

# 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

September 2013

Technical Report No. 13-21

**INTRODUCTION:**

This report provides a summary of biotoxin activity for the month of September, 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 September (Figure 1). A small number of this dinoflagellate was observed in phytoplankton samples from offshore of Diablo Cove (September 11) and in Fish Harbor, Long Beach (September 27). PSP toxins were not detected in any shellfish

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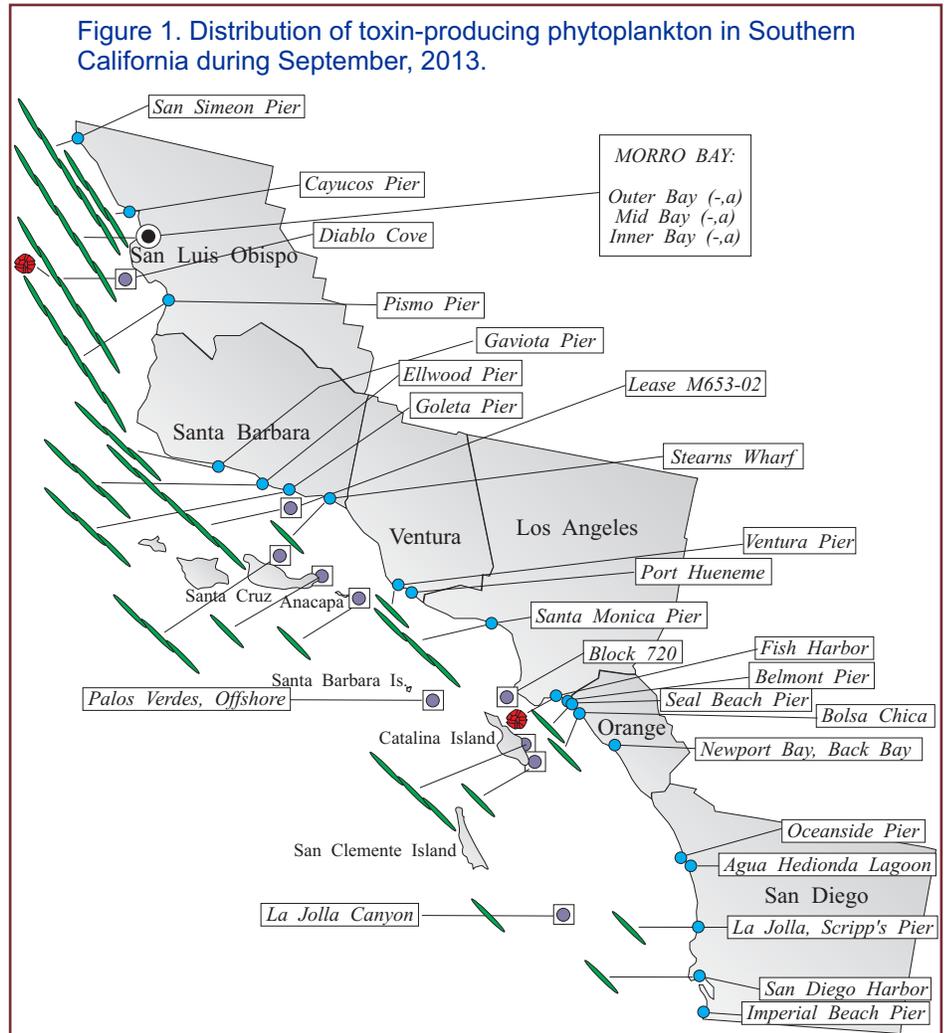


Figure 1. Distribution of toxin-producing phytoplankton in Southern California during September, 2013.

