



Marine Biotoxin Monitoring Report

April 2020

Technical Report No. 20-17

INTRODUCTION:

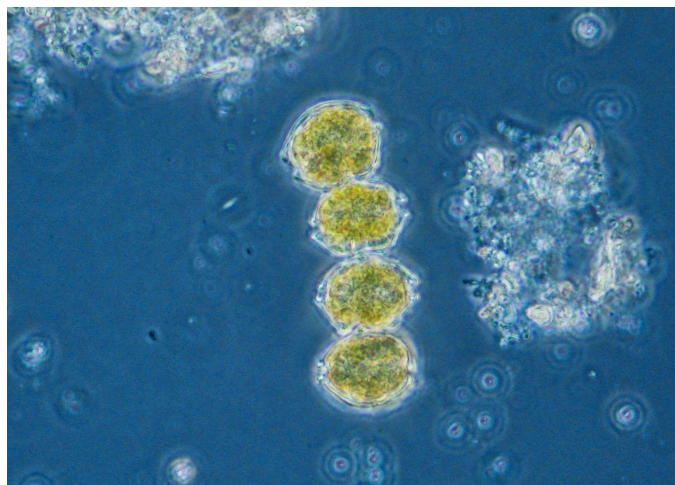
This report contains results from the California Department of Public Health (CDPH) monitoring programs for shellfish toxins and associated toxin-producing phytoplankton. Toxin concentration ranges are provided for the paralytic shellfish poisoning (PSP) toxins and for domoic acid (DA), the latter associated 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 only one northern California location in April. Moderate numbers of this dinoflagellate were observed in samples from the Humboldt Bay sentinel station on April 6, 20, and 27 (Figure 1). The highest percent composition of *Alexandrium* (1%) was observed on the latter date.

PSP toxins were detected in mussel samples from



Alexandrium was observed in northern and southern California sites during April.

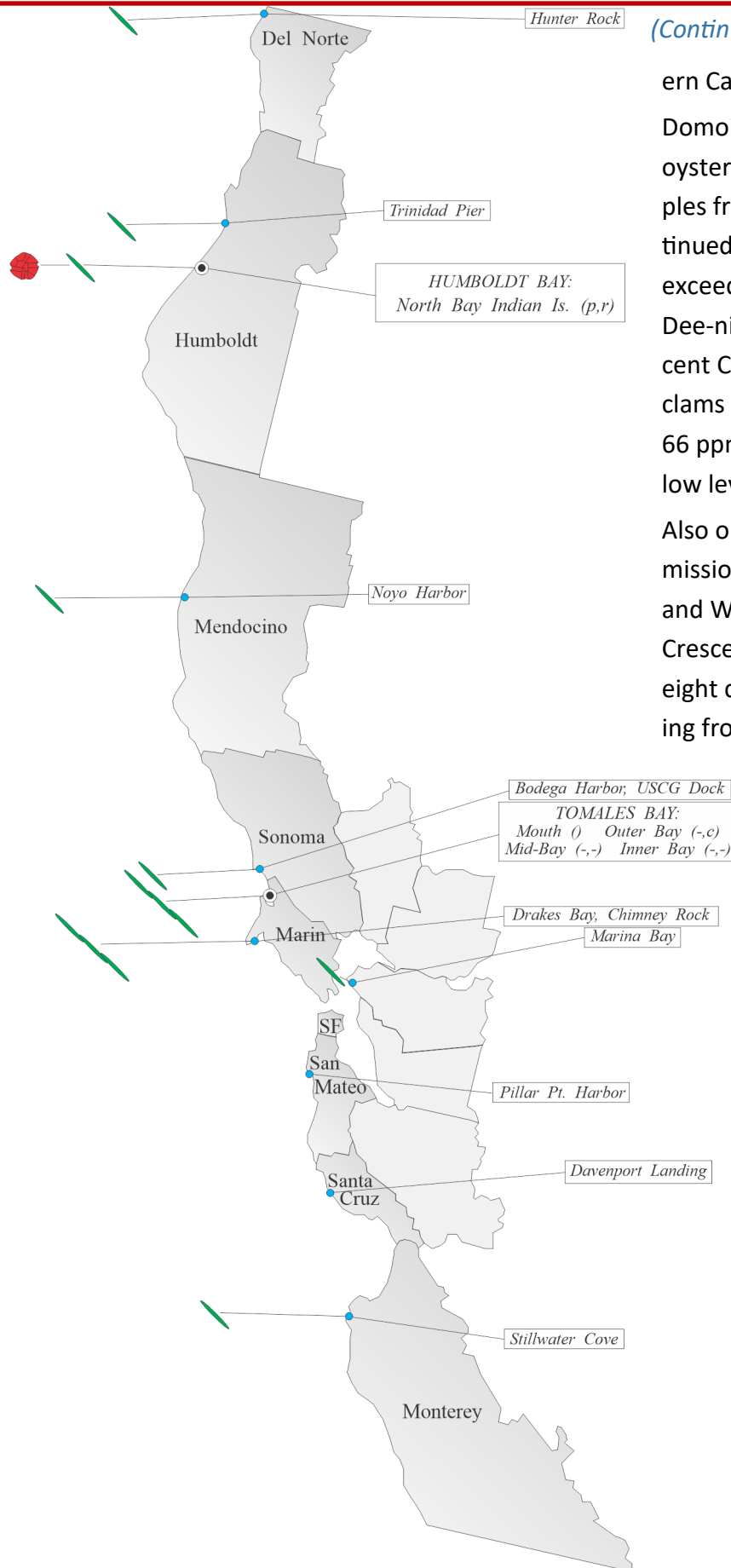
Hunter Rock in Del Norte County (37 µg/100 g; April 2); Humboldt Bay (April 20; 40 µg/100 g); and Eureka in Humboldt County (39 and 36 µg/100 g on April 3 and 13, respectively).

