

Increasing Efficiency & Effectiveness Through Collaboration

Jon B Marshack, DEnv
Monitoring Council
Executive Director

Everyone Needs Data

- 💧 211,000 miles of rivers & streams
- 💧 1.6 million acres lakes
- 💧 1,100 miles of coastline
- 💧 1.3 million acres of bays and estuaries
- 💧 15 million acre-feet of groundwater extracted per year



The Data and Information Problem

2010 Clean Water Act Section 303(d)
Impaired Waters Map of California



The Response – CA Senate Bill 1070



- Became California law in 2006
- Required formation of the California Water Quality Monitoring Council
 - Memorandum of Understanding between
 - California Environmental Protection Agency
 - California Natural Resources Agency
- Required recommendations – December 2008
 - To maximize efficiency and effectiveness of existing water quality data collection and dissemination
 - To ensure data available to decision makers and public
- *A Comprehensive Monitoring Program Strategy for California* – December 2010

Monitoring Council Members



**California Division
of Drinking Water**



The Monitoring Council's Solution

Don't get mired in technical details!

- 💧 Focus first on streamlined data access
 - 💧 Theme-based web portals
 - 💧 Directly address users' questions
 - 💧 Single global point of entry
- 💧 Theme-specific workgroups
- 💧 Overarching Monitoring Council guidance



Theme-Specific Workgroups

Issue-experts represent key stakeholders

Monitoring Council

Develop web portal

Develop monitoring & assessment methods & data management procedures

Achieve standardization to meet users' needs

Coordinate monitoring programs

A Comprehensive Monitoring Program Strategy for California



www.MyWaterQuality.ca.gov/monitoring_council

Monitoring Council Workgroups



Website and Portals

www.MyWaterQuality.ca.gov



[Home](#)

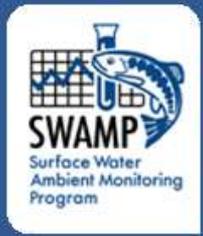
Welcome to My Water Quality

This web portal, supported by a wide variety of public and private organizations, presents California water quality monitoring data and assessment information that may be viewed across space and time. Initial web portal development concentrates on four theme areas, with web portals to be released one at a time. Click the [Contact Us](#) tab for more information.

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, thereby identifying areas for needed improvement in order to better address the public's questions. Questions and comments should be addressed through the [Contact Us](#) tab.



- » Cal/EPA
- » Natural Resources Agency
- » About the California Water Quality Monitoring Council
- » Web Portal Partners
- » Monitoring & Assessment Programs, Data Sources & Reports
- » Water Quality Standards, Plans and Policies
- » Regulatory Activities
- » Enforcement Actions
- » Research
- » State & Regional Water Boards
 - » Performance Report
 - » About SWAMP
 - » SWAMP Tools



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. [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. [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. [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. [\[Future Portal\]](#)

Safe-to-Swim Workgroup

- First portal released to public – July 2009
- Initial focus – coastal beaches
bacterial indicators & beach closures
 - Future expansion – inland waters bacteria & HABs
- Developing improved data management system
 - New Beach Watch database for coastal data
 - Data feed to CEDEN and USEPA
 - Combine with inland waters bacterial indicator data
- Portal and workgroup funding through State Water Board



Home >> Safe To Swim



Is It Safe to Swim In Our Waters?

Show County Info:



Beach water quality monitoring and strong pollution prevention measures are critical for protecting beach goers from waterborne diseases. Monitoring is performed by city and county health agencies, publicly owned sewage treatment plants, other dischargers, environmental groups and numerous citizen-monitoring groups.

View Monitoring and Assessment Information

- >> Click on a county or;
- >> Select from the Show County Info menu.

QUESTIONS ANSWERED

- >> [Can I swim at my beach, lake, or stream?](#)
- >> [How clean was my beach, lake, or stream during the past week or month?](#)
- >> [What are the long-term trends at my beach, lake, or stream?](#)
- >> [Which beaches, lakes, and streams are currently closed by county health agencies?](#)
- >> [Which beaches, lakes, and streams are listed by the State as impaired?](#)
- >> [Are the problems getting better?](#)

- >> Cal/EPA
- >> Natural Resources Agency
- >> About the California Water Quality Monitoring Council

SAFE TO SWIM LINKS

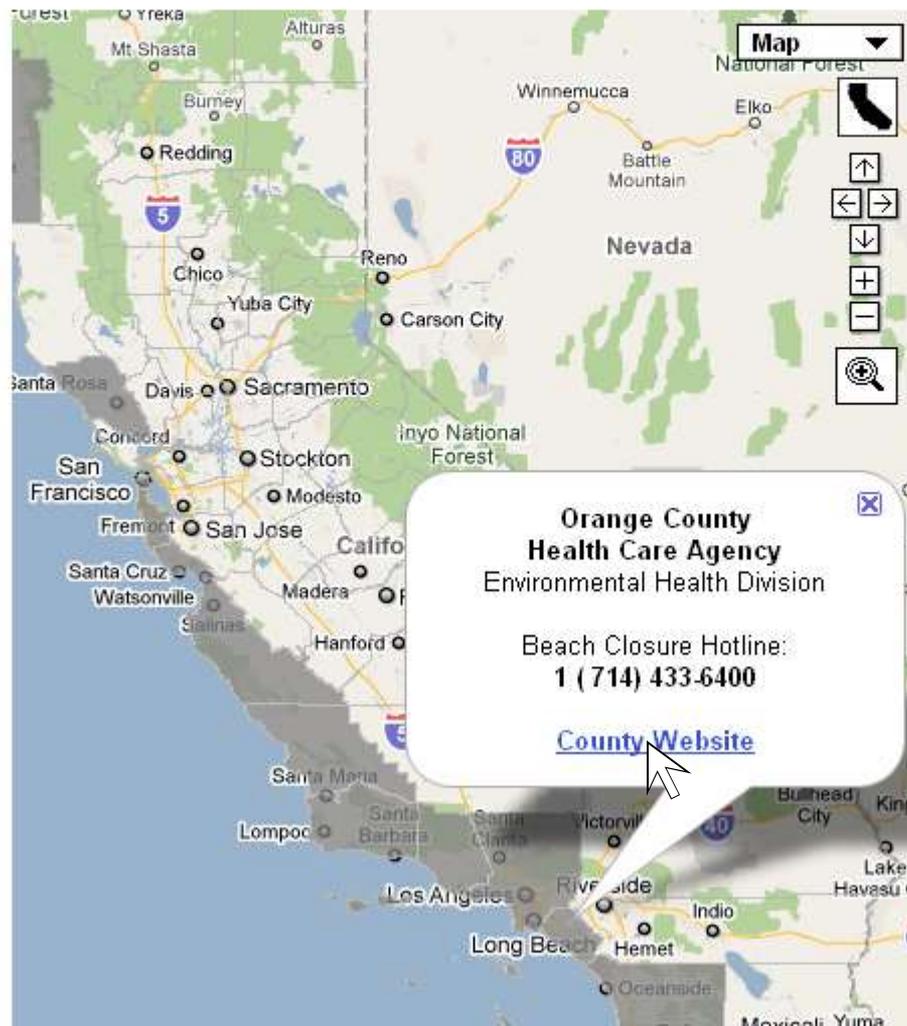
- >> Pollution Sources & Health Risks
- >> Laws, Regulations & Standards
- >> Regulatory Activities
- >> Enforcement Actions
- >> Research
- >> Monitoring Programs, Data Sources & Reports

Home → Safe To Swim → Closures Postings

Which Beaches, Lakes, or Streams are Currently Closed or Posted by County Health Agencies?



Show County Info:



Ocean Beaches

This interactive map provides access to the most current information on postings and closures.

- Postings - Warnings to avoid contact with the water. Monitoring shows bacteria levels exceed standards.
- Closures - Prohibitions on uses of water. Imminent public health threats, such as sewage spills.

This information is updated daily to weekly, depending on the county.

View Posting and Closure Information

- Click on a county or
- Select from the Show County Info menu.

Freshwater Lakes and Streams

A few county health agencies provide creek and lake information along with ocean beach information. Otherwise, lake and stream information is currently unavailable electronically.

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Ocean Water Protection Program

Health Care Agency



Google Search

Google Custom Search

OC Beach Menu

Homepage

Beach Information

Downloads

FAQ

Links

Shellfish toxins

Annual Report



Health Care Agency
Public Health
Environmental Health

Ocean Water Protection Program

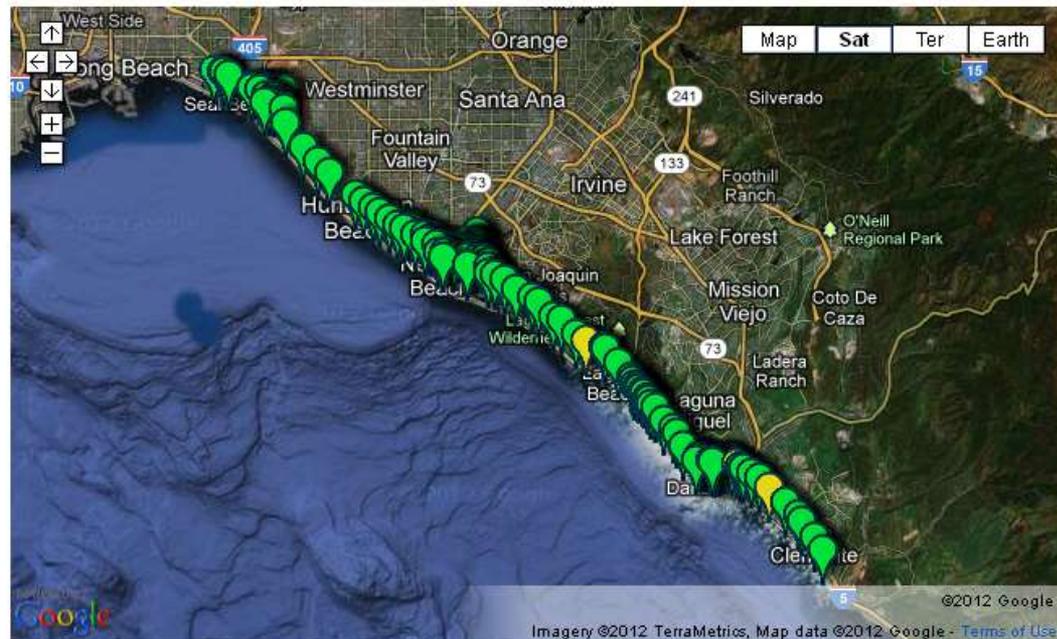
Ocean water bacteria levels meet state health standards.

Ocean water bacteria levels exceed state health standards and may cause illness.
[More Information](#)

Ocean water is closed due to sewage contaminated water.

Use the menu bar below to view the map and current water quality status of your favorite local beach.

- Huntington Beach
- Newport Beach
- Laguna Beach
- Dana Point
- San Clemente



Google Map Tips



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[RSS](#) [Print](#) [Email](#) [Link](#)

Beach Grades

Historical Data

Documents

FAQ

Select Grades

[\[West Coast\]](#) [\[State View\]](#)

Grade Type: Dry Wet [\[?\]](#)

Los Angeles County [\[v\]](#)

Search Beach [Go](#)

Predefined Searches [\[v\]](#)

Los Angeles County

Sort By Name [\[v\]](#)

40 [Long Beach City Beach- projection of Coronado Ave.](#)

Los Angeles County
A dry, ns wet

41 [Long Beach City Beach- projection of Granada Ave.](#)

Los Angeles County
A+ dry, ns wet

42 [Long Beach City Beach- projection of Molino Ave.](#)

Los Angeles County
F dry, ns wet

43 [Long Beach City Beach- projection of Prospect Ave.](#)

Los Angeles County
A dry, ns wet

All Beaches

Terrain Satellite Map

[\[Recenter Map\]](#) [\[Expand\]](#)

Los Angeles County

[\[max zoom\]](#) [\[set as default\]](#) [\[close\]](#)

Long Beach City Beach- projection of Molino Ave.

Grades based on a 30-day period ending 1/19/2012

Dry Weather [?]	Wet Weather [?]
F	ns
	No samples taken or available

Location: Long Beach, Los Angeles County, CA 90803

Current Condition: Wind:

[Get Directions](#) [Extended Forecast](#)

[Get Updates via RSS](#) [Add a widget to my site](#)

[\[Report an Issue with this Beach\]](#)

State Alerts

[4 Closures](#)

[2 Rain Advisories](#)

[Learn More](#)

State Summary

Heal the Bay analyzed data for [359 locations](#) in California this grading period. Grades updated on Fridays.

What's New

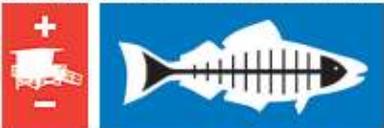
9/27/2011
[2011 End of Summer Beach Report Card](#)

Volunteer

Be Safe at the Beach

Tips for Clean Beaches

Get Connected



Presented by [Heal the Bay](#)

[RSS](#) [Print](#) [Email](#) [Link](#)

Beach Grades

Historical Data

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All Beaches [Traffic](#) [Terrain](#) [Satellite](#) [Map](#)

[\[Recenter Map\]](#) [\[Expand\]](#)

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What are the Long-Term Bacteria Trends at My Beach, Lake, or Stream?



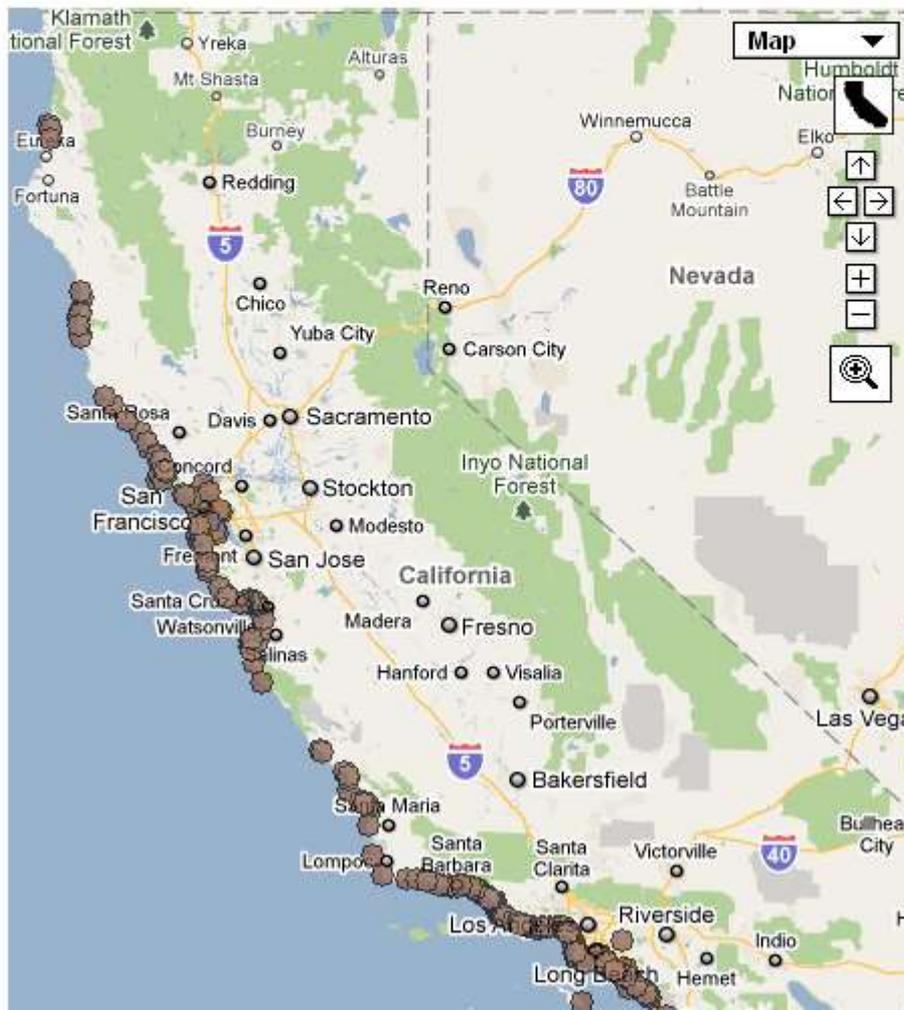
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SAFE TO SWIM LINKS

- Pollution Sources & Health Risks
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All Show county



Understanding trends allows decision makers to determine whether pollution sources are increasing in magnitude and/or frequency and the effectiveness of control measures.

View Trends in Bacterial Indicator Levels

The interactive map below provides sampling results for coastal beach monitoring locations over time. A few county health agencies provide creek and lake information along with ocean beach information. Otherwise, lake and stream information is currently unavailable electronically.

- To find bacterial sample results for a particular site, first select the county, then click on a site location. The results will appear to the right of the map. Results may take time to appear.
- Place your mouse cursor over a point on the chart to see the date and sample result for a particular sample event.