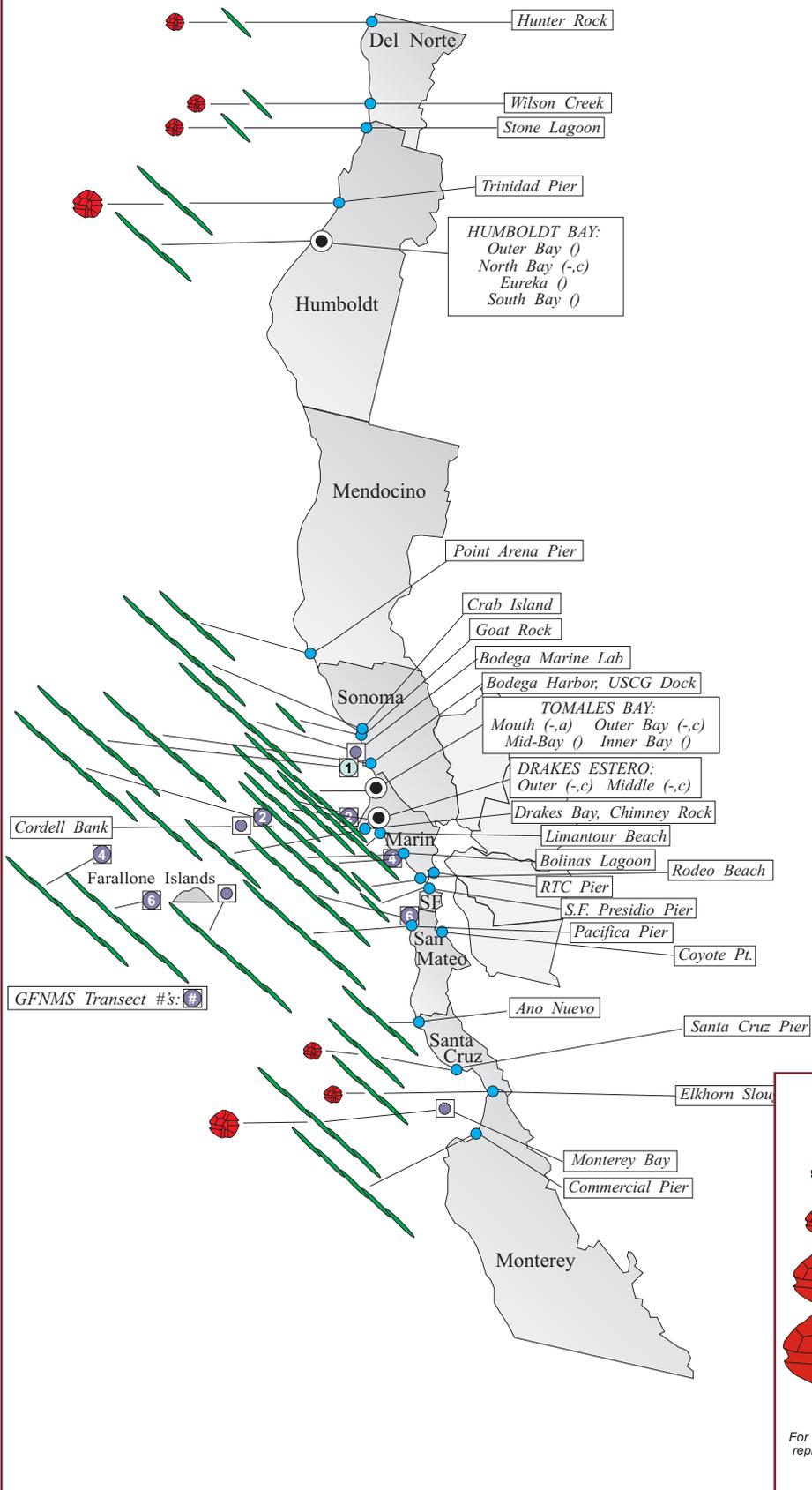
| Relative Abundance of Known Toxin Producers |                              |                          |                              |
|---|------------------------------|--------------------------|------------------------------|
| Alexandrium Species                         |                              | 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 September, 2013.



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samples during the month (Figure 3).

