

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 2009

Technical Report No. 09-25

INTRODUCTION:

This report provides a summary of biotoxin activity for the month of September, 2009. 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 all sampling locations along the San Luis Obispo coast and at two locations in Santa Barbara during September (Figure 1). Cell numbers for this dinoflagellate were low at these locations.

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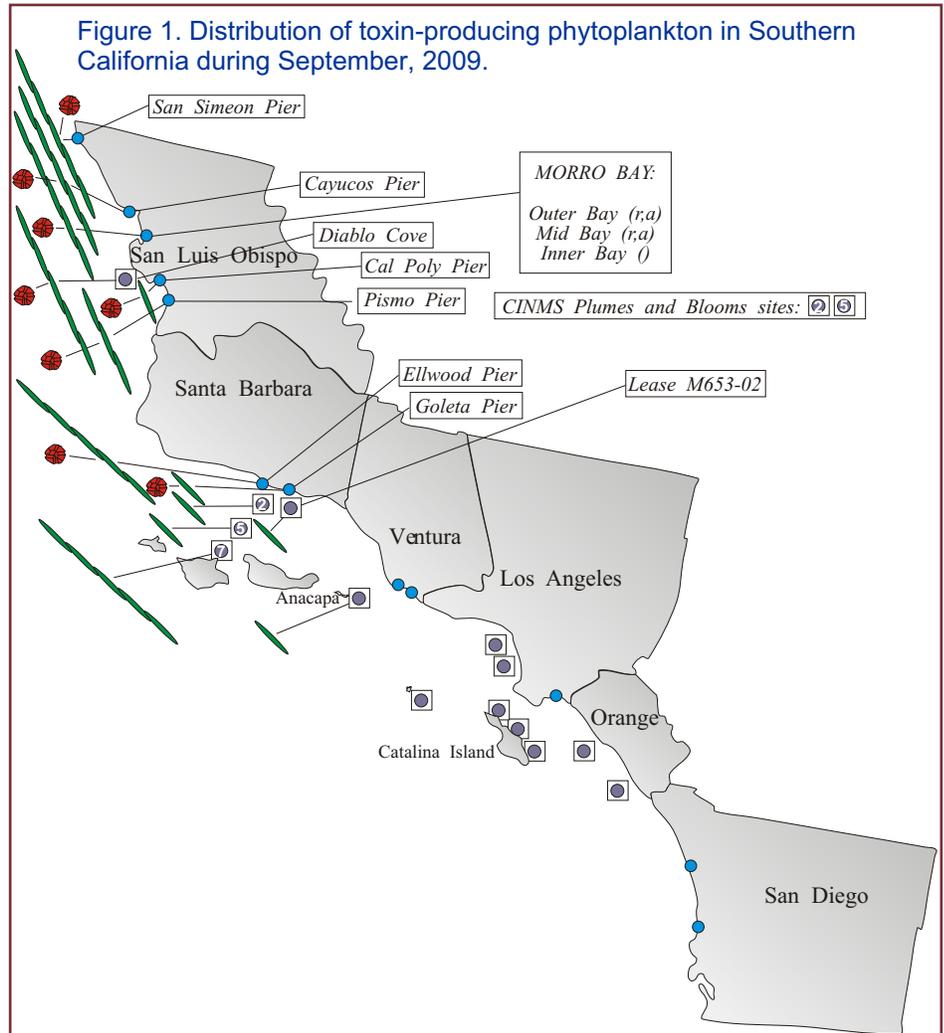


Figure 1. Distribution of toxin-producing phytoplankton in Southern California during September, 2009.

