

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

April 2013

Technical Report No. 13-14

INTRODUCTION:

This report provides a summary of biotoxin activity for the month of April, 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 April (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).

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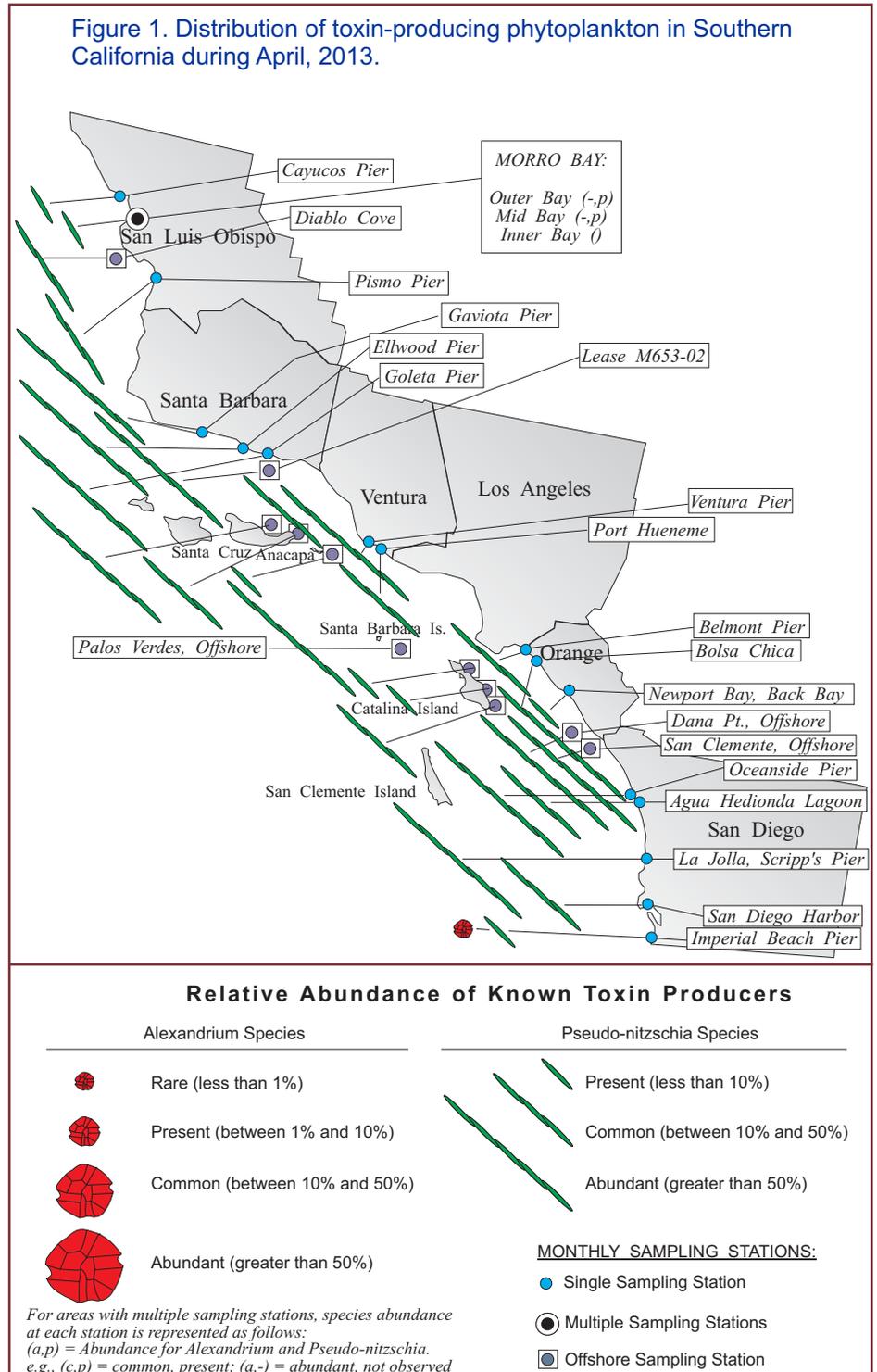
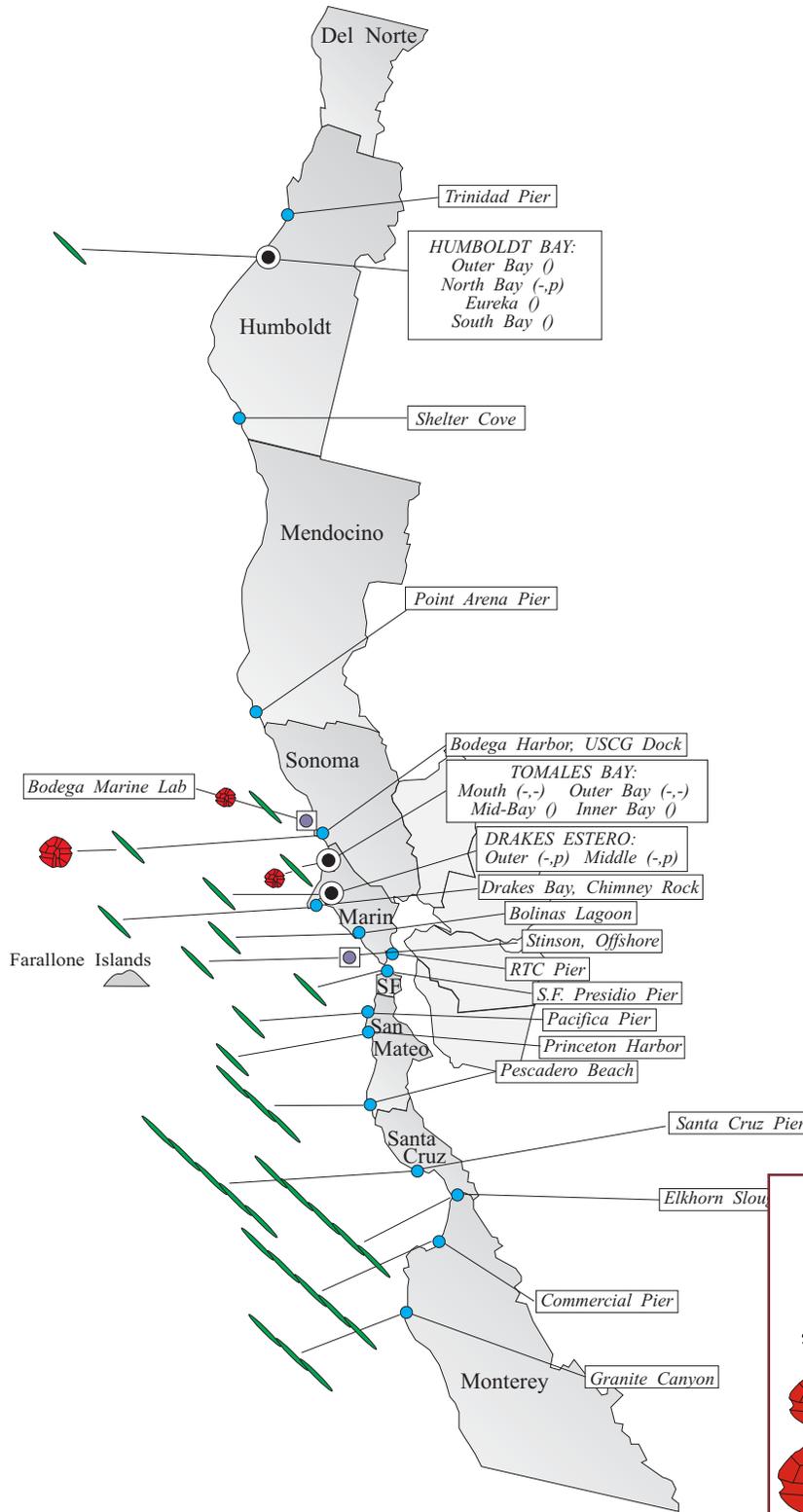


Figure 2. Distribution of toxin-producing phytoplankton in Northern California during April, 2013.