Horizontal lines on the charts represent bacterial water quality objectives specified in the [2005 California Ocean Plan](#).

→ **Red** is the Single Sample Maximum



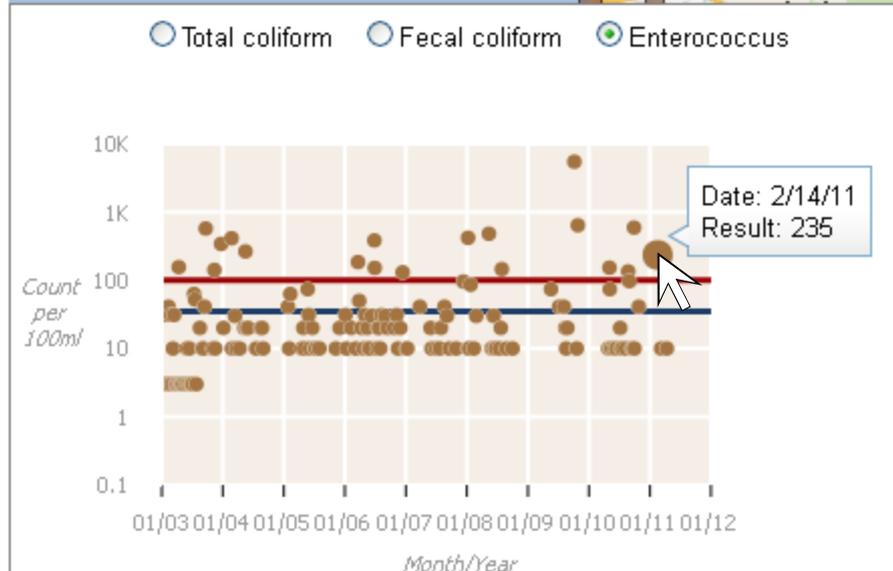
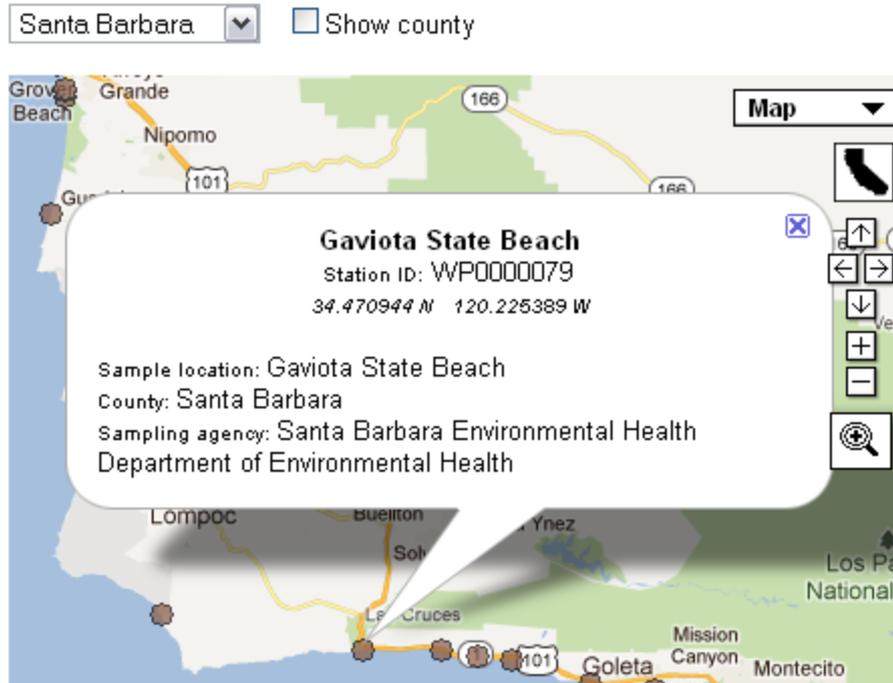
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Horizontal lines on the charts represent bacterial water quality objectives specified in the [2005 California Ocean Plan](#).

- **Red** is the Single Sample Maximum objective. Sample points above this line represent violations of the objective.
- **Blue** is the 30-day Geometric Mean objective - the geometric mean of the five most recent samples from each

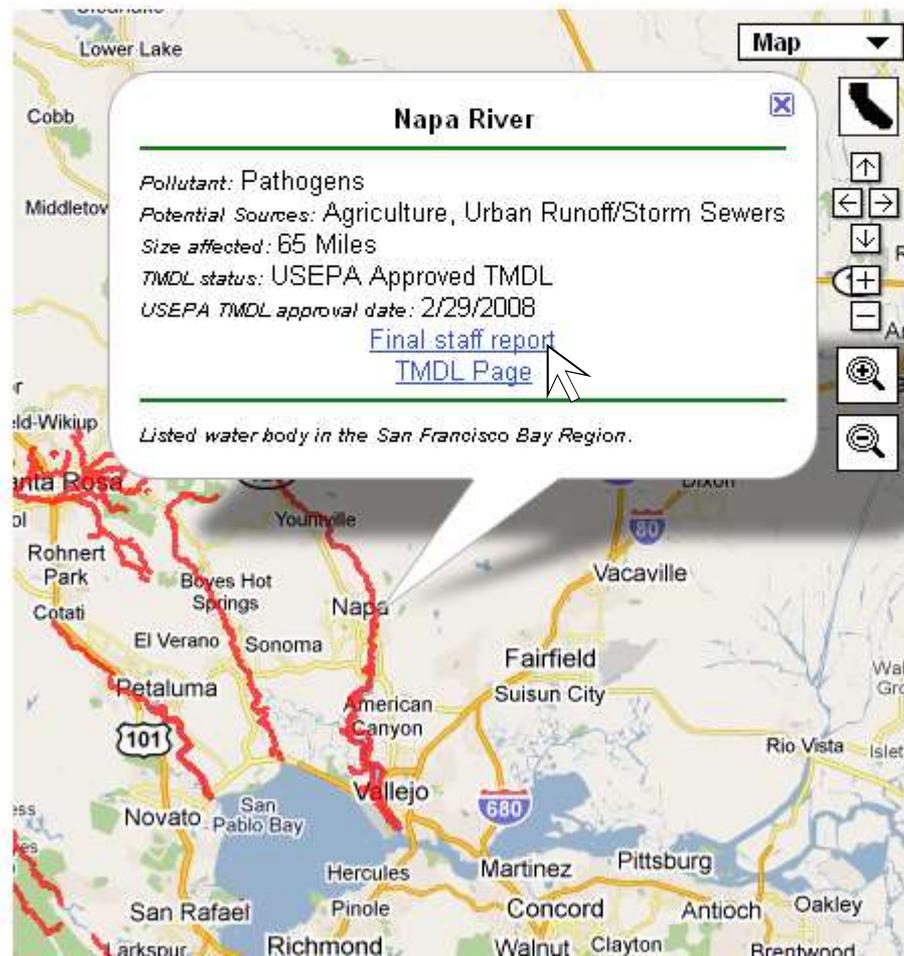
Home → Safe To Swim → Impaired Beaches

Which Beaches, Lakes, and Streams Are Listed as Impaired for Bacterial Indicators?



County: Water Body:

Show county



This interactive map shows which of California's waters are listed as impaired for contact recreation related factors and which pollutants are involved. Also shown are potential sources of pollutants and the Total Maximum Daily Load (TMDL) projects to reduce pollutants to acceptable levels.

View 2006 303(d) Listing and current TMDL Information:

- Click on a water body (shown in red), or;
- Select (or type) the county in the County box, then select the water body from the Water Body menu, or;
- Select (or type) the water body name directly in the Water Body box.

Impaired Water Bodies

Listing a water body as impaired in California is governed by the [State Water Board's 303\(d\) Listing Policy](#).

Regional Water Boards assess water quality data for California's waters every two years to determine if they contain pollutants at levels that exceed protective water quality criteria and standards. This biennial assessment is required under Section 303(d) of the [federal Clean Water Act](#).

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1 / 97

75%

Sign

Find

Pathogens in the Napa River Watershed Total Maximum Daily Load (TMDL)

Staff Report



**California Regional Water Quality Control Board
San Francisco Bay Region**



Clean Beaches Initiative (CBI)

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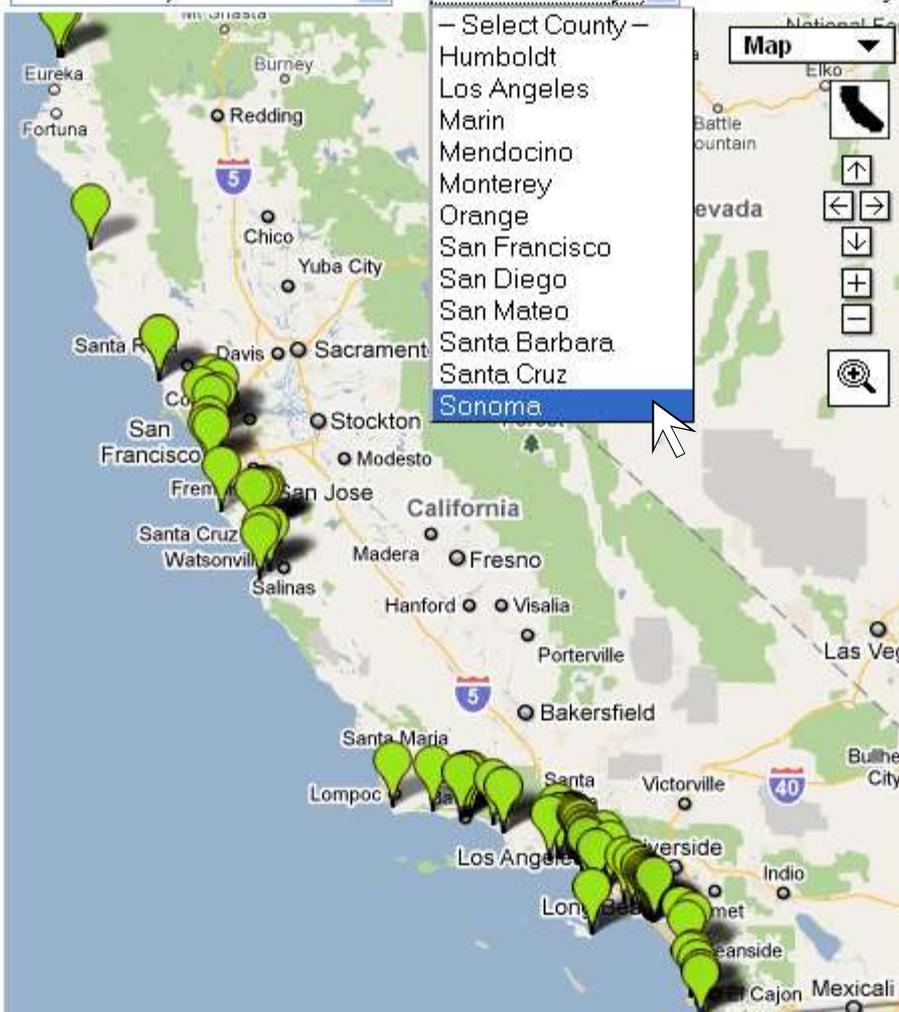
Zoom to project:

– Select Project –

Zoom to county:

– Select County –

Show county



The Clean Beaches Initiative Grant Program addresses postings and closures at California public beaches caused by bacterial contamination. CBI grants help local agencies, non-profit organizations, and public agencies implement projects that protect and restore California's coastal water quality. This interactive map presents coastal water quality improvement projects funded by the CBI Grant Program.

View Information on a Specific CBI Grant Project

- Click on a map location, or
- Select the project name from the pop-up menu.

Statewide Clean Beaches Initiative Information

- For more information about a specific project, email [Patricia Leary](#) or phone (916) 341-5167
- Clean Beach Videos

→ English Version:

- [no subtitles](#)
- [subtitles](#)

→ Versión Español:

- [sin subtítulos](#)





Clean Beaches Initiative (CBI)

Zoom to project: Zoom to county: Show county

Campbell Cove

Project: Study/Source Abatement
 Water Board funding: \$285,000
 Fund source / project no(s): Prop. 13 / 36

Contact(s):
 Diana Henriouille, (707) 576-2350
dhenriouille@waterboards.ca.gov

[View Project Report](#)

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Fecal Bacteria Source Identification Study at Campbell Cove State Beach, Bodega Bay

Campbell Cove State Beach, Bodega Bay is a popular beach for families, school field trips, kayaks, divers, etc. because of its beach being protected from the rough northern California surf and water temperatures often 10° warmer than the open coastline water temperatures. A year-round source of freshwater flows from the “Hole-in-the-Head” pond onto the beach that attracts a constant flock of sea gulls who like to drink from the creek. However, a phenomenon has been observed of elevated fecal bacteria contamination typically during the fall months that led to a Clean Beaches Initiative (CBI) Grant that should help lower the level of bacteria at the beach.



The County of Sonoma Environmental Health Division in cooperation with the North Coast Regional Water Quality Control Board, Bodega Marine Laboratory and California Parks and Recreation Department to date have ruled out the State beach's vault privy (see attached photo) through extensive dye studies. The California Parks and Recreation Department has implemented a dog ban notice. The Bodega Marine Laboratory has completed one study phase of tidal circulation patterns in May 2003 and is conducting a second study the week of October 13-17, 2003. Results from the May 2003 tidal circulation study indicated: strong tidal circulation with high rate of flushing within Bodega Harbor including Campbell Cove and small area of tidal intake outside the harbor mouth limited to less than 300 meters.



The County of Sonoma contracted with Dr. Mansour Samadpour with the Institute for Environmental Health to conduct

Bioaccumulation Oversight Group

- Second portal released to public – December 2009
- Initial focus – threats to human consumers from sport fish
 - Expanding – threats to aquatic life and wildlife
- Workgroup strategy in place to coordinate monitoring, assessment and reporting
- First comprehensive statewide survey of contaminants in sport fish from California waters
- Data lead to the first statewide advisory on eating fish from lakes and reservoirs (OEHHA)
- SWAMP standard methods & QA
- Data managed through CEDEN
- Funding from Water Boards & USEPA through SWAMP



Home → Safe To Eat



Is It Safe to Eat Fish and Shellfish From Our Waters?

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- National Perspective

Show County Info: Show counties



Fish and shellfish are nutritious and good for you to eat. But some fish and shellfish may take in toxic chemicals from the water they live in and the food they eat. Some of these chemicals build up in the fish and shellfish - and in the humans that eat fish and shellfish - over time. Although the chemical levels are usually low, it is a good idea to learn about advisories and monitoring in water bodies where you fish, and for fish or shellfish you eat.

QUESTIONS ANSWERED

- [Can I eat fish or shellfish caught in my lake, stream, or ocean?](#)
- [Does my lake, stream, or ocean location have fish or shellfish with contaminants at levels of concern?](#)
- [What are the levels and long-term trends in my lake, stream, or ocean location?](#)
- [Which lakes, streams, or ocean locations are listed by the State as impaired?](#)
- [What is being done to reduce these problems?](#)

Water Quality information addressing these questions is currently available for the counties that are shaded on this map. This 25

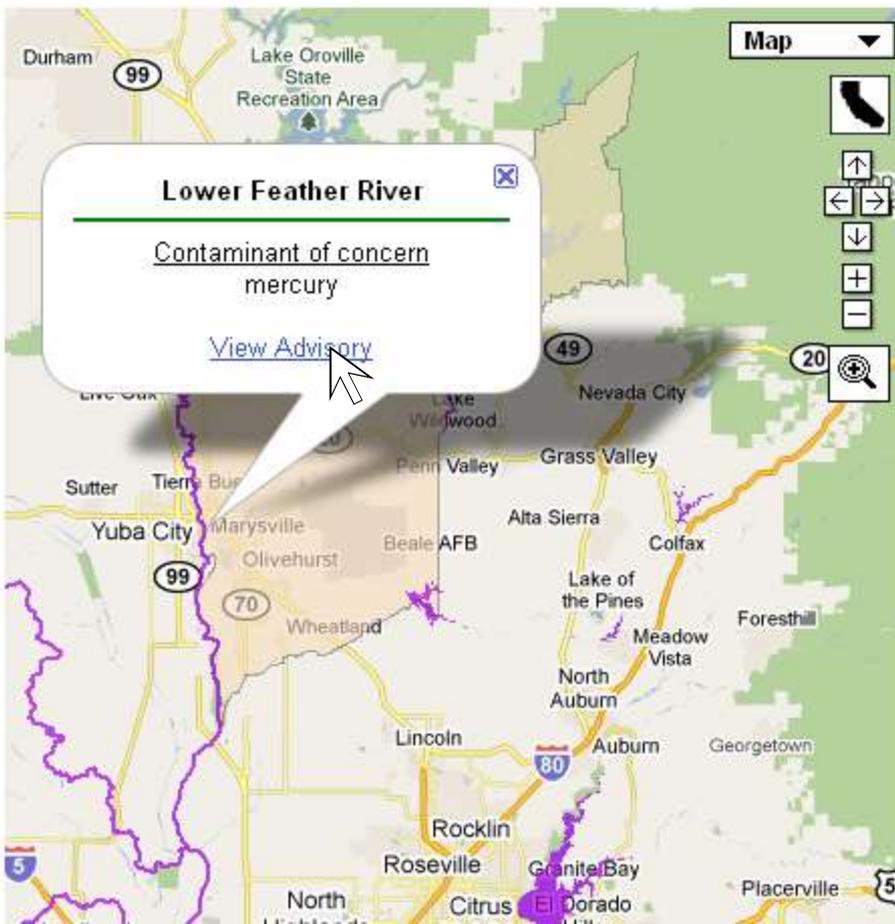
Home → Safe To Eat → Consumption Advisories

Can I Eat Fish or Shellfish Caught in My Lake, Stream, or Ocean Location?



