WATER QUALITY PROGRAM OVERVIEW

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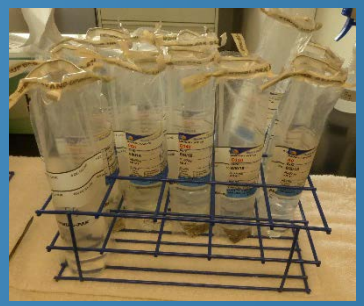
Water Quality Program Manager

03 February 2021



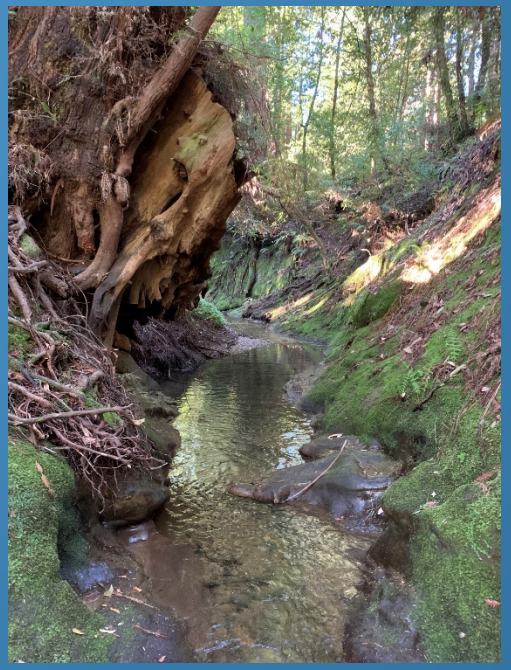
SANTACRUZHEALTH.ORG

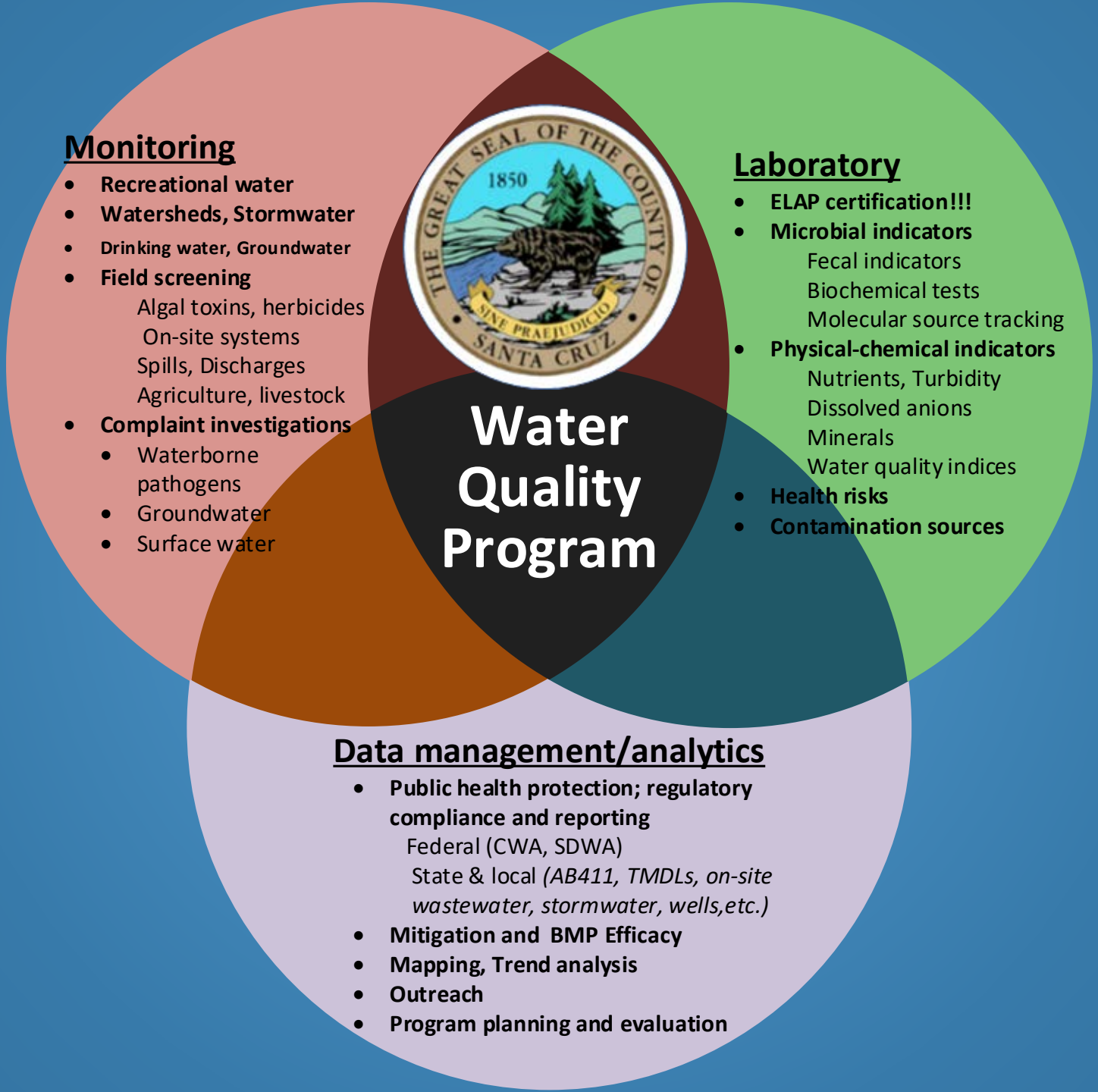
COUNTY OF SANTA CRUZ
Health Services Agency

