



# 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?

CA .GOV WATER QUALITY CALIFORNIA  
California Water Quality Monitoring Council  
My Water Quality  
A COLLABORATION BETWEEN THE CALIFORNIA ENVIRONMENTAL PROTECTION AND NATURAL RESOURCES AGENCIES

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Home Portals About Us Work Groups

Welcome Prop 1 Applicants!  
Guidance on the WRAMP framework for monitoring and assessment.

1 2 ||

### Welcome to My Water Quality

**Is Our Water Safe to Drink?**  
Safe drinking water depends on a variety of chemical and biological factors regulated by a number of local, state, and federal agencies. [\[Future Portal\]](#)

**Is it Safe to Swim in Our Waters?**  
Swimming safety of our waters is linked to the levels of pathogens that have the potential to cause disease. [Learn more >>](#)

**Is it Safe to Eat Fish and Shellfish From our Waters?**  
Aquatic organisms are able to accumulate certain pollutants from the water in which they live, sometimes reaching levels that could harm consumers. [Learn more >>](#)

**Are Our Aquatic Ecosystems Healthy?**  
The health of fish and other aquatic organisms and communities depends on the chemical, physical, and biological quality of the waters in which they live. [Learn more >>](#)

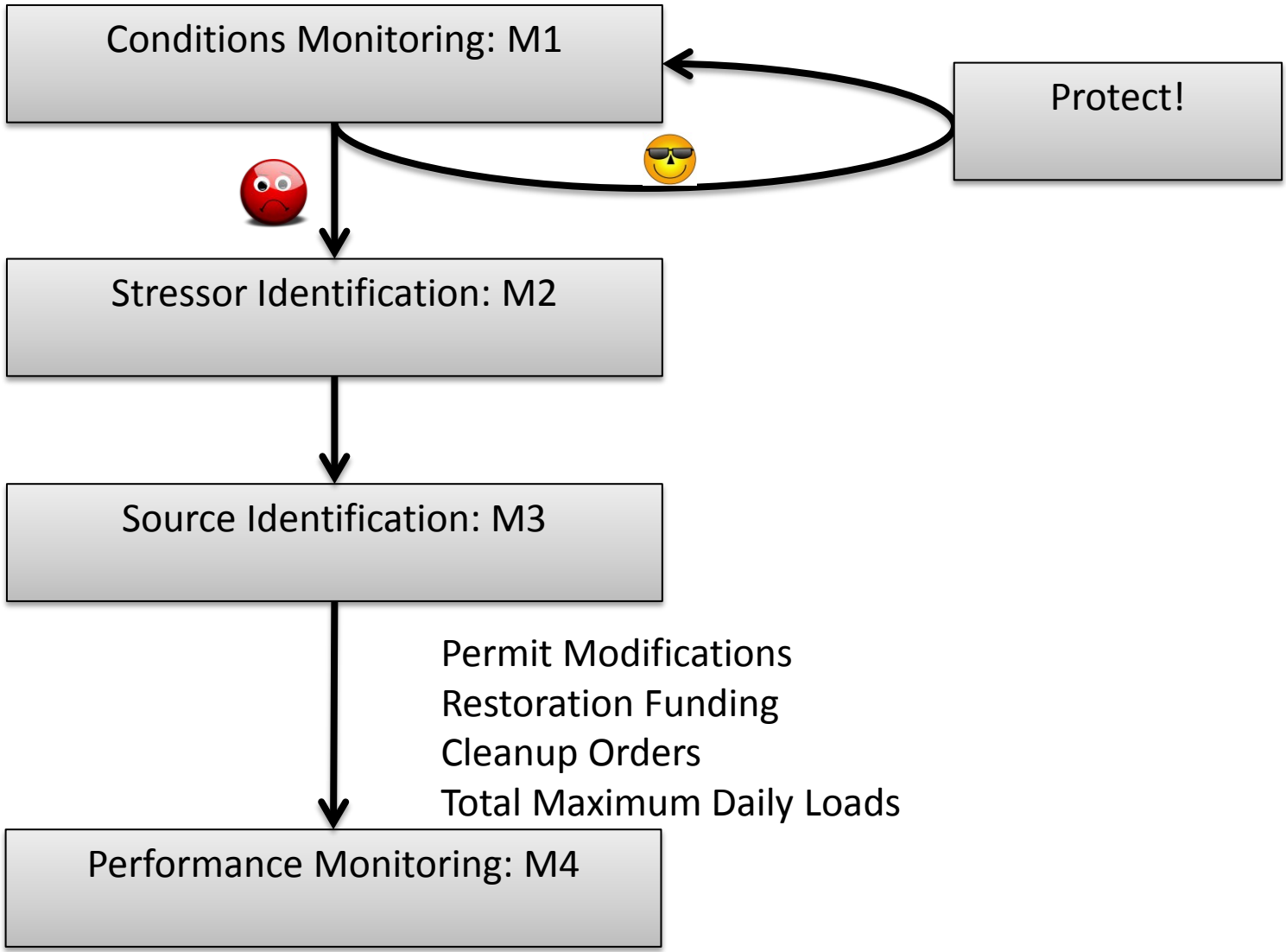
**What Stressors and Processes Affect our Water Quality?**  
Beneficial uses of our waters are affected by emerging contaminants, invasive species, trash, global warming, acidification, pollutant loads, and flow. [\[Future Portal\]](#)

**About Us**  
The Monitoring Council seeks to provide multiple perspectives on water quality information and to highlight existing data gaps and inconsistencies in data collection and interpretation. [Learn more >>](#)

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



# Monitoring Framework





# Are Habitats and Ecosystems Healthy? Are Fish and Shellfish Safe to Eat?

Grab Samples?



# 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)

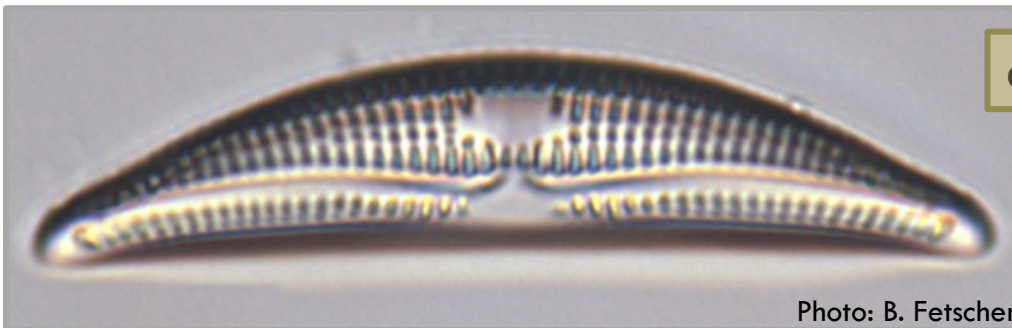
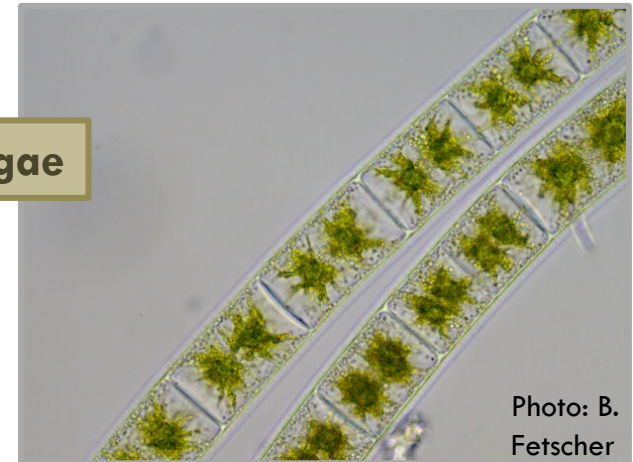


# Benthic Algae

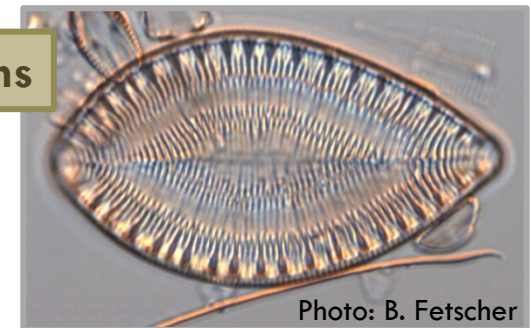
- primary producers
- highly responsive to water quality (esp. nutrients)
- community composition can shift quickly
- relatively unconstrained by microhabitats
- [Indices of Biotic Integrity](#) (Fetscher *et al.* 2014)



soft algae



diatoms

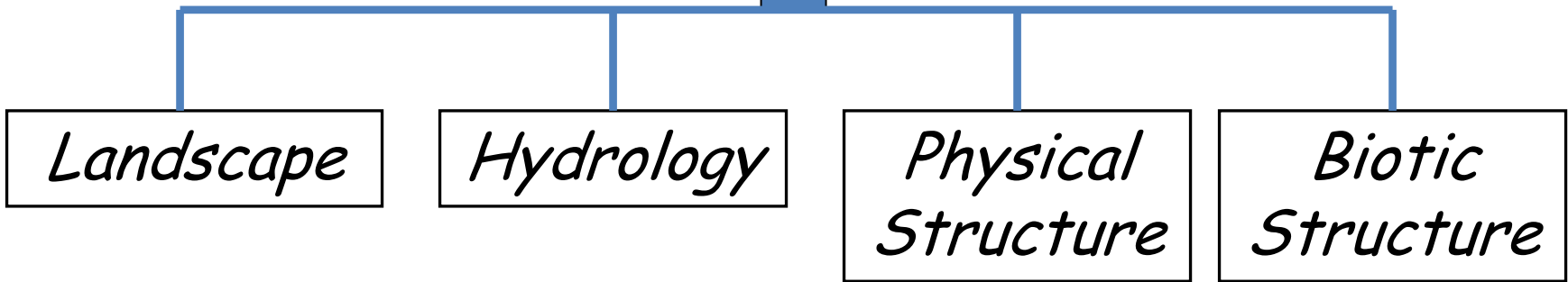


# California Rapid Assessment Method (**CRAM**)

(L2 Committee/CWMW, 2013)

