



# Marine Biotoxin Monitoring Report

August 2020

Technical Report No. 20-23

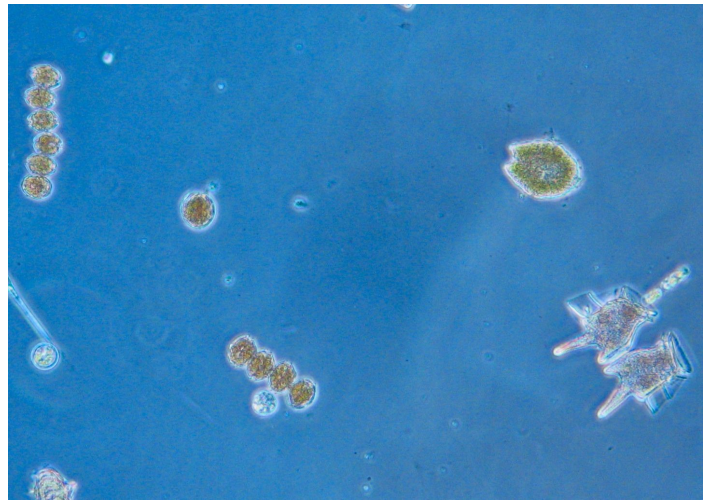
## INTRODUCTION:

This report contains results from the California Department of Public Health (CDPH) monitoring programs for shellfish toxins and associated toxin-producing phytoplankton. Toxin concentration ranges are provided for the paralytic shellfish poisoning (PSP) toxins and for domoic acid (DA), the latter associated with the syndrome called Amnesic Shellfish Poisoning. Estimates are provided for the distribution and relative abundance of *Alexandrium*, the dinoflagellate that produces PSP toxins, and *Pseudo-nitzschia*, the diatom that produces domoic acid. This report also contains summary information for any quarantine or health advisory in effect during the reporting period. Finally, lists of participating agencies and volunteers for each monitoring effort are provided.

### Northern California Summary:

#### Paralytic Shellfish Poisoning

*Alexandrium* was observed at several sites between Del Norte and Monterey counties in August, similar to the distribution observed in July (Figure 1). The relative abundance of *Alexandrium* was slightly elevated in samples from Trinidad Pier in Humboldt County (2%, August 28) and Stillwater Cove in Monterey County (6%, August 26). *Alexandrium* was rare at the



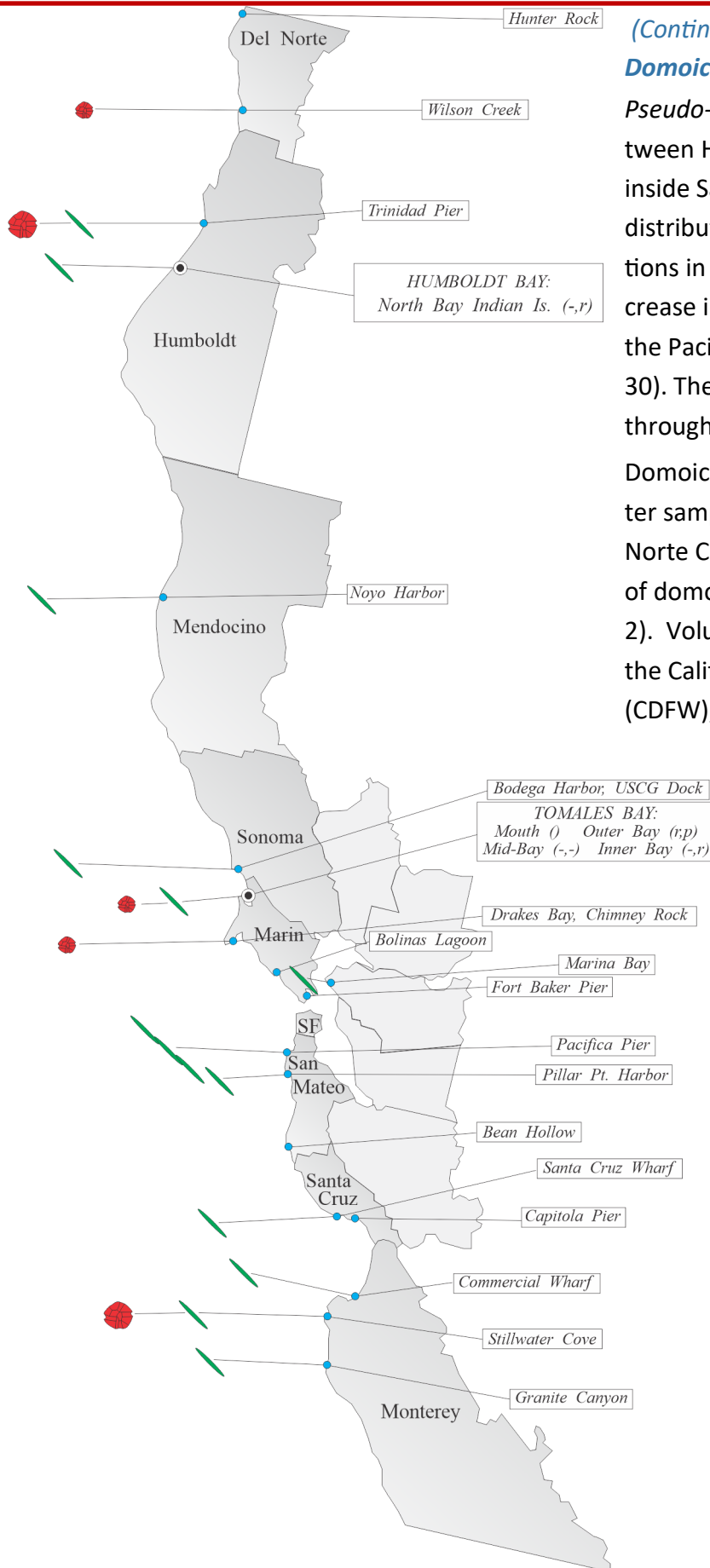
Chains of *Alexandrium* cells. Also present are the dinoflagellates *Dinophysis caudata* (lower right, responsible for diarrhetic shellfish poisoning) and *Akashiwo sanguineum* (upper right, capable of producing harmful red tides).

