



Marine Biotoxin Monitoring Report

February 2018

Technical Report No. 18-11

INTRODUCTION:

This report provides a summary of biotoxin activity for the month of February, 2018. Toxin concentration ranges are provided for the paralytic shellfish poisoning (PSP) toxins and for domoic acid (DA). Estimates are also provided for the distribution and relative abundance of *Alexandrium*, the dinoflagellate that produces PSP toxins, and *Pseudo-nitzschia*, the diatom that produces domoic acid. Summary information is also provided for any quarantine or health advisory in effect during the reporting period.

Please note the following conventions for the phytoplankton and shellfish biotoxin distribution maps: (i) All estimates for phytoplankton relative



Alexandrium and *Pseudo-nitzschia* are occasionally observed together and their respective toxins have been detected in the same sample by CDPH labs.

abundance are qualitative, based on sampling effort and percent composition; (ii) All toxin data are for mussel samples, unless otherwise noted; (iii) All samples are assayed for PSP toxins; DA anal-



California sea mussels, *Mytilus californianus*, are the most common shellfish sampled by volunteers along the coast.

yses are performed as needed (e.g., on the basis of detected blooms of the diatoms that produce DA); (iv) Please refer to the appropriate figure key for an explanation of the symbols used on the maps.

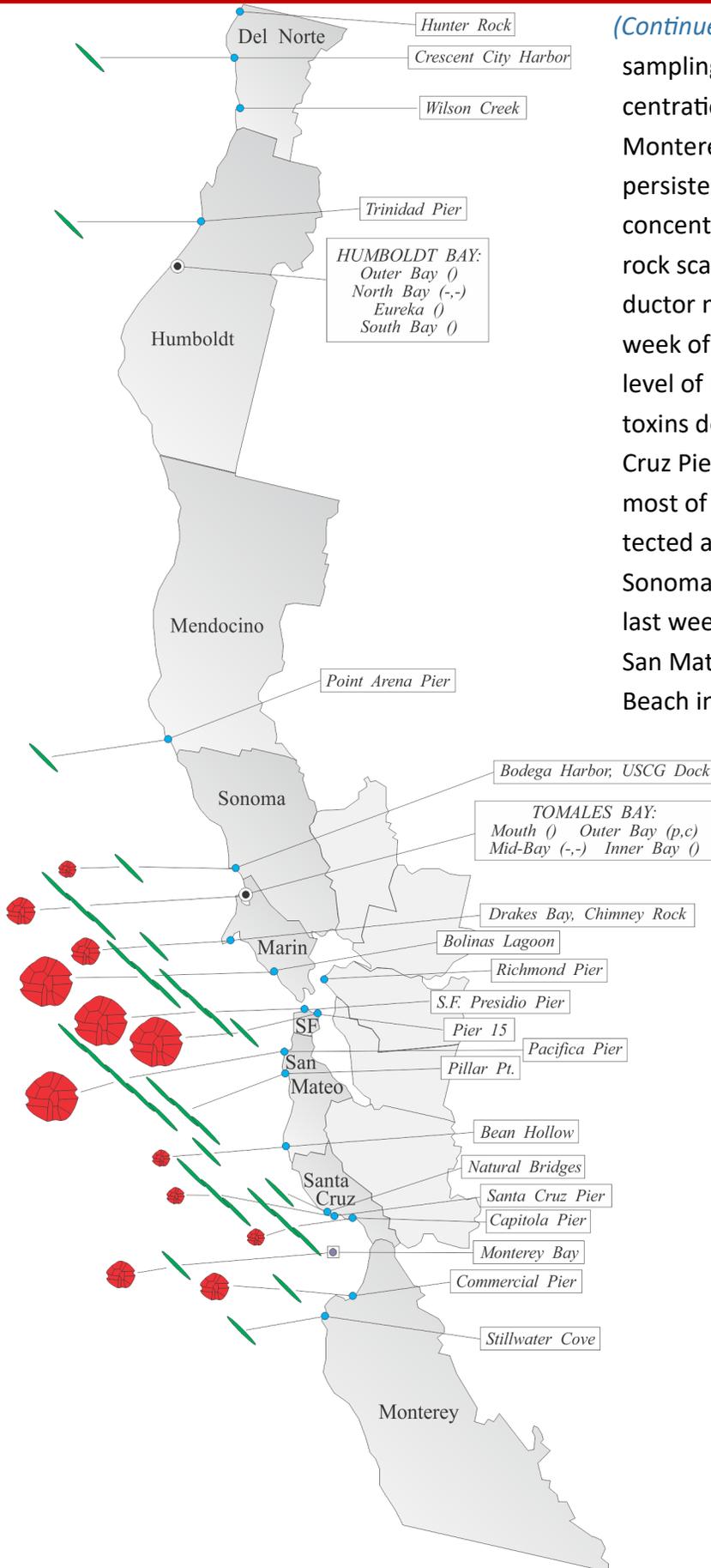
Northern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was observed at numerous locations between Sonoma and Monterey counties during February (Figure 1). The relative abundance of this toxin-producing dinoflagellate increased significantly within this range. The highest relative abundances observed were in samples collected in Monterey Bay (February 28) and inside Bolinas Lagoon (February 26). Significant numbers of cells were also observed in samples from outer Tomales Bay (February 11), the San Francisco Presidio Pier (February 25), and the Pacifica Pier (February 18 and 24).

