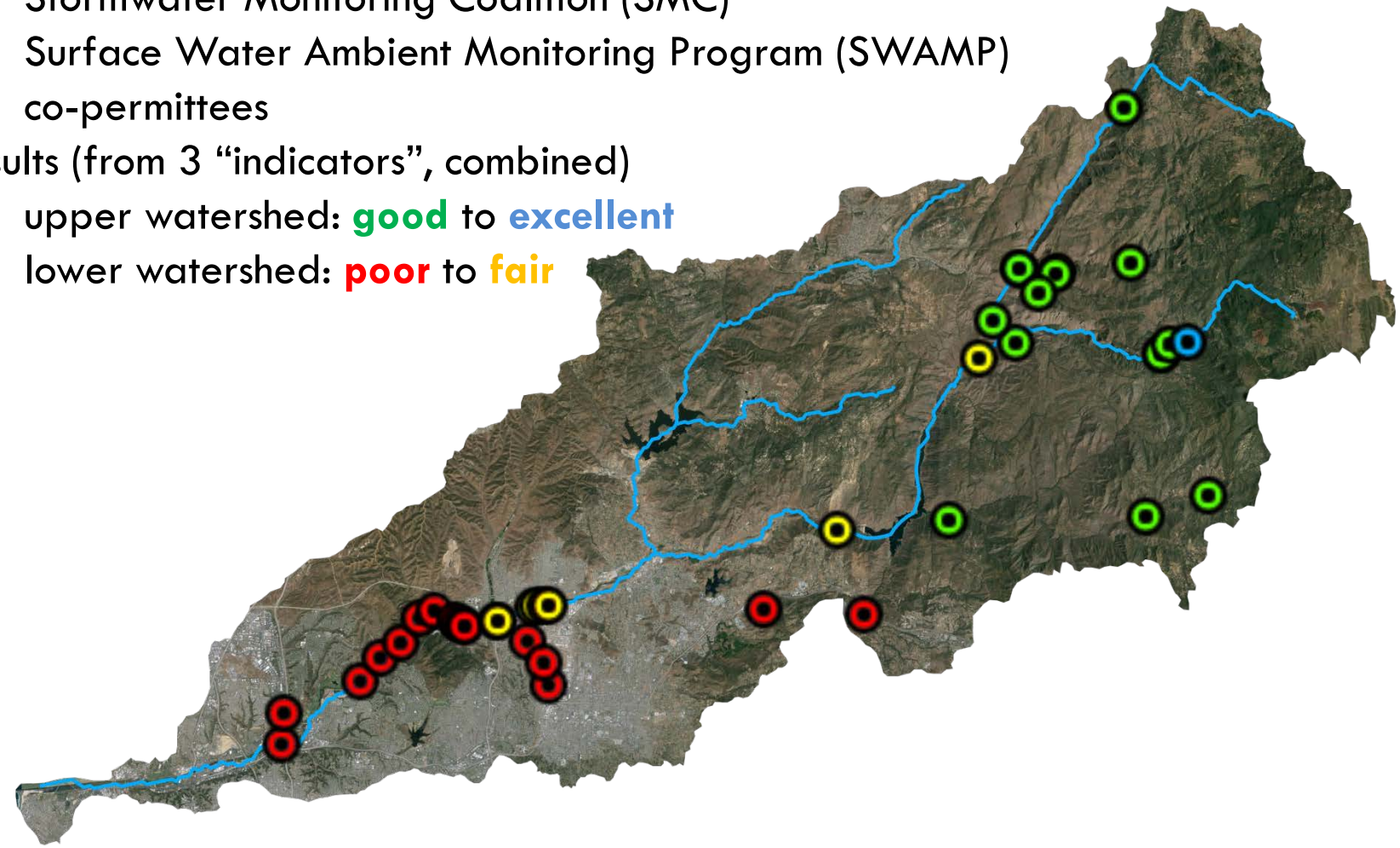
Cuyamaca Rancho State Park

Assessing the Ecological Health of the San Diego River Watershed

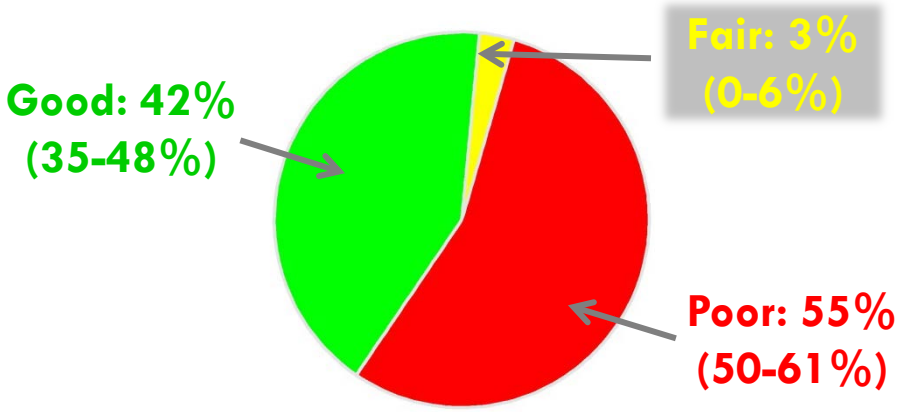


Assessment Overview

- N = 40 sampling stations
- *Ecological* data sources:
  - Stormwater Monitoring Coalition (SMC)
  - Surface Water Ambient Monitoring Program (SWAMP)
  - co-permittees
- Results (from 3 "indicators", combined)
  - upper watershed: **good** to **excellent**
  - lower watershed: **poor** to **fair**



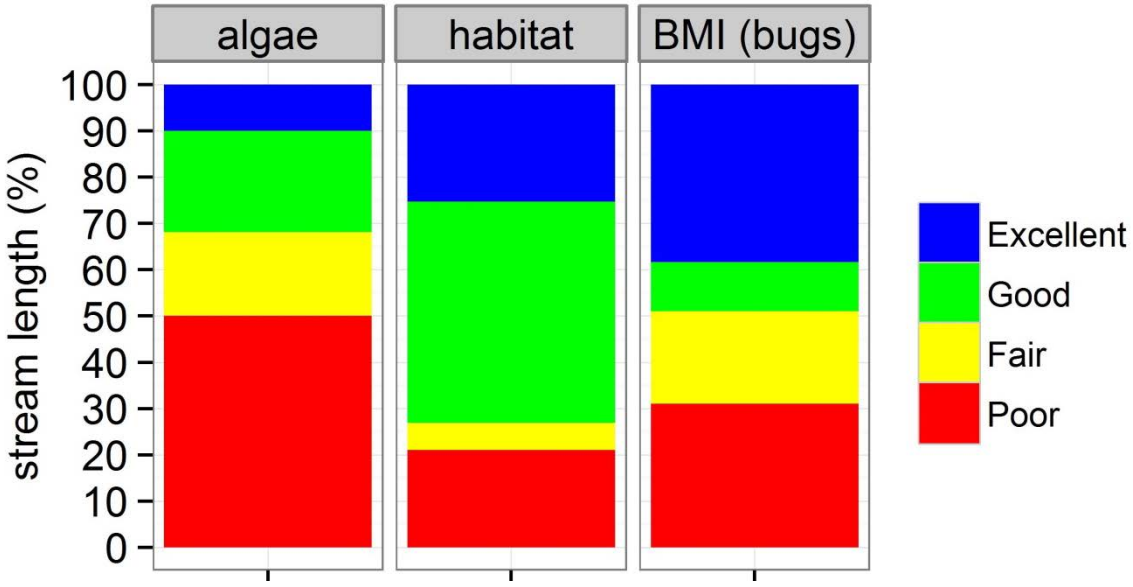
Estimated Stream Ecological Condition *Throughout* Watershed



- subset of sampling stations (N=25) part of a "*probability survey*" (yields condition estimate for overall watershed)
- nearly ½ of aggregate stream length is in *fair or better* condition
- decent sample size → ~narrow 95% confidence intervals

