

# 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 2011

Technical Report No. 11-20

## INTRODUCTION:

This report provides a summary of biotoxin activity for the month of August, 2011. 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 in very low numbers at several sites in August (Figure 1). PSP toxins were not detected in any shellfish samples this month (Figure 3).

#### Domoic Acid

*Pseudo-nitzschia* was observed along the entire southern California coast in August  
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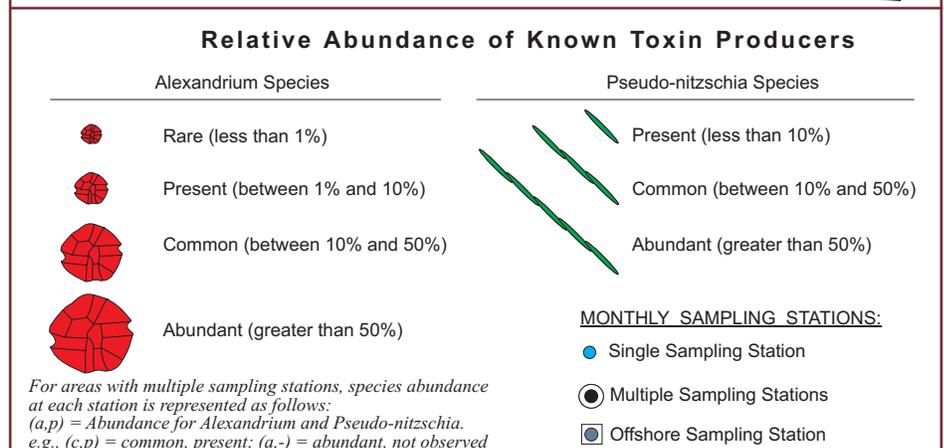
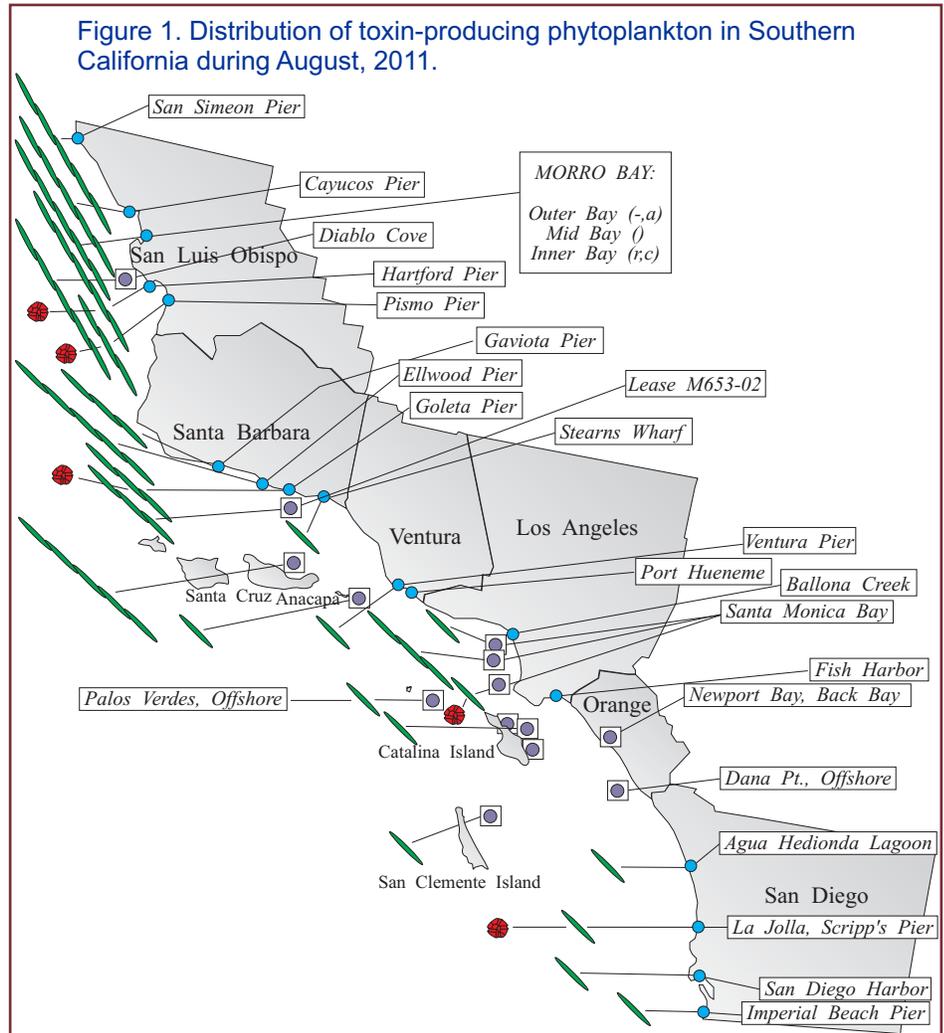
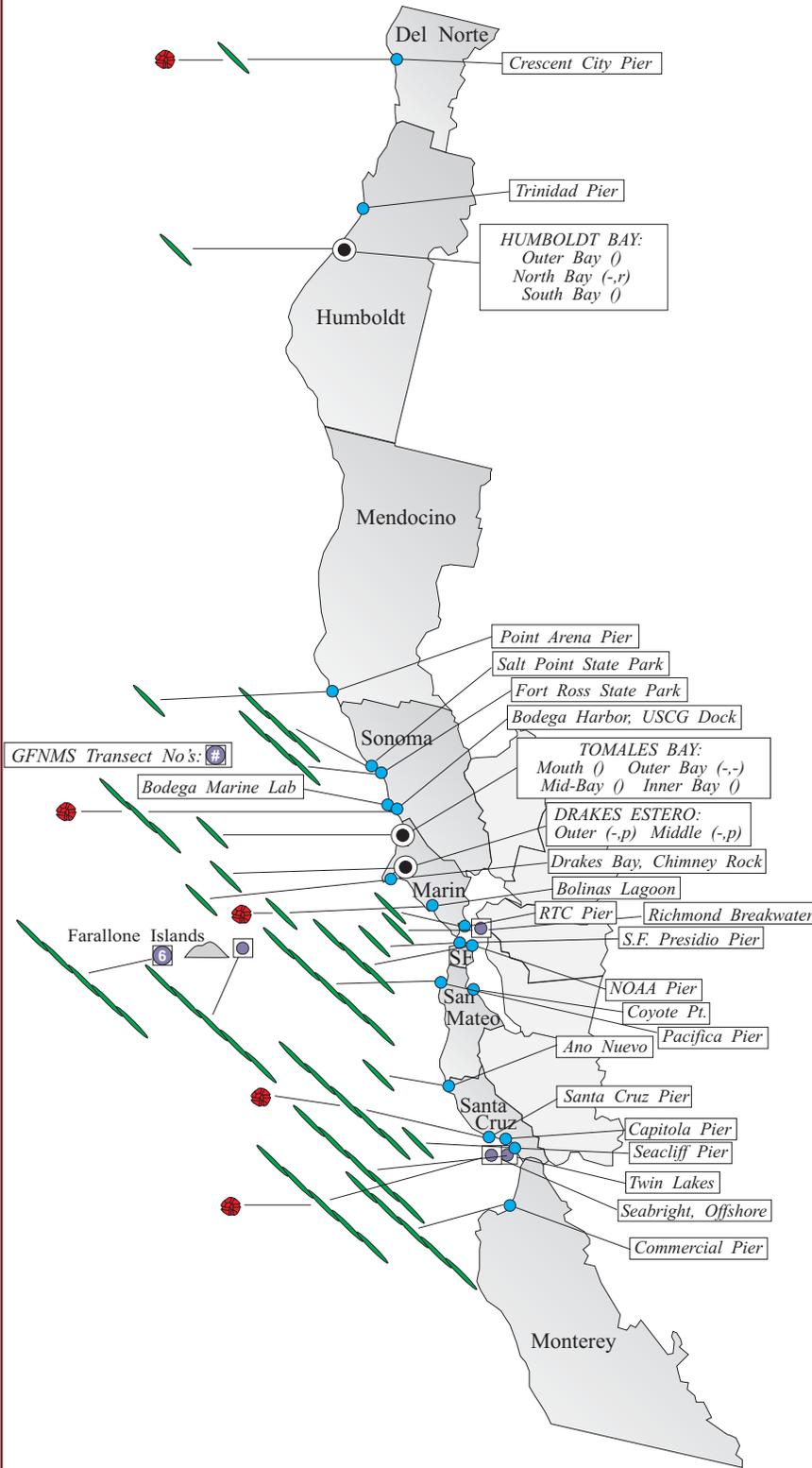


