

M o n t h l y M a r i n e B i o t o x i n R e p o r t

August 2013

Technical Report No. 13-20

INTRODUCTION:

This report provides a summary of biotoxin activity for the month of August, 2013. Ranges of toxin concentrations 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 that was 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 are for mussel samples, unless otherwise noted; (iii) All samples are assayed for PSP toxins; DA analyses are performed as needed (i.e., 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.

Southern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was observed at two sampling locations in August (Figure 1). A small number of this dinoflagellate was observed in phytoplankton samples from Hartford Pier (August 1) and from offshore of Diablo Cove (August 2). A low concentration of PSP toxins was detected in sentinel mussels from outer

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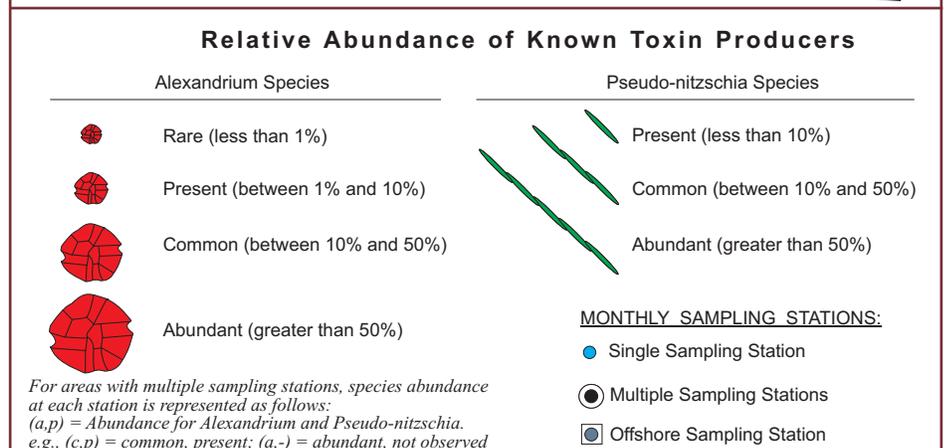
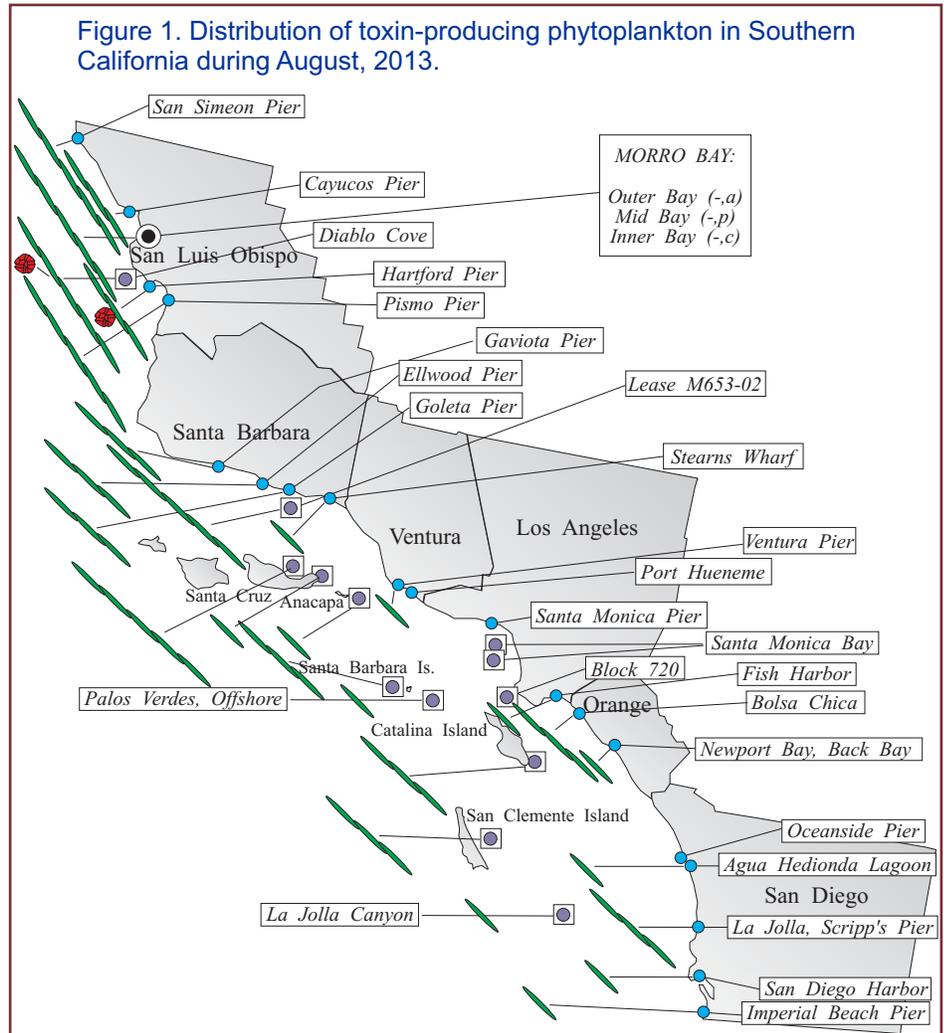
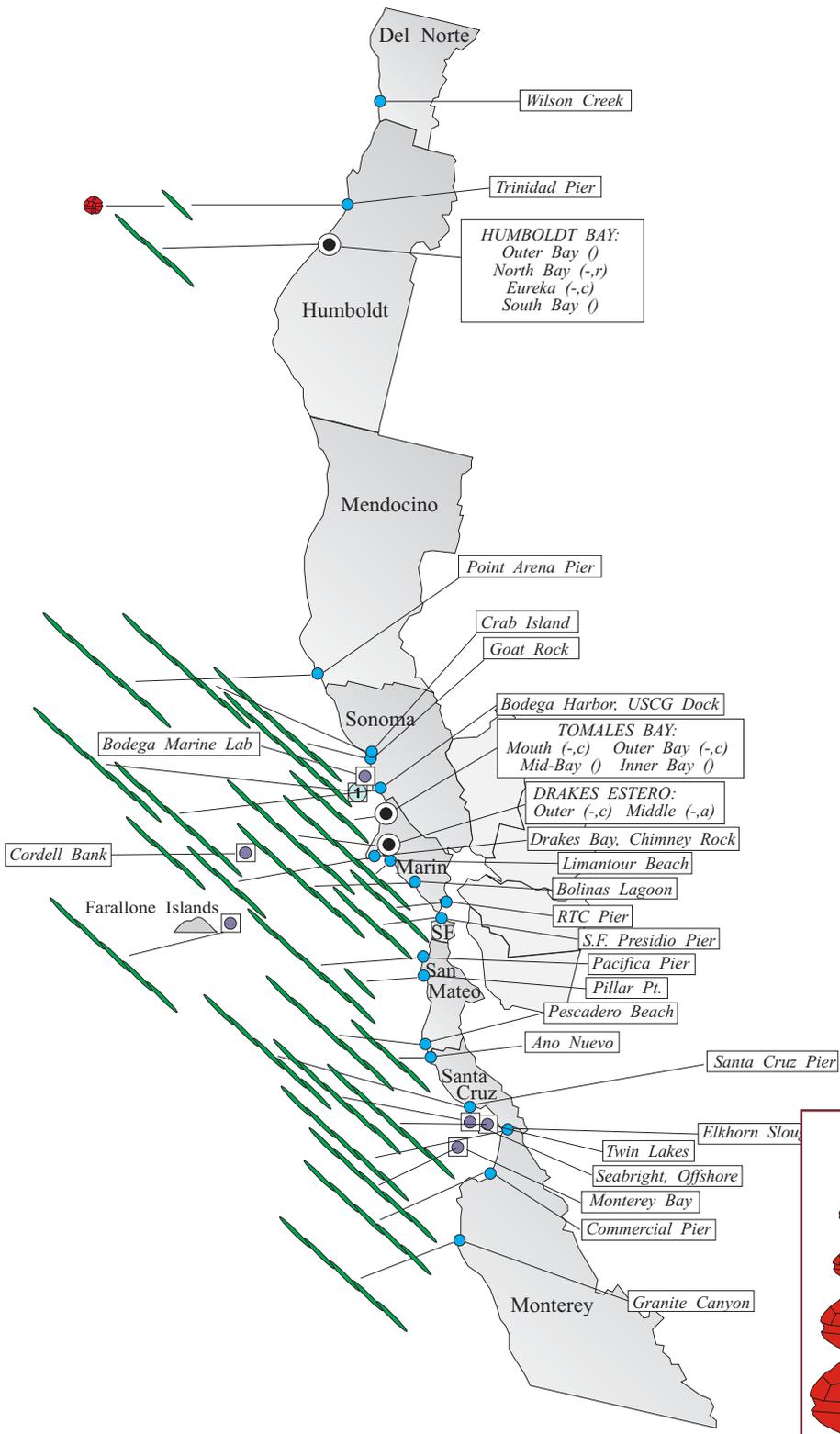


