



Marine Biotoxin Monitoring Report

October 2020

Technical Report No. 20-27

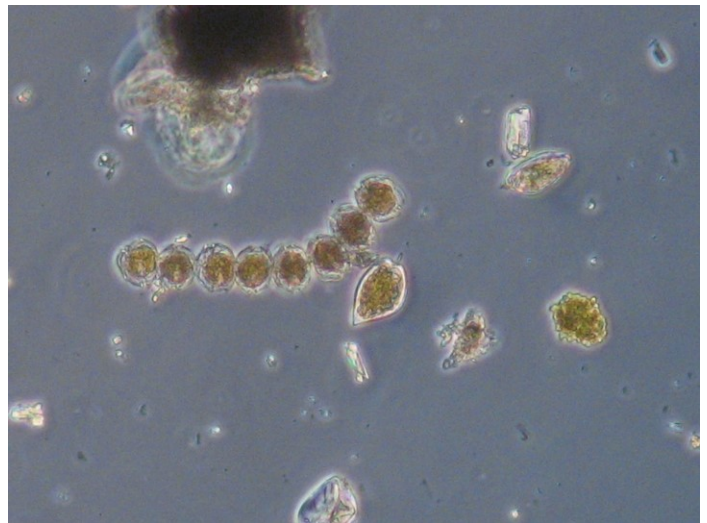
INTRODUCTION:

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 Humboldt and Monterey counties in October (Figure 1). This distribution was similar to observations in September and August, however the frequency of occurrence increased in October. The relative abundance of *Alexandrium* increased at Noyo Harbor in Mendocino County (8%, October 28) compared to

