



Marine Biotoxin Monitoring Report

September 2018

Technical Report No. 18-22

INTRODUCTION:

This report provides a summary of biotoxin activity for the month of September, 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 abundance are qualitative, based on sampling effort and percent composition; (ii) All toxin data



Alexandrium, the PSP toxin-producer, was observed at several sites along the California coast during September.

are for mussel samples, unless otherwise noted; (iii) 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); (iv) Please refer to the appropriate figure key for



Sunset at Salt Point State Park in Sonoma County (photo courtesy of Jonathan Lim).

an explanation of the symbols used on the maps.

Northern California Summary:

Paralytic Shellfish Poisoning

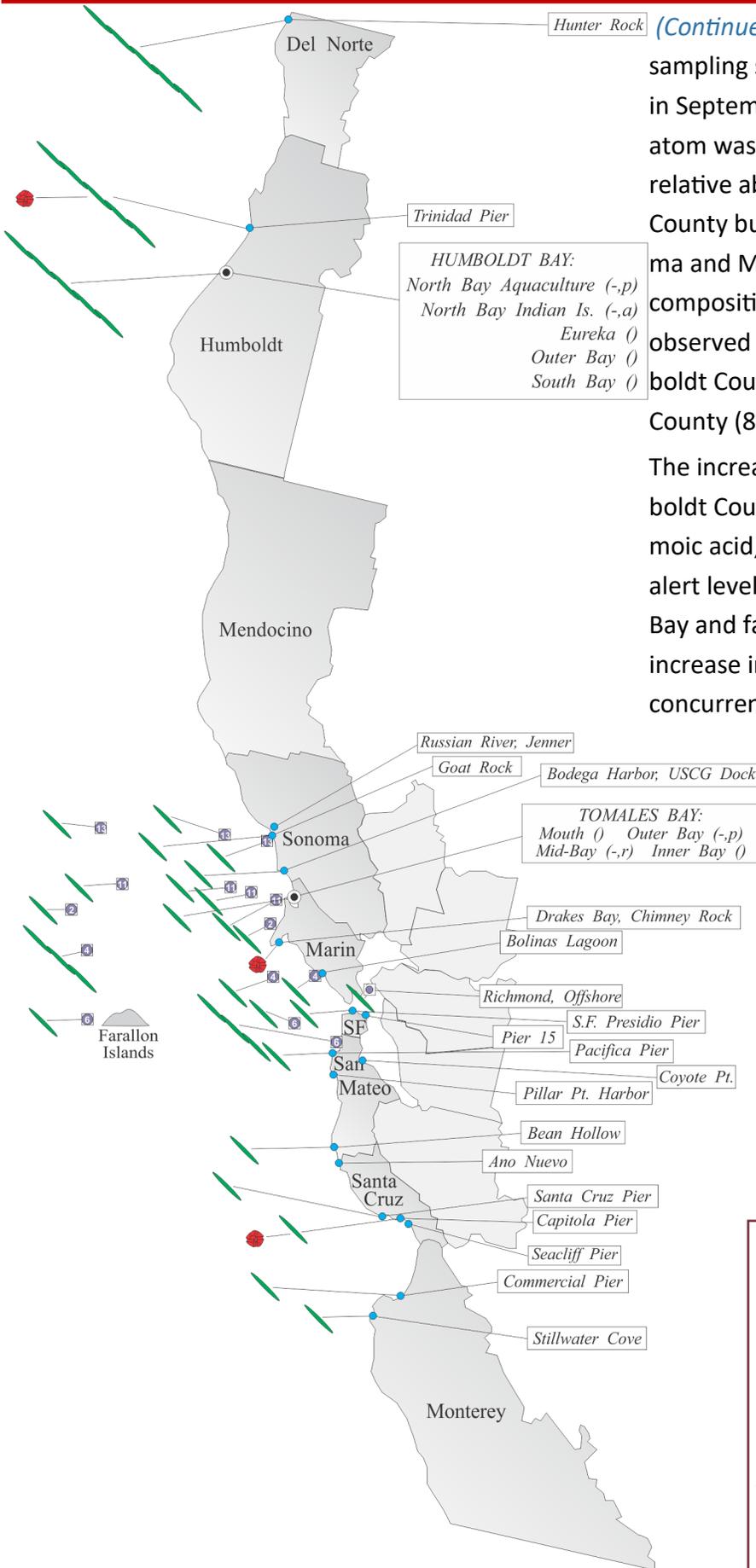
Alexandrium was observed at a small number of locations along the northern California coast in September (Figure 1). The cell mass of *Alexandrium* was low in all observations and the distribution and relative abundance was greatly decreased compared to observations in August.