Domoic Acid

Pseudo-nitzschia was observed at numerous sites between Del Norte and Monterey counties in April (Figure 1), similar to observations in March. This diatom was common in outer Tomales Bay (10% and 15% on April 20 and April 27, respectively) and at the Drakes Bay sentinel station (35% on April 14). The cell mass was elevated in all three samples. Cell numbers were low at all other sites along the north-

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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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ern California coast.

Domoic acid was not detected in any mussel or oyster samples in April, however razor clam samples from Del Norte and Humboldt counties continued to contain concentrations of this toxin that exceeded the alert level (Figure 2). The Tolowa Dee-ni' Nation collected razor clams from Crescent City, South Beach on April 9. Four of the six clams exceeded the alert level, ranging from 23 to 66 ppm. The remaining two samples contained low levels of domoic acid (6.4 and 12 ppm).

Also on this date volunteer Ken Graves, with permission from the California Department of Fish and Wildlife (CDFW), collected razor clams from Crescent Beach in Del Norte County. Three of the eight clam samples exceeded the alert level, ranging from 23 to 65 ppm. The remaining five clam

samples all contained toxin, ranging from 6.4 to 16 ppm.

CDFW collected six razor clam samples from Clam Beach in Humboldt County, also on April 9. Four of the six clams exceeded the alert level, ranging from 30 to 46 ppm. One of the remaining two clam samples was just below the alert level (17 ppm) and the other did not contain a detectable amount of toxin.

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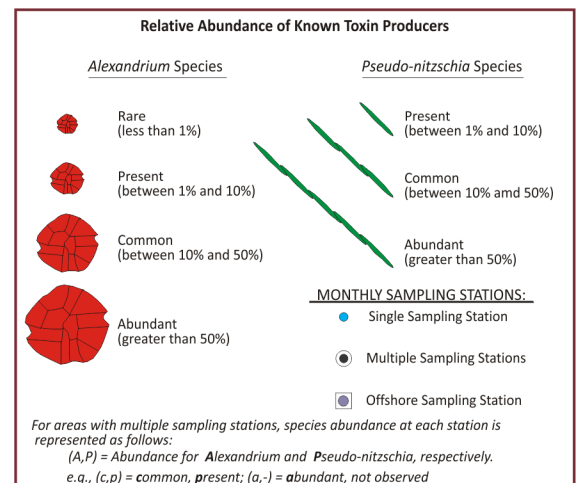


Figure 1. Toxic phytoplankton distribution in northern California.