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The relative abundance of this diatom increased significantly at most sites between San Luis Obispo and San Diego counties. The highest relative abundances of *Pseudo-nitzschia* were observed, in decreasing order, at Santa Cruz Island (April 20), offshore of Palos Verdes (April 4 and 24), Ellwood Pier (April 22), offshore of Diablo Cove (April 23), Gaviota Pier (April 22), Scripps Pier (April 15), and Bolsa Chica (April 19).

Domoic acid was detected at several sites between Santa Barbara and San Diego in April. Mussels from Scripps Pier increased dramatically but briefly on April 15. This was the highest concentration of domoic acid ever detected in mussels from San Diego County (48 ppm), although higher concentrations have been detected in crab viscera. Shellfish samples increased above the alert level by the last week of April at the following locations: Goleta Pier and the offshore aquaculture lease (Santa Barbara), Mussel Shoals (Ventura), Portuguese Bend (Los Angeles). Domoic acid also remained at high levels in rock crab viscera collected near San Miguel Island, ranging from nondetectable to 120 ppm (Figure 3).

Non-toxic Species

The diatom *Chaetoceros* continued to be the most common genera observed along the southern California coast. The dinoflagellate

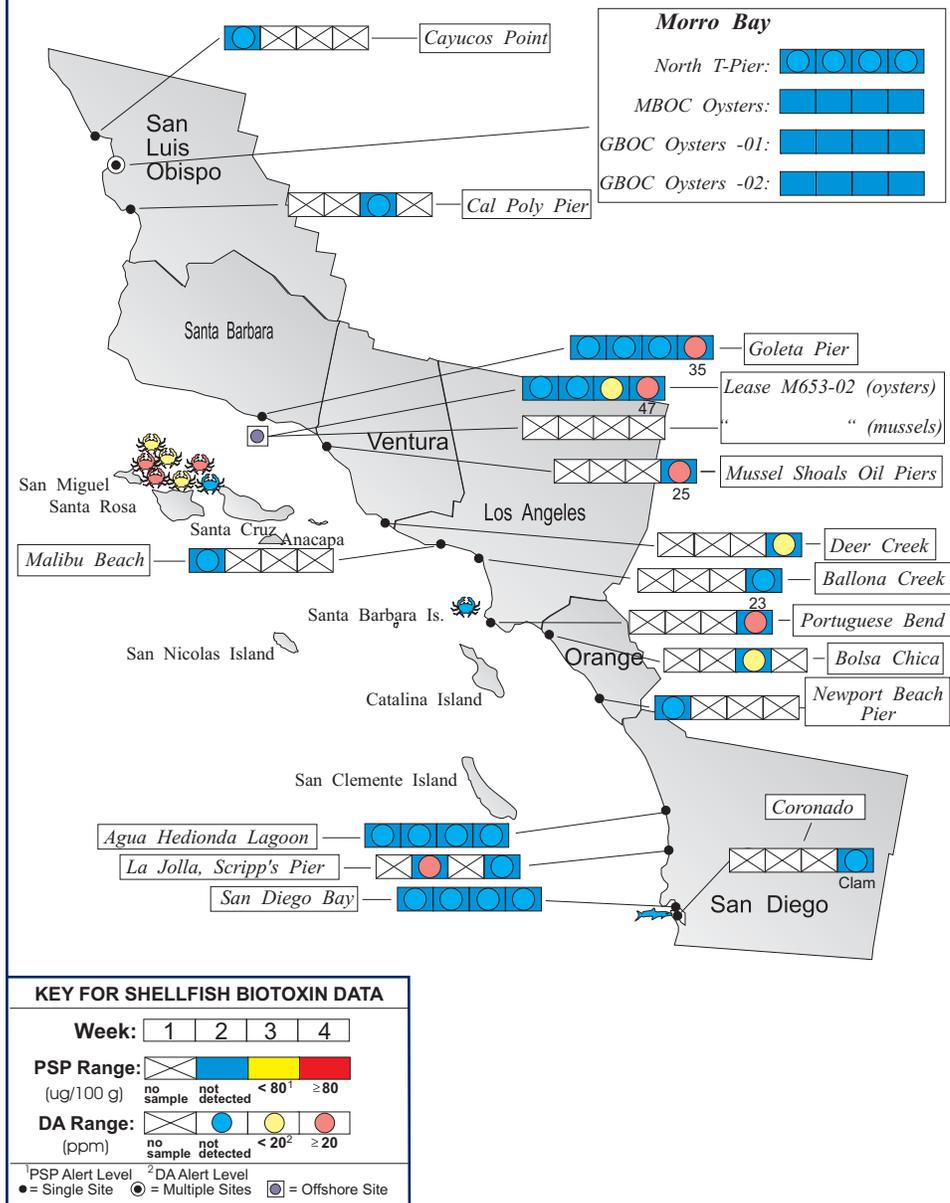
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Relative Abundance of Known Toxin Producers