remaining sites: Wilson Creek, Del Norte County (August 20); outer Tomales Bay, Marin County (August 3); and the Drakes Bay sentinel mussel station, Marin County (August 17).

PSP toxicity was detected in mussel samples from sites in most northern California counties (Figure 2). The low concentrations of PSP toxins detected inside Humboldt Bay in July persisted throughout August in the outer bay sentinel mussel station. The elevated PSP toxicity detected in mussels from San Mateo, Santa Cruz, and Monterey counties during July declined below the alert level in August.

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Please note the following conventions for the phytoplankton and shellfish biotoxin distribution maps: (i) All estimates for phytoplankton relative abundance are qualitative, based on sampling effort and percent composition; (ii) Only known toxin-producing species (e.g., *seriata* complex for *Pseudo-nitzschia*) are represented on the maps; (iii) All toxin data are for mussel samples, unless otherwise noted; (iv) All samples are assayed for PSP toxins; DA analyses are performed as needed (e.g., on the basis of detected blooms of the diatoms that produce DA); (v) Please refer to the appropriate figure key for an explanation of the symbols used on the maps.



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**Domoic Acid**

*Pseudo-nitzschia* was observed at most sites between Humboldt and Monterey counties, including inside San Francisco Bay, in August (Figure 1). The distribution of this diatom was similar to observations in July, however there was a noticeable increase in the percent composition of this diatom at the Pacifica Pier in San Mateo County (15%, August 30). The observed cell mass was low in all samples throughout the month.

Domoic acid was not detected in any mussel or oyster samples in August. Razor clam samples from Del Norte County continued to contain concentrations of domoic acid that exceeded the alert level (Figure 2). Volunteer Ken Graves, with permission from the California Department of Fish and Wildlife (CDFW), collected razor clams from Crescent Beach

on August 3. All eight clam samples contained domoic acid, with three samples exceeding the 20 ppm alert level (21, 23, and 39 ppm). The remaining samples ranged from 3 to 17 ppm. These results were similar to those in July. Follow-up samples collected on August 19 were more variable, with one of eight samples exceeding the alert level (94 ppm). Three of the remaining seven samples

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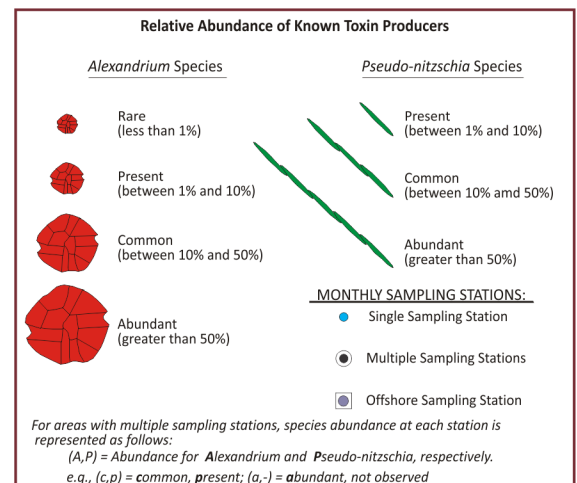


Figure 1. Toxic phytoplankton distribution in northern California.