PSP toxicity was detected in shellfish samples from several locations during September (Figure 2). Low concentrations of the PSP toxins were detected in mussel samples from numerous sites between Del Norte and Monterey counties, including inside Humboldt Bay. The highest concentration detected was 65 $\mu\text{g}/100\text{ g}$ in sentinel mussels from outer Humboldt Bay.

Domoic Acid

Pseudo-nitzschia was observed at the majority of

(Continued on page 2)



sampling sites along the northern California coast in September (Figure 1). The distribution of this diatom was similar to observations in August; the relative abundance increased at sites in Humboldt County but decreased at most sites between Sonoma and Monterey counties. The highest percent compositions and cell masses of this diatom were observed in samples from the Trinidad Pier in Humboldt County (92%) and Hunter Rock in Del Norte County (83%).

The increase in *Pseudo-nitzschia* at sites in Humboldt County was associated with increases in domoic acid, with toxin concentrations exceeding the alert level in sentinel mussels from outer Humboldt Bay and farther inside the bay at Indian Island. This increase in domoic acid inside Humboldt Bay was concurrent with the presence of low levels of PSP

toxins in sentinel mussels. Mussel samples from northern Del Norte County contained lower levels of domoic acid, with concentrations increasing between September 11 (5 ppm) and September 26 (15 ppm). Low levels of domoic acid were also detected in mussels from Wilson Creek in southern Del Norte County. Razor clams in Humboldt County were also impacted by the increase in *Pseudo-nitzschia*. Of the 10 razor clams collected

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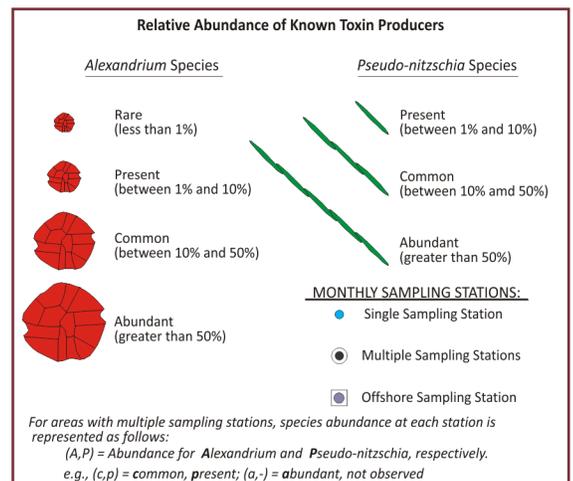


Figure 1. Toxic phytoplankton distribution in northern California.