Figure 2. Distribution of toxin-producing phytoplankton in Northern California during August, 2011.



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(Figure 1). The relative abundance of *Pseudo-nitzschia* increased along the San Luis Obispo coast compared to observations in July. Highest abundances were observed at the beginning of the month, declining in some areas by the end of the month. There was an erratic pattern of increase and decrease in this diatom along the Santa Barbara coast throughout the month, with the highest relative abundances observed at the end of August. The highest relative abundances of *Pseudo-nitzschia* were observed at the Morro Bay T-Pier and offshore of Diablo Cove in San Luis Obispo County.

Domoic acid levels in shellfish mirrored the phytoplankton observations for San Luis Obispo and Santa Barbara counties. Toxin concentrations above the alert level were detected inside Morro Bay during the first two weeks of the month (Figure 3). The high levels of domoic acid detected at the aquaculture lease offshore of Santa Barbara at the end of July decreased below the detection limit by the first week of August. There was a brief increase and decline at this site over the next two weeks, increasing above the alert level again by the end of the month. Spiny lobster from Santa Cruz Island continued to exhibit high concentrations of domoic acid in the viscera, ranging between 43 and 270 ppm. Three rock crab viscera

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**Relative Abundance of Known Toxin Producers**

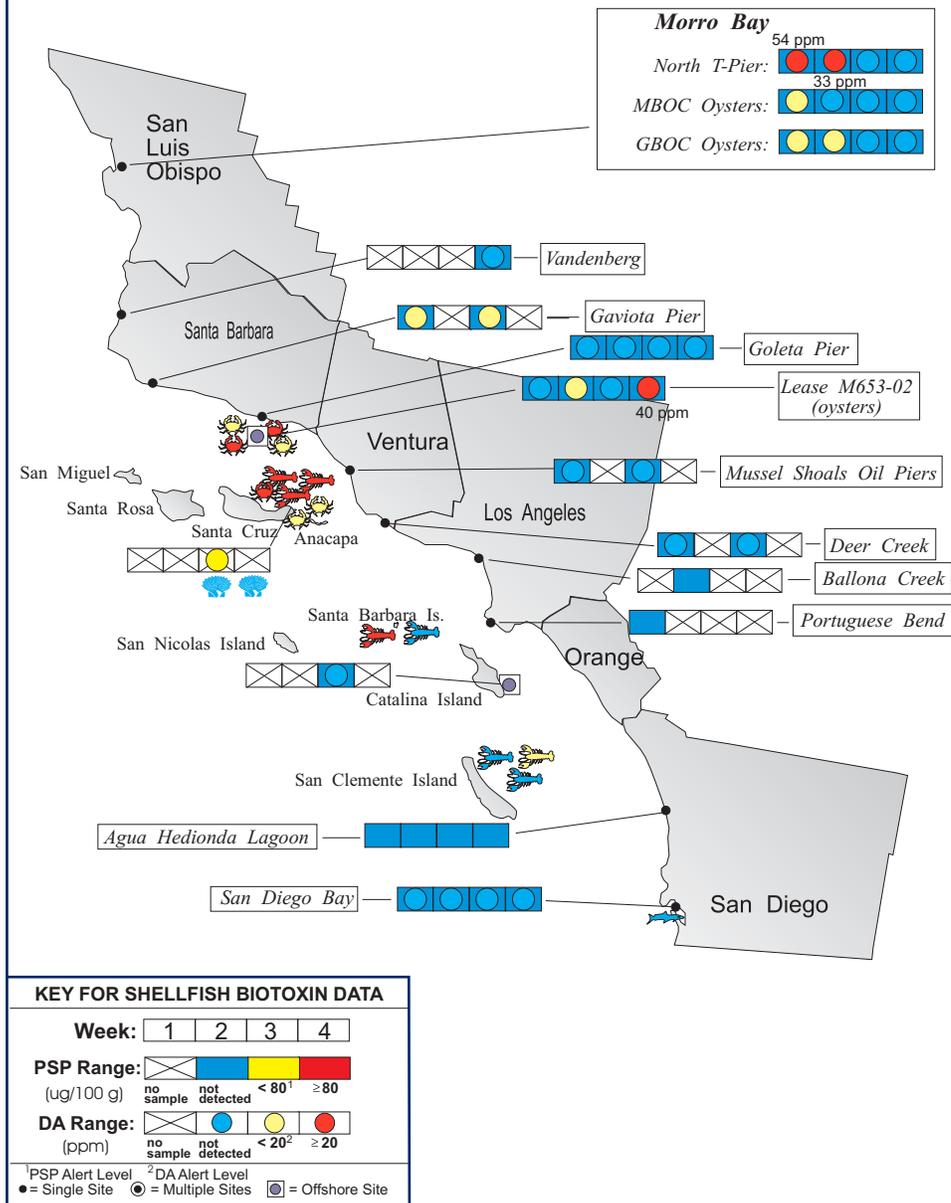
Alexandrium Species	Pseudo-nitzschia Species
Rare (less than 1%)	Present (between 1% and 10%)
Present (between 1% and 10%)	Common (between 10% and 50%)
Common (between 10% and 50%)	Abundant (greater than 50%)
Abundant (greater than 50%)	

