



Marine Biotoxin Monitoring Report

July 2020

Technical Report No. 20-22

INTRODUCTION:

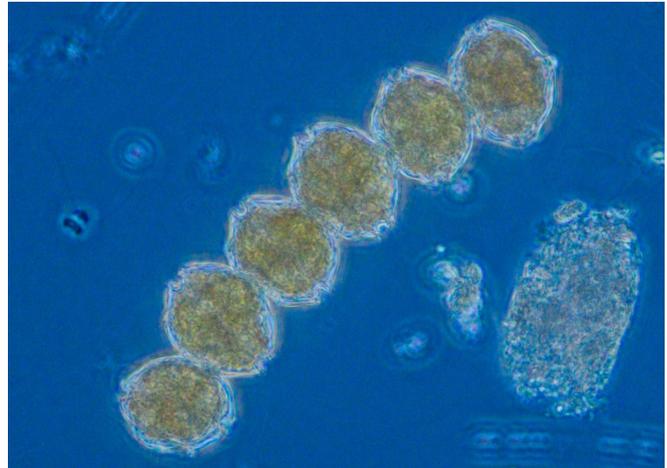
This report contains results from the California Department of Public Health (CDPH) monitoring programs for shellfish toxins and associated toxin-producing phytoplankton. Toxin concentration ranges are provided for the paralytic shellfish poisoning (PSP) toxins and for domoic acid (DA), the latter associated 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 numerous sites between Sonoma and Santa Cruz counties, as well as at two sites in Humboldt County, in July (Figure 1). This distribution was similar to observations in June, however the percent composition declined at some sites, most notably at the Pacifica Pier in San Mateo County and the Monterey Commercial Wharf. The highest



Alexandrium increased along the San Luis Obispo coast in July.

relative abundance of *Alexandrium* was observed in outer Tomales Bay in a sample collected on July 6. PSP toxicity was detected in mussel samples from sites in most northern California counties (Figure 2). The elevated PSP toxicity detected in mussels between San Mateo and Monterey counties during the last week of June persisted through the first week of July. PSP concentrations exceeding the alert level were detected at the following locations (north to south): Bean Hollow State Park in San Mateo County (225 $\mu\text{g}/100\text{ g}$, July 9); Davenport Landing (859 $\mu\text{g}/100\text{ g}$, July 6) and Four Mile Beach (108 $\mu\text{g}/100\text{ g}$, July 6) in Santa Cruz County; and the Monterey Commercial Wharf (206 $\mu\text{g}/100\text{ g}$, July 7) in Monterey

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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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County.

Low concentrations of PSP toxins continued to be detected in mussel samples from the outer Humboldt Bay sentinel station on July 20 and 27 (38 and 35 µg/100 g, respectively) and also in sentinel mussels farther inside the bay at the Indian Island station (38, 44, and 27 µg/100 g on July 13, 20, and 27, respectively). Low levels of toxicity were also detected in mussels from various locations between Sonoma and Monterey counties.

Domoic Acid

Pseudo-nitzschia was observed at most sites between Humboldt and Monterey counties, including inside San Francisco Bay, in July (Figure 1). The distribution of this diatom was similar to observations in June, however there was a noticeable decrease in relative abundance at sites in Sonoma, Marin,

and San Mateo counties in July. The cell mass was low in all samples.

Domoic acid was not detected in any mussel or oyster samples in June. Razor clam samples from Del Norte and Humboldt counties 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 Wild-

