

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

July 2011

Technical Report No. 11-19

INTRODUCTION:

This report provides a summary of biotoxin activity for the month of July, 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 three sites in July, including offshore of the Palos Verdes peninsula on July 20 (Figure 1). A low level of the PSP toxins was detected in mussels collected on July 20 from

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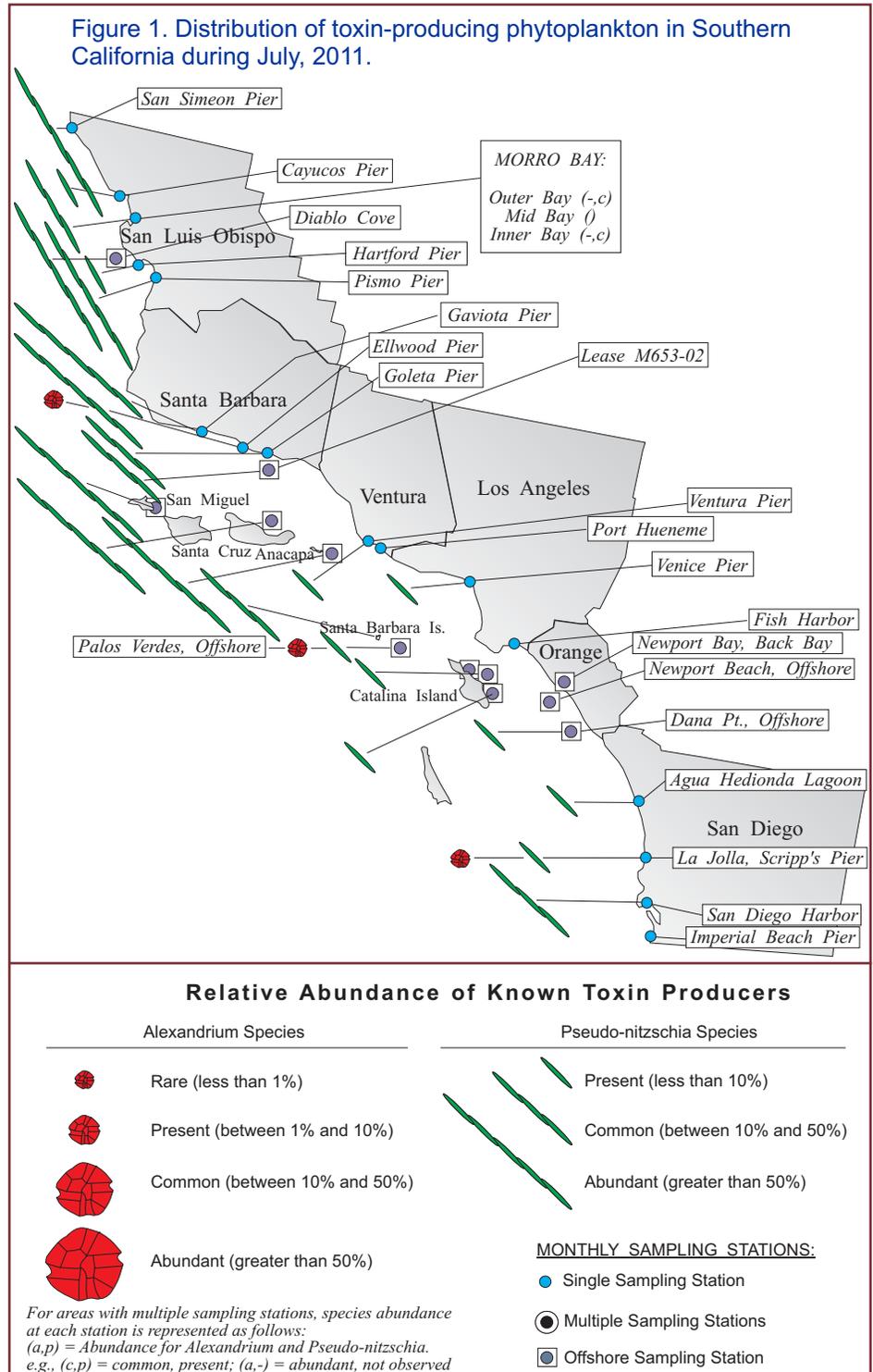
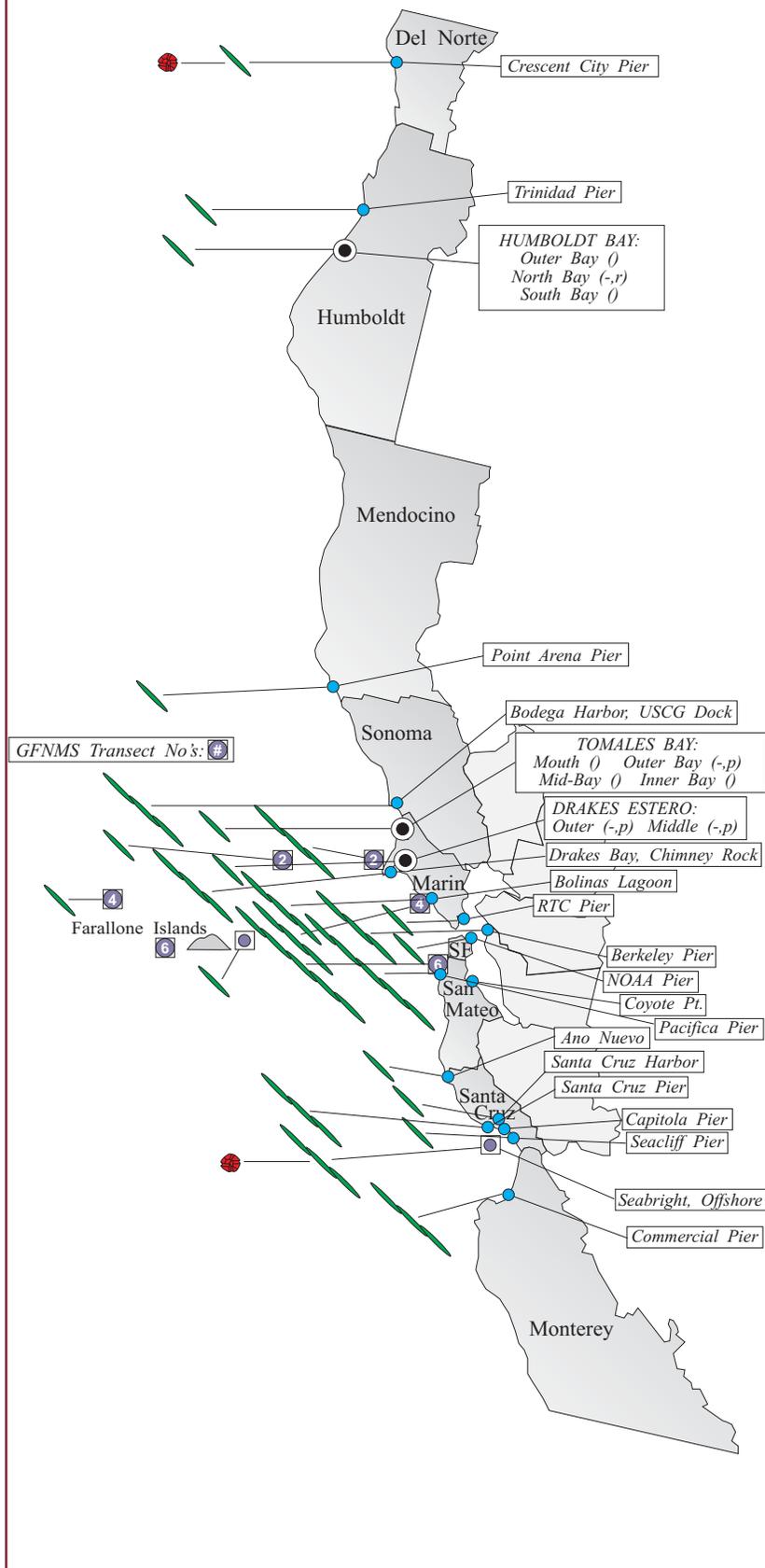


Figure 2. Distribution of toxin-producing phytoplankton in Northern California during July, 2011.



