



Marine Biotoxin Monitoring Report

February 2020

Technical Report No. 20-13

INTRODUCTION:

This report contains results from the California Department of Public Health (CDPH) monitoring programs for shellfish toxins and associated toxin-producing phytoplankton. Toxin concentration ranges are provided for the paralytic shellfish poisoning (PSP) toxins and for domoic acid (DA), the latter associated with the syndrome called Amnesic Shellfish Poisoning. Estimates are provided for the distribution and relative abundance of *Alexandrium*, the dinoflagellate that produces PSP toxins, and *Pseudo-nitzschia*, the diatom that produces domoic acid. This report also contains summary information for any quarantine or health advisory in effect during the reporting period. Finally, lists of participating agencies and volunteers for each monitoring effort are provided.

Northern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was observed at several sites along the northern California coast in February (Figure 1). Low numbers of this dinoflagellate were observed between Marin and Monterey counties, representing an increase in distribution and frequency of occurrence compared to observations in January. The highest percent composition of *Alexandrium* (1%)



Several chains of *Alexandrium* cells.

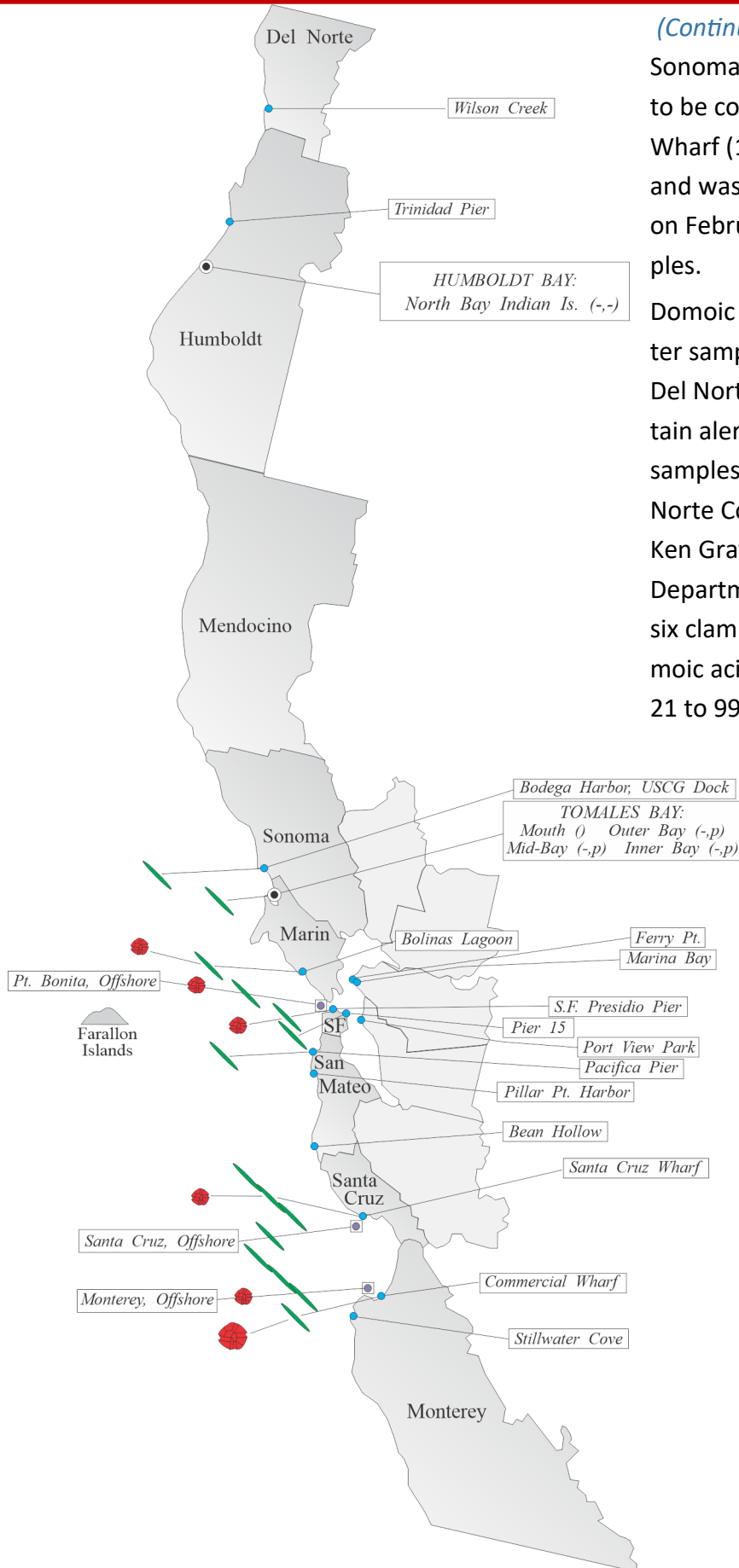
was observed at the Monterey Commercial Wharf. Although this low percentage of cells may seem insignificant, it can be enough to produce measurable toxicity in shellfish due to the potency of the PSP toxins. In fact, low levels of PSP toxicity were detected in mussel samples from the Monterey Commercial Wharf during the latter half of February (Figure 2).