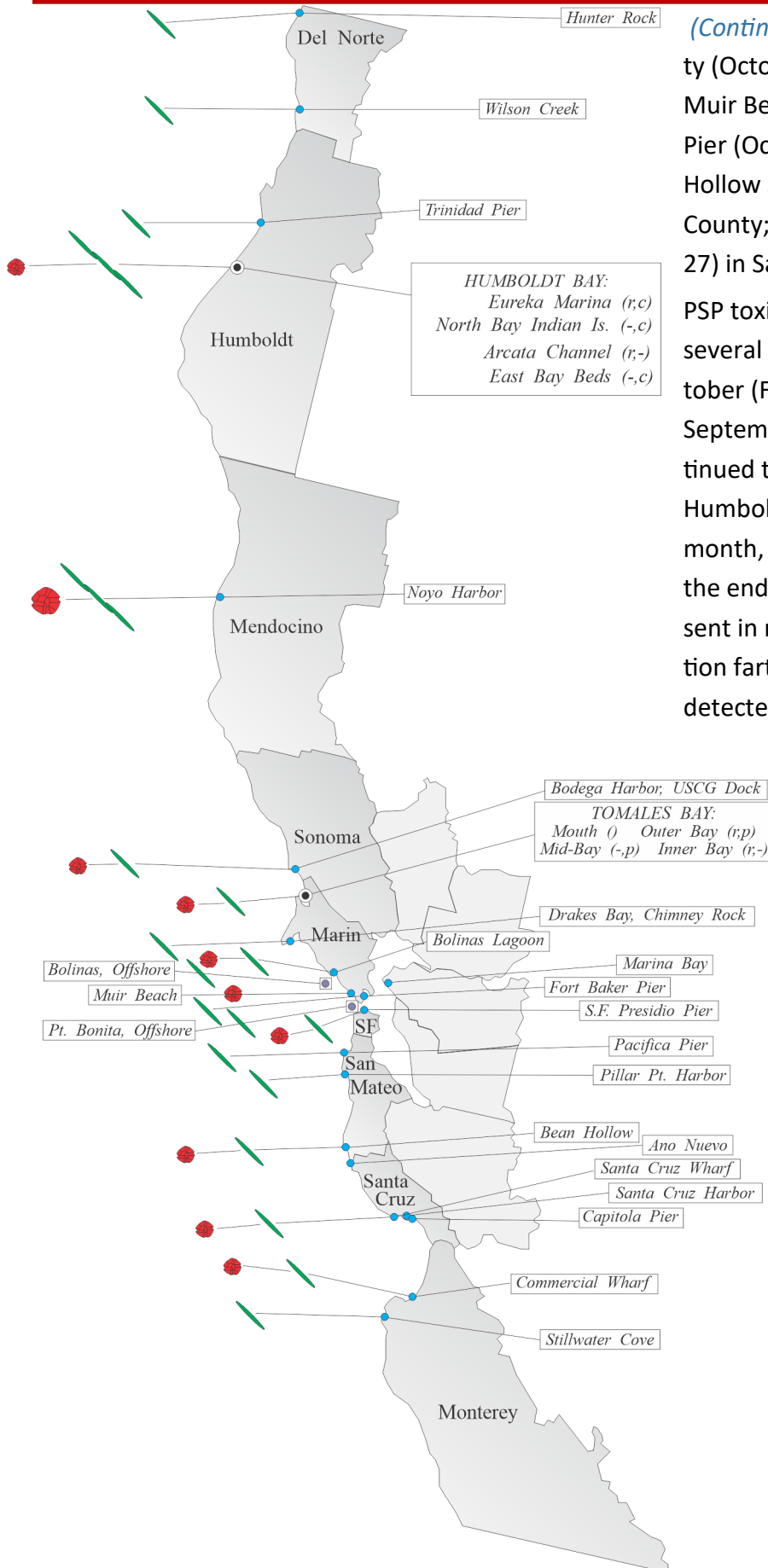


A chain of Alexandrium cells and a single cell of Procentrum micans. Both dinoflagellates were observed along much of the California coast.

observations in September; there was also a notable increase in cell mass. *Alexandrium* continued to be observed in outer Tomales Bay throughout the month and was also detected in an October 18 sample from the inner bay. This dinoflagellate also continued to be observed at the Commercial Wharf (October 21 and 28) in Monterey County. New observations of *Alexandrium* were recorded for samples from the following locations: Eureka Marina (October 16) and Arcata Channel (October 15) in Humboldt Bay; Bodega Harbor sentinel station in Sonoma Coun-

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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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ty (October 26); Bolinas Lagoon (October 28) and Muir Beach (October 29) in Marin County; Presidio Pier (October 29) in San Francisco County; Bean Hollow State Beach (October 6, 28) in San Mateo County; and the Santa Cruz Wharf (October 6, 20, 27) in Santa Cruz County.

PSP toxicity was detected in mussel samples from several sites in northern California counties in October (Figure 2), increasing in distribution from September. Low concentrations of PSP toxins continued to be detected in mussels from the outer Humboldt Bay sentinel station throughout the month, a condition that has existed since July; by the end of the month these toxins were also present in mussels from the Indian Island sentinel station farther inside the bay. PSP toxicity was also detected at low levels in mussel samples from out-

er Tomales Bay throughout the month, eventually occurring in outer bay oysters (third and fourth weeks) and mid-bay oysters (fourth week). By the second week of October toxicity was detected in mussels from the Bodega Harbor sentinel station, increasing above the alert level by the 26th (148 µg/100 g). Low levels of PSP toxicity continued to be detected at two sites in Del Norte

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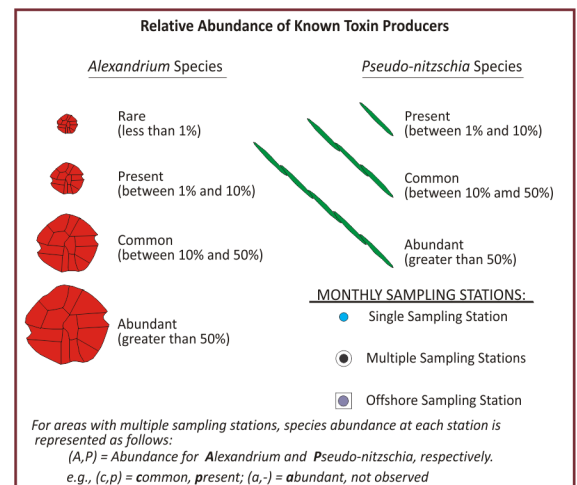


Figure 1. Toxic phytoplankton distribution in northern California.

