

# 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

May 2013

Technical Report No. 13-15

## INTRODUCTION:

This report provides a summary of biotoxin activity for the month of May, 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 only observed at one sampling location in May (Figure 1). PSP toxins were not detected in any shellfish samples collected during the month (Figure 3).

#### Domoic Acid

*Pseudo-nitzschia* was observed along the entire southern California coast (Figure 1).

(Continued on Page 2)

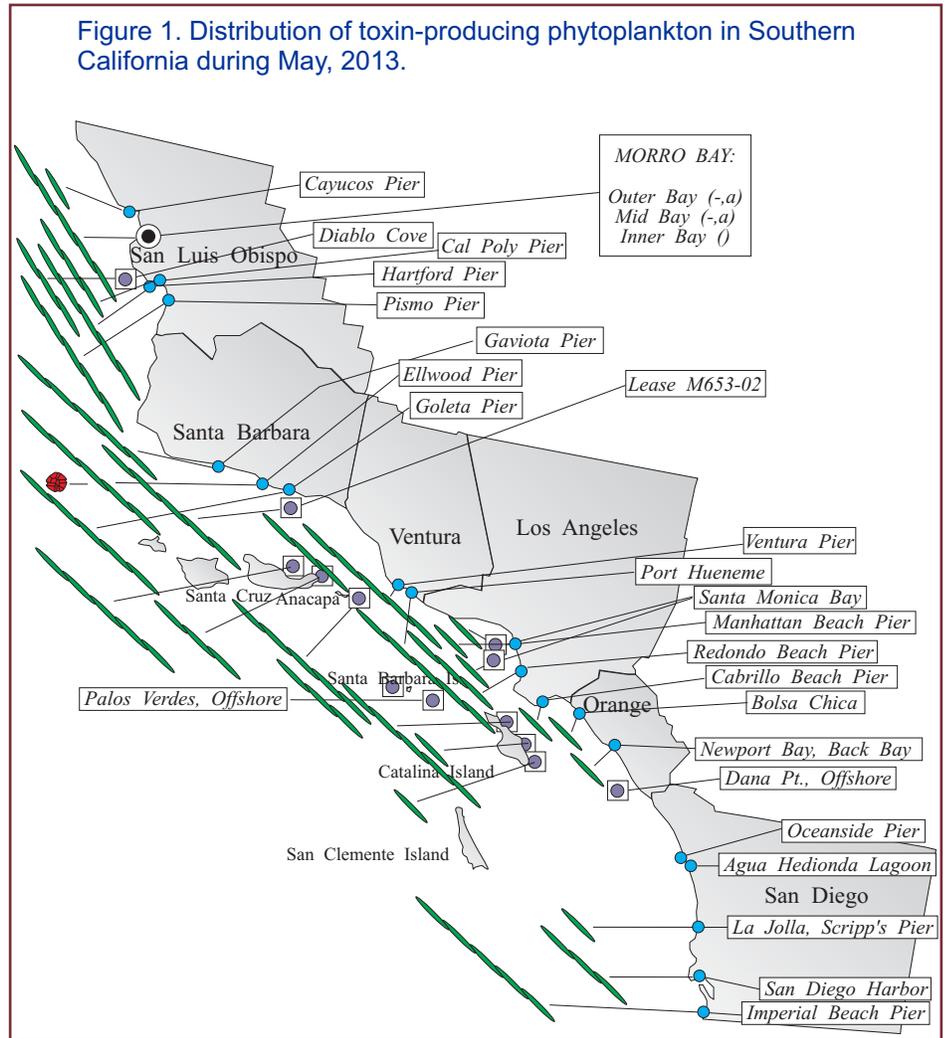


Figure 1. Distribution of toxin-producing phytoplankton in Southern California during May, 2013.