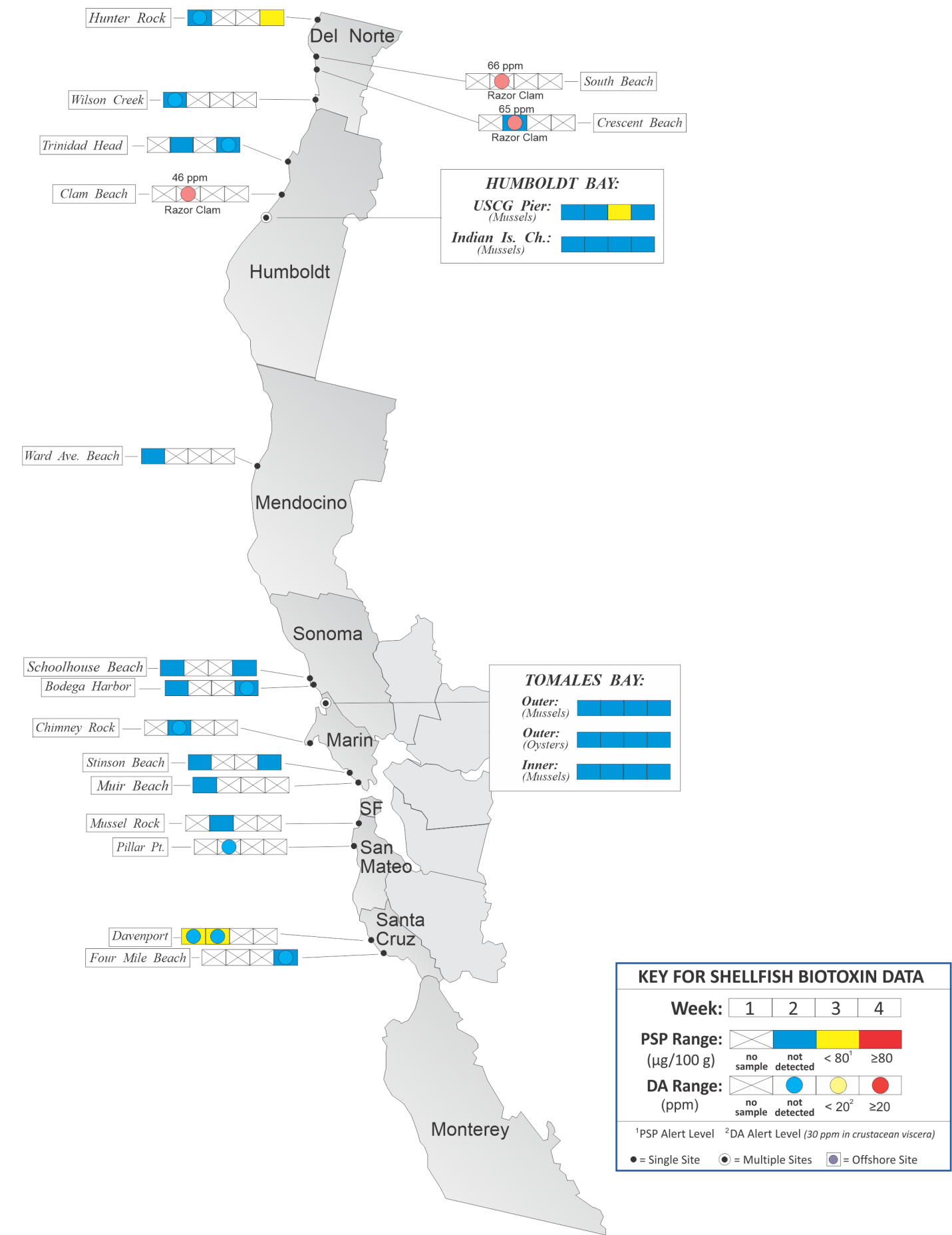


Figure 2. Distribution of shellfish biotoxins in northern California.

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Figure 3. Toxic phytoplankton distribution in southern California.

Although razor clams in both Del Norte and Humboldt counties continue to contain dangerous levels of domoic acid, the magnitude of toxicity has decreased compared to concentrations detected over the past several months.