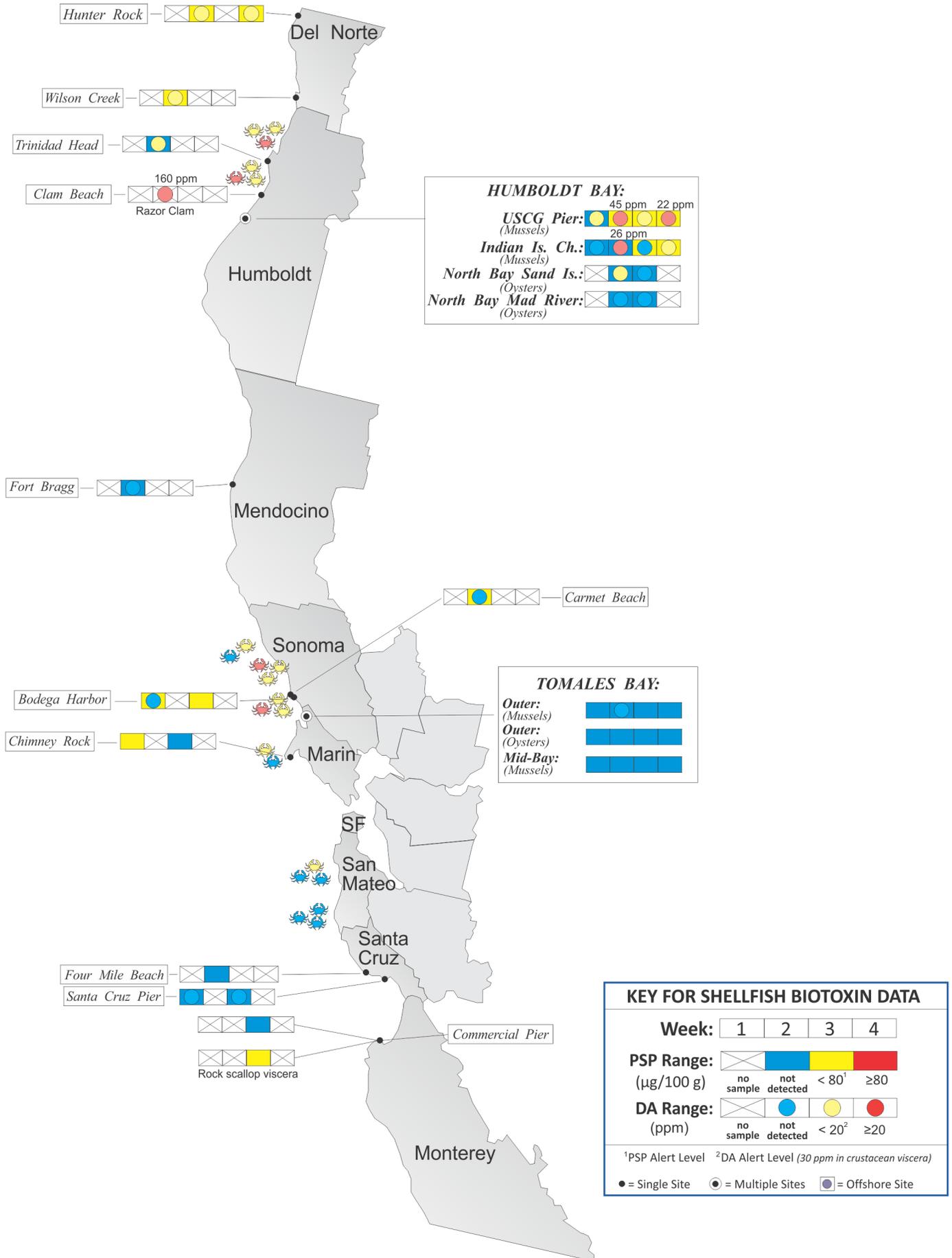


Figure 2. Distribution of shellfish biotoxins in northern California.