Domoic Acid

Pseudo-nitzschia was observed at numerous sites between Sonoma and Monterey counties in February (Figure 1). Low numbers of this diatom were present in samples in each coastal county between

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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) Only known toxin-producing species (e.g., *seriata* complex for *Pseudo-nitzschia*) are represented on the maps; (iii) All toxin data are for mussel samples, unless otherwise noted; (iv) All samples are assayed for PSP toxins; DA analyses are performed as needed (e.g., on the basis of detected blooms of the diatoms that produce DA); (v) Please refer to the appropriate figure key for an explanation of the symbols used on the maps.



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Sonoma and Monterey. *Pseudo-nitzschia* continued to be common in samples from the Santa Cruz Wharf (15% on February 19, 10% on February 26) and was also common offshore of Monterey (10% on February 19). The cell mass was low in all samples.

Domoic acid was not detected in any mussel or oyster samples in February, however razor clams from Del Norte and Humboldt counties continue to contain alert levels of this toxin (Figure 2). Razor clam samples were obtained from Crescent Beach (Del Norte County) on February 8 thanks to volunteer Ken Graves, with permission from the California Department of Fish and Wildlife (CDFW). All of the six clam samples contained concentrations of domoic acid in excess of the alert level, ranging from 21 to 99 ppm. This represents a significant de-

crease in toxicity compared to the previous samples collected in October. The CDFW collected six razor clam samples from Clam Beach in Humboldt County, all of which were above the alert level. Domoic acid concentrations ranged from 27 to 150 ppm, significantly higher than the previous samples collected in August.

Non-Toxic Species

Phytoplankton abundance remained low

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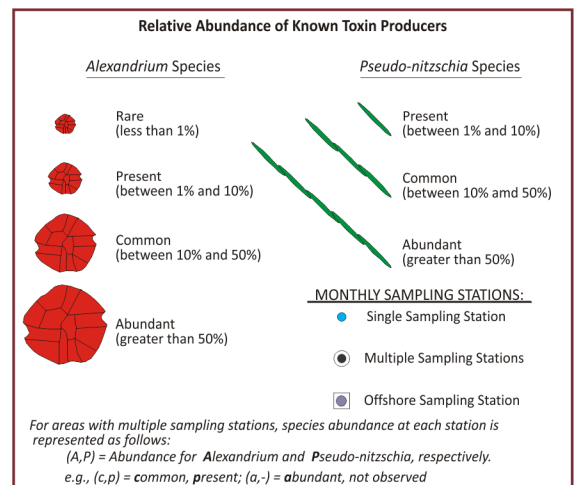


Figure 1. Toxic phytoplankton distribution in northern California.

