



Marine Biotoxin Monitoring Report

May 2019

Technical Report No. 19-15

INTRODUCTION:

This report provides a summary of biotoxin activity for the month of May, 2019. 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) Only known toxin-producing species (*seriata* complex) 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 de-



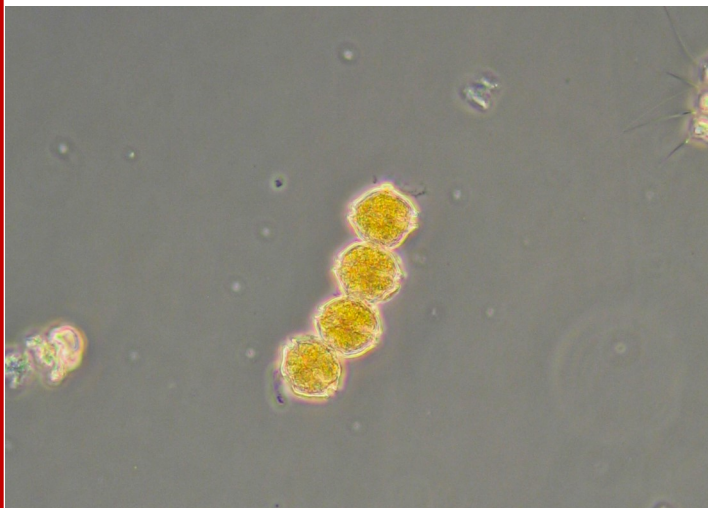
tected blooms of the diatoms that produce DA); (v) Please refer to the appropriate figure key for an explanation of the symbols used on the maps.

Northern California Summary:

Paralytic Shellfish Poisoning

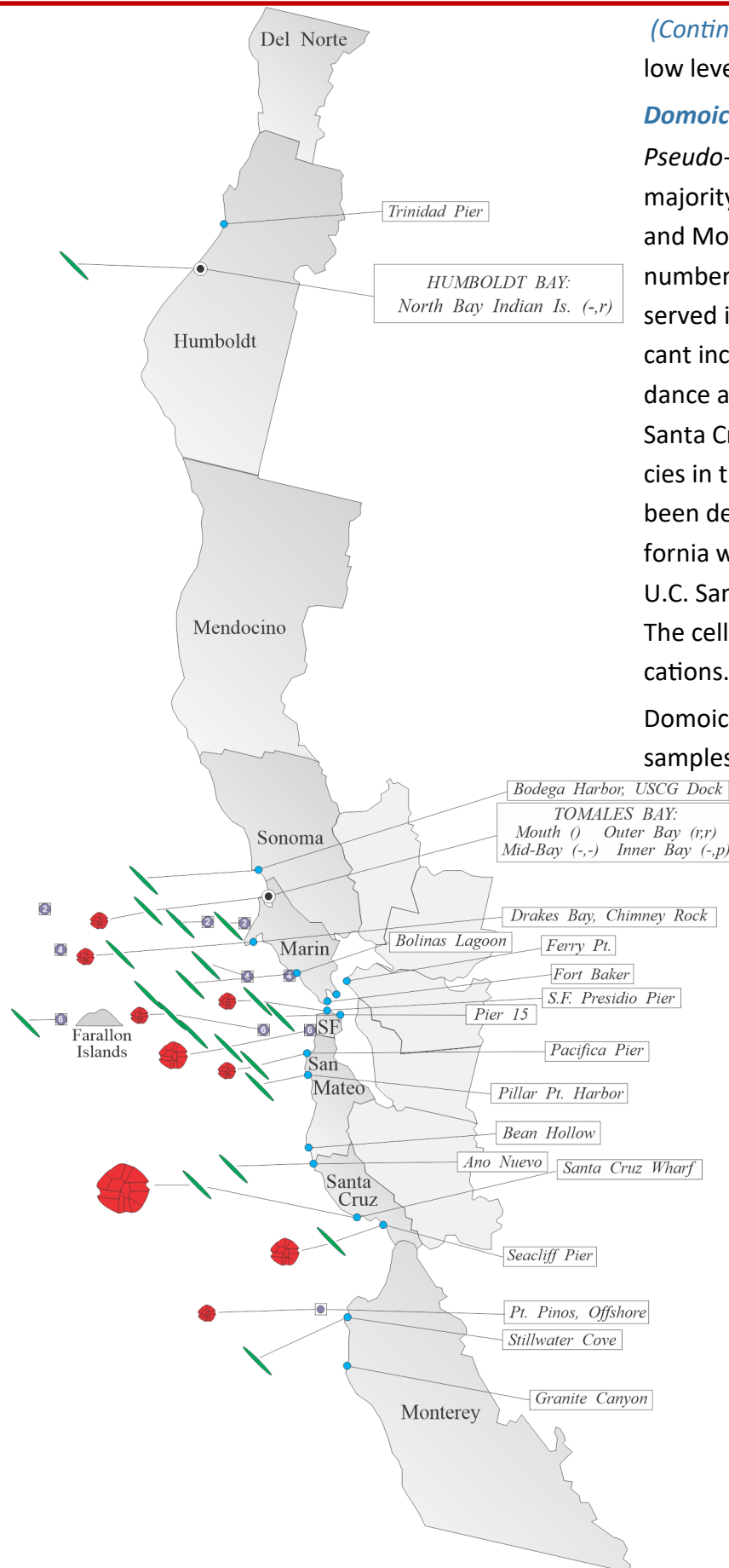
Alexandrium was observed at several locations between Marin and Monterey counties in May (Figure 1). These observations represent an increase in the distribution and relative abundance of *Alexandrium* compared to observations in April. The highest relative abundances of this dinoflagellate were detected in samples collected at Santa Cruz Wharf, Pacifica Pier, offshore of south San Francisco County, and at the Chimney Rock sentinel station in Drakes Bay.