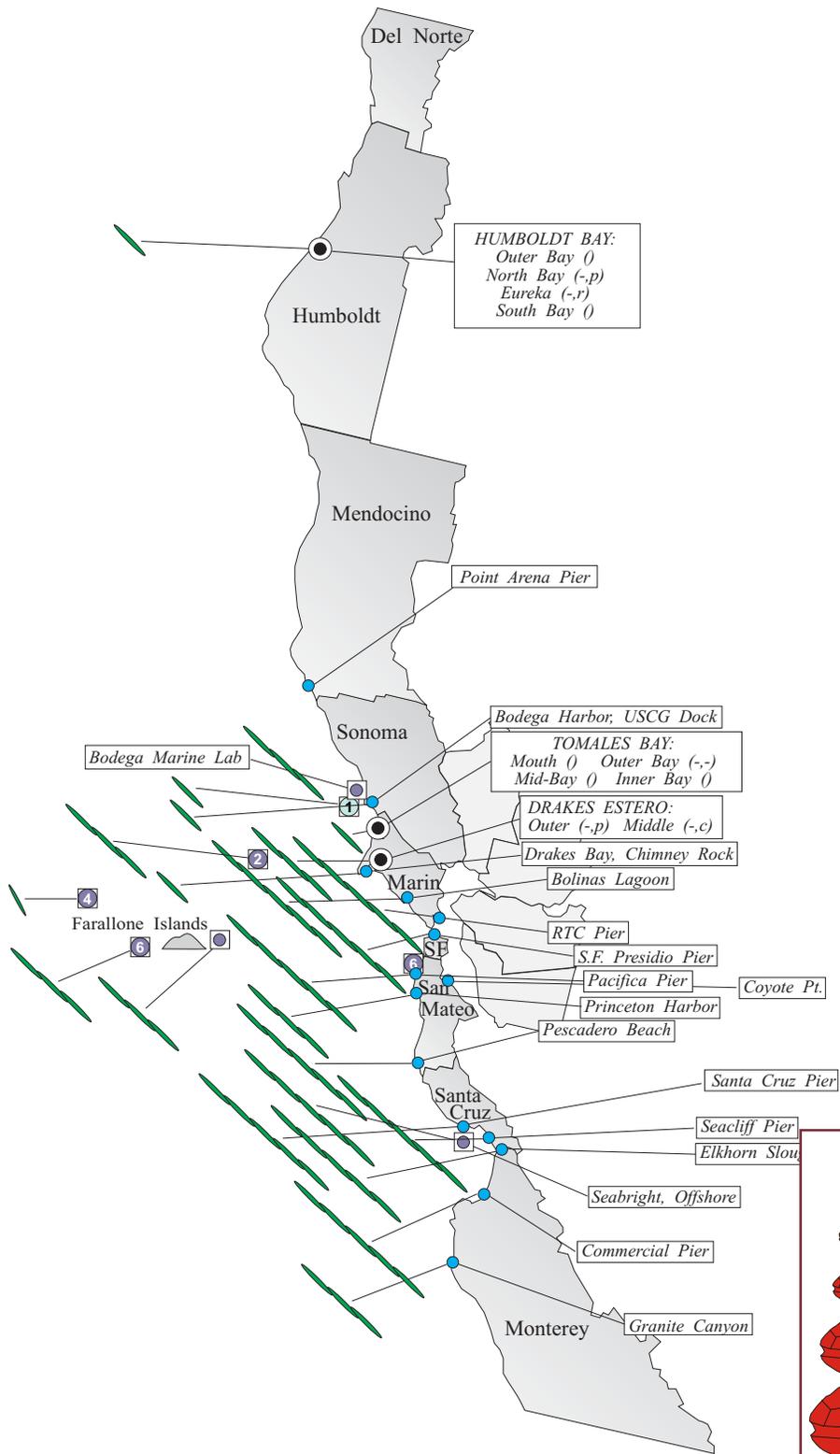
Relative Abundance of Known Toxin Producers			
Alexandrium Species		Pseudo-nitzschia Species	
	Rare (less than 1%)		Present (less than 10%)
	Present (between 1% and 10%)		Common (between 10% and 50%)
	Common (between 10% and 50%)		Abundant (greater than 50%)
	Abundant (greater than 50%)		

**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 2. Distribution of toxin-producing phytoplankton in Northern California during May, 2013.



(Continued from Page 1)  
 The relative abundance of this diatom increased at San Luis Obispo sites and decreased at Orange and San Diego county stations. The highest relative abundances of *Pseudo-nitzschia* were observed at several San Luis Obispo County sites.  
 Domoic acid was detected at several sites between Santa Barbara and Los Angeles counties in May (Figure 3). A high concentration of toxin was detected in oysters (May 1) and in mussels (May 24) from an aquaculture lease offshore of Santa Barbara. A mussel sample from Mussel Shoals in northern Ventura County was also above the alert level on May 14, declining below the detection limit by May 28. A moderate level of domoic acid was detected in rock crab viscera from Stearns Wharf and low levels were present in mussels from Goleta Pier (May 15, 22), southern Ventura County (May 14) and Portuguese Bend in Los Angeles County (May 17).