Non-Toxic Species

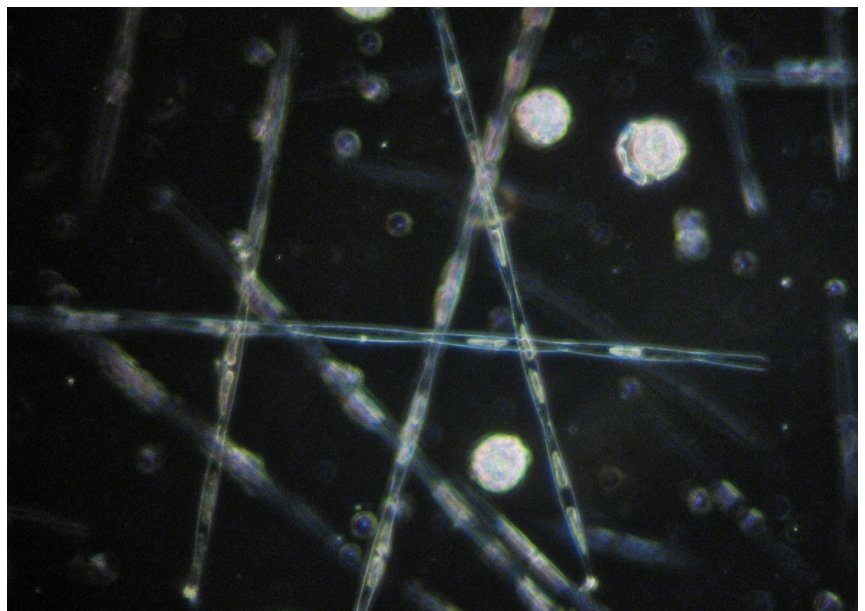
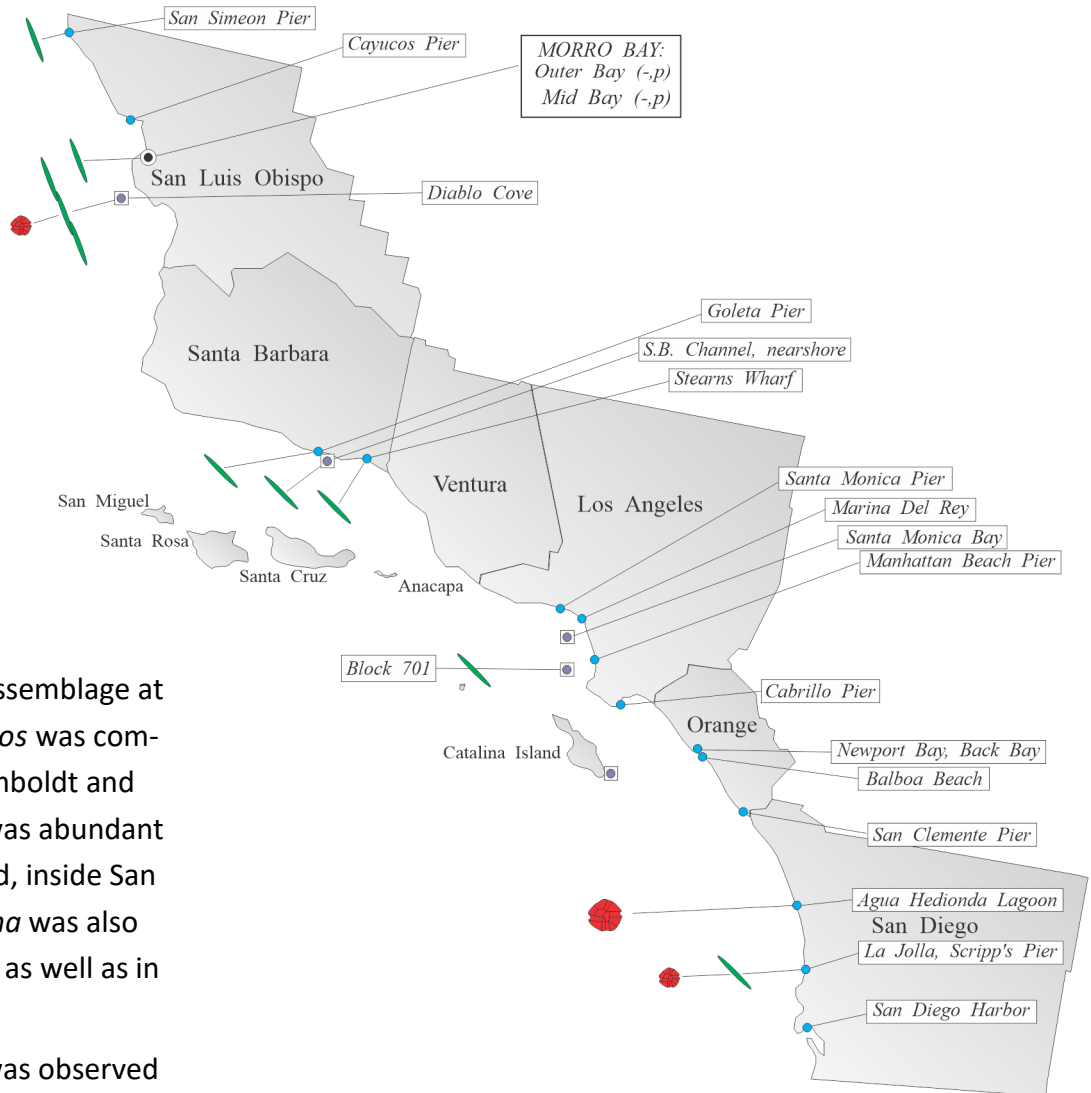
Phytoplankton abundance continued to increase along the northern California coast in April, with diatoms dominating the assemblage at most locations. *Chaetoceros* was common at sites between Humboldt and San Mateo counties and was abundant at Marina Bay in Richmond, inside San Francisco Bay. *Skeletonema* was also common at the latter site, as well as in Humboldt Bay.