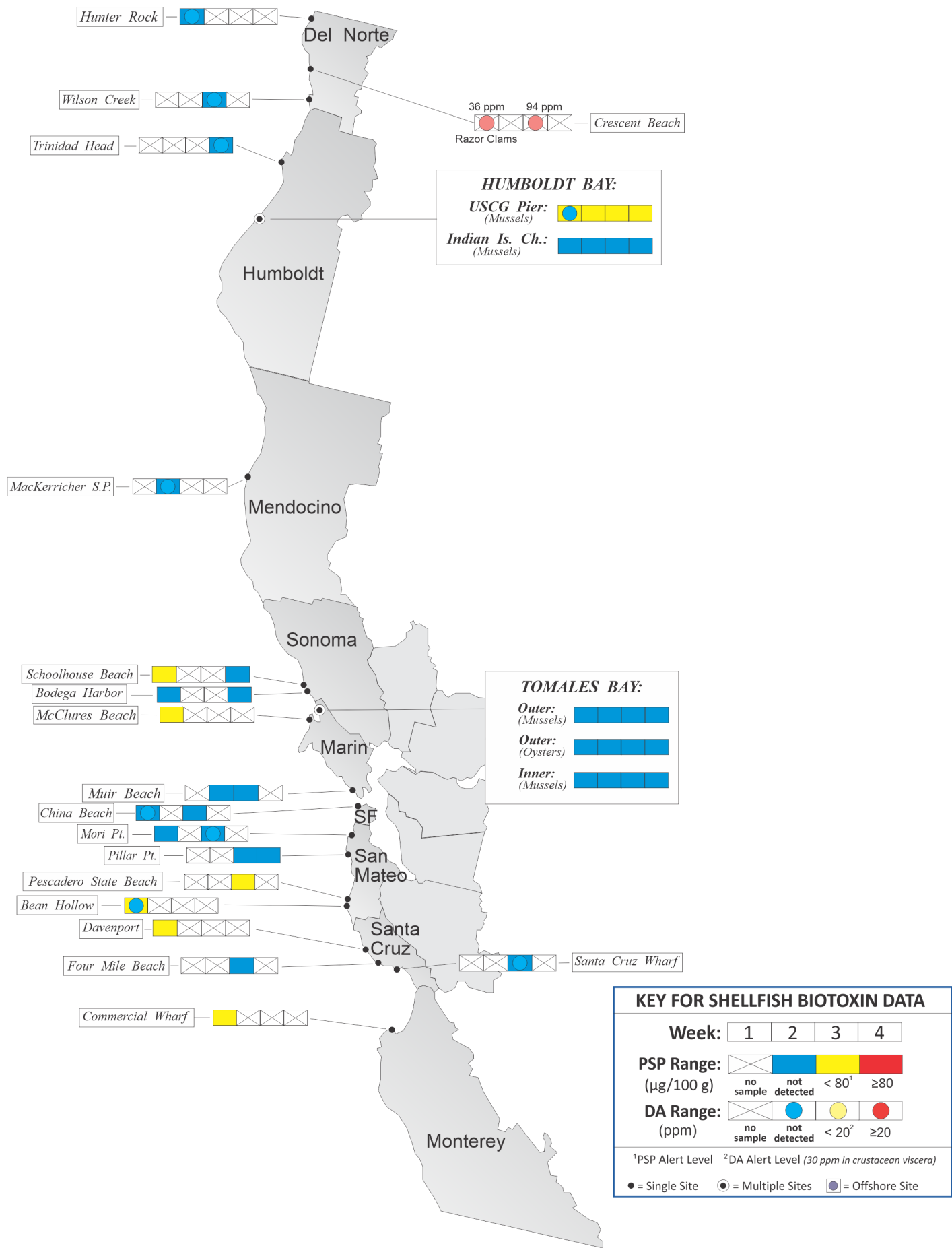


Figure 2. Distribution of shellfish biotoxins in northern California.

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Figure 3. Toxic phytoplankton distribution in southern California.

were below the detection limit and the remaining three samples ranged from 3 to 12 ppm.