**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, 2011.



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 samples from this region contained widely varying toxin concentrations (3, 12, and 99 ppm). Samples of rock crab viscera from nearshore Santa Barbara were also highly variable, with five of seven samples between 20 and 77 ppm of domoic acid. Samples of mussel from Santa Cruz Island contained a very low level of domoic acid and rock scallop viscera from this area did not contain measurable amounts of this toxin. Lobster viscera from farther south at Santa Barbara Island also contained a high level of domoic acid (119 ppm), while samples from San Clemente Island contained low to nondetectable levels of this toxin.

**Northern California Summary:**  
**Paralytic Shellfish Poisoning**

*Alexandrium* was observed in very low numbers from several sites during August (Figure 2). Low levels of PSP toxins were detected in shellfish samples from sites in Del Norte, Santa Cruz, and Monterey counties (Figure 4).

**Domoic Acid**

*Pseudo-nitzschia* was observed at most sites during August (Figure 2). This diatom was abundant offshore near the Farallone Islands and at sites in San Mateo, Santa Cruz, and Monterey counties.

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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

(Continued from Page 3)

Domoic acid increased from nondetectable to above the alert level in sentinel mussels from the Santa Cruz Pier between August 3 and 10 (Figure 4). A low level of this toxin was also detected in mussels from Monterey during the last week of the month.

**Red Tide Event**

The California Department of Fish and Game (DFG) and the Bodega Marine Lab (BML) reported red tides along the Sonoma coast and began investigating the beginning of a large-scale mortality event involving abalone and numerous other invertebrates. Phytoplankton samples collected by DFG, BML, and CDPH at sites between Bodega Harbor and Salt Point State Park contained an abundance of *Gonyaulax spinifera*. This dinoflagellate was also common at several coastal sites between San Mateo and Marin counties. Mussel samples collected by DFG along the Sonoma coast were analyzed by CDPH and U.S. Food and Drug (FDA) laboratories and were not found to contain detectable levels of toxins known to affect human health. No confirmed human health impacts were reported from this massive event.