Low concentrations of PSP toxins were detected in mussel samples at sites in each coastal county between Humboldt and Monterey in May (Figure 2; note: San Francisco County was not sampled). PSP toxicity well above the alert level was detected in sentinel mussels from the Santa Cruz Wharf (231 µg/100 g) during the first week of May. Toxicity declined below the alert level by May 8, persisting at



A four-celled chain of *Alexandrium*.

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low levels for the remainder of the month.

Domoic Acid

Pseudo-nitzschia continued to be observed at the majority of sampling locations between Sonoma and Monterey counties in May (Figure 1). Low numbers of this diatom also continued to be observed inside Humboldt Bay. There was a significant increase in *Pseudo-nitzschia* relative abundance and cell mass in a May 29 sample from the Santa Cruz Wharf, however it appeared to be a species in the *delicatissima* complex, which has not been demonstrated to produce domoic acid in California waters. A special thanks to the Kudela Lab at U.C. Santa Cruz for confirming our observations. The cell mass was low in samples from all other locations.

Domoic acid was not detected in mussel or oyster samples during May (Figure 2). Razor clams from

Humboldt and Del Norte counties, however, continued to contain dangerous concentrations of this toxin. Of eight razor clam meat samples collected at Crescent Beach (Del Norte County) on May 6, all but one exceeded the domoic acid alert level, ranging from 18 to 220 ppm. Additional sampling was conducted at this site on May 20, with all eight razor clams exceeding the alert level. Toxin

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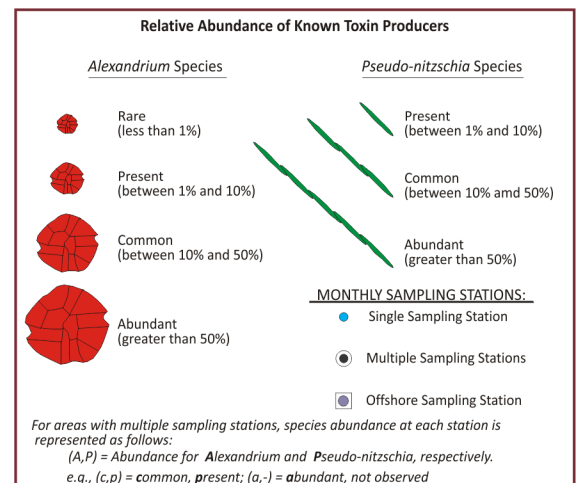


Figure 1. Toxic phytoplankton distribution in northern California.