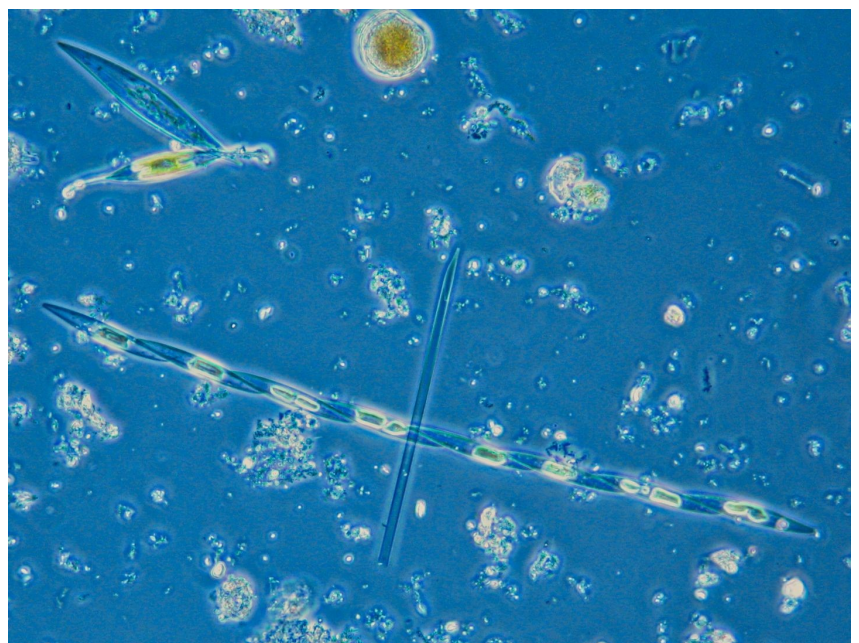
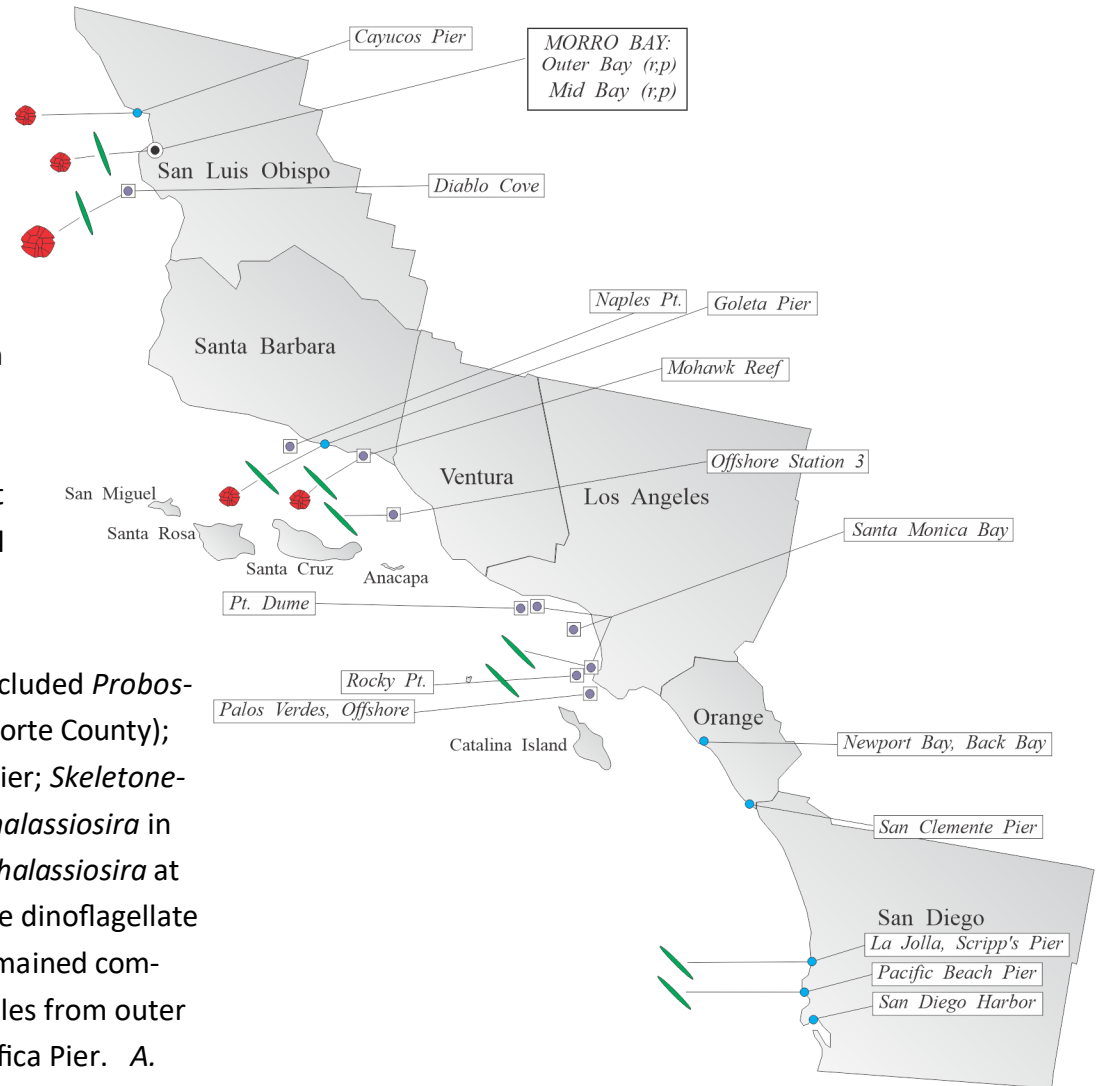
### Non-Toxic Species

A mix of diatoms and dinoflagellates was observed along the northern California coast in August. The diatom *Chaetoceros* was common to abundant at most sites between Del Norte and San Mateo counties. Other prominent diatoms observed included *Proboscica* at Wilson Creek (Del Norte County); *Rhizosolenia* at Trinidad Pier; *Skeletonema*, *Coscinodiscus*, and *Thalassiosira* in outer Tomales Bay; and *Thalassiosira* at the Santa Cruz Wharf. The dinoflagellate *Akashiwo sanguineum* remained common to abundant in samples from outer Tomales Bay and the Pacifica Pier. *A. sanguineum* was also common in samples from the Santa Cruz Wharf and Capitola Pier inside Monterey Bay.