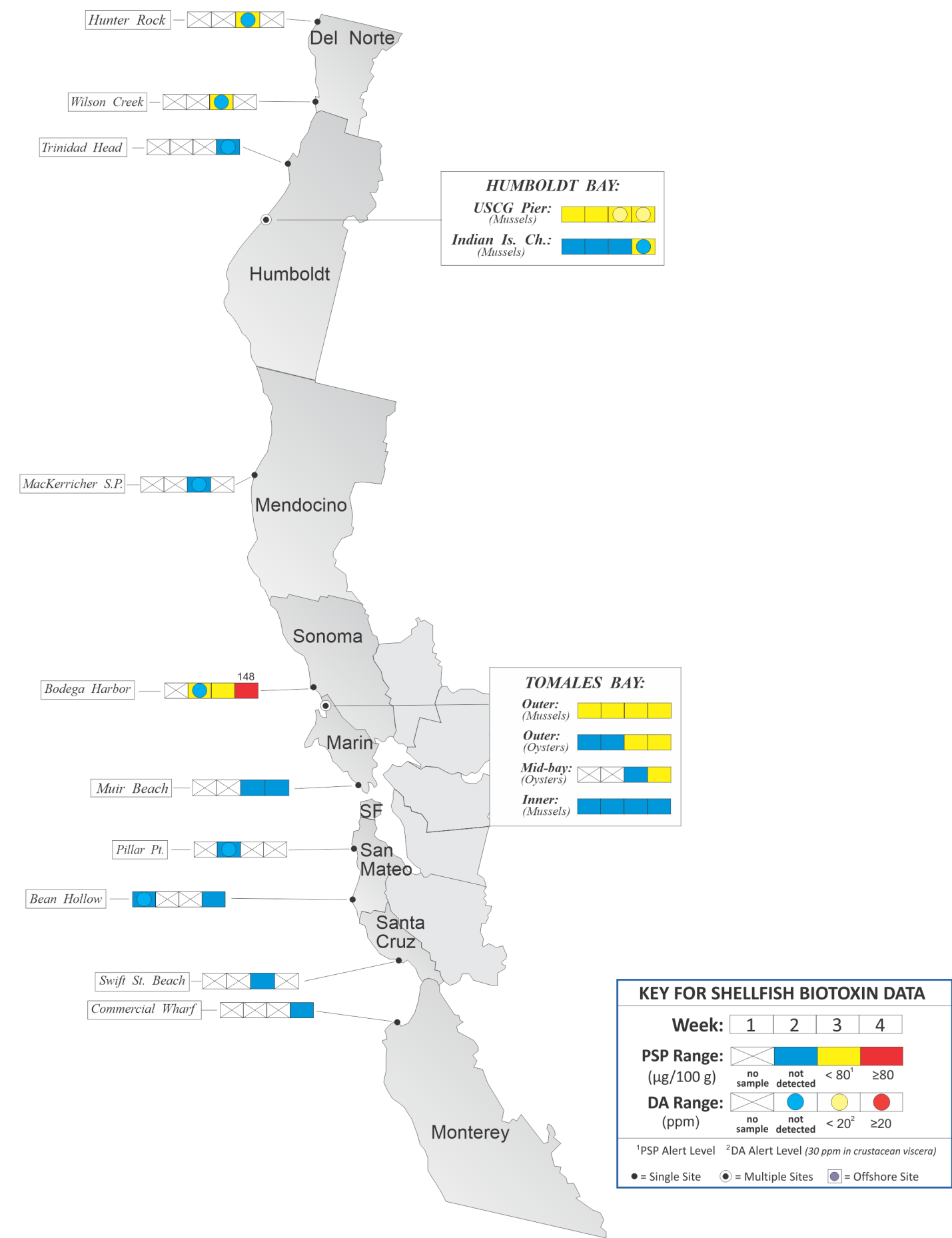


Figure 2. Distribution of shellfish biotoxins in northern California.