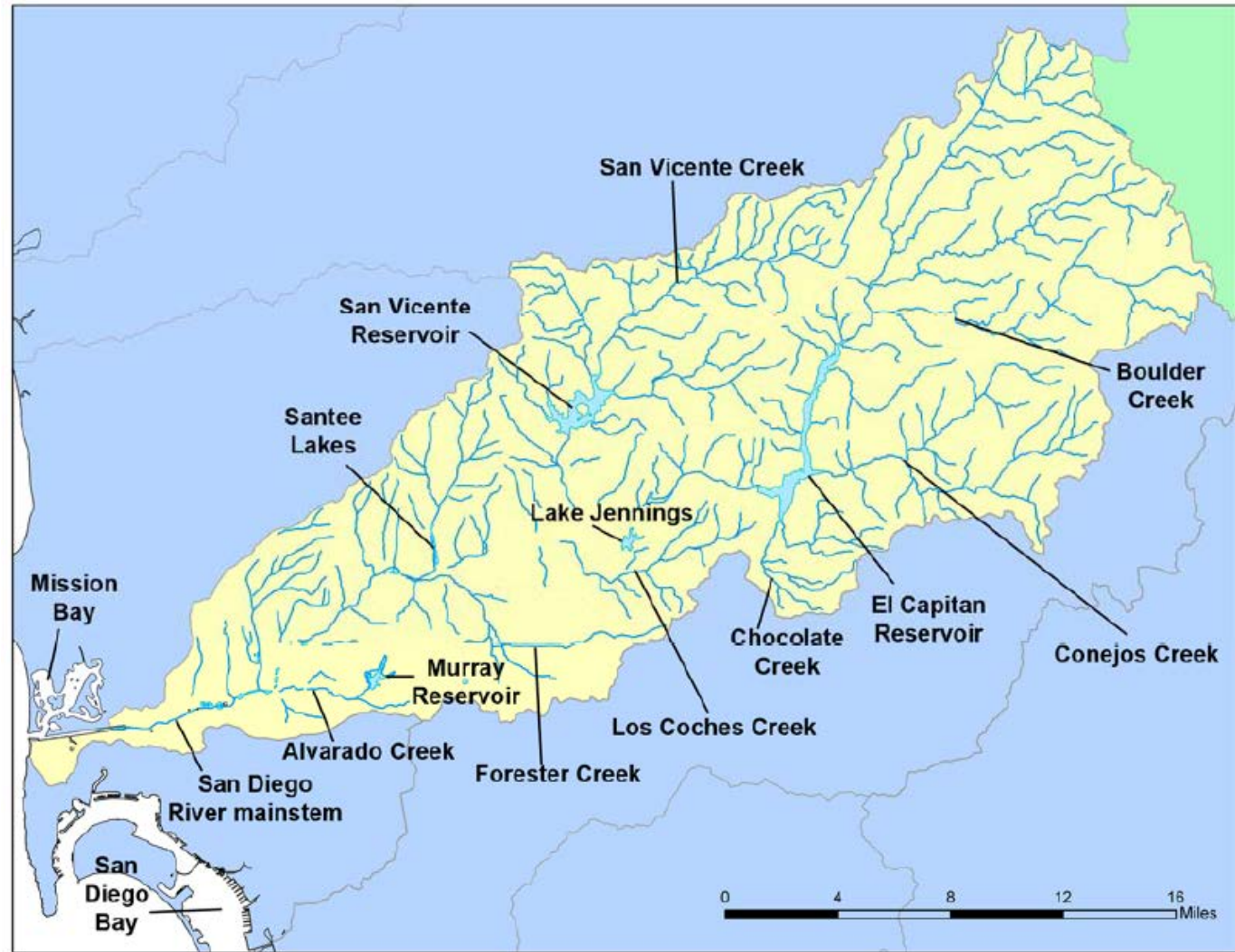


*Wetland  
Condition*





# San Diego River Watershed



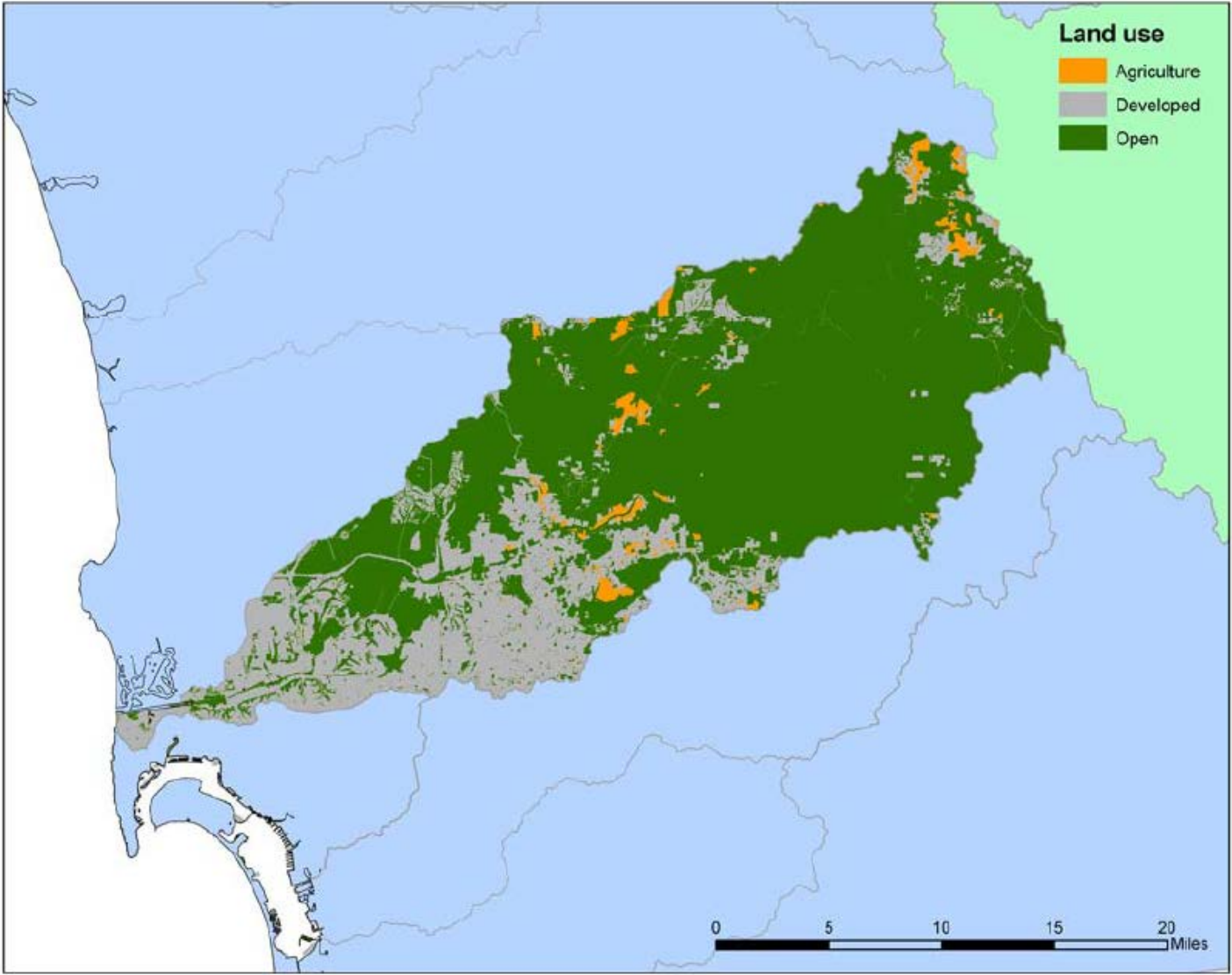
440 Square Miles

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

ARE  
ECOSYSTEMS  
HEALTHY

Is it safe to  
swim

Are fish and  
shellfish safe  
to eat

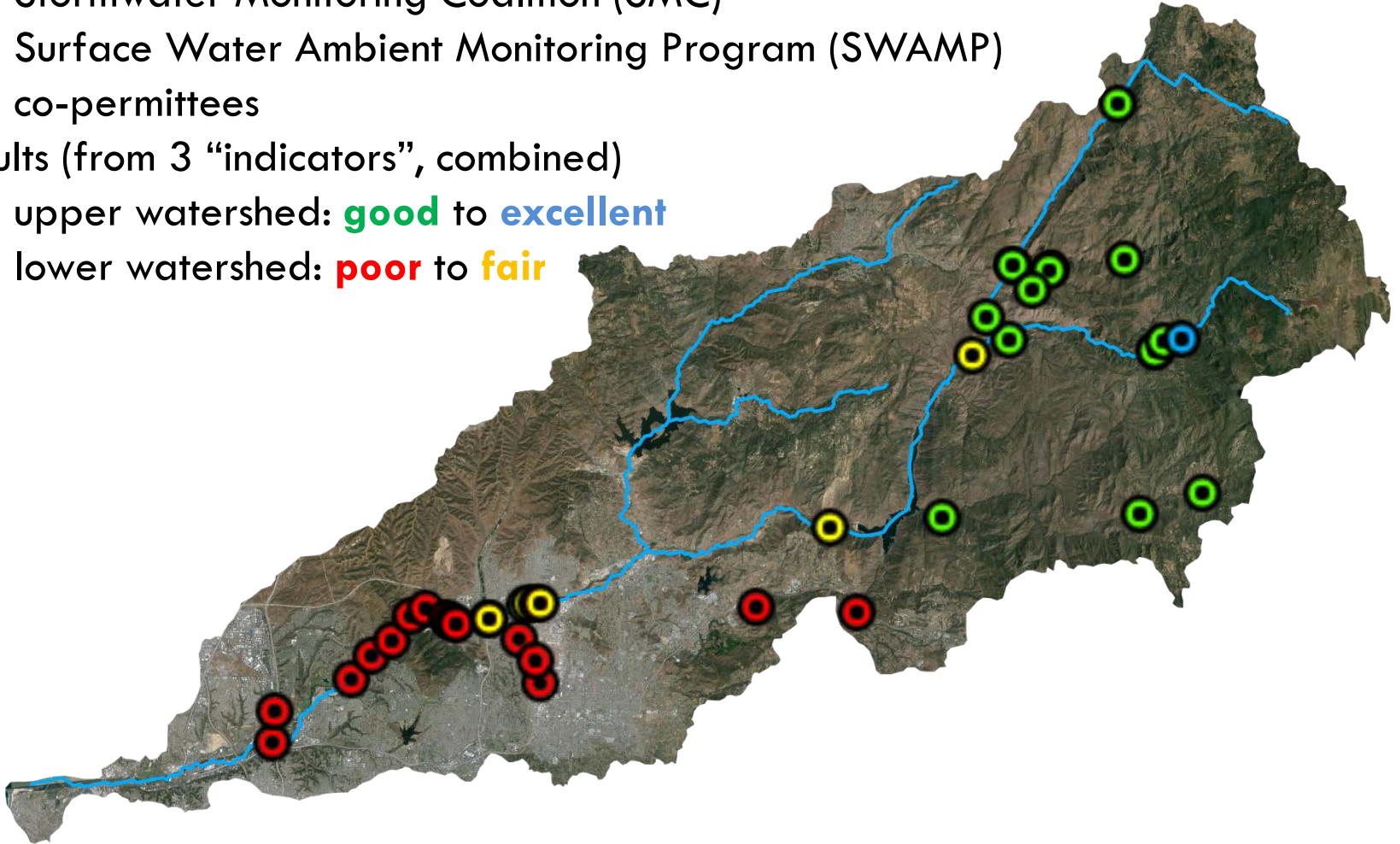
Is water safe  
to drink



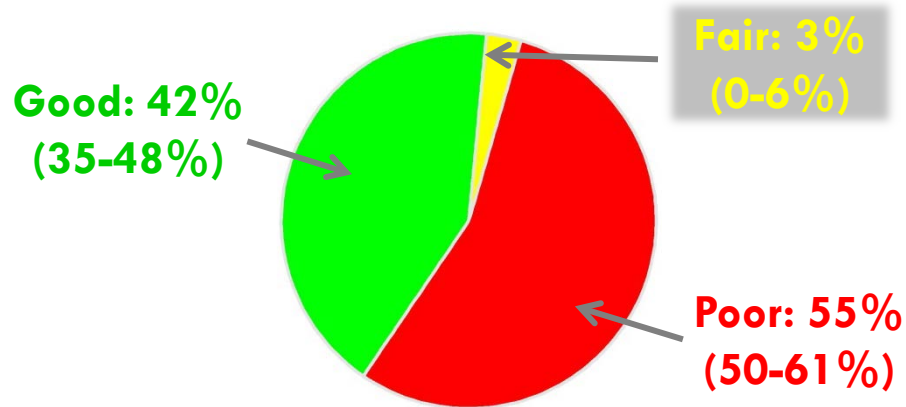
Photo: C Nagode

# 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***

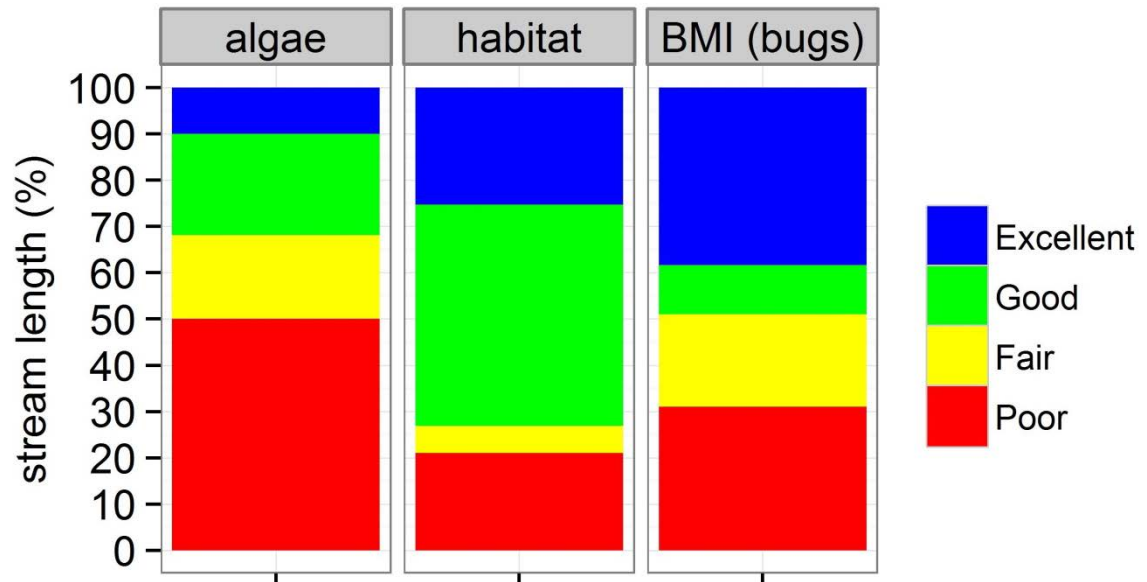