Figure 2. Distribution of toxin-producing phytoplankton in Northern California during August, 2013.



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Morro Bay on August 5 (Figure 3).

Domoic Acid

Pseudo-nitzschia was observed along the entire southern California coast (Figure 1). The relative abundance of this diatom remained abundant at sites in San Luis Obispo County and decreased at sites in Santa Barbara, Ventura, and San Diego counties. This diatom was common at several sites near the Channel Islands and also nearshore at Bolsa Chica (Orange County). The highest relative abundances of *Pseudo-nitzschia* were observed along the San Luis Obispo County coast offshore of Diablo Cove (August 29), at San Simeon Pier (August 24), and in inner Morro Bay (August 12).

Domoic acid was only detected at one location in August (Figure 3). Sentinel mussels at Gaviota Pier contained a very low level of this toxin on August 22.

Non-Toxic Species

Aside from the prevalence of *Pseudo-nitzschia* along the southern California coast, diatoms were most abundant. *Chaetoceros* was ubiquitous and locally other species, such as *Bacterisatrum*, *Rhizosolenia*, and *Guinardia*, were common to abundant. Dinoflagellates were also common along the coast, with *Ceratium furca* and *Prorocentrum micans* common at a number of locations between San Luis Obispo and San Diego. *Lingulodinium polyedrum* was abundant at

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Relative Abundance of Known Toxin Producers

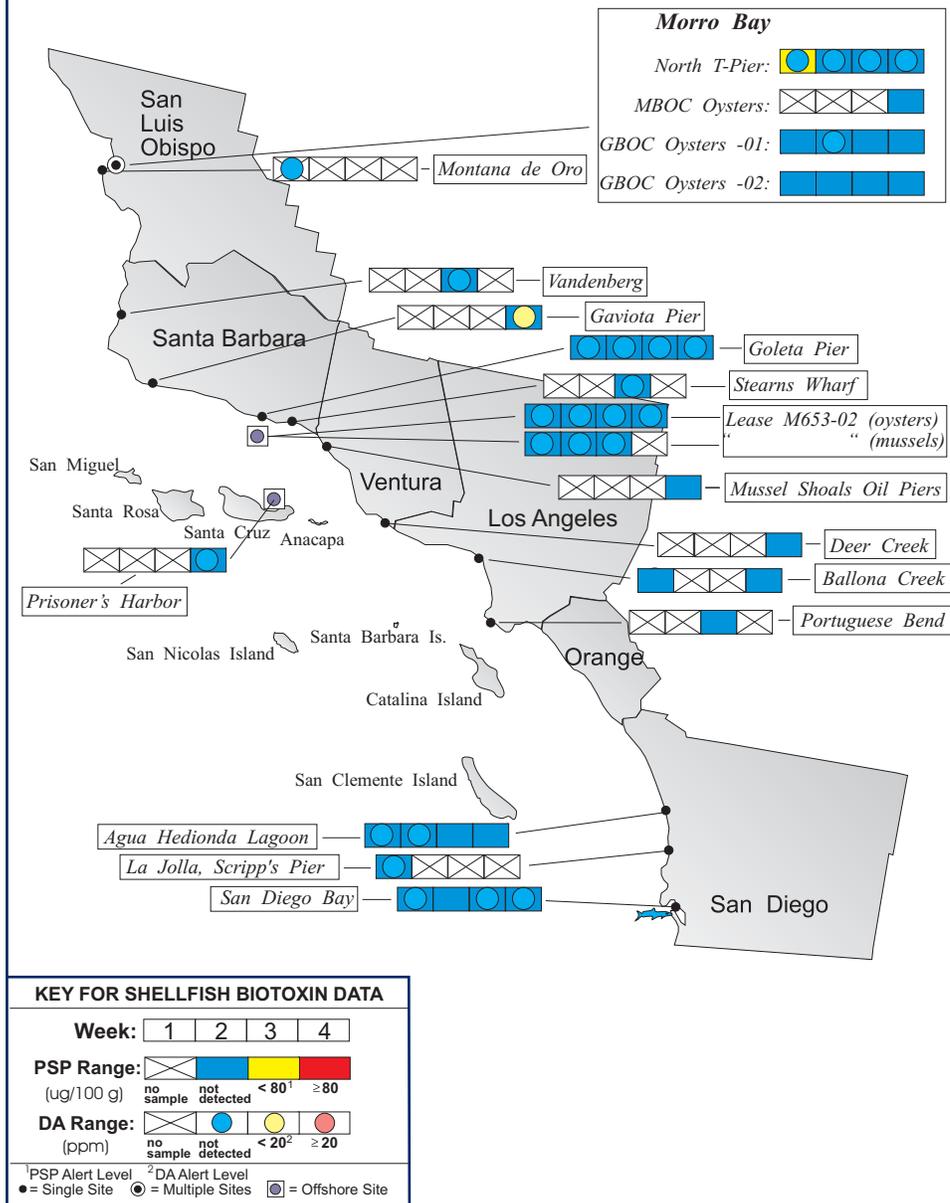
Alexandrium Species		Pseudo-nitzschia Species	
	Rare (less than 1%)		Present (between 1% and 10%)
	Present (between 1% and 10%)		Common (between 10% and 50%)
	Common (between 10% and 50%)		Abundant (greater than 50%)
	Abundant (greater than 50%)		