**Diarhetic Shellfish Poisoning**

On May 12 Cal Poly reported high cell densities (>50,000 cells/L) of the dinoflagellate *Dinophysis* spp., some species of which produce the toxins responsible for diarrhetic shellfish poisoning (DSP). Phytoplankton samples collected by the CDPH network from surrounding sites in San Luis Obispo County did not reveal high numbers of this dinoflagellate, although

(Continued on Page 3)

**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%)		

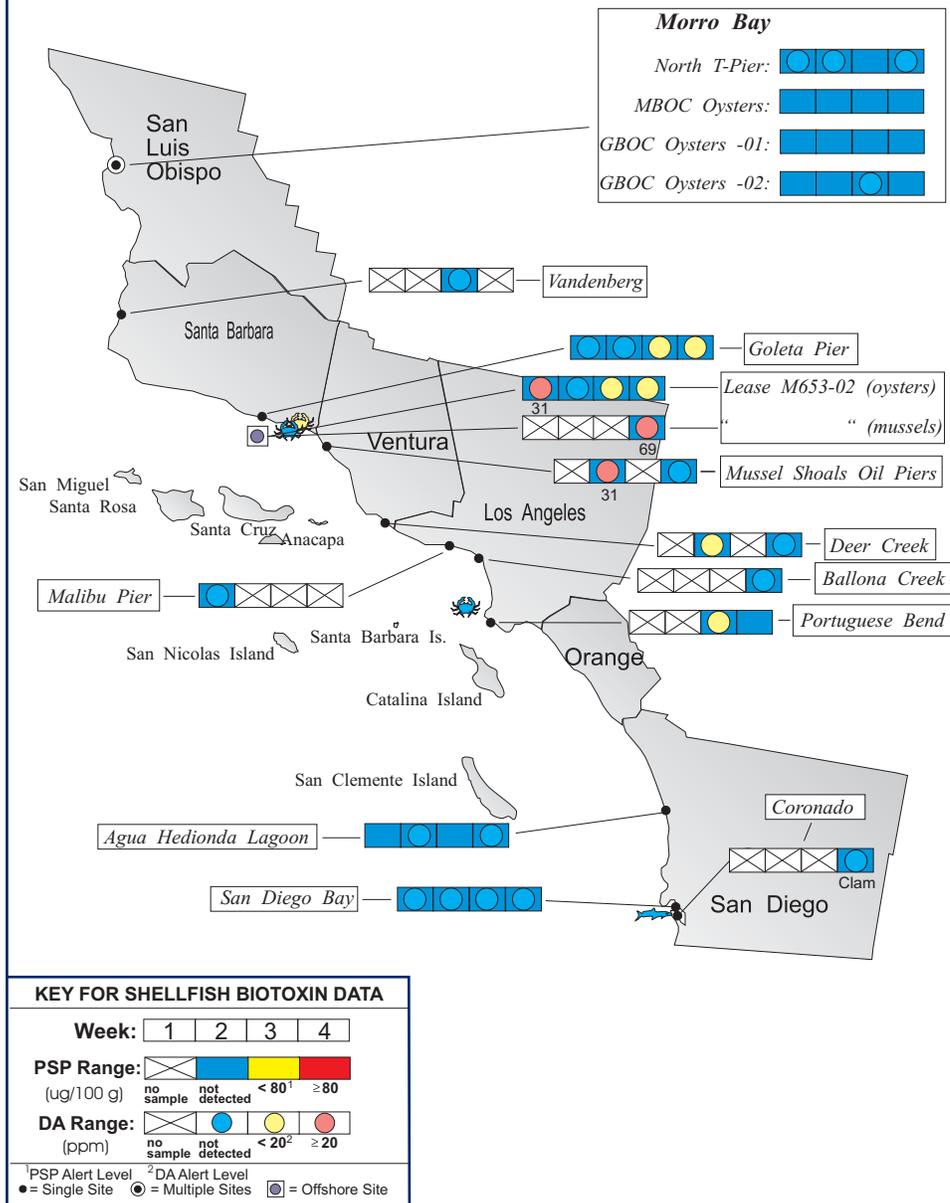
**MONTHLY SAMPLING STATIONS:**

- 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

(Continued from Page 2)