HEALTH SERVICES AGENCY • ENVIRONMENTAL HEALTH •

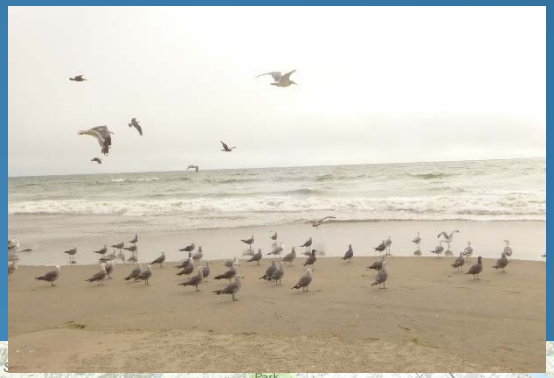
COUNTY WATER QUALITY PROGRAM

- Overview of scope of program
- Summary of monitoring activities
- Laboratory features
- Specific focus areas
  - Cyanobacterial toxins
  - Fire recovery
  - Molecular source tracking

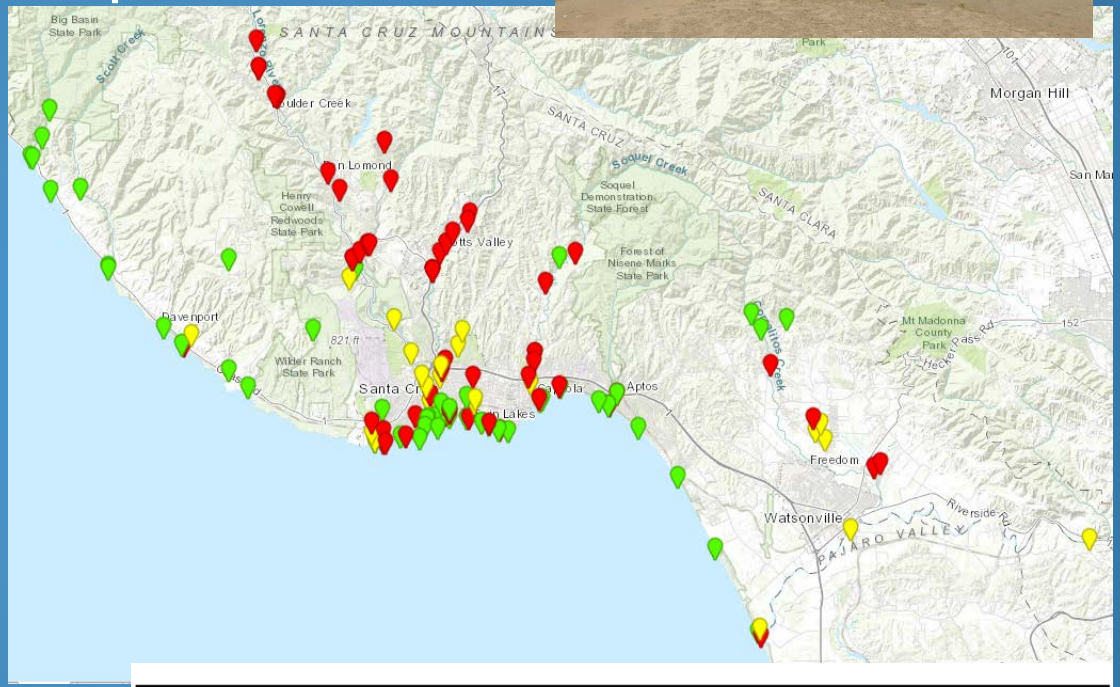



Monitoring
Recreational water
Watersheds, Stormwater
Drinking water, Groundwater
Field screening
Algal toxins, herbicides
On-site systems
Spills, Discharges
Agriculture, livestock
Complaint investigations
Waterborne pathogens
Groundwater
Surface water
Laboratory
ELAP certification!!!
Microbial indicators
Fecal indicators
Biochemical tests
Molecular source tracking
Physical-chemical indicators
Nutrients, Turbidity
Dissolved anions
Minerals
Water quality indices
Health risks
Contamination sources
Water Quality Program
Data management/analytics
Public health protection; regulatory compliance and reporting
Federal (CWA, SDWA)
State & local (AB411, TMDLs, on-site wastewater, stormwater, wells,etc.)
Mitigation and BMP Efficacy
Mapping, Trend analysis
Outreach
Program planning and evaluation

COUNTY WATER QUALITY MONITORING PROGRAM



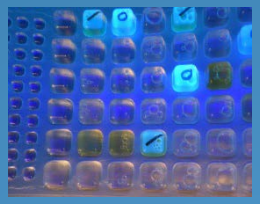
- Routine, seasonal, and episodic monitoring of 30-200 county locations per month
  - Beaches
  - Estuaries
  - Creeks
  - Rivers
- Regulatory linkages
  - Clean Water Act
    - Recreational Water
    - Impaired Waterways (TMDLs)
    - Stormwater
    - Flood control
  - Safe Drinking Water Act
- Investigatory surveillance
- Support for:
  - Snapshot Day
  - First Flush

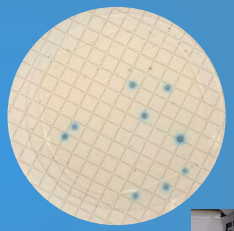


Indicator Bacteria	Beach Site Status Based on most recent beach sample: Acceptable	Caution	Health Advisory	Comment
Enterococci, MPN/ 100 mL	<80	80-103	≥ 104	*Beach **Health Advisory** triggered by single sample maximum*
Coliform bacteria E. Coli, MPN/100 mL	<200	200-400	≥ 400	
Total Coliforms, MPN/100 mL	<1,000	1,000-10,000	≥10,000	