**Domoic Acid**

*Pseudo-nitzschia* was observed along the entire southern California coast (Figure 1). The relative abundance of this diatom was very similar to observations in August, with a slight decline at sites in Orange and San Diego counties. This diatom was common at sites near Santa Cruz (September 19) and Catalina islands (September 4, 5). The highest relative abundances of *Pseudo-nitzschia* were again observed along the San Luis Obispo County coast inside Morro Bay (September 2, 9, 23), at the San Simeon Pier (September 24, 28), and offshore of Diablo Cove throughout the month.

Domoic acid was detected at several locations in September (Figure 3). Low levels of this toxin were detected in sentinel mussels in outer Morro Bay (September 2), in sea mussels from Vandenberg (September 17), and in mussels and oysters from an aquaculture lease offshore of Santa Barbara. A wide range of domoic acid concentrations was detected in rock crab viscera samples collected on September 12 in the vicinity of San Miguel and Santa Rosa islands (<2.5 to 53 ppm and 7.2 to 216 ppm, respectively).

**Non-Toxic Species**

Diatoms dominated the assemblage between San Luis Obispo and Los Angeles counties, with *Chaetoceros* and *Bacterisatrum* the most common species.

(Continued on Page 3)

**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%)

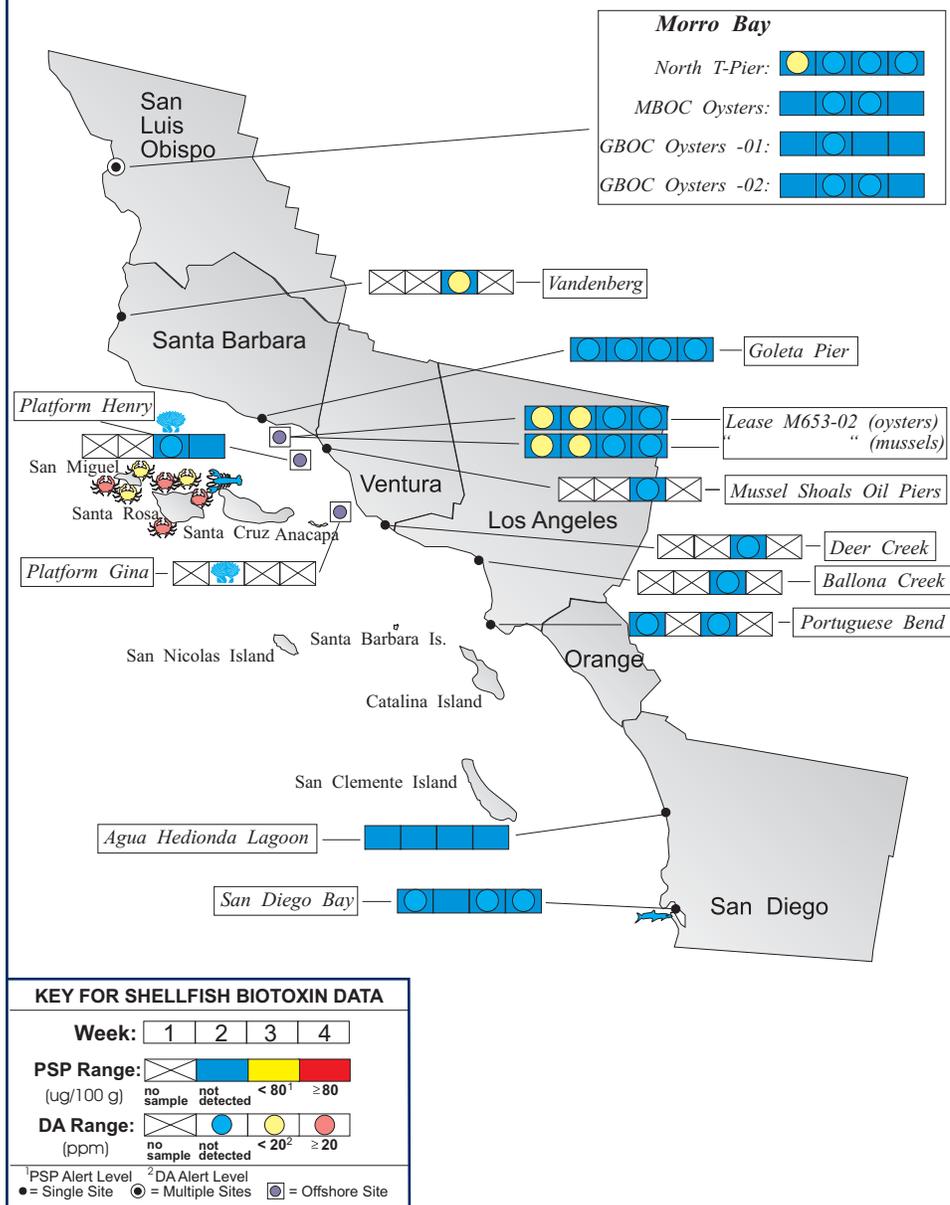
MONTHLY SAMPLING STATIONS:

- 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 September, 2013.



(Continued from Page 2)

Dinoflagellates were more dominant at sites in Orange and San Diego counties, with *Lingulodinium polyedrum* abundant at several sites and *Ceratium furca* and *Prorocentrum micans* also common at some locations.

**Northern California Summary:**

**Paralytic Shellfish Poisoning**

*Alexandrium* was detected at several locations in September (Figure 2). The distribution and relative abundance of this dinoflagellate increased compared to observations in August. *Alexandrium* numbers were greatest at the Trinidad Pier in Humboldt County (September 23).

PSP toxins remained above the alert level in mussels from southern Del Norte and northern Humboldt counties (Figure 4). Low levels of these toxins persisted at other locations in these two counties, and were present throughout the month inside Humboldt Bay. The highest concentration of these toxins was detected in a sea mussel sample from Stone Lagoon on September 17 (661 ug/100 g), twice the concentration detected in this region at the end of August.

**Domoic Acid**

*Pseudo-nitzschia* was observed at most sampling locations in September (Figure 2). The relative abundance of this diatom remained high at sites between Mendocino

(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.

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(510) 412-4635

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

(Continued from Page 3)

and Monterey counties, including offshore near the Farallone Islands. The highest relative abundance of *Pseudo-nitzschia* was observed in outer Tomales Bay (September 10), at the commercial wharf in Monterey (September 10), and at Pacifica Pier (September 3).

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**

Diatoms dominated the assemblage, with *Chaetoceros* and *Rhizosolenia* the most common genera. Several species of the dinoflagellate *Ceratium* were common inside Monterey Bay and *Gonyaulax spinifera* was common at Pacifica Pier.