Relative Abundance of Known Toxin Producers

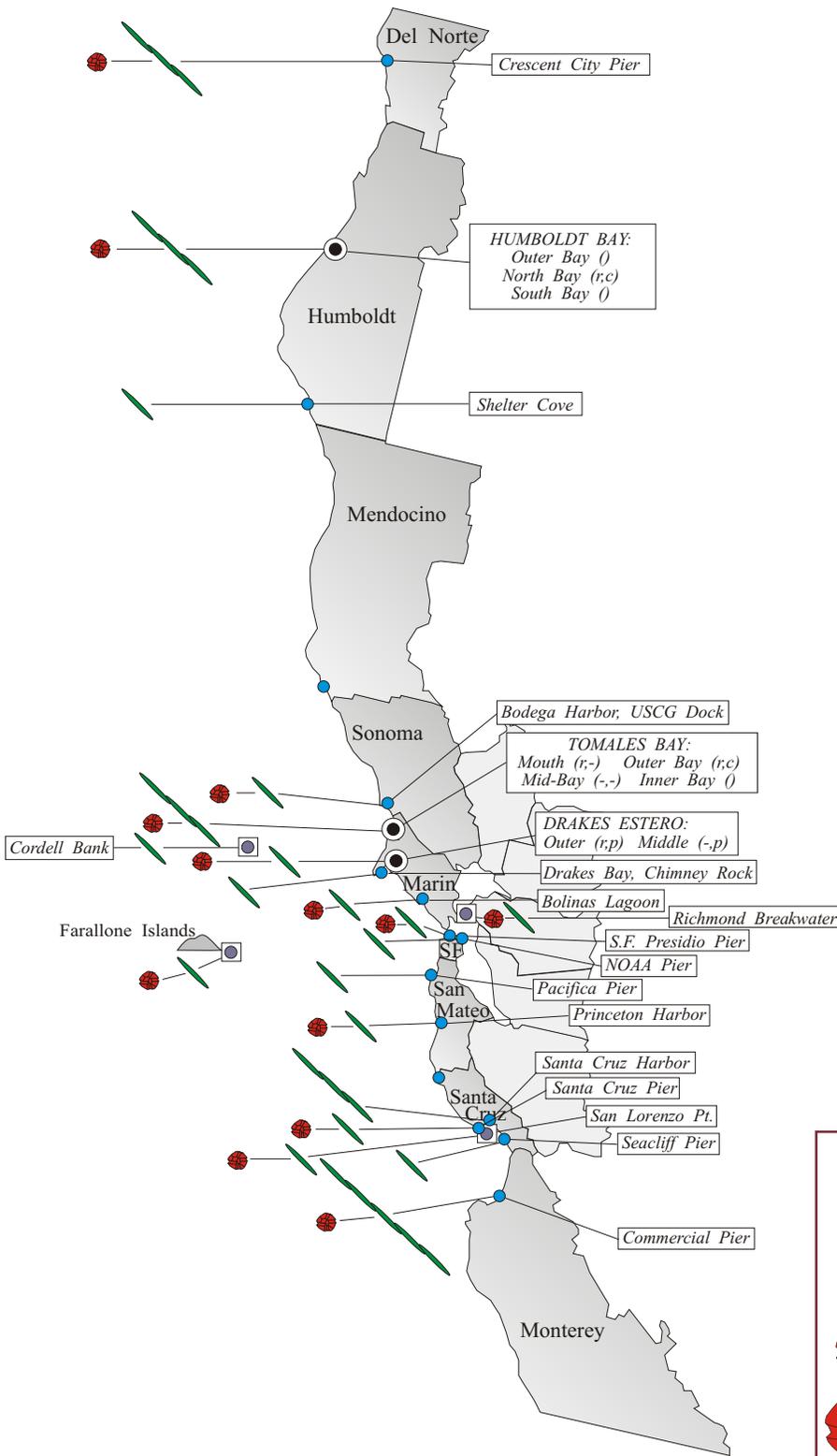
Alexandrium Species	Pseudo-nitzschia Species
 Rare (less than 1%)	 Present (less than 10%)
 Present (between 1% and 10%)	 Common (between 10% and 50%)
 Common (between 10% and 50%)	 Abundant (greater than 50%)
 Abundant (greater than 50%)	

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, 2009.



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Low concentrations of the PSP toxins were detected in shellfish samples collected from Cal Poly Pier and inside Morro Bay.

Domoic Acid

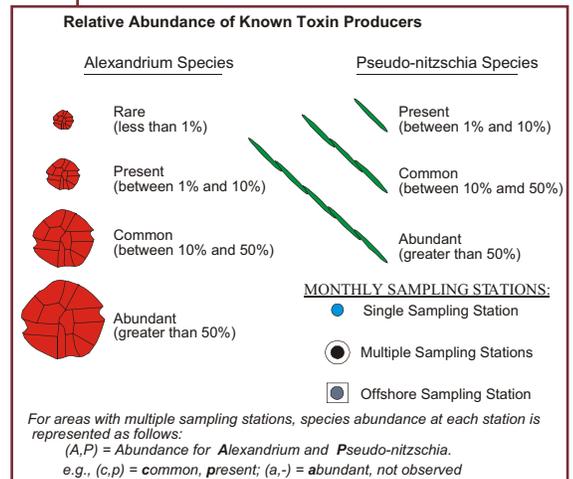
Pseudo-nitzschia was detected along the San Luis Obispo and Santa Barbara coast during September (Figure 1). There was an increase in the abundance of this diatom at sites along the San Luis Obispo coast and a striking decrease along the remainder of the southern California coast, with *Pseudo-nitzschia* disappearing from all samples south of Santa Barbara. There also appeared to be a shift from the nontoxic *Pseudo-nitzschia* species in the delicatissima complex to the toxic species in the seriata complex. As previously noted, these distinctions are considered tentative given the difficulty in identifying species of this diatom with light microscopy. The highest cell densities were observed in samples from offshore of Diablo Cove (September 18) and in outer Morro Bay (September 29).

Low levels of domoic acid were detected in shellfish samples collected from two locations in Morro Bay during September (Figure 3).

Non-toxic Species

Diatoms dominated the San Luis Obispo coast, whereas dinoflagellates became

(Continued on Page 3)



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Domoic Acid

Pseudo-nitzschia was observed at most sampling locations in September (Figure 2). There was a decline in the relative abundance of this diatom at sites between Marin and Sonoma counties, with a dramatic increase at the Monterey commercial pier. Although the percent composition was high at the latter site (65%), the cell density was relatively low. Domoic acid was not detected in any shellfish samples collected in September.

Non-toxic Species

A mix of diatoms and dinoflagellates occurred along the northern California coast in September, with the latter group dominant inside Bolinas Lagoon (*Ceratium spp.*) and near the Richmond shore inside San Francisco Bay. A *Heterosigma* bloom was detected at the latter location at the beginning of the month. The diatom *Chaetoceros* was ubiquitous at most other locations.



QUARANTINES:

The annual mussel quarantine went in effect on May 1. This quarantine applies specifically to the sport-harvesting of mussels along the entire California coastline, including all bays and estuaries. Routine phytoplankton and biotoxin monitoring is maintained throughout the year, not just within the quarantine period. This allows the detection of unexpected increases in biotoxin activity outside of the routine quarantine period. The annual quarantine does not apply to the certified commercial shellfish growing areas in California, which are monitored intensively. All certified shellfish growers are required to

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Figure 4. Distribution of shellfish biotoxins in Northern California during September, 2009.