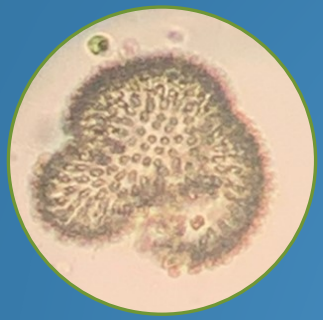
WATER QUALITY LABORATORY 1060 EMELINE

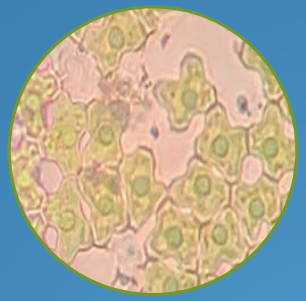
- ELAP certification through January 2022
- Certified analyses
  - Indicator bacteria
  - Heterotrophic plate counts
  - Geochemical analyses
    - pH, conductivity, turbidity
    - Color, UV-254
    - Alkalinity, Hardness, solids, sodium
  - Anion analyses
    - Chloride, Bromide, Fluoride, Sulfate
  - Nutrients
    - Nitrogen (Nitrate, Ammonia, Total-N)
    - Phosphate (Orthophosphate, Total-P)
- Investigatory assays
  - Fluorescence
  - Molecular Source Tracking (Human Markers)
  - ELISA (Enzyme-Linked ImmunoSorbent Assay)
    - Cyanotoxins, herbicides
    - Surfactants
    - Some hydrocarbons
  - Gas Chromatography (VOCs)
  - Biochemical tests





CYANOBACTERIAL TOXINS





EPA United States Environmental Protection Agency

Office of Water
EPA 822-F-19-001
May 2019

Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin

Microcystins	Cylindrospermopsin
8 µg/L	15 µg/L

California CyanoHAB Network

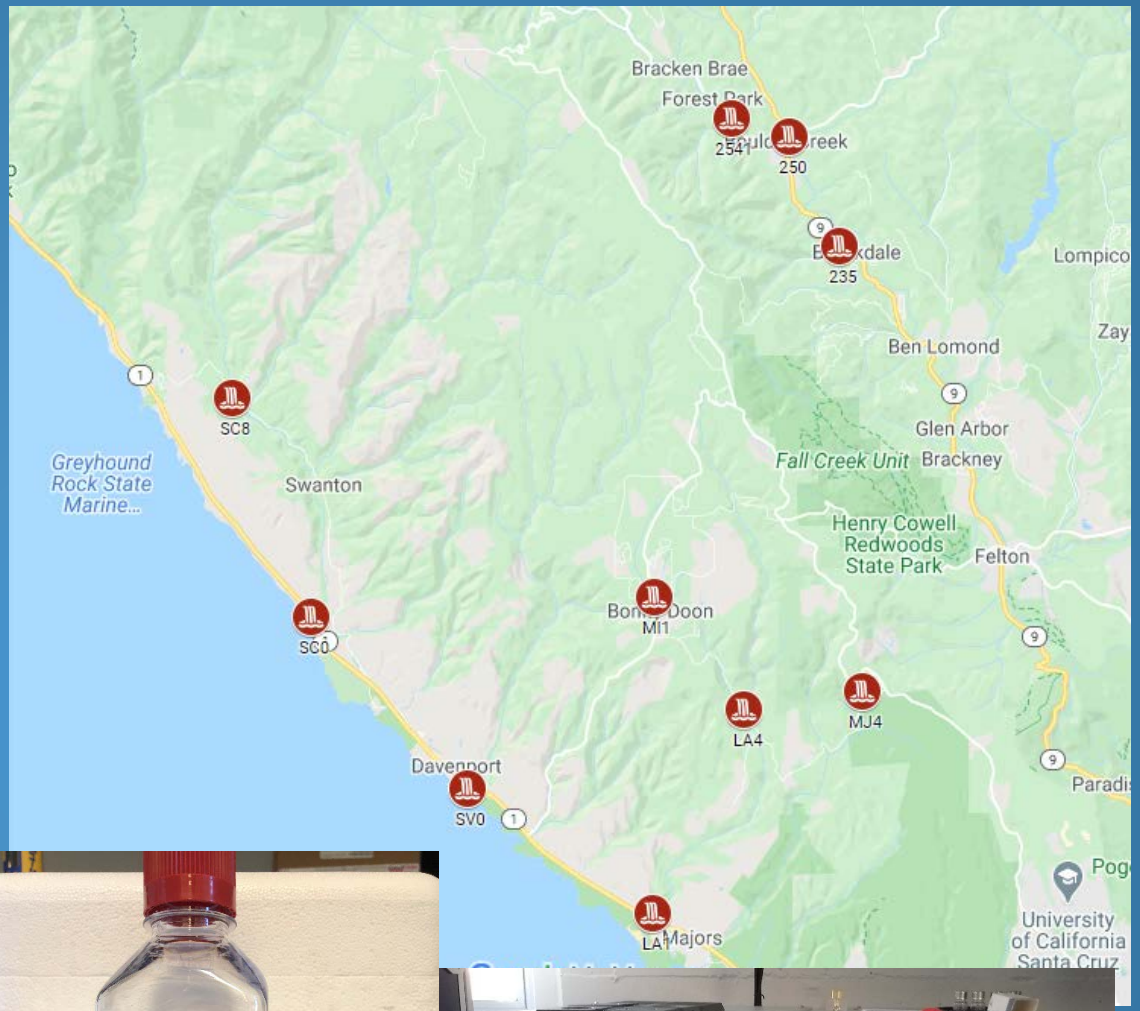
Table 1: Trigger Levels for Human and Animal Health

	Caution Action Trigger	Warning TIER I	Danger TIER II
Primary Triggers			
Total Microcystins[b]	0.8 µg/L	6 µg/L	20 µg/L
Anatoxin-a	Detection[c]	20 µg/L	90 µg/L
Cylindrospermopsin	1 µg/L	4 µg/L	17 µg/L
Secondary Triggers			
Cell Density *(Toxin Producers)*	4,000 cells/mL	--	--
Site Specific Indicators of CyanoHAB	Visible bloom/discoloration, scum, algal mats, satellite imagery,	--	--

[a] The primary triggers are met when ANY toxin exceeds criteria
[b] Microcystins refers to the sum of all measured microcystin congeners
[c] Must use an analytical method that detects ≤ 1 µg/L Anatoxin-a