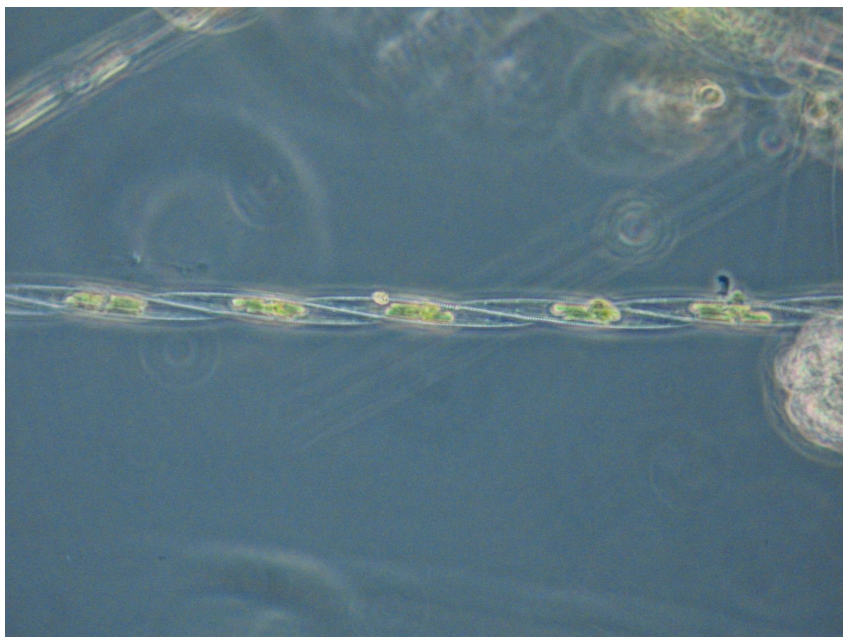
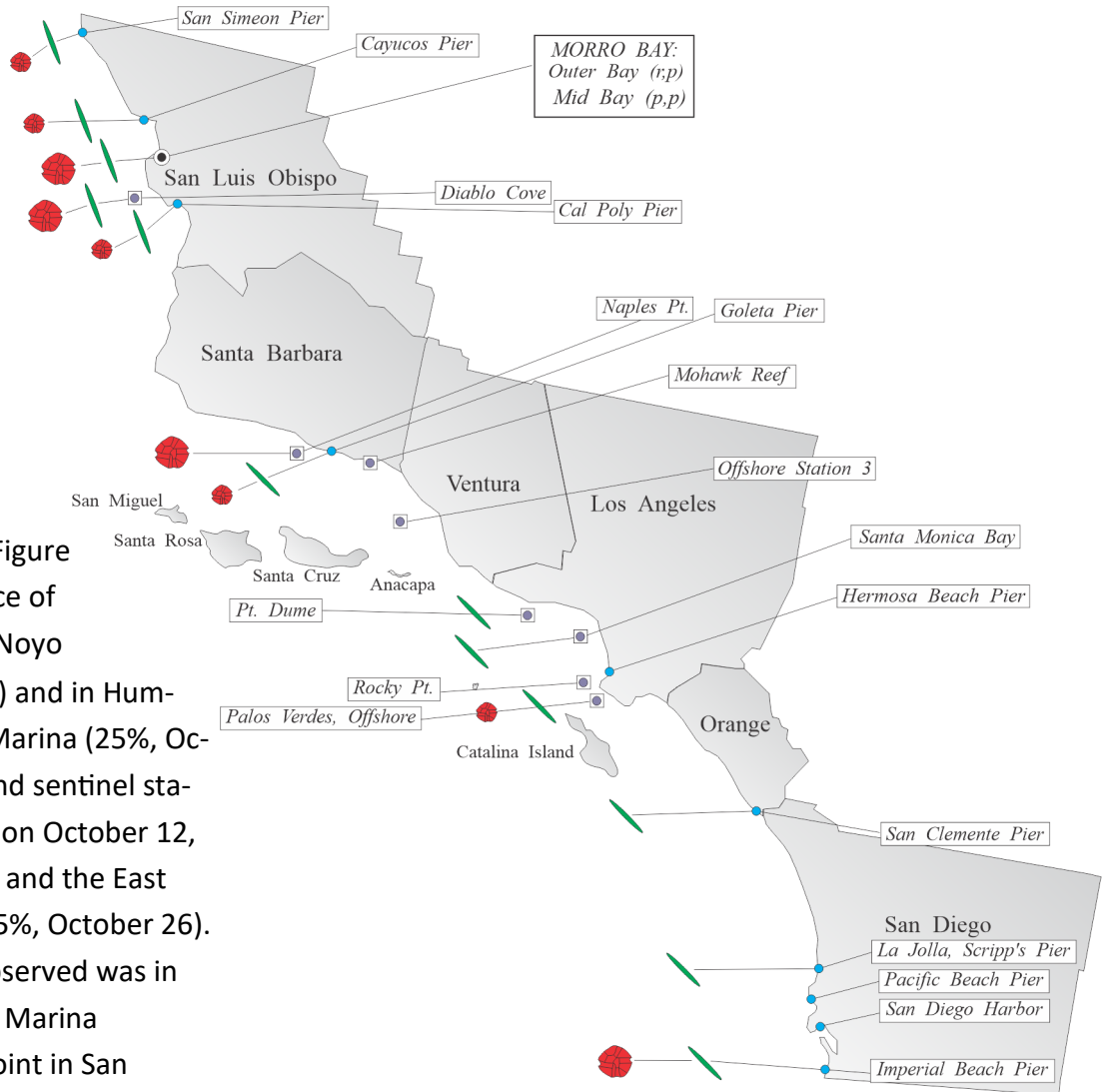
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Figure 3. Toxic phytoplankton distribution in southern California.