County: Water Body:

Show county



Fish and Shellfish Consumption Advisories by Location

There are health benefits from eating fish and shellfish. But, some fish and shellfish may contain chemical or biotoxin contaminants that could pose health risks. When contaminant levels are unsafe, consumption advisories may recommend that people limit or avoid eating certain species of fish caught in certain places and at certain times.

[California Sport Fish Consumption Advisories](#)

For a number of California water bodies, the Cal/EPA office of Environmental Health Hazard Assessment (OEHHA) publishes consumption advisories for chemicals in noncommercial fish which you and your family or friends catch.

These advisories are shown on the map to the left.



- Click on a water body (shown in **purple**), or
- Select (or type) the county in the County box, then select the water body from the Water Body menu, or
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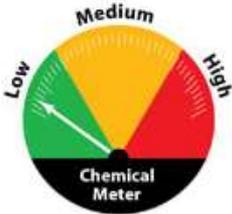
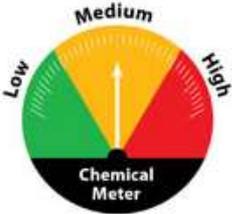
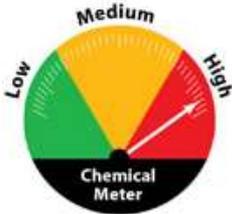
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SAFE EATING GUIDELINES FOR FISH FROM THE LOWER FEATHER RIVER, INCLUDING THE DIVERSION POOL BELOW LAKE OROVILLE (BUTTE, SUTTER AND YUBA COUNTIES) UPDATED [09/24/14] BASED ON MERCURY OR PCBs

Women 18 – 45 and Children 1 – 17 Years

		
 American Shad 	 Carp	 Black Bass
 Chinook (king) salmon 	 Hardhead	 Catfish
 Steelhead trout** 	 Sunfish	 Pikeminnow
	 Sucker	 Striped Bass
		 Sturgeon
<p style="text-align: center;">2-3 Servings a week OR</p>	<p style="text-align: center;">1 Serving a week</p>	<p style="text-align: center;">Do not eat</p>

LISTSERVS

CONTACT OEHHA

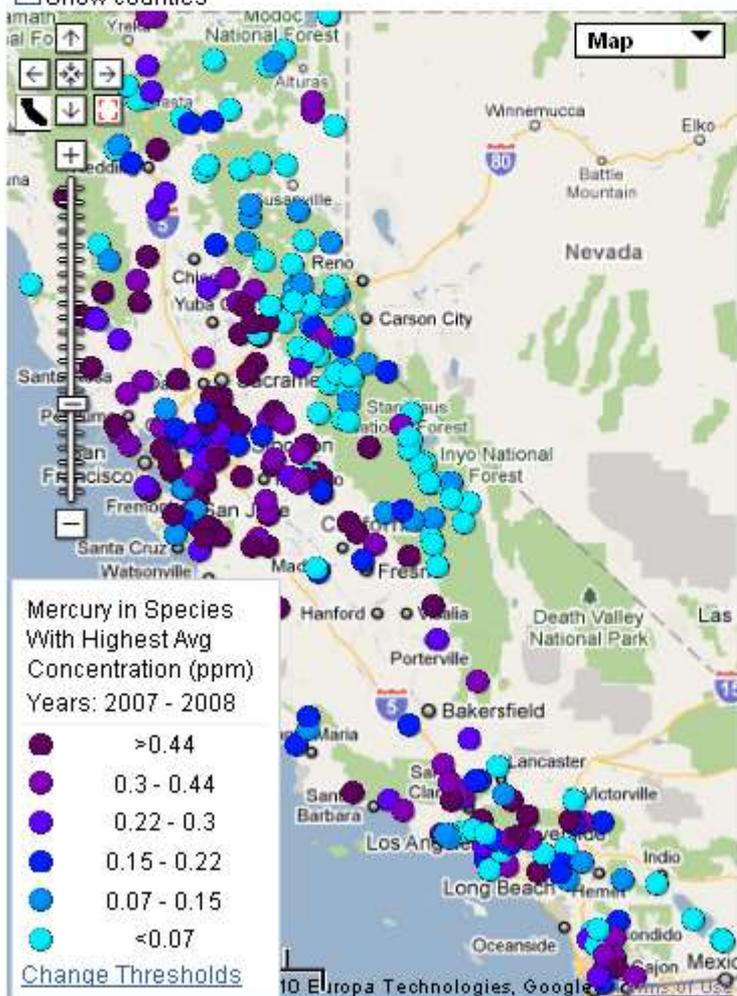


What are the Levels and Long-Term Trends in My Lake, Stream, or Ocean Location?

Select location from list. ▼

Zoom to county: ▼

Show counties



Contaminant Data

This interactive map allows you to explore fish contaminant data for your fishing locations. Data from extensive monitoring of lakes and reservoirs by SWAMP are available for 2007 and 2008. Data from these two years are shown by default.

- Select parameters of interest from the menus below and click on the "Go" button. The map will display average concentrations for the selected water bodies.
- To view data for all species at your water body, trends, or comparisons with nearby water bodies, click on a map location or select a water body from the menu above the map.
- Enter your own threshold or modify thresholds displayed on the map by clicking the Change Thresholds link in the map legend.

Select Species:

Species With Highest Avg Concentration ▼

Select Contaminant:

Mercury ▼

Select Start Date:

2007 ▼

Select End Date:

2008 ▼

Go

Reset



What are the Levels and Long-Term Trends in My Lake, Stream, or Ocean Location?

- » Cal/EPA
- » Natural Resources Agency
- » About the California Water Quality Monitoring Council

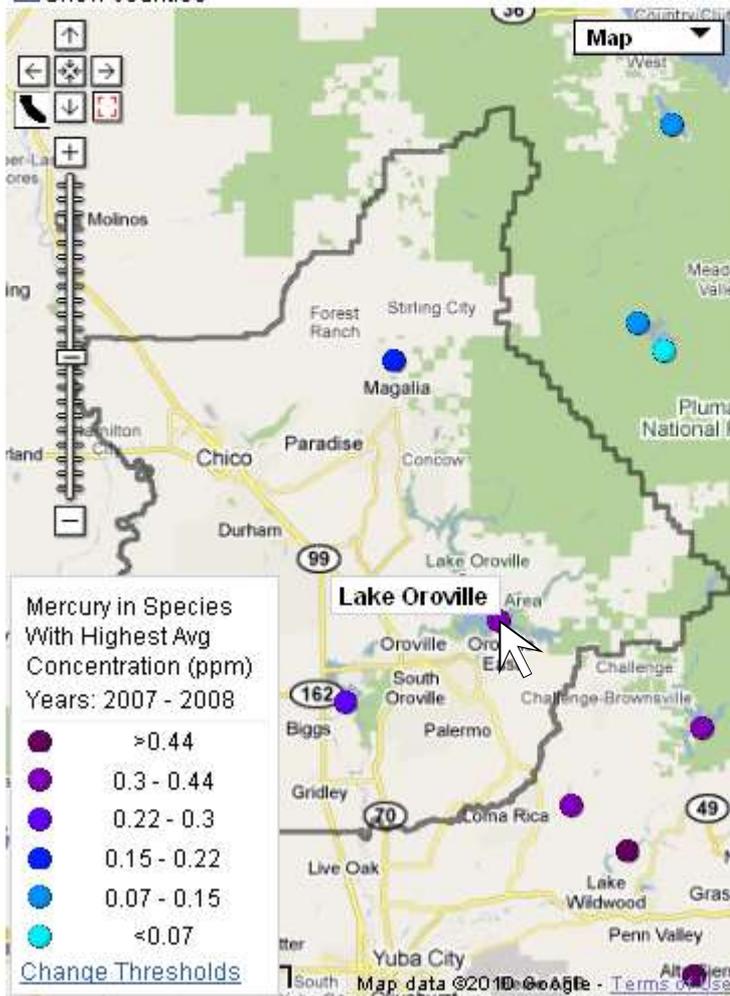
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Select location from list.

Zoom to county: Butte

Show counties



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Species With Highest Avg Concentration

Select Contaminant:

Mercury

Select Start Date:

2007

Select End Date:

2008

[Change Thresholds](#)

Map data ©2010 Google - [Terms of Use](#)



What are the Levels and Long-Term Trends in My Lake, Stream, or Ocean Location?

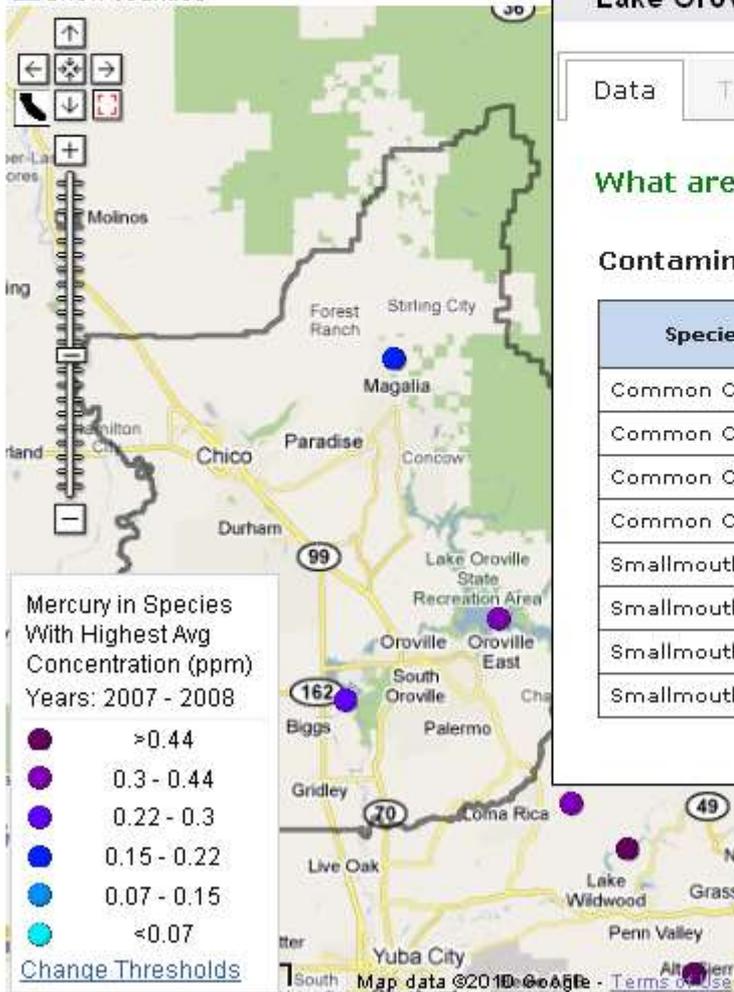
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Contaminant Data

Zoom to county: Butte

This interactive map allows you to explore fish contaminant data for your fishing locations. Data from extensive monitoring of lakes and reservoirs by SWAMP are available for 2007 and 2008. Data from these two years are shown by default.

Show counties



Lake Oroville

Data Trends Nearby Locations

What are the most recent data for my location?

Contaminant Data For 2007 - 2008

Species	Sample Type	MERCURY (ppm)
Common Carp	Location Composite 1	0.29 (2007)
Common Carp	Location Composite 2	0.22 (2007)
Common Carp	Location Composite 3	0.23 (2007)
Common Carp	Location Composite 4	0.31 (2007)
Smallmouth Bass	Average of Individuals 1	0.5 (2007)
Smallmouth Bass	Average of Individuals 2	0.45 (2007)
Smallmouth Bass	Average of Individuals 3	0.42 (2007)
Smallmouth Bass	Average of Individuals 4	0.39 (2007)

Select End Date:

2008

Go Reset

and click
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What are the Levels and Long-Term Trends in My Lake, Stream, or Ocean Location?

- Cal/EPA
- Natural Resources Agency
- About the California Water Quality Monitoring Council

SAFE TO EAT FISH LINKS

- Pollution Sources & Health Risks
- Laws, Regulations, Standards & Guidelines
- Assessment Thresholds
- Regulatory Activities
- Enforcement Actions
- Research
- Monitoring Programs, Data Sources & Reports
- Statewide Perspective
- National Perspective

Select location from list. ▼

Contaminant Data

Zoom to county: Butte ▼

This interactive map allows you to explore fish contaminant data for your fishing locations. Data from extensive monitoring of lakes and reservoirs by SWAMP are available for 2007 and 2008. Data from

Lake Oroville

Data
Trends
Nearby Locations

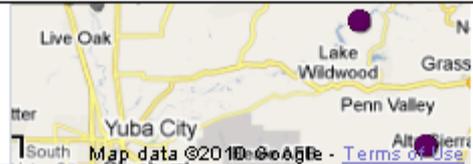
How does my location compare to nearby water bodies?

Change search parameters:

Nearby Water Body	Distance (mi)	Species	Mercury (ppm)
Thermalito Afterbay	14.07	Species With Highest Avg Concentration (Common Carp)	0.24 (2007)
Collins Lake	16.01	Species With Highest Avg Concentration (Largemouth Bass)	0.38 (2008)
Bullards Bar Reservoir	18.33	Species With Highest Avg Concentration (Largemouth Bass)	0.4 (2008)
Harry L Englebright Lake	21.19	Species With Highest Avg Concentration (Sacramento Sucker)	0.62 (2008)
Paradise Lake	22.72	Species With Highest Avg Concentration (Largemouth Bass)	0.16 (2008)
Bucks Lake	25.52	Species With Highest Avg Concentration (Rainbow Trout)	0.02 (2008)
Little Grass Valley Reservoir	25.94	Species With Highest Avg Concentration (Rainbow Trout)	0.02 (2008)
Lower Bucks Lake	26.45	Species With Highest Avg Concentration (Kokanee)	0.1 (2007)
Zayak/Swan Lake	32.74	Species With Highest Avg Concentration (Largemouth Bass)	0.98 (2007)
Scotts Flat Reservoir	33.25	Species With Highest Avg Concentration (Rainbow Trout)	0.03 (2008)

- 0.15 - 0.22
- 0.07 - 0.15
- <0.07

[Change Thresholds](#)



2008 ▼

Go Reset



Safe to Eat Fish & Shellfish Pollution Sources & Health Risks



- Cal/EPA
- Natural Resources Agency
- About the California Water Quality Monitoring Council

SAFE TO EAT FISH LINKS

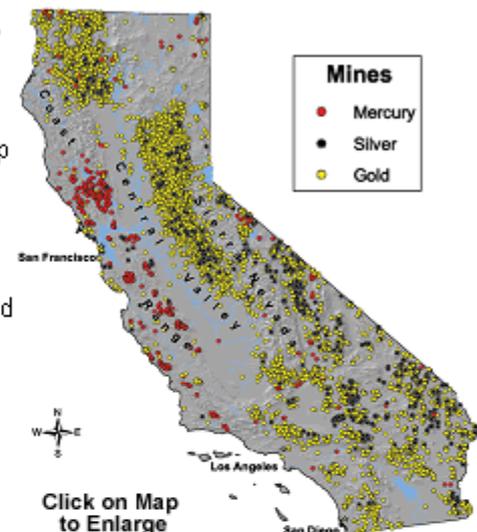
- Pollution Sources & Health Risks
- Laws, Regulations, Standards & Guidelines
- Assessment Thresholds
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- National Perspective

What are the Sources of Fish and Shellfish Contamination?

Most California fish consumption advisories involve four primary contaminants: mercury, PCBs, DDTs, and dieldrin. These and other chemical contaminants persist for long periods in the environment. Persistent organic chemicals, such as PCBs, DDT, and dieldrin accumulate in fatty tissues. Mercury, on the other hand, accumulates primarily in muscle tissue. Levels of all of these contaminants increase as they are transferred up the food chain. For example, concentrations of mercury in top predators (such as largemouth bass) may be a million times higher than concentrations in water.

These pollutants originate from a number of past and present municipal, industrial, and agricultural sources, such as mercury and gold mining, pesticide use around homes and in agriculture, leaking electrical transformers, and chemical manufacturing.