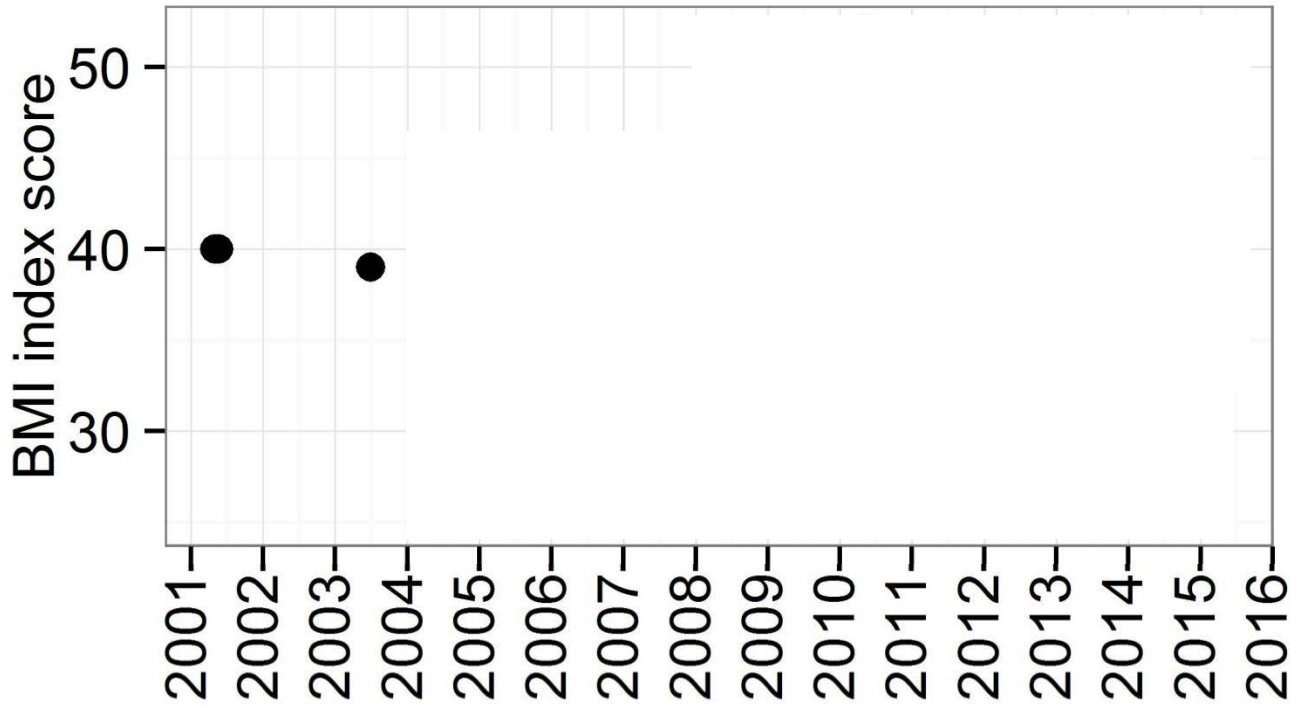
What Story Do Individual Indicators Tell?

- lowest condition scores via "lens" of algae
- highest based on bugs and habitat
- differential responses provide 1st step to inferring stressors



Trends in Ecological Condition Over Time

e.g., bugs provide evidence for Boulder Cr. recovery from Cedar fire



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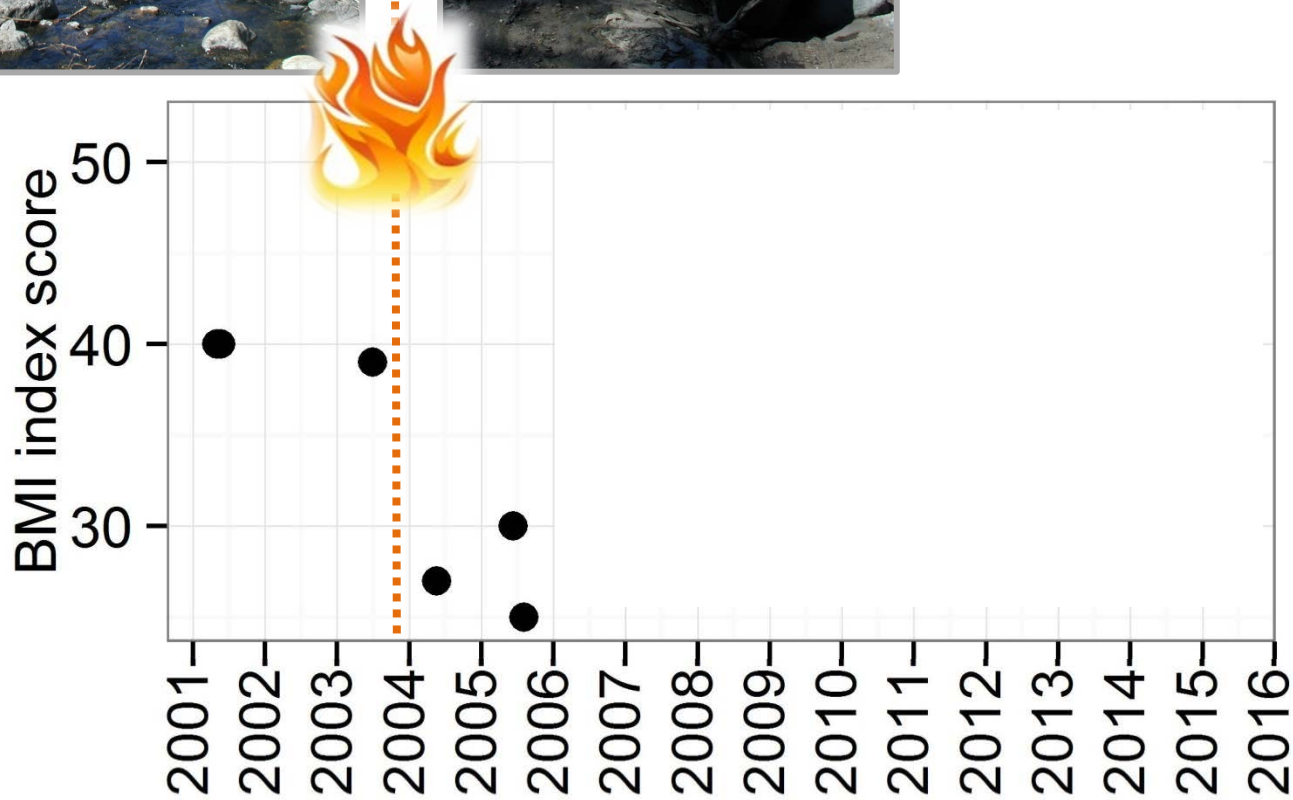