PSP toxicity was detected in shellfish from several

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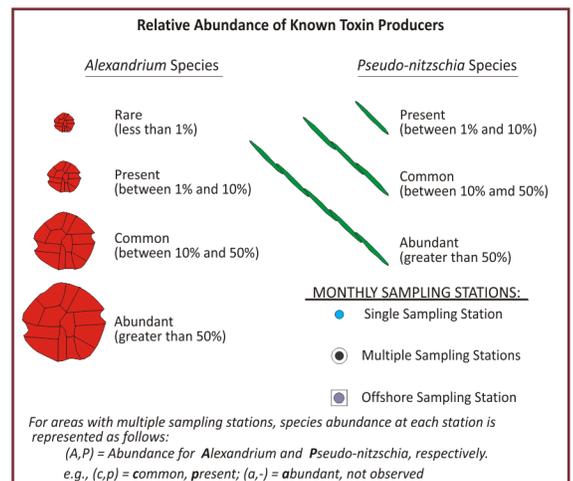
sampling sites in February (Figure 2). The high concentration of toxin detected in mussels from the Monterey Commercial Pier at the end of January persisted into the first week of February. High toxin concentrations persisted throughout the month in rock scallop viscera samples from this site; an adductor muscle sample collected during the first week of the month did not contain a detectable level of PSP toxins. Similarly, the low level of PSP toxins detected in sentinel mussels from the Santa Cruz Pier at the end of January persisted through most of February. Low toxin levels were also detected at several sites between San Mateo and Sonoma counties, exceeding the alert level by the last week of February in mussels from Mori Pt. in San Mateo County (302 µg/100g) and Stinson Beach in Marin County (228 µg/100g).

Domoic Acid

Pseudo-nitzschia was observed at sites in all coastal counties in February (Figure 1). The distribution of this diatom was similar to observations in January, however the relative abundance increased at sites between Marin and Santa Cruz counties. The highest relative abundances were observed in samples collected in Monterey Bay (February 28), in outer

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Figure 1. Toxic phytoplankton distribution in northern California.