### Southern California Summary:

#### Paralytic Shellfish Poisoning:

*Alexandrium* was observed at several sites in San Luis Obispo and Santa Barbara counties in August (Figure 3). Compared to July, there was a significant decrease in the percent composition of *Alexandrium* in samples from all San Luis Obispo County sites, with this dinoflagellate remaining slightly elevated in an August 21 sample from offshore of Diablo

A chain of the diatom *Pseudo-nitzschia*.

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Cove. Low numbers of *Alexandrium* were also observed at Goleta Pier and just offshore of Santa Barbara at Mohawk Reef.

PSP toxins were detected at only one site in August (Figure 4).

The low concentration of toxins detected in oysters from inner Morro Bay at the end of July persisted through the first week of August, then declined below the detection limit.

### Domoic Acid

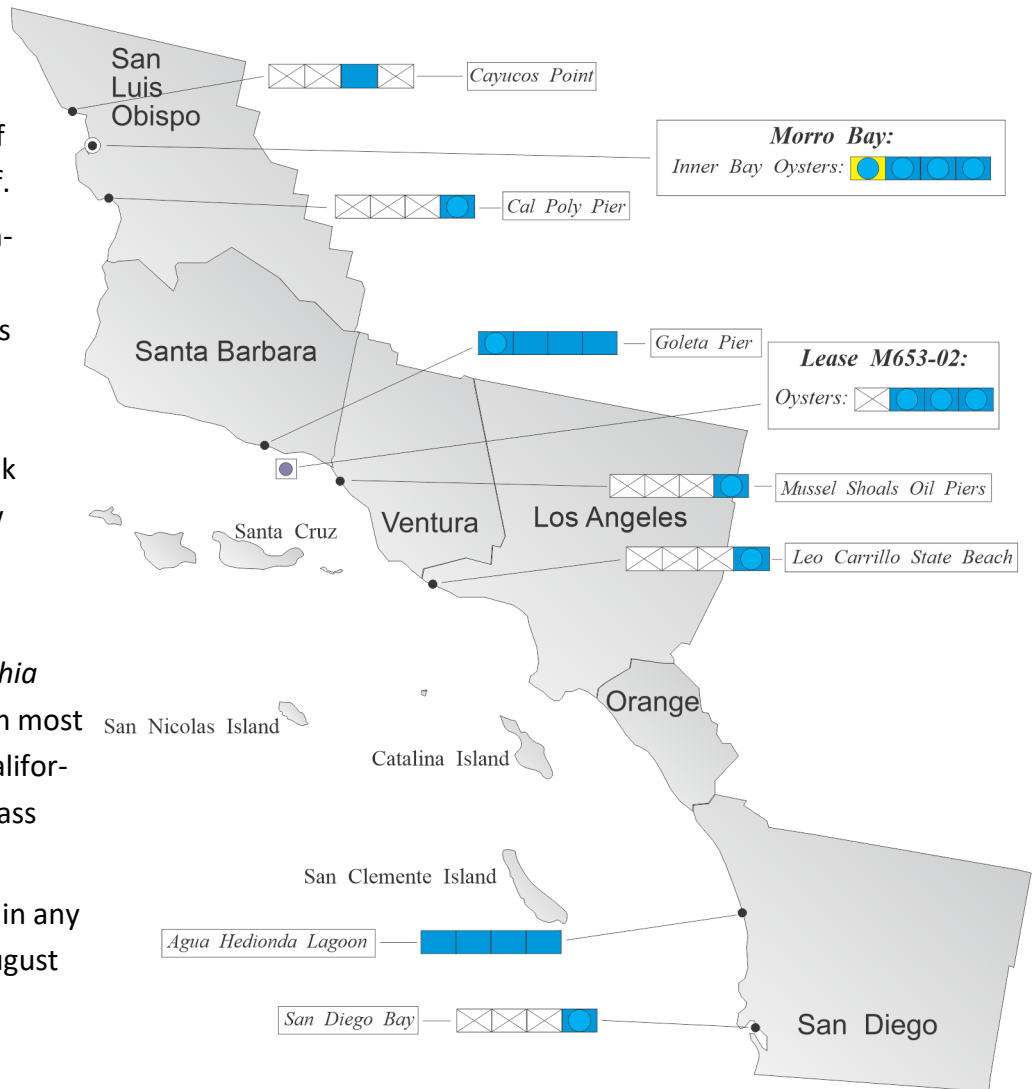
Low numbers of *Pseudo-nitzschia* were observed in samples from most counties along the southern California coast (Figure 3). The cell mass was low in all samples.