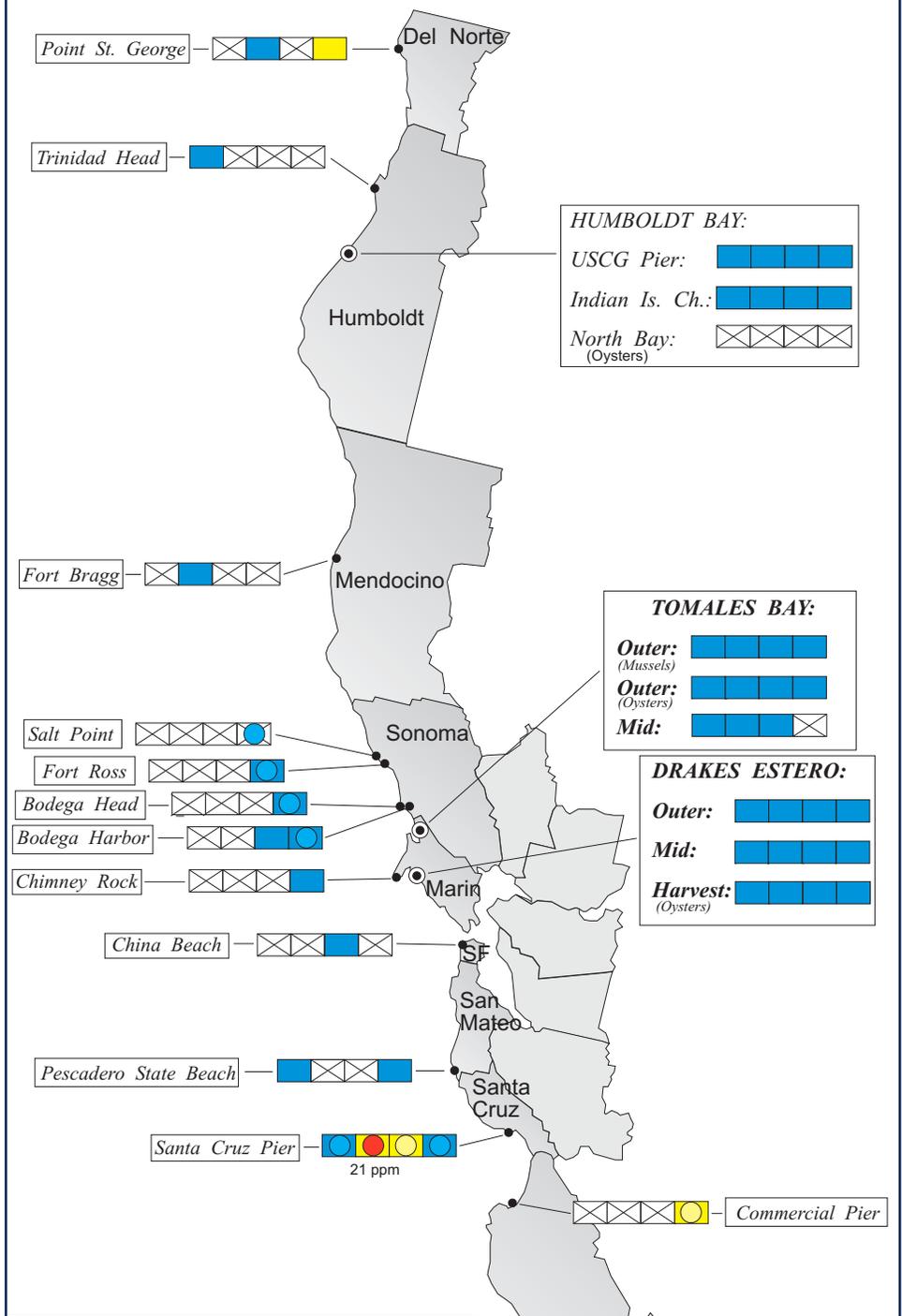
**QUARANTINES:**

The October 16 health advisory remained in effect, warning consumers not to eat sport-harvested shellfish or the internal organs of crustaceans and small finfish from the Channel Islands. Elevated levels of domoic acid continued to be detected in the viscera of lobster in this region and subsequently in rock crab viscera.