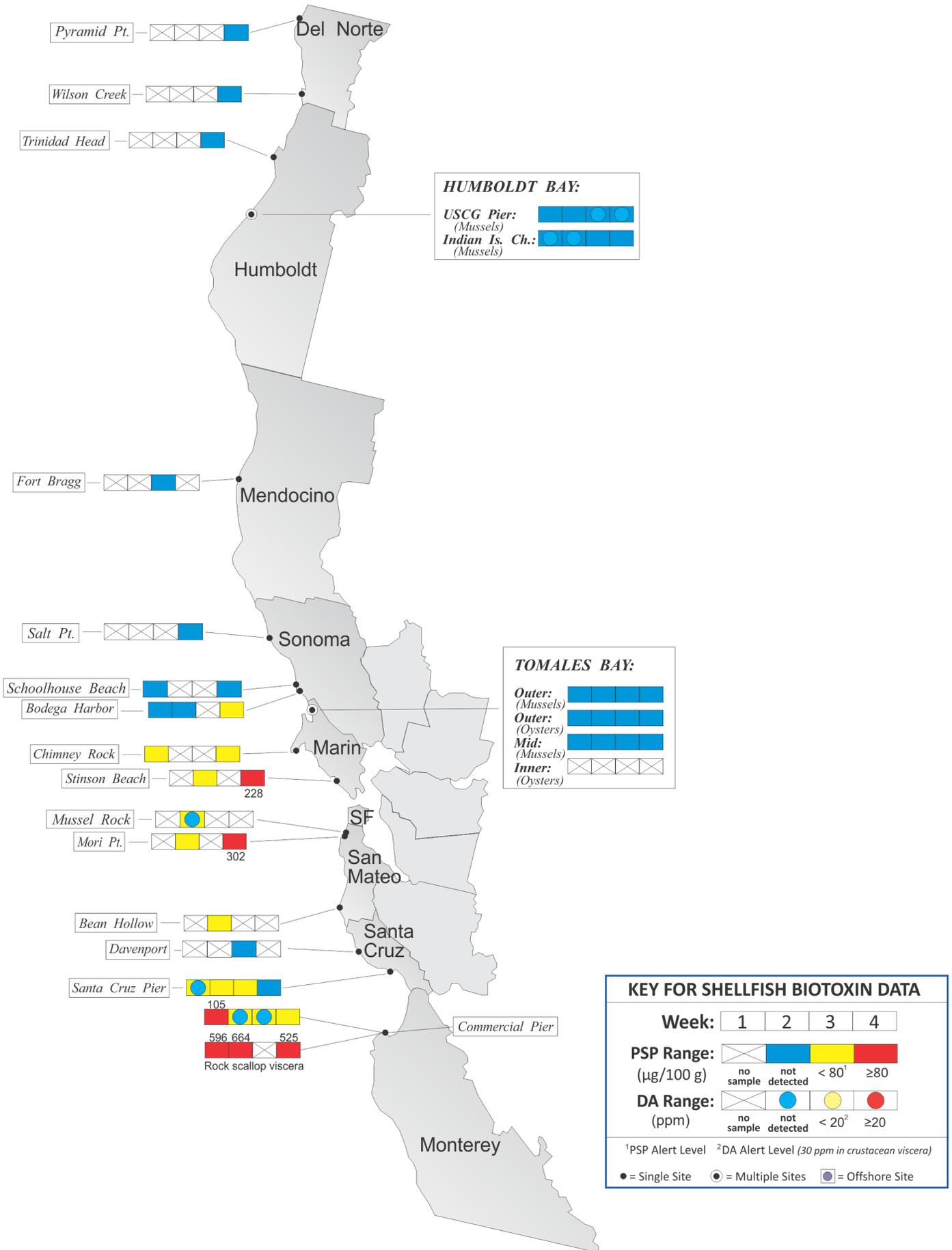


Figure 2. Distribution of shellfish biotoxins in northern California.

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Figure 3. Toxic phytoplankton distribution in southern California.

Tomales Bay (February 11), and inside Bolinas Lagoon (February 26).

Domoic acid was not detected in any mussel or oyster samples analyzed in February.