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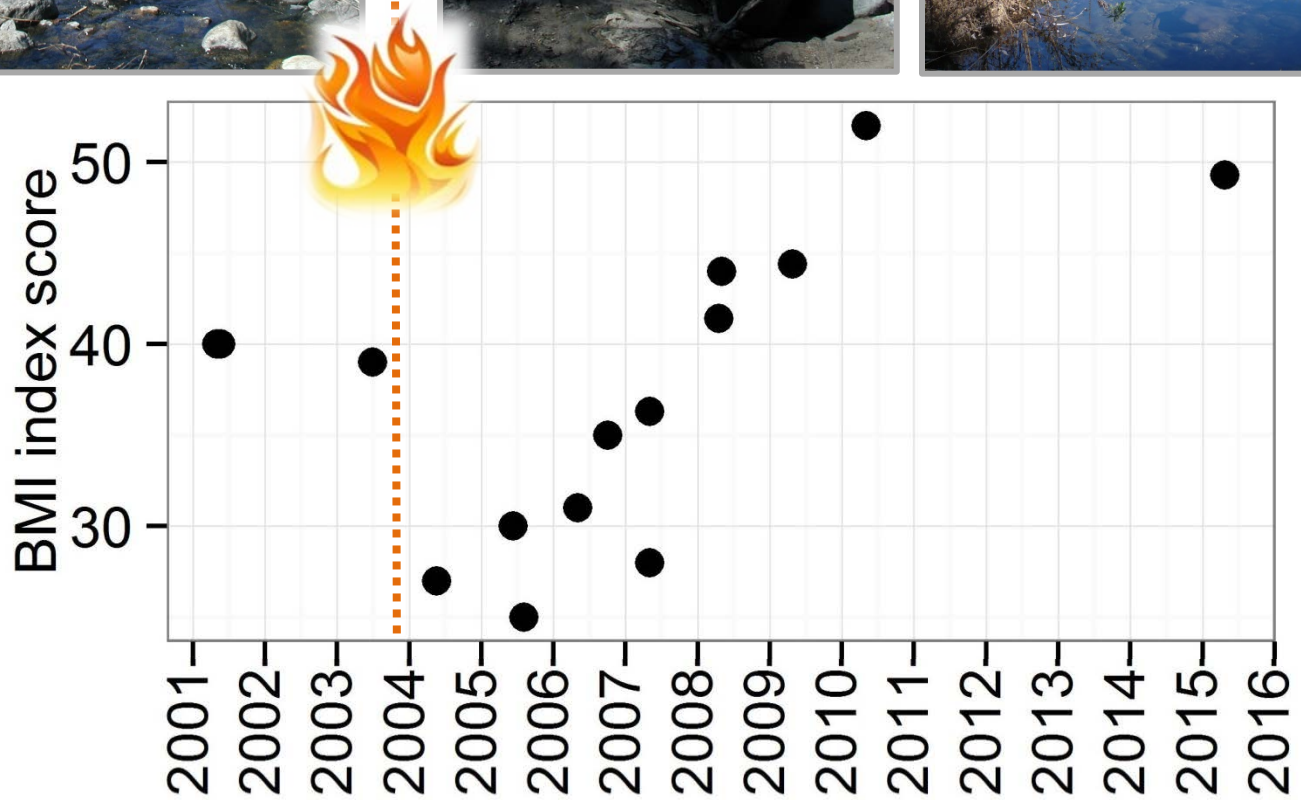
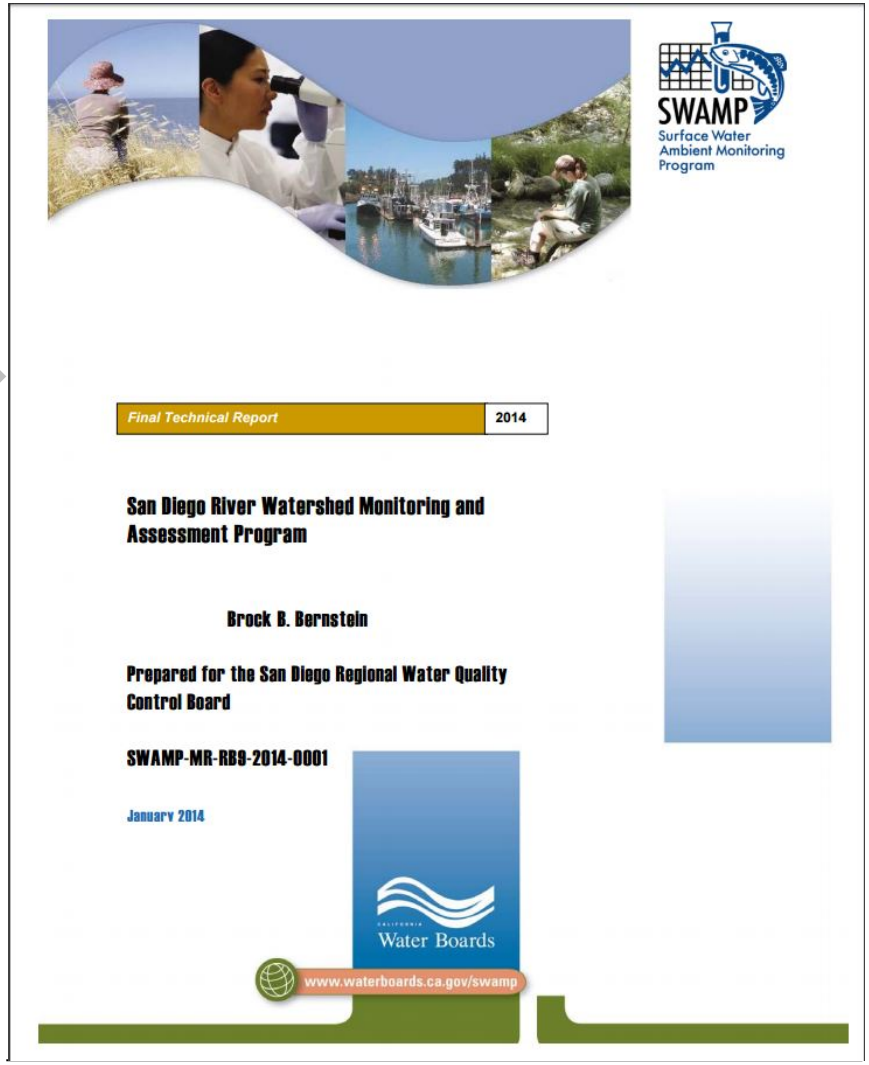
Photos: SWAMP



Next Steps for San Diego River Watershed

- Can use as foundation for working through M1→ M4 of the Monitoring & Assessment Framework
- *Per Practical Vision Ch. 2*: basic groundwork for a stakeholder watershed monitoring group (SDRWMAP) has been laid out
- Began making permit changes to support program (e.g., Padre Dam/Stormwater Monitoring Coalition); more stakeholders to be incorporated



(http://www.waterboards.ca.gov/sandiego/water_issues/programs/swamp/docs/SD_River_Program_Document_Final_04_30_2014.pdf)

San Diego River: Safe to Eat?

Not Monitored in 15-20 years

Recreational and Subsistence Fishing

Historic Monitoring Found OC Pesticides, PCBs, Mercury

San Diego River: Safe to Eat?

Simple Question = Complex Answer

↓

OEHHA
SCIENCE FOR A HEALTHY CALIFORNIA

GOOD CATCH
CALIFORNIA

San Diego River: Safe to Eat?

What Can We Do?

- Collect the Data
- Compare Pollutant Levels to Thresholds of Concern
- Make the Public Aware of the Data

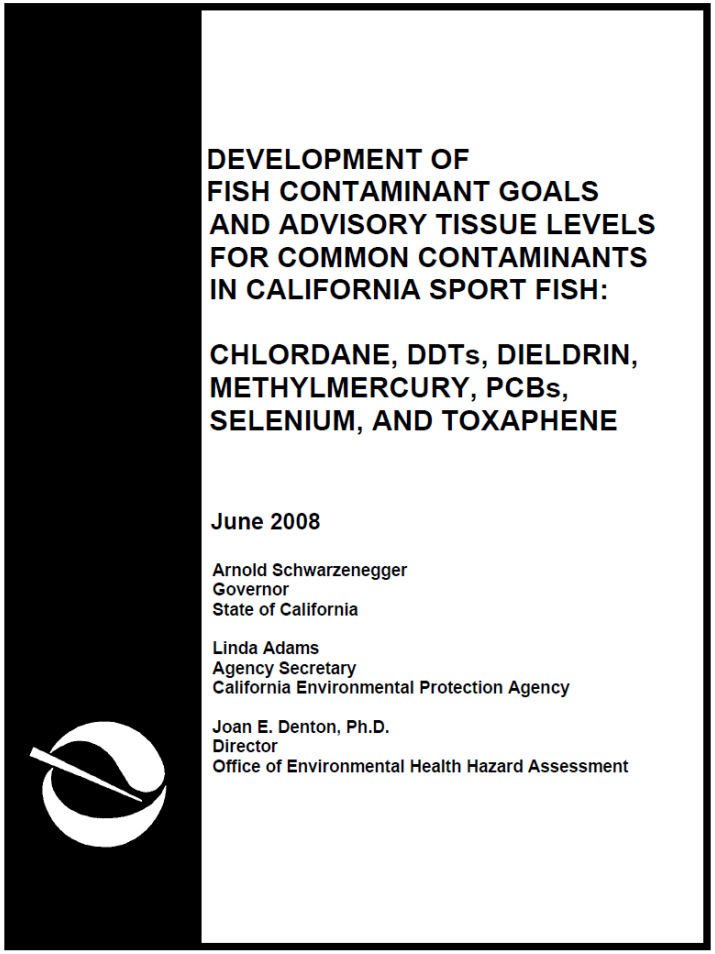
San Diego River: Safe to Eat?