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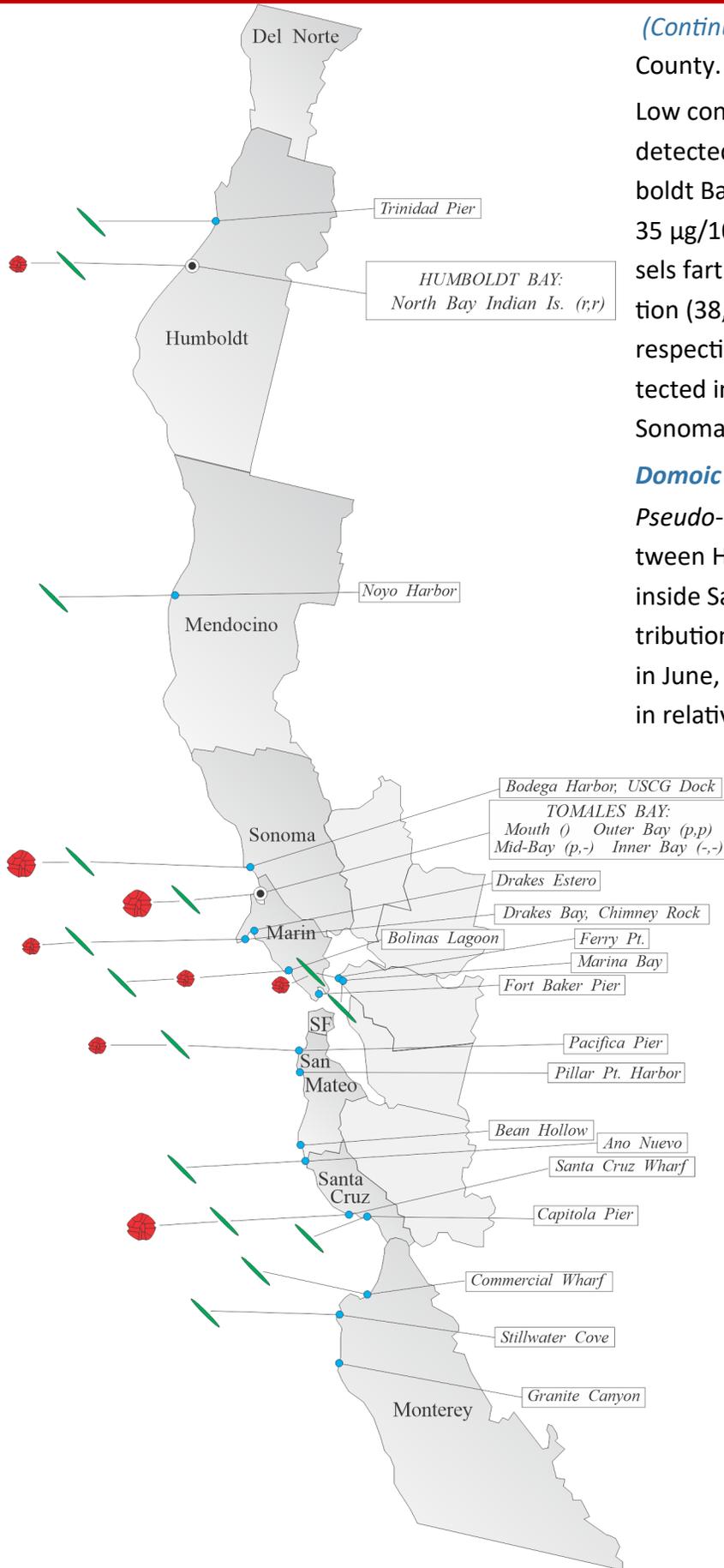
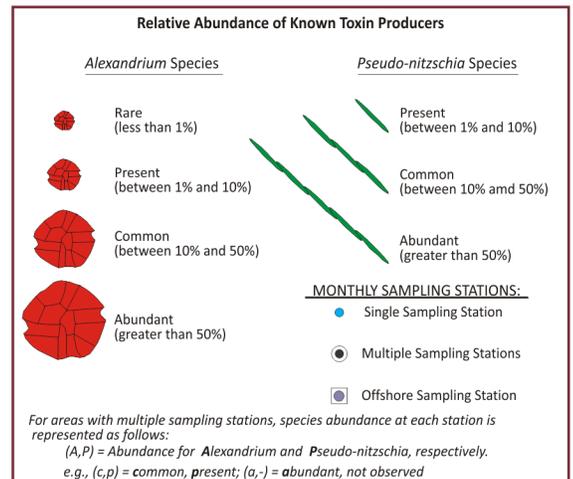


Figure 1. Toxic phytoplankton distribution in northern California.