MONTHLY SAMPLING STATIONS:

- Single Sampling Station
- Multiple Sampling Stations
- Offshore Sampling Station

For areas with multiple sampling stations, species abundance at each station is represented as follows:
(A,P) = Abundance for *Alexandrium* and *Pseudo-nitzschia*.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Figure 3. Distribution of shellfish biotoxins in Southern California during August, 2013.



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Imperial Beach Pier throughout the month.

Northern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was detected at only one sampling location in August (Figure 2). A low number of this dinoflagellate was observed at Trinidad Pier on August 28.

The low levels of PSP toxins detected in shellfish samples from northern California in July increased above the alert level in August (Figure 4). High concentrations of the PSP toxins were detected in mussels from several locations in Del Norte and Humboldt counties, including inside Humboldt Bay. The highest concentration of these toxins was detected in a sample of scallop viscera collected just offshore of Trinidad Head (3926 ug/100 g, August 14).

Domoic Acid

Pseudo-nitzschia was observed at most sampling locations in August (Figure 2). The relative abundance of this diatom remained high at sites between Mendocino and Monterey counties, including offshore near the Farallone Islands. The highest relative abundance of *Pseudo-nitzschia* was observed at Goat Rock along the Sonoma coast (August 9, 24, and 30), at the Eureka Marina inside Humboldt Bay (August 28), and to a lesser extent at Bolinas Lagoon (August 12) and Pacifica Pier (August 27).

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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 health is threatened.

For More Information Please Call:
(510) 412-4635

For Recorded Biotoxin Information Call:
(800) 553 - 4133

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As reported the past several months, domoic acid was not detected in any shellfish samples from the regions experiencing very high densities of *Pseudo-nitzschia*.

Non-Toxic Species

There were very few common or abundant species observed in August due to the continued dominance of high numbers of *Pseudo-nitzschia* along most of the coast. Where numbers of this diatom were reduced, primarily Humboldt and Del Norte counties, other diatoms such as *Chaetoceros*, *Skeletonema*, and *Rhizosolenia* were common.