The history of gold mining in California's Sierra Nevada Motherlode began with the Gold Rush of 1848/49 and is well known. Mercury, mined mainly in the Coast Range, was used to amalgamate the gold. Between 1848 and 1981, 88% of the mercury mined in the United States came from the northern Coast Range of California. The map on the right shows the historic extent of gold, silver, and mercury mining in California. Mercury contamination from mining activities persists to this day and contributes to the mercury that accumulates in fish. Other sources of mercury include emissions from the burning of fossil fuels and oil refining, the deposition of those atmospheric emissions, municipal and industrial wastewater discharges, and urban runoff.



What are the Risks of Eating Contaminated Fish and Shellfish?



The amounts of chemicals found in sport fish in California are not known to cause immediate sickness. But chemicals can collect in the body over time and they may eventually affect your health or that of your children. Some of the adverse health effects that might occur from long-term exposure to high levels of toxic chemicals in fish include increased risk of cancer, damage to the developing nervous system in the fetus and in young children, and damage to the reproductive system.

Information for Fish Consumers:

- [Methylmercury in sport fish](#)
- [PCBs in fish caught in California](#)

How Can I Reduce My Risks from Eating Contaminated Fish and Shellfish?

Fish and shellfish are an important part of a healthful diet. There are things you can do to help lower your chances of taking in ³²

California Wetland Monitoring Workgroup



- 💧 Partnership of 24 state and federal agencies and non-governmental organizations



- 💧 Under the overarching guidance of the California Water Quality Monitoring Council
- 💧 Funding through USEPA, CIAP & Water Boards

Products & Tools



- Wetland and Riparian Area Monitoring Plan
 - Framework for monitoring, assessment, and reporting
 - Based on Level 1-2-3 Framework of U.S. EPA
- California Rapid Assessment Method
 - www.CRAMWetlands.org
 - Cost-effective and defensible method for monitoring wetland condition
 - Regular training and support
- EcoAtlas – www.EcoAtlas.org
 - Provides landscape context to aquatic resource extent, condition, and project information
 - Integrates maps, restoration information and monitoring results



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AQUATIC HEALTH LINKS

- Stressors
- Laws, Regulations & Standards
- Regulatory Activities
- Enforcement Actions
- Research
- Monitoring Programs, Data Sources & Reports

Home → Eco Health



Are Our Aquatic Ecosystems Healthy?

California has many types of aquatic habitats. Follow the links below to learn more ...



WETLANDS

Wetlands form along the shallow margins of deepwater ecosystems such as lakes, estuaries, and rivers. They also form in upland settings where groundwater or runoff makes the ground too wet for upland vegetation. [More »»](#)



ESTUARIES

Estuaries are unique habitats found where rivers and the ocean mix. They feature a diverse array of plants and animals adapted to life along the mixing zone. [More »»](#)



STREAMS, RIVERS & LAKES

California's streams and rivers flow through diverse habitats, from mountain canyons, valleys, deserts, estuaries and urban areas. Riparian woodlands develop along stream banks and floodplains, linking forest, chaparral, scrubland, grassland, and wetlands. California lakes, supporting deep water, wetlands, riparian woodlands, offer a quiet refuge for plants, animals and humans alike. [More »»](#)



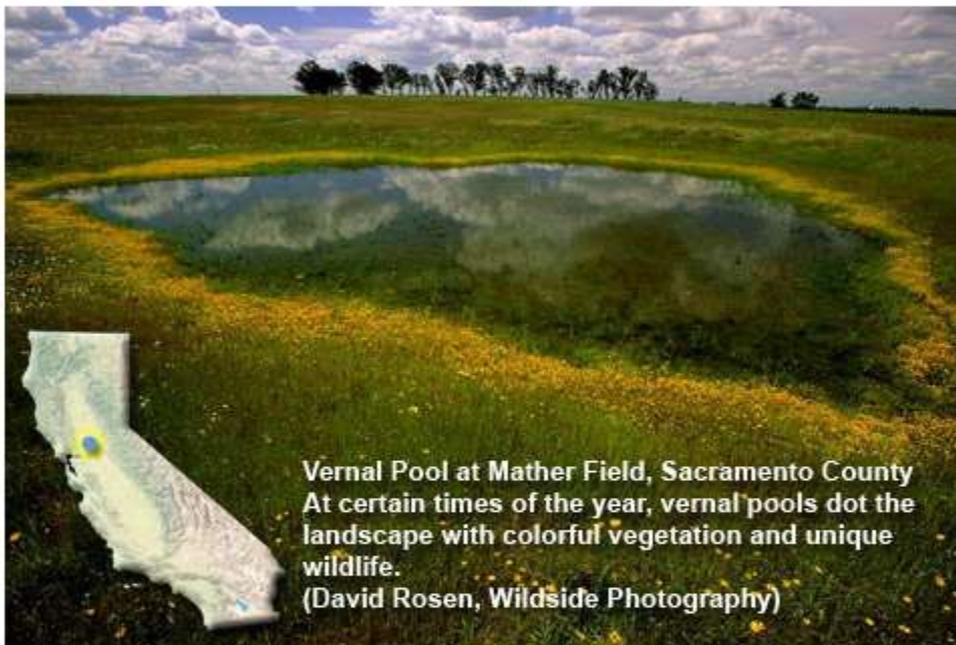
OCEAN & COASTAL

California has 1,100 miles of shoreline and 220,000 square miles of state and federal oceanic habitat, featuring one of the world's most diverse marine ecosystems. [More »»](#)

(Updated 11/19/13)



California Wetlands



Vernal Pool at Mather Field, Sacramento County
At certain times of the year, vernal pools dot the landscape with colorful vegetation and unique wildlife.
(David Rosen, Wildside Photography)

Click on an image above for more information



1/9



Wetlands have both aquatic and terrestrial characteristics. Wetlands form along the shallow margins of lakes, estuaries, and rivers, and in areas with high groundwater or shallow surface water, such as springs, wet meadows, ponds, and freshwater and tidal marshes. They often go through wet and dry cycles, and therefore support a unique array of life specially adapted to these conditions. Wetlands provide important habitat for birds, fish, and other wildlife. They support local food webs, contribute to flood protection, groundwater recharge, shoreline protection, and water filtration: all important [ecosystem services](#).

California has lost more than 90% of its [historical wetlands](#) and today, many

QUESTIONS ANSWERED

What is the extent of our wetlands?

- [Where did our numbers come from?](#)
- [Where are they?](#)
- [How much have we lost?](#)
- [What types are there?](#)
- [How do we classify them?](#)
- [What services do they provide?](#)
- [What is the status of mapping?](#)

How healthy are our wetlands?

- [How do we know how they're doing?](#)
- [How do we assess wetland health?](#)
- [What studies have documented wetland condition?](#)

How are our wetlands protected?

- [What regulations protect them?](#)
- [Where are wetlands being restored near me?](#)

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WETLANDS

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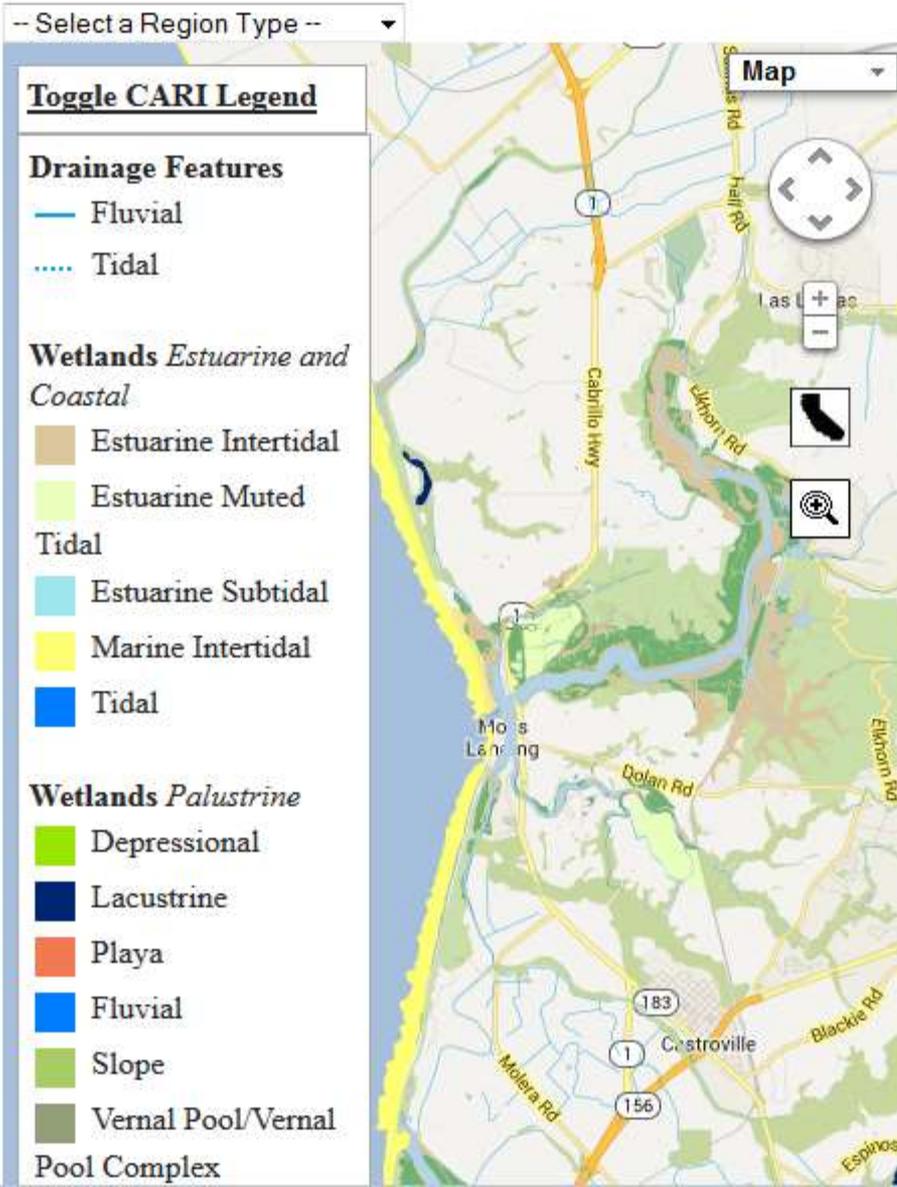


Where Are California Wetlands?

- Cal/EPA
- Natural Resources Agency
- About the California Water Quality Monitoring Council

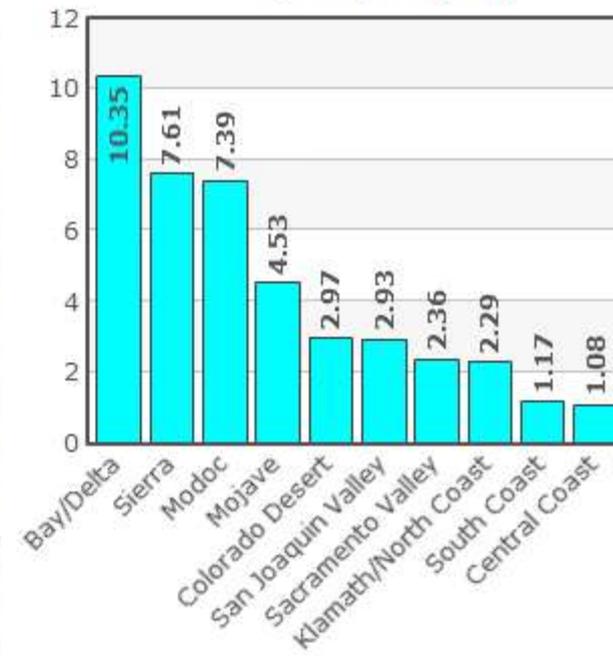
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Wetlands occur in every region of California, from the high Sierras to the deserts of the southwest, and form wherever water collects. They can vary from location to location be found along streams (riverine), in low points with slow drainage (depressional), at the edges of tidal water bodies (estuarine), at the edges of lakes (lacustrine), and around springs (slope).

California Wetland Acreage by Ecoregion* (x100,000)



* Note this chart does not include non-wetland open water types as listed in CARCS

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- Natural Resources Agency
- About the California Water Quality Monitoring Council

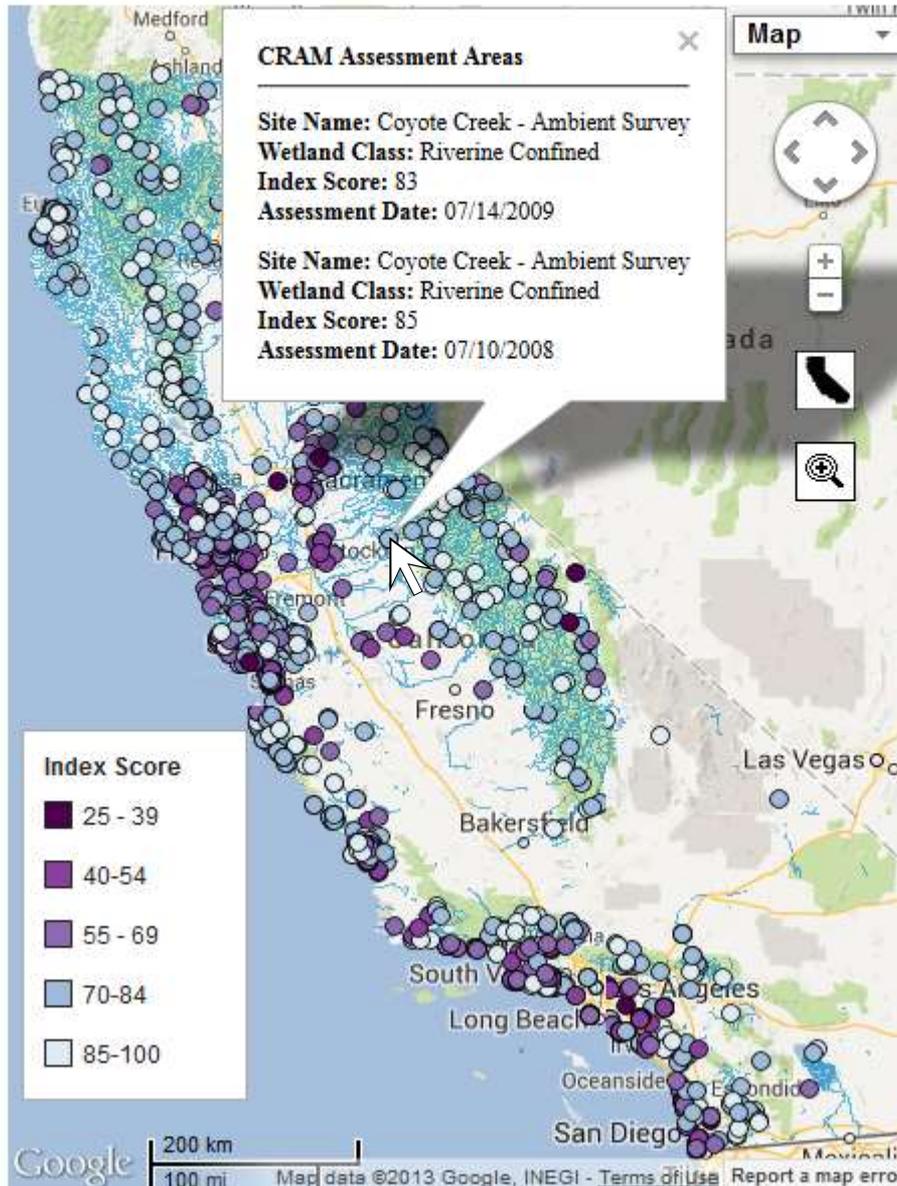
WETLANDS

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How Do We Assess Wetland Health?



-- Select a Region Type --



Measurement of overall health of wetlands has long been an elusive goal for scientists and wetland managers. Methods of analysis were often restricted to individual agencies or organizations for limited purposes. The ability to compare conditions between places and programs was missing, and so we could not measure or understand trends at the watershed, regional and state level.

Today, we are moving to overcome this by standardization of wetland assessments. One way to measure the overall health of streams in California is to perform assessments using the [California Rapid Assessment Method](#) (CRAM). CRAM is a field-based diagnostic tool that, when used as directed, provides rapid, repeatable, and numeric assessment of the overall condition of a wetland.

CRAM assesses four overarching attributes of wetland condition: Buffer and



Landscape Context, Hydrologic Regime, Physical Structure, and Biotic Structure. Each attribute is related to several attribute-specific metrics and submetrics that are evaluated in the field for a prescribed assessment area. The attribute scores are averaged to produce an overall index score. Attribute and index scores range from 25 (lowest possible) to a maximum of 100. In the context of CRAM, condition is evaluated based on observations made at the time of the assessment. Higher scores represent better condition and suggest a higher potential to provide the functions and



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How Do We Know How California's Wetlands Are Doing?