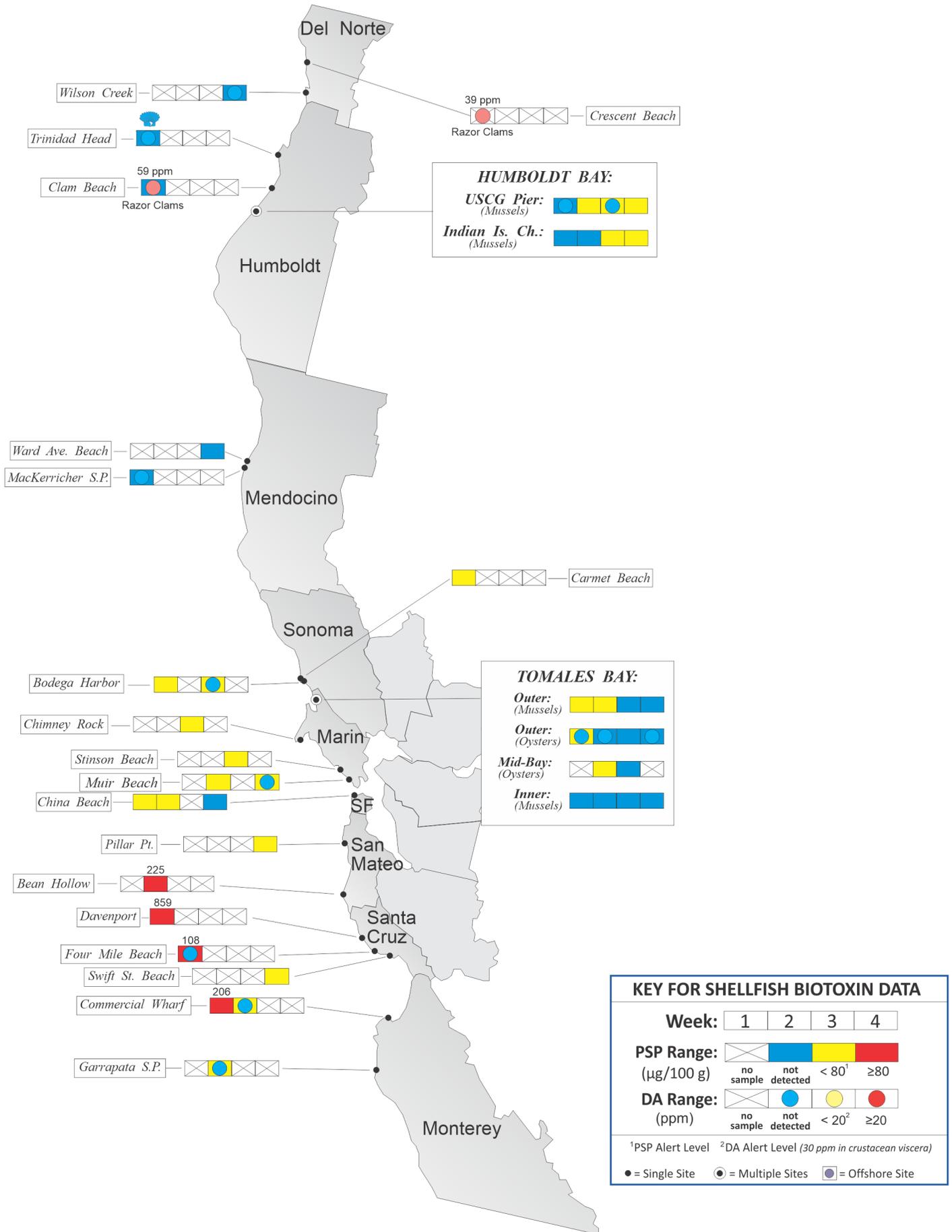


Figure 2. Distribution of shellfish biotoxins in northern California.

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Figure 3. Toxic phytoplankton distribution in southern California.

life (CDFW), collected razor clams from Crescent Beach on July 4. All eight clam samples contained domoic acid, with two samples exceeding the 20 ppm alert level (25 and 39 ppm). The remaining samples ranged from 7.5 to 18 ppm.

CDFW collected seven razor clam samples from Clam Beach in Humboldt County on July 6. All samples contained domoic acid, with three of the six clams exceeding the alert level (25, 59, and 72 ppm). The remaining samples ranged from 2.9 to 11 ppm.