Non-Toxic Species

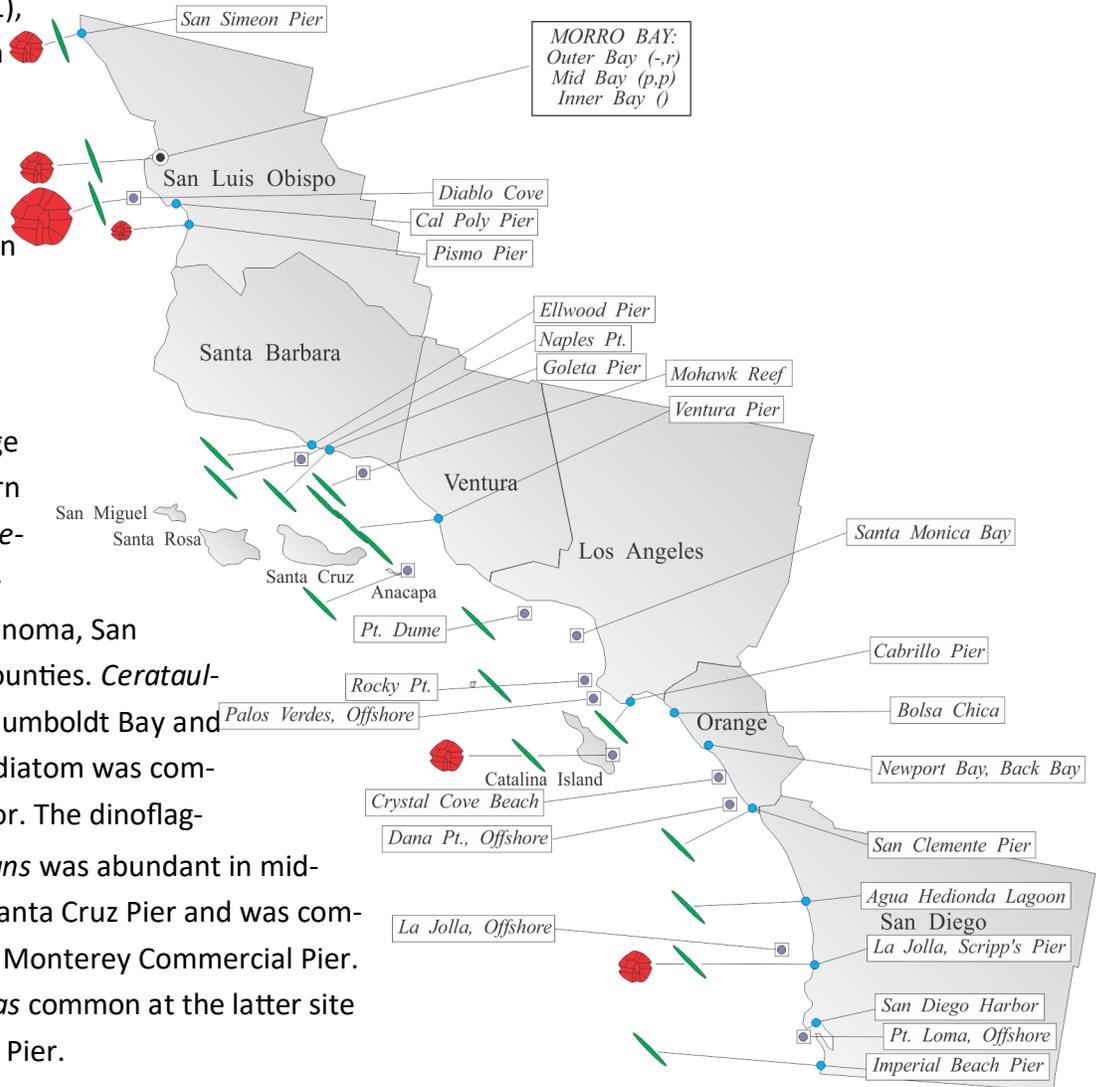
Diatoms dominated the phytoplankton assemblage along most of the northern California coast, with *Chaetoceros* common to abundant at several sites in Sonoma, San Mateo, and Santa Cruz counties. *Cerataulina* was common inside Humboldt Bay and an unidentified pennate diatom was common inside Bodega Harbor. The dinoflagellate *Prorocentrum micans* was abundant in mid-Tomales Bay and at the Santa Cruz Pier and was common in samples from the Monterey Commercial Pier. *Akashiwo sanguineum* was common at the latter site and abundant at Capitola Pier.

Southern California Summary:

Paralytic Shellfish Poisoning:

Alexandrium was observed at sites in several southern California counties in February (Figure 3). The distribu-

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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.