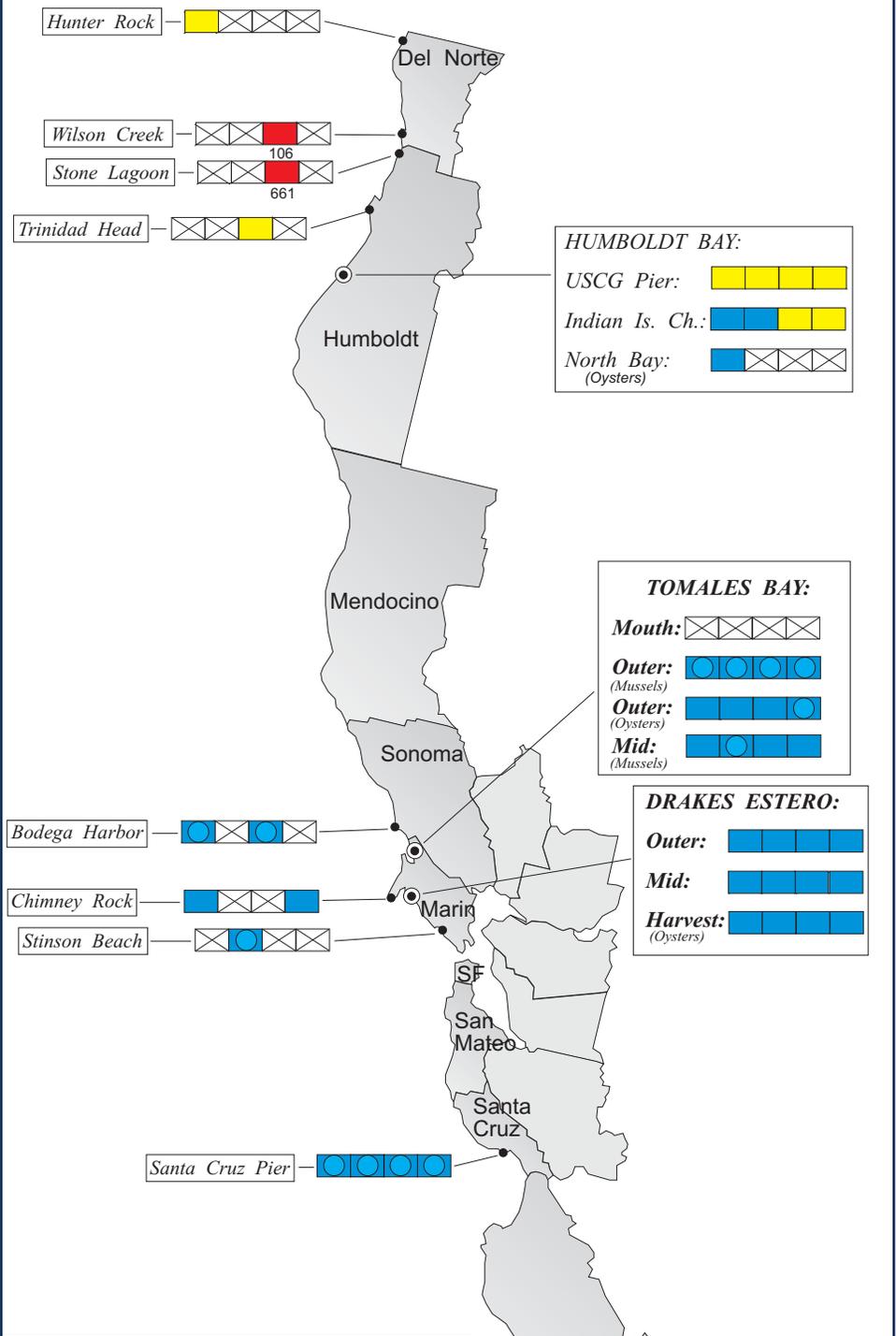
**QUARANTINES:** The annual mussel quarantine began early, on April 24, as a result of increasing levels of domoic acid and *Pseudo-nitzschia* abundance over a wide region.

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

(Continued on Page 5)

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



**KEY FOR SHELLFISH BIOTOXIN DATA**

Week: [1] [2] [3] [4]

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

**DA Range:** [X] [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 collecting phytoplankton samples during September, 2013.