Non-Toxic Species

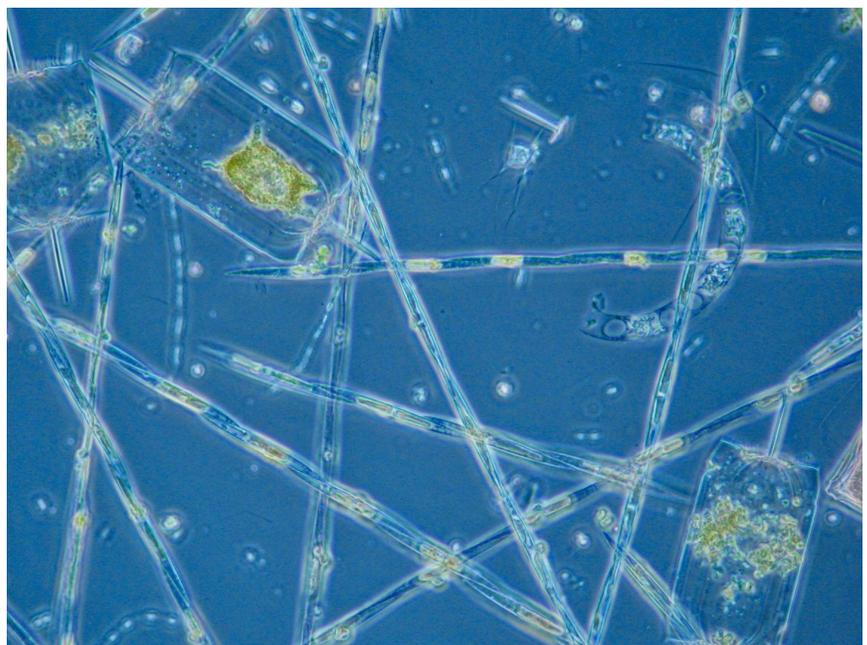
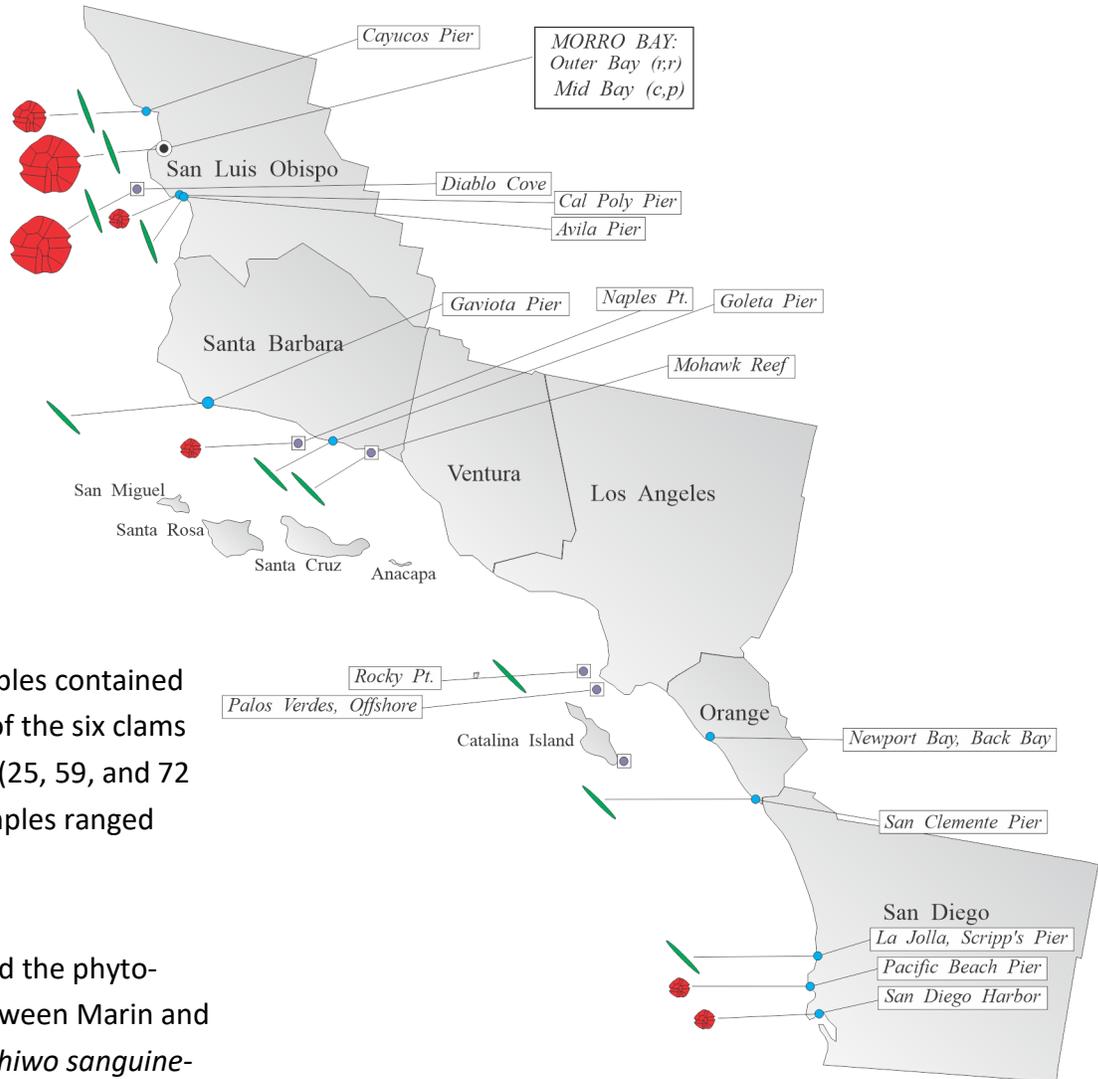
Dinoflagellates dominated the phytoplankton assemblage between Marin and Monterey counties. *Akashiwo sanguineum* was common to abundant throughout this range, with the greatest cell masses observed in samples from outer Tomales Bay (July 27) and the Pacifica Pier (July 5). *Ceratium furca* and *Prorocentrum micans* were also common in samples from Santa Cruz County. Diatoms were more prevalent in Humboldt (*Chaetoceros* and *Thalassiosira*) and Mendocino (*Skeletonema*) counties.