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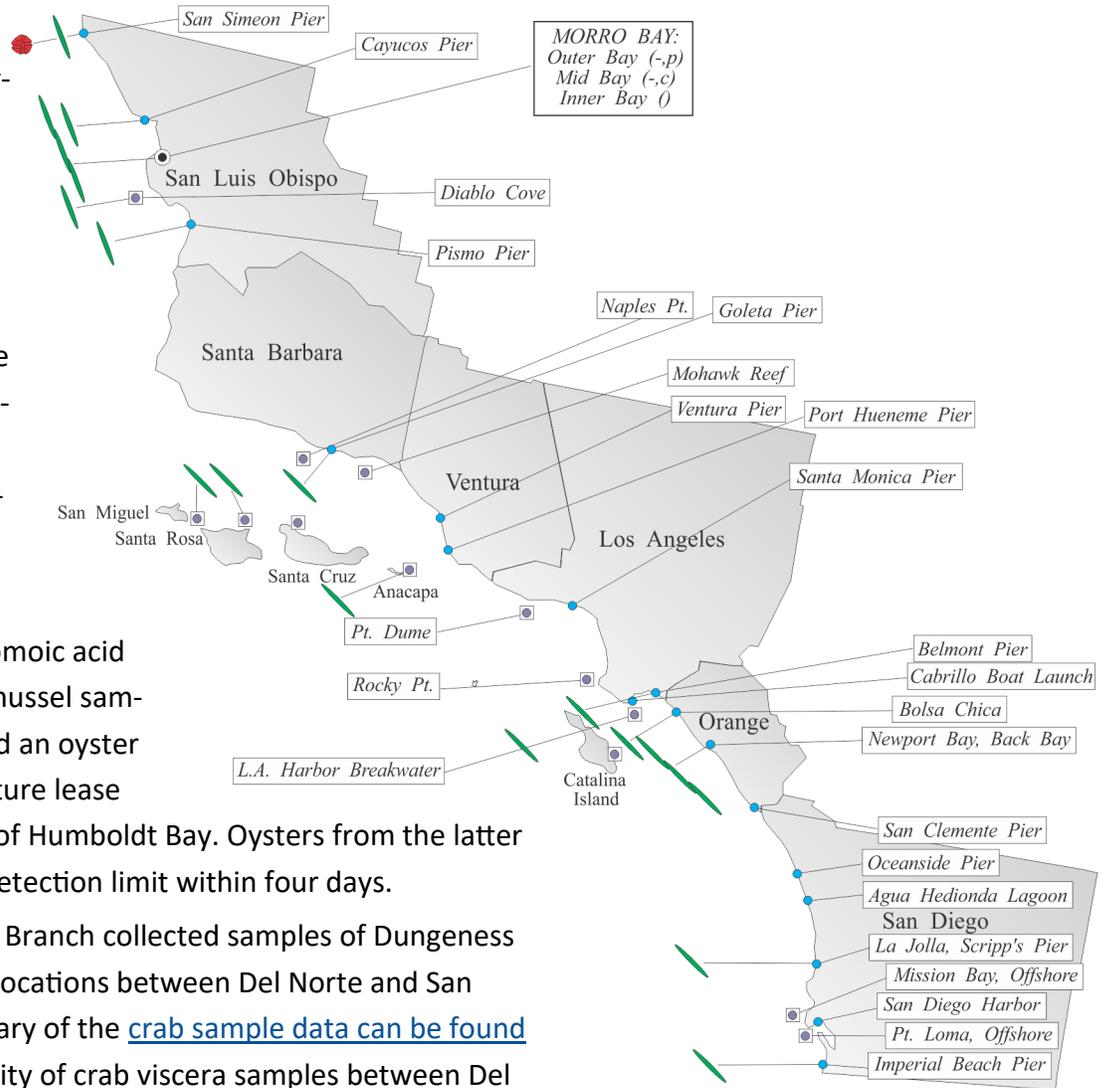
Figure 3. Toxic phytoplankton distribution in southern California.