| AGENCY   | # | AGENCY  | #  |
|--|---|---|----|
| <b>DEL NORTE COUNTY</b>                          |   | Yurok Tribe Environmental Group                   | 1  |
|  |   | Smith River Rancheria                             | 2  |
| <b>HUMBOLDT COUNTY</b>                           |   | Coast Seafood Company                             | 4  |
| Yurok Tribe Environmental Group                  | 1 | Humboldt State University Marine Lab              | 3  |
| <b>MENDOCINO COUNTY</b>                          |   | CDPH Volunteer ( <i>Marie DeSantis</i> )          | 2  |
| <b>SONOMA COUNTY</b>                             |   | Bodega Marine Lab & Farallone Institute           | 8  |
| CDPH Marine Biotoxin Program                     | 2 | Sonoma Coast Watch                                | 1  |
| <b>MARIN COUNTY</b>                              |   | Drakes Bay Oyster Company                         | 12 |
| CDPH Marine Biotoxin Program                     | 2 | CDPH Volunteer ( <i>Brent Anderson</i> )          | 4  |
| SFSU, Romberg Tiburon Center                     | 2 | Hog Island Oyster Company                         | 2  |
| Cordell Bank National Marine Sanctuary           | 1 | Sonoma State University                           | 8  |
| National Park Service                            | 1 | Gulf of the Farallones Nat'l Marine Sanctuary     | 6  |
| <b>SAN FRANCISCO COUNTY</b>                      |   | CDPH Volunteer ( <i>Eugenia McNaughton</i> )      | 3  |
| Gulf of the Farallones Nat'l Marine Sanctuary    | 3 | San Francisco Bay Whale Watching Co.              | 1  |
| <b>SAN MATEO COUNTY</b>                          |   | The Marine Mammal Center ( <i>Stan Jensen</i> )   | 4  |
| Friends of the Sea Otter ( <i>Diane Larson</i> ) | 3 | U.C. Santa Cruz                                   | 1  |
| <b>SANTA CRUZ COUNTY</b>                         |   | California Department of Parks and Recreation     | 1  |
| Santa Cruz Co. Environmental Health Dept.        | 3 | U.C. Santa Cruz                                   | 4  |
| <b>MONTEREY COUNTY</b>                           |   | Friends of the Sea Otter ( <i>Janis Chaffin</i> ) | 3  |
| Marine Life Studies                              | 2 | Monterey Abalone Company                          | 3  |
| <b>SAN LUIS OBISPO COUNTY</b>                    |   | Friends of the Sea Otter ( <i>Kelly, Guild</i> )  | 4  |
| CDPH Volunteer ( <i>Dan Hoskins</i> )            | 2 | Grassy Bar Oyster Company                         | 5  |
| Morro Bay National Estuary Program               | 2 | Coastal Discovery Center, San Simeon              | 2  |
| Tenera Environmental                             | 4 | The Marine Mammal Center ( <i>P.J. Webb</i> )     | 2  |
| <b>SANTA BARBARA COUNTY</b>                      |   | CDPH Volunteer ( <i>Sylvia Short</i> )            | 4  |
| HABNet/CDPH Volunteer ( <i>Boyd Grant</i> )      | 5 | Island Packers/HABNet                             | 1  |
| Tole Mour  | 1 | Santa Barbara Mariculture Company                 | 7  |
| Ty Warner Sea Life Center/HABNet                 | 2 | U.C. Santa Barbara                                | 3  |
|  |   | CDPH Marine Biotoxin Program                      | 1  |
| <b>VENTURA COUNTY</b>                            |   | CDPH Volunteer ( <i>Fred Burgess</i> )            | 2  |
| National Park Service                            | 2 | Ventura Co. Environmental Health Dept.            | 1  |
|  |   | Tole Mour   | 1  |
| <b>LOS ANGELES COUNTY</b>                        |   | CDPH Volunteers ( <i>Cal Parsons, Kai Xu</i> )    | 3  |
| Catalina Island Marine Institute                 | 2 | Long Beach Marine Institute                       | 1  |
| Los Angeles County Sanitation District           | 2 | Voyager Excursions/HABNet                         | 1  |
| Tole Mour  | 3 | Southern California Marine Institute              | 1  |
| <b>ORANGE COUNTY</b>                             |   | Amigos de Bolsa Chica                             | 4  |
| California Department of Fish and Wildlife       | 3 | CDPH Volunteer ( <i>Jennifer McCarthy</i> )       | 2  |
| <b>SAN DIEGO COUNTY</b>                          |   | Carlsbad Aquafarms, Inc.                          | 2  |
| CDPH Volunteer ( <i>Cynthia Hall</i> )           | 1 | Sea Camp/HABNet                                   | 3  |
| Scripps Institute of Oceanography                | 4 | Tijuana River National Estuary Research           | 4  |
| U.S. Navy Marine Mammal Program                  | 4 |   |    |

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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., 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.