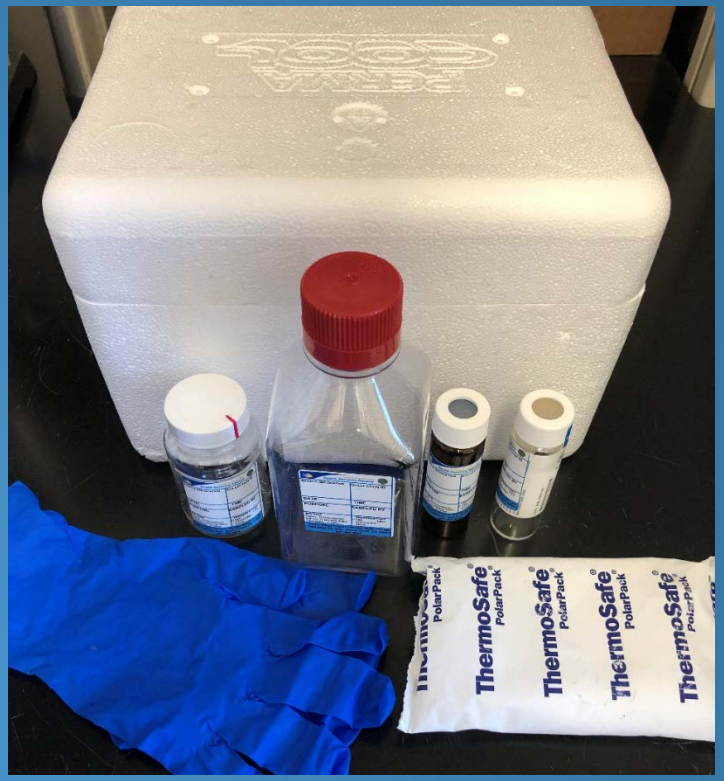
FIRE RECOVERY

- Ambient water
  - Sampling locations
    - Accessible sample sites in the North County and San Lorenzo Valley
    - Collaboration with City of Santa Cruz
  - Several sampling campaigns
    - Post-fire
    - Dry weather
    - Post-storms
- Drinking Water Testing for Fire-impacted water systems



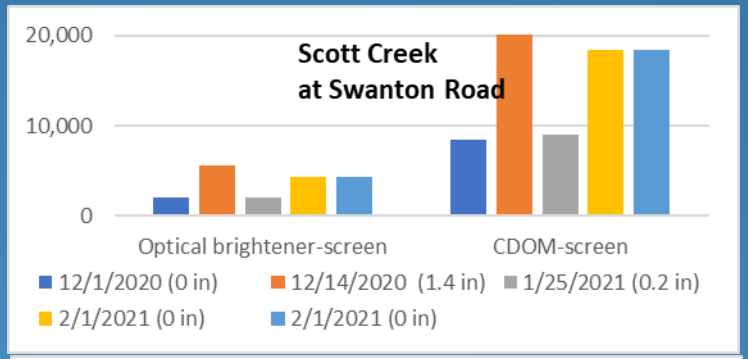
FIRE RECOVERY SUMMARY

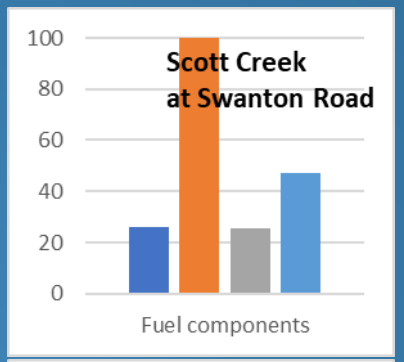
- Drinking Water Testing for Fire-impacted water systems
  - Tested ~ 50 locations to date
  - Preliminary findings
    - Bacterial contamination due to loss of pressure or breaches in system (tanks, pipes)
    - Testing for organics is still in progress
- Ambient water
  - 7 sample events
  - Preliminary findings
    - Screening tests useful for detecting site-specific changes
    - Follow-up testing and statistical analyses are in progress

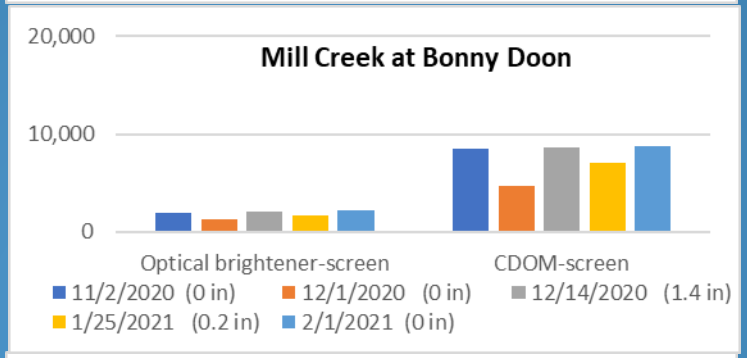


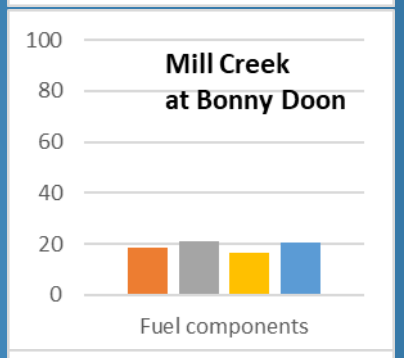
FIRE RECOVERY PRELIMINARY SCREENING DATA

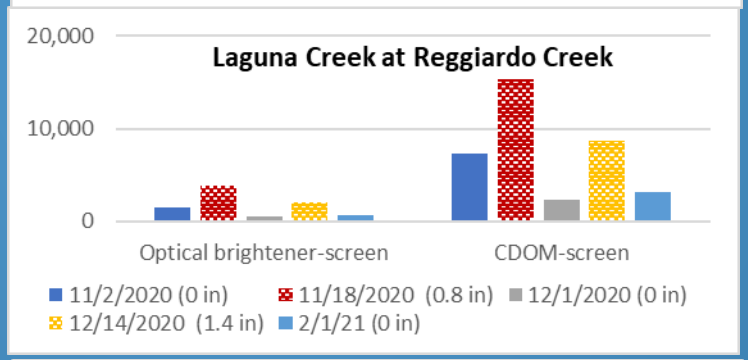
- Optical Brighteners
- Dissolved Organic Matter (CDOM)
- Fuel residues