A bloom of *Rhizosolenia* was observed in outer Tomales Bay on April 12, declining over the following two weeks. This diatom was also common in Stillwater Cove (Monterey County). Bloom levels of *Melosira* were observed at Noyo Harbor in Mendocino County (April 30).

Southern California Summary:

Paralytic Shellfish Poisoning:

Alexandrium was observed at three sites in April (Figure 3). Low numbers of this dinoflagellate occurred in samples collected offshore of Diablo Cove



A darkfield photograph of the diatom *Pseudo-nitzschia*.

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in San Luis Obispo County (April 10) and at the Scripps Pier in La Jolla, San Diego County (April 13 and 27). Greater numbers of *Alexandrium* were present in outer Agua Hedionda Lagoon in northern San Diego County on April 15. PSP toxins were not detected in any shellfish sampled in April (Figure 4).

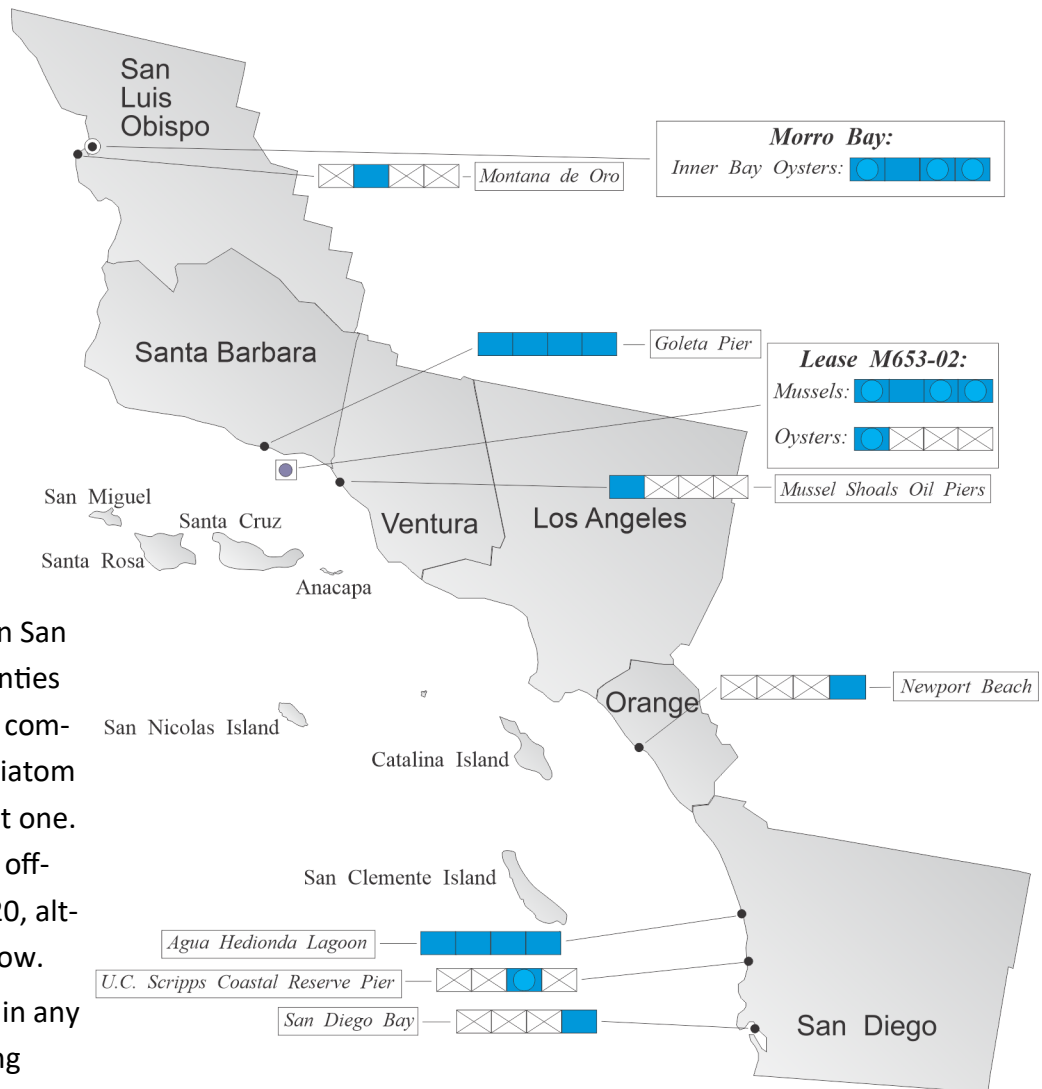
Domoic Acid

Pseudo-nitzschia was observed at most sampling sites between San Luis Obispo and San Diego counties in April (Figure 3). The percent composition and cell mass of this diatom remained low at all sites except one. *Pseudo-nitzschia* was common offshore of Diablo Cove on April 20, although the cell numbers were low. Domoic acid was not detected in any mussel or oyster samples during April (Figure 4).

Non-Toxic Species

The diatom *Chaetoceros* was abundant in outer and mid Morro Bay,

Figure 4. Distribution of shellfish biotoxins in southern California.



offshore of Diablo Cove, and at Goleta Pier in Santa Barbara County. The dinoflagellates *Ceratium furca* and *Lingulodinium polyedrum* were also common at the latter site.