County: Hunter Rock (40 $\mu\text{g}/100\text{ g}$, October 15) and Wilson Creek (37 $\mu\text{g}/100\text{ g}$, October 16).

Domoic Acid

Pseudo-nitzschia was observed at most sites between Del Norte and Monterey counties in October, similar in distribution to observations in August and September (Figure 1). The relative abundance of this diatom increased in Noyo Harbor (20%, October 19) and in Humboldt Bay at the Eureka Marina (25%, October 16), the Indian Island sentinel station (20%, 15%, and 25% on October 12, 19, and 26, respectively), and the East Bay Beds in North Bay (15%, October 26). The greatest cell mass observed was in samples from the Eureka Marina (October 16) and Pillar Point in San



A chain of the diatom *Pseudo-nitzschia*. The chloroplasts are visible, as is the stair-step pattern of cell overlap.

Mateo County (October 28).

Domoic acid was detected in mussels from the outer Humboldt Bay sentinel station on October 19 (5.8 ppm) and October 26 (4.0 ppm). All other shellfish samples were below the detection limit.

Non-Toxic Species

Diatoms were predominant in samples from Humboldt and Mendocino counties. *Skeletonema* was common to abundant inside Humboldt Bay, while *Chaetoceros* was common inside Humboldt Bay and Noyo Harbor.