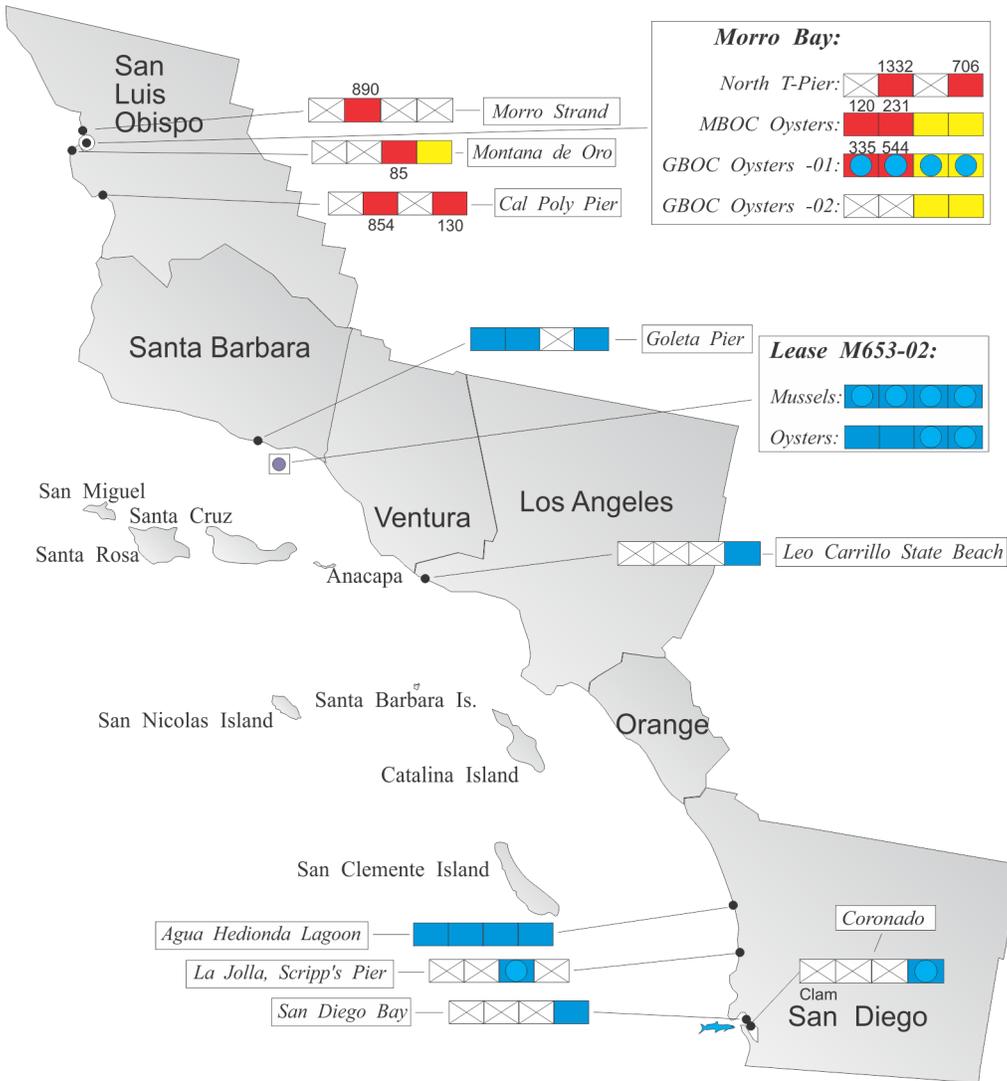
For Information on Volunteering:

For Recorded Biotoxin Information Call:

Email redtide@cdph.ca.gov or call 510-412-4635

(800) 553 - 4133

Figure 4. Distribution of shellfish biotoxins in southern California.



persisted at various sites along the San Luis Obispo County coast since June 2017.

The elevated level of PSP toxins detected in outer Morro Bay at the end of January continued through February at this site and expanded well inside the bay. Toxin concentrations exceeding the alert level were detected in oysters from the outermost aquaculture leases, with low toxin levels occurring in oysters from the innermost lease. PSP concentrations well above the alert level were also detected in mussels at several sites along the San Luis Obispo County coast.