The 2011 annual mussel quarantine is in effect. This quarantine prohibits the sport-harvesting of mussels along the entire

(Continued on Page 5)

Figure 4. Distribution of shellfish biotoxins in Northern California during August, 2011.



**KEY FOR SHELLFISH BIOTOXIN DATA**

Week: 1 2 3 4

**PSP Range:** (ug/100 g) no sample not detected < 80<sup>1</sup> ≥ 80

**DA Range:** (ppm) no sample not detected < 20<sup>2</sup> ≥ 20

<sup>1</sup>PSP Alert Level <sup>2</sup>DA Alert Level  
 ● = Single Site ○ = Multiple Sites ◐ = Offshore Site

21 ppm

Table 1. California Marine Biotoxin Monitoring Program participants submitting shellfish samples during August, 2011.

COUNTY	AGENCY	#
Del Norte	Del Norte County Health Department	2
Humboldt	Coast Seafood Company	10
	Humboldt County Environmental Health Department	1
Mendocino	Mendocino County Environmental Health Department	1
Sonoma	CDPH Marine Biotoxin Program	2
	California Department of Fish and Game	3
Marin	Cove Mussel Company	3
	Drakes Bay Oyster Company	20
	Hog Island Oyster Company	4
	Marin Oyster Company	5
	CDPH Marine Biotoxin Program	1
San Francisco	San Francisco Health Department	1
San Mateo	San Mateo County Environmental Health Department	2
Santa Cruz	U.C. Santa Cruz	5
Monterey	None Submitted	
San Luis Obispo	Grassy Bar Oyster Co.	16
	Morro Bay Oyster Company	8
Santa Barbara	Santa Barbara Mariculture Company	10
	U.C. Santa Barbara	7
	Wild Planet Foods	3
	California Department of Fish and Game	16
	Vandenberg AFB	1
Ventura	Ventura County Environmental Health Department	4
Los Angeles	Los Angeles County Health Department	2
	CDPH Volunteer ( <i>Cal Parsons</i> )	1
	California Department of Fish and Game	3
Orange	None Submitted	
San Diego	Carlsbad Aquafarms, Inc.	5
	U.S. Navy Marine Mammal Program	4

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 neither cooking or freezing eliminates domoic acid or the PSP toxins from the shellfish tissue. These toxins may also accumulate in the viscera of other seafood species such as crab, lobster, and small finfish like sardines and anchovies, therefore these tissues should not be 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.

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California coastline, including all bays and estuaries. The annual quarantine does not apply to the certified commercial shellfish growing areas in California, which are monitored intensively throughout the year. In addition, routine coastal phytoplankton and biotoxin monitoring is maintained throughout the quarantine period. Special quarantines or health advisories may be issued for

additional seafood species as warranted by increasing toxin levels.  
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

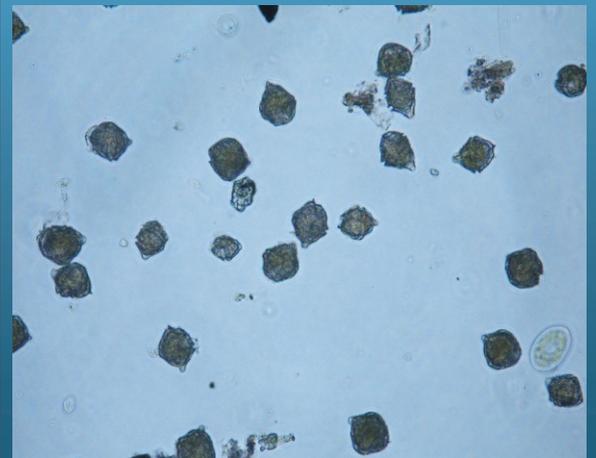


Table 2. Agencies, organizations and volunteers participating in marine phytoplankton sample collection during August, 2011.