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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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L. polyedrum dominated the phytoplankton assemblage from Los Angeles to San Diego, being the only species ranked as Common or Abundant throughout this range (with the exception of *Chaetoceros* in the Back Bay of Newport Bay). This dinoflagellate accounted for 95% of the phytoplankton at Santa Monica Pier (April 20); 85% in Santa Monica Bay (April 23); 88% at Cabrillo Pier (April 8); 97% in outer Agua Hedionda Lagoon (April 29); and 87% and 84% at the Scripps Pier in La Jolla, San Diego County (April 7 and 20, respectively). The highest relative abundance observed was in Agua Hedionda Lagoon, which was more than 40 times the next highest observed abundance at Cabrillo Pier on April 8.

QUARANTINES:

The annual mussel quarantine is scheduled to begin on May 1. This



Table 1. Program participants collecting phytoplankton samples.

AGENCY	#	AGENCY	#
DEL NORTE COUNTY		Tolowa Dee-ni' Nation	1
HUMBOLDT COUNTY			
Humboldt State University Marine Lab	1	Pacific Shellfish	4
MENDOCINO COUNTY			
CDPH Volunteer (Kristin Gordon)	3	Mendocino Area Parks Association	1
SONOMA COUNTY		CDPH Marine Biotoxin Program	2
MARIN COUNTY			
CDPH Marine Biotoxin Program	1	Hog Island Oyster Company	6
CONTRA COSTA COUNTY		CDPH Marine Biotoxin Program	4
SAN FRANCISCO COUNTY			
SAN MATEO COUNTY		CDPH Marine Biotoxin Program	1
SANTA CRUZ COUNTY		CDPH Marine Biotoxin Program	1
MONTEREY COUNTY		Pacific Grove Museum of Natural History	3
SAN LUIS OBISPO COUNTY			
CDPH Volunteers (Skip Rotstein, Dan Hoskins)	4	Grassy Bar Oyster Company	3
Tenera Environmental	2	U.C. Santa Barbara	1
SANTA BARBARA COUNTY			
Santa Barbara Channelkeeper	1	U.C. Santa Barbara	7
VENTURA COUNTY			
LOS ANGELES COUNTY			
CDPH Volunteers (Gina Lumbruno, Cal Parsons)	4	City of L.A. Environmental Monitoring Division	5
ORANGE COUNTY			
Back Bay Science Center	3	Orange County Health Care Agency	1
SAN DIEGO COUNTY		Carlsbad Aquafarms, Inc.	2
Scripps Institute of Oceanography	4	U.S. Navy Marine Mammal Program	4

quarantine applies to the sport-harvesting of mussels along the entire California coast, including all bays and estuaries.