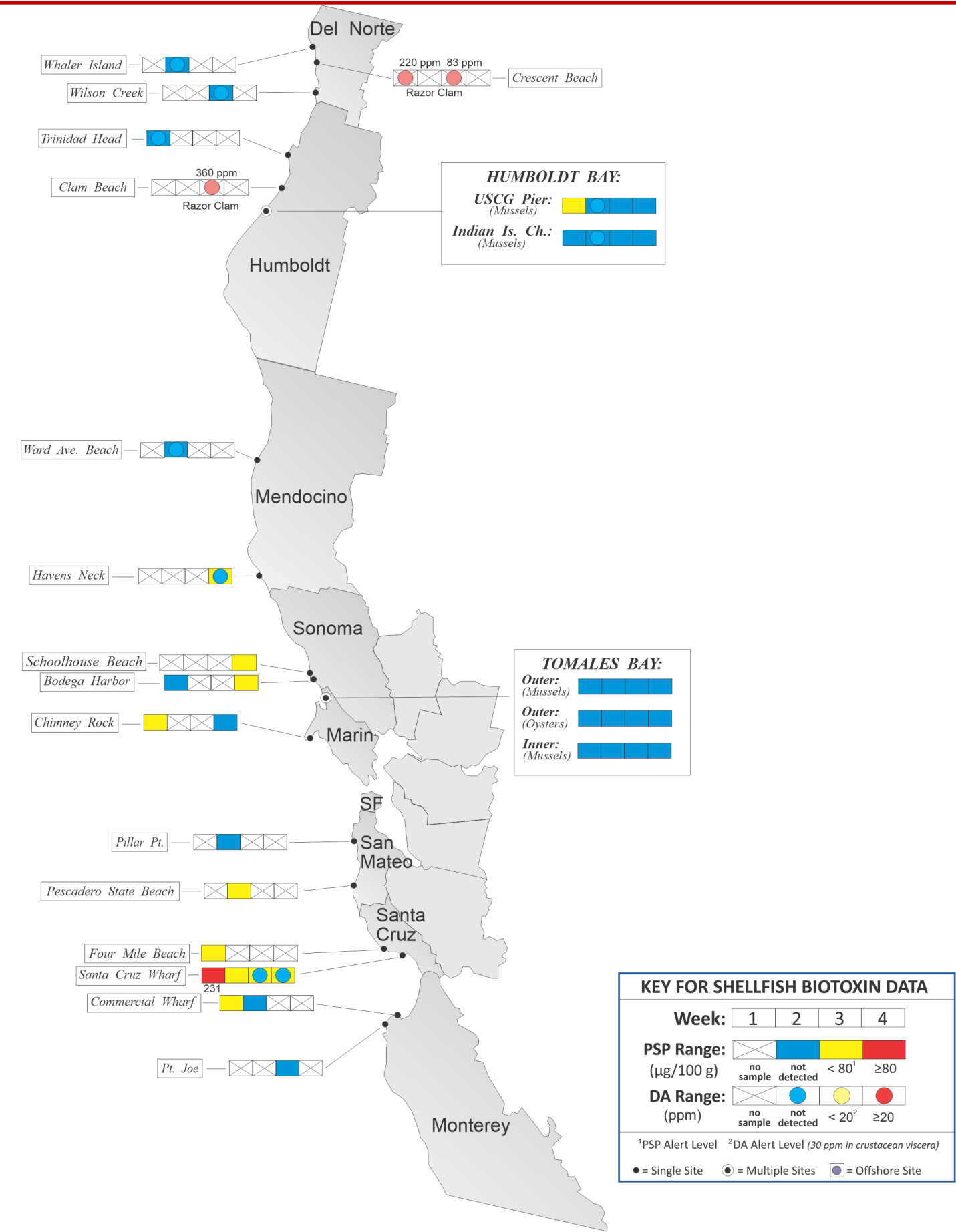


Figure 2. Distribution of shellfish biotoxins in northern California.