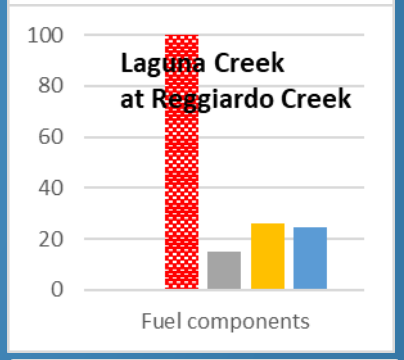


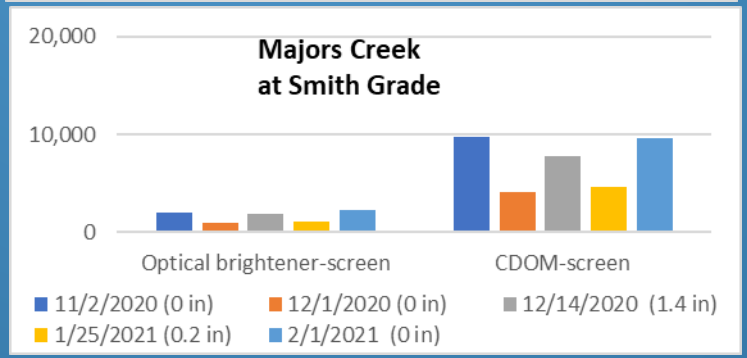


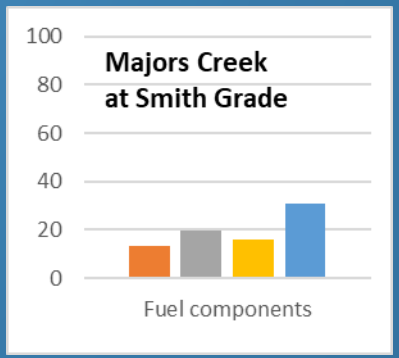




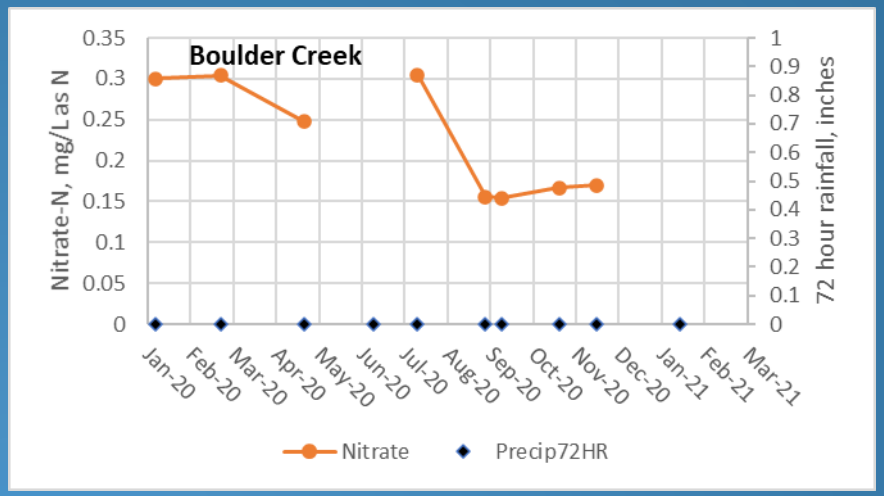


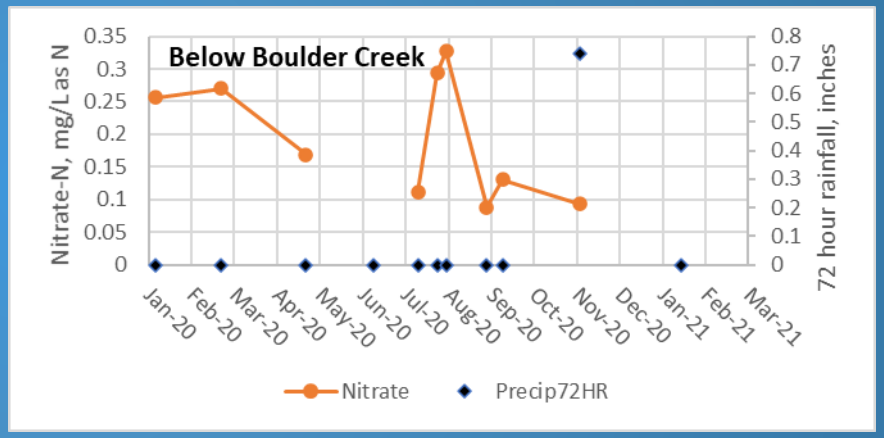


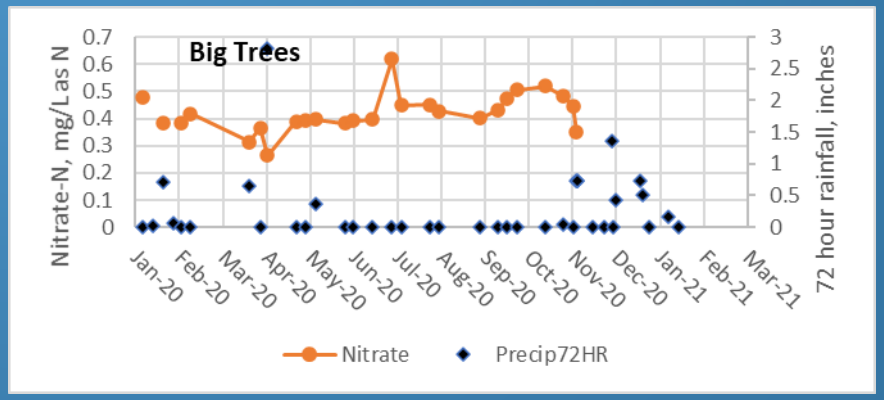




SNAPSHOT OF NITRATE DATA

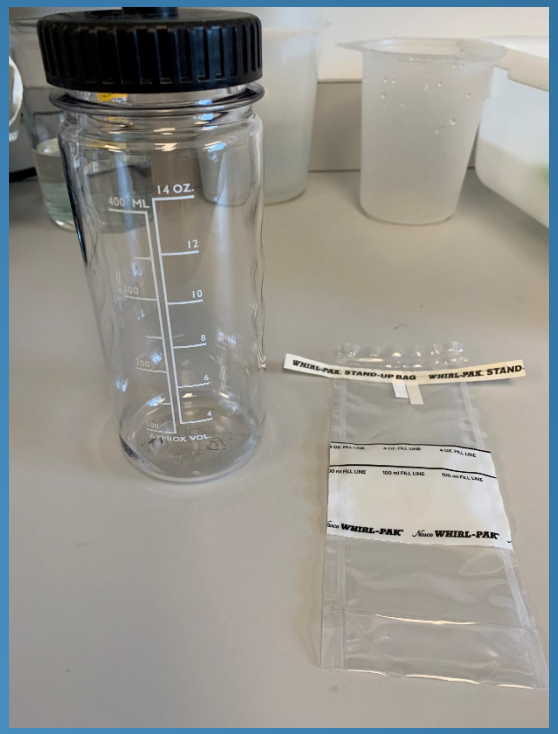






MOLECULAR ANALYSES

- HF183 – Detection of human-associated gene sequences from *Bacteroides*.
- *Enterococcus* – Rapid detection of *Enterococci* in water
- Other markers (*Lachnospiraceae*, pets, wildlife)