on September 9 from Clam Beach by the California Department of Fish and Wildlife (CDFW), all exceeded the alert level for domoic acid. Nine of the 10 clam samples exceeded 100 ppm, with the highest concentration being 160 ppm. The one clam below 100 ppm contained 85 ppm of domoic acid.

Low concentrations of domoic acid were also detected in a mussel sample from Trinidad Pier and an oyster sample from an aquaculture lease in the North Bay portion of Humboldt Bay. Oysters from the latter site declined below the detection limit within four days.

The CDPH Food and Drug Branch collected samples of Dungeness crab fished from various locations between Del Norte and San Mateo counties. A summary of the [crab sample data can be found online](#). Briefly, the majority of crab viscera samples between Del

Norte and Marin counties contained low levels of domoic acid, however a small number of samples exceeded the alert level of 30 ppm for crab (Figure 2). The highest concentration detected was 46 ppm in a sample from north of Trinidad in Humboldt County. The majority of crab fished from the San Mateo coast did not



(Continued on page 5)

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.

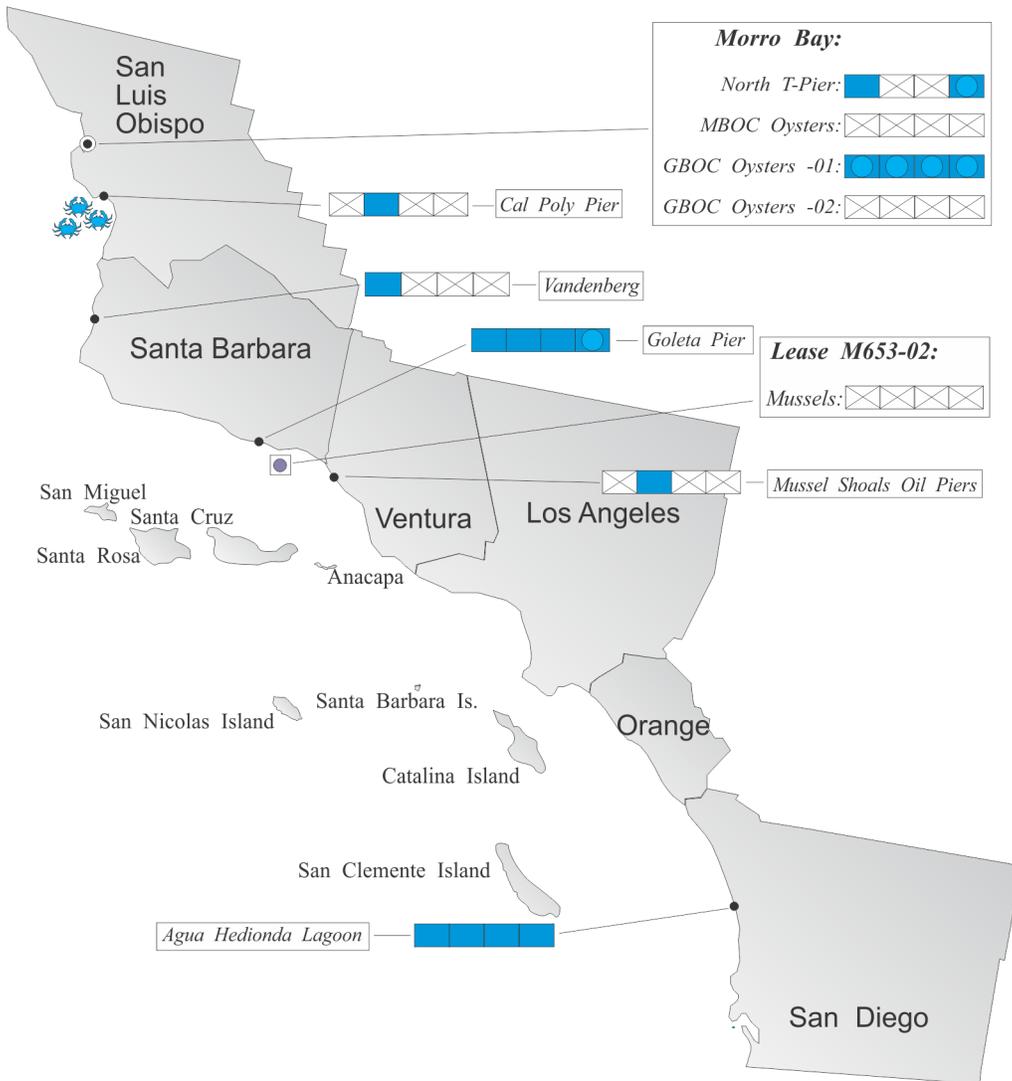
For Information on Volunteering:

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.



month (Figure 3). Low cell numbers of this dinoflagellate were detected in a September 7 sample from the San Simeon Pier. *Alexandrium* has been observed at one or more sites along the San Luis Obispo coast for each month of 2018 except April. PSP toxicity was not detected in any shellfish samples in September (Figure 4).

Domoic Acid

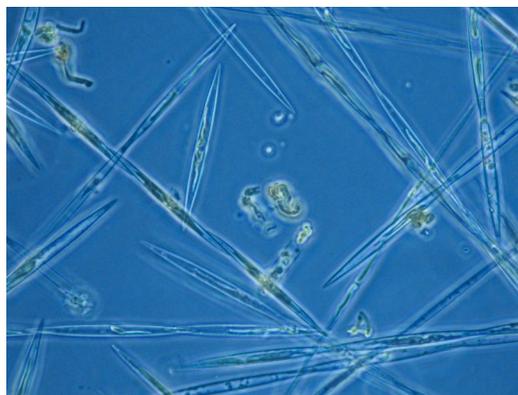
Pseudo-nitzschia was observed at sampling sites in each southern California county during September (Figure 3). The distribution of this diatom was similar to observations in August and the relative abundance increased in samples from Morro Bay and the Back Bay portion of Newport Bay. The cell mass was low at all sites.

(Continued from page 4)

contain a detectable level of domoic acid.

Non-Toxic Species

The diatom *Chaetoceros* was common to abundant at some sites between Sonoma and Monterey counties, however dinoflagellates dominated the assemblage in this region. The most common dinoflagellates were *Ceratium furca* and *Prorocentrum micans*. *Akashiwo sanguineum* was common in outer Tomales Bay and both *Ceratium fusus* and *Gymnodinium sp.* were common in a



Chains of the domoic acid-producing diatom *Pseudo-nitzschia*.

sample from the Santa Cruz Pier.

Southern California Summary:

Paralytic Shellfish Poisoning:

Alexandrium continued to have a presence along the San Luis Obispo coast for the fifth consecutive

Domoic acid was not detected in any bivalve shellfish samples analyzed in September (Figure 4). The CDPH Food and Drug Branch collected samples of Dungeness crab fished San Luis Obispo County. None of the six viscera samples contained a detectable level of domoic acid.