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%)		

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 April, 2013.



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Prorocentrum was common inside Agua Hedionda Lagoon.

Northern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was observed at several sites along the northern California coast in April (Figure 2). The distribution and percent composition of this dinoflagellate declined compared to observations in March.

Low levels of PSP toxins continued to be detected in shellfish samples throughout the month between San Mateo and Del Norte counties (Figure 4). Shellfish in some locations began to decline below the detection limit for these toxins by the end of the month.

Domoic Acid

Pseudo-nitzschia continued to be abundant inside Monterey Bay through April (Figure 2). The relative abundance of this diatom declined in other locations. The highest relative abundances of this diatom were observed, in decreasing magnitude, at the Monterey Commercial Pier (April 17), the Santa Cruz Pier (April 17), and at the entrance to Elkhorn Slough (April 13). Despite the persistent *Pseudo-nitzschia* bloom inside Monterey Bay, domoic acid was not detected in shellfish samples from

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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

this region (Figure 4).

Non-toxic Species

Diatoms continued to dominate the phytoplankton assemblage. *Skeletonema* and *Chaetoceros* were the most common genera. The dinoflagellate *Prorocentrum* was abundant inside Tomales Bay (April 2).



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.

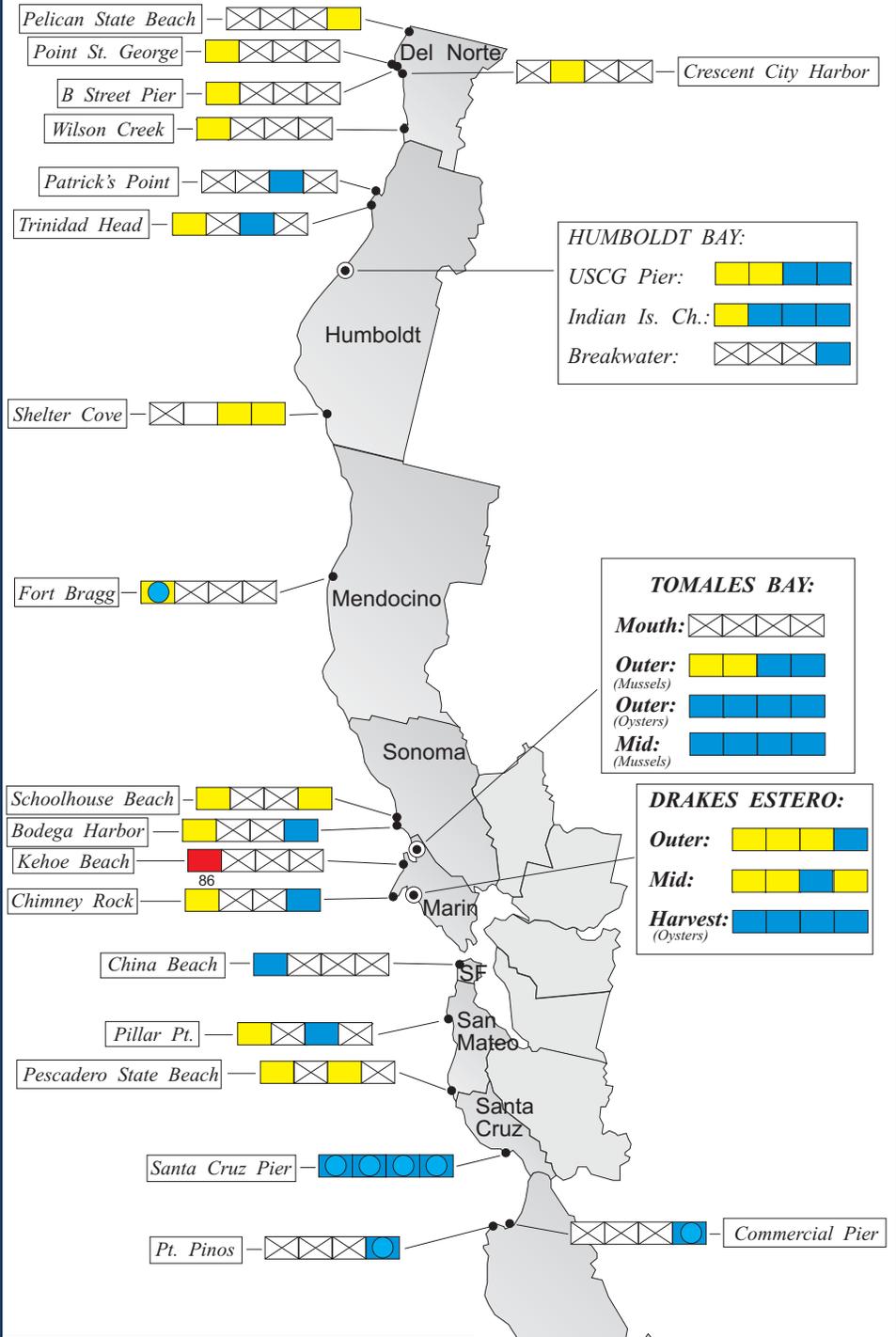