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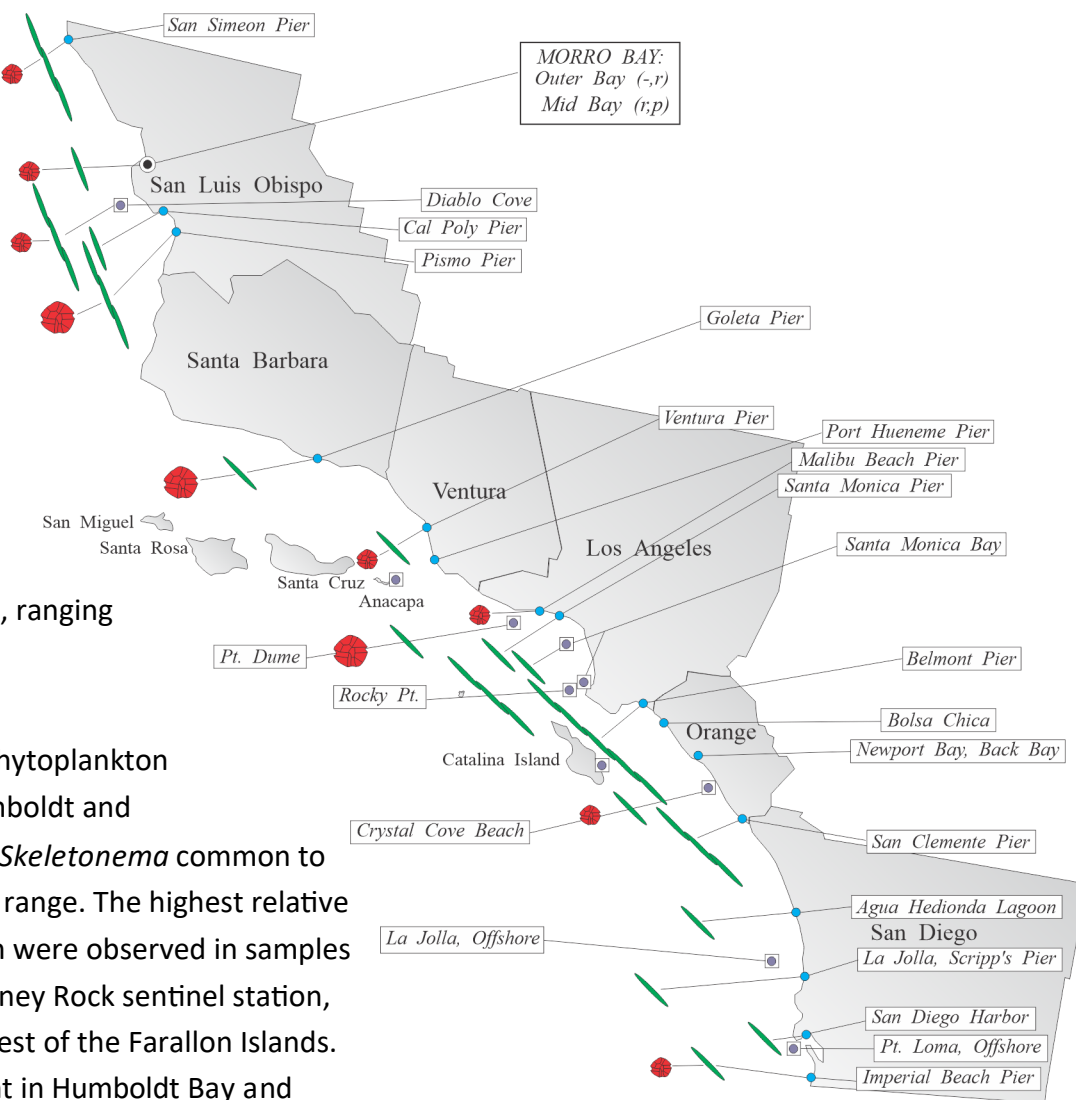
Figure 3. Toxic phytoplankton distribution in southern California.

concentrations ranged from 43 to 83 ppm, representing a significant decrease in overall toxicity from past samples. The California Department of Fish and Wildlife (CDFW) collected eight samples of razor clam meat from Clam Beach (Humboldt County) on May 20. All samples exceeded the alert level for domoic acid, ranging from 38 to 360 ppm.

Non-Toxic Species

Diatoms dominated the phytoplankton assemblage between Humboldt and San Mateo counties, with *Skeletonema* common to abundant throughout this range. The highest relative abundances of this diatom were observed in samples from Humboldt Bay, Chimney Rock sentinel station, outer Tomales Bay, and west of the Farallon Islands. *Chaetoceros* was abundant in Humboldt Bay and

common in Tomales Bay. *Thalassiosira* was abundant just offshore of Bolinas Lagoon in a sample collected by the Applied California Current Ecosystem Studies (ACCESS) project. Although diatoms dominated the northern California coast, some dinoflagellates were observed in significant numbers. *Heterocapsa* was common at



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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.