Domoic acid was not detected in any mussel or oyster samples in August (Figure 4).

### Non-Toxic Species

A mix of diatoms and dinoflagellates was observed along the southern California coast. The diatom *Chaetoceros* was common to abundant in samples from San Luis Obispo and

Figure 4. Distribution of shellfish biotoxins in southern California.



Santa Barbara counties. *Bacteriastrium* was common in Santa Monica Bay (Los Angeles County, August 3 and 4) and at the Pacific Beach Pier (San Diego County, August 23). The dinoflagellate *Cochlodinium*

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The Marine Biotoxin Monitoring and Control Program, managed by the California Department of Public Health, is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins and domoic acid.

The Phytoplankton Monitoring Program is a state-wide effort designed to detect toxin producing species of phytoplankton in ocean water before they impact the public. The phytoplankton monitoring and observation effort can provide an advanced warning of a potential toxic bloom, allowing us to focus sampling efforts in the affected area before California's valuable shellfish resources or the public's health is threatened.

For Information on Volunteering:

For Recorded Biotoxin Information Call:

Email [redtide@cdph.ca.gov](mailto:redtide@cdph.ca.gov) or call 510-412-4635

(800) 553 - 4133

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was common in samples from the Cayucos Pier (August 18) and outer Morro Bay (August 24). *Cerati-um furca* was common at sites between San Luis Obispo and Los Angeles counties, with *Prorocen-trum micans* common in San Luis Obispo and Santa Barbara sites. *Lingulodinium polyedrum* and, more unusually, a species of *Gym-nodinium*, were common at several sites along the Los Angeles County coast.

### QUARANTINES:

CDPH issued a health advisory on July 1, advising consumers not to eat sport-harvested mussels, clams, or scallops from San Francisco, San Mateo, Santa Cruz, and Monterey counties due to elevated levels of the PSP toxins in shellfish samples.

The annual mussel quarantine began on May 1. This quarantine applies to the sport-harvesting of mussels along the entire California coast, including all bays and estuaries.

The CDFW closure of the razor clam fishery remains in effect due to the continued presence of dangerous levels of domoic acid in razor clams from beaches in Humboldt and Del Norte counties.

Consumers of Washington clams, also known as butter clams (*Saxidomus nuttalli*), are cau-

Table 1. Program participants collecting phytoplankton samples.

AGENCY	#	AGENCY	#
<b>DEL NORTE COUNTY</b>			
Tolowa Dee-ni' Nation	1	Yurok Tribe Environmental Program	1
<b>HUMBOLDT COUNTY</b>			
Humboldt State University Marine Lab	1	Pacific Shellfish	4
<b>MENDOCINO COUNTY</b>		CDPH Volunteer ( <i>Kristin Gordon</i> )	3
<b>SONOMA COUNTY</b>		CDPH Marine Biotoxin Program	2
<b>MARIN COUNTY</b>		CDPH Volunteers ( <i>Brent Anderson, Nacho Martin</i> )	4
CDPH Marine Biotoxin Program	1	Hog Island Oyster Company	10
<b>CONTRA COSTA COUNTY</b>		CDPH Marine Biotoxin Program	3
<b>SAN FRANCISCO COUNTY</b>		None Submitted	
<b>SAN MATEO COUNTY</b>		CDPH Marine Biotoxin Program	2
The Marine Mammal Center	5	San Mateo County Environmental Health Dept.	3
<b>SANTA CRUZ COUNTY</b>		CDPH Volunteer ( <i>Nacho Martin</i> )	2
Monterey Bay National Marine Sanctuary	1	U.C. Santa Cruz	3
<b>MONTEREY COUNTY</b>		Marine Pollution Studies Laboratory	1
Monterey Abalone Company	2	Pacific Grove Museum of Natural History	3
<b>SAN LUIS OBISPO COUNTY</b>		CDPH Volunteers ( <i>Skip Rotstein, Dan Hoskins</i> )	3
Grassy Bar Oyster Company	5	Tenera Environmental	4
<b>SANTA BARBARA COUNTY</b>			
Santa Barbara Channelkeeper	3	U.C. Santa Barbara	6
<b>VENTURA COUNTY</b>		Coastal Marine Biolabs	1
<b>LOS ANGELES COUNTY</b>			
City of L.A. Environmental Monitoring Division	3	Los Angeles Water Keeper	4
<b>ORANGE COUNTY</b>			
Back Bay Science Center	1	CDPH Volunteer ( <i>Truong Nguyen</i> )	1
<b>SAN DIEGO COUNTY</b>		CDPH Volunteer ( <i>Melissa Roa</i> )	2
Scripps Institute of Oceanography	5	U.S. Navy Marine Mammal Program	3

tioned to eat only the white meat. Washington clams can concentrate the PSP toxins in the viscera and in the dark parts of the siphon and can remain toxic for a long period of time. Persons taking scallops or clams, with the exception of razor clams, are advised to remove and discard the dark parts (i.e., the digestive organs or viscera). Razor clams (*Siliqua patula*) are an exception to this general guidance due to their ability to concentrate and retain domoic acid in the edible white meat as well as in the viscera.