Domoic Acid

Pseudo-nitzschia was observed at sampling sites in each southern California county during February (Figure 3).

This distribution was similar to observations in January and the cell

mass of *Pseudo-nitzschia* was low in all samples.

Domoic acid was not detected in any bivalve shellfish samples analyzed in February (Figure 4).

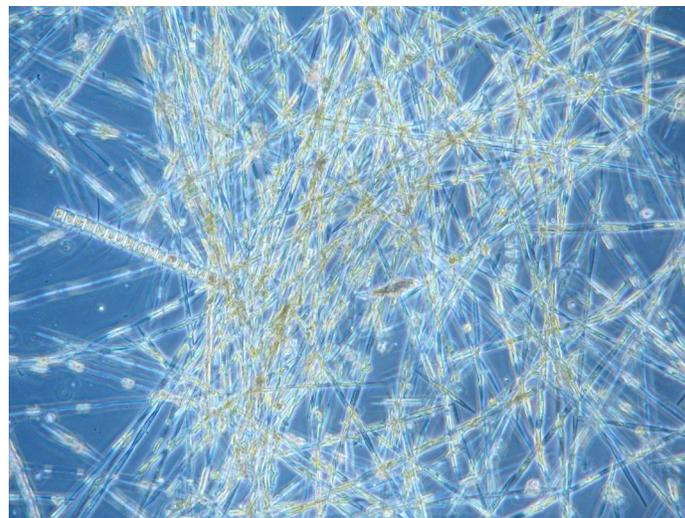
Non-Toxic Species

There was a greater diversity of diatoms than dinoflagellates observed in February, with *Chaetoceros* and *Bacteriastrum* ubiquitous

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tion of *Alexandrium* expanded in February to include San Simeon Pier in northern San Luis Obispo County, Catalina Island, and La Jolla Pier in San Diego County. The relative abundance of *Alexandrium* remained elevated in samples from offshore of Diablo Cove and inside Morro Bay (San Luis Obispo County). The highest relative abundance was observed in a

February 5 sample from outer Morro Bay. The presence of this toxin-producing dinoflagellate has



A phytoplankton sample of a *Pseudo-nitzschia* bloom looks like a haystack under the microscope.

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along the southern California coast. *Skeletonema* was common in a sample from Catalina Island, *Leptocylindrus* was abundant at Bolsa Chica, and pennate diatoms were common inside San Diego Bay. The dinoflagellate *Ceratium furca* was common at Ellwood Pier and offshore of Santa Barbara, with *Lingulodinium polyedrum* abundant offshore of Palos Verdes and common offshore of Pt. Dume.

QUARANTINES:

On February 1 CDPH issued a health advisory alerting consumers to avoid eating recreationally harvested mussels, clams or scallops from Monterey County due to dangerous levels of the PSP toxins in this area.

On January 31 CDPH issued a health advisory warning consumers not to eat recreationally harvested mussels, clams or scallops from San Luis Obispo County because of dangerous levels of PSP toxins in mussels from this region.

On January 26 CDPH lifted the health advisory for lobsters caught in state waters around the northeast end of Santa Cruz Island (Santa Barbara County) and on the south side of Anacapa Island (Ventura County). This advisory had been established on October 24 due to elevated levels of domoic acid in this region.

Table 1. Program participants collecting phytoplankton samples.