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



several species of *Dinophysis* were present in low numbers. Mussel samples were collected at the Cal Poly Pier, outer Morro Bay, and at Goleta Pier in Santa Barbara. The latter location had the greatest numbers of *Dinophysis* observed in CDPH samples, although these were still exceedingly low ( $\leq 2\%$ ) compared to the more common species present. CDPH also collected rock crab and phytoplankton samples (concentrated net tow and whole water composited over three depths) from Avila Bay. All samples were analyzed by the U.S. Food and Drug Administration Gulf Coast Seafood Lab in Alabama for a suite of fat-soluble toxins associated with DSP. The FDA lab reported the detection of trace levels of several toxins in all mussel and plankton samples, all of which were well below the 0.16 ppm regulatory threshold for DSP toxins. These toxins were not detected in the crab viscera. The highest toxin concentration, 0.04 ppm, was found in the Goleta Pier mussels, corresponding to our phytoplankton observations. Subsequent samples did not reveal high numbers of this dinoflagellate.

**Acknowledgement:** We would like to express our gratitude to Dr. Alison Robertson and the FDA GCSL for their rapid response to our request for analytical support and to the FDA regional specialists

(Continued on Page 4)

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)

for the initial facilitation. We would also like to thank our program participants that responded to requests for additional samples. This episode was a good example of the efficacy of the volunteer-based phytoplankton monitoring program for providing an early warning of a potential toxic bloom.

**Northern California Summary:**

**Paralytic Shellfish Poisoning**

*Alexandrium* was absent in May (Figure 2). Low levels of PSP toxins continued to be detected in shellfish samples from Humboldt and Del Norte counties (Figure 4).

**Domoic Acid**

*Pseudo-nitzschia* increased significantly at sites between Sonoma and San Mateo counties and continued to be abundant inside Monterey Bay through May (Figure 2). As noted in April, domoic acid was not detected in shellfish samples from this region despite this persistent *Pseudo-nitzschia* bloom inside Monterey Bay.



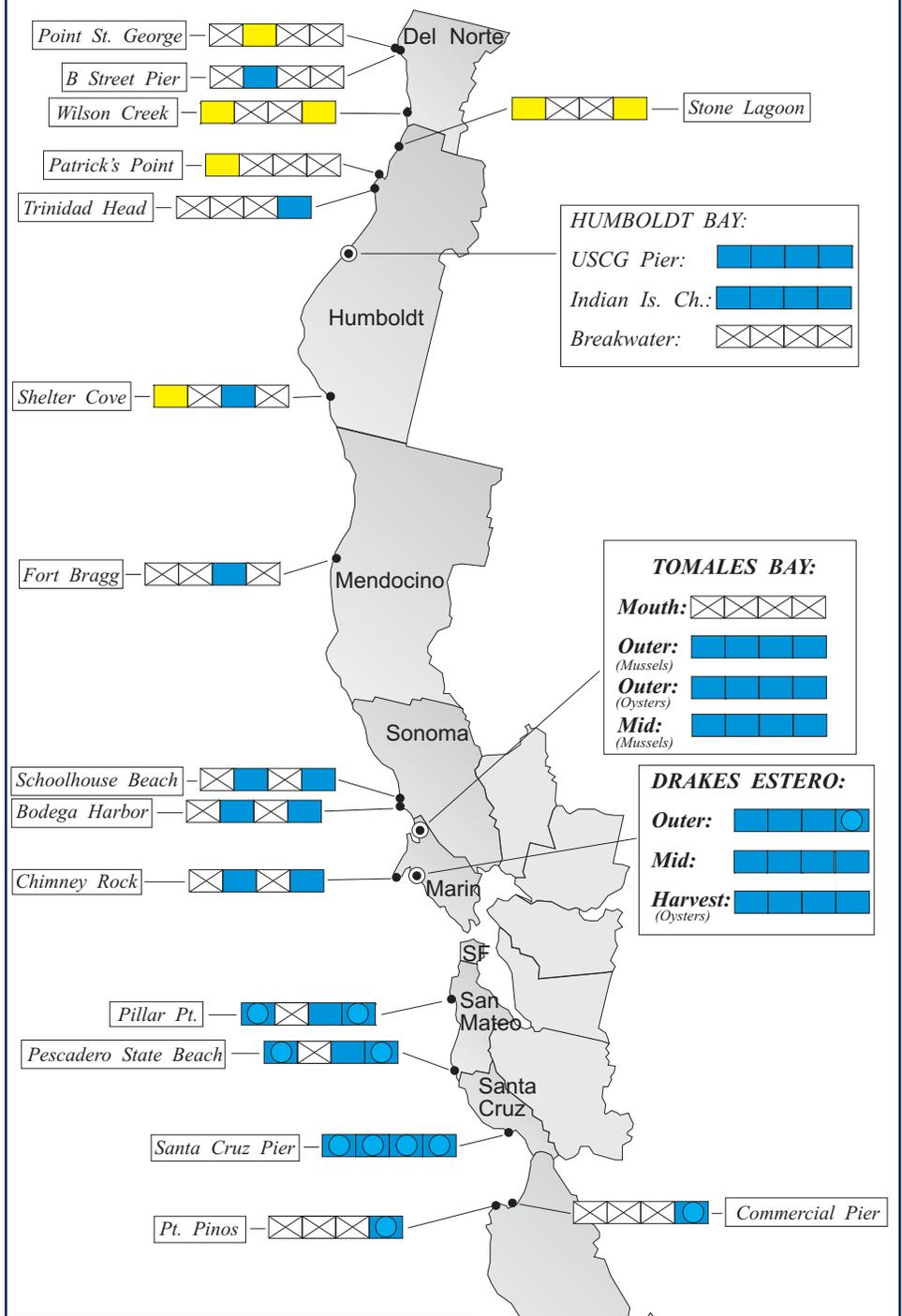
**QUARANTINES:** The annual mussel quarantine began early, on April 24, as a result of increasing levels of domoic acid and *Pseudo-nitzschia* abundance over a wide region.