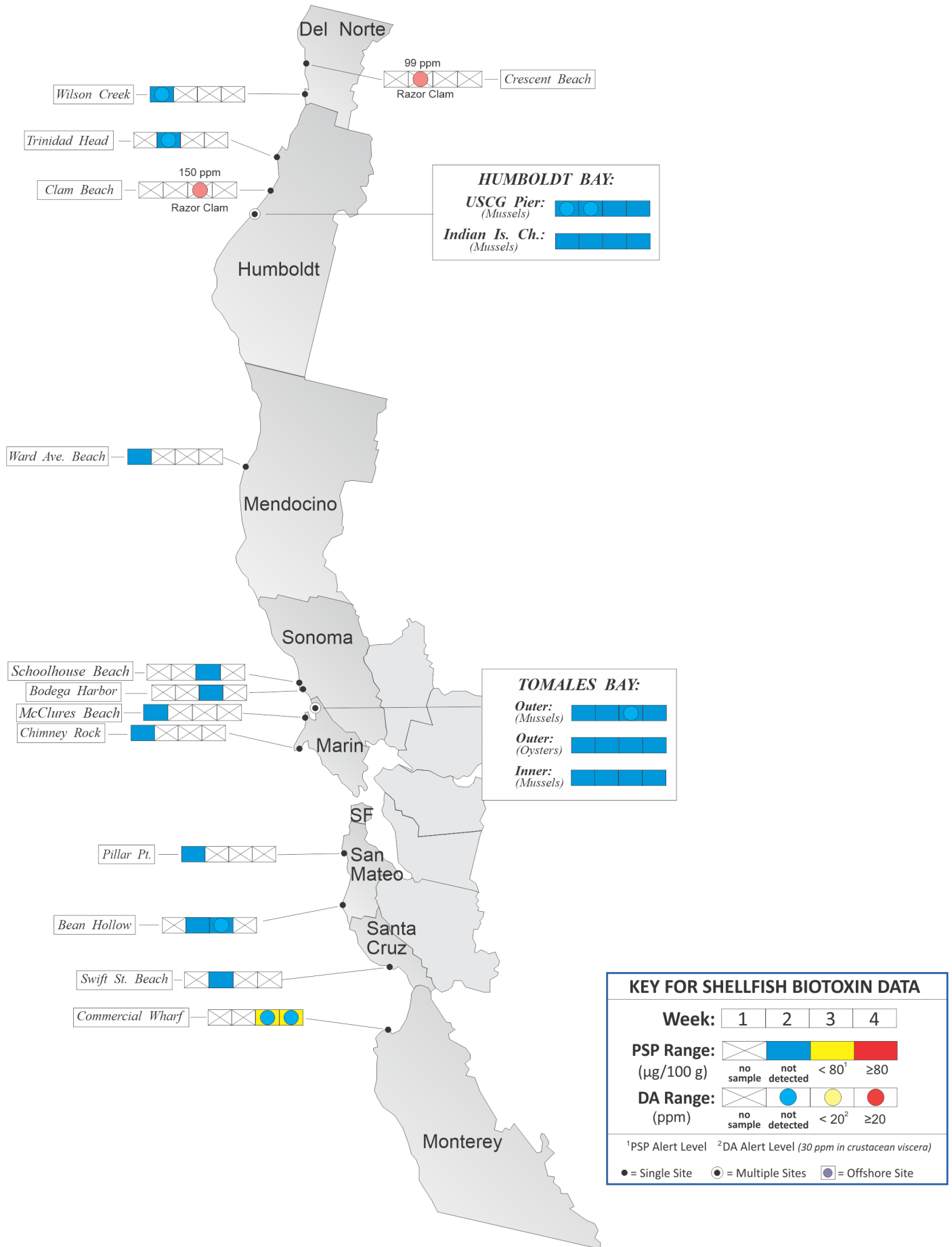