On March 15 CDPH terminated both the November 6 health advisory for all bivalve shellfish in Del Norte County and the October 31 extension of the annual mussel quarantine for Humboldt and Del Norte counties. Both of these control measures had been taken due to dangerous levels of the PSP toxins throughout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

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.,

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

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

COUNTY	AGENCY	#
Del Norte	Yurok Tribe Environmental Program	1
	CDPH Volunteer (<i>Harriet Jenesky</i>)	1
	California Department of Fish and Wildlife	2
Humboldt	Coast Seafood Company	10
	California Department of Fish and Wildlife	6
	CDPH Volunteers (<i>Georgianna Wood</i>)	1
	Humboldt State University Marine Lab	1
Mendocino	Mendocino County Environmental Health Department	1
	CDPH Volunteers (<i>Mark Zarin</i>)	1
Sonoma	CDPH Marine Biotoxin Program	4
Marin	Cove Mussel Company	4
	Drakes Bay Oyster Company	21
	Hog Island Oyster Company	4
	Point Reyes Oyster Company	5
	CDPH Marine Biotoxin Program	3
San Francisco	San Francisco County Health Department	1
San Mateo	San Mateo County Environmental Health Department	4
Santa Cruz	U.C. Santa Cruz	4
Monterey	Monterey Abalone Company	1
	CDPH Marine Biotoxin Program	1
San Luis Obispo	Grassy Bar Oyster Co.	13
	Morro Bay Oyster Company	7
	Avila Beach Sea Life Center	1
	CDPH Volunteers (<i>Otto Schmidt</i>)	1
Santa Barbara	Santa Barbara Mariculture Company	5
	U.C. Santa Barbara	4
	HABNET/Sea Grant	38
	HABNET/Santa Barbara City College	3
Ventura	Ventura County Environmental Health Department	2
Los Angeles	Los Angeles County Health Department, Burke	1
	Los Angeles County Health Department, Torrance	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.	5
	CDPH Volunteer (<i>Steve Crooke</i>)	1
	Scripps Institute of Oceanography	2
	U.S. Navy Marine Mammal Program	6