Southern California Summary:

Paralytic Shellfish Poisoning:

Alexandrium was observed at several sites in San Luis Obispo, Santa Barbara,

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Chains of the diatom *Pseudo-nitzschia*.

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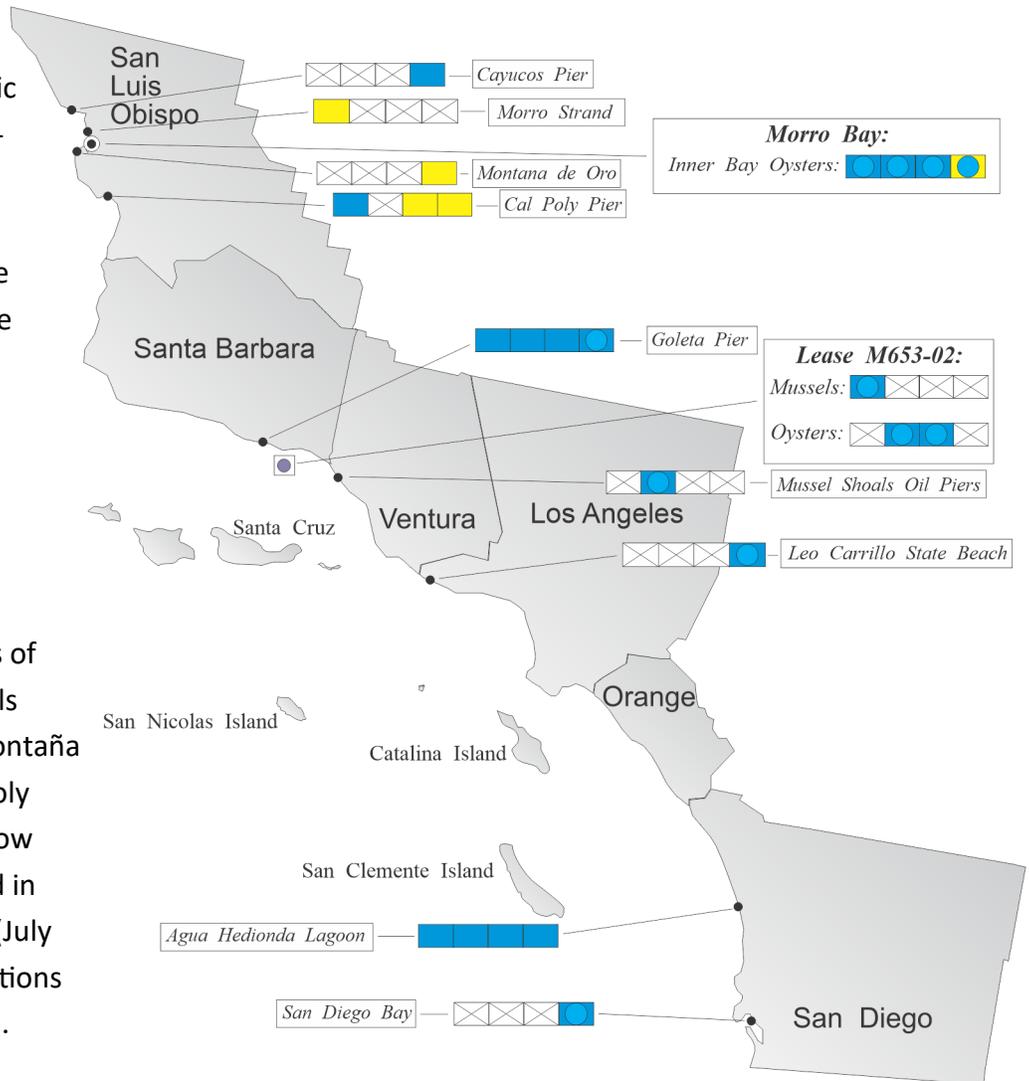
and San Diego counties in June (Figure 3). There was a dramatic increase in the percent composition of *Alexandrium* in samples from mid Morro Bay (July 27) and offshore of Diablo Cove (July 30), comprising 10% of the phytoplankton assemblage at both sites in San Luis Obispo County.