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Portuguese Bend in the Palos Verdes region (Figure 3).

Domoic Acid

Pseudo-nitzschia was observed along the entire southern California coast in July. The relative abundance of *Pseudo-nitzschia* increased along the San Luis Obispo coast throughout the month and was abundant at most of these sites by the end of July (Figure 1). For example, in samples from the San Simeon Pier this diatom was observed to increase from one percent to 33 percent of all species present between July 1 and July 15, then to 70 percent by July 30. *Pseudo-nitzschia* remained abundant at Gaviota Pier (July 21, 85 percent) and Elwood Pier (July 19, 55 percent) in Santa Barbara County but declined at sites along the Ventura coast compared to observations in June. This diatom remained abundant in offshore samples from the Channel Islands. The highest relative abundance of *Pseudo-nitzschia* was observed offshore of Diablo Cove in San Luis Obispo County.

The high levels of domoic acid detected during June at the aquaculture lease offshore of Santa Barbara decreased below the detection limit by the first week of July. This decline was temporary, as the toxin level increased during the second week and exceeded the alert level the last two weeks of

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Relative Abundance of Known Toxin Producers

Alexandrium Species

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

Pseudo-nitzschia Species

- Present (between 1% and 10%)
- Common (between 10% and 50%)
- Abundant (greater than 50%)

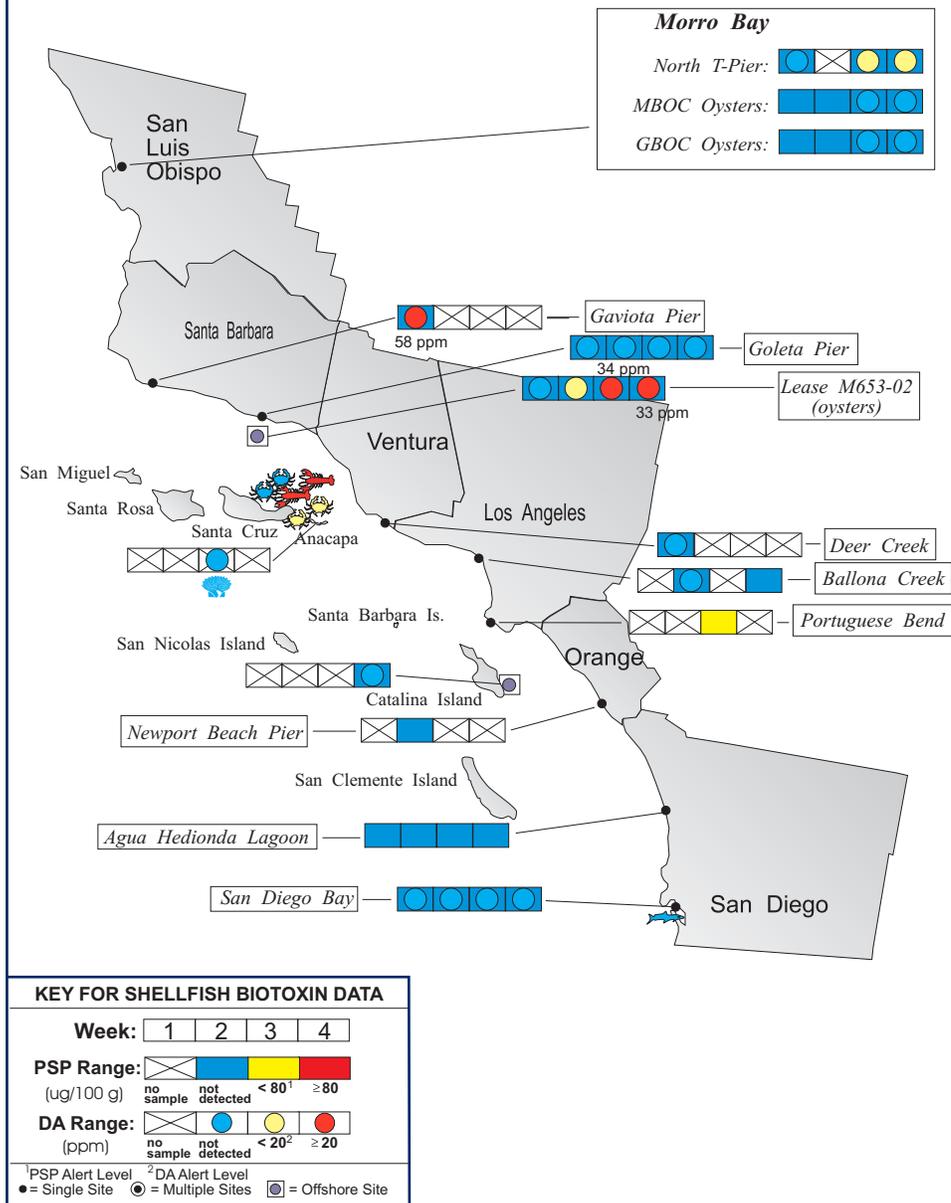
MONTHLY SAMPLING STATIONS:

- 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 July, 2011.



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July (Figure 3). Spiny lobster from Santa Cruz Island continued to exhibit high concentrations of domoic acid in the viscera, with two of four samples exceeding 400 ppm. Rock crab samples from northeast of Santa Cruz Island contained low (< 10 ppm) to nondetectable levels of this toxin. Samples of mussel and rock scallop viscera from Anacapa Island did not contain domoic acid. As *Pseudo-nitzschia* increased along the San Luis Obispo coast, domoic acid was detected in sentinel mussels in outer Morro Bay during the latter half of the month.

Non-toxic Species

Diatoms continued to dominate much of the southern California coast. *Chaetoceros* was common to abundant throughout this region. Dinoflagellates were also common between Santa Barbara and San Diego, including several species of *Ceratium*, as well as *Prorocentrum* and *Lingulodinium*.

Northern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was observed in very low numbers from two sites during July (Figure 2). PSP toxins were not detected in any shellfish samples (Figure 4).

Domoic Acid

Pseudo-nitzschia was observed at several

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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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sites along the northern California coast (Figure 2). There was a noticeable increase in this diatom between Marin and San Mateo counties. Domoic acid was not detected in any samples analyzed in July.

Non-toxic Species

Diatoms remained dominant along the northern California coast, with *Chaetoceros* and *Skeletonema* common to abundant. The dinoflagellate *Gonyaulax spinifera* was common at Pacifica Pier (July 18) and Bolinas Lagoon (July 29), while *Protoperidinium* was common in Santa Cruz Harbor (July 30).