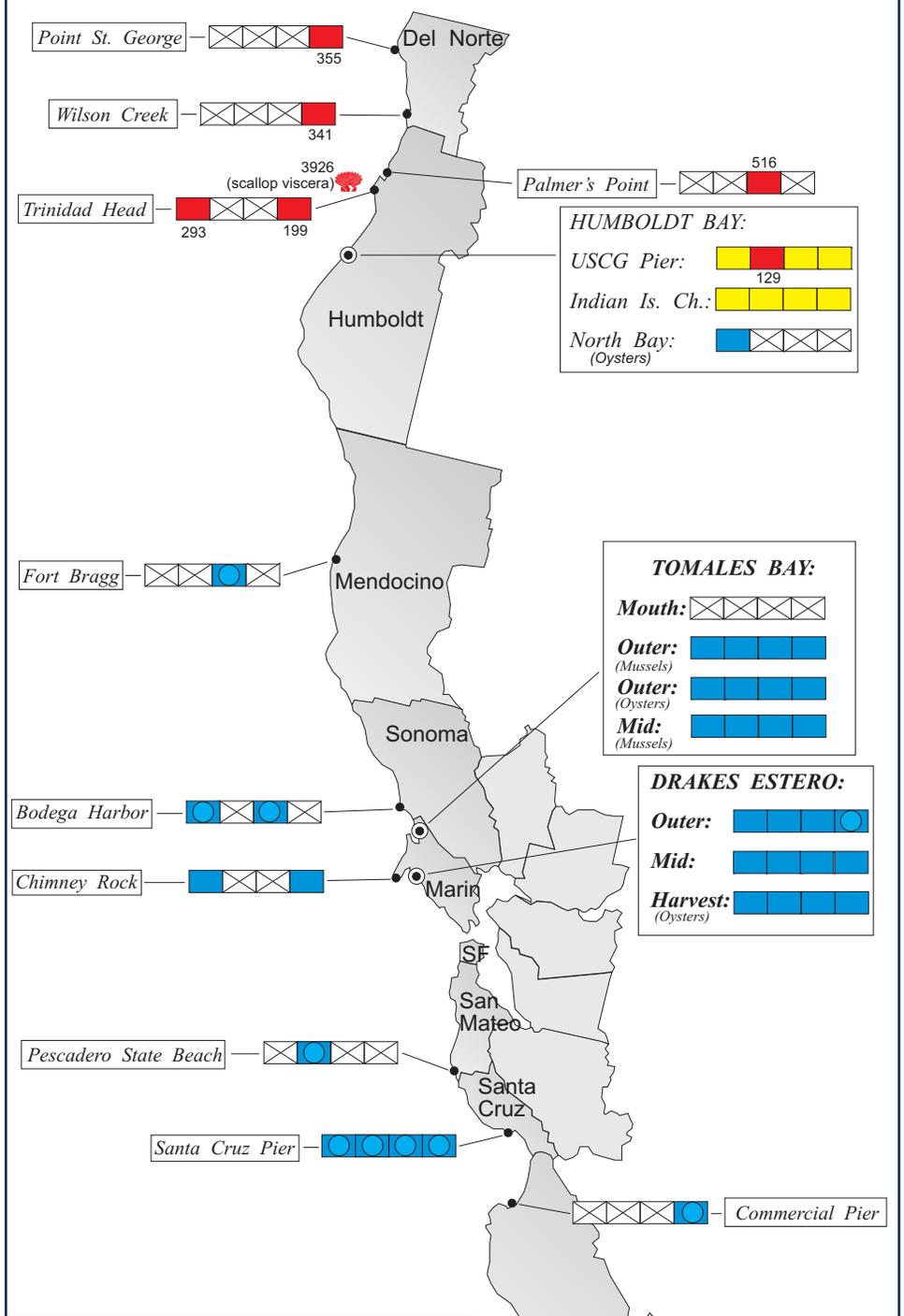
QUARANTINES: The annual mussel quarantine began early, on April 24, as a result of increasing levels of domoic acid and *Pseudo-nitzschia* abundance over a wide region.

On March 15 CDPH terminated both the November 6 health advisory for all bivalve shellfish in Del Norte County and the October 31 extension of the annual mussel quarantine for Humboldt and Del Norte counties. Both of these control measures had been taken due to dangerous levels of the PSP toxins throughout this region.