- Collect the Data
  - Hook and Line, Trap, Shock
  - SWAMP Collection and Analysis
  - Target 3 Species

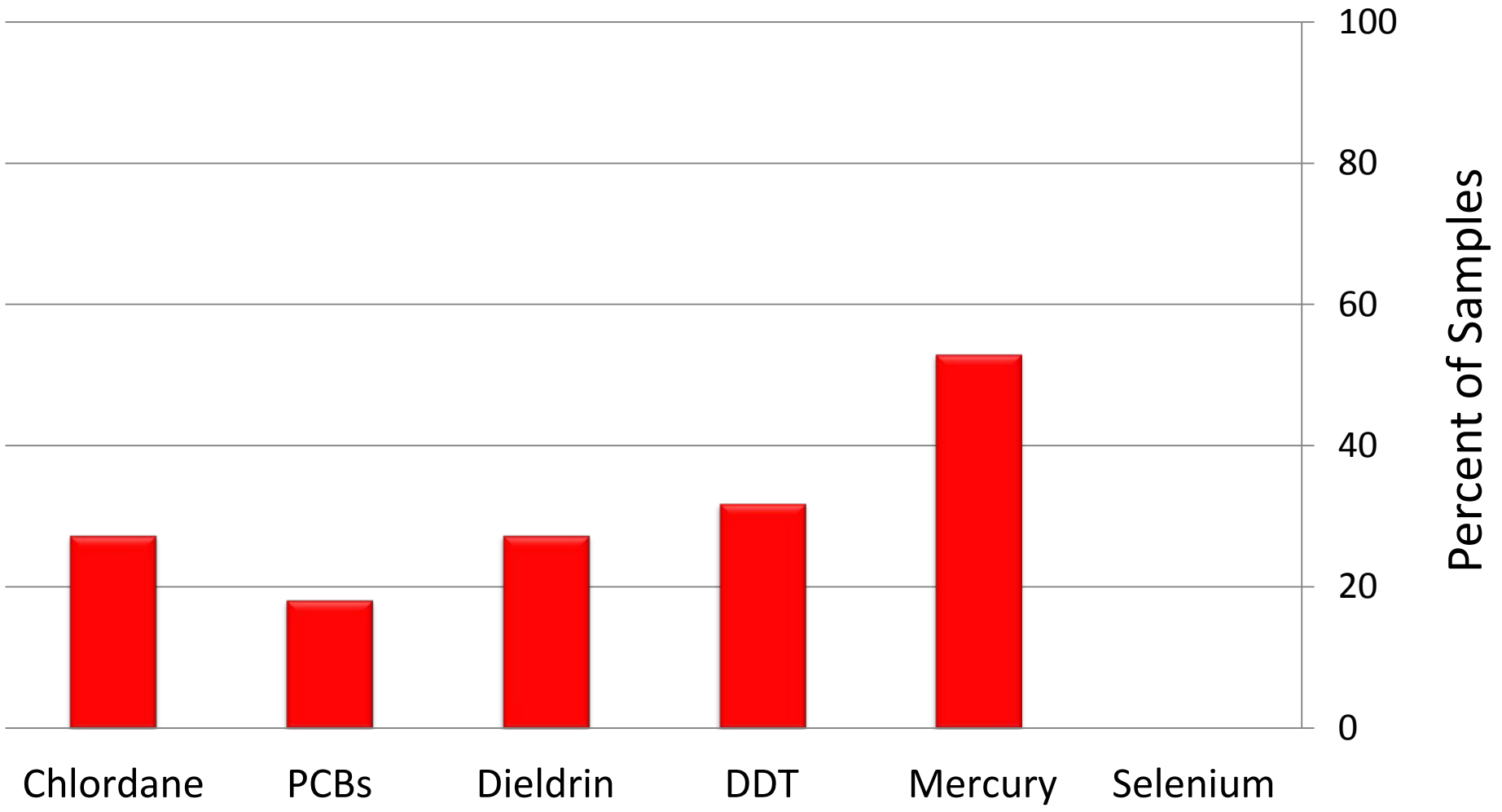
San Diego River: Safe to Eat?

Compare Pollutant Levels to Thresholds of Concern

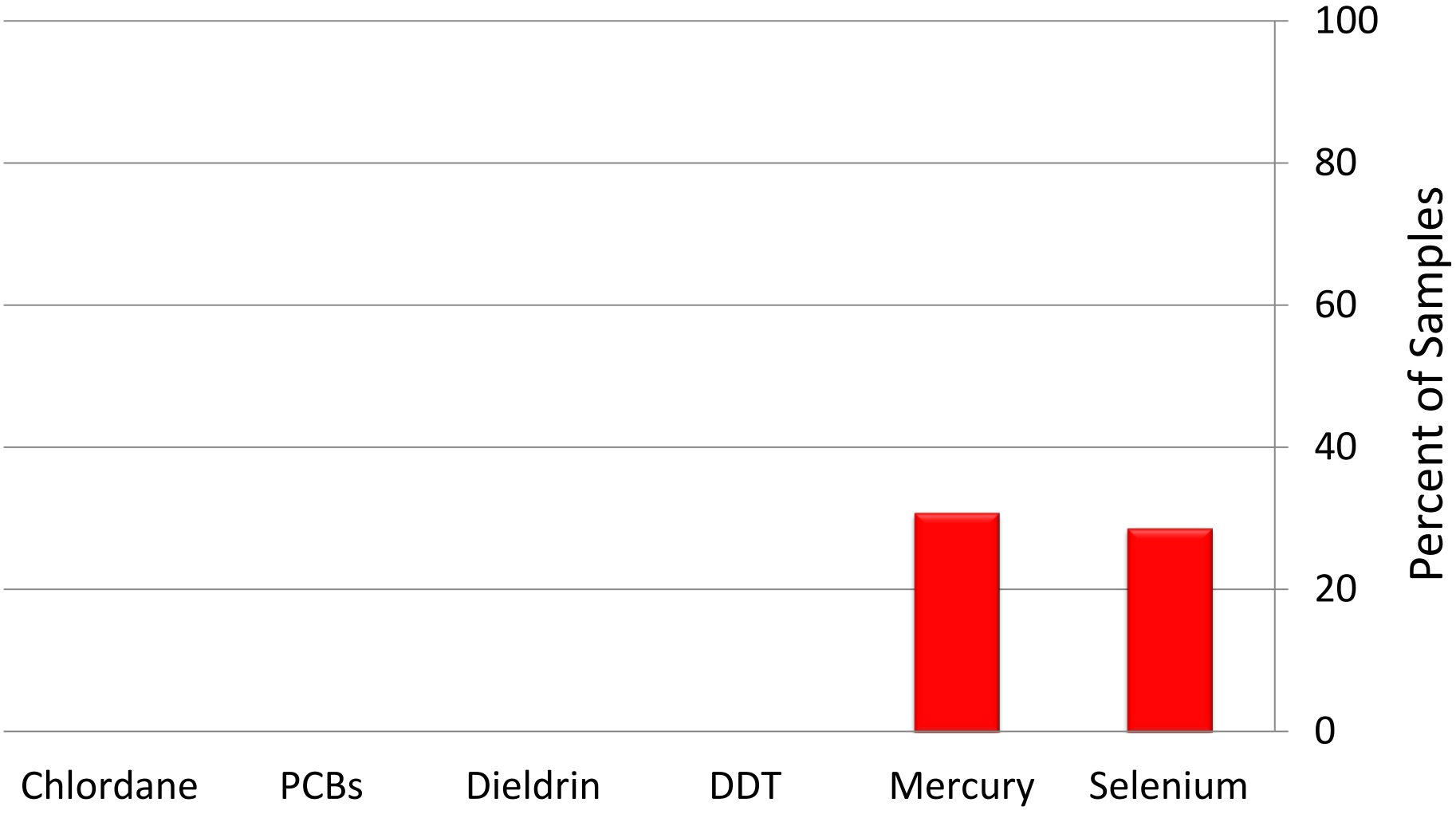
- Recreational Consumption
- "Not static bright lines"
- Starting Point for OEHHA