- subset of sampling stations (N=25) part of a “*probability survey*” (yields condition estimate for overall watershed)
- nearly 1/2 of aggregate stream length is in *fair or better* condition
- decent sample size → ~narrow 95% confidence intervals



# What Story Do Individual Indicators Tell?

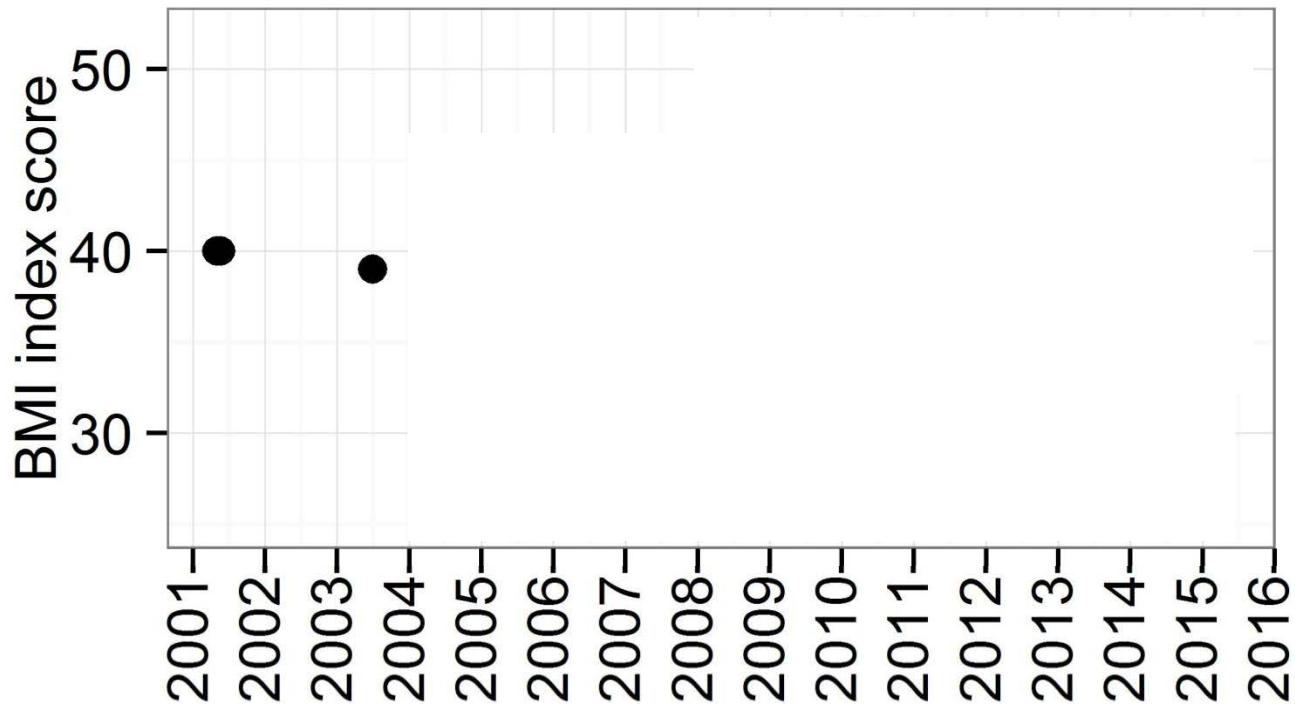
- lowest condition scores via “lens” of algae
- highest based on bugs and habitat
- differential responses provide 1<sup>st</sup> step to inferring stressors