WETLAND AND RIPARIAN AREA ASSESSMENT PLAN TOOL KIT

Comprehensive assessments of wetland health in California are challenging because standardized tools to evaluate the diversity of wetland types have never existed. The WRAMP (Wetland and Riparian Area Assessment Plan) was launched in 2010 to create standardized assessments of wetlands throughout California. WRAMP seeks to create a consistent approach to wetland classification, mapping, and monitoring that will allow for statewide assessments of wetland extent and condition.



->> California Wetland Monitoring Workgroup - "[Tenets of a State Wetland and Riparian Monitoring Plan](#)" (WRAMP).

What is the WRAMP tool kit?

California's WRAMP Toolkit consists of standardized mapping and assessment methods that provide a comprehensive assessment of wetland extent and ecological integrity for the wetland within the context of the surrounding watershed. Assessments are conducted at three levels:

Landscape Assessment (Level 1)



(click to enlarge)

Uses remote sensing data and field surveys to inventory wetlands. The California Aquatic Resources Inventory and the [National Wetlands Inventory](#) are examples of Level 1 assessments.

Rapid Assessment (Level 2)



(click to enlarge)

Uses visible field diagnostics and existing data to assess conditions. [CRAM](#) is an example of a Level 2 assessment method.



Intensive Site Assessment (Level 3)



(click to enlarge)

Provides quantitative field data to give more precise answers to management questions. Bioassessments of the health of a particular organism within a wetland are an example of a Level 3 assessment. Level 3 methods can be used to calibrate and validate Level 1 and Level 2 methods, and to test hypotheses about the causes of habitat conditions.



Where are Wetlands Being Restored Near Me?

-- Select a Region Type --

Wetland Projects

Project Name: Blacklock Tidal Marsh Restoration
Type: Compensatory mitigation
Total Acreage: 70
Contact Organizations:
 California Department of Fish and Game, California Department of Water Resources, U.S. Fish and Wildlife Service

Restoration

California has made substantial progress over the last ten years in identifying, acquiring, restoring and enhancing thousands of acres of wetlands. From large scale restoration such as the South Bay Salt Pond Restoration Project to tiny vernal pool restoration projects, these efforts continue to stem the tide of wetland loss. The map on this page shows wetland restoration and improvement projects.

Many details about project are available through the California [EcoAtlas](#). EcoAtlas files may include permit details, contact information, habitat plans, and monitoring reports.

The map provided here is incomplete. Hundreds of restoration projects statewide have been accomplished by individuals, local watershed groups, conservation districts, agencies, and multi-agency work groups. We are working to update and improve this map.



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WETLANDS

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How Are California's Wetlands Protected?



California's unique and vulnerable wetlands are often impacted adversely by human use, and are therefore protected by a combination of regulations, incentives, and grant-funded restoration programs. There are two primary ways in which state, federal, and other agencies within California are protecting wetlands:

1. Through programs that regulate the activities that occur within wetlands, and
2. Through programs that protect, conserve, and manage wetland resources.

A particular agency may have both a regulatory and resource management role.

Quick Links

[Regulation](#) | [Incentives](#) | [Restoration](#) | [How Can I Make a Difference?](#)

Regulation

The primary regulatory tool for protecting wetlands in the United States is Section 404 of the Clean Water Act (CWA), implemented and enforced by the regulatory branch of the [U.S. Army Corps of Engineers](#). This federal law requires that a project that includes changes in land use which might affect wetlands must file for a permit. These permits require the avoidance of all significant negative impacts to the aquatic environment, including the impacted wetlands. If impacts cannot be avoided, then they must be minimized to reduce degradation to the system. Unavoidable impacts must be compensated for by the creation of other wetland areas in support of the federal and state no net-loss policy.



The [U.S. Environmental Protection Agency](#) (EPA) is responsible for implementing and enforcing laws that protect various resources, including wetlands. EPA's regulatory programs include, but are not limited to, developing rules to control air quality, industrial wastewater discharge, and stormwater discharge; enforcing water quality standards; and overseeing U.S.ACE regulatory activities pertaining to wetlands protection.



In California, no single agency has authority over all aquatic resources. Regulation of wetlands and streams falls under the authority of six state and federal agencies leading to a complex and varied regulatory structure.

The [State Water Resources Control Board](#) and the nine Regional Water Quality Control Boards (Regional Water Boards) are the state's primary water quality regulatory agencies, tasked with protecting the beneficial uses of the waters of the state under the [California Water Code](#).



The [California Coastal Commission](#) is a State coastal management and regulatory agency that, in partnership with local governments, is responsible for implementation of the [California Coastal Management Program](#). The Coastal Commission's primary role in regards to wetland protection is the regulation of coastal development affecting wetlands in California's coastal zone. The Coastal Commission's jurisdiction does not extend into or around San Francisco Bay, where development is regulated by the [San Francisco Bay Conservation and Development Commission](#).



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WETLANDS

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WHO PROTECTS CALIFORNIA'S WETLANDS?

Explore the websites of agencies who have a role in wetland protection and management.

Federal Regulatory Agencies

- [U.S. Army Corps of Engineers](#)
- [U.S. Environmental Protection Agency](#)
- [National Marine Fisheries Service](#)

State Regulatory Agencies

- [California Environmental Protection Agency](#)
- [State Water Resources Control Board and Regional Water Quality Control Boards](#)
- [Department of Water Resources](#)
- [California Department of Fish and Wildlife](#)
- [California Coastal Commission](#)
- [San Francisco Bay Conservation and Development Commission](#)

Federal Resource Agencies

- [U.S. Fish & Wildlife Service](#)
- [National Park Service](#)
- [Natural Resources Conservation Service](#)

State Resource Agencies

- [California Natural Resources Agency](#)
- [Department of Parks and Recreation](#)

California Healthy Streams Partnership



- Partnership of state and federal agencies and non-governmental organizations



- Under the overarching guidance of the California Water Quality Monitoring Council

Products & Tools



- 💧 SWAMP Tools for consistent monitoring and assessment
 - 💧 Documented monitoring and assessment Standard Operating Procedures (SOPs)
 - 💧 Quality assurance procedures
 - 💧 Data quality documentation procedures
- 💧 California Environmental Data Exchange Network (CEDEN)
- 💧 First statewide integrated multi-metric assessment of watershed health
 - 💧 Partnership with USEPA Healthy Watersheds Initiative



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AQUATIC HEALTH LINKS

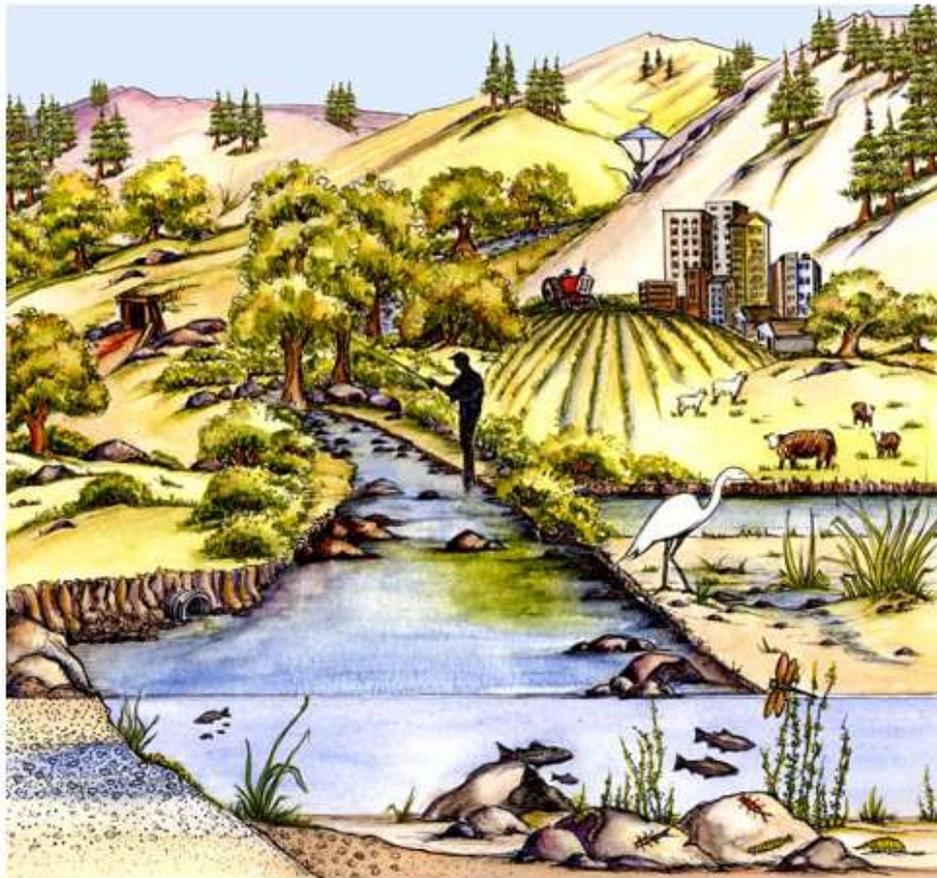
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California Streams, Rivers and Lakes



[Urban](#) | [Agriculture](#) | [Other Uses](#) | [Fines & Sands](#) | [Gravels](#) | [Cobbles & Boulders](#) | [Riffles & Rapids](#) | [Buffer](#) | [Riparian Cover](#) | [Pools](#) | [Groundwater](#) | [Water Quality](#) | [Sediment Quality](#) | [Stream Gradient](#) | [Channel Stability](#) | [Channel Alteration](#) | [Algae](#) | [Bugs](#) | [Fish](#) | [Fish Contaminants](#) |

Also see: [Hydrologic Connectivity](#) | [Hydrologic Sufficiency](#) | [Invasive Species](#) | [Sediment Balance](#)



Healthy streams, rivers, and lakes provide safe drinking water, recreational opportunities, and important habitat for species ranging from the red-shouldered hawk to steelhead to crayfish and dragonflies. Maintaining healthy streams, rivers, and lakes can reduce the need for water treatment and water supply costs and make landscapes more resilient to climate change. To determine the health of a waterway and the flora and fauna that live there, investigators can use a combination of chemical, biological, and physical assessments. Among the characteristics that may be considered are habitat quality, aquatic life diversity, water chemistry, stream hydrology, the physical channel form, and sediment transport processes of the stream.

Navigation Instructions: [Show](#) | [Hide](#) :

→ [Portal Fact Sheet](#)

QUESTIONS ANSWERED

- [What is the extent of our stream and river resources?](#)
- [What is the condition of our streams and rivers?](#)
- [What is being done to make our waters healthier?](#)

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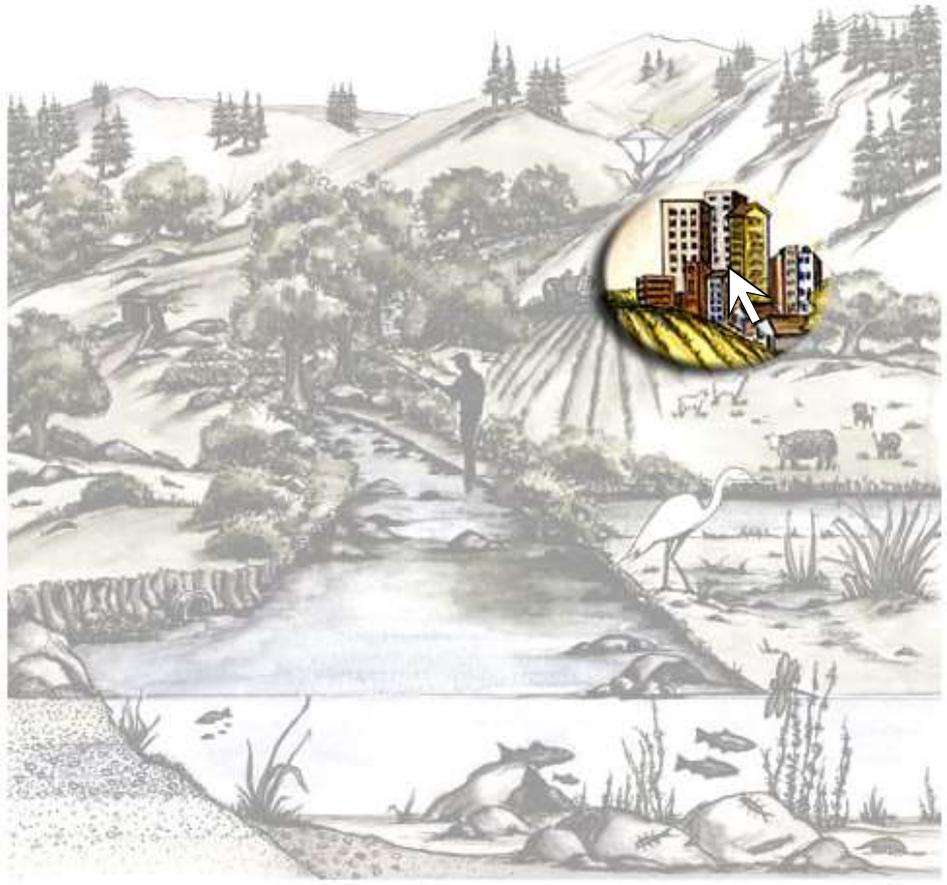
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California Streams, Rivers and Lakes



[Urban](#) | [Agriculture](#) | [Other Land Uses](#) | [Fines & Sands](#) | [Gravels](#) | [Cobbles & Boulders](#) | [Riffles & Rapids](#) | [Buffer](#) | [Riparian Cover](#) | [Pools](#) | [Groundwater](#) | [Water Quality](#) | [Sediment Quality](#) | [Stream Gradient](#) | [Channel Stability](#) | [Channel Alteration](#) | [Algae](#) | [Bugs](#) | [Fish](#) | [Fish Contaminants](#) |

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QUESTIONS ANSWERED

- [What is the extent of our stream and river resources?](#)
- [What is the condition of our streams and rivers?](#)
- [What is being done to make our waters healthier?](#)

→ [California Watersheds Slideshow](#) - Learn



California Streams, Rivers and Lakes

Why is Land Use Important?

→ Nearby Urban

The developed landscapes found in urban areas introduce a number of factors that can affect the health of nearby streams, rivers, and lakes. Roads and other paved surfaces, sewer systems, gardens and parks, industrial facilities, and storm water management systems mark the landscape. These cause significant changes in how water flows across the landscape and on the content of that water. Stormwater runoff in urban areas can pick up sediment, oils and chemical residue from our cars and streets; bacteria and nutrients from pet waste; and pesticides and nutrients from lawns and gardens. These pollutants can harm fish and wildlife populations, compromise native vegetation, and degrade water quality.



Buildings, paved parking lots and roads are hard, impervious surfaces which control how water is transported to urban streams. In an urban setting, rain and snowmelt cannot penetrate the hard surfaces and soak into the ground. Instead, stormwater drains directly to storm drains, streams, or other surface water bodies. Typically the volume and velocity of surface water are higher in urban areas than in undeveloped areas. This can alter the natural drainage patterns and change the physical habitat of streams.

Often streams that flow through our cities and towns have lost many of the adjacent trees and shrubs that provide shade and streamside (riparian) habitat. The loss of riparian vegetation may increase water temperature above that which is healthy for fish and other native species that live in the streams.

→ Nearby Agriculture

Agricultural practices can greatly impact stream health. Plowing, pesticide application, irrigation, fertilizing, planting, and harvesting can introduce pollutants into nearby streams. Confined animal facilities (e.g., feedlots, dairies), and grazing can also be a source of pollution. Excess sediment, nutrients, pathogens, pesticides, and salts are commonly found pollutants in waters adjacent to and downstream of agricultural areas.



Grazing cattle can eliminate riparian vegetation, trample stream bank and bottom habitat, and compact the soil, making it harder for rainfall to infiltrate soils and move into groundwater basins. Instead, more water flows directly into streams. Some natural drainages are channelized to provide water for irrigation or to move agricultural runoff away from fields. Increased flow volume and velocity can alter the natural drainage patterns and change the physical habitat of streams.