PSP toxins can produce a tingling around the mouth and fingertips within a few minutes to a few hours after eating toxic shellfish. These symptoms can be followed by disturbed balance, lack of muscular coordination, slurred speech and difficulty swallowing. In severe poisonings, complete muscular paralysis and death from asphyxiation can occur.

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Symptoms of domoic acid poisoning can occur within 30 minutes to 24 hours after eating toxic seafood. In mild cases, symptoms of exposure to this nerve toxin may include vomiting, diarrhea, abdominal cramps, headache and dizziness.

These symptoms disappear completely within several days. In severe cases, the victim may experience excessive bronchial secretions, difficulty breathing, confusion, disorientation, cardiovascular instability, seizures, permanent loss of short-term memory, coma and death.

Any person experiencing any of these symptoms should seek immediate medical care. Consumers are also advised that neither cooking or freezing eliminates domoic acid or the PSP toxins from the shellfish tissue. These toxins may also accumulate in seafood species such as crab, lobster, and small fin-fish like sardines and anchovies.

Sport harvesters should only collect shellfish from areas that are not affected by a current health advisory or quarantine. Contact the “Biotoxin Information Line” at 1-800-553-4133 for a current update on marine biotoxin activity prior to gathering and consuming shellfish.



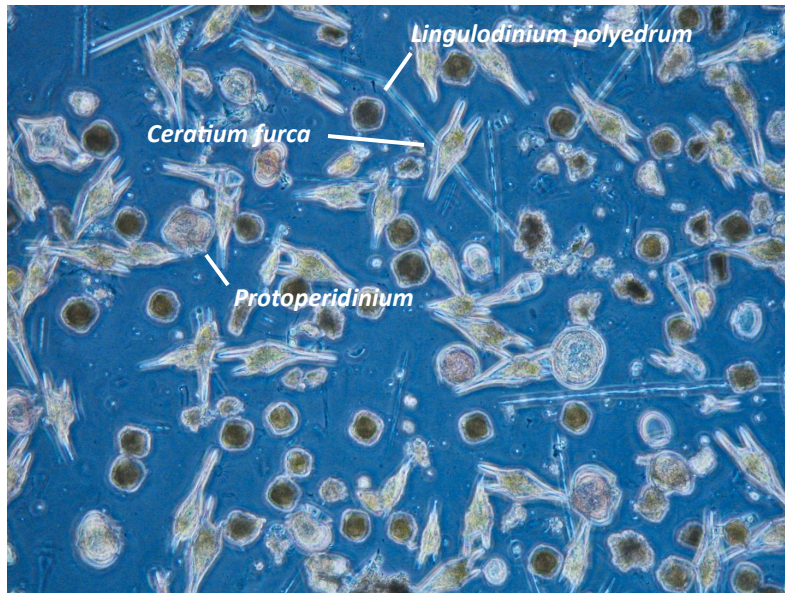
Table 2. Program participants collecting shellfish samples.

COUNTY	AGENCY	#
Del Norte	CDPH Volunteer ( <i>Ken Graves</i> )	16
	Tolowa Dee-ni' Nation	1
	Yurok Tribe Environmental Program	1
Humboldt	Humboldt County Environmental Health Department	1
	Pacific Shellfish	10
Mendocino	CDPH Volunteer ( <i>Kristin Gordon</i> )	1
Sonoma	CDPH Marine Biotoxin Program	4
Marin	CDPH Volunteer ( <i>Rand Dobleman</i> )	1
	CDPH Marine Biotoxin Program	2
	Cove Mussel Company	5
	Hog Island Oyster Company	10
San Francisco	CDPH Marine Biotoxin Program	2
San Mateo	CDPH Marine Biotoxin Program	4
	San Mateo County Environmental Health Department	2
Santa Cruz	CDPH Volunteers ( <i>Richard Buddington, Nacho Martin</i> )	2
	CDPH Marine Biotoxin Program	1
Monterey	Monterey Abalone Company	1
San Luis Obispo	CDPH Volunteer ( <i>Wesley Jarman</i> )	1
	California Polytechnic State University	1
	Grassy Bar Oyster Company	7
Santa Barbara	Santa Barbara Mariculture Company	4
	U.C. Santa Barbara	4
Ventura	Ventura County Environmental Health Department	1
Los Angeles	CDPH Volunteer ( <i>Steven Field</i> )	1
Orange	None Submitted	
San Diego	Carlsbad Aquafarm, Inc.	4
	U.S. Navy Marine Mammal Program	1