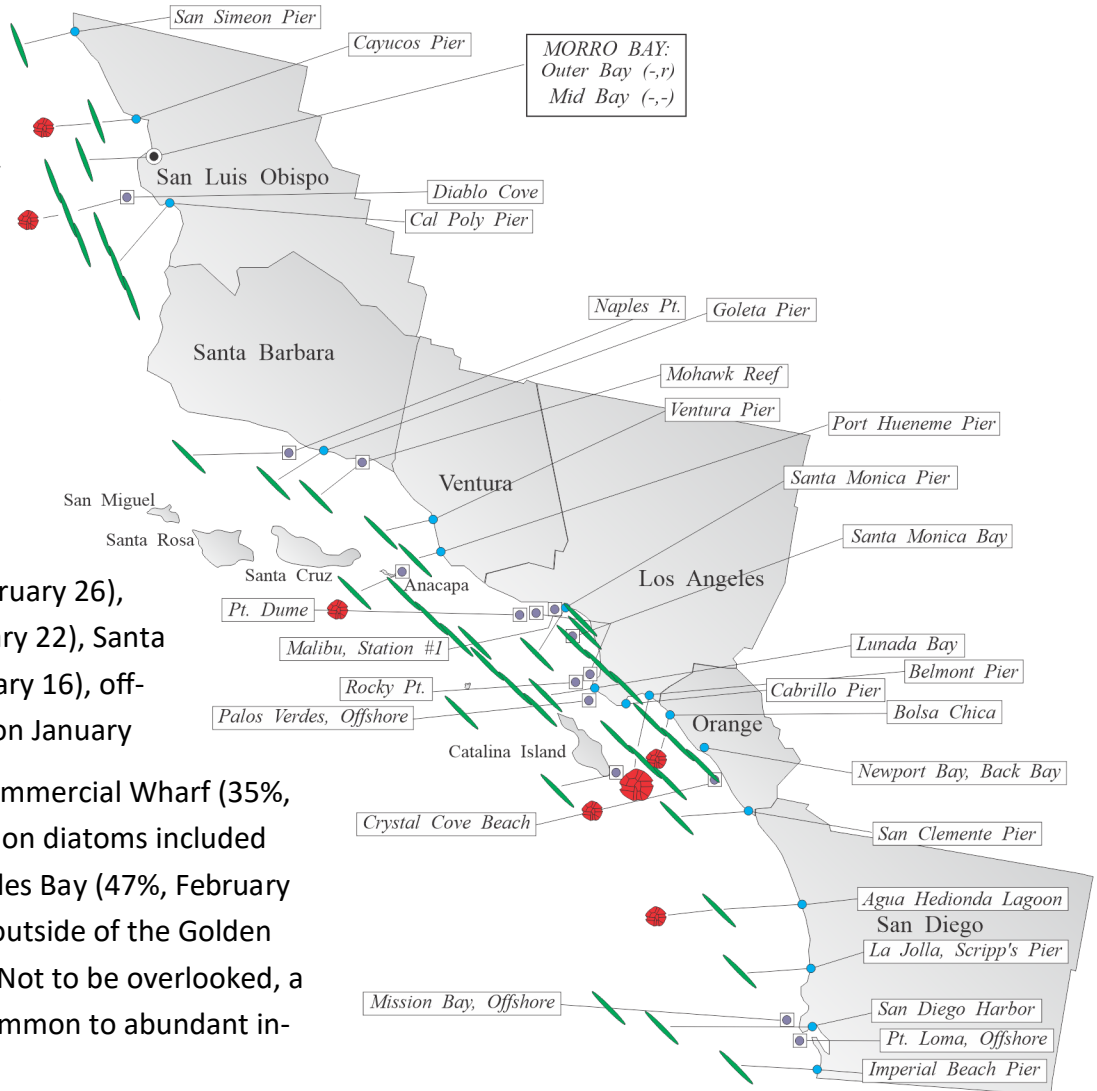