PSP toxins were detected in several shellfish samples from San Luis Obispo County in July (Figure 4). Low concentrations of toxins were detected in mussels from Morro Strand (July 7), Montaña de Oro (July 24), and the Cal Poly Pier in Avila (July 20 and 27). Low level toxicity was also detected in oysters from inner Morro Bay (July 27 and 29). All toxin concentrations were well below the alert level.

Domoic Acid

Low numbers of *Pseudo-nitzschia* were observed in samples from scattered locations along the southern California coast (Figure 3). The

Figure 4. Distribution of shellfish biotoxins in southern California.



cell mass was low in all samples.

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

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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 or call 510-412-4635

(800) 553 - 4133

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Non-Toxic Species

Dinoflagellates were dominant along the San Luis Obispo County coast, with *Prorocentrum micans* and *Ceratium furca* common to abundant at various locations. Diatoms were dominant at sites between Santa Barbara and Orange counties, but the prevalent genera varied somewhat. *Chaetoceros* and *Bacteriastrium* were common at Santa Barbara sites and *Hemialus* was common in samples along the Los Angeles coast. Orange County samples contained *Hemialus* (San Clemente Pier), with *Chaetoceros* and *Skeletonema* common in the Back Bay of Newport Bay. San Diego samples contained a mix of diatoms (*Eucampia*, *Hemialus*) and the dinoflagellate *Lingulodinium polyedrum*.

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.

Table 1. Program participants collecting phytoplankton samples.

AGENCY	#	AGENCY	#
DEL NORTE COUNTY		None Submitted	
HUMBOLDT COUNTY			
Humboldt State University Marine Lab	2	Pacific Shellfish	5
MENDOCINO COUNTY			
		CDPH Volunteer (<i>Kristin Gordon</i>)	4
SONOMA COUNTY			
		CDPH Marine Biotoxin Program	2
MARIN COUNTY			
		CDPH Volunteer (<i>Brent Anderson</i>)	1
CDPH Marine Biotoxin Program	1	Hog Island Oyster Company	6
CONTRA COSTA COUNTY			
		CDPH Marine Biotoxin Program	5
SAN FRANCISCO COUNTY			
		None Submitted	
SAN MATEO COUNTY			
		CDPH Volunteer (<i>Nacho Martin</i>)	1
CDPH Marine Biotoxin Program	2	San Mateo County Environmental Health Dept.	4
The Marine Mammal Center	4	U.C. Santa Cruz	2
SANTA CRUZ COUNTY			
		CDPH Volunteer (<i>Nacho Martin</i>)	3
Monterey Bay National Marine Sanctuary	2	U.C. Santa Cruz	4
MONTEREY COUNTY			
		CDPH Volunteer (<i>Nacho Martin</i>)	1
Monterey Abalone Company	3	Pacific Grove Museum of Natural History	5
SAN LUIS OBISPO COUNTY			
		CDPH Volunteers (<i>Skip Rotstein, Dan Hoskins</i>)	2
Grassy Bar Oyster Company	4	Tenera Environmental	3
SANTA BARBARA COUNTY			
		CDPH Volunteer (<i>John Kuizenga</i>)	1
Santa Barbara Channelkeeper	4	U.C. Santa Barbara	6
VENTURA COUNTY			
		None Submitted	
LOS ANGELES COUNTY			
		CDPH Volunteers (<i>Cal Parsons</i>)	1
Los Angeles County Sanitation District	1	Los Angeles Water Keeper	4
ORANGE COUNTY			
Back Bay Science Center	3	CDPH Volunteer (<i>Truong Nguyen</i>)	1
SAN DIEGO COUNTY			
CDPH Volunteers (<i>Randy Dick, Melissa Roa</i>)	2	Carlsbad Aquafarms, Inc.	2
Scripps Institute of Oceanography	5	U.S. Navy Marine Mammal Program	3

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 cautioned 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 with-

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in 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.