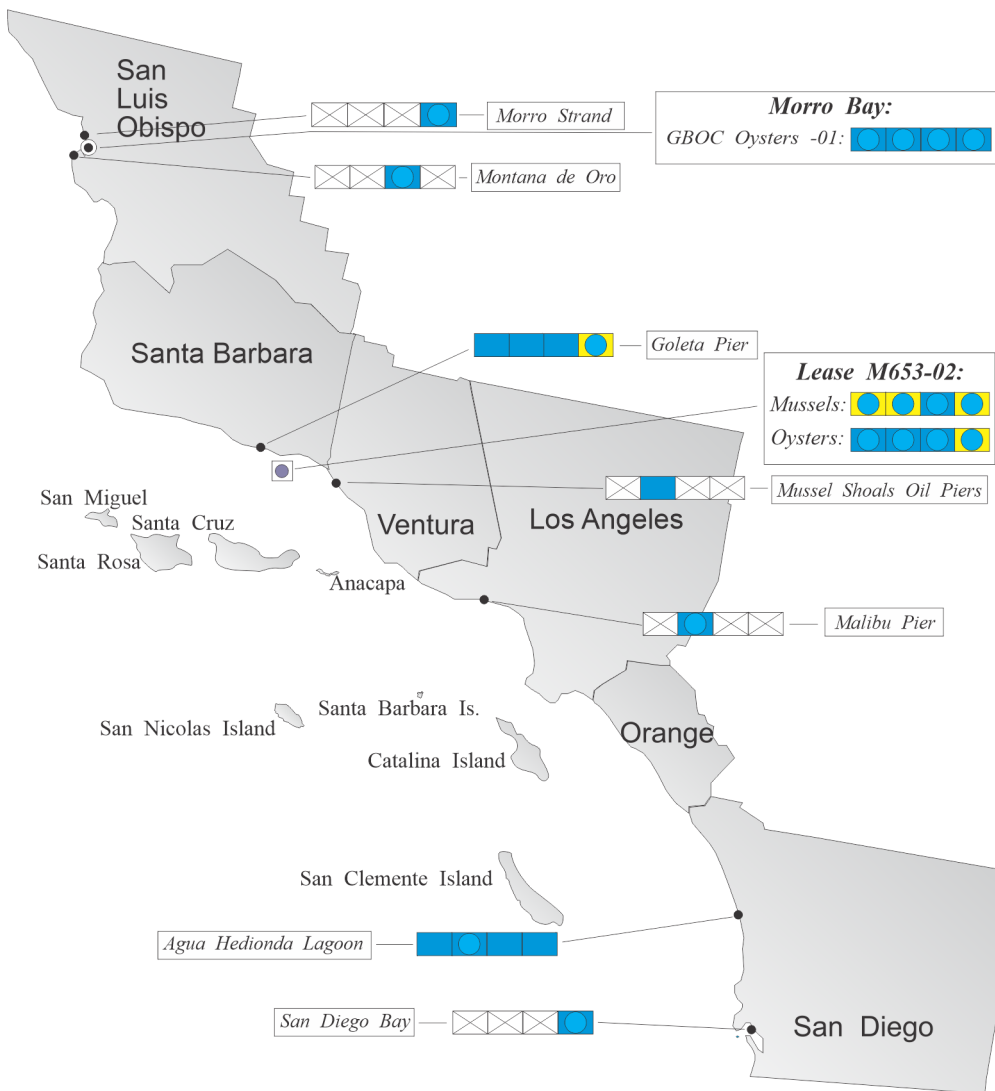
For Information on Volunteering:

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.



dance of this dinoflagellate also increased at several sites between San Luis Obispo and Los Angeles counties. The highest cell numbers observed were in samples from Goleta Pier (May 29) and Pismo Pier (May 28).

PSP toxicity well below the alert level was detected in mussel samples from an aquaculture lease offshore of Santa Barbara throughout most of the month (Figure 4). By the last week of May an oyster sample from this site also contained a low concentration of PSP toxins. PSP toxicity was also detected in mussels from nearby Goleta Pier on May 29.

Domoic Acid

Pseudo-nitzschia continued to be observed at the majority of

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the Presidio Pier and Akashiwo *sanguineum* was common offshore of south San Francisco County and abundant at the Pacifica Pier and the Seacliff Pier. Also abundant at Seacliff Pier was *Cochlodinium*, a harmful algal species capable of mass mortalities of various species (e.g., sessile invertebrates) when present in high numbers.