COUNTY	AGENCY	#
Del Norte	Del Norte County Health Department	2
Humboldt	Coast Seafood Company	5
	CDPH Volunteer ( <i>Dustin</i> )	1
Mendocino	CDPH Volunteer ( <i>Marie de Santis</i> )	3
Sonoma	CDPH Marine Biotxin Program	2
	California Department of Fish and Game	4
	CDPH Volunteer ( <i>Cathleen Cannon</i> )	1
Marin	Drakes Bay Oyster Company	13
	CDPH Volunteer ( <i>Brent Anderson</i> )	5
	CDPH Marine Biotxin Program	2
	SFSU, Romberg Tiburon Center	3
	Hog Island Oyster Company	2
Contra Costa	CDPH Marine Biotxin Program	1
Alameda	None Submitted	
San Francisco	CDPH Volunteer ( <i>Eugenia McNaughton</i> )	1
	Exploratorium	3
	San Francisco Bay Whale Watching Company	2
San Mateo	San Mateo County Environmental Health Department	2
	Friends of the Sea Otter ( <i>Diane Larsen</i> )	2
	The Marine Mammal Center ( <i>Stan Jensen</i> )	4
	San Mateo County Environmental Health Department	2
	U.C. Santa Cruz	2
Santa Cruz	California Department of Parks and Recreation	3
	U.C. Santa Cruz	5
Monterey	Monterey Abalone Company	4
	CDPH Volunteer ( <i>Jerry Norton</i> )	1
San Luis Obispo	Friends of the Sea Otter ( <i>Kelly Cherry</i> )	5
	Grassy Bar Oyster Company	5
	Morro Bay National Estuary Program	1
	Monterey Bay National Marine Sanctuary	2
	Tenera Environmental	3
	The Marine Mammal Center ( <i>P.J. Webb, Tim Lytsell</i> )	5
	CDPH Marine Biotxin Program	1

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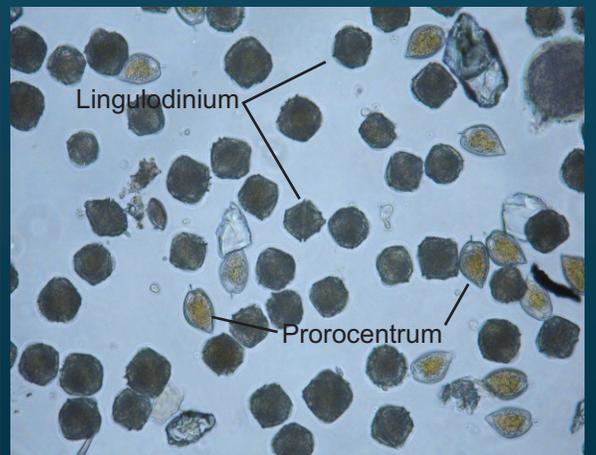
## PHYTOPLANKTON GALLERY



The dinoflagellate *Gonyaulax spinifera*, responsible for massive red tides along the Sonoma coast.



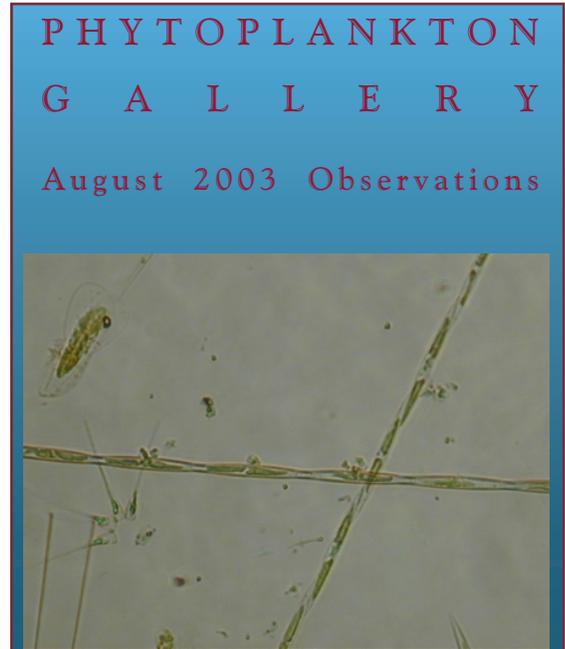
*Alexandrium*, the PSP toxin producing dinoflagellate, was formerly in the genus *Gonyaulax*.