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

(Continued on Page 5)

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



**KEY FOR SHELLFISH BIOTOXIN DATA**

**Week:** 1 2 3 4

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

**DA Range:** (White) (Blue) (Yellow) (Red)  
 (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

Table 1. Program participants submitting shellfish samples during May, 2013.

COUNTY	AGENCY	#
Del Norte	Yurok Tribe Environmental Program	4
	CDPH Volunteer ( <i>Harriet Jenesky</i> )	1
	Del Norte County Environmental Health Department	1
Humboldt	Coast Seafood Company	8
	CDPH Volunteer ( <i>Steve Fox</i> )	2
	Humboldt County Environmental Health Department	1
	Humboldt State University	1
Mendocino	Mendocino County Environmental Health Department	1
Sonoma	CDPH Marine Biotoxin Program	4
Marin	Cove Mussel Company	5
	Drakes Bay Oyster Company	16
	Hog Island Oyster Company	4
	Point Reyes Oyster Company	4
	CDPH Marine Biotoxin Program	2
San Francisco	None Submitted	
San Mateo	San Mateo County Environmental Health Department	6
Santa Cruz	U.C. Santa Cruz	5
Monterey	Monterey Abalone Company	1
	CDPH Marine Biotoxin Program	1
San Luis Obispo	Grassy Bar Oyster Co.	10
	Morro Bay Oyster Company	6
Santa Barbara	Santa Barbara Mariculture Company	6
	U.C. Santa Barbara	5
	Vandenberg AFB	1
	HABNET/Santa Barbara City College	5
Ventura	Ventura County Environmental Health Department	4
Los Angeles	Los Angeles County Health Department, Burke	2
	Los Angeles County Health Department, Torrance	1
	Los Angeles County Health Department, Commerce	1
	CDPH Volunteer ( <i>Vladimir Ogoshin</i> )	1
Orange	Amigos de Bolsa Chica	1
	Orange County Health Care Agency	1
San Diego	Carlsbad Aquafarms, Inc.	4
	CDPH Volunteer ( <i>Steve Crooke</i> )	1
	U.S. Navy Marine Mammal Program	5

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 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.



(Continued from Page 4)

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.

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

Table 2. Program participants collecting phytoplankton samples during May, 2013.