Figure 2. Distribution of shellfish biotoxins in northern California.

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Figure 3. Toxic phytoplankton distribution in southern California.

at most coastal sampling locations but increased moderately in more protected waters. *Chaetoceros* was common inside Humboldt Bay (20%, February 24), as was *Cylindrotheca* (25%, February 17). *Chaetoceros* was also common at the following sampling sites: Tomales Bay (30%, February 23), Bolinas Lagoon (43%, February 26), Pacifica Pier (47%, February 22), Santa Cruz Wharf (35% on January 16), offshore of Monterey (40% on January 29), and the Monterey Commercial Wharf (35%, February 2). Other common diatoms included *Thalassiosira* inside Tomales Bay (47%, February 16) and *Asterionella* just outside of the Golden Gate (38%, February 27). Not to be overlooked, a variety of ciliates were common to abundant inside Tomales Bay.



Southern California Summary:

Paralytic Shellfish Poisoning:

The distribution of *Alexandrium* remained widespread along the southern California coast in February (Figure 3). This dinoflagellate was observed at sites in each coastal county except Santa Barbara and Ventura. An elevated number of *Alexandrium* cells was observed in a February 29 sample from Belmont Pier. Low numbers of *Alexandrium* were observed at Cayucos Pier (February 11) and offshore of Diablo Cove in San Luis Obispo County (February 21 and 26); offshore of Pt. Dume in Los Angeles County (February 15); in Bolsa Chica Lagoon (February 7, 14, 21, 28) and offshore of Crystal Cove



The percent composition of *Pseudo-nitzschia* increased along the coast of several counties during February.

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(February 5) in Orange County; and inside Agua Hedionda Lagoon in San Diego County (February 12 and 19). PSP toxicity was not detected in any mussel or oyster samples in February (Figure 4).