*Lingulodinium* increased in density at southern California sites. This dinoflagellate was also formerly in the genus *Gonyaulax*.

## A Look Back: PSP and Domoic Acid during August 2003

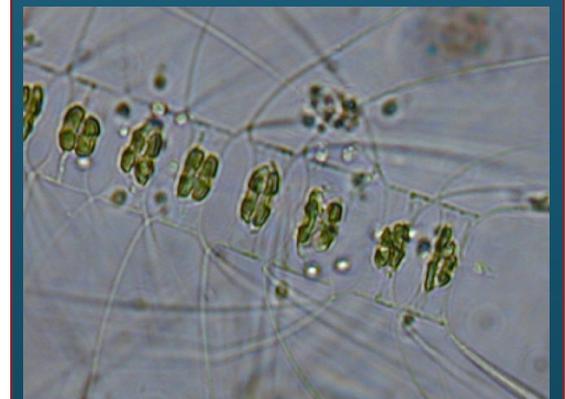
Northern California Summary: <i>Paralytic Shellfish Poisoning</i>	Southern California Summary: <i>Domoic Acid</i>
<p>Low relative abundances of <i>Alexandrium</i> were detected at several locations between Del Norte and Monterey counties in August 2003.</p> <p>Low concentrations of PSP toxins were detected in sentinel mussels from Humboldt Bay, Trinidad, Fort Bragg, at several Marin County sites, and at the Santa Cruz Pier. By the last week in August the toxin concentrations increased above the federal alert level near Trinidad (81 ug/100 g on August 27, 2003) and Fort Bragg (120 ug on August 28, 2003).</p>	<p>High relative abundances of <i>Pseudo-nitzschia</i> continued to be observed along the San Luis Obispo coast at sites inside Morro Bay and offshore of Diablo Cove. The elevated numbers of <i>Pseudo-nitzschia</i> observed in July at several locations near the Channel Islands appeared to dissipate by August 2003. There was also a notable increase of this diatom at Gaviota Pier (Santa Barbara County).</p>



*Pseudo-nitzschia* was abundant at several locations along the California coast during August 2003.

Table 2 continued (from Page 6).

COUNTY	AGENCY	#
Santa Barbara	CDPH Volunteer ( <i>Sylvia Short</i> )	5
	National Park Service	1
	Santa Barbara Mariculture Company	5
	Sea Grant Extension Volunteer ( <i>Jonathan Gonzales</i> )	2
	U.C. Santa Barbara	5
	CDPH Marine Biotxin Program	1
Ventura	CDPH Volunteer ( <i>Fred Burgess</i> )	4
	Ventura County Environmental Health Department	1
	National Park Service	1
Los Angeles	Los Angeles County Sanitation District	4
	City of Los Angeles Environmental Monitoring Division	3
	CDPH Volunteer ( <i>Cal Parsons</i> )	1
	Southern California Marine Institute	1
	Tole Mour	2
	Orange	California Department of Fish and Game
	Ocean Institute	1
San Diego	Carlsbad Aquafarms, Inc.	4
	Scripps Institute of Oceanography	5
	Tijuana River National Estuary Research Reserve	2
	U.S. Navy Marine Mammal Program	4



The diatom *Chaetoceros* remained common along the Northern California coast.



Dinoflagellates gradually replaced diatoms along most of the Southern California coast by August, with *Ceratium* one of several common genera present.