COUNTY	AGENCY	#
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	4
	Humboldt State University Marine Lab	1
Mendocino	CDPH Volunteer ( <i>Marie DeSantis</i> )	2
Sonoma	CDPH Marine Biotoxin Program	2
	Bodega Marine Lab & Farallone Institute	6
Marin	Drakes Bay Oyster Company	11
	CDPH Volunteer ( <i>Brent Anderson</i> )	5
	SFSU, Romberg Tiburon Center	4
	CDPH Marine Biotoxin Program	2
	Hog Island Oyster Company	1
	Gulf of the Farallones National Marine Sanctuary	3
Contra Costa	None Submitted	
Alameda	None Submitted	
San Francisco	CDPH Volunteer ( <i>Eugenia McNaughton</i> )	1
	Gulf of the Farallones National Marine Sanctuary	4
	San Francisco Bay Whale Watching Company	1
San Mateo	The Marine Mammal Center ( <i>Stan Jensen</i> )	2
	San Mateo County Environmental Health Department	6
	Friends of the Sea Otter ( <i>Diane Larson</i> )	1
Santa Cruz	U.C. Santa Cruz	5
	California Department of Parks and Recreation	2
	Santa Cruz County Environmental Health Department	2
Monterey	Friends of the Sea Otter ( <i>Janis Chaffin</i> )	4
	Monterey Abalone Company	2
	Marine Pollution Studies Laboratory	3
San Luis Obispo	Friends of the Sea Otter ( <i>Kelly Cherry, Al Guild</i> )	6
	Grassy Bar Oyster Company	4
	Morro Bay National Estuary Program	2
	Tenera Environmental	3
	The Marine Mammal Center ( <i>P.J. Webb</i> )	1
	CDPH Marine Biotoxin Program	2
Santa Barbara	CDPH Volunteer ( <i>Sylvia Short</i> )	5
	HABNet/CDPH Volunteer ( <i>Boyd Grant</i> )	8
	HABNet/Island Packers	1
	Tole Mour	1
	Santa Barbara Mariculture Company	4
	U.C. Santa Barbara	5
	CDPH Marine Biotoxin Program	1
Ventura	CDPH Volunteer ( <i>Fred Burgess</i> )	3
	National Park Service	1
	Ventura County Environmental Health Department	2

(Continued on Page 7)

# PHYTOPLANKTON GALLERY



*Dinophysis fortii*, one of the DSP-producing species of this dinoflagellate.



*Dinophysis caudata* undergoing asexual reproduction.



*Dinophysis acuminata*, mixed with the larger dinoflagellate *Protoperidinium*.

# A LOOK BACK: This Month in 2003

The following is a summary of toxin activity in May 2003 (Figure 5).

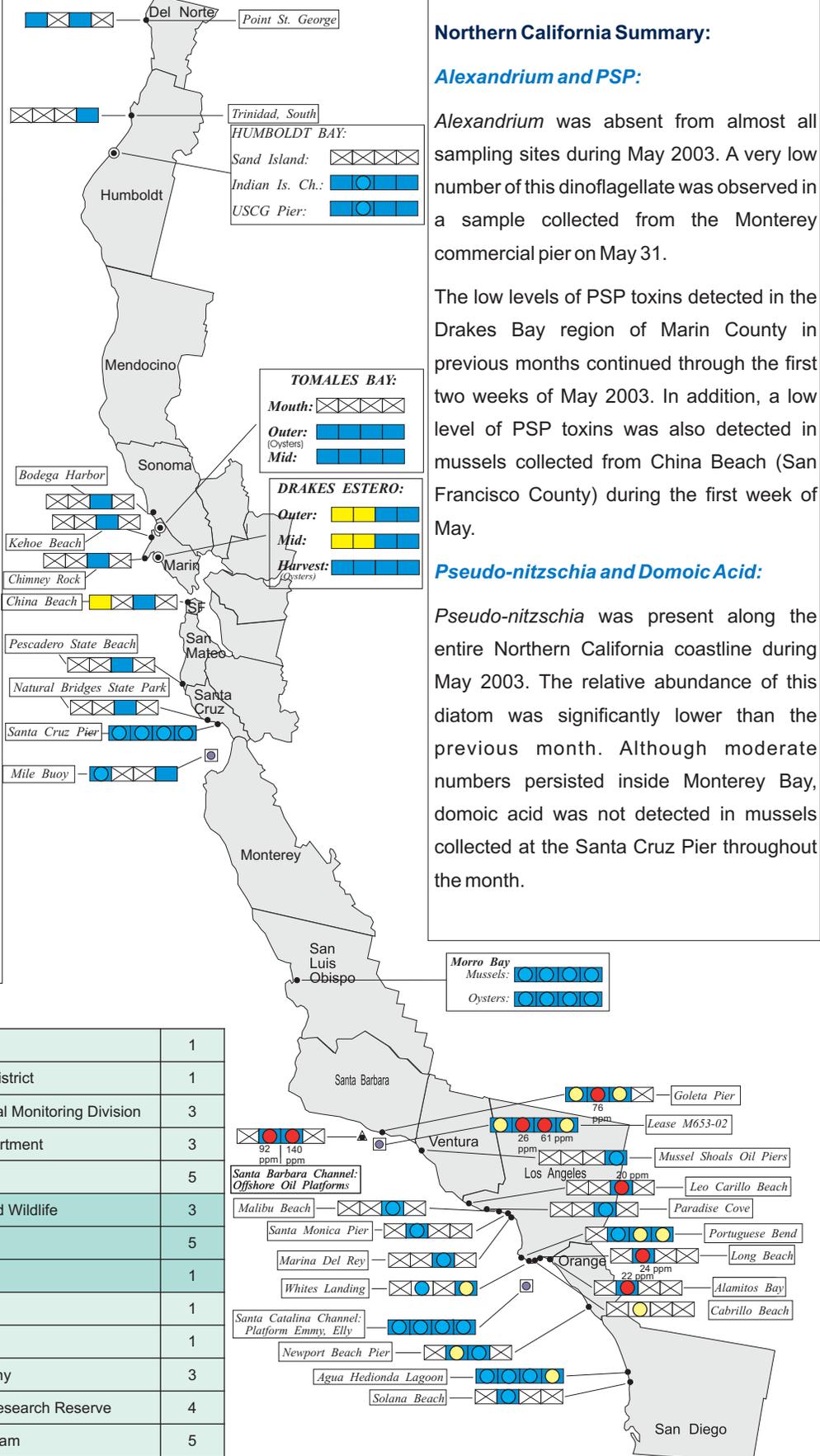
## Southern California Summary:

### *Pseudo-nitzschia* and Domoic Acid:

The distribution and relative abundance of *Pseudo-nitzschia* continued to increase during May 2003. The greatest densities were observed at sites along the Santa Barbara coast and offshore.

Low levels of domoic acid were detected during the first week of May 2003 at two sites in Santa Barbara. By the second week the concentration of this toxin in mussels had increased well above the 20 ppm alert level at Goleta Pier (76 ppm), at an offshore oil platform (92 ppm), and farther south at Long Beach (24 ppm) and Alamitos Bay (22 ppm). Concentrations below the alert level were also detected during this time at Cabrillo Pier and Newport Beach Pier. The highest concentration detected during this event was 140 ppm in mussels from an offshore oil platform in Santa Barbara Channel. By the fourth week in May the concentrations of domoic acid had declined significantly in Santa Barbara but persisted at low levels at several sites farther down coast

Figure 5. Distribution of marine toxins 10 years ago in May, 2003.



along the Los Angeles and San Diego coastline.

## Northern California Summary:

### *Alexandrium* and PSP:

*Alexandrium* was absent from almost all sampling sites during May 2003. A very low number of this dinoflagellate was observed in a sample collected from the Monterey commercial pier on May 31.

The low levels of PSP toxins detected in the Drakes Bay region of Marin County in previous months continued through the first two weeks of May 2003. In addition, a low level of PSP toxins was also detected in mussels collected from China Beach (San Francisco County) during the first week of May.

### *Pseudo-nitzschia* and Domoic Acid:

*Pseudo-nitzschia* was present along the entire Northern California coastline during May 2003. The relative abundance of this diatom was significantly lower than the previous month. Although moderate numbers persisted inside Monterey Bay, domoic acid was not detected in mussels collected at the Santa Cruz Pier throughout the month.

(Continued from Page 6)

Los Angeles	CDPH Volunteer (Cal Parsons)	1
	Los Angeles County Sanitation District	1
	City of Los Angeles Environmental Monitoring Division	3
	Los Angeles County Health Department	3
	Tole Mour	5
Orange	California Department of Fish and Wildlife	3
	Amigos de Bolsa Chica	5
	Ocean Institute	1
San Diego	Carlsbad Aquafarms, Inc.	1
	CDPH Volunteer (Cynthia Hall)	1
	Scripps Institute of Oceanography	3
	Tijuana River National Estuary Research Reserve	4
	U.S. Navy Marine Mammal Program	5