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 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



Samples of *Lingulodinium* bloom in Agua Hedionda Lagoon before (left) and after (right) settling.

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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 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

Table 2. Program participants collecting shellfish samples.

COUNTY	AGENCY	#
Del Norte	CDPH Volunteer (<i>Ken Graves</i>)	8
	Tolowa Dee-ni' Nation	9
	Yurok Tribe Environmental Program	1
Humboldt	California Department of Fish and Wildlife	6
	CDPH Volunteer (<i>Georgina Wood</i>)	1
	Pacific Shellfish	8
	Humboldt County Environmental Health Department	1
Mendocino	Mendocino County Environmental Health Department	1
Sonoma	CDPH Marine Biotoxin Program	4
Marin	CDPH Marine Biotoxin Program	2
	CDPH Volunteers (<i>Jamie Sutton, Rand Dobleman</i>)	2
	Hog Island Oyster Company	8
	Tomales Bay Oyster Company	4
San Francisco	None Submitted	
San Mateo	CDPH Volunteer (<i>Gary Della Maggiora</i>)	1
Santa Cruz	CDPH Marine Biotoxin Program	2
	CDPH Volunteer (<i>Richard Buddington</i>)	1
Monterey	None Submitted	
San Luis Obispo	CDPH Volunteer (<i>Stuart Helmtoller</i>)	1
	Grassy Bar Oyster Company	4
Santa Barbara	Santa Barbara Mariculture Company	5
	U.C. Santa Barbara	5
Ventura	Ventura County Environmental Health Department	1
Los Angeles	None Submitted	
Orange	Orange County Health Care Agency	1
San Diego	Carlsbad Aquafarm, Inc.	5
	University of California Scripps Coastal Reserve Pier	1
	U.S. Navy Marine Mammal Program	1

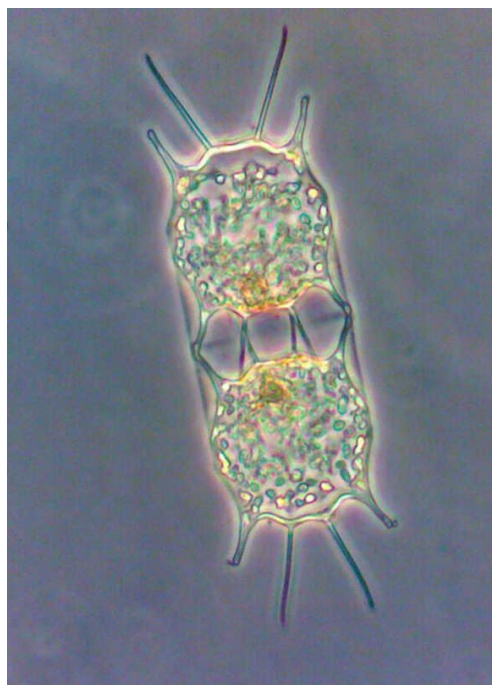
species such as crab, lobster, and small finfish like sardines and anchovies.

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.