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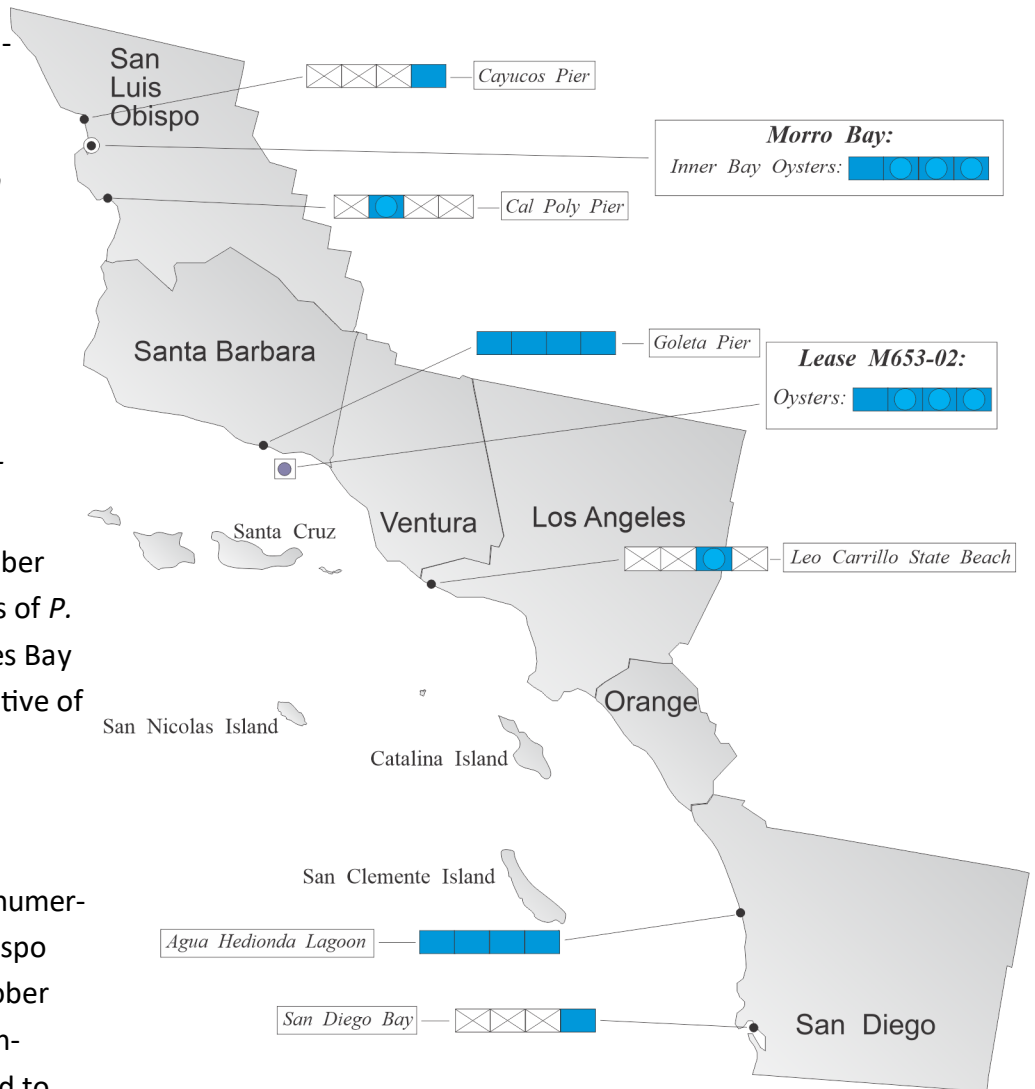
Dinoflagellates were most common between Sonoma and Monterey counties. *Akashiwo sanguineum* and *Prorocentrum micans* continued to be the dominant species throughout this range. The cell mass was elevated in most samples containing either dinoflagellate. The highest cell mass of *A. sanguineum* was observed in a sample from Muir Beach (October 29), while the highest cell mass of *P. micans* occurred in mid Tomales Bay (October 18); both were indicative of a bloom.

Southern California Summary:

Paralytic Shellfish Poisoning:

Alexandrium was observed at numerous sites between San Luis Obispo and San Diego counties in October (Figure 3). This represents an increase in distribution compared to observations in September. While the cell numbers were low in all samples containing *Alexandrium*, this dinoflagellate comprised 8% of the

Figure 4. Distribution of shellfish biotoxins in southern California.



phytoplankton assemblage in an October 19 sample from mid Morro Bay. *Alexandrium* was also present at the following locations: offshore of Diablo Cove in San Luis Obispo County (1%, October 21); offshore of Naples Point in Santa Barbara County (1%, October 9); and

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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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at the Imperial Beach Pier in San Diego County (3%, October 27). PSP toxins were not detected in any mussel or oyster samples in October (Figure 4).

Domoic Acid

Pseudo-nitzschia was observed at sites in every coastal county except Ventura in October (Figure 3). Cell numbers were low in all samples. The elevated percent composition of *Pseudo-nitzschia* at Goleta Pier in September declined by October.

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

Non-Toxic Species

A mix of diatoms and dinoflagellates were observed along the southern California coast in October. The diatom *Chaetoceros* was common at scattered sites between San Luis Obispo and San Diego. The dinoflagellate *Prorocentrum micans* was common in samples from most San Luis Obispo sites, while *Ceratium furca* was also common offshore of Palos Verdes in Los Angeles County.

QUARANTINES:

On October 31 CDPH lifted the annual mussel quarantine for all counties except Sonoma.

On September 29 CDPH rescinded the July 1 PSP health advisory for sport-harvested clams and scal-

Table 1. Program participants collecting phytoplankton samples.