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 finfish 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.

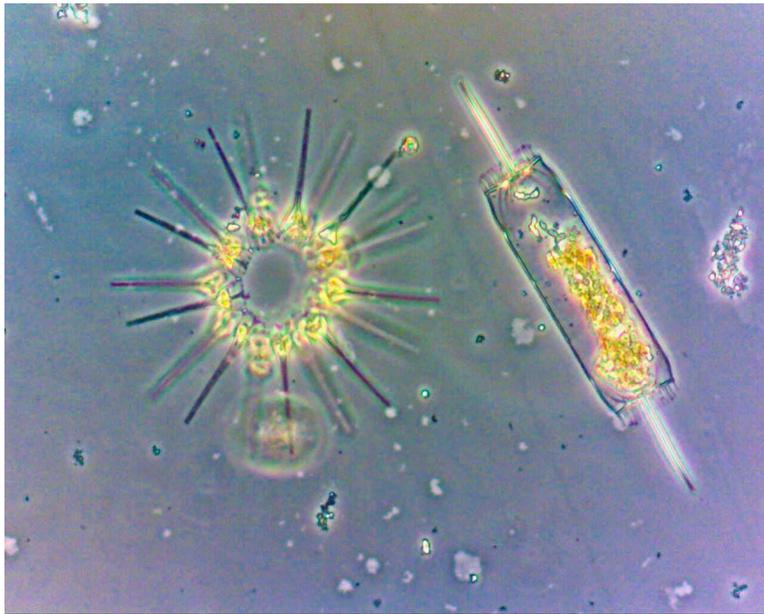


If you are having difficulty accessing this document, please contact CDPH at 1-800-553-4133 to request this information in an alternate format.

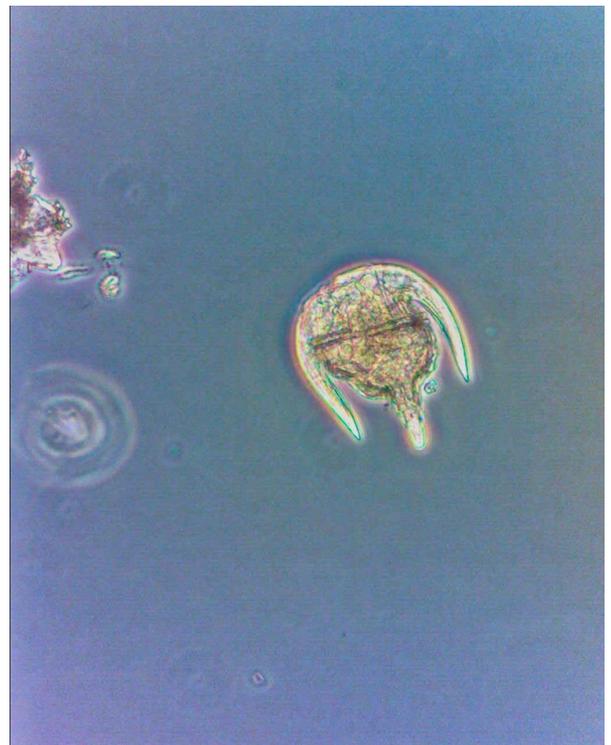
Table 2. Program participants collecting shellfish samples.

COUNTY	AGENCY	#
Del Norte	CDPH Volunteer (<i>Ken Graves</i>)	6
	Tolowa Dee-ni' Nation	9
Humboldt	California Department of Fish and Wildlife	6
	Humboldt County Environmental Health Department	1
	Pacific Shellfish	10
Mendocino	CDPH Volunteer (<i>Kristin Gordon</i>)	1
	Mendocino County Environmental Health Department	1
Sonoma	CDPH Marine Biotoxin Program	3
Marin	CDPH Marine Biotoxin Program	2
	Cove Mussel Company	2
	Hog Island Oyster Company	13
San Francisco	None Submitted	
San Mateo	CDPH Volunteer (<i>Nacho Martin</i>)	1
	CDPH Marine Biotoxin Program	3
	San Mateo County Environmental Health Department	2
Santa Cruz	CDPH Volunteer (<i>Stuart Jackson</i>)	2
	CDPH Marine Biotoxin Program	1
	U.C. Santa Cruz	2
Monterey	CDPH Volunteers (<i>Serena Lomonico, Mark Donaldson</i>)	2
	Monterey Abalone Company	2
San Luis Obispo	CDPH Volunteer (<i>Stuart Helms</i>)	1
	California Polytechnic State University	1
	Grassy Bar Oyster Company	5
Santa Barbara	CDPH Volunteer (<i>Burki</i>)	1
	Santa Barbara Mariculture Company	9
	U.C. Santa Barbara	5
Ventura	Ventura County Environmental Health Department	1
Los Angeles	Los Angeles County Health Department	3
	Southern California Marine Institute	1
Orange	Orange County Health Care Agency	1
San Diego	Carlsbad Aquafarm, Inc.	4
	U.S. Navy Marine Mammal Program	1