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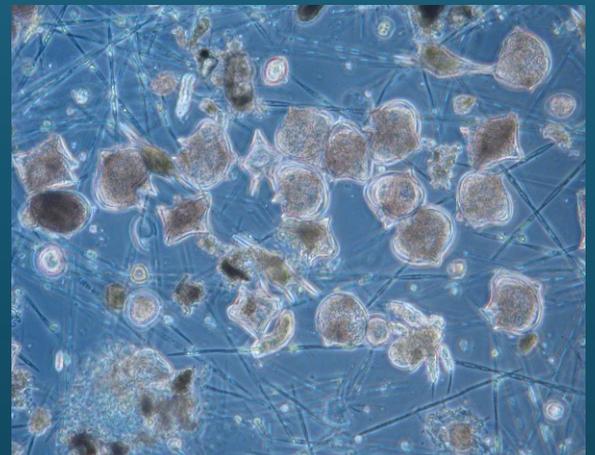
Table 2. CDPH program participants submitting shellfish samples during September, 2013.

| COUNTY          | AGENCY  | #  |
|-----------------|---|----|
| Del Norte       | Yurok Tribe Environmental Program               | 1  |
|                 | Smith River Rancheria                           | 1  |
| Humboldt        | Coast Seafood Company                           | 8  |
|                 | Humboldt County Environmental Health Department | 1  |
|                 | Yurok Tribe Environmental Program               | 1  |
| Mendocino       | None Submitted                                  |    |
| Sonoma          | CDPH Marine Biotoxin Program                    | 2  |
| Marin           | Cove Mussel Company                             | 4  |
|                 | Drakes Bay Oyster Company                       | 16 |
|                 | Hog Island Oyster Company                       | 4  |
|                 | Point Reyes Oyster Company                      | 5  |
|                 | CDPH Marine Biotoxin Program                    | 2  |
|                 | CDPH Volunteer ( <i>James Sutton</i> )          | 1  |
| San Francisco   | None Submitted                                  |    |
| San Mateo       | None Submitted                                  |    |
| Santa Cruz      | U.C. Santa Cruz                                 | 4  |
| Monterey        | None Submitted                                  |    |
| San Luis Obispo | Grassy Bar Oyster Co.                           | 13 |
|                 | Morro Bay Oyster Company                        | 6  |
| Santa Barbara   | Santa Barbara Mariculture Company               | 14 |
|                 | CDPH Volunteer ( <i>Bill Weinerth</i> )         | 1  |
|                 | U.C. Santa Barbara                              | 5  |
|                 | U.C. Santa Barbara Marine Sciences/HABNet       | 3  |
|                 | Vandenberg AFB                                  | 1  |
| Ventura         | Ventura County Environmental Health Department  | 2  |
|                 | CDPH Volunteer ( <i>Bill Weinerth</i> )         | 1  |
| Los Angeles     | Los Angeles County Health Department, Burke     | 1  |
|                 | Los Angeles County Health Department, Torrance  | 2  |
| Orange          | None Submitted                                  |    |
| San Diego       | Carlsbad Aquafarms, Inc.                        | 4  |
|                 | U.S. Navy Marine Mammal Program                 | 5  |

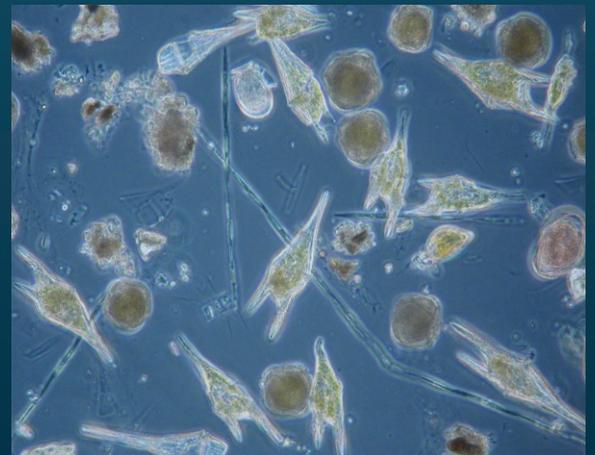
# PHYTOPLANKTON GALLERY



*Various species of the chain-forming diatom Chaetoceros usually dominate the phytoplankton assemblage, particularly in northern and central California.*



*The dinoflagellate Protoperdinium is most numerous in this photo, although Pseudo-nitzschia and Ceratium furca are also present.*



*The dinoflagellates Lingulodinium polyedrum and Ceratium furca were common in southern California.*

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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.