→ Other Uses

- Cal/EPA
- Natural Resources Agency
- About the California Water Quality Monitoring Council

AQUATIC HEALTH LINKS

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- Laws, Regulations & Standards
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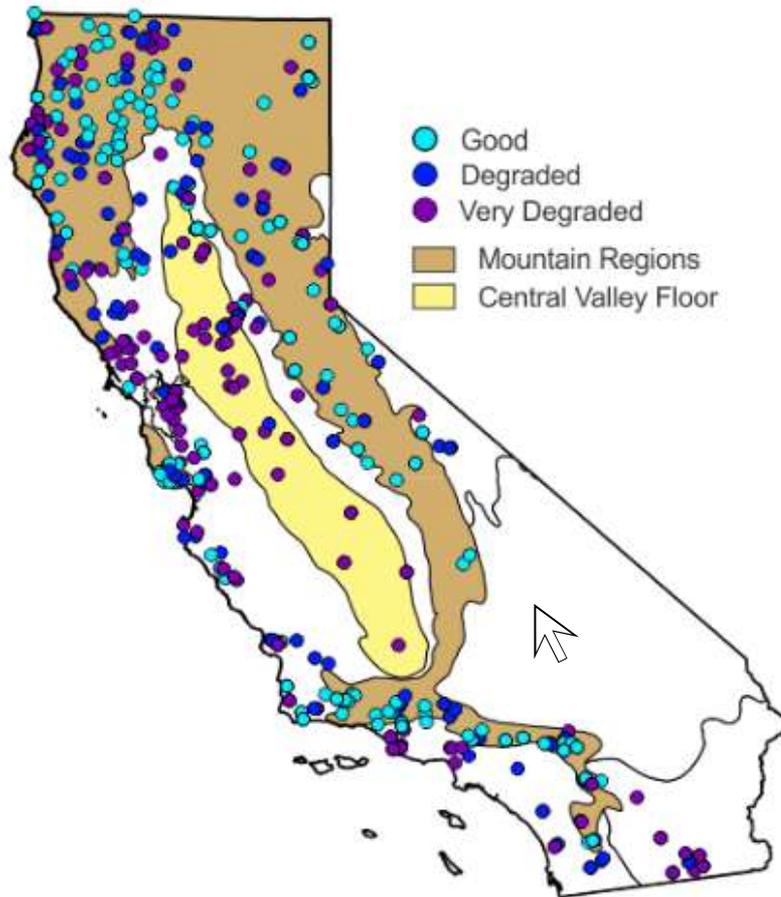


California Streams, Rivers and Lakes

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How does land use affect the health of our streams?

The health of our rivers and streams is influenced by their surroundings. Streams that run through industrial corridors may be subject to increased stress relative to pristine streams in the Sierra. Streams in agricultural areas can be subject to contaminants from pesticide applications. Streams in cities may be littered with trash.

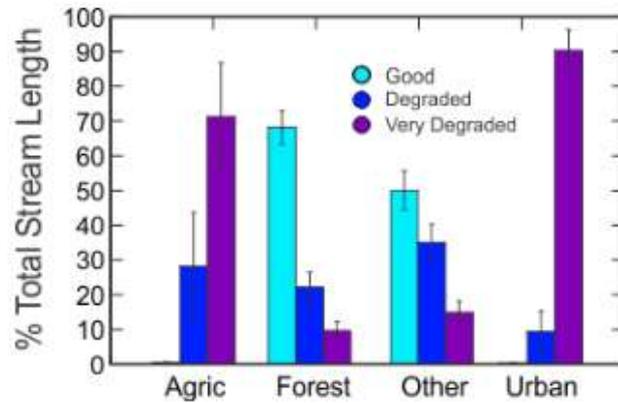
» [Why is land use important?](#)

This map shows the distribution of sites sampled under the Perennial Streams Assessment (PSA) Program between 2000 and 2007 coded by biological condition.

The Perennial Streams Assessment (PSA) looked at the relationship between the condition of our streams and nearby land uses. The PSA study sites were classified based on the dominant land use in the upstream watershed. Stream condition was then compared across these land use classes. Land use appears to be strongly related to stream condition. A higher proportion of stream miles are impaired in agricultural and urban landscapes. In fact, 100% of streams draining agricultural and urban landscapes sampled in the PSA survey had degraded or very degraded biological condition, whereas about 30% of streams draining forested landscapes had degraded biological condition.

Streams draining agricultural areas tended to have high levels of agriculture related contaminants (phosphorous, nitrogen, chloride). In addition, almost all of these streams exhibited some form of habitat disturbance, both instream and riparian. Urban streams had high levels of nutrients and very high levels of chloride. Habitat degradation was common in most urban streams where instream habitat was especially degraded. Poor water quality and habitat degradation observed in forested areas was less pervasive than for either agricultural or urban areas.

» [View reports of the State Water Board's Perennial Streams Assessment \(PSA\)](#)

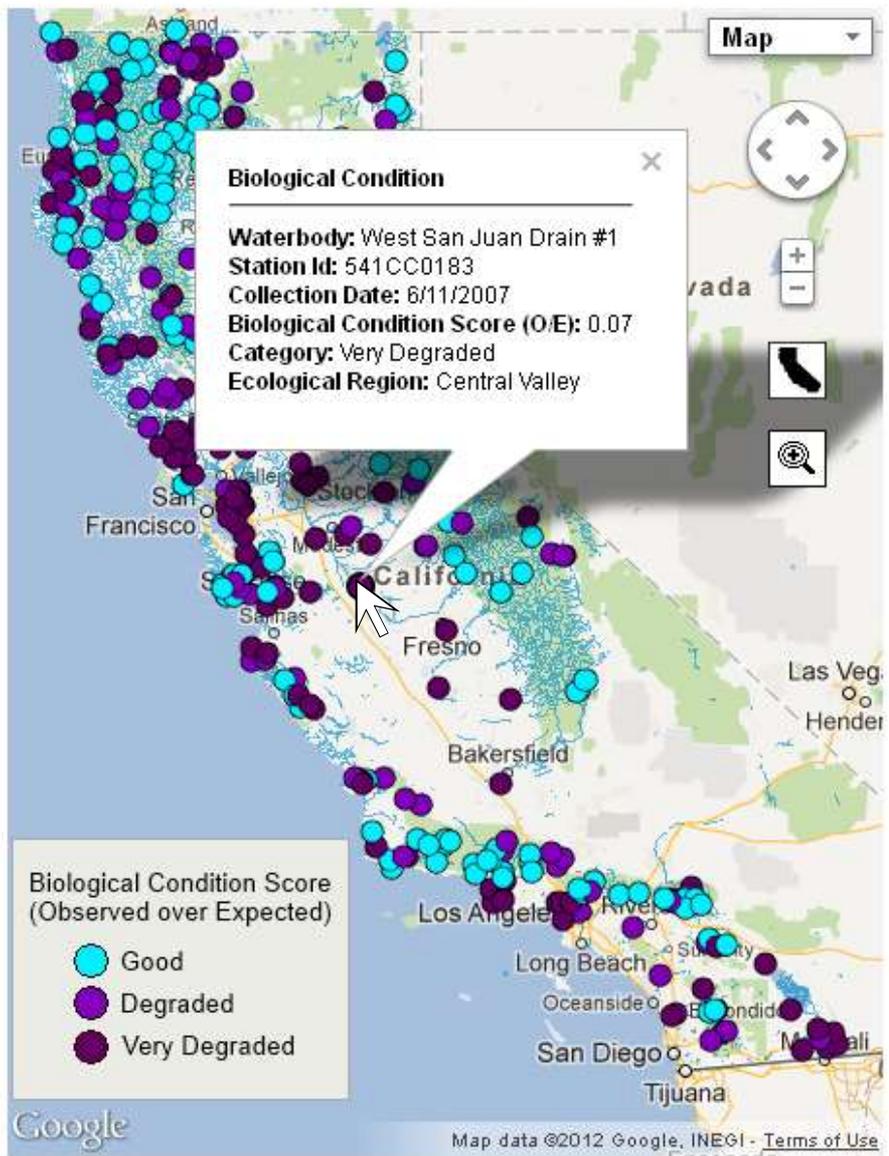


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AQUATIC HEALTH LINKS

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- Select a Region Type -



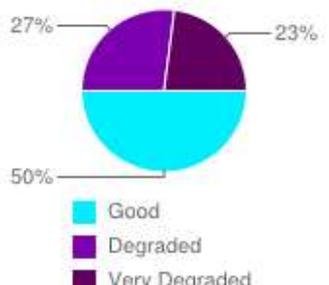
What do Benthic Macroinvertebrates tell us about the health of our streams?

One powerful way to measure stream health is through an assessment of the bugs, or benthic macroinvertebrates, that live there. Benthic macroinvertebrates, which live on the bottom of streams, include early life stages of insects such as dragonflies and mayflies, crustaceans such as crayfish, and worms and snails. The particular species and abundance of invertebrates present in a stream can help scientists determine both the current condition of a stream and the cumulative impact of longer term stressors, such as pollution. For example, a stream with a variety of species that includes sensitive species is considered healthier than one with a few pollution-tolerant species.

Bioassessment is the characterization of environmental conditions through the observation of biological communities of organisms. Two common types of bioassessment are O/E and IBI. O/E stands for observed over expected, which compares the number of certain species observed at a site to the number of those species that were expected to occur, based on data from reference sites that are known to be healthy. IBI is an Index of Biotic Integrity, which combines a variety of individual measures of health of a community of organisms, such as species richness (how diverse the community is) and pollution tolerance (how resistant to pollution they are).

→ [View reports of the State Water Board's Perennial Streams Assessment \(PSA\)](#)

Statewide Statistics

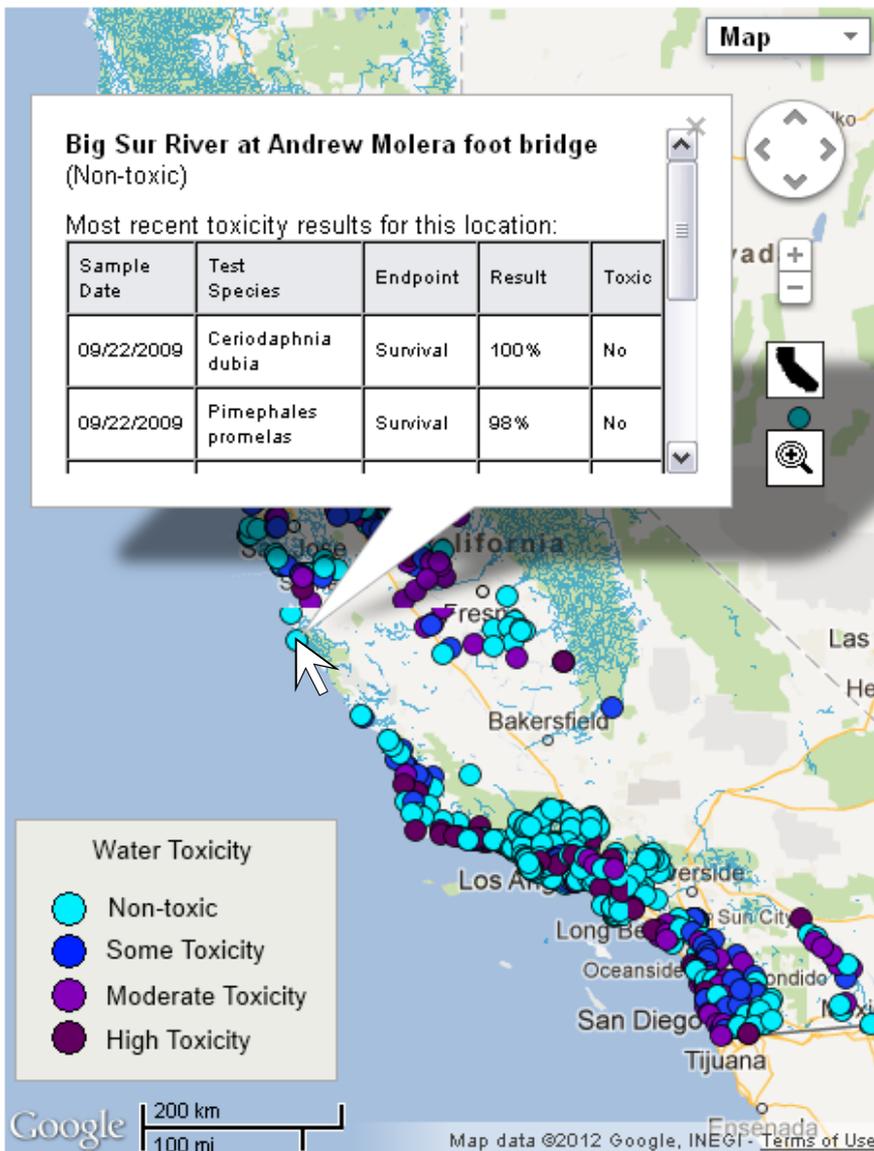


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AQUATIC HEALTH LINKS

- Stressors
- Laws, Regulations & Standards
- Regulatory Activities
- Enforcement Actions
- Research
- Monitoring Programs, Data Sources & Reports

– Select a Region Type –



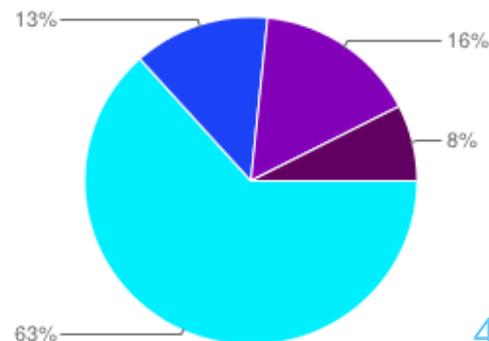
Download data and code definitions from CEDEN [website](#).

How toxic is the water in our streams, rivers and lakes?

To measure how well a water body supports aquatic life, we can perform a toxicity test. Water samples from a given water body are taken to the laboratory and test organisms are exposed to that water to see if they exhibit any adverse effects. Toxicity tests are especially useful in water quality monitoring because they show the overall effect on aquatic life of all of the chemicals found in the water sample. Toxicity tests can assess mortality, behavioral changes, reproductive status or physiological and biochemical changes. Follow-up tests called Toxicity Identification Evaluations are used in the laboratory to identify the probable cause of toxicity. In California, pesticides have been a common cause.

The assessment of toxicity displayed here is based on methods used to summarize nine years of toxicity testing data collected by the Surface Water Ambient Monitoring Program (SWAMP) and partner programs ([click here to view the report](#)). The process used to characterize the magnitude of toxicity at each site was designed to integrate results from multiple samples taken at a site and multiple tests conducted on the samples. Note that the assessment displayed here does not completely match the [SWAMP report](#) due to differences in statistical methods and additional data assessed in this portal.

Statewide Statistics





California Streams, Rivers and Lakes

WHAT IS BEING DONE TO MAKE OUR WATERS HEALTHIER?

- [What is being done to protect stream, river and lake habitats?](#)
- [What is being done to reduce impacts from waste discharges?](#)
- [How can I get involved?](#)

What is being done to protect stream, river and lake habitats?

Protecting and Restoring Wetlands

Development of lands in and adjacent to wetlands, riparian areas, and headwaters for roads, housing, agriculture, and other uses can reduce the amount of wetland habitat that remains and can reduce the health of adjacent wetlands. To reduce or mitigate adverse impacts on wetland habitats, activities that occur within wetlands are subject to permitting requirements under Section 404 of the Clean Water Act and certification under Section 401. These programs are designed to ensure that overall wetland habitat is not lost or degraded. Upstream development can alter the amount and timing of stormwater flows, a process called "hydromodification."

- [Permits for Dredging and Filling of Wetlands](#)
Activities in waters of the United States regulated under the 404 program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports) and mining projects. Section 404 requires a permit before dredged or fill material may be discharged into waters of the United States, unless the activity is specifically exempt (e.g. certain farming and forestry activities).
- [California's Dredge/Fill \(401\) and Wetlands Program](#)
- [What is being done to improve California's wetlands?](#) - on the California Wetlands Portal
- [Wetland Restoration Projects](#) - on the California Wetlands Portal

Restoring Bay-Delta Ecosystems

The [Ecosystem Restoration Program \(ERP\)](#) is a multi-agency effort designed to maintain, improve and increase aquatic and terrestrial habitats and improve ecological function in the San Francisco Bay-Delta estuary and its tributaries in order to support sustainable populations of diverse and valuable plant and animal species. The ERP has executed a wide range of actions through a competitive grant program and directed actions using a science-based adaptive management framework. These actions include:

- Large-scale restoration projects
- Habitat protection through acquisition of land and/or easements



Managing Polluted Runoff

A portion of stormwater can enter drainage networks and streams via overland flow or sheet flow. As stormwater or snowmelt flows across landscapes subject to agriculture, mining, timber harvest, and other development activities, it can accumulate pollutants and contribute to declining stream health. Development activities in water, such as marinas and recreational boating, can also add pollutants. Over time, governmental agencies have developed methods to lessen the impact of this diffuse or nonpoint source (NPS) pollution.



→ [Nonpoint Source Pollution Control](#)

→ [NPS Encyclopedia](#) - online reference guide to facilitate a basic understanding of nonpoint source (NPS) pollution control and to provide quick access to essential information from a variety of sources.

[Back to Top](#)

How can I get involved?

Volunteers can become citizen scientists and work through a variety of organizations to monitor water quality in streams and rivers throughout the state. Activities can include collecting water quality data, evaluating fish habitat, counting birds, or making visual observations of stream health. Volunteers can be trained to use sophisticated scientific equipment to measure water quality and stream health. Community and resource managers use the monitoring information to better protect California's waters.

Want to know more, or maybe volunteer?