Non-Toxic Species

A variety of diatoms and dinoflagellates were observed along coast of San Luis Obispo and Santa Barbara. Common diatoms included

(Continued on page 6)

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Chaetoceros and *Hemialus*; common dinoflagellates were *Ceratium fusus* and *C. furca*. The remainder of the coast, from Ventura to San Diego, was dominated by a variety of diatoms. Among the most commonly observed genera were *Hemialus*, *Stephanopyxis*, and *Guinardia*. *Navicula* was abundant at the Ventura Pier and *Skeletonema* was common in the Newport Bay Back Bay.

QUARANTINES:

The annual mussel quarantine began on May 1 and will continue through at least October 31. This annual quarantine prohibits the sport-harvesting of mussels along the entire California coastline, including all bays and estuaries.

On September 13 CDPH warned consumers not to eat any recreationally harvested bivalve shellfish, which includes all clams, scallops, and mussels, from Humboldt County due to elevated levels of domoic acid.

On September 7 CDPH warned consumers to avoid eating any recreationally harvested bivalve shellfish from Del Norte County due to the detection of dangerous levels of domoic acid.

On June 25 CDPH lifted the PSP health advisory for sport-harvested clams and scallops from Sonoma, Santa Cruz, and Santa Barbara counties. Mussels remain under the annual quarantine.

Table 1. Program participants collecting phytoplankton samples.

AGENCY	#	AGENCY	#
DEL NORTE COUNTY		Tolowa Dee-ni' Nation	2
HUMBOLDT COUNTY		CDPH Marine Biotoxin Program	2
Coast Seafood Company	4	Humboldt State University Marine Lab	1
MENDOCINO COUNTY		None Submitted	
SONOMA COUNTY		CDPH Marine Biotoxin Program	2
Gulf of the Farallones National Marine Sanctuary	3	Sonoma Coast Watch/WaterTreks Ecotours	5
MARIN COUNTY		CDPH Volunteer (<i>Brent Anderson</i>)	2
CDPH Marine Biotoxin Program	1	Gulf of the Farallones National Marine Sanctuary	9
Hog Island Oyster Company	11	National Park Service	1
CONTRA COSTA COUNTY		CDPH Marine Biotoxin Program	1
SAN FRANCISCO COUNTY		CDPH Volunteer (<i>Eugenia McNaughton</i>)	1
Exploratorium	1	Gulf of the Farallones National Marine Sanctuary	3
SAN MATEO COUNTY			
Friends of the Sea Otter	2	The Marine Mammal Center	4
San Mateo County Environmental Health Dept.	2	U.C. Santa Cruz	1
SANTA CRUZ COUNTY		CDPH Volunteer (<i>Jeff Palsgaard</i>)	4
Monterey Bay National Marine Sanctuary	1	U.C. Santa Cruz	4
MONTEREY COUNTY		Monterey Abalone Company	1
Pacific Grove Museum of Natural History	1	The Otter Project	2
SAN LUIS OBISPO COUNTY			
CDPH Volunteers (<i>Dan Hoskins, Ron Easley</i>)	2	Friends of the Sea Otter	1
Grassy Bar Oyster Company	4	Monterey Bay National Marine Sanctuary	4
Morro Bay National Estuary Program	2	Tenera Environmental	3
SANTA BARBARA COUNTY		Channel Islands National Park/HABNet	4
Santa Barbara Channel Keeper	2	U.C. Santa Barbara	4
VENTURA COUNTY			
CDPH Volunteer (<i>Fred Burgess</i>)	4	Channel Islands National Park	1
National Park Service	1	Ventura County Environmental Health Dept.	1
LOS ANGELES COUNTY			
CDPH Volunteer (<i>Michelle Tran</i>)	2	Cabrillo Marine Aquarium	3
Catalina Island Marine Institute	1	City of L.A. Environmental Monitoring Division	1
Los Angeles County Health Department	1	Los Angeles Water Keeper	4
ORANGE COUNTY		Amigos de Bolsa Chica	4
Back Bay Science Center	4	CDPH Volunteer (<i>Truong Nguyen</i>)	2
SAN DIEGO COUNTY		Carlsbad Aquafarms, Inc.	3
CDPH Volunteer (<i>Tricia Murray</i>)	1	Scripps Institute of Oceanography	4
Sea Camp/HABNet	2	Tijuana River National Estuary Research	4
U.S. Navy Marine Mammal Program	1	Wildcoast	2

On June 16 CDPH lifted the PSP health advisory for sport-harvested clams and scallops from Marin and Ventura counties.