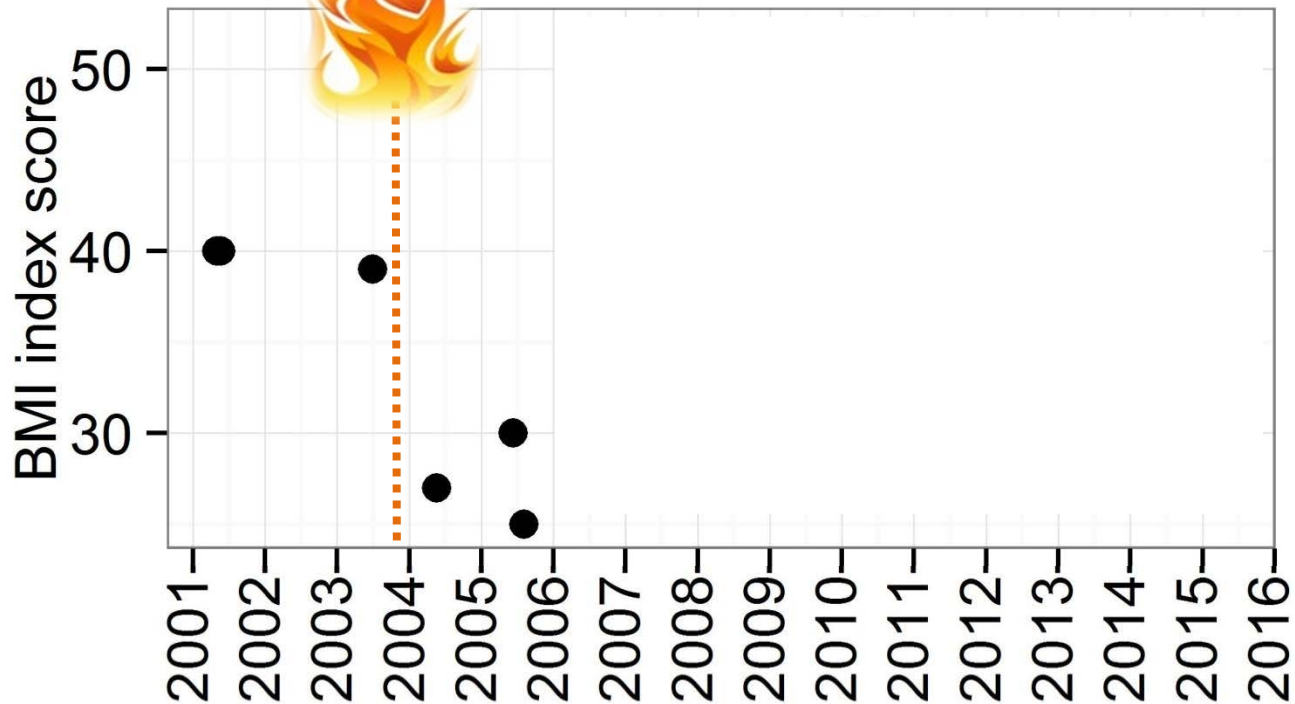
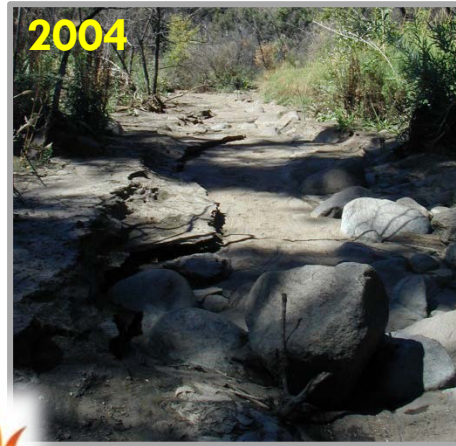
# Trends in Ecological Condition Over Time

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



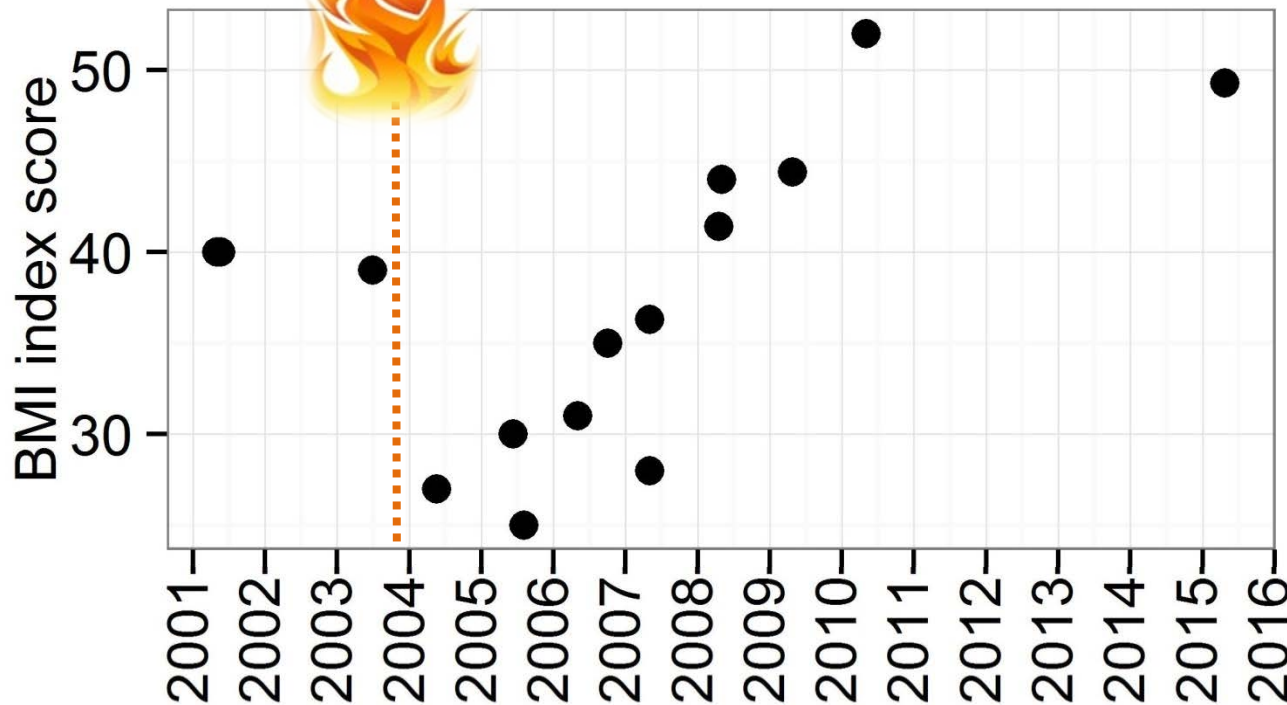
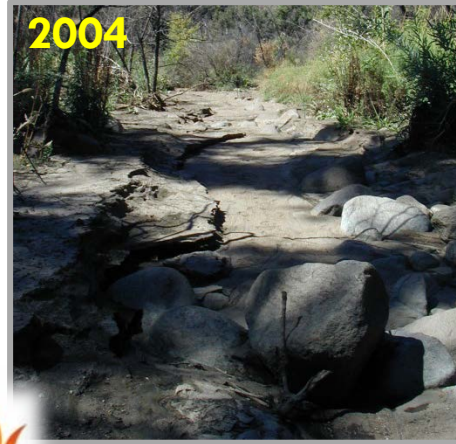
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# Trends in Ecological Condition Over Time

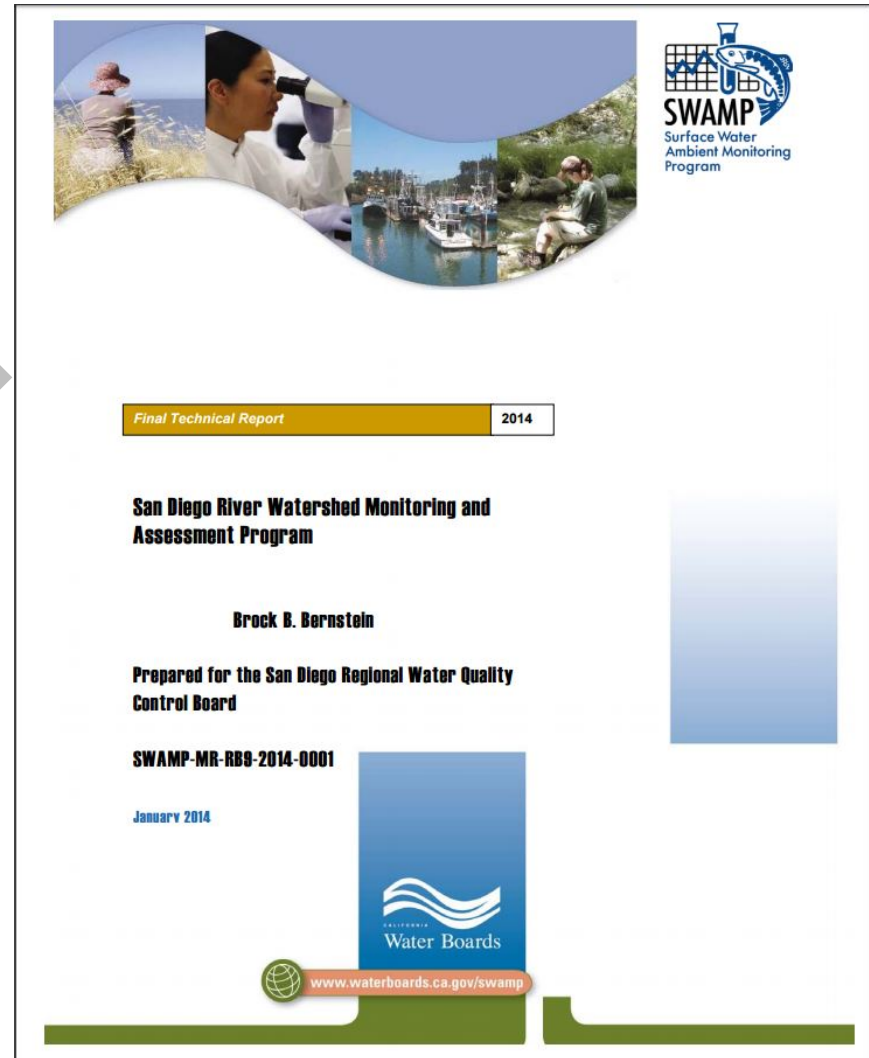
e.g., bugs provide evidence for Boulder Cr. recovery from Cedar fire



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





# 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





# 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

**DEVELOPMENT OF  
FISH CONTAMINANT GOALS  
AND ADVISORY TISSUE LEVELS  
FOR COMMON CONTAMINANTS  
IN CALIFORNIA SPORT FISH:**