AGENCY	#	AGENCY	#
DEL NORTE COUNTY			
Tolowa Dee-ni' Nation	1	Yurok Tribe Environmental Program	1
HUMBOLDT COUNTY		CDPH Marine Biotoxin Program	2
Humboldt State University Marine Lab	1	Pacific Shellfish	5
MENDOCINO COUNTY		CDPH Volunteer (<i>Kristin Gordon</i>)	3
SONOMA COUNTY		CDPH Marine Biotoxin Program	3
MARIN COUNTY		CDPH Volunteer (<i>Brent Anderson</i>)	2
CDPH Marine Biotoxin Program	7	Hog Island Oyster Company	7
CONTRA COSTA COUNTY		CDPH Marine Biotoxin Program	1
SAN FRANCISCO COUNTY		CDPH Volunteer (<i>Eugenia McNaughton</i>)	1
SAN MATEO COUNTY			
CDPH Volunteer (<i>Nacho Martin</i>)	1	The Marine Mammal Center	4
San Mateo County Environmental Health Dept.	6	U.C. Santa Cruz	1
SANTA CRUZ COUNTY			
Monterey Bay National Marine Sanctuary	5	U.C. Santa Cruz	4
MONTEREY COUNTY			
Monterey Abalone Company	3	Pacific Grove Museum of Natural History	4
SAN LUIS OBISPO COUNTY		CDPH Marine Biotoxin Program	2
CDPH Volunteers (<i>Jeff Reifel, Skip Rotstein, Dan Hoskins</i>)			3
Grassy Bar Oyster Company	4	Monterey Bay National Marine Sanctuary	1
Tenera Environmental	5	U.C. Santa Barbara	1
SANTA BARBARA COUNTY			
Santa Barbara Channelkeeper	2	U.C. Santa Barbara	5
VENTURA COUNTY		Coastal Marine Biolabs	1
LOS ANGELES COUNTY		City of L.A. Environmental Monitoring Division	2
Los Angeles County Sanitation District	1	Los Angeles Water Keeper	3
ORANGE COUNTY		CDPH Volunteer (<i>Truong Nguyen</i>)	2
SAN DIEGO COUNTY			
CDPH Volunteer (<i>Melissa Roa</i>)	2	Scripps Institute of Oceanography	4
Tijuana River National Estuary Research	5	U.S. Navy Marine Mammal Program	5

lops from Santa Cruz and Monterey counties.

On September 1 CDPH issued a press release rescinding the July 1 PSP health advisory for sport-harvested clams and scallops from San Francisco and San Mateo counties. This health advisory remained in effect for Santa Cruz and Monterey counties.

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.

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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.

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

Table 2. Program participants collecting shellfish samples.

COUNTY	AGENCY	#
Del Norte	Tolowa Dee-ni' Nation	1
	Yurok Tribe Environmental Program	1
Humboldt	Humboldt County Environmental Health Department	1
	Pacific Shellfish	8
Mendocino	Mendocino County Environmental Health Department	1
Sonoma	CDPH Marine Biotxin Program	3
Marin	CDPH Volunteer (<i>Rand Dobleman</i>)	1
	CDPH Marine Biotxin Program	1
	Cove Mussel Company	3
	Hog Island Oyster Company	11
	Point Reyes Oyster Company	3
	Starbird Mariculture	1
San Francisco	None Submitted	
San Mateo	San Mateo County Environmental Health Department	3
Santa Cruz	CDPH Volunteers (<i>Stuart Jackson</i>)	2
Monterey	Monterey Abalone Company	1
San Luis Obispo	CDPH Volunteer (<i>Wesley Jarman</i>)	1
	CDPH Marine Biotxin Program	1
	Grassy Bar Oyster Company	4
Santa Barbara	Santa Barbara Mariculture Company	4
	U.C. Santa Barbara	4
Ventura	None Submitted	
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