On May 25 CDPH lifted PSP health advisories for scallops and clams in Alameda, Contra Costa, Monterey, San Francisco, and San Mateo 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

(Continued on page 7)

(Continued from page 6)

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 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.

Table 2. Program participants collecting shellfish samples.

COUNTY	AGENCY	#
Del Norte	Tolowa Dee-ni' Nation	2
	Yurok Tribe Environmental Program	1
Humboldt	Coast Seafood Company	14
	Humboldt County Environmental Health Department	1
	California Department of Fish and Wildlife	10
Mendocino	Mendocino County Environmental Health Department	1
Sonoma	CDPH Marine Biotoxin Program	2
	CDPH Volunteer (<i>John Morozumi</i>)	1
Marin	CDPH Volunteer (<i>Pete Schmidt</i>)	1
	CDPH Marine Biotoxin Program	2
	Cove Mussel Company	5
	Hog Island Oyster Company	5
San Francisco	Point Reyes Oyster Company	4
	None Submitted	
	None Submitted	
San Mateo	None Submitted	
	None Submitted	
Santa Cruz	CDPH Volunteer (<i>Richard Buddington</i>)	1
	U.C. Santa Cruz	3
Monterey	Monterey Abalone Company	2
San Luis Obispo	CDPH Marine Biotoxin Program	1
	Grassy Bar Oyster Company	4
	Morro Bay Oyster Company	2
Santa Barbara	U.C. Santa Barbara	4
	Vandenberg Air Force Base Environmental Health Services	1
Ventura	Ventura County Environmental Health Department	1
Los Angeles	None Submitted	
Orange	None Submitted	
San Diego	Carlsbad Aquafarm, Inc.	4

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.

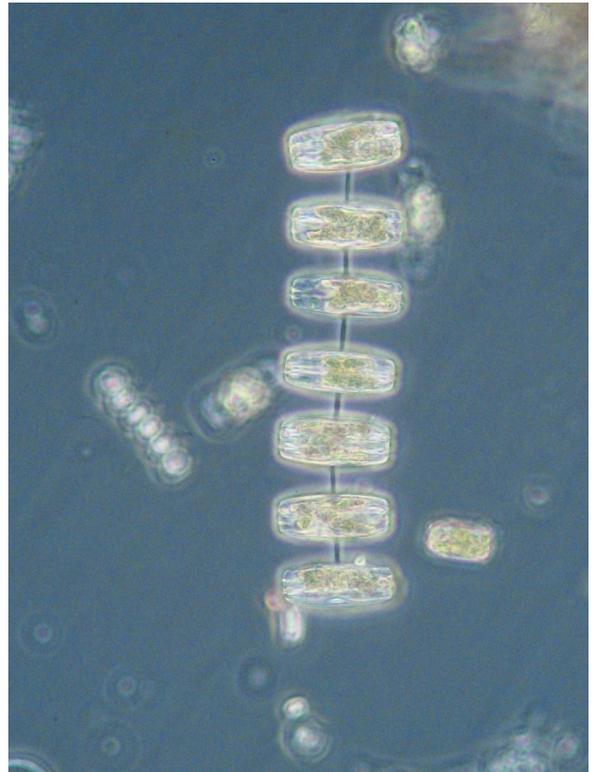
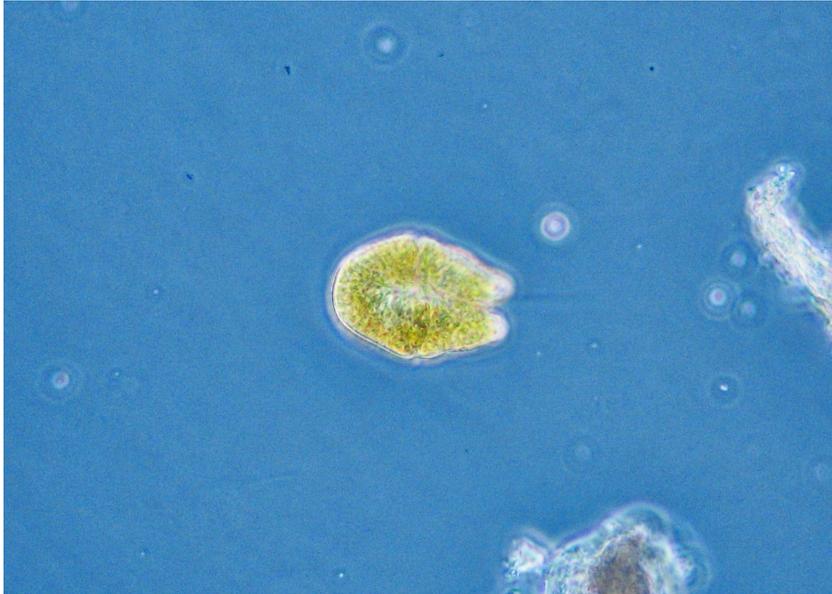
Sportharvesters should only collect shellfish from areas that are not affected by a current health advisory or quarantine. Contact the "Biotoxin Information Line" at 1-800-553-4133 for a current update on marine biotoxin activity prior to gathering and consuming shellfish.