The September 14 health advisory for the northern Channel Islands remained in effect. This alert was issued due to high levels of domoic acid in samples of crab viscera, also known as 'crab butter'. The advisory warned consumers to avoid eating bivalve shellfish or the internal organs of crab, lobster, and small finfish like sardines and anchovies from the affected region.

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Figure 4. Distribution of shellfish biotoxins in Northern California during August, 2013.



KEY FOR SHELLFISH BIOTOXIN DATA

Week: 1 2 3 4

PSP Range: (ug/100 g) no sample not detected < 80¹ ≥ 80

DA Range: (ppm) no sample not detected < 20² ≥ 20

¹PSP Alert Level ²DA Alert Level
 ● = Single Site ○ = Multiple Sites ◐ = Offshore Site

Table 1. Program participants collecting phytoplankton samples during August, 2013.

AGENCY	#	AGENCY	#
DEL NORTE COUNTY		Yurok Tribe Environmental Group	1
HUMBOLDT COUNTY		Coast Seafood Company	4
		Humboldt State University Marine Lab	5
MENDOCINO COUNTY		CDPH Volunteer (<i>Marie DeSantis</i>)	4
SONOMA COUNTY		Bodega Marine Lab & Farallone Institute	8
CDPH Marine Biotoxin Program	2	Sonoma Coast Watch	6
MARIN COUNTY		Drakes Bay Oyster Company	11
CDPH Marine Biotoxin Program	4	CDPH Volunteer (<i>Brent Anderson</i>)	4
SFSU, Romberg Tiburon Center	1	Hog Island Oyster Company	1
Cordell Bank National Marine Sanctuary	1	Sonoma State University	2
SAN FRANCISCO COUNTY		CDPH Volunteer (<i>Eugenia McNaughton</i>)	2
		Oikonos	1
SAN MATEO COUNTY		The Marine Mammal Center (<i>Stan Jensen</i>)	4
San Mateo Co. Environmental Health Dept.	3	U.C. Santa Cruz	1
SANTA CRUZ COUNTY		California Department of Parks and Recreation	2
		U.C. Santa Cruz	4
MONTEREY COUNTY		Friends of the Sea Otter (<i>Janis Chaffin</i>)	3
Marine Life Studies	2	Monterey Abalone Company	2
Marine Pollution Studies Laboratory	4		
SAN LUIS OBISPO COUNTY		Friends of the Sea Otter (Kelly, Guild)	5
CDPH Volunteer (<i>Dan Hoskins</i>)	2	Grassy Bar Oyster Company	4
Morro Bay National Estuary Program	2	Coastal Discovery Center, San Simeon	1
Tenera Environmental	3	The Marine Mammal Center (<i>Webb, Lytself</i>)	4
SANTA BARBARA COUNTY		CDPH Volunteer (<i>Sylvia Short</i>)	4
HABNet/CDPH Volunteer (<i>Boyd Grant</i>)	4	Island Packers/HABNet	4
National Park Service	1	Santa Barbara Mariculture Company	3
Ty Warner Sea Life Center/HABNet	2	U.C. Santa Barbara	4
Tole Mour	1		
VENTURA COUNTY		CDPH Volunteer (<i>Fred Burgess</i>)	2
National Park Service	2	Ventura Co. Environmental Health Dept.	1
LOS ANGELES COUNTY		CDPH Volunteers (<i>Cal Parsons, Kai Xu</i>)	3
City of L.A. Environmental Monitoring Division	3	Los Angeles County Health Department	1
Los Angeles County Sanitation District	2	Voyager Excursions/HABNet	1
Tole Mour	1	Southern California Marine Institute	1
ORANGE COUNTY		Amigos de Bolsa Chica	5
California Department of Fish and Wildlife	5	Ocean Institute	1
SAN DIEGO COUNTY		Carlsbad Aquafarms, Inc.	1
CDPH Volunteer (<i>Cynthia Hall</i>)	2	Sea Camp/HABNet	1
Scripps Institute of Oceanography	4	Tijuana River National Estuary Research	4
U.S. Navy Marine Mammal Program	4		

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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 affect the human central nervous system, producing a tingling around the mouth and fingertips within a few minutes to a few hours after eating toxic shellfish. These symptoms typically are 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