→ [Visit the Clean Water Team's web page...](#)

→ [Find a citizen monitoring program near you...](#)

→ [Watch the Clean Water Team's 'You Tube' channel of training and educational videos...](#)

→ The [Clean Water Team Guidance Compendium for Watershed Monitoring and Assessment](#) has over 300 resources to enhance the user's knowledge and ability to make decisions regarding measurements of water quality in various water bodies. It should be useful to field operators conducting water quality monitoring, technical advisors and trainers of citizen monitoring groups, agency staff, or any other person interested in water quality issues and citizen monitoring.

→ The [Creek Watch](#) application is an easy to use water quality monitoring smart phone app aimed at everyday citizens, community groups and environmental organizations with a need or desire to monitor the quality of the waters around them. It was developed by IBM with the assistance of the State Water Board's Surface Water Ambient Monitoring Program (SWAMP)-Clean Water Team.

→ [Download the free Creek Watch app.](#)



(Updated 5/14/12)

California Estuary Monitoring Workgroup

Workgroup members



- Initial focus is San Francisco Bay-Delta Estuary
 - Educational – What? Where? Food web relationships?
 - Estuary Health
 - Condition of major biological resources
 - Drivers of biological resource patterns (phased)
 - Detailed data – physical, hydrologic, chemical, meteorological

California Estuary Monitoring Workgroup

- Initial leadership and funding
 - State & Federal Contractors Water Agency
- Coordination through Interagency Ecological Program
 - Monitoring, assessment and reporting
- Data visualization through 34 North
 - Workgroup website and tools
 - Portal development and hosting
- Potential use of EcoAtlas for restoration project tracking
 - Endorsement from Sac-SJ Delta Conservancy

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Home → Eco Health → Estuaries



California Estuaries

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CALIFORNIA ESTUARIES

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San Francisco Bay

Description: San Francisco Bay, the downstream portion of the San Francisco Estuary, is made up of four smaller bays or basins. Suisun Bay and the diked wetlands of Suisun Marsh form the least salty of these, immediately downstream from the Delta. Saltier San Pablo Bay is next in line, west of Carquinez Strait. The saltiest basins are the Central Bay, which connects with the ocean through the Golden Gate, and the South Bay, a large shallow lobe extending off the Central Bay. From "An Introduction to the San Francisco Estuary" by Andrew Cohen. **Photo Credit:** 34 North

QUESTIONS ANSWERED

- What are estuaries, and why are they important?
- Where are California's estuaries?
- How healthy are California's estuaries?
- What's being done to protect California's estuaries?
- How can I be part of the solution?

IMAGES / VIDEO ▶▶



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Home → Eco Health → Estuaries → Where



Where are California's Largest Estuaries?

- Cal/EPA
- Natural Resources Agency
- About the California Water Quality Monitoring Council

CALIFORNIA ESTUARIES

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CALIFORNIA'S LARGEST ESTUARIES (THIS MAP IS INTERACTIVE)

QUESTIONS ANSWERED

- Where are California's largest estuaries?
 - San Francisco Estuary
 - Santa Monica Bay
 - Elkhorn Slough
 - Morro Bay Estuary
 - Smith River Estuary
 - Klamath River Estuary
 - Mad River Estuary
 - Noyo River Estuary
 - Eel River Estuary
 - Russian River Estuary

Hundreds of estuaries are found in California, including the San Francisco Estuary (SF Estuary), Santa Monica Bay, and Morro Bay Estuary among others.

The goal of the California Estuaries Portal is to provide comparable information on each of these estuaries. The first step in building the portal is focused on California's largest estuary, the SF Estuary. Information describing the health of California's other estuaries will follow.

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Home → Eco Health → Estuaries → Healthy



How Healthy are California's Estuaries?

- [Cal/EPA](#)
- [Natural Resources Agency](#)
- [About the California Water Quality Monitoring Council](#)

CALIFORNIA ESTUARIES

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<p>Water Quality and Quantity (Click to learn more)</p> 	<p>Habitat (Click to learn more)</p> 	<p>Living Resources (Click to learn more)</p> 	<p>Ecological Processes (Click to learn more)</p> 	<p>Stewardship (Coming Soon)</p> 
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QUESTIONS ANSWERED

- How healthy are California's estuaries?
- SF Estuary Health

The health of each of California's estuaries is an estimate of the overall condition of the ecosystem. The health of an estuary as a whole depends on the condition of individual ecosystem elements that combine to create the estuary. This is similar to the health of the human body which is dependent on the health of individual parts like the brain, heart, and bones.

Estimating the health of the SF Estuary is the first step in building the My Water Quality Portal that answers the question "Are Our Estuaries Healthy?" Estimating the health of California's other estuaries will follow.



Home → Eco Health → Estuaries → Healthy → San Francisco



How Healthy is the San Francisco Estuary?

- [Cal/EPA](#)
- [Natural Resources Agency](#)
- [About the California Water Quality Monitoring Council](#)

CALIFORNIA ESTUARIES

- [Laws, Regulations & Standards](#)
- [Research](#)
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- [Site Map](#)

[Living Resources \(Click here to learn more\)](#)



QUESTIONS ANSWERED

- What is the San Francisco Estuary, and why is it important?
- **How healthy is the SF Estuary?**
 - Water Quality and Quantity
 - Habitat
 - Living Resources
 - Ecological Processes
 - Stewardship (coming soon)
- What is being done to protect California's estuaries?
- How can I be part of the solution? (coming soon)

Assessing Health

The vision for this portal is to assess the health of the SF Estuary by evaluating five ecosystem elements called "key attributes." The key attributes are living resources, water, habitat, ecological processes, and stewardship. These are the same attributes used in [State of the San Francisco Bay 2011 Report](#) to evaluate the health of the San Francisco Bay (the western portion of the SF Estuary). Measurable elements of each attribute are used to evaluate the condition or health of the five attributes, which are then used to estimate the overall health of the estuary.

The Portal is currently focusing on an evaluation of the health of two key attributes: living resources and water in the SF Estuary. Information about these key attributes is currently under development.

Health of the San Francisco Estuary

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Home » Eco Health » Estuaries » Healthy » San Francisco » Living Resources



Why are Living Resources a Key Attribute of Estuary Health?

- » [Cal/EPA](#)
- » [Natural Resources Agency](#)
- » [About the California Water Quality Monitoring Council](#)

CALIFORNIA ESTUARIES

- » [Laws, Regulations & Standards](#)
- » [Research](#)
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[Birds \(Click here to learn more\)](#)



QUESTIONS ANSWERED

- » How healthy is the SF Estuary?
- » **Why are living resources a key attribute?**
 - » [Phytoplankton](#)
 - » [Zooplankton](#)
 - » [Benthic Organisms](#)
 - » [Fish](#)
 - » [Birds](#)
 - » [Plants](#)
 - » [Mammals](#)
- » How do we determine the health of living resources?

Healthy estuaries support diverse and resilient populations of living resources, dominated by native species and broadly distributed across different habitats. These living resources include **phytoplankton, zooplankton, benthic organisms, fish, birds, plants, and mammals.**

How healthy are SF Estuary living resources?

The SF Estuary is in crisis due to rapidly declining resident and migratory fish populations, the collapse of California's salmon fishing industry, and changes and declines in the aquatic food web. More than 90 species of plants and animals have regulatory protection to prevent losing them from the SF Estuary ecosystem. However, some introduced species such as largemouth bass, Asian clams, jellyfish, and blue-green algae are thriving.

Interested in our process?

Learn more about the most recent evaluation of the health of the SF Estuary.



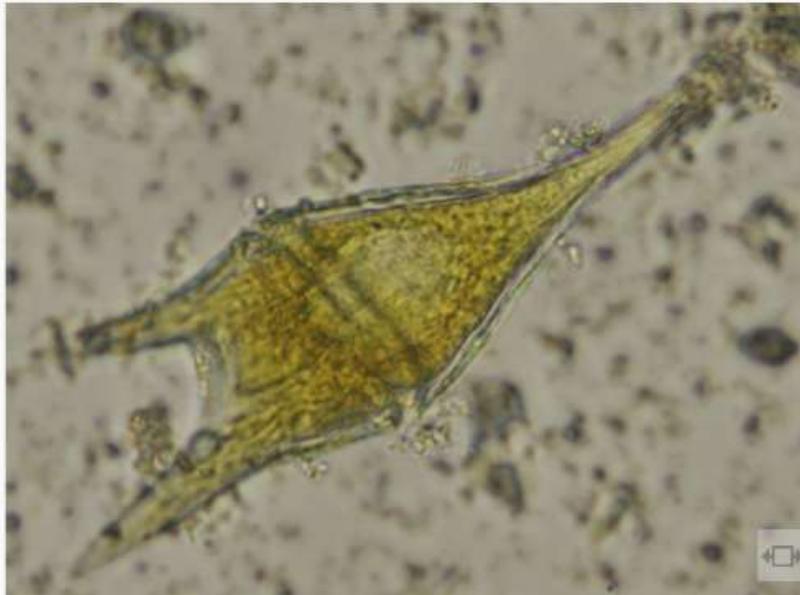
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What are Phytoplankton?

- » [Cal/EPA](#)
- » [Natural Resources Agency](#)
- » [About the California Water Quality Monitoring Council](#)

CALIFORNIA ESTUARIES

- » [Laws, Regulations & Standards](#)
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Phytoplankton

Description: Dinoflagellate (Ceratum species). The astonishing diversity of phytoplankton is visible only under a microscope. One trait all phytoplankton share, however, is chlorophyll—the green pigment that converts energy from the sun into food. **Photo Credit:** Photo by EcoAnalysts, Inc. for DWR

QUESTIONS ANSWERED

- » [What are phytoplankton, and why are they important?](#)
- » [How and where are they monitored in the SF Estuary?](#)
- » [What are their trends in the SF Estuary?](#)
- » [How healthy are they in the SF Estuary?](#)
- » [What is being done to protect California's estuaries?](#)

IMAGES / VIDEO



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Home → Eco Health → Estuaries → Healthy → San Francisco → Living Resources → Phytoplankton

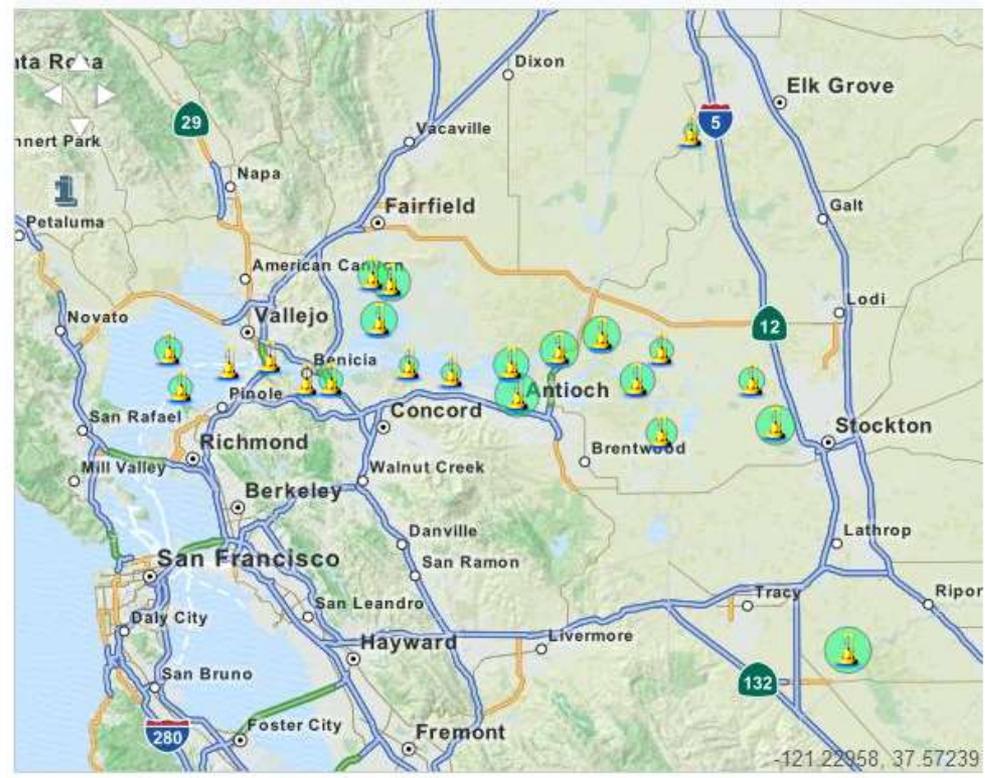


How and Where are Phytoplankton Monitored in the San Francisco Estuary?

- Cal/EPA
- Natural Resources Agency
- About the California Water Quality Monitoring Council

CALIFORNIA ESTUARIES

- Laws, Regulations & Standards
- Research
- Monitoring Programs, Data Sources & Reports
- Solution
- About Us
- Site Map



QUESTIONS ANSWERED

- What are phytoplankton, and why are they important?
- How and where are they monitored in the SF Estuary?
- What are their trends in the SF Estuary?
- How healthy are they in the SF Estuary?
- What is being done to protect California's estuaries?

CHLOROPHYLL A: 2011

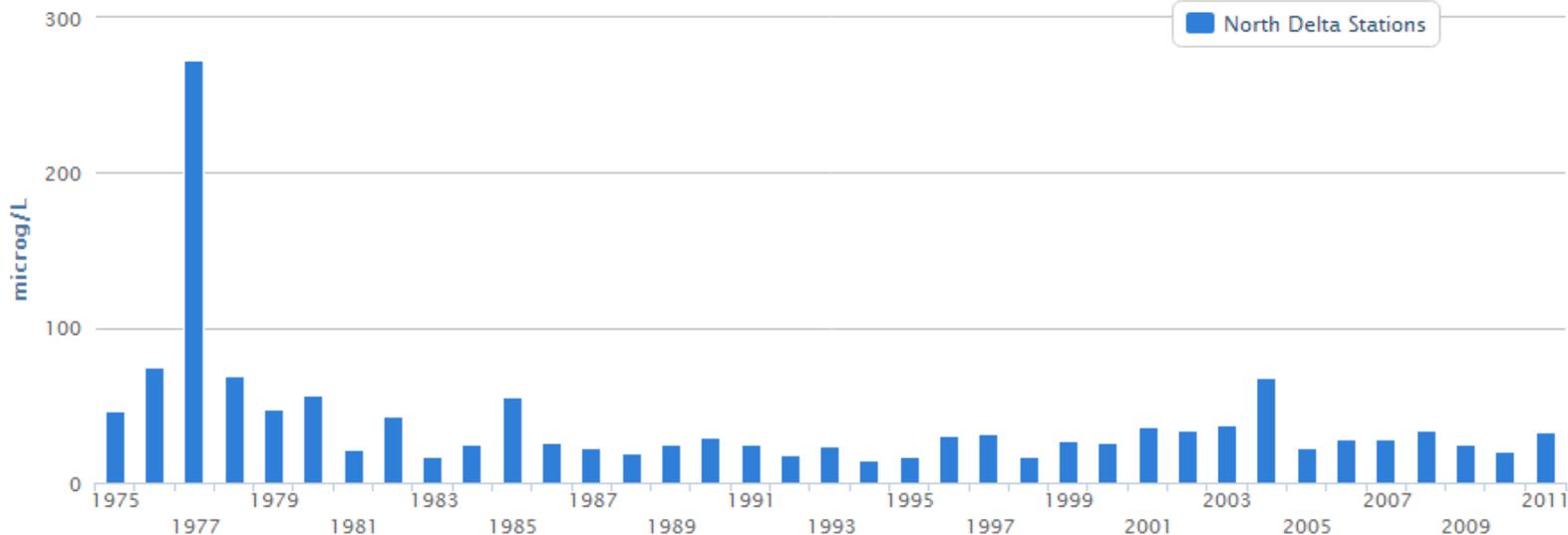
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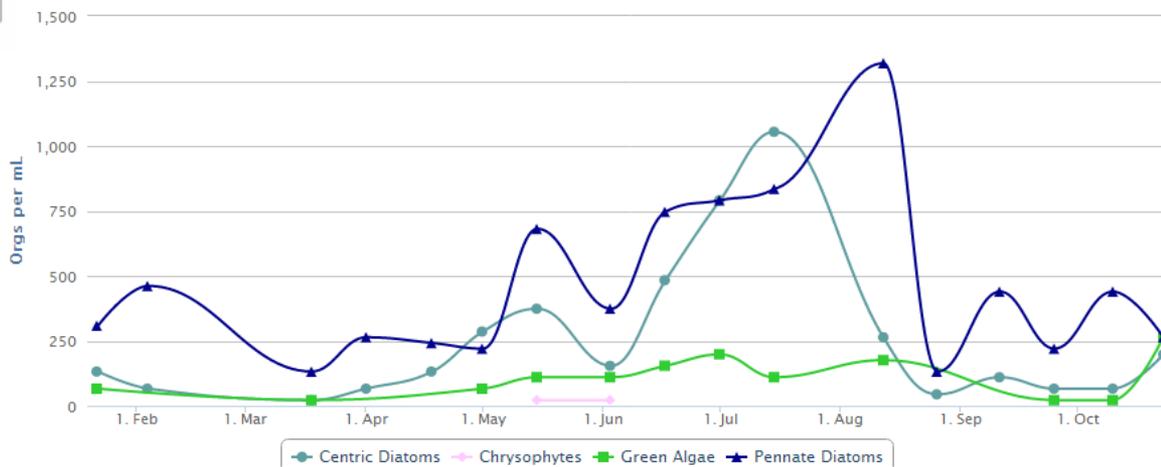
(All graphs are interactive. Use your mouse to see data results.)