**CHLORDANE, DDTs, DIELDRIN,  
METHYLMERCURY, PCBs,  
SELENIUM, AND TOXAPHENE**

June 2008

Arnold Schwarzenegger  
Governor  
State of California

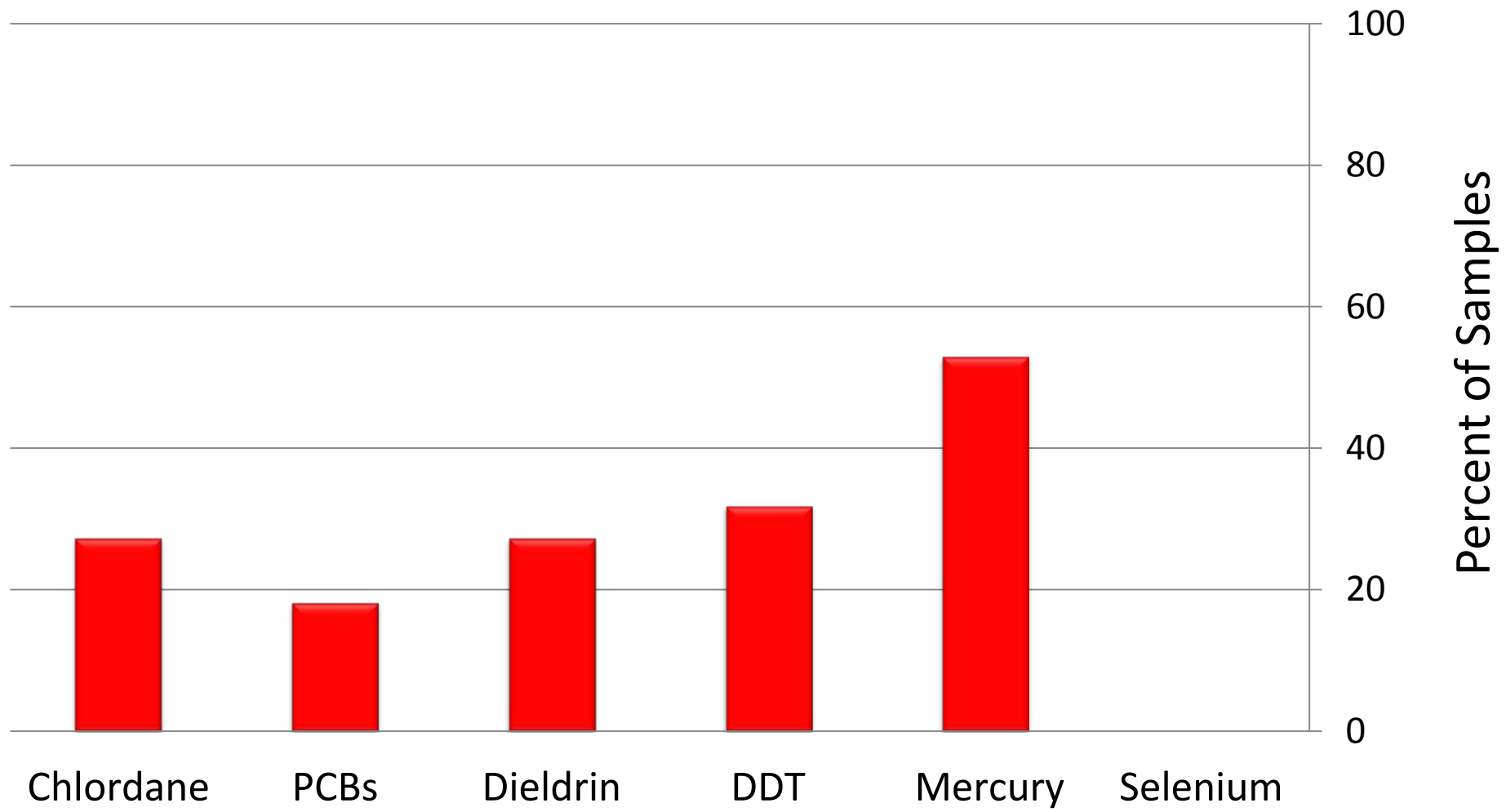
Linda Adams  
Agency Secretary  
California Environmental Protection Agency

Joan E. Denton, Ph.D.  
Director  
Office of Environmental Health Hazard Assessment