AGENCY	#	AGENCY	#
DEL NORTE COUNTY		CDPH Volunteer (<i>Jim Hooper</i>)	1
Tolowa Dee-ni' Nation	1	Yurok Tribe Environmental Group	1
HUMBOLDT COUNTY			
Coast Seafood Company	4	Humboldt State University Marine Lab	1
MENDOCINO COUNTY		CDPH Volunteer (<i>Marie DeSantis</i>)	1
SONOMA COUNTY		CDPH Marine Biotoxin Program	4
MARIN COUNTY		CDPH Volunteers (<i>Brent Anderson, George Clyde</i>)	5
CDPH Marine Biotoxin Program	2	Hog Island Oyster Company	4
CONTRA COSTA COUNTY		CDPH Marine Biotoxin Program	1
SAN FRANCISCO COUNTY			
CDPH Volunteer (<i>Eugenia McNaughton</i>)	2	Exploratorium	4
SAN MATEO COUNTY			
The Marine Mammal Center	4	San Mateo County Environmental Health Dept.	4
SANTA CRUZ COUNTY		CDPH Volunteers	5
Marine Life Science	1	(<i>Jeff Palsgaard, Ignacio Martin-Bragado</i>)	
Santa Cruz County Environmental Health Dept.	2	U.C. Santa Cruz	4
MONTEREY COUNTY			
Monterey Abalone Company	2	The Otter Project	4
SAN LUIS OBISPO COUNTY			
CDPH Marine Biotoxin Program	1	Friends of the Sea Otter	2
Grassy Bay Oyster Company	3	Morro Bay National Estuary Program	1
Monterey Bay National Estuary Program	4	Tenera Environmental	2
SANTA BARBARA COUNTY		HABNet	1
Santa Barbara Channel Keeper	4	U.C. Santa Barbara	4
VENTURA COUNTY		Channel Island High School	1
CDPH Volunteer (<i>Fred Burgess</i>)	4	National Park Service	1
LOS ANGELES COUNTY		CDPH Volunteer (<i>Gina Lumbruno</i>)	2
Catalina Island Marine Institute	3	City of L.A. Environmental Monitoring Division	1
Los Angeles County Sanitation District	1	Los Angeles Water Keeper	6
ORANGE COUNTY		Amigos de Bolsa Chica	4
Back Bay Science Center	1	CDPH Volunteer (<i>Truong Nguyen</i>)	2
Crystal Cove Alliance	1	Ocean Institute	1
SAN DIEGO COUNTY		Carlsbad Aquafarms, Inc.	3
Sea Camp/HABNet	2	Scripps Institute of Oceanography	4
Tijuana River National Estuary Research	4	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

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

Table 2. Program participants collecting shellfish samples.

COUNTY	AGENCY	#
Del Norte	Tolowa Dee-ni' Nation	1
	Yurok Tribe Environmental Group	1
Humboldt	Coast Seafood Company	8
	Humboldt County Environmental Health Department	1
	Mendocino County Environmental Health Department	1
Sonoma	CDPH Volunteer (<i>Dennis Spike</i>)	1
	CDPH Marine Biotoxin Program	7
Marin	CDPH Volunteers (<i>Jamie Sutton, Dennis Spike</i>)	3
	CDPH Marine Biotoxin Program	2
	Cove Mussel Company	4
	Hog Island Oyster Company	4
	Point Reyes Oyster Company	4
San Francisco	None Submitted	
San Mateo	CDPH Volunteer (<i>Gary Della Maggiora, David Batten</i>)	3
	San Mateo County Environmental Health Department	1
Santa Cruz	CDPH Volunteer (<i>Joel Herzel</i>)	1
	U.C. Santa Cruz	4
Monterey	Monterey Abalone Company	8
	CDPH Volunteer (<i>Stuart Helmsmoller</i>)	2
	California Polytechnic State University	1
	CDPH Marine Biotoxin Program	2
San Luis Obispo	Grassy Bar Oyster Company	9
	Morro Bay Oyster Company	9
	Santa Barbara Mariculture Company	8
Santa Barbara	U.C. Santa Barbara	3
	Ventura	None Submitted
Los Angeles	Los Angeles County Health Department	1
Orange	None Submitted	
San Diego	Carlsbad Aquafarm, Inc.	4
	CDPH Volunteer (<i>Steve Crooke</i>)	1
	Scripps Institute of Oceanography	1
	U.S. Navy Marine Mammal Program	2

Spotharvesters 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.

Phytoplankton Gallery

The diatom *Chaetoceros* and dinoflagellate *Ceratium furca*.



A chain of the diatom *Melosira*.



Photo courtesy of Patrick Webster

Bioluminescent waves at Garrapata State Park, Monterey County, captured by Patrick Webster.