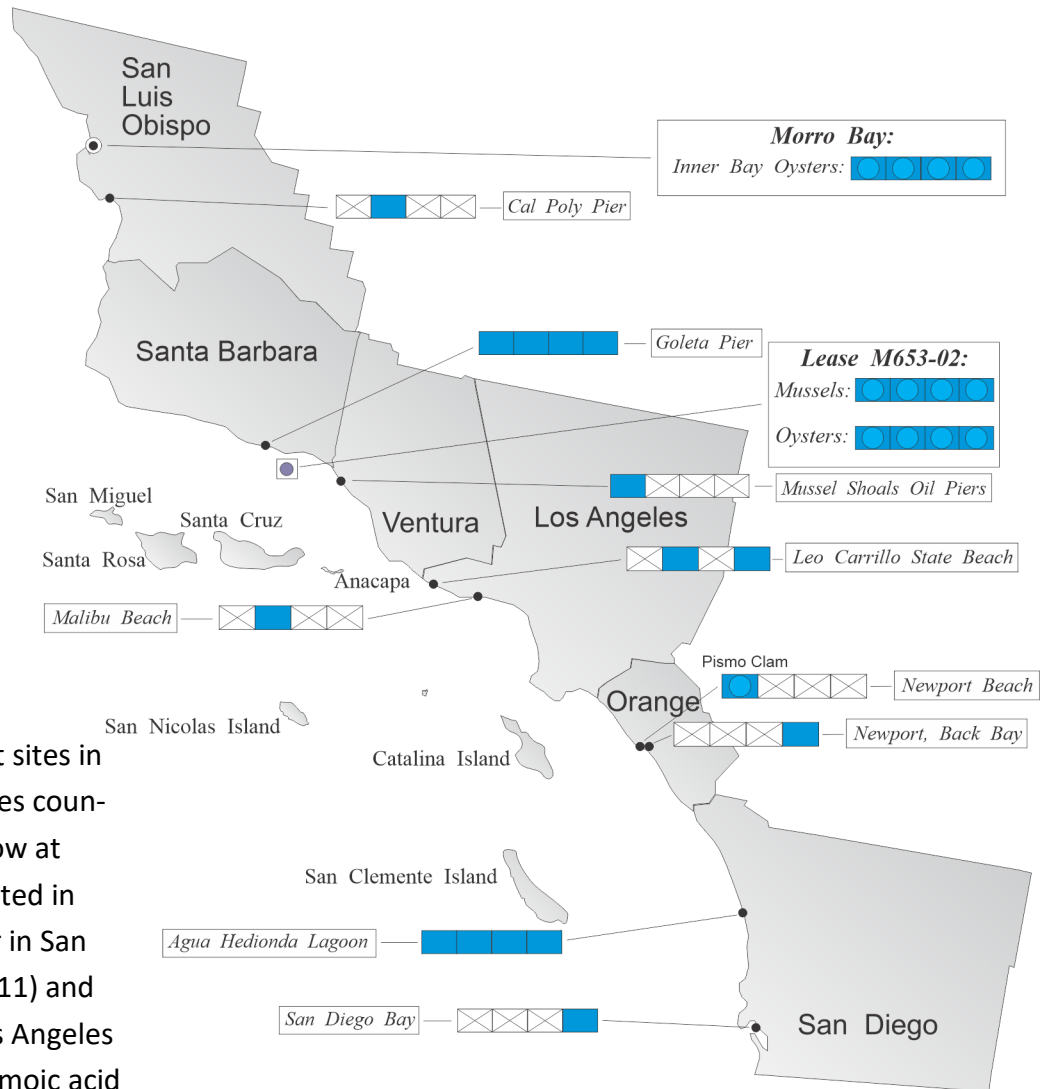
Domoic Acid

Pseudo-nitzschia continued to be observed at one or more sites in each coastal county in February (Figure 3). There was a significant increase in the percent composition of this diatom compared to observations in January, particularly at sites in San Luis Obispo and Los Angeles counties. The cell mass remained low at most sites, being slightly elevated in samples from the Cal Poly Pier in San Luis Obispo County (February 11) and inside Santa Monica Bay in Los Angeles County (February 6 and 8). Domoic acid was not detected in any mussel or oyster samples during February (Figure 4).

Non-Toxic Species

Diatoms dominated the phytoplankton

Figure 4. Distribution of shellfish biotoxins in southern California.



assemblage along the southern California coast in February. The diatom *Chaetoceros* was abundant in samples from offshore of Diablo Cove in San Luis Obispo County (50%, February 7) and in

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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's health is threatened.

For Information on Volunteering:

For Recorded Biotoxin Information Call:

Email redtide@cdph.ca.gov or call 510-412-4635

(800) 553 - 4133

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Santa Monica Bay (67%, February 7) and offshore of the Palos Verdes Peninsula (77%, February 14) in Los Angeles County. This diatom was also common at sites in Ventura, Orange, and San Diego counties. Other common diatoms included *Thalassiosira* (Cal Poly Pier, February 11), *Bacteriastrium* (Anacapa Island, February 12; San Clemente Pier, February 19; offshore of Mission Bay, February 5), and *Lauderia* (Cabrillo Beach Pier, February 22).

The dinoflagellate *Lingulodinium polyedrum* was common at several sites in Santa Monica Bay and inside Agua Hedionda Lagoon.

QUARANTINES:

On December 20 CDPH lifted the domoic acid health advisory for sport-harvested mussels, scallops, and clams in Mendocino County.

On November 19 CDPH lifted the domoic acid health advisory in Humboldt County for all bivalve shellfish except razor clams.

The CDFW closure of the razor clam fishery remains in effect due to the continued presence of dangerous levels of domoic acid in razor clams from beaches in Humboldt and Del Norte counties.

Consumers of Washington clams, also known as butter clams (*Saxidomus nuttalli*), are cautioned to eat only the white meat. Washington clams can concen-

Table 1. Program participants collecting phytoplankton samples.