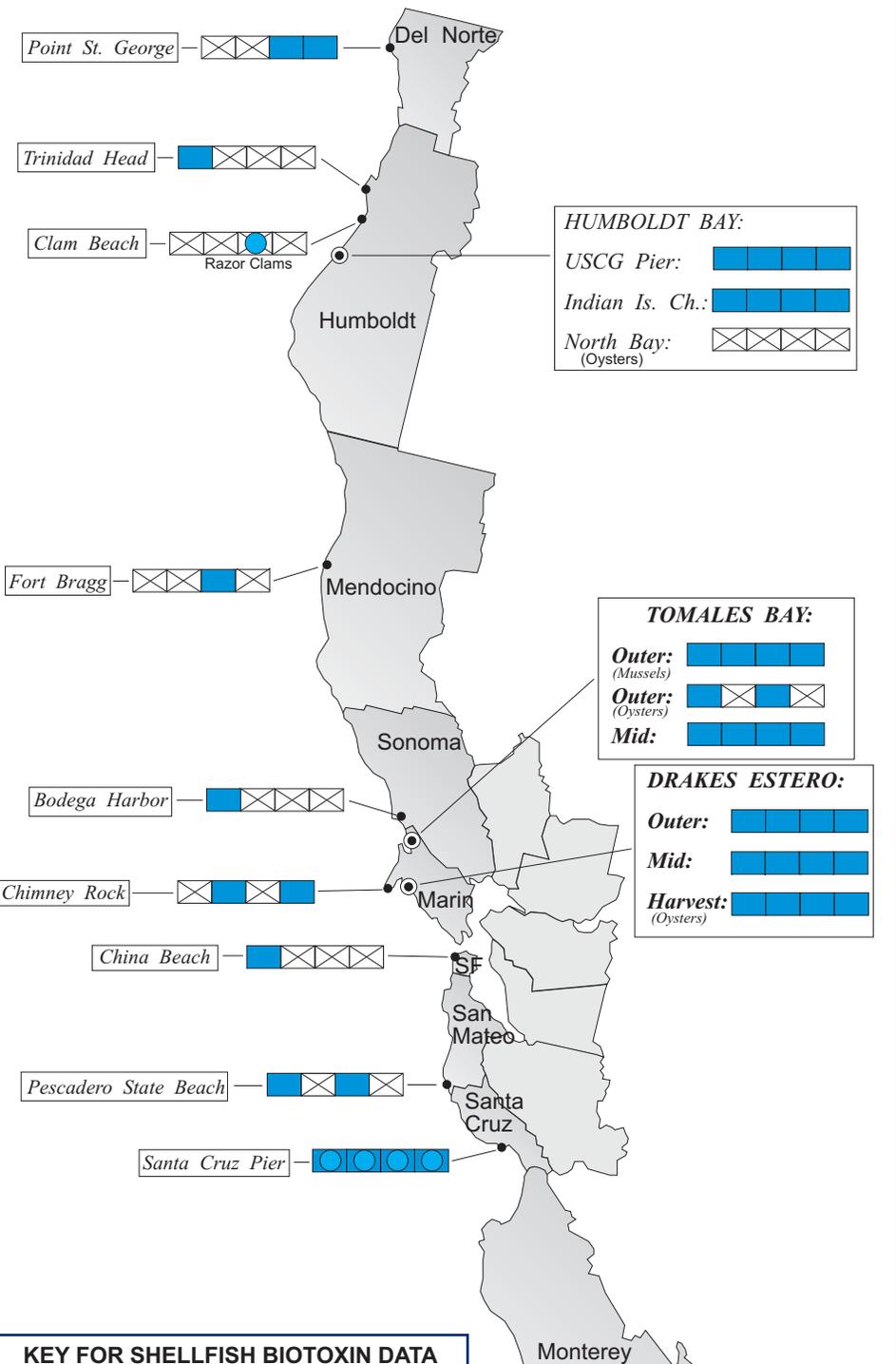
QUARANTINES:

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. The annual quarantine began early (March 29) this year due to significant, increasing levels of the PSP toxins and domoic acid. This quarantine prohibits the sport-harvesting of mussels along the entire 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. All certified shellfish growers are required to submit at least weekly samples of shellfish for toxin monitoring. Harvest restrictions or closures are implemented as needed to protect the public's health. In addition, routine coastal phytoplankton

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



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. California Marine Biotoxin Monitoring Program participants submitting shellfish samples during July, 2011.