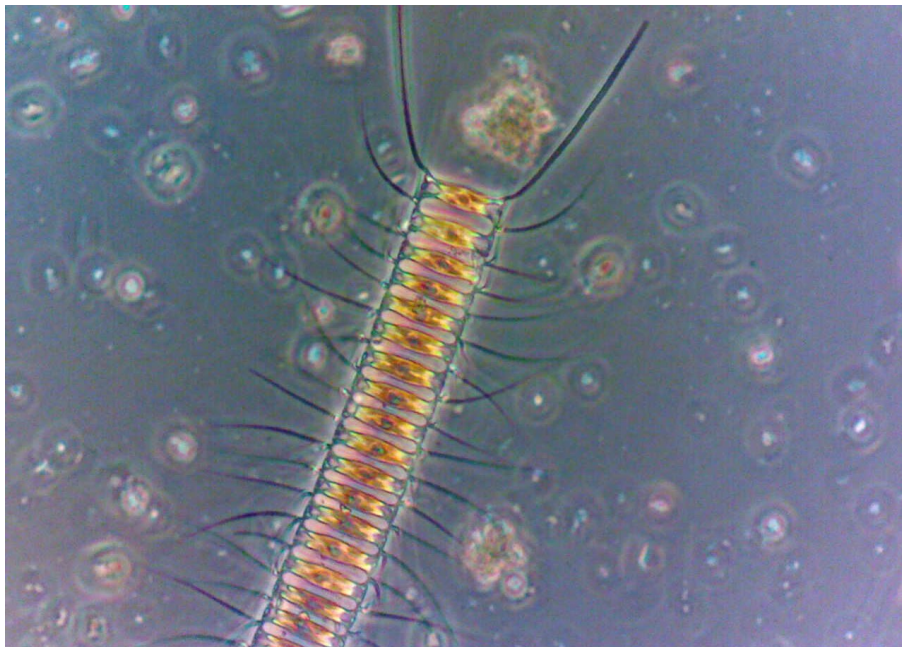


If you are having difficulty accessing this document, please contact CDPH at 1-800-553-4133 to request this information in an alternate for-

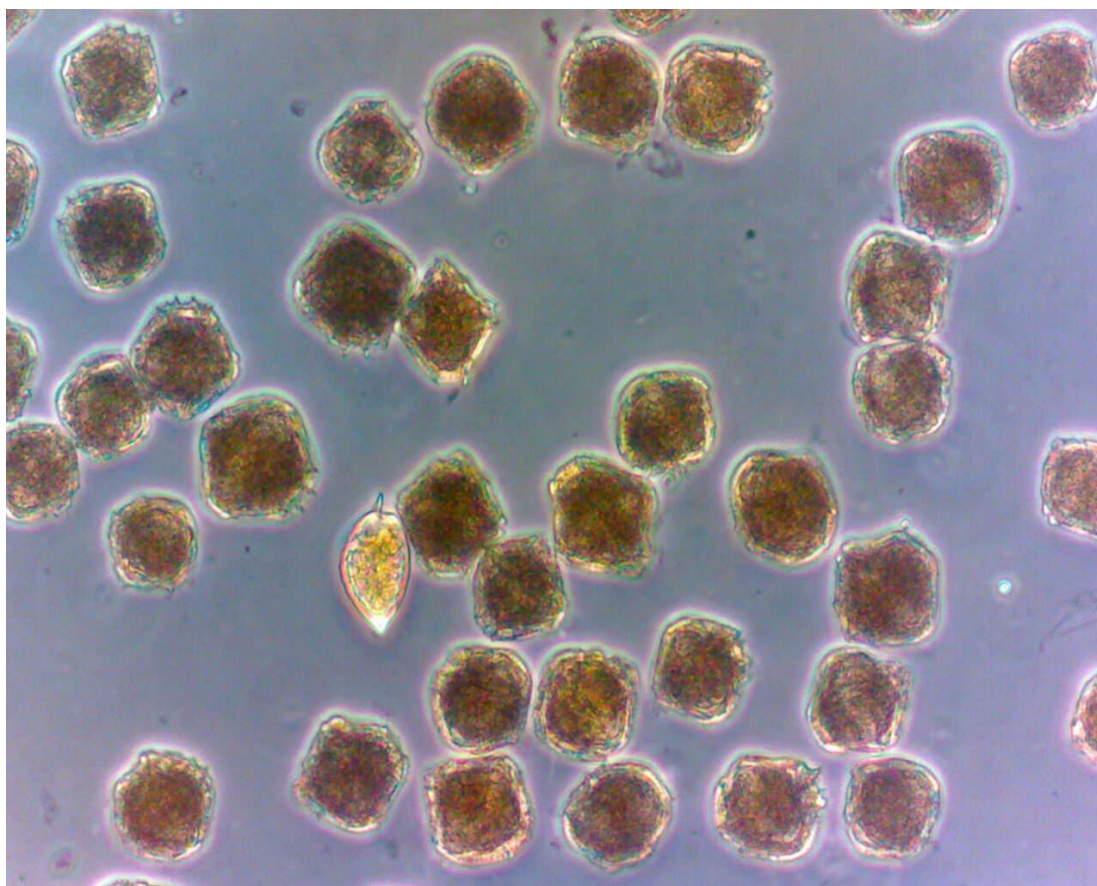
Phytoplankton Gallery



The diatom *Odontella*.



The diatom *Chaetoceros*.



Blooms of the dinoflagellate *Lingulodinium polyedrum* were observed along the southern California coast between Los Angeles and San Diego counties.