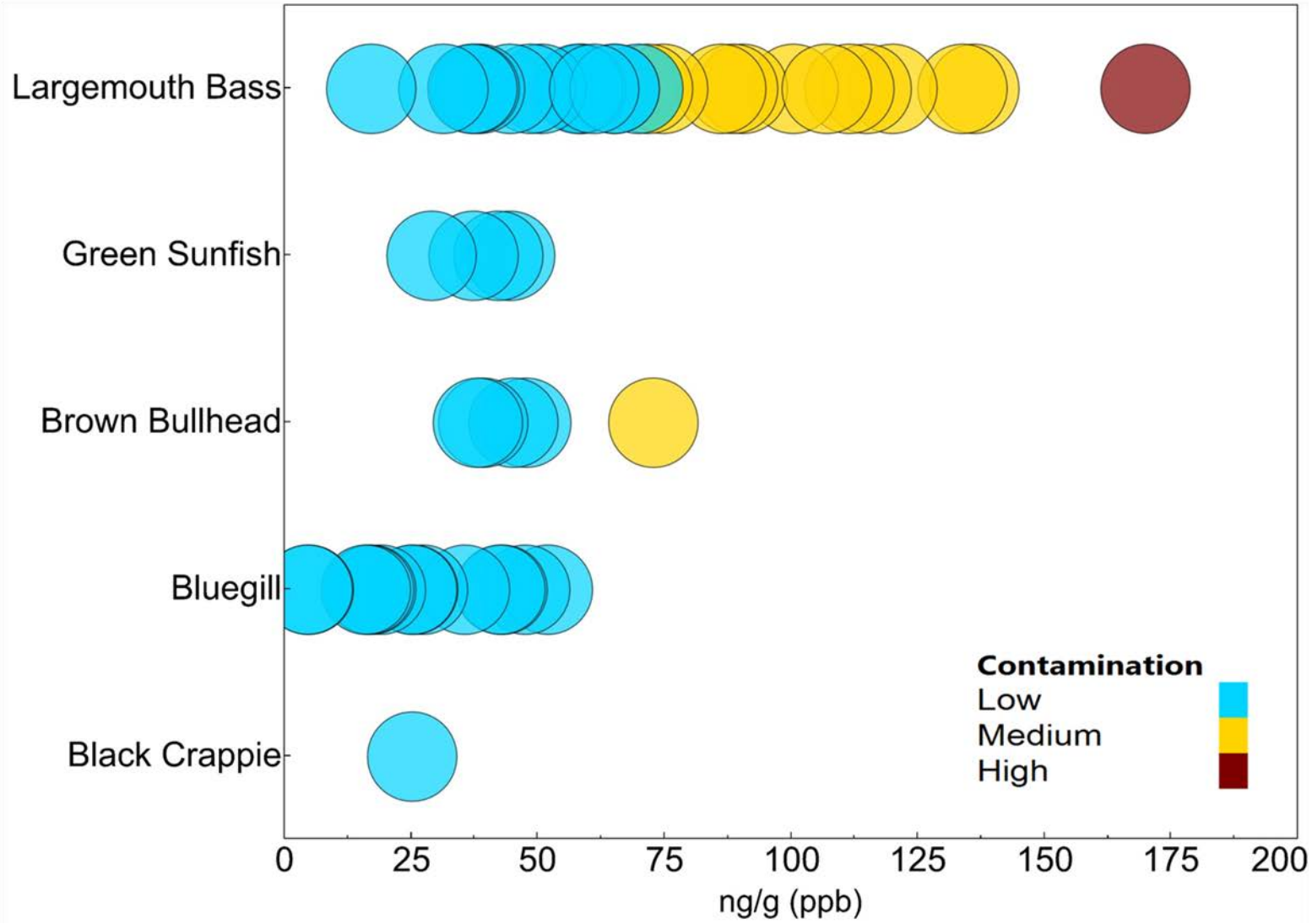
San Diego River: 15-20 years Ago Consumption Risk High



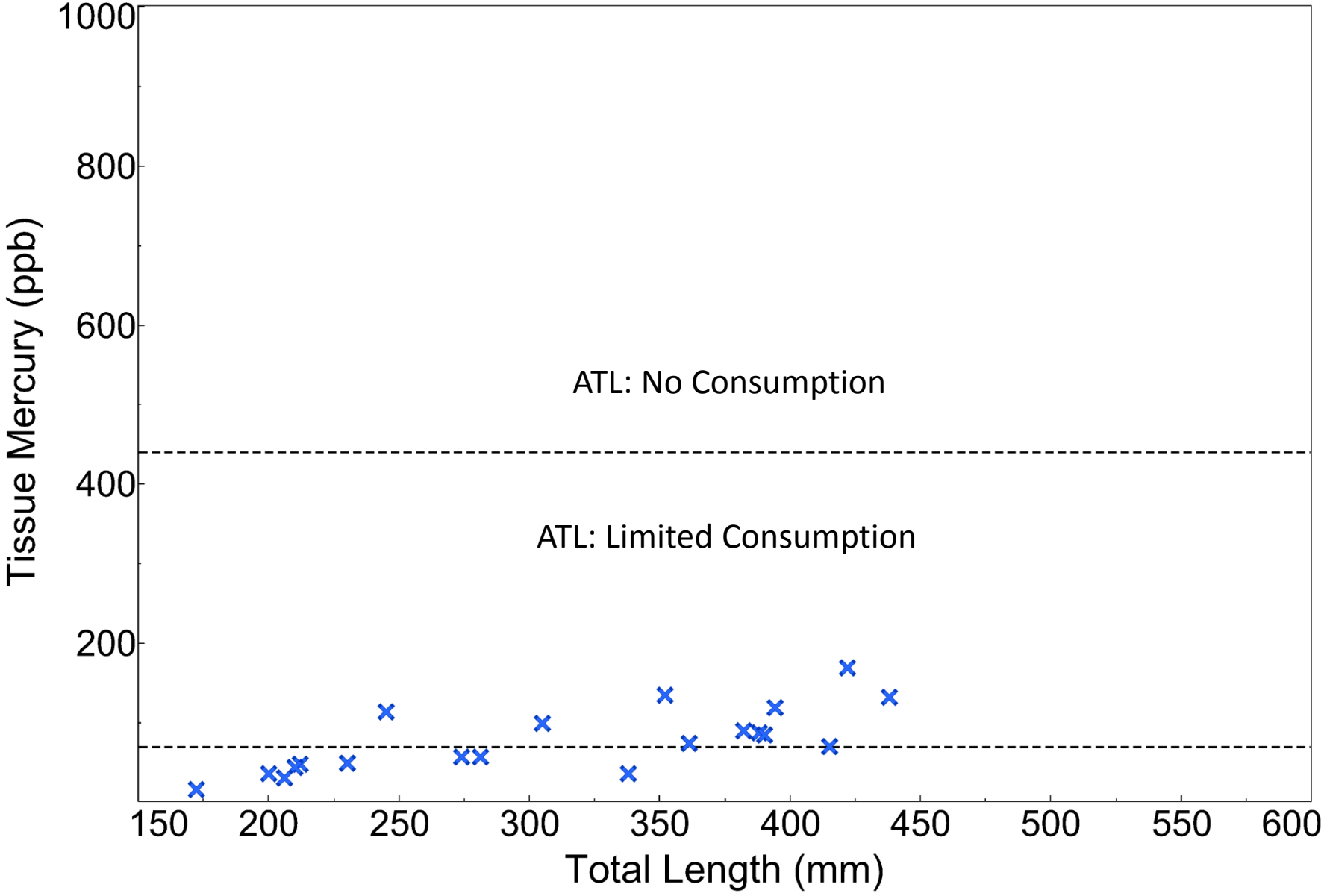
San Diego River: Now Consumption Risk Lower