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.



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

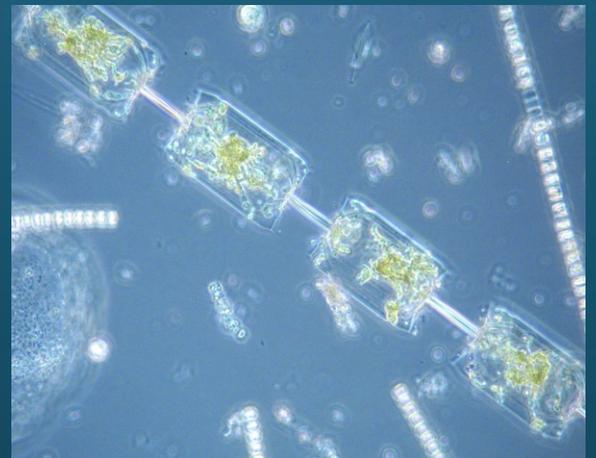
COUNTY	AGENCY	#
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	5
	CDPH Volunteer (<i>Brett Stacy</i>)	1
	Bureau of Land Management	1
Mendocino	CDPH Volunteer (<i>Marie DeSantis</i>)	2
Sonoma	CDPH Marine Biotoxin Program	2
	Bodega Marine Lab	5
Marin	Drakes Bay Oyster Company	10
	CDPH Volunteer (<i>Brent Anderson</i>)	4
	SFSU, Romberg Tiburon Center	2
	CDPH Marine Biotoxin Program	3
	Hog Island Oyster Company	1
	San Francisco Bay Whale Watching Company	1
Contra Costa	None Submitted	
Alameda	None Submitted	
San Francisco	CDPH Volunteer (<i>Eugenia McNaughton</i>)	2
San Mateo	The Marine Mammal Center (<i>Stan Jensen</i>)	5
	San Mateo County Environmental Health Department	6
Santa Cruz	U.C. Santa Cruz	4
Monterey	Friends of the Sea Otter (<i>Janis Chaffin</i>)	4
	Monterey Abalone Company	2
	Marine Pollution Studies Laboratory	4
San Luis Obispo	Friends of the Sea Otter (<i>Kelly Cherry, Al Guild</i>)	4
	Grassy Bar Oyster Company	5
	Morro Bay National Estuary Program	2
	Tenera Environmental	2
	The Marine Mammal Center (<i>P.J. Webb</i>)	2
Santa Barbara	CDPH Volunteer (<i>Sylvia Short</i>)	1
	HABNet/CDPH Volunteer (<i>Boyd Grant, Heather Liu</i>)	6
	HABNet/Island Packers	2
	National Park Service	1
	Santa Barbara Mariculture Company	5
Ventura	U.C. Santa Barbara	7
	CDPH Volunteer (<i>Fred Burgess</i>)	4
	National Park Service	1
	Ventura County Environmental Health Department	1
Los Angeles	Catalina Island Marine Institute	2
	CDPH Volunteer (<i>Cal Parsons</i>)	1
	Los Angeles County Sanitation District	4