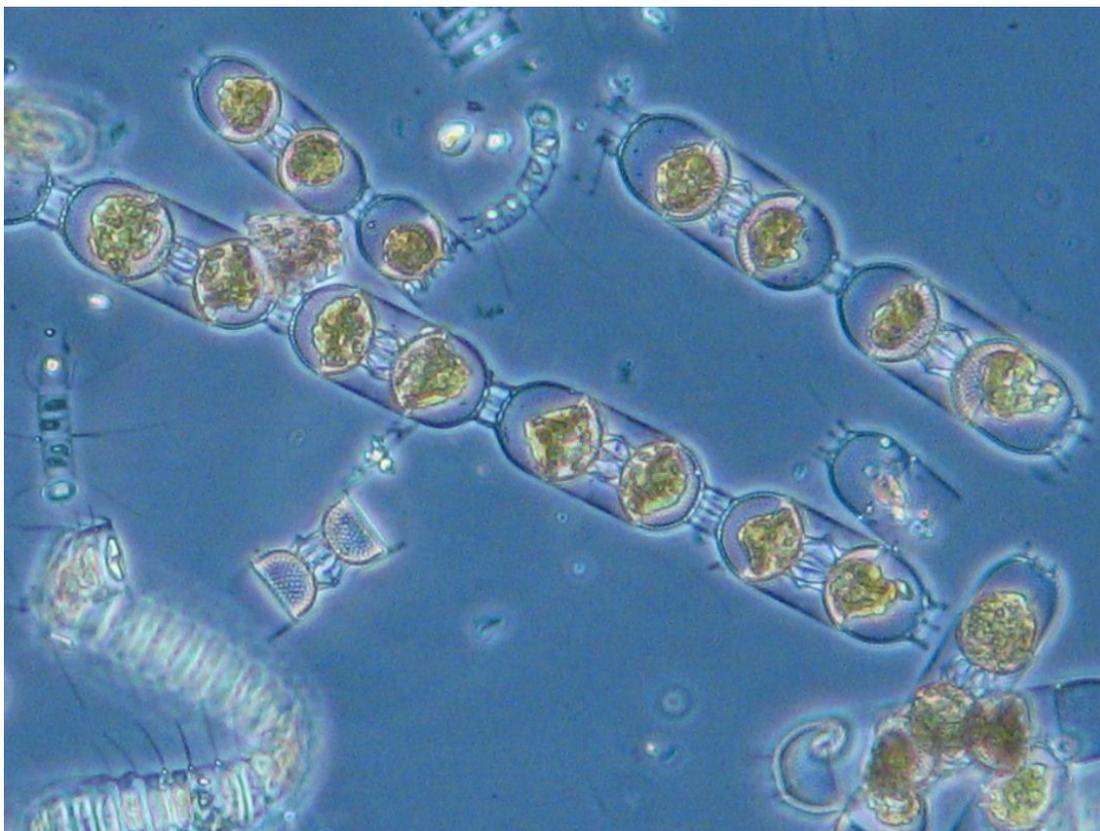
If you are having difficulty accessing this document, please contact CDPH at 1-800-553-4133 to request this information in an alternate for-

Phytoplankton Gallery

The unarmored dinoflagellate *Akashiwo sanguineum*.



The diatom *Thalassiosira*.



Chains of the diatom *Stephanopyxis*.