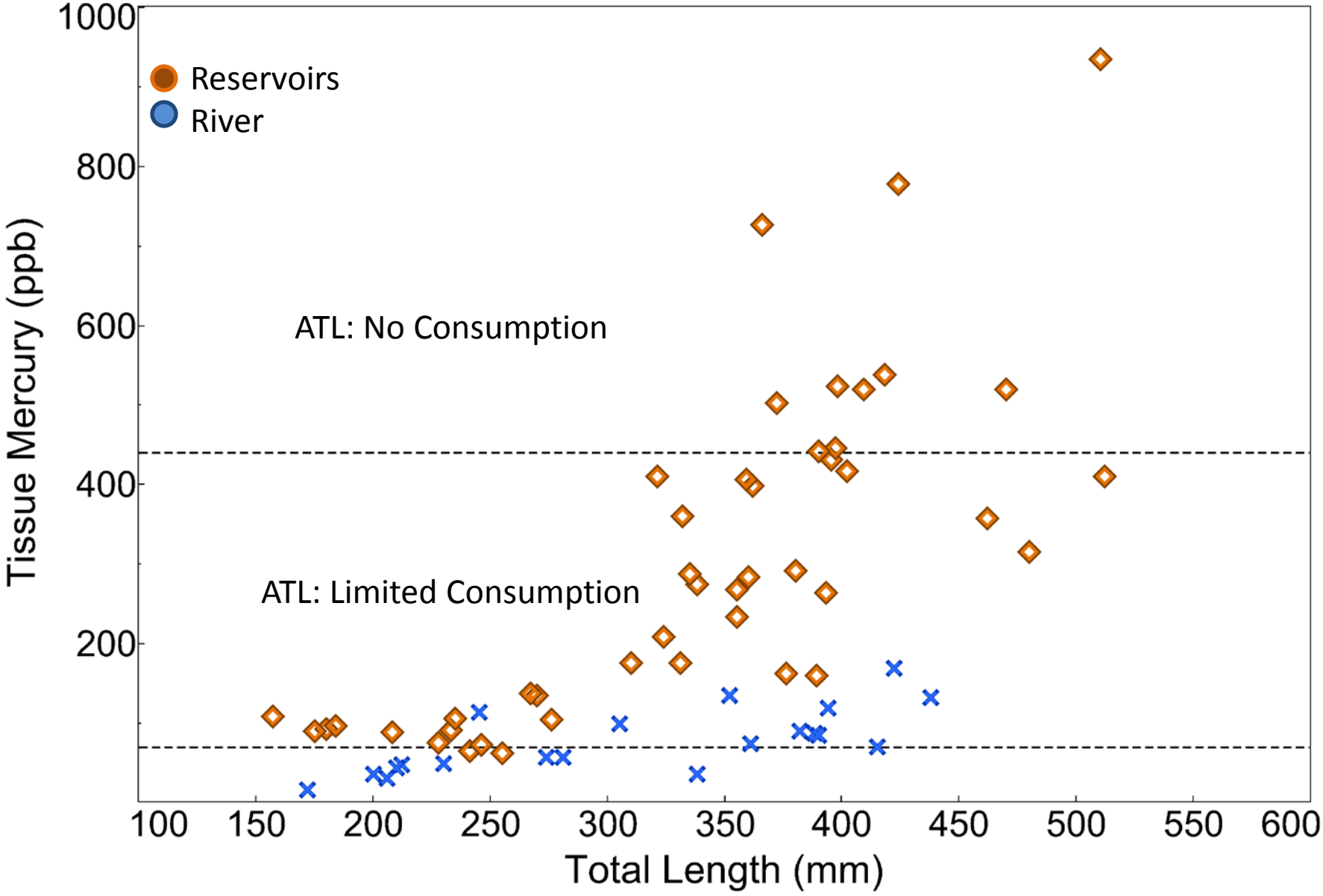
San Diego River: Mercury



San Diego River: Mercury



San Diego River: Mercury



San Diego River: Safe to Eat?

In Summary

- Improvement!
- Highest Risk Associated with Large Largemouth Bass & Fish in Mining Ponds
- Lowest Risk in All Other Species at Other Locations

Next Steps:

- Confirm Selenium Levels in Mining Ponds
- Addition of Downstream Sampling Sites
- OEHHA Consultation