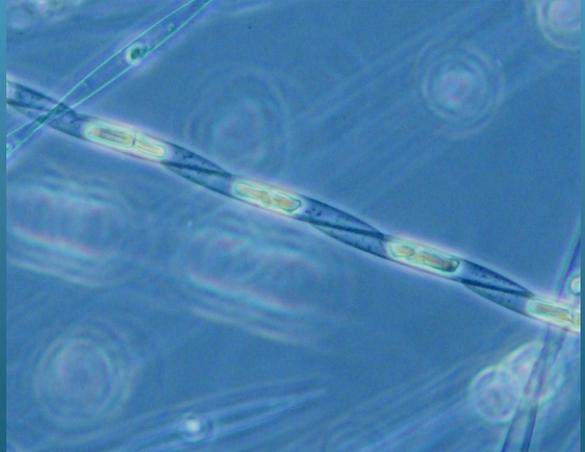
Table 2. CDPH program participants submitting shellfish samples during August, 2013.

COUNTY	AGENCY	#
Del Norte	Yurok Tribe Environmental Program	1
	Del Norte County Environmental Health Department	1
Humboldt	Coast Seafood Company	9
	Humboldt County Environmental Health Department	2
	Humboldt State University Marine Lab	2
Mendocino	Mendocino County Environmental Health Department	1
Sonoma	CDPH Marine Biotoxin Program	2
	Marin	Cove Mussel Company
Drakes Bay Oyster Company		16
Hog Island Oyster Company		5
Point Reyes Oyster Company		4
	CDPH Marine Biotoxin Program	2
San Francisco	None Submitted	
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	U.C. Santa Cruz	4
Monterey	Monterey Abalone Company	1
San Luis Obispo	Grassy Bar Oyster Co.	10
	Morro Bay Oyster Company	3
	CDPH Volunteer (<i>Ellen Lennon</i>)	1
Santa Barbara	Santa Barbara Mariculture Company	8
	HABNet/CDPH Volunteer (<i>Boyd Grant</i>)	1
	U.C. Santa Barbara	4
	Ty Warner Sea Life Center/HABNet	1
Ventura	Vandenberg AFB	1
	Ventura County Environmental Health Department	2
Los Angeles	Los Angeles County Health Department, Burke	1
	Los Angeles County Health Department, Torrance	1
Orange	None Submitted	
San Diego	Carlsbad Aquafarms, Inc.	4
	Scripps Institute of Oceanography	1
	U.S. Navy Marine Mammal Program	5

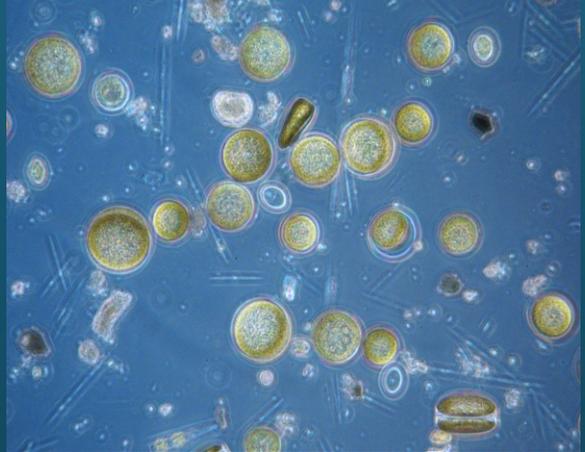
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<p>neither cooking or freezing eliminates domoic acid or the PSP toxins from the shellfish tissue. These toxins may also accumulate in the viscera of seafood species such as crab, lobster, and small finfish like sardines and anchovies, therefore these tissues should not be</p>	<p>consumed. Contact the “Biotoxin Information Line” at 1-800-553-4133 for a current update on marine biotoxin activity prior to gathering and consuming shellfish.</p> 
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PHYTOPLANKTON GALLERY



A chain of the domoic acid-producing diatom Pseudo-nitzschia, showing the characteristic pattern of overlapping cells.



Centric diatoms became common in several areas. If you look closely you will recognize several different cell orientations.



A 'chain' of the dinoflagellate Ceratium candelabrum, a species most commonly observed offshore of southern California counties.