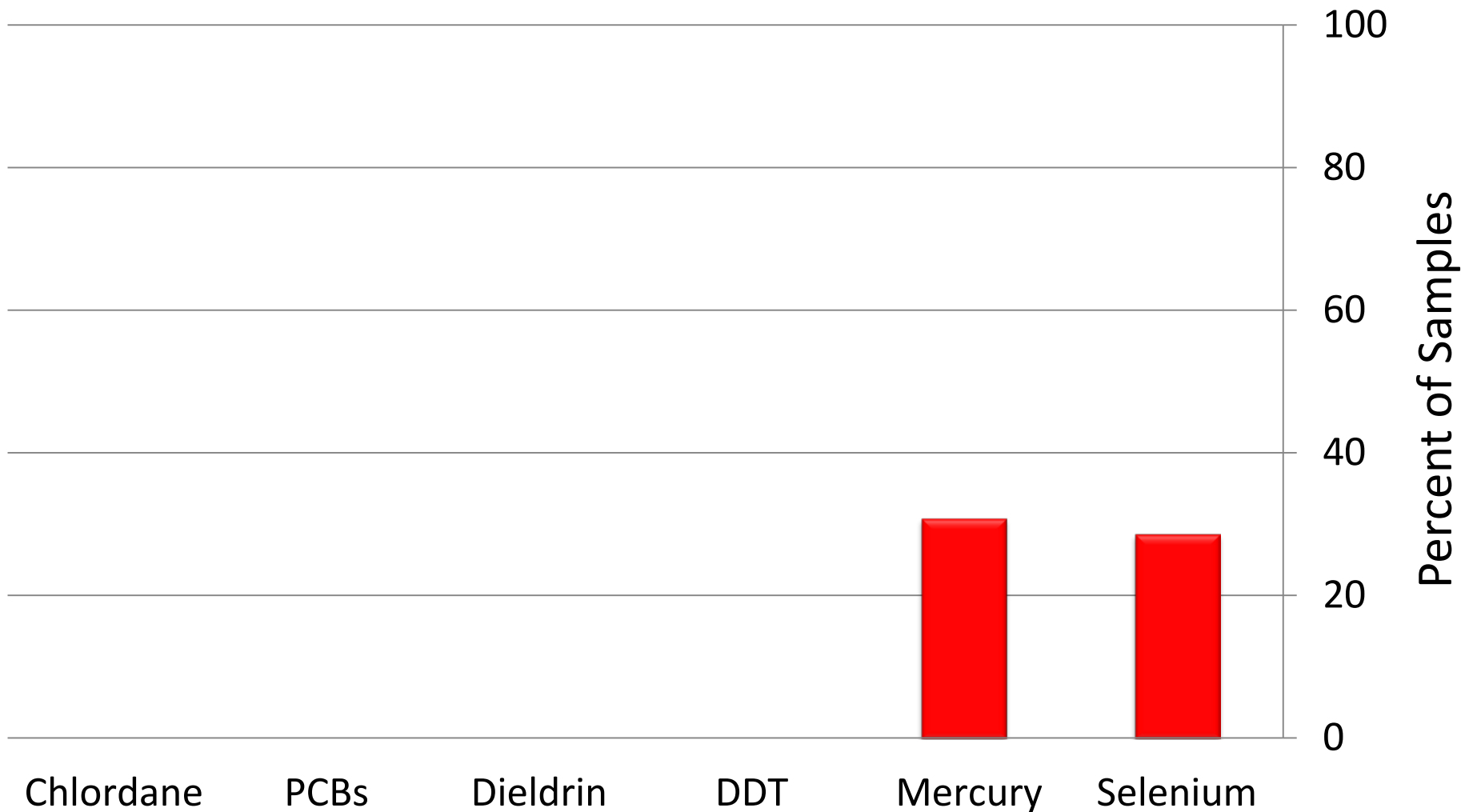


# San Diego River: 15-20 years Ago Consumption Risk High



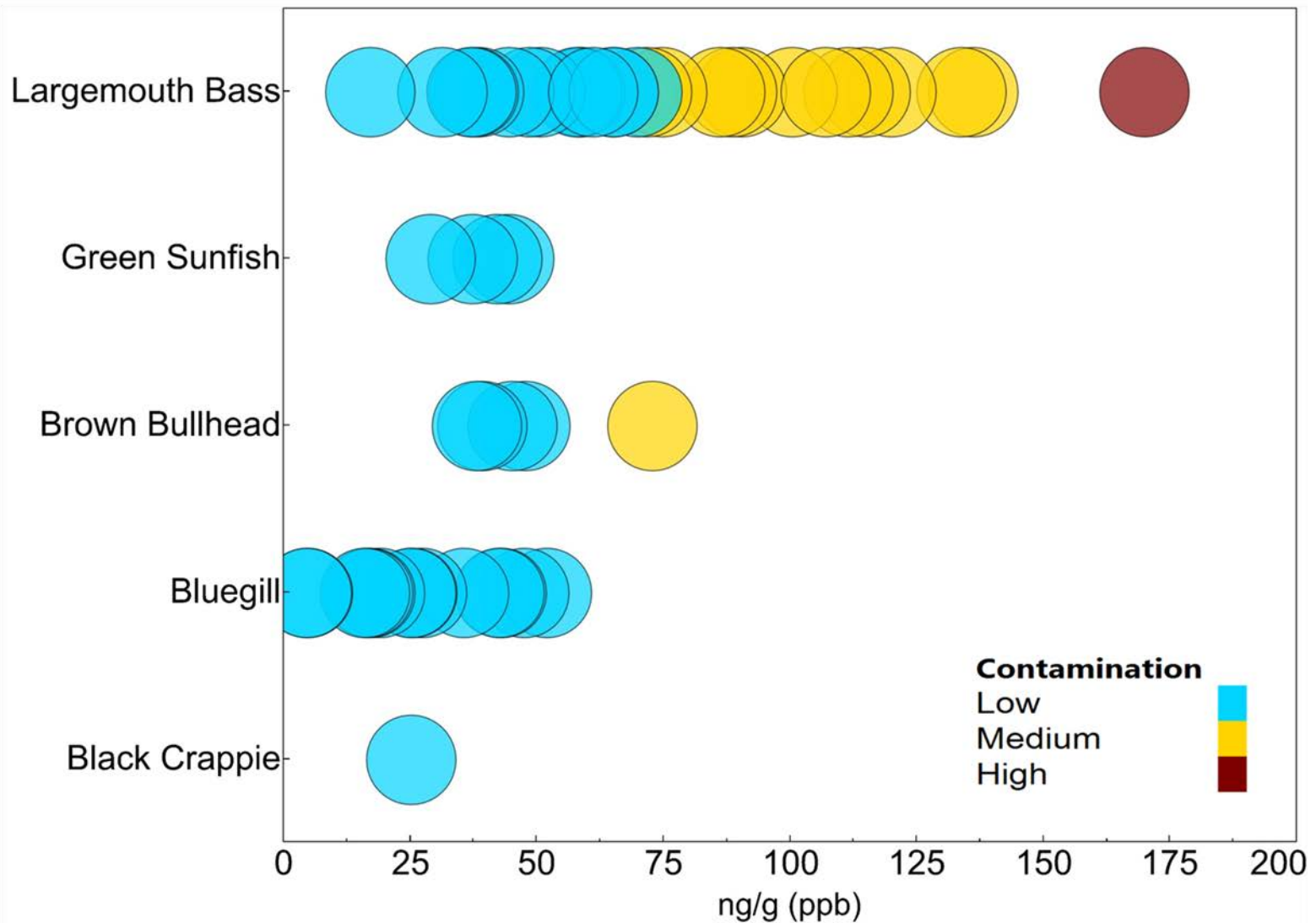


# San Diego River: Now Consumption Risk Lower



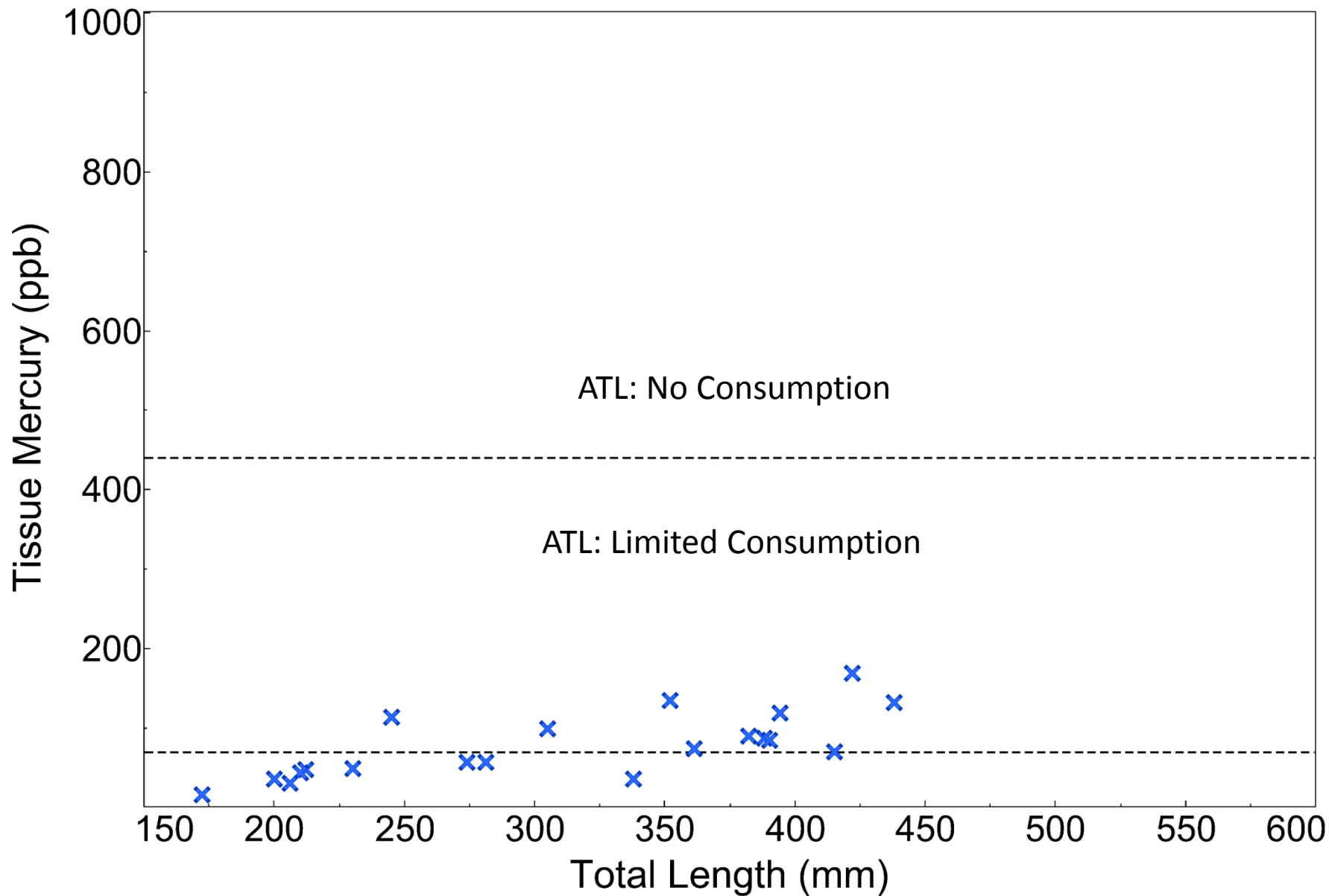


# San Diego River: Mercury



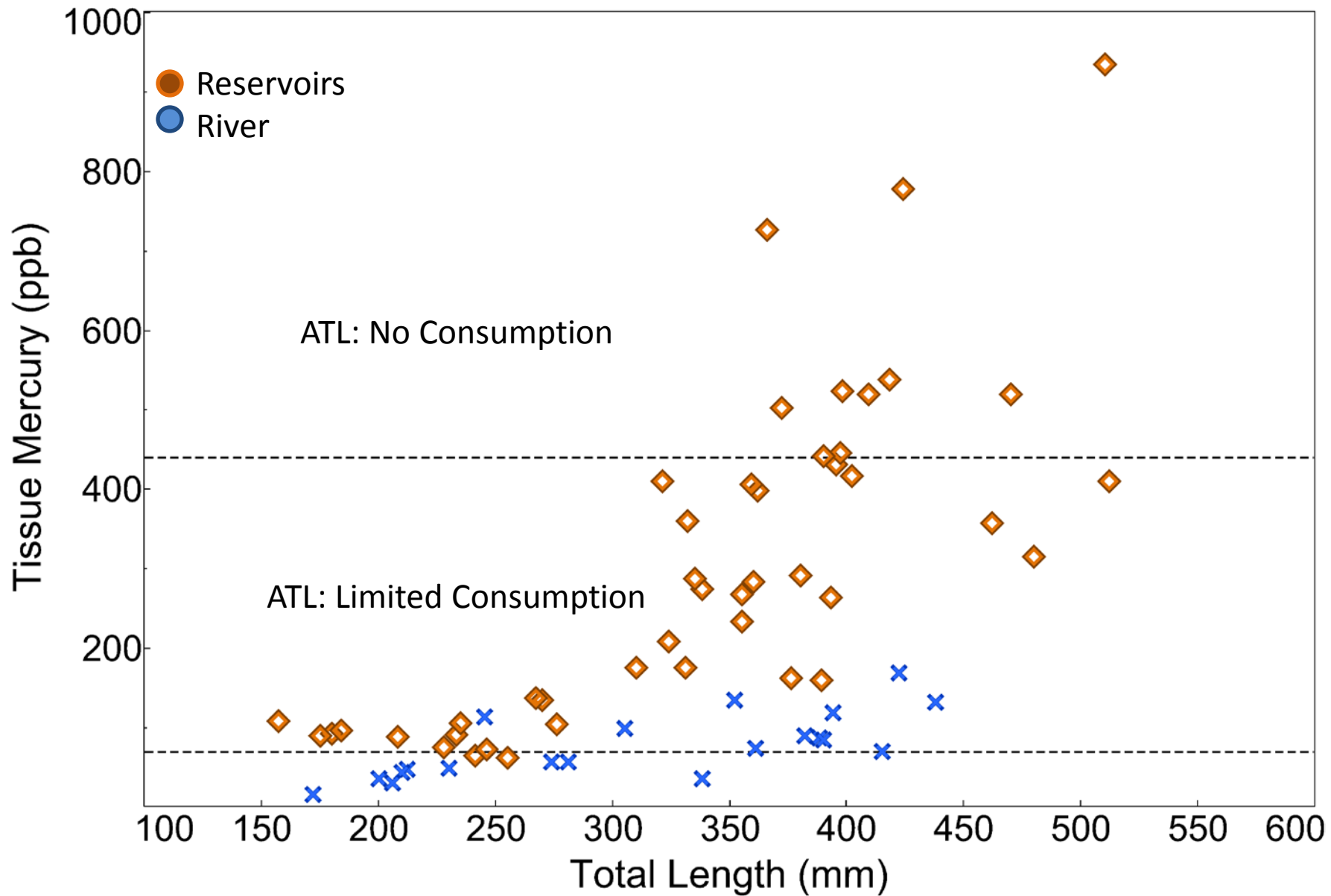


# San Diego River: Mercury





# 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

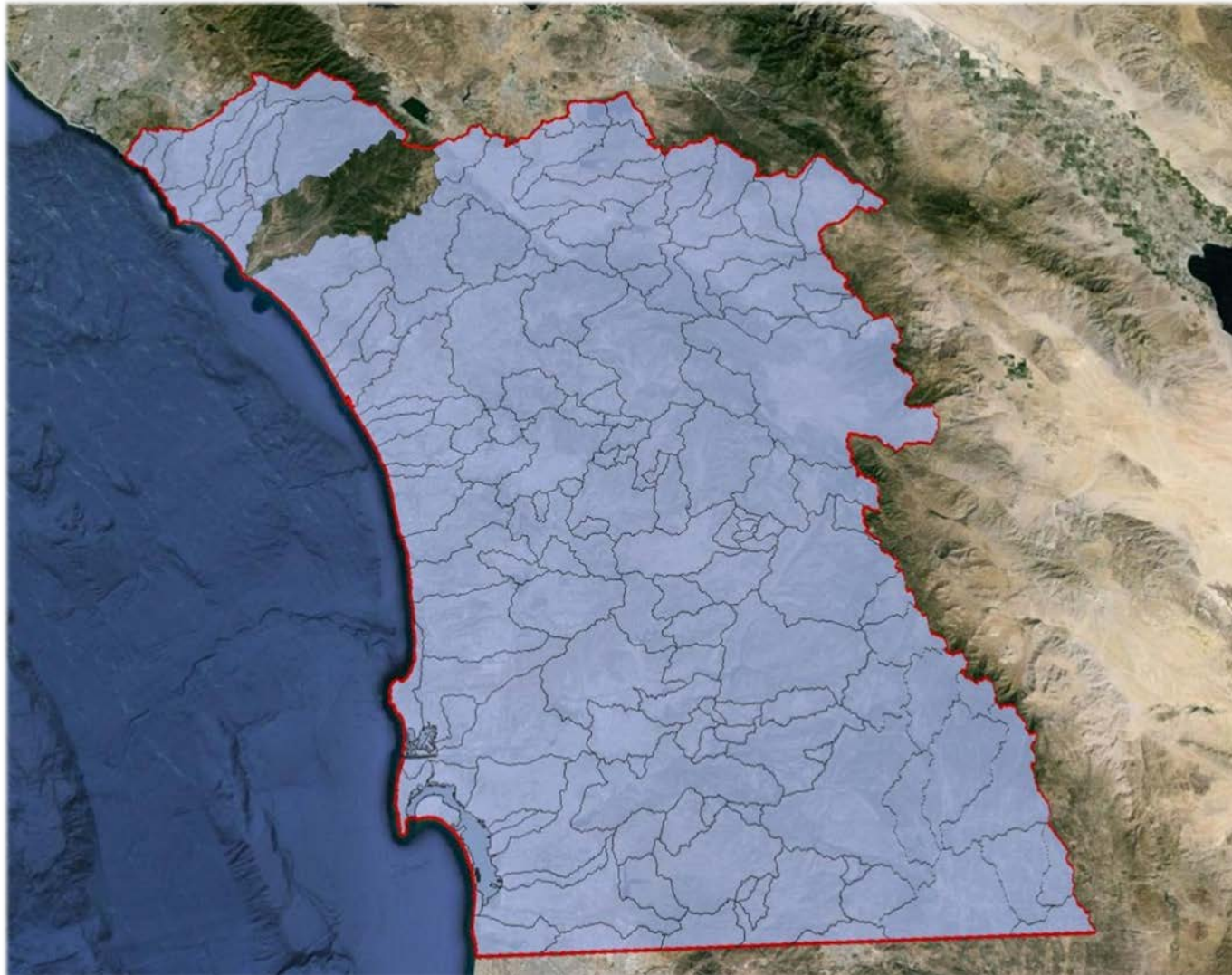
## Next Steps:

- 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

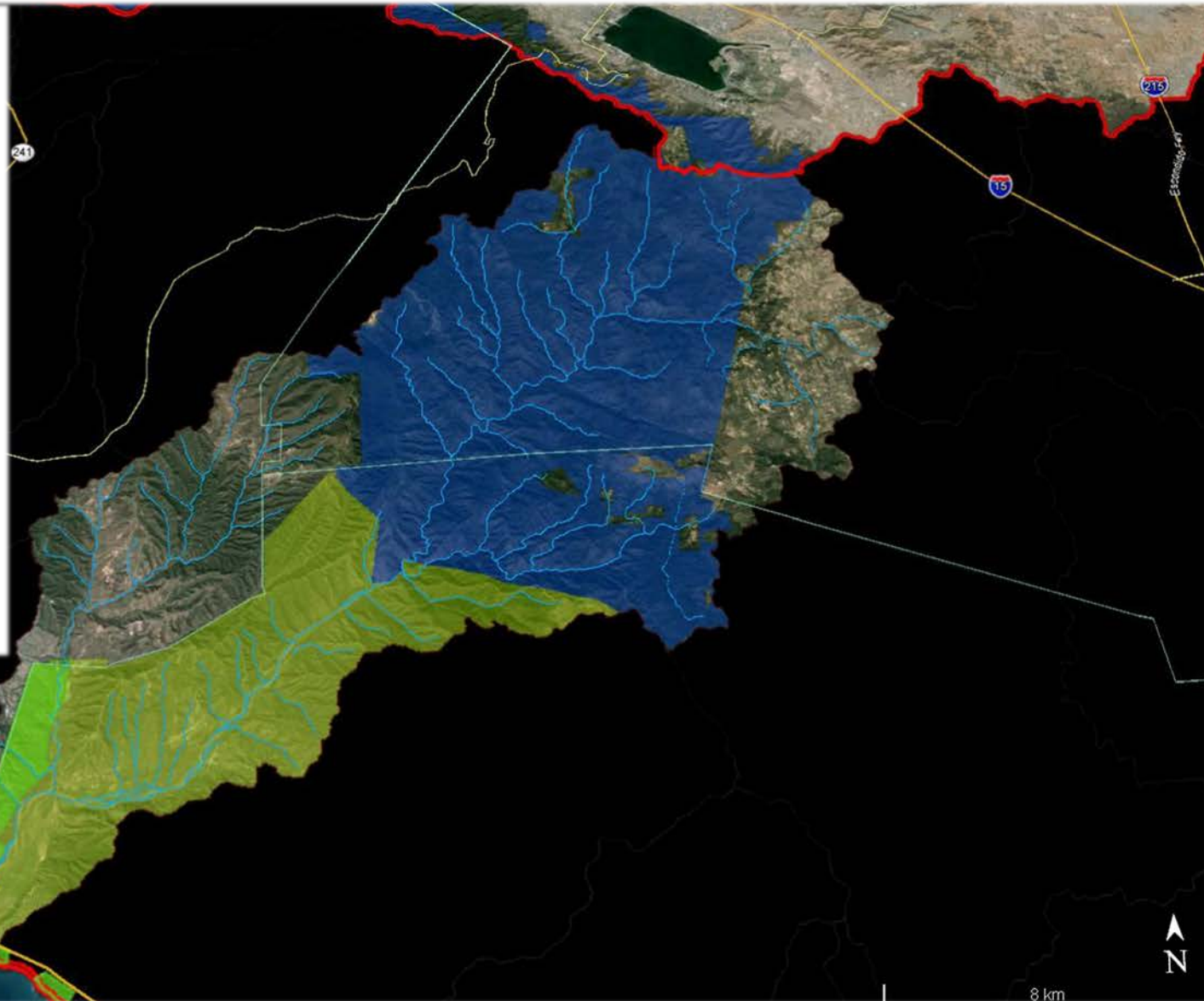
Cleveland NF:

San Mateo Wilderness

US Marine Corps:

Camp Pendleton

San Onofre State Park



Google earth

© 2016 Google  
Data CSUMB SFML, CA, OPC  
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

8 km



# San Mateo Watershed



### What Are The Steelhead Telling Us?

**They Are Anadromous**

A steelhead is the "anadromous" form of a rainbow trout. This means that a steelhead is born in a freshwater stream, swims down to the ocean as a juvenile, and then returns later as an adult, upstream to the stream to spawn.

A rainbow trout and a steelhead are really the same fish (Oncorhynchus mykiss), but they have developed two different life forms. Rainbow trout stay in the streams, and steelhead live up to five years in the ocean.

While living and growing in the ocean, steelhead fish stay, to the extent an adult steelhead grows larger, more muscular and more so when they return to fresh water, a steelhead will begin to resemble a rainbow trout again. During spawning, both fish have a bright pinkish-red hue along their sides.

Unlike a salmon which dies after spawning, a steelhead can swim back to the ocean, and may return to the original stream where it was born to spawn again during its life.