Southern California Summary:

Paralytic Shellfish Poisoning:

Alexandrium was observed at sampling sites in each coastal County along the southern Cali-

fornia coast in May (Figure 3). The distribution of *Alexandrium* expanded along the southern California coast into northern San Luis Obispo County compared to observations in April. The relative abun-



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

sampling sites along the southern California coast in May (Figure 3). This diatom was common in samples from San Luis Obispo, Los Angeles, and Orange counties and was abundant in a May 25 sample from Belmont Pier (Los Angeles County). The highest cell masses were observed in samples from Pismo Pier (May 28) and Belmont Pier (May 25). *Pseudo-nitzschia* species in the *delicatissima* complex were common in samples from Goleta Pier, Ventu-

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ra Pier, offshore of Pt. Dume, Scripps Pier, and Imperial Beach Pier. Although presumed to be nontoxic, occurrences of species in the *delicatissima* complex may be indicative of environmental conditions suitable for the population growth of toxin-producing species of *Pseudo-nitzschia*.

Domoic acid was not detected in any shellfish samples during May (Figure 4).

Non-Toxic Species

Diatoms dominated the phytoplankton assemblage along the San Luis Obispo coast, with *Chaetoceros* common to abundant and *Thalassiosira* common. A variety of dinoflagellate species were common to abundant at sampling sites between Santa Barbara and San Diego counties. *Dinophysis acuminata*, one of several *Dinophysis* species capable of producing the diarrhetic shellfish poisoning (DSP) toxins, was common in a sample from Ventura Pier on May 2. *Cochlodinium*, a potentially harmful red tide species, was common in samples from Goleta Pier, Malibu Pier, and Santa Monica Bay. *Lincolnodinium polyedrum* and *Akashiwo sanguineum* were common to abundant at numerous sites between Los Angeles and San Diego counties.

QUARANTINES:

The annual mussel quarantine be-

Table 1. Program participants collecting phytoplankton samples.

AGENCY	#	AGENCY	#
DEL NORTE COUNTY		None Submitted	
HUMBOLDT COUNTY			
Coast Seafood Company	4	Humboldt State University Marine Lab	1
MENDOCINO COUNTY		None Submitted	
SONOMA COUNTY		CDPH Marine Biotoxin Program	1
MARIN COUNTY		CDPH Marine Biotoxin Program	2
CDPH Volunteers (Brent Anderson, Ignacio Martin-Bragado)			5
Gulf of the Farallones National Marine Sanctuary	6	Hog Island Oyster Company	6
CONTRA COSTA COUNTY		CDPH Volunteer (Russel Shearer)	2
SAN FRANCISCO COUNTY		CDPH Volunteer (Eugenia McNaughton)	3
Exploratorium	2	Gulf of the Farallones National Marine Sanctuary	3
SAN MATEO COUNTY		The Marine Mammal Center	4
San Mateo County Environmental Health Dept	3	U.C. Santa Cruz	1
SANTA CRUZ COUNTY			
Monterey Bay National Marine Sanctuary	3	U.C. Santa Cruz	5
MONTEREY COUNTY		Marine Pollution Studies Laboratory	1
Monterey State Historic Park	1	Pacific Grove Museum of Natural History	5
SAN LUIS OBISPO COUNTY			
CDPH Volunteer (Skip Rotstein)	1	CDPH Marine Biotoxin Program	1
Friends of the Sea Otter	1	Grassy Bar Oyster Company	4
Monterey Bay National Marine Sanctuary	4	Tenera Environmental	5
SANTA BARBARA COUNTY		U.C. Santa Barbara	5
VENTURA COUNTY		CDPH Volunteer (Fred Burgess)	5
National Park Service	1	Ventura County Environmental Health Dept.	1
LOS ANGELES COUNTY			
CDPH Volunteers (Michelle and Samantha Tran, Spencer Peterman)			2
Catalina Island Marine Institute	1	City of L.A. Environmental Monitoring Division	3
Los Angeles County Health Department	1	Los Angeles Water Keeper	5
ORANGE COUNTY			
Amigos de Bolsa Chica	5	Back Bay Science Center	3
Crystal Cove Alliance	1	CDPH Volunteer (Truong Nguyen)	2
SAN DIEGO COUNTY		Carlsbad Aquafarms, Inc.	4
Scripps Institute of Oceanography	4	Sea Camp/HABNet	2
Tijuana River National Estuary Research	5	U.S. Navy Marine Mammal Program	2

gan 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.