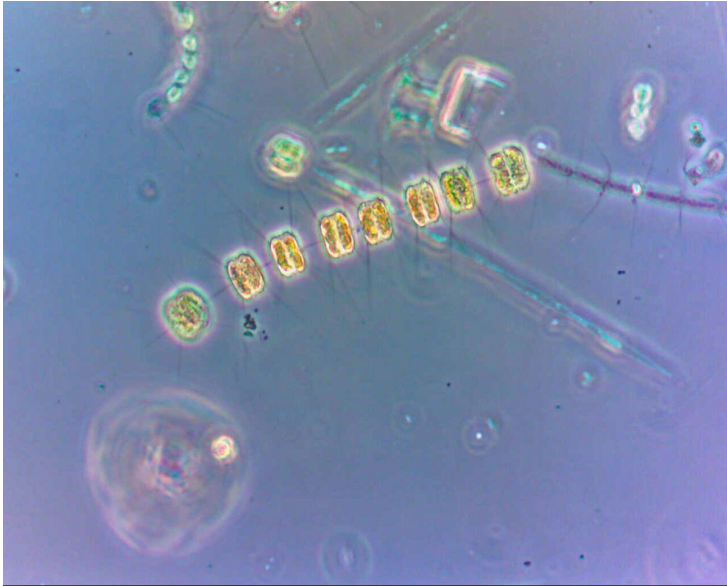
species such as crab, lobster, and small finfish like sardines and anchovies.

Sport harvesters should only collect shellfish from areas that are not affected by a current health advisory or quarantine. Contact the "Biotxin 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.

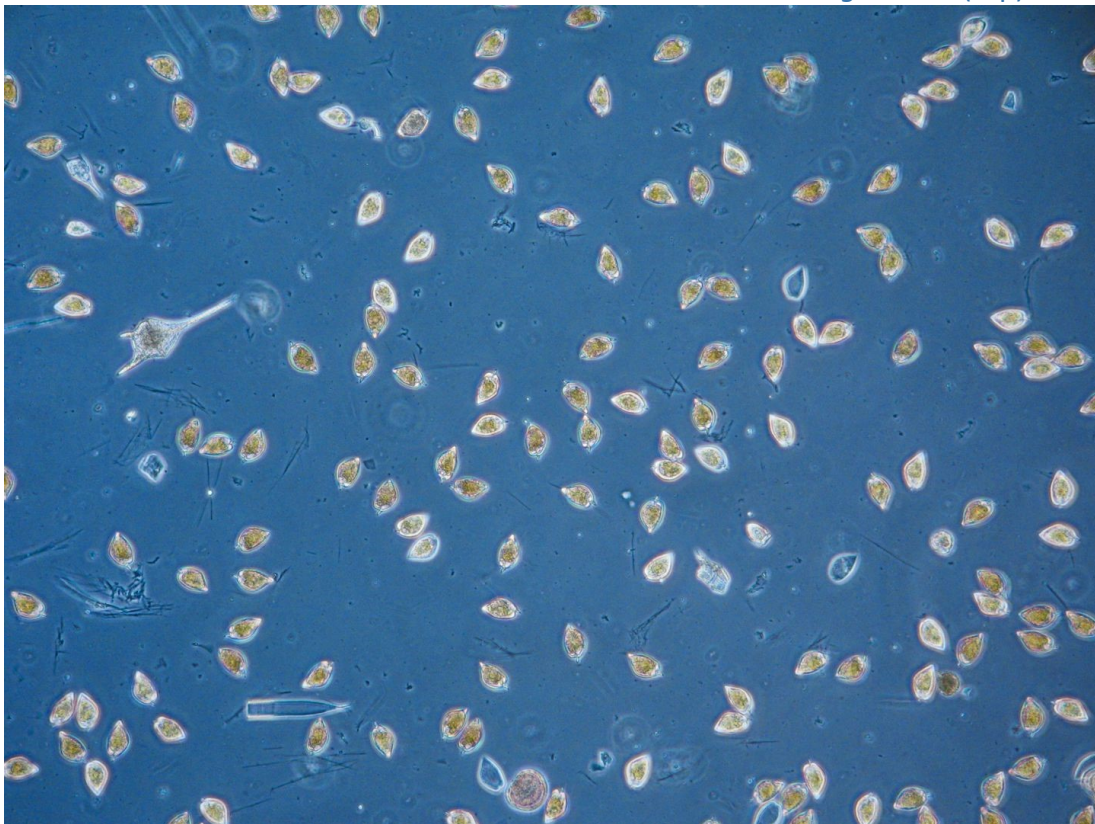
Phytoplankton Gallery



The chain-forming centric diatom *Thalassiosira*.



The dinoflagellates *Polykrikos* (center) and *Akashiwo sanguineum* (top).



A bloom of the dinoflagellate *Prorocentrum micans* was observed inside Tomales Bay.