| AGENCY | # | AGENCY | # |
|--|---|--|---|
| DEL NORTE COUNTY | | Yurok Tribe Environmental Program | 1 |
| HUMBOLDT COUNTY | | | |
| Coast Seafood Company | 3 | Humboldt State University Marine Lab | 1 |
| MENDOCINO COUNTY | | None Submitted | |
| SONOMA COUNTY | | CDPH Marine Biotoxin Program | 1 |
| MARIN COUNTY | | CDPH Volunteer (<i>Brent Anderson</i>) | 4 |
| CDPH Marine Biotoxin Program | 1 | Hog Island Oyster Company | 6 |
| CONTRA COSTA COUNTY | | | |
| CDPH Volunteer (<i>Russel Shearer</i>) | 1 | CDPH Marine Biotoxin Program | 3 |
| ALAMEDA COUNTY | | CDPH Volunteer (<i>Joe Ferrie</i>) | 1 |
| SAN FRANCISCO COUNTY | | | |
| CDPH Volunteer (<i>Eugenia McNaughton</i>) | 3 | Exploratorium | 1 |
| SAN MATEO COUNTY | | | |
| San Mateo County Environmental Health Dept. | 4 | The Marine Mammal Center | 4 |
| SANTA CRUZ COUNTY | | | |
| Nomad Charters | 2 | U.C. Santa Cruz | 4 |
| MONTEREY COUNTY | | California Department of Parks and Recreation | 1 |
| Monterey Abalone Company | 4 | Pacific Grove Museum of Natural History | 2 |
| SAN LUIS OBISPO COUNTY | | | |
| CDPH Volunteers (<i>Dan Hoskins, Skip Rotstein</i>) | | | 2 |
| CDPH Marine Biotoxin Program | 2 | Grassy Bar Oyster Company | 2 |
| Monterey Bay National Marine Sanctuary | 3 | Tenera Environmental | 4 |
| SANTA BARBARA COUNTY | | | |
| Santa Barbara Channelkeeper | 2 | U.C. Santa Barbara | |
| VENTURA COUNTY | | | |
| CDPH Volunteer (<i>Fred Burgess</i>) | 4 | National Park Service | 1 |
| NOAA Channel Islands National Marine Sanctuary | 1 | Ventura County Environmental Health Dept. | 1 |
| LOS ANGELES COUNTY | | City of L.A. Environmental Monitoring Division | 3 |
| CDPH Volunteers (<i>Cal Parsons, Gina Lumbruno, Michelle Tran</i>) | | | 3 |
| Los Angeles County Health Department | 1 | Los Angeles County Sanitation District | 1 |
| Los Angeles Water Keeper | 7 | Malibu Oyster Company | 1 |
| ORANGE COUNTY | | | |
| Amigos de Bolsa Chica | 4 | Back Bay Science Center | 2 |
| CDPH Volunteer (<i>Truong Nguyen</i>) | 1 | Crystal Cove Alliance | 1 |
| SAN DIEGO COUNTY | | Carlsbad Aquafarms, Inc. | 3 |
| Scripps Institute of Oceanography | 4 | SEACAMP/HABNet | 2 |
| Tijuana River National Estuary Research | 3 | U.S. Navy Marine Mammal Program | 4 |

trate 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

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as well as in the viscera.

PSP toxins can produce a tingling around the mouth and fingertips within a few minutes to a few hours after eating toxic shellfish. These symptoms can be 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 seafood species such as crab, lobster, and small finfish like sardines and anchovies.

Table 2. Program participants collecting shellfish samples.