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

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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. 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 tox-

Table 2. Program participants collecting shellfish samples.

COUNTY	AGENCY	#
Del Norte	CDPH Volunteers (<i>Ken Graves, Richard Nehmer</i>)	17
	Yurok Tribe Environmental Program	1
Humboldt	California Department of Fish and Wildlife	8
	Coast Seafood Company	8
	Humboldt County Environmental Health Department	1
Mendocino	CDPH Volunteer (<i>Jamie Jackson</i>)	1
	Mendocino County Environmental Health Department	1
Sonoma	CDPH Marine Biotoxin Program	3
Marin	CDPH Marine Biotoxin Program	2
	Cove Mussel Company	4
	Hog Island Oyster Company	4
	Tomales Bay Oyster Company	4
San Francisco	None Submitted	
San Mateo	CDPH Volunteer (<i>Stuart Jackson</i>)	1
	San Mateo County Environmental Health Department	1
Santa Cruz	CDPH Volunteer (<i>Richard Buddington</i>)	1
	U.C. Santa Cruz	5
Monterey	CDPH Volunteer (<i>Serena Lomonico</i>)	1
	Monterey Abalone Company	2
San Luis Obispo	CDPH Volunteer (<i>Stuart Helmtoller</i>)	1
	CDPH Marine Biotoxin Program	1
	Grassy Bar Oyster Company	4
Santa Barbara	Santa Barbara Mariculture Company	10
	U.C. Santa Barbara	5
Ventura	Ventura County Environmental Health Department	1
Los Angeles	Los Angeles County Health Department	1
Orange	None Submitted	
San Diego	Carlsbad Aquafarm, Inc.	4
	U.S. Navy Marine Mammal Program	1

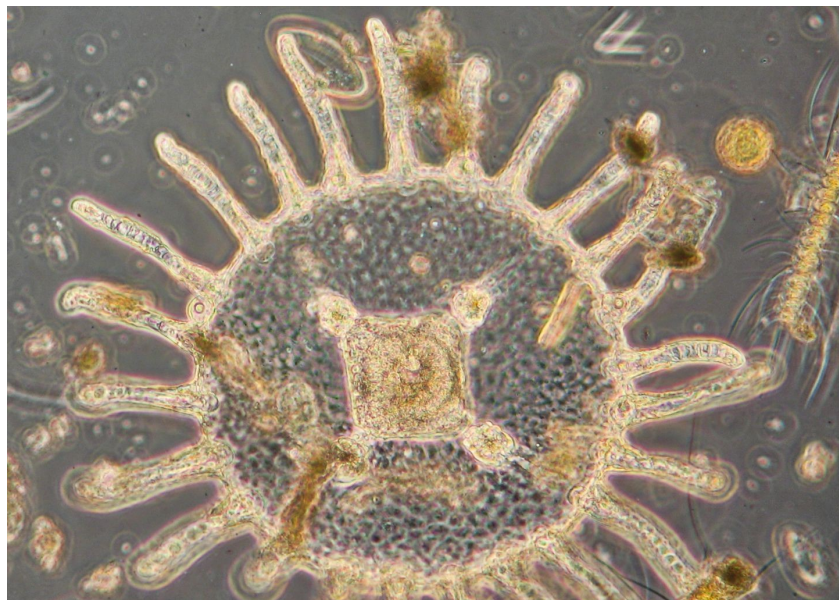
ins may also accumulate in seafood species such as crab, lobster, and small finfish like sardines and anchovies.

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.

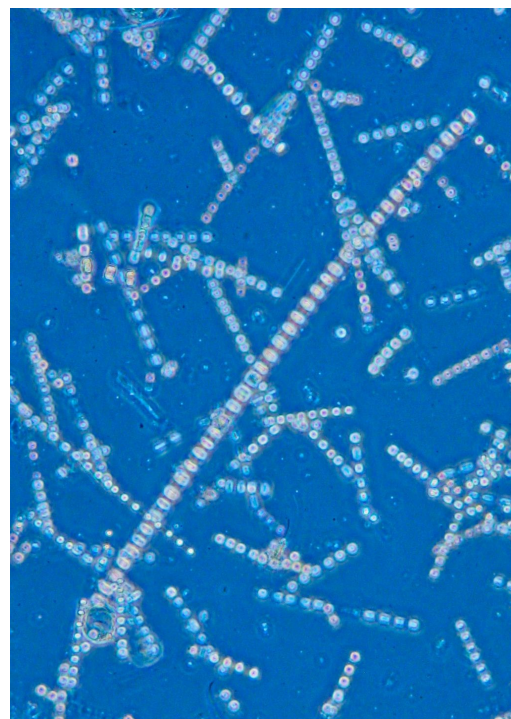


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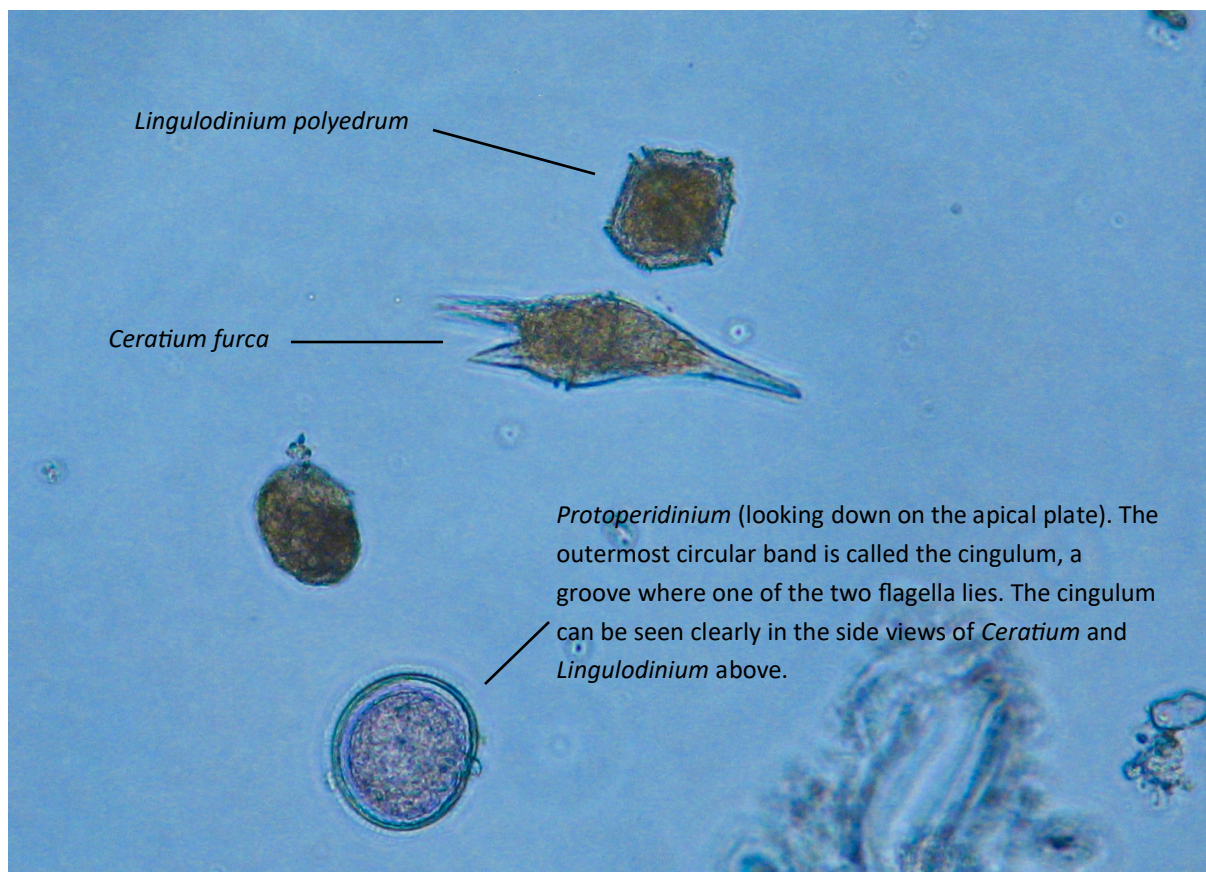
Phytoplankton Gallery



The medusa stage of the hydrozoan *Obelia*.



The chained diatom *Skeletonema*.



Common dinoflagellates often observed in phytoplankton samples.