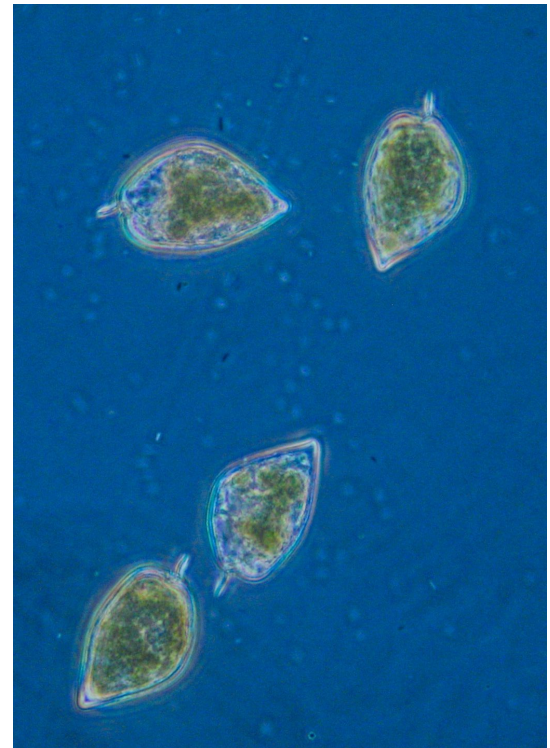
If you are having difficulty accessing this document, please contact CDPH at 1-800-553-4133 to request this information in an alternate format.



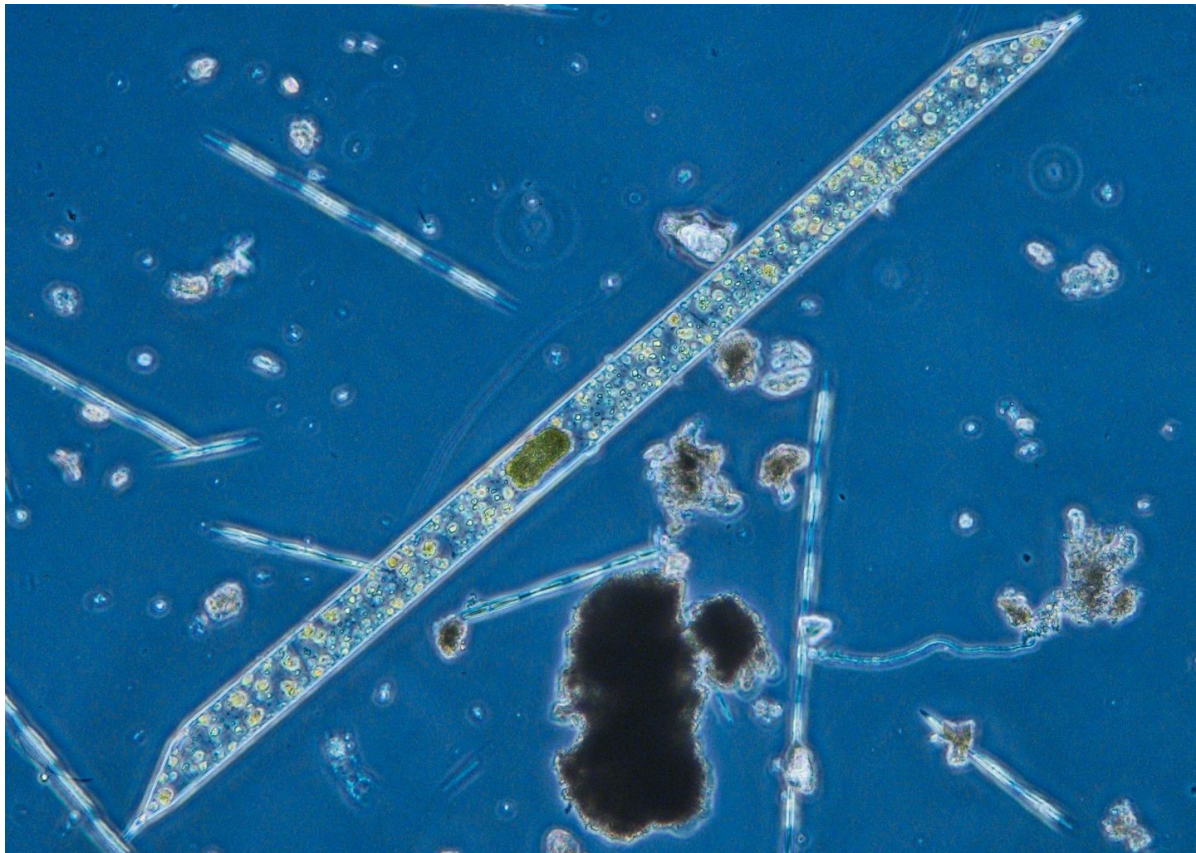
# Phytoplankton Gallery



The dinoflagellates *Ceratium furca*, *Lingulodinium polyedrum*, and *Protoperidinium* sp.



The dinoflagellate *Prorocentrum micans*



The diatom *Proboscia alata* (formerly *Rhizosolenia*).