North Delta 1975 - 2011



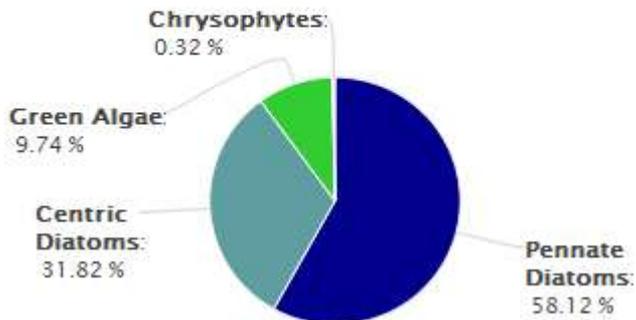
This graph depicts the relatively stable trend in chlorophyll a concentrations summed by year between 1975 and 2012 in the North Delta. In the North Delta abundance has stayed consistent, except in 1977.

North Delta 1975 Seasonal Trends



The pie chart and line graph above represent phytoplankton species composition in 1975, where Pennate Diatoms are dominate. The seasonality shows a spike in Centric and Pennate Diatoms in the late summer, and the number of Centric and Pennate Diatoms are far greater than in the 2000s. Data points not depicted for a species indicate zero values (was analyzed for but not detected).

North Delta Regional Average 1975 Annually Averaged





California Estuaries - Water Quality

[Show](#) | [Hide](#) Left Navigation Items

Water Quality Conditions

in the Sacramento-San Joaquin Delta and Suisun and San Pablo Bays.

 Introduction Information about this report and water quality monitoring results.	 Hydrological Conditions Annual summary of net Delta outflow, runoff and water year indices.	 Water Quality Water Temperature, Dissolved Oxygen, Specific Conductance, Secchi Disk Depth, Turbidity and more.	 Phytoplankton and Chlorophyll a Monitoring results of algal community composition and biomass.
 Zooplankton Annual and seasonal abundance and distribution of major zooplankton taxa.	 Benthic Monitoring Distribution, diversity and abundance of bottom dwelling organisms.	 Explore Data Coming soon. View and compare all data from this report.	 Continuous Monitoring Real Time water quality and environmental data.

Report to the State Water Resources Control Board in Accordance with Water Right Decision 1641

This report summarizes the results of water quality monitoring and special studies conducted by the

Ocean & Coastal Ecosystem Health

- Initial effort
 - Multi-Agency Rocky Intertidal Network (MARINe)
 - Tide Pool Portal released – October 2013
 - Build on MARINe data website
 - Add public interest focus

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Home → Eco Health → Ocean → Tide Pools

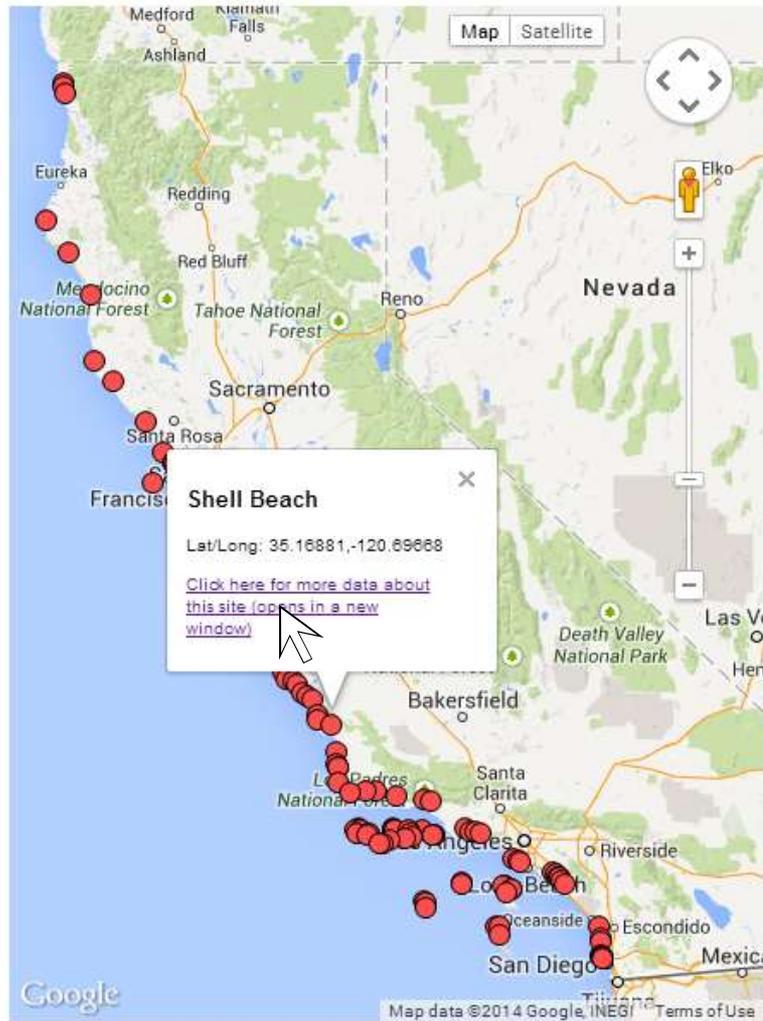


Rocky Intertidal Coastal Habitats (Tide Pools)

- Cal/EPA
- Natural Resources Agency
- About the California Water Quality Monitoring Council

TIDE POOL LINKS

- Stressors
- Laws, Regulations & Standards
- Regulatory Activities
- Enforcement Actions
- Research
- Monitoring Programs, Data Sources & Reports



Are Our Tide Pools Healthy?

Rocky intertidal zones, sometimes referred to as tide pools, are a diverse ecosystem. Organisms living in tide pools have to deal with naturally harsh conditions such as spending time out of water and dealing with strong wave action. In addition, tide pools are impacted by human activities, such as overexploitation and trampling and are vulnerable to climate change.

Long term monitoring of these habitats helps us understand how tide pool plant and animal populations change over time and gives us information to help determine the condition of these ecosystems.

QUESTIONS ANSWERED

- [What is a tide pool \(or Rocky Intertidal Habitat\)?](#)
- [Why are tide pools important?](#)
- [Where are the tide pools?](#)
- [Who monitors tide pools?](#)
- [What lives there and what species are monitored?](#)
- [How healthy are our tide pools?](#)
- [Who protects the tide pools?](#)
- [Are there rules that I should follow when I explore tide pools?](#)

→ [View videos](#) of California tide pools.



Shell Beach

[CLICK HERE FOR LONG-TERM TRENDS](#)

[CLICK HERE FOR BIODIVERSITY SURVEY FINDINGS](#)

Shell Beach is located in the Central Coast region of California. This site is near the San Luis Obispo Bay/Point San Luis Mussel Watch site. The site is located within a developed stretch of coastline, with stairs leading to the beach downcoast of the site, and human use is fairly high. This gently sloping site consists of moderately uneven terrain, containing few cracks and folds.



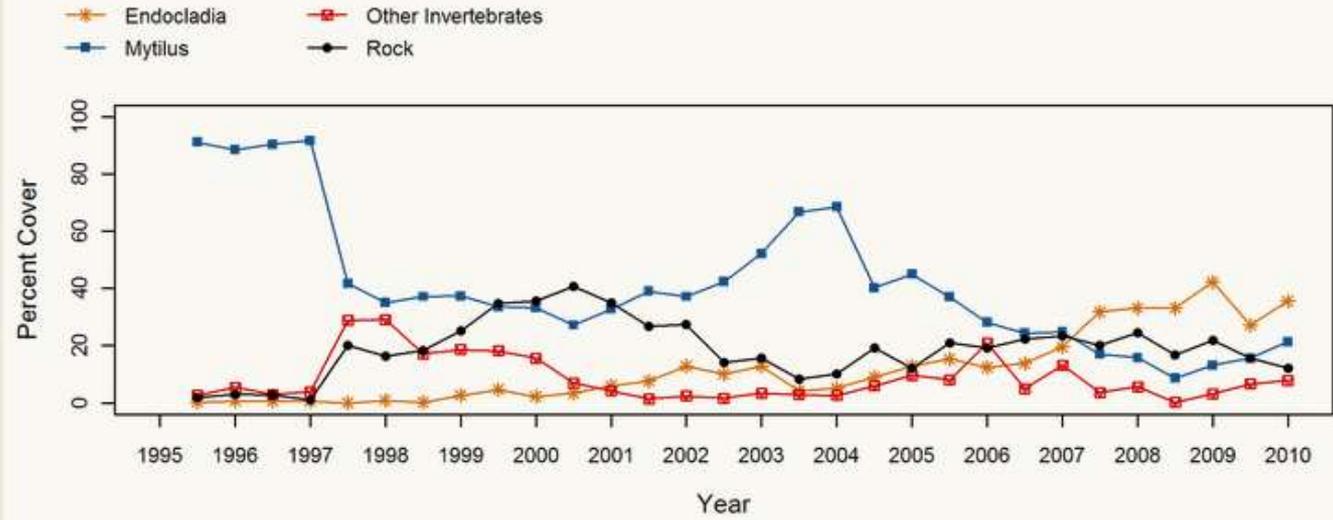
Shell Beach is dominated by consolidated bedrock, and the area surrounding the site is comprised of a mixture of consolidated bedrock, boulder fields, and sandy beach. The primary coastal orientation of this site is southwest.

Long-Term Monitoring Surveys at Shell Beach were established in 1995, and are done by University of California Santa Cruz. Long-Term MARINE surveys currently target the following species: *Chthamalus/Balanus* (Acorn Barnacles), *Mytilus* (California Mussel), *Silvetia* (Golden Rockweed), *Endocladia* (Turfweed), *Mastocarpus* (Turkish Washcloth), *Phyllospadix* (Surfgrass), and *Pisaster* (Ochre Star). In addition, motile invertebrates, barnacle recruitment, mussel size structure, and water temperature are monitored at this site. [Click here](#) to view Long-Term trends at this site.

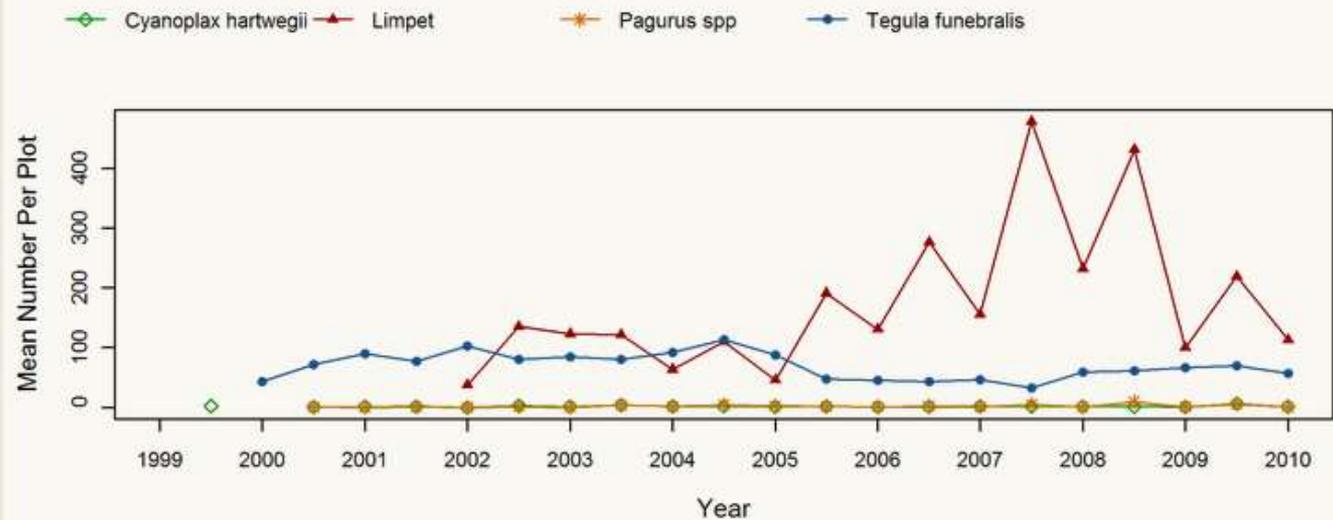
Biodiversity Surveys were done by University of California Santa Cruz in 2001 and 2006. The Biodiversity Survey grid encompasses two sections that are approximately 9 meters (along shore) x 33 meters (seaward), and 18 meters (along shore) x 33 meters (seaward). [Click here](#) to view Biodiversity Survey findings at this site.



Mytilus (California Mussel) – percent cover



Mytilus (California Mussel) – motile invertebrate counts





Home → Eco Health → Ocean → Tide Pools



Who Protects the Tide Pools?

- Cal/EPA
 - Natural Resources Agency
 - About the California Water Quality Monitoring Council
- TIDE POOL LINKS**
- Stressors
 - Laws, Regulations & Standards
 - Regulatory Activities
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Numerous tide pool habitats along the California coast are protected by state laws and regulations aimed at reducing the threat of collecting intertidal plants and animals by people. The state of California enacted the Marine Life Protection Act (MLPA) to increase the number, coherence, and effectiveness of Marine Protected Areas (MPAs).

MPAs include many different types of protection levels and include both intertidal and other coastal marine ecosystems. Many of the sites currently being monitored are within existing or proposed MPA boundaries. The purpose of the MPAs is to protect plants and animals by prohibiting collecting of a list of species. You can find more information about MPAs as follows:

- [Marine Life Protection Act](#)
- [Marine Protected Areas](#)
- [Maps and Coordinates](#)



Egregia Limpet



Lottia Gigantea

[click to enlarge]

SMCA = state marine conservation area SMP = state marine park
SMR = state marine reserve SMRMA = state marine recreational management area

Ocean & Coastal Ecosystem Health

💧 Future plans

- 💧 Roadmap developed by Ocean Science Trust
 - 💧 Funded by Resources Legacy Fund Foundation
 - 💧 Phased approach

💧 Priority issues

- 💧 Marine Protected Areas & water quality (ASBSs)
- 💧 Harmful algal blooms
- 💧 Ocean acidification
- 💧 Marine debris & trash control
- 💧 Smaller workgroups for each priority issue
 - 💧 Coordinated by overarching Oceans Workgroup

Safe Drinking Water Workgroup

- 💧 Leadership – CA Division of Drinking Water
- 💧 Portal mockup approved by Monitoring Council
 - 💧 Entire story of water quality
 - 💧 From the source to the tap
 - 💧 Telling each agency's role
- 💧 Move of Drinking Water Program
 - 💧 From CDPH to Water Boards
 - 💧 Delayed portal development

Additional Workgroup Efforts

- 💧 Data Management Workgroup
 - 💧 Provide recommendations on data access, data management, GIS and web development
 - 💧 Issues common to all theme-specific workgroups
- 💧 Water Quality Monitoring Collaboration Network
 - 💧 Provide regular web-based seminars for agency personnel, citizen monitors and others
 - 💧 Foster information exchange
 - 💧 Encourage broader use sound methods and tools for monitoring, assessment, reporting, and data management

Opportunities and Benefits

- 💧 Deliver answers to the public
 - 💧 Underscore important work of agencies involved
- 💧 Provide framework to motivate and guide improvement
 - 💧 Reveal data gaps, lack of assessment tools, poor data integration, and other problems hamper statewide assessment
- 💧 Broader assessments possible through information sharing

Opportunities and Benefits

- 💧 Automate agencies' annual reporting
- 💧 Allow decision makers, legislators, and public understand how their dollars are spent
 - 💧 Beyond bean counting – Are conditions getting better?
 - 💧 Big picture status and trends
 - 💧 Access to information to guide future expenditures
- 💧 Collaboration improves efficiency of monitoring and assessment programs
- 💧 Transparency builds credibility

More Than Just Data on the Web

- 💧 Forming and maintaining lasting relationships
 - 💧 Through theme-specific workgroups
- 💧 Implementing a portal design that requires & motivates parties to solve issues related to
 - 💧 Monitoring and assessment coordination
 - 💧 Data integration
- 💧 Focus directly on management questions
- 💧 Provides structure that initiates dialogues
 - 💧 Induces broader-based thinking
 - 💧 Enables broader-based assessments

C A L I F O R N I A



WATER

QUALITY

MONITORING COUNCIL

Thank you

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