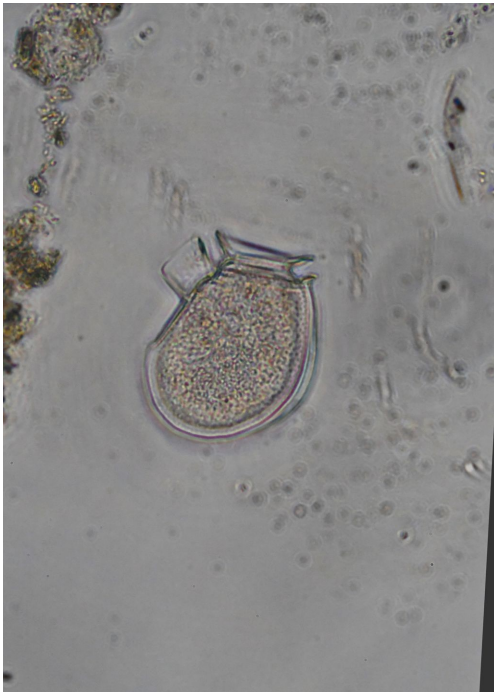
| COUNTY | AGENCY | # |
|-----------------|--|---|
| Del Norte | CDPH Volunteer (<i>Ken Graves</i>) | 6 |
| | Yurok Tribe Environmental Program | 1 |
| Humboldt | California Department of Fish and Wildlife | 6 |
| | Coast Seafood Company | 8 |
| | Humboldt County Environmental Health Department | 1 |
| Mendocino | Mendocino County Environmental Health Department | 1 |
| Sonoma | CDPH Marine Biotoxin Program | 2 |
| Marin | CDPH Marine Biotoxin Program | 2 |
| | Cove Mussel Company | 3 |
| | Hog Island Oyster Company | 8 |
| | Starbird Mariculture | 1 |
| San Francisco | None Submitted | |
| San Mateo | CDPH Volunteer (<i>Sam Greenberg</i>) | 1 |
| | San Mateo County Environmental Health Department | 2 |
| Santa Cruz | CDPH Volunteer (<i>Stuart Jackson</i>) | 1 |
| Monterey | Monterey Abalone Company | 2 |
| San Luis Obispo | CDPH Marine Biotoxin Program | 1 |
| | Grassy Bar Oyster Company | 4 |
| Santa Barbara | Santa Barbara Mariculture Company | 8 |
| | U.C. Santa Barbara | 4 |
| Ventura | Ventura County Environmental Health Department | 1 |
| Los Angeles | CDPH Volunteer (<i>Steven Field</i>) | 2 |
| | Los Angeles County Health Department | 1 |
| Orange | Back Bay Science Center | 1 |
| | CDPH Volunteer (<i>Steve Crooke</i>) | 1 |
| San Diego | Carlsbad Aquafarm, Inc. | 4 |
| | U.S. Navy Marine Mammal Program | 1 |

Sport harvesters should only collect shellfish from areas that are not affected by a current health advisory or quarantine. Contact the “Biotoxin Information Line” at 1-800-553-4133 for a current update on marine biotoxin activity prior to gathering and consuming shellfish.

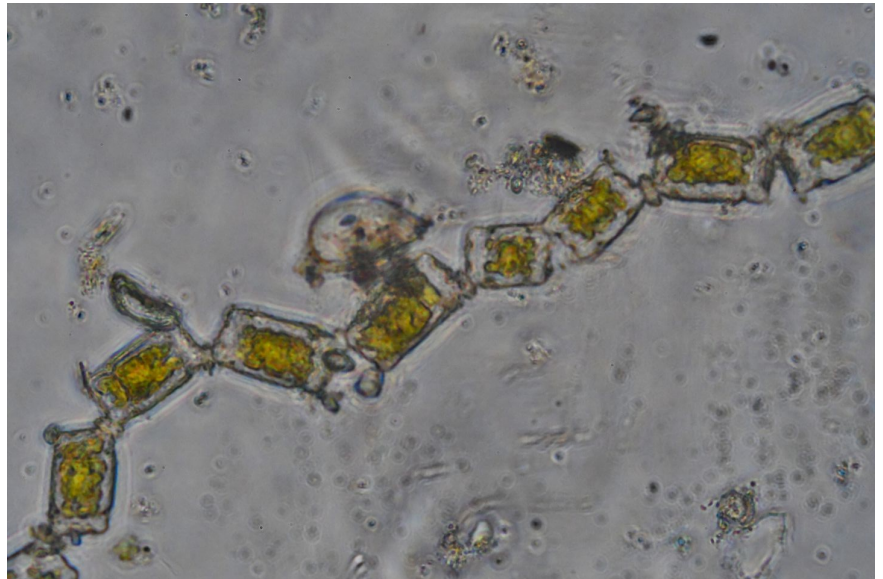


If you are having difficulty accessing this document, please contact CDPH at 1-800-553-4133 to request this information in an alternate format.

Phytoplankton Gallery



Dinophysis fortii, one of several species that produce the diarrhetic shellfish poisons (DSP).



A chain of the diatom *Odontella*.



The diatom *Ditylum*.