COUNTY	AGENCY	#
Del Norte	Del Norte County Health Department	2
Humboldt	Coast Seafood Company	8
	Humboldt County Environmental Health Department	1
	Humboldt State University	1
Mendocino	Mendocino County Environmental Health Department	1
Sonoma	CDPH Marine Biotoxin Program	1
Marin	Cove Mussel Company	4
	Drakes Bay Oyster Company	16
	Hog Island Oyster Company	5
	Marin Oyster Company	2
	CDPH Marine Biotoxin Program	2
San Francisco	San Francisco Health Department	1
San Mateo	San Mateo County Environmental Health Department	2
Santa Cruz	U.C. Santa Cruz	4
Monterey	None Submitted	
San Luis Obispo	Grassy Bar Oyster Co.	6
	Morro Bay Oyster Company	5
Santa Barbara	Santa Barbara Mariculture Company	10
	U.C. Santa Barbara	4
	Wild Planet Foods	9
	California Department of Fish and Game	4
	Sea Grant Extension Volunteer (<i>Jonathan Gonzales</i>)	1
Ventura	Ventura County Environmental Health Department	1
	California Department of Fish and Game	2
Los Angeles	Los Angeles County Health Department	3
	CDPH Volunteer (<i>Cal Parsons</i>)	1
Orange	Orange County Health Care Agency	1
San Diego	Carlsbad Aquafarms, Inc.	4
	U.S. Navy Marine Mammal Program	7

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 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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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

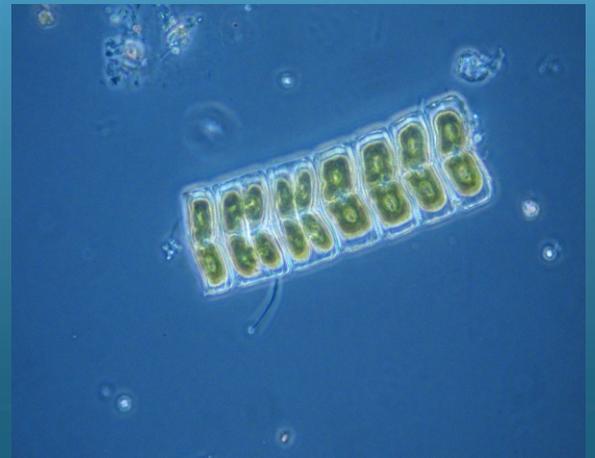
known as butter clams (*Saxidomus nuttalli*), are cautioned to eat only the white meat. Washington clams can concentrate the PSP toxins in the viscera and in the dark parts of the siphon and can remain toxic for a long period of time. Persons taking scallops or clams, with the

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

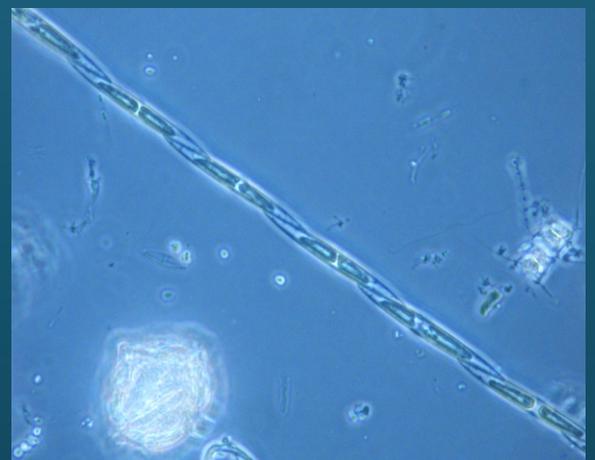
COUNTY	AGENCY	#
Del Norte	Del Norte County Health Department	3
Humboldt	Coast Seafood Company	4
	CDPH Volunteer (<i>Dustin</i>)	1
Mendocino	CDPH Volunteer (<i>Marie de Santis</i>)	2
Sonoma	CDPH Marine Biotoxin Program	1
	CDPH Volunteer (<i>Cathleen Cannon</i>)	1
Marin	Drakes Bay Oyster Company	12
	CDPH Volunteer (<i>Brent Anderson</i>)	3
	CDPH Marine Biotoxin Program	2
	SFSU, Romberg Tiburon Center	4
	Gulf of the Farallones National Marine Sanctuary	4
	Hog Island Oyster Company	1
Contra Costa	None Submitted	
Alameda	CDPH Volunteer (<i>Ariel Durant</i>)	2
San Francisco	Exploratorium	4
	Gulf of the Farallones National Marine Sanctuary	4
	San Francisco Bay Whale Watching Company	1
San Mateo	San Mateo County Environmental Health Department	2
	The Marine Mammal Center (<i>Stan Jensen</i>)	4
	U.C. Santa Cruz	2
Santa Cruz	California Department of Parks and Recreation	2
	Santa Cruz County Environmental Health Department	3
	San Lorenzo Valley High School	1
	U.C. Santa Cruz	4
	The Marine Mammal Center (<i>Nancy Scarborough</i>)	1
Monterey	Monterey Abalone Company	3
San Luis Obispo	Friends of the Sea Otter (<i>Kelly Cherry</i>)	4
	Grassy Bar Oyster Company	4
	Morro Bay National Estuary Program	1
	Monterey Bay National Marine Sanctuary	3
	Tenera Environmental	2
	The Marine Mammal Center (<i>P.J. Webb, Tim Lytsell</i>)	5