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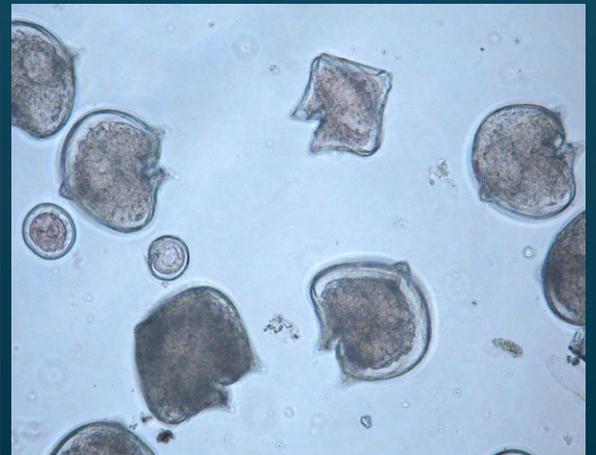
PHYTOPLANKTON GALLERY



The chained diatom *Skeletonema*. At higher magnification thin silica spines between the cells are visible.



The large diatom *Ditylum* normally occurs as single cells.



Several views of the dinoflagellate *Protoperidinium*.

A LOOK BACK: This Month in 2003

The distribution of *Pseudo-nitzschia* 10 years ago (Figure 5) was quite similar to observations in April 2013 (Figures 1-2). The following is a summary of activity in 2003.

Southern California Summary:

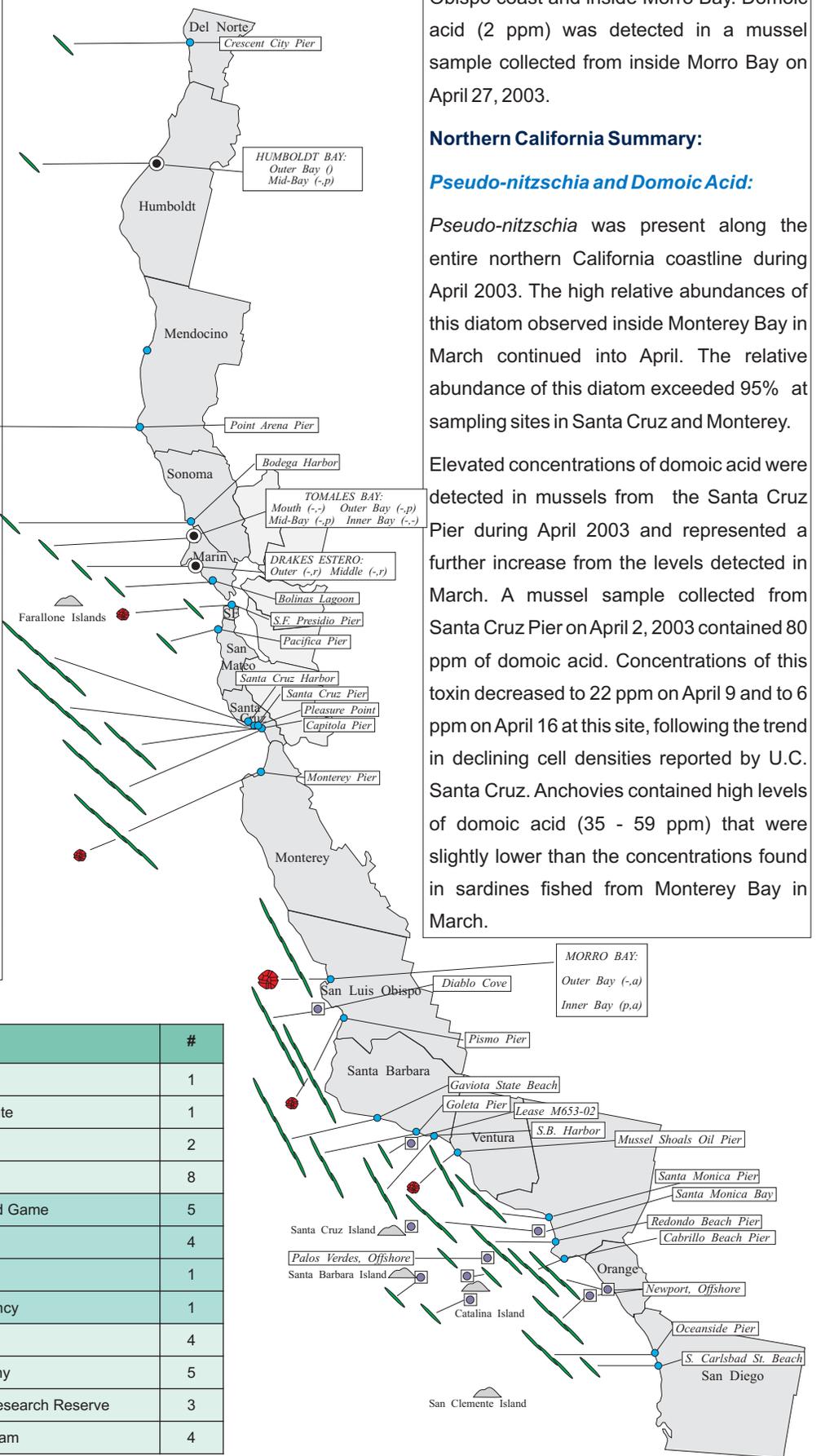
Pseudo-nitzschia and Domoic Acid:

Pseudo-nitzschia distribution and relative abundance increased dramatically along the southern California coast during April 2003. The relative abundance and cell number for this diatom was greatest at sites from San Luis Obispo through Los Angeles counties.

The relative abundance of *Pseudo-nitzschia* increased at sites in Santa Monica Bay and a mussel sample collected by the Los Angeles County Health Department from Portuguese Bend, just south of Santa Monica Bay, contained a low level of domoic acid. *Pseudo-nitzschia* increased in abundance farther south (Redondo and Cabrillo piers) by the end of the month.

Frequent sampling by volunteers revealed that *Pseudo-nitzschia* was a dominant component of the phytoplankton

Figure 5. Distribution of toxigenic phytoplankton 10 years ago in April, 2003.



throughout most of April along the San Luis Obispo coast and inside Morro Bay. Domoic acid (2 ppm) was detected in a mussel sample collected from inside Morro Bay on April 27, 2003.

Northern California Summary:

Pseudo-nitzschia and Domoic Acid:

Pseudo-nitzschia was present along the entire northern California coastline during April 2003. The high relative abundances of this diatom observed inside Monterey Bay in March continued into April. The relative abundance of this diatom exceeded 95% at sampling sites in Santa Cruz and Monterey.

Elevated concentrations of domoic acid were detected in mussels from the Santa Cruz Pier during April 2003 and represented a further increase from the levels detected in March. A mussel sample collected from Santa Cruz Pier on April 2, 2003 contained 80 ppm of domoic acid. Concentrations of this toxin decreased to 22 ppm on April 9 and to 6 ppm on April 16 at this site, following the trend in declining cell densities reported by U.C. Santa Cruz. Anchovies contained high levels of domoic acid (35 - 59 ppm) that were slightly lower than the concentrations found in sardines fished from Monterey Bay in March.

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COUNTY	AGENCY	#
L. A. (cont.)	Long Beach Marine Institute	1
	Southern California Marine Institute	1
	HABNet/Voyager Excursions	2
	Tole Mour	8
Orange	California Department of Fish and Game	5
	Amigos de Bolsa Chica	4
	Ocean Institute	1
	Orange County Health Care Agency	1
San Diego	Carlsbad Aquafarms, Inc.	4
	Scripps Institute of Oceanography	5
	Tijuana River National Estuary Research Reserve	3
	U.S. Navy Marine Mammal Program	4