- Cyanobacteria, viruses, pathogens



EPA United States Environmental Protection Agency

Office of Water EPA 821-R-19-002

www.epa.gov March 2019

Method 1696: Characterization of Human Fecal Pollution in Water by HF183/BacR287 TaqMan® Quantitative Polymerase Chain Reaction (qPCR) Assay

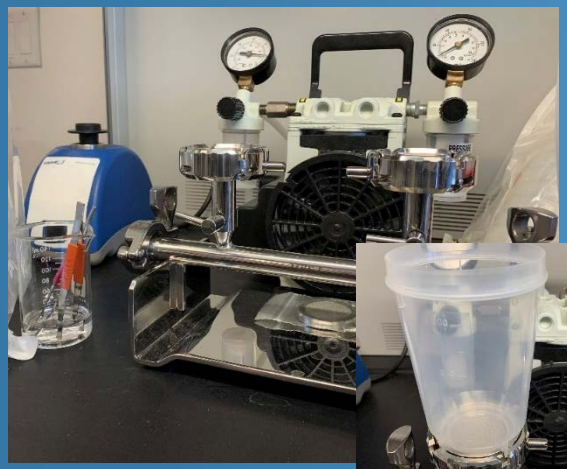
EPA United States Environmental Protection Agency

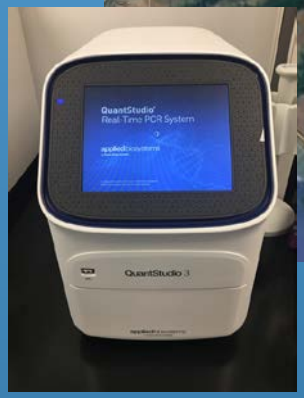
Method 1609.1: Enterococci in Water by TaqMan® Quantitative Polymerase Chain Reaction (qPCR) with Internal Amplification Control (IAC) Assay