San Mateo Watershed

139 Square Miles

No Major Surface Water Impoundments

San Mateo Watershed

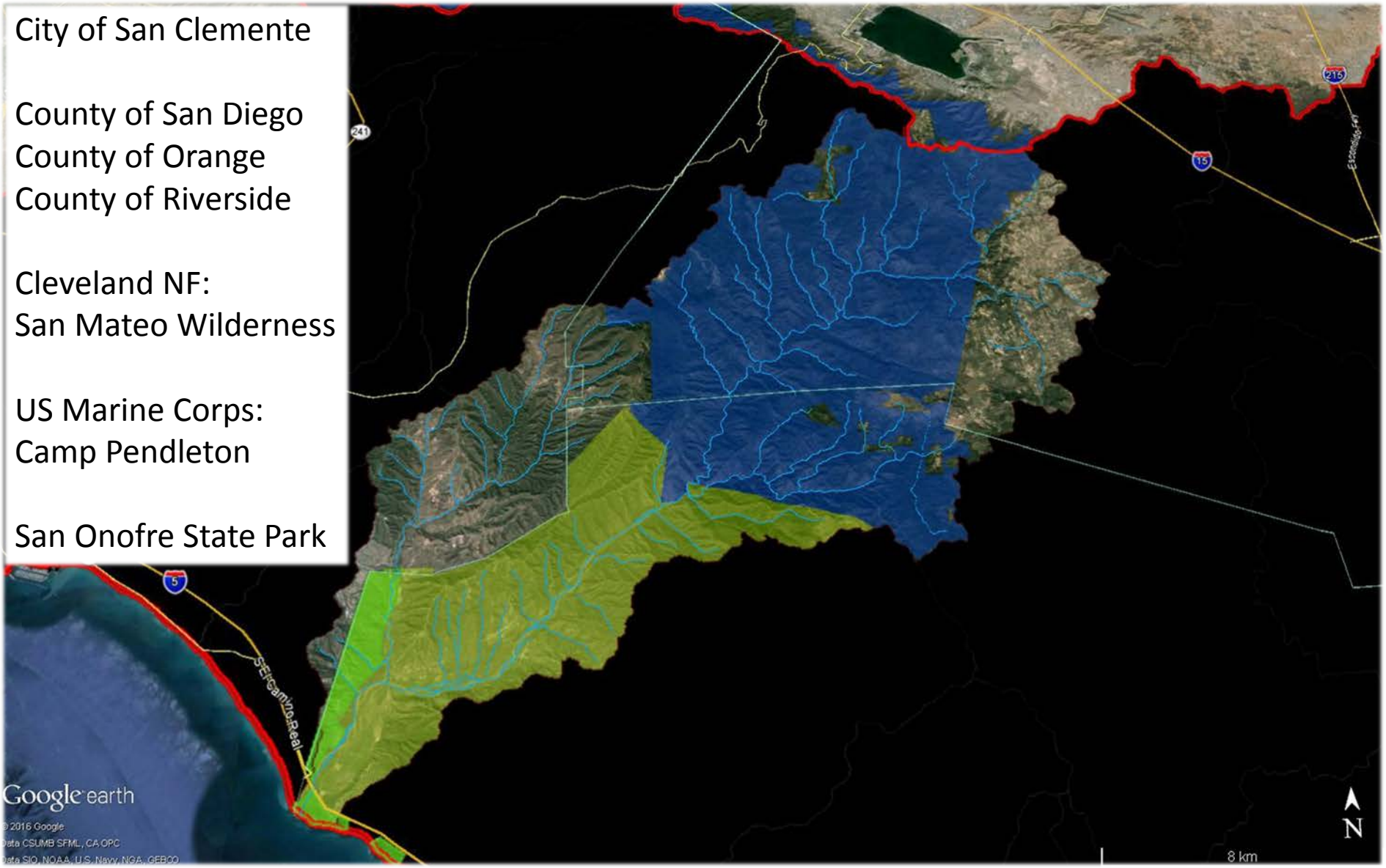
City of San Clemente

County of San Diego
County of Orange
County of Riverside

Cleveland NF:
San Mateo Wilderness

US Marine Corps:
Camp Pendleton

San Onofre State Park

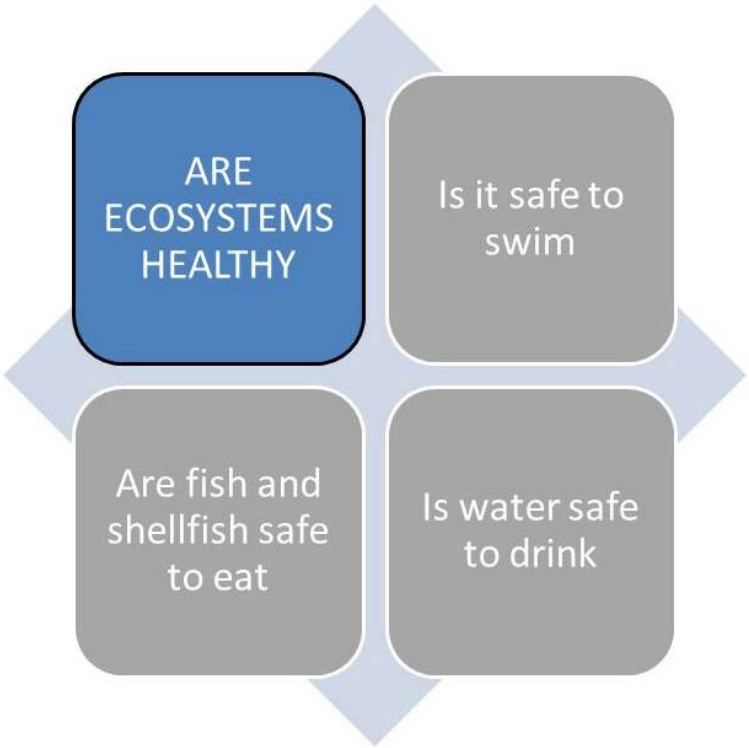


San Mateo Watershed

Threats:

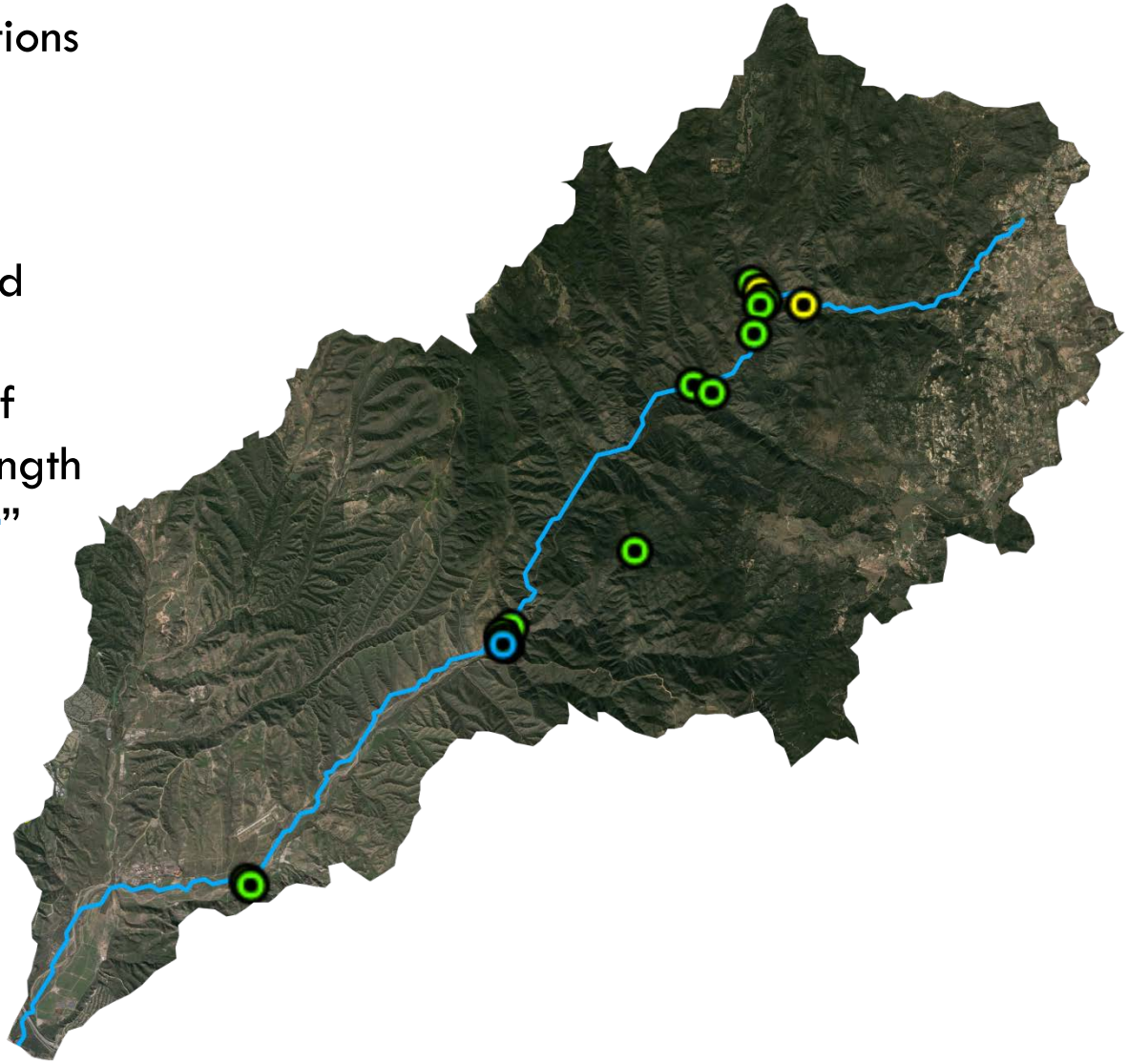
- Non-native Species
- Groundwater Withdrawal
- Development