**They Have The Drive To Survive**

Steelhead have a certain life cycle that helps them survive different environments. They have a natural instinct to migrate from freshwater to saltwater and back. This ability to migrate is a survival strategy. Steelhead must migrate to the ocean to grow. The ocean provides a place where they can grow larger and stronger. After spending time in the ocean, steelhead return to freshwater streams to spawn. This cycle of migration is essential for their survival.

**They Are Important**

Thriving steelhead populations reflect healthy stream ecosystems. Steelhead use an entire stream system and they need cool, clear and CLEAN WATER that is running through a healthy riparian area. There is a strong positive relationship between healthy native riparian vegetation and healthy trout populations.

Federal, state and local government agencies actively manage stream habitat for the recovery of this species.

**Life Cycle**

**You Can Help**

Because steelhead populations have declined in many watersheds, riparian areas are being restored to support steelhead populations. You can help by:

- Removing non-native plants and animals from your property.
- Planting native plants and trees.
- Keeping your property clean and free of litter.
- Using native plants and trees in your landscaping.
- Supporting the riparian area.

**Get Involved!**

- Join a local group involved in stream habitat restoration.
- Participate in local events and projects.
- Support the efforts of local groups and government agencies working to improve stream habitats for steelhead.
- Visit www.clevelandnrf.org

San Mateo and San Juan Creeks are closed to all angling all year. Trabuco Creek is also closed to all angling all year from the I-5 bridge to San Juan Creek. Subject to fine. Title 14 CCR Section 7.50 (b), (170.5) (188.6) and (194.5).

**Cleveland National Forest**

Call CAL-TIP to report poachers and polluters. 1-888-334-2268

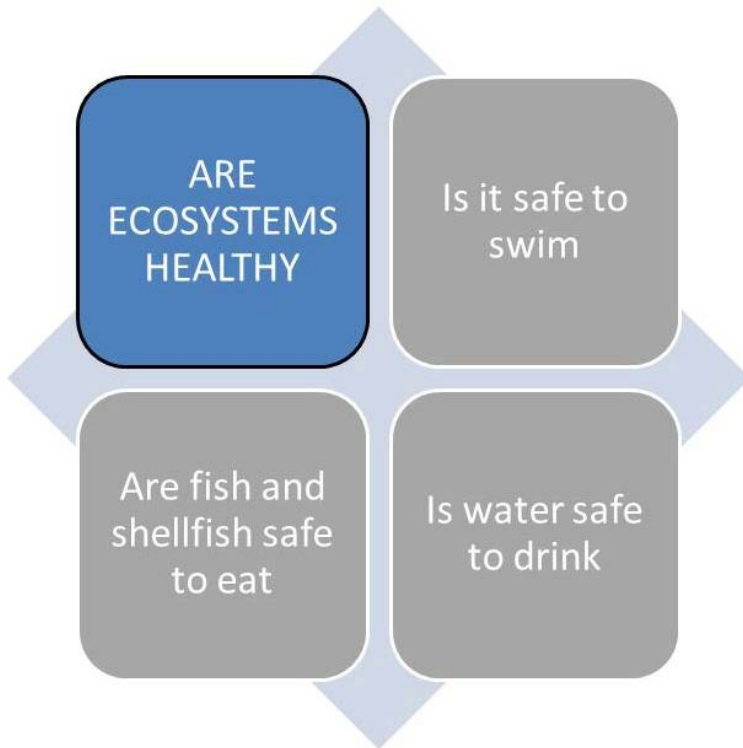
We all live downstream... Let's all keep it healthy.

03/11/2015

## Threats:

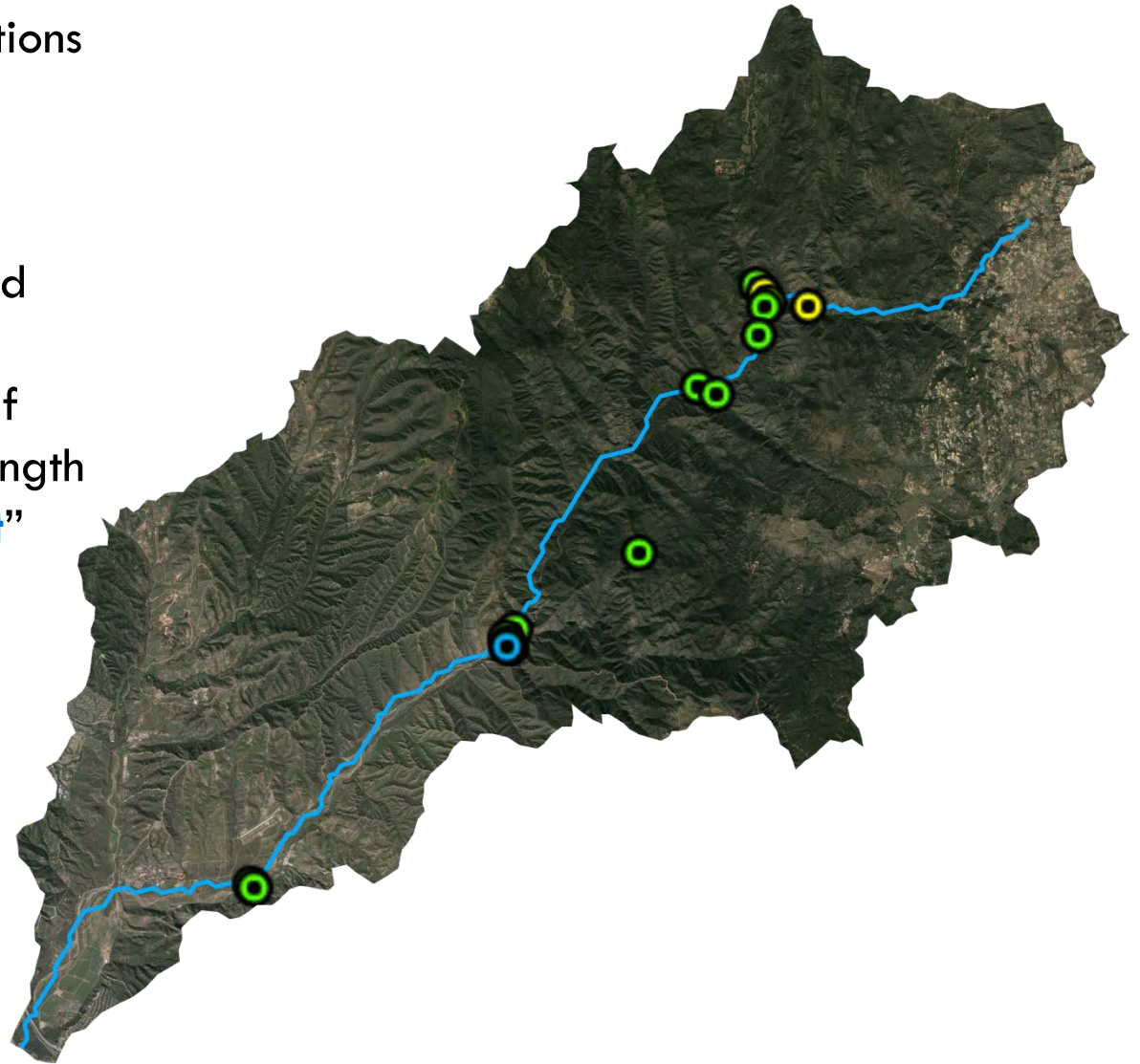
- Non-native Species
- Groundwater Withdrawal
- Development

# Assessing Ecological Health of the San Mateo Creek Watershed

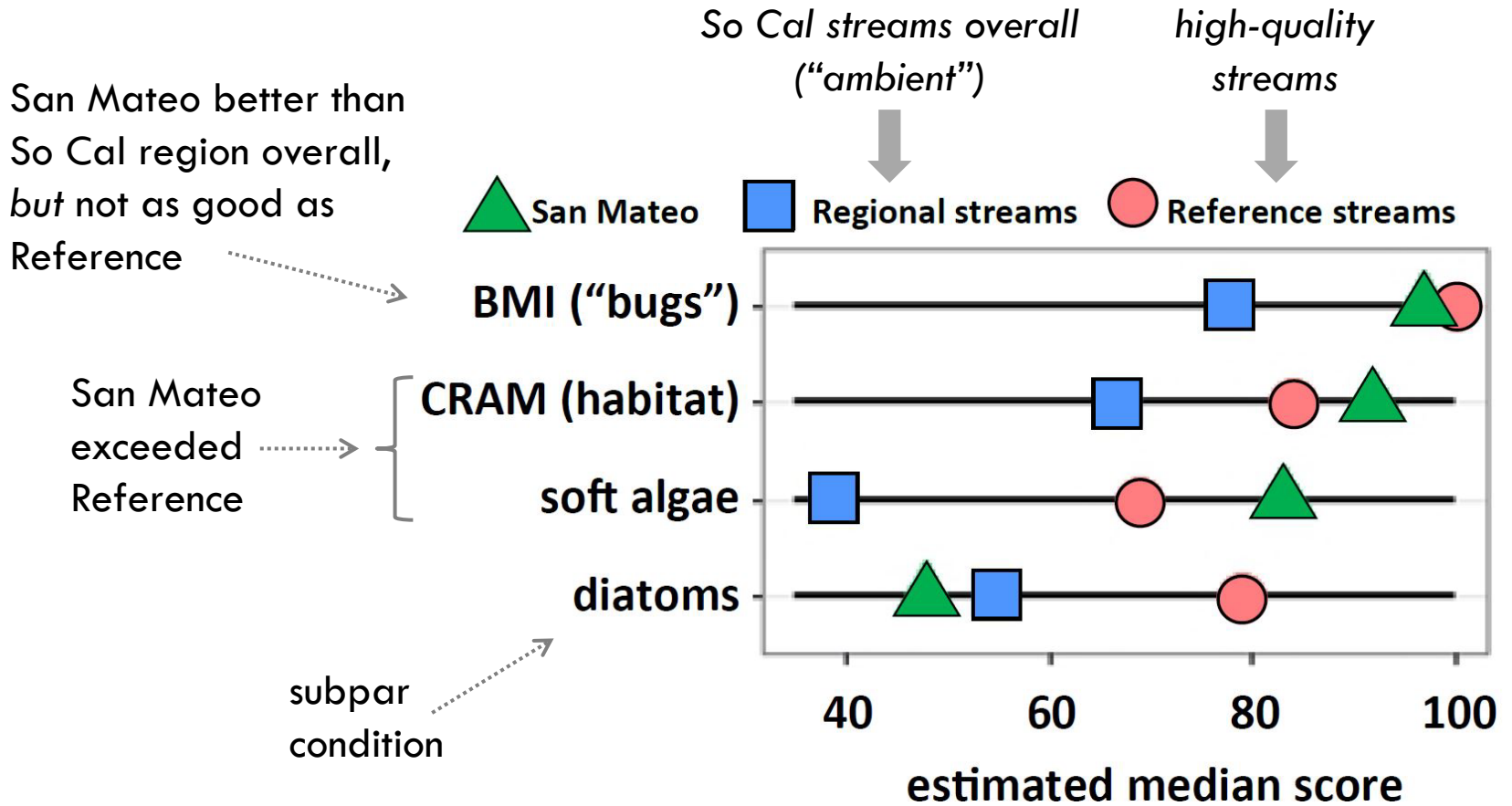


# Assessment Overview

- 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





# Estimated Stream Ecological Condition Throughout Watershed