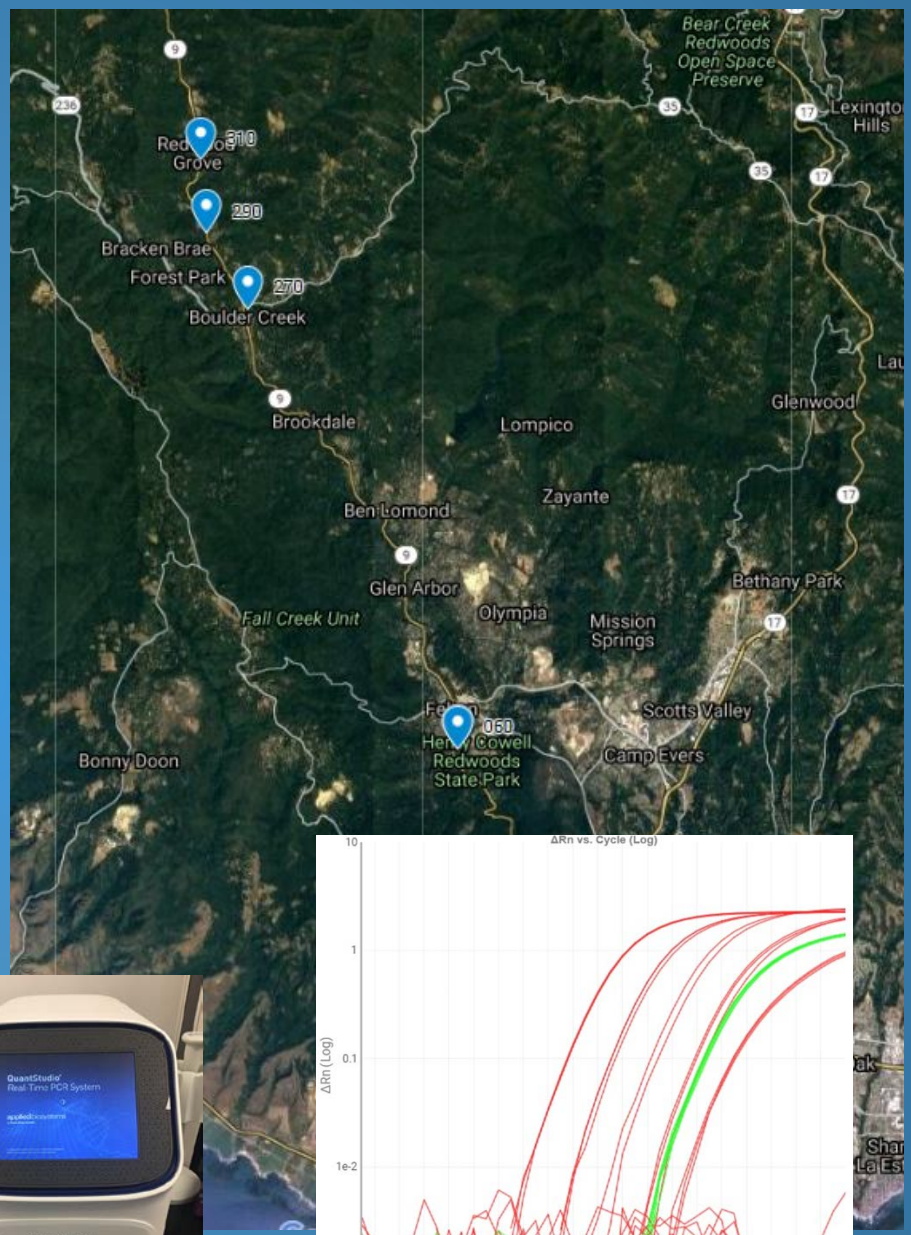
April 2015

ANALYTICAL PROGRAM

- Triplicate Filtration
- Extraction
- Rigorous Quality Control
- Assay development
- Data interpretation

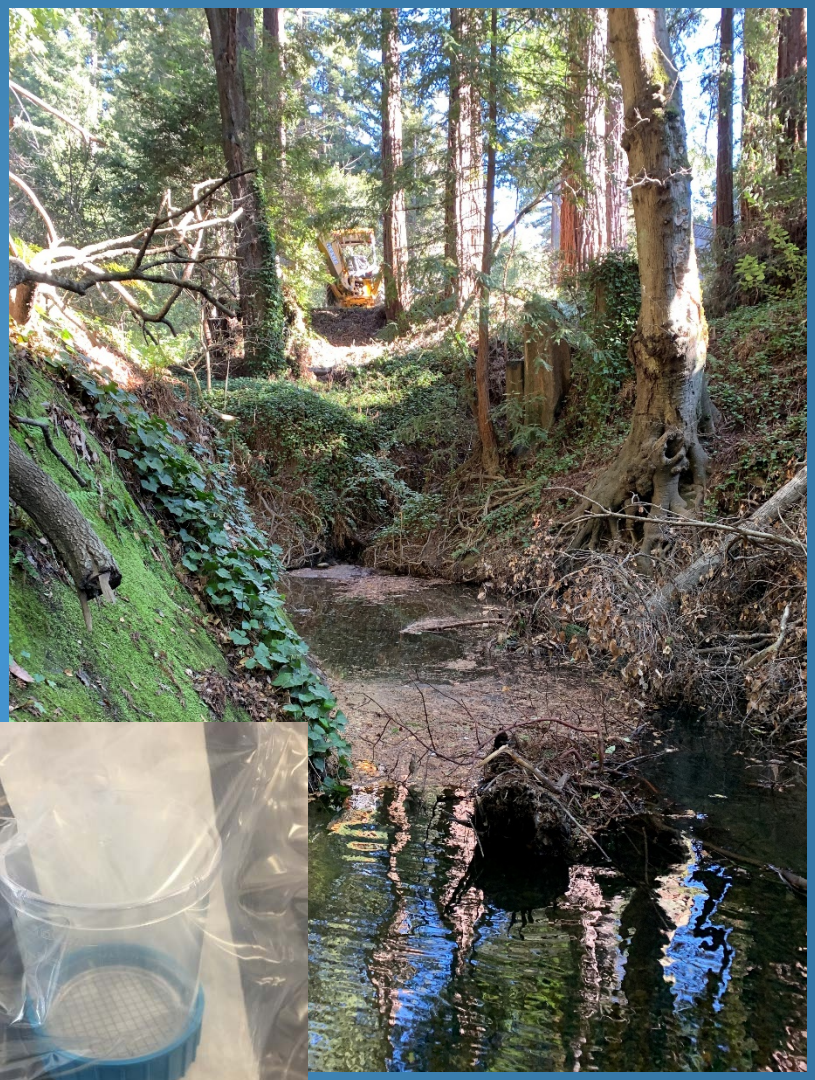


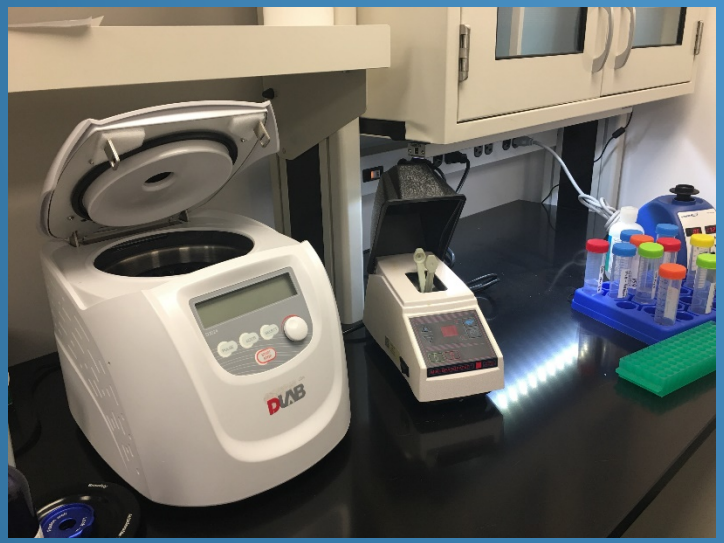




NEXT STEPS

- Ongoing testing of human markers at targeted locations
  - Stormwater
  - Downgradient of onsite wastewater systems
  - San Lorenzo River watershed
- Exploring other markers (gulls, dogs)
- Same day testing of Enterococci