Assessing Ecological Health of the San Mateo Creek Watershed

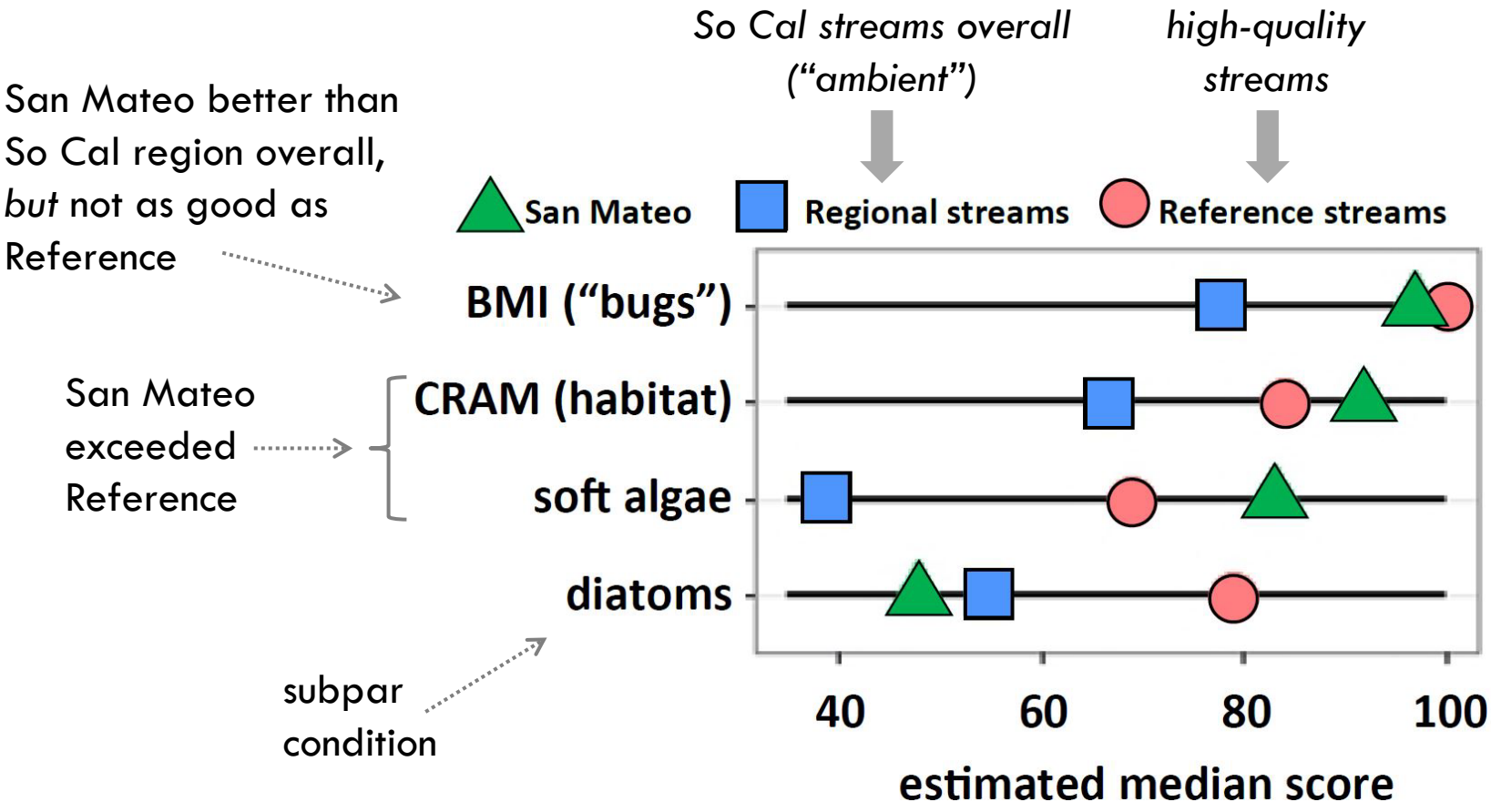


Assessment Overview

- N = 17 sampling stations
- Data sources:
  - SMC
  - SWAMP
- Overwhelmingly good conditions throughout watershed: **> 75%** of aggregate stream length in "**good**"/"**excellent**" condition, indicators combined



What Story Do Individual Indicators Tell?



Closing Thoughts

- The assessment tools can help achieve mission of protecting, enhancing water resources

- Status sheets on ecological data:
  - Important for PV Chapter 2 to understand & communicate watershed conditions, plan next steps
  - Board feedback welcomed
  - More watershed-based sheets to be rolled out; prioritized based on levels of interest & data availability

STATE OF CALIFORNIA
SAN DIEGO REGION
REGIONAL WATER QUALITY CONTROL BOARD

CALIFORNIA DEPARTMENT OF FISH & WILDLIFE
California Department of
Fish and Wildlife

SCCWRP
Established 1969

SMC
Southern California
STORMWATER MONITORING
Coalition

SAN DIEGO STATE UNIVERSITY
1897

SWAMP
Surface Water Ambient Monitoring Program

MPSL
Marine Pollution Studies Laboratory

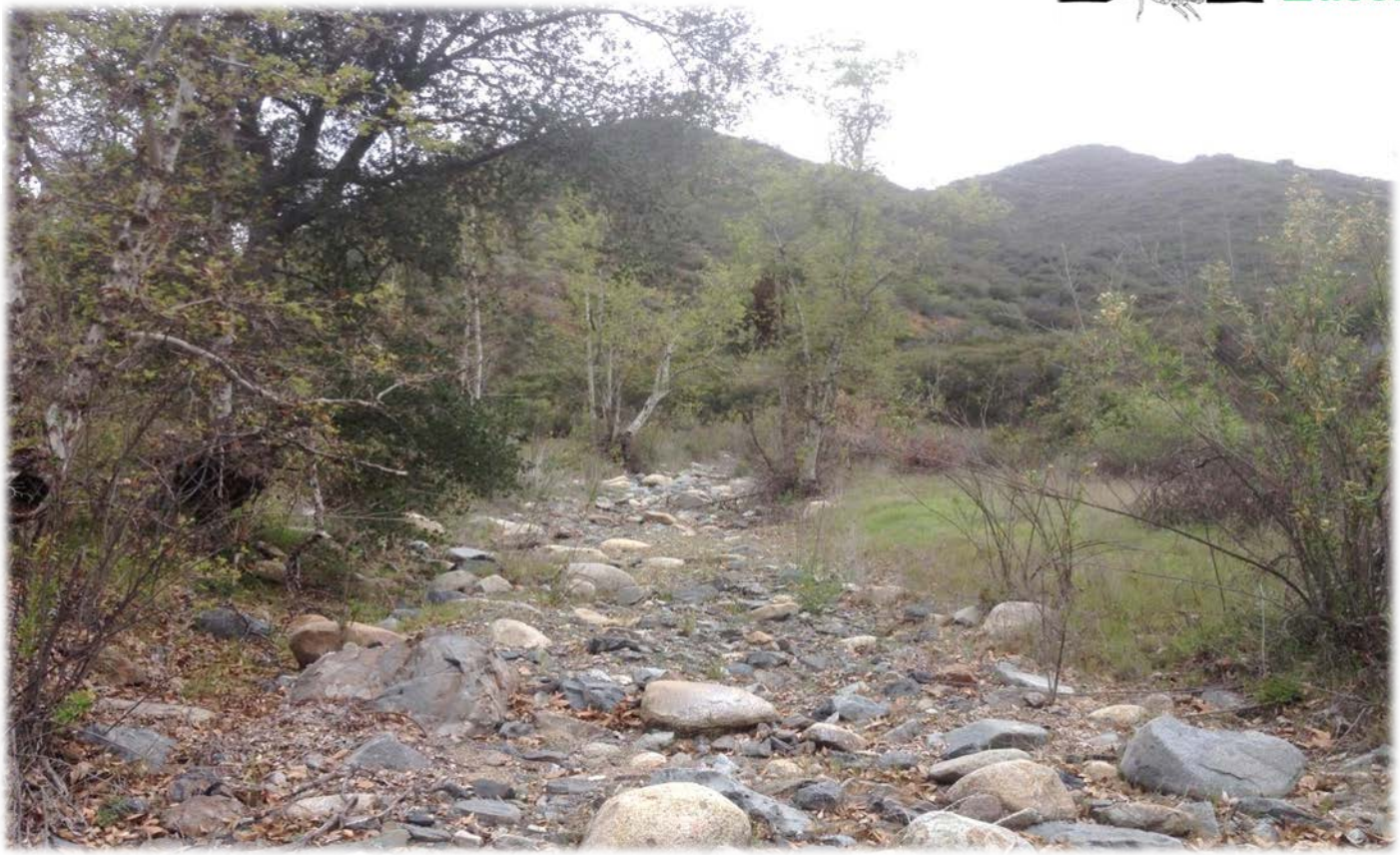
EcoANALYSTS, INC.
LIFE IN WATER

San Diego Fly Fishers
Cleaner Water, Brighter Streams, Better Fishing

California State University
SAN MARCOS

Aquatic Bioassessment Laboratory

THE SAN DIEGO RIVER PARK FOUNDATION



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