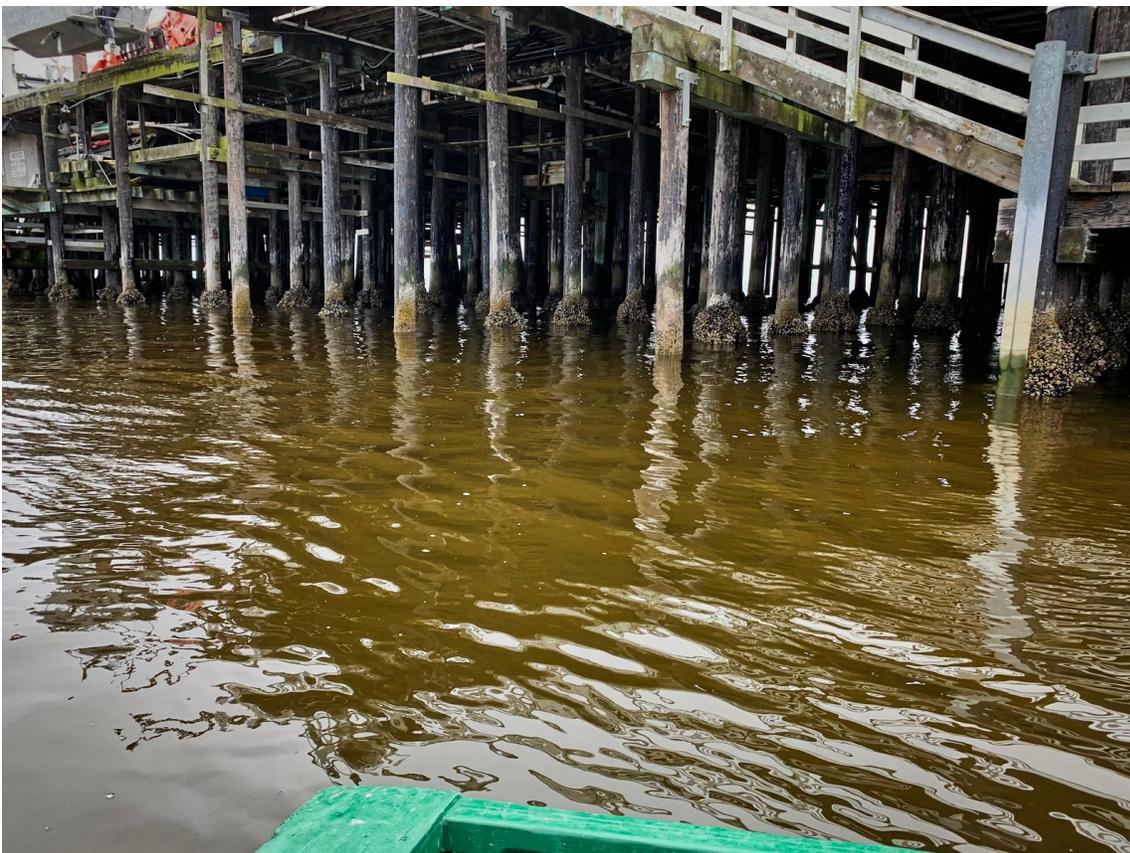
Phytoplankton Gallery



The diatoms *Asterionella* (left) and *Ditylum* (right).



The rarely observed *Ceratium limulus* c.f.



The June bloom of *Ceratium furca* and *Prorocentrum micans* at the Santa Cruz Wharf (above) transitioned to *Akashiwo sanguineum* and *C. furca* in July. (photo credit: Nacho Martin)