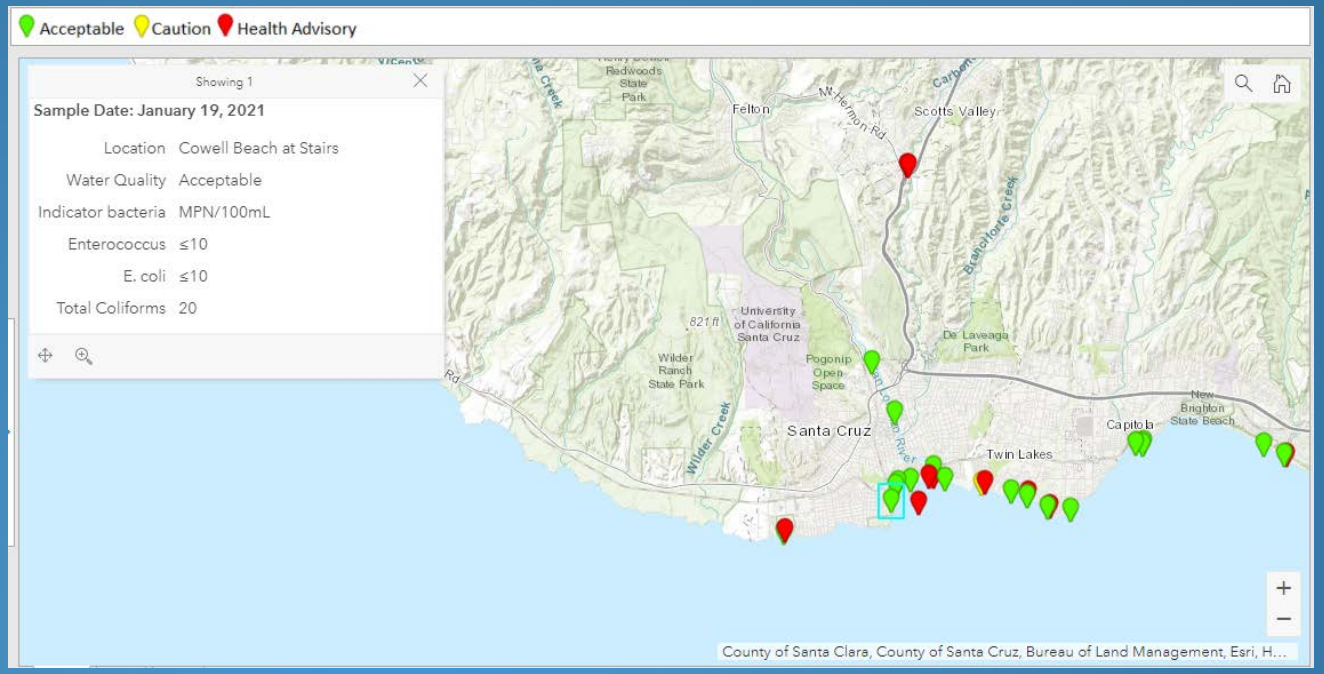
WEBSITE

- Updated from database
- Provides up-to one year of data in graphical or table format

http://scceh.com/waterquality.aspx

PHONE APP

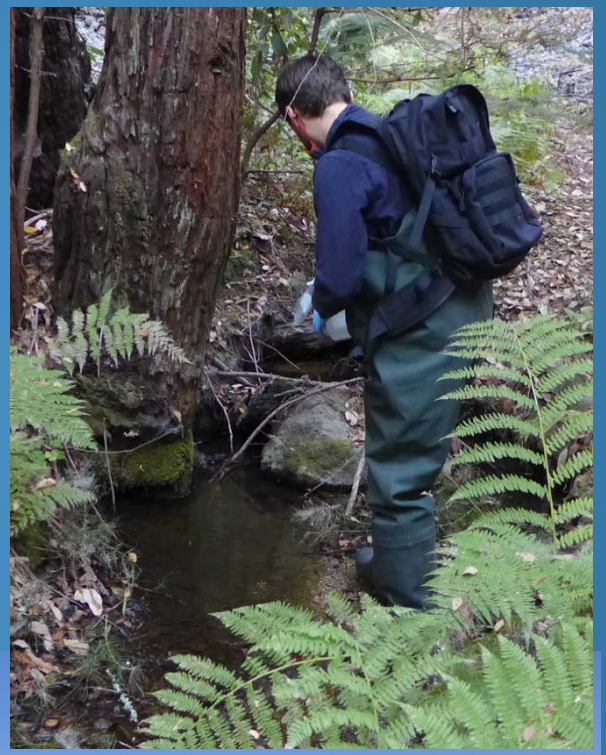
- Available from Citizen Connect
- Linked to database



http://sccgis.maps.arcgis.com/apps/opsdashboard/index.html#/d500dbfbd292461a834462cb867c2224

SUMMARY

- ELAP Certification
- Freshwater, estuarine, and beach samples
  - 1,000 to 4,000 samples per year
  - 3,000 to 50,000 analyses per year
- 2021 Themes
  - Fire recovery
  - Cyanobacterial toxins
  - Molecular Source Tracking
  - Support for regulatory programs



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831.454.3624

CALIFORNIA REQUIREMENTS

AB411 (1999): Weekly microbiological testing between April 1st and October 31st of waters adjacent to public beaches that are

2018 California Code
Health and Safety Code - HSC
DIVISION 104 - ENVIRONMENTAL HEALTH
PART 10 - RECREATIONAL SAFETY
CHAPTER 5 - Safe Recreational Water Use
ARTICLE 2 - Public Beaches

- Section 115875.
- Section 115880.
- Section 115881.
- Section 115885.
- Section 115890.
- Section 115895.
- Section 115910.
- Section 115915.

- Visited by more than 50,000 people annually
- Adjacent to a conveyance through which water flows onto or adjacent to a public beach or into an ocean water-contact sports area; conveyances include rivers, creeks, streams, and natural or constructed channels (generically referred to as storm drains) .

Fecal Indicator Bacteria	Single Sample Maximum, MPN/100 mL or CFU/100 mL		30-day Geometric mean) MPN/100 mL	
	Ocean beaches	Freshwater beaches	Ocean beaches	Freshwater beaches
Enterococci	104	61	35	33
Coliforms				
Total Coliform	10,000	10,000	1,000	1,000
Fecal Coliform	400	400	200	200
Escherichia Coliform		235		126
Fecal /Total Coliform Ratio ≥ 0.1	Total <1,000	N/A	N/A	N/A