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PHYTOPLANKTON GALLERY



This chained diatom (Achnanthes c.f.) is occasionally observed in our samples, always in very low numbers.



Pseudo-nitzschia, responsible for domoic acid, remained common to abundant at a number of locations.



Ceratium species

Although diatoms continued to dominate much of the coast, some dinoflagellates like Ceratium were commonly observed.

A Look Back: PSP and Domoic Acid during July 2004

<p>Northern California Summary: <i>Paralytic Shellfish Poisoning</i></p> <p><i>Alexandrium</i> distribution increased along most of the Northern California coastline in July 2004. Mussels from the sentinel buoy in Drakes Estero contained 1602 ug/100 g of PSP toxins. Sentinel mussels from Santa Cruz Pier increased to 770 ug by July 28, 2004.</p> <p>Domoic Acid</p> <p>A <i>Pseudo-nitzschia</i> bloom occurred in Del Norte reaching 90% relative abundance. Domoic acid in cleaned (eviscerated) razor clams reached 54 ppm.</p>	<p>Southern California Summary: <i>Paralytic Shellfish Poisoning</i></p> <p><i>Alexandrium</i> was observed along the entire Southern California coast during July 2004, including offshore near Catalina Island. The distribution of this dinoflagellate increased significantly at sites in San Luis Obispo County, where it was observed throughout the month.</p> <p>Coinciding with the increase in <i>Alexandrium</i> at San Luis Obispo sites, the concentration of PSP toxins increased at several locations in this region. PSP toxicity increased in mussel samples from Morro Bay from 43 ug/100 g on July 5 to 203 ug on July 11, 2004.</p>
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Table 2 continued (from Page 6).

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

PHYTOPLANKTON GALLERY

July 2004 Observations

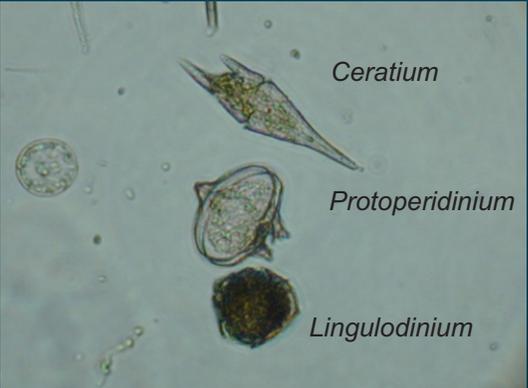


Skeletonema
Pseudo-nitzschia

Diatoms dominated the north coast, with Pseudo-nitzschia and Skeletonema the most abundant during June.



The chain-forming diatom Thalassiosira was abundant along the San Luis Obispo coast.



Ceratium
Protoperidinium
Lingulodinium

Dinoflagellates dominated the coast south of Point Conception.