CALIFORNIA DEPT.OF PUBLIC HEALTH ENVIRONMENTAL MANAGEMENT BRANCH

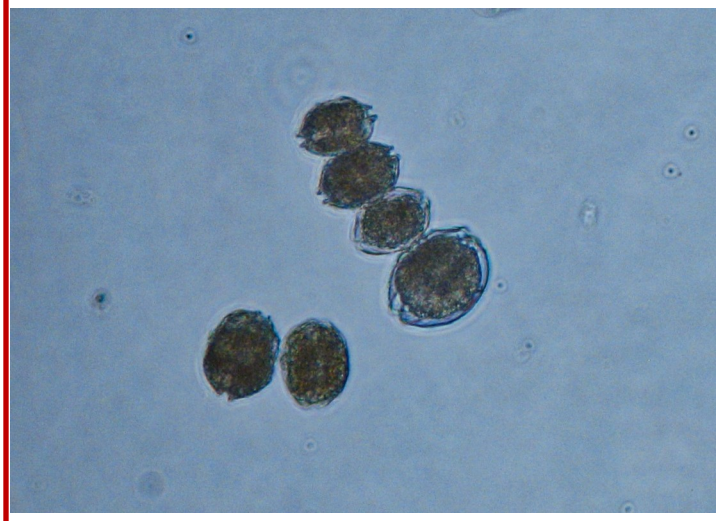
Marine Biotoxin Monitoring Report

June 2019 Technical Report No. 19-22

INTRODUCTION:

This report provides a summary of biotoxin activity for the month of June, 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 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.



Alexandrium was observed along the coast and inside bays and estuaries.

Northern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was observed at several locations between Sonoma and Monterey counties in June (Figure 1). There was a noticeable increase in the relative abundance of *Alexandrium* at sites in Marin and San Francisco counties compared to observations in May. In contrast, there was a decline in percent composition at sites inside Monterey Bay (Santa Cruz County). The highest percent composition (15%) of this dinoflagellate was observed in samples from Rodeo Beach (June 14, Marin County) and the Presidio Pier just inside the Golden Gate (June 11, San Francisco County). The greatest cell mass of *Alexandrium* was observed in outer Tomales Bay (June 16, Marin County).

PSP toxicity was detected at every sampling location between Sonoma and Monterey counties (excluding the middle and inner portions of Tomales Bay), with the majority of these sites experiencing toxin concentrations well above the alert level (Figure 2). The highest concentrations of PSP toxins were detected in mussel samples from the Drakes Bay sentinel station (734 µg/100 g, June 19) and Carmet Beach (535 µg/100 g, June 23). Alert levels of these toxins were also detected in gaper clams (*Tresus nuttalli*, 192 µg/100 g) and butter clams (*Saxidomus nuttalli*, 133 µg/100 g) collected from Clam Island, just inside Tomales Bay, on June 19.

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Domoic Acid

Pseudo-nitzschia was observed at the majority of coastal sampling locations between Humboldt and Monterey counties in June (Figure 1). The relative abundance of this diatom increased in outer and inner Tomales Bay (June 16 and 9, respectively) and inside Monterey Bay at the Santa Cruz Wharf (June 19) and Seacliff Pier (June 6). The cell mass was elevated in the outer Tomales Bay sample but remained low in samples from all other locations.

Domoic acid was not detected in mussel or oyster samples during June (Figure 2). Razor clams from Humboldt and Del Norte counties continued to contain dangerous concentrations of this toxin, however there was a continued decline in domoic acid concentrations at the latter location. Of 10 razor clam meat samples collected at Crescent Beach (Del Norte County) on June 5, five exceeded the domoic acid alert level. The toxin concentrations ranged from 24 to 40 ppm, continuing the downward trend observed in May. Of the remaining five clam samples, three contained low levels of domoic acid and two were below the detection limit. Additional sampling was conducted at this site on June 18, with only two of eight razor clams exceeding the alert level (23 ppm and 26 ppm).

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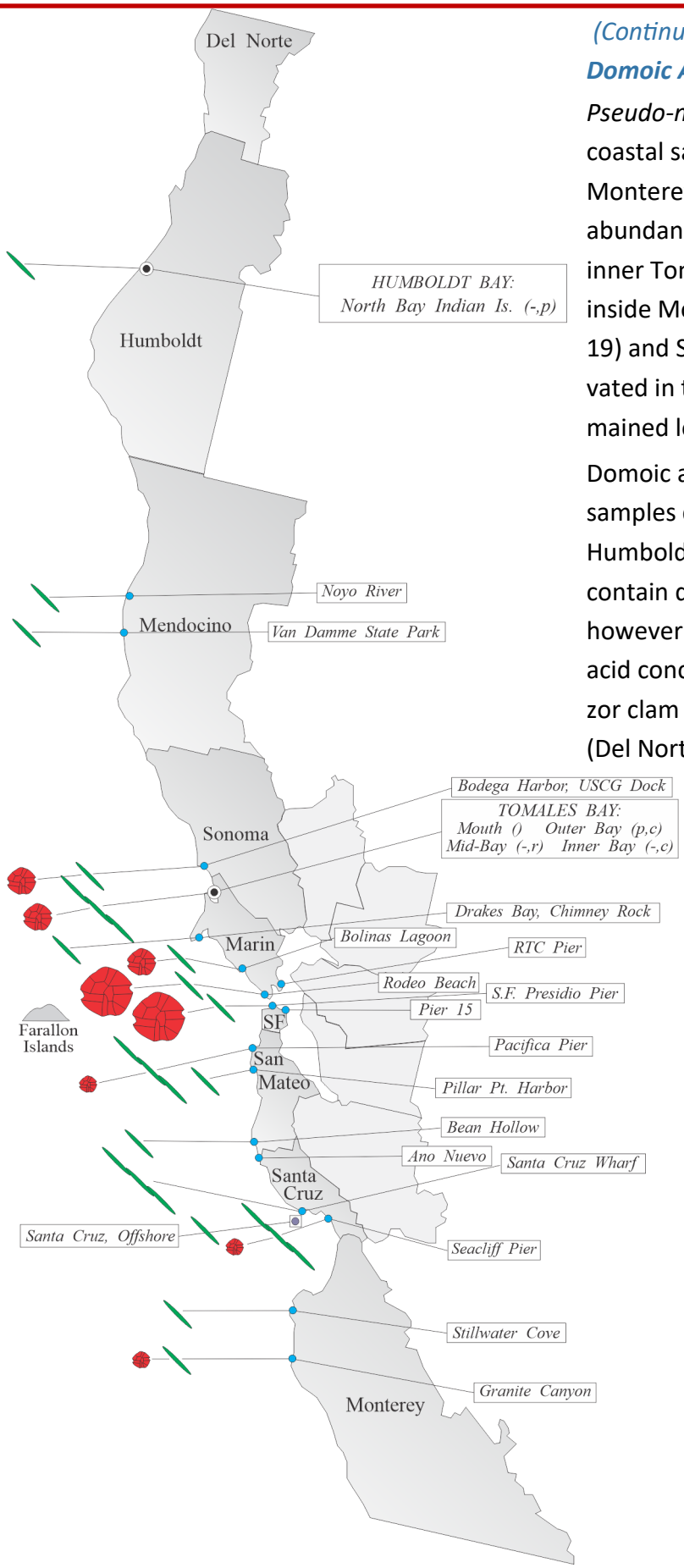
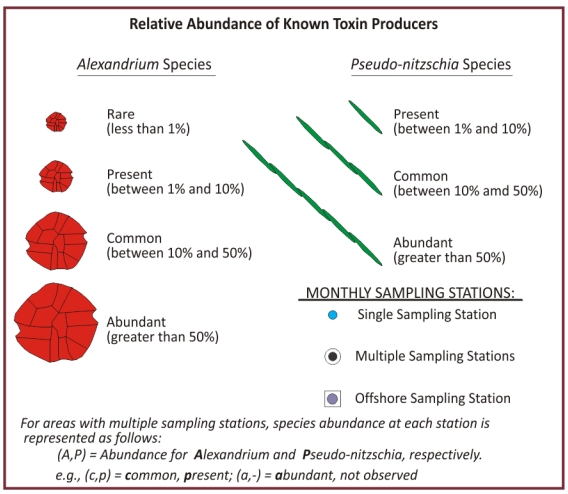


Figure 1. Toxic phytoplankton distribution in northern California.



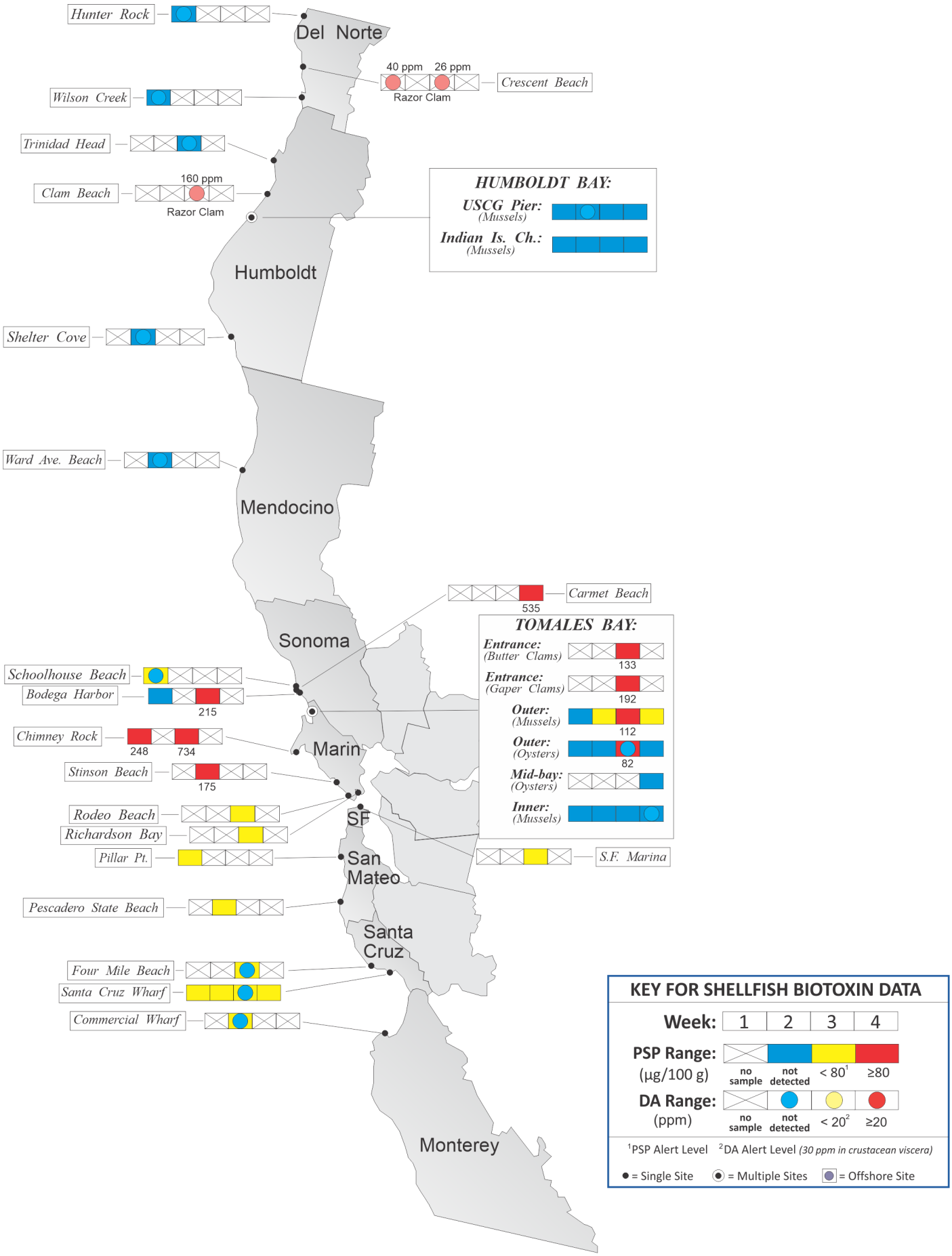


Figure 2. Distribution of shellfish biotoxins in northern California.

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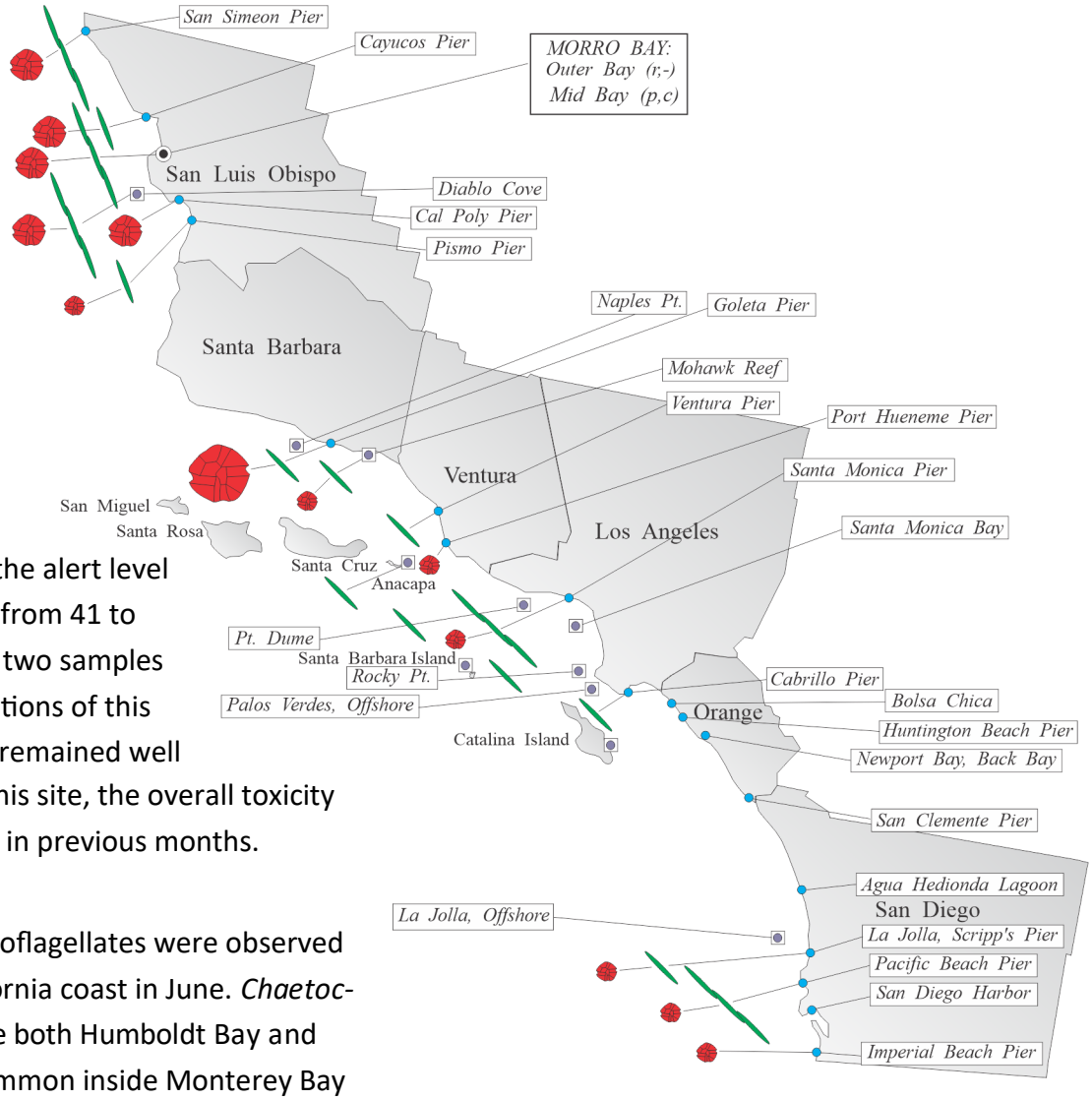
Figure 3. Toxic phytoplankton distribution in southern California.



Four of these clam samples contained a low concentration of domoic acid and one sample was below the detection limit. The California Department of Fish and Wildlife (CDFW) collected 10 samples of razor clam meat from Clam Beach (Humboldt County) on June 17. Eight of these clam samples exceeded the alert level for domoic acid, ranging from 41 to 160 ppm. The remaining two samples contained low concentrations of this toxin. Although samples remained well above the alert level at this site, the overall toxicity was lower than detected in previous months.

Non-Toxic Species

A mix of diatoms and dinoflagellates were observed along the northern California coast in June. *Chaetoceros* was abundant inside both Humboldt Bay and Tomales Bay and was common inside Monterey Bay at the Santa Cruz Wharf and Seacliff Pier. In Mendocino County, *Licmophora* was abundant at Van Damme State Park and *Melosira* was common in Noyo River. The dinoflagellates *Prorocentrum micans* and *Akashiwo*

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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.

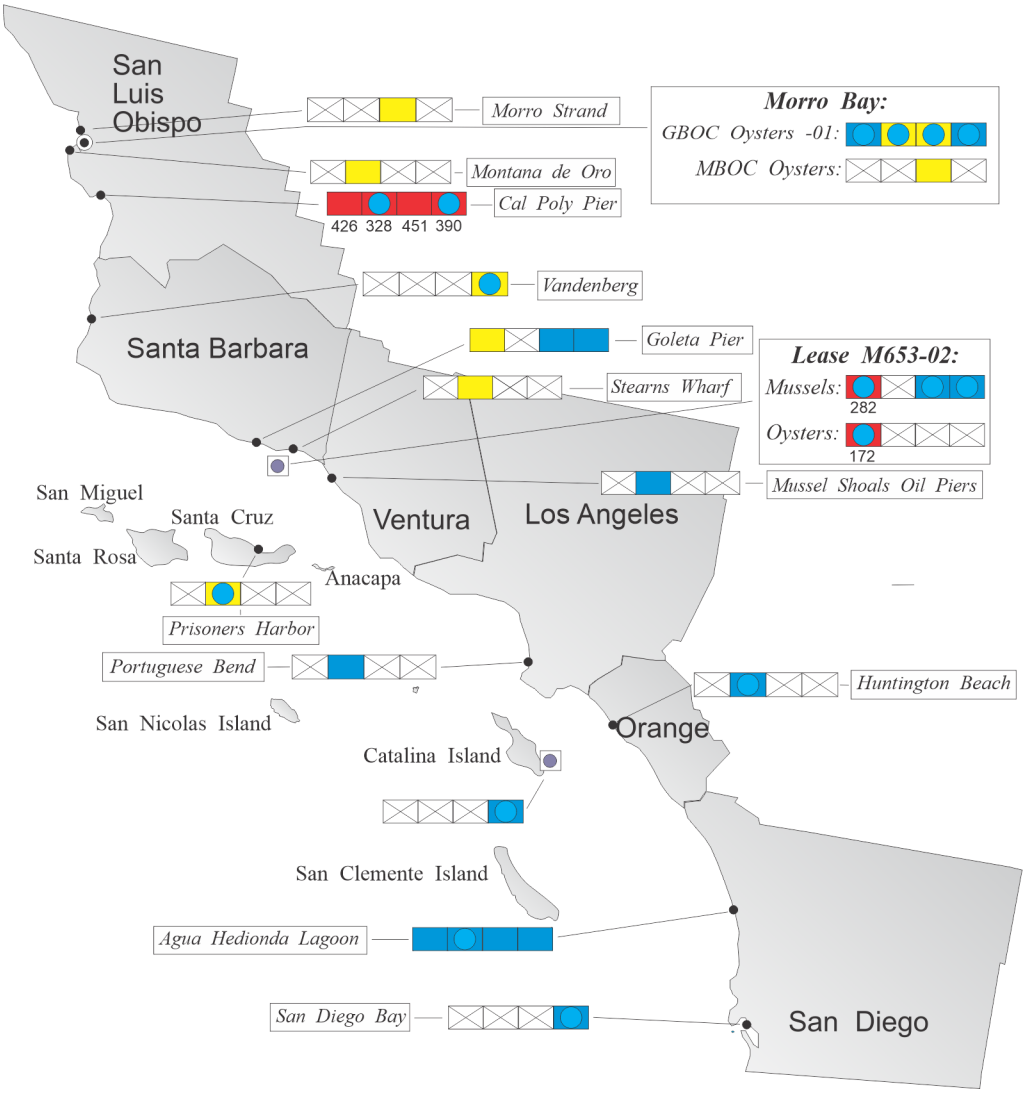
For Information on Volunteering:

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

For Recorded Biotoxin Information Call:

(800) 553 - 4133

Figure 4. Distribution of shellfish biotoxins in southern California.



PSP toxicity was detected in shellfish samples from all sampling sites in San Luis Obispo and Santa Barbara counties (Figure 4). Of note was the detection of PSP toxicity offshore in sentinel mussels from Santa Cruz Island, as well as in oyster samples from inside Morro Bay. PSP toxicity well above the alert level was detected in mussels from the Cal Poly Pier throughout the month and in both mussels and oysters from an aquaculture lease offshore of Santa Barbara during the first week of June.

Domoic Acid

Pseudo-nitzschia continued to be observed at the majority of sampling sites along the southern California coast in June (Figure 3). This diatom remained common along the San Luis Obispo County coast and in Santa Monica Bay (Los Angeles County). *Pseudo-nitzschia* was also common in a sample from the Pacific Beach Pier in San Diego County (June 2). The highest cell masses were observed in samples from inside Morro Bay (June 3) and offshore of Diablo Cove (June 14), both in San Luis Obispo County. *Pseudo-nitzschia* species in the *delicatissima* complex were common in samples from inside

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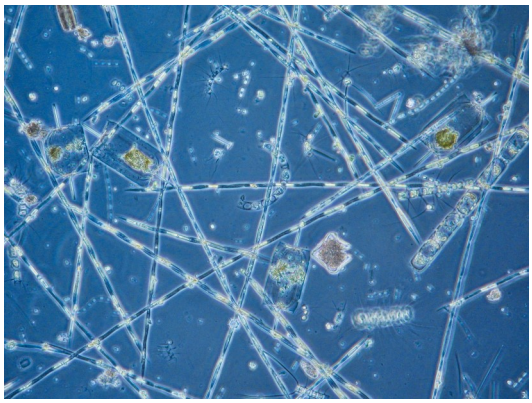
sanguineum were common inside Tomales Bay; the latter was also common at the Santa Cruz Wharf. *Ceratium divaricatum* was common at the Seacliff Pier.

Southern California Summary:

Paralytic Shellfish Poisoning:

Alexandrium was observed at sampling sites in each southern California coastal county, except Orange, in June (Figure 3). The relative abundance of this dinoflagellate increased at most sites in San Luis Obispo County, as well as at the Goleta Pier in Santa Barbara County (25%; June 4). Low numbers of *Alexandrium* were observed at several San Diego County sampling sites between La Jolla and Imperial Beach, a rare occurrence.



Pseudo-nitzschia was common at numerous locations in June.

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Morro Bay (June 10) and offshore of Pt. Dume (June 8).

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

Non-Toxic Species

A mix of diatoms (*Eucampia*, *Chaetoceros*) and dinoflagellates (*Ceratium divaricatum*, *Protoperidinium*) were observed along the San Luis Obispo coast. Dinoflagellates dominated the remainder of the southern California coast. Common species included *C. divaricatum* and *Cochlodinium* in Santa Barbara County and *Prorocentrum micans* and *Lingulodinium polyedrum* between Ventura and San Diego counties.

QUARANTINES:

On June 7 CDPH advised consumers not to eat sport-harvested mussels, clams, or whole scallops from San Luis Obispo and Santa Barbara counties due to elevated levels of the PSP toxins.

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.

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.

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	2
MENDOCINO COUNTY		U.S. Food and Drug Administration	2
SONOMA COUNTY		CDPH Marine Biotoxin Program	2
MARIN COUNTY		CDPH Volunteer (*Brent Anderson)*	2
CDPH Marine Biotoxin Program	3	Hog Island Oyster Company	9
National Park Service	1	SF State University Estuary and Science Center	1
SAN FRANCISCO COUNTY			
CDPH Volunteer (*Eugenia McNaughton)*	2	Exploratorium	1
SAN MATEO COUNTY		San Mateo County Environmental Health Dept.	4
The Marine Mammal Center	4	U.C. Santa Cruz	1
SANTA CRUZ COUNTY			
Monterey Bay National Marine Sanctuary	3	U.C. Santa Cruz	4
MONTEREY COUNTY		Marine Pollution Studies Laboratory	1
Nomad Charters	1	Pacific Grove Museum of Natural History	1
SAN LUIS OBISPO COUNTY			
CDPH Volunteers (*Dan Hoskins, Skip Rotstein)*	2	CDPH Marine Biotoxin Program	1
Friends of the Sea Otter	2	Grassy Bar Oyster Company	4
Monterey Bay National Marine Sanctuary	3	Tenera Environmental	2
SANTA BARBARA COUNTY			
Santa Barbara Channel Keeper	4	U.C. Santa Barbara	4
VENTURA COUNTY		CDPH Volunteer (*Fred Burgess)*	3
National Park Service	1	Ventura County Environmental Health Dept.	1
LOS ANGELES COUNTY		CDPH Volunteers (*Cal Parsons, Spencer Peterman)*	2
Los Angeles County Health Department	2	Los Angeles County Sanitation District	1
Los Angeles Water Keeper	5	National Park Service	1
ORANGE COUNTY		Amigos de Bolsa Chica	4
Back Bay Science Center	2	CDPH Volunteer (*Truong Nguyen)*	3
SAN DIEGO COUNTY		Carlsbad Aquafarms, Inc.	2
Scripps Institute of Oceanography	4	Tijuana River National Estuary Research	4
U.S. Navy Marine Mammal Program	3	Wildcoast	1

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

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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.

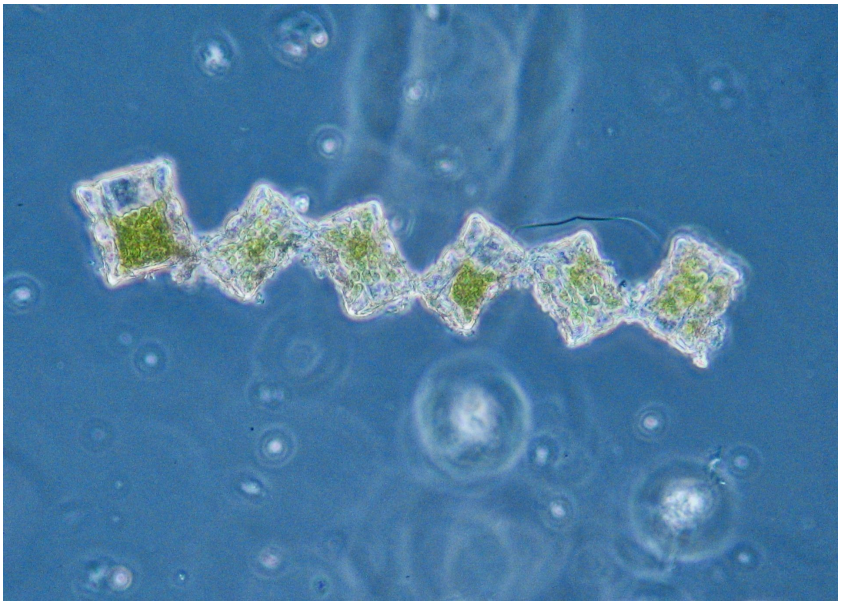
Sportharvesters should only collect shellfish from areas that are not affected by a current health advisory or quarantine. Contact the "Biotoxin Information Line" at 1-800-553-4133 for a current update on marine biotoxin activity prior to gathering and consuming shellfish.

Table 2. Program participants collecting shellfish samples.

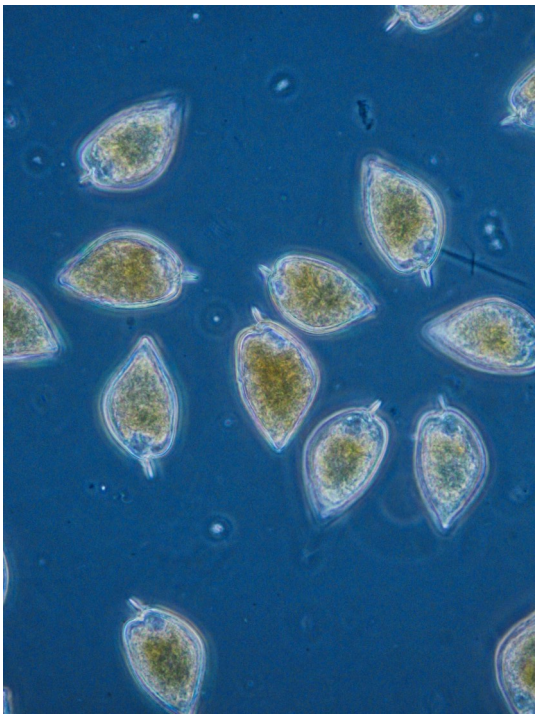
COUNTY	AGENCY	#
Del Norte	CDPH Volunteer (*Ken Graves)*	18
	Tolowa Dee-ni' Nation	1
	Yurok Tribe Environmental Program	1
Humboldt	California Department of Fish and Wildlife	10
	CDPH Volunteer (*Steve Fox)*	1
	Coast Seafood Company	8
	Humboldt County Environmental Health Department	1
Mendocino	Mendocino County Environmental Health Department	1
Sonoma	CDPH Volunteer (*John Morozumi)*	2
	CDPH Marine Biotoxin Program	3
Marin	CDPH Volunteers (*Jamie Sutton, Rand Dobleman, Gage Vogler)*	4
	CDPH Marine Biotoxin Program	2
	Cove Mussel Company	5
	Hog Island Oyster Company	6
	Marin Oyster Company	1
	Point Reyes Oyster Company	1
	San Francisco Estuary Institute	1
	Tomales Bay Oyster Company	7
San Francisco	San Francisco Estuary Institute	1
San Mateo	CDPH Volunteer (*Stuart Jackson)*	1
	San Mateo County Environmental Health Department	1
Santa Cruz	CDPH Volunteer (*Richard Buddington)*	1
	U.C. Santa Cruz	4
Monterey	Monterey Abalone Company	1
San Luis Obispo	CDPH Volunteer (*Stuart Helmintoller)*	1
	CDPH Marine Biotoxin Program	2
	California Polytechnic State University	4
	Grassy Bar Oyster Company	7
	Morro Bay Oyster Company	2
Santa Barbara	CDPH Volunteers (Mike *Hartman, John Kuizenga)*	1
	Santa Barbara Mariculture Company	4
	Santa Barbara Museum of Natural History Sea Center	1
	U.C. Santa Barbara	3
	Vandenberg Air Force Base Environmental Health Services	1
Ventura	Ventura County Environmental Health Department	1
Los Angeles	CDPH Volunteers *(Cal Parsons, Steven Field)*	2
	Los Angeles County Health Department	1
Orange	CDPH Volunteer (*Jacob Yohr)*	2
San Diego	Carlsbad Aquafarm, Inc.	4
	U.S. Navy Marine Mammal Program	1

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

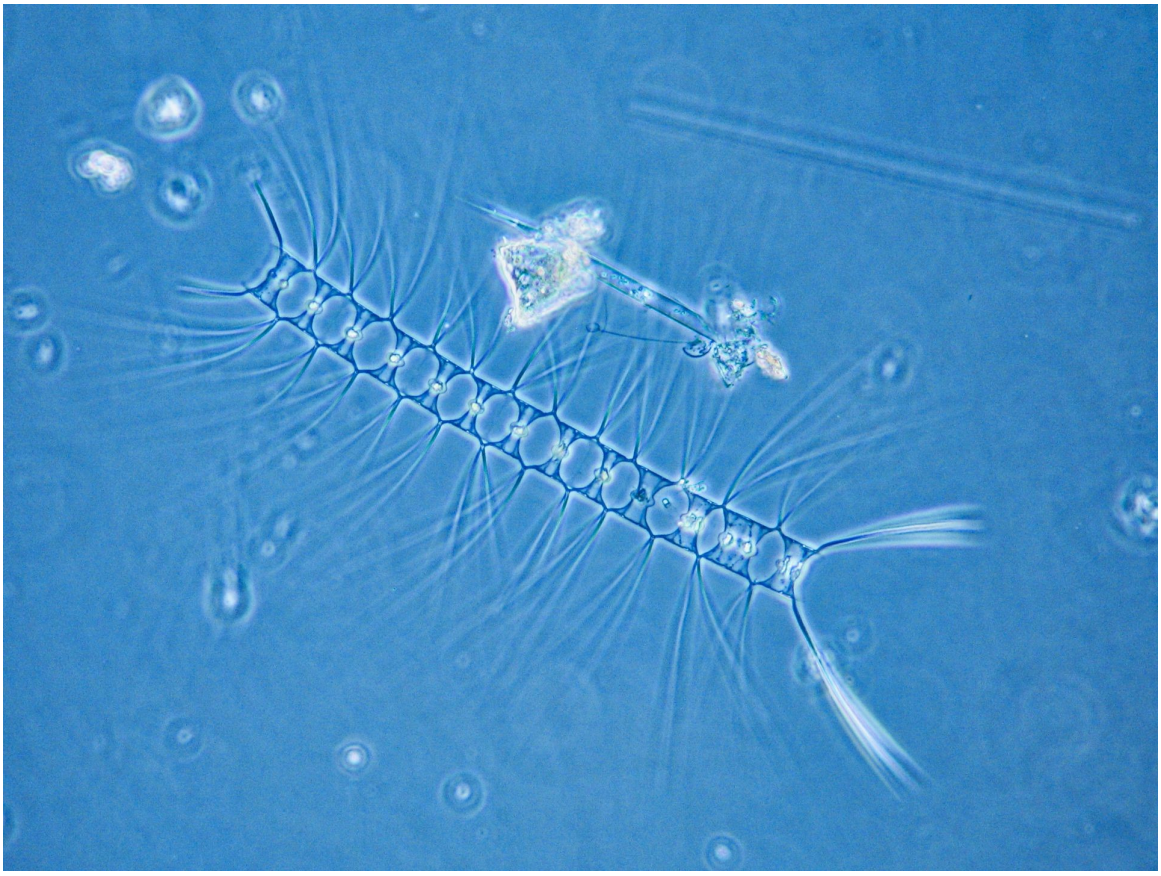
Phytoplankton Gallery



A chain of the diatom *Odontella*.



The dinoflagellate *Prorocentrum.*



A chain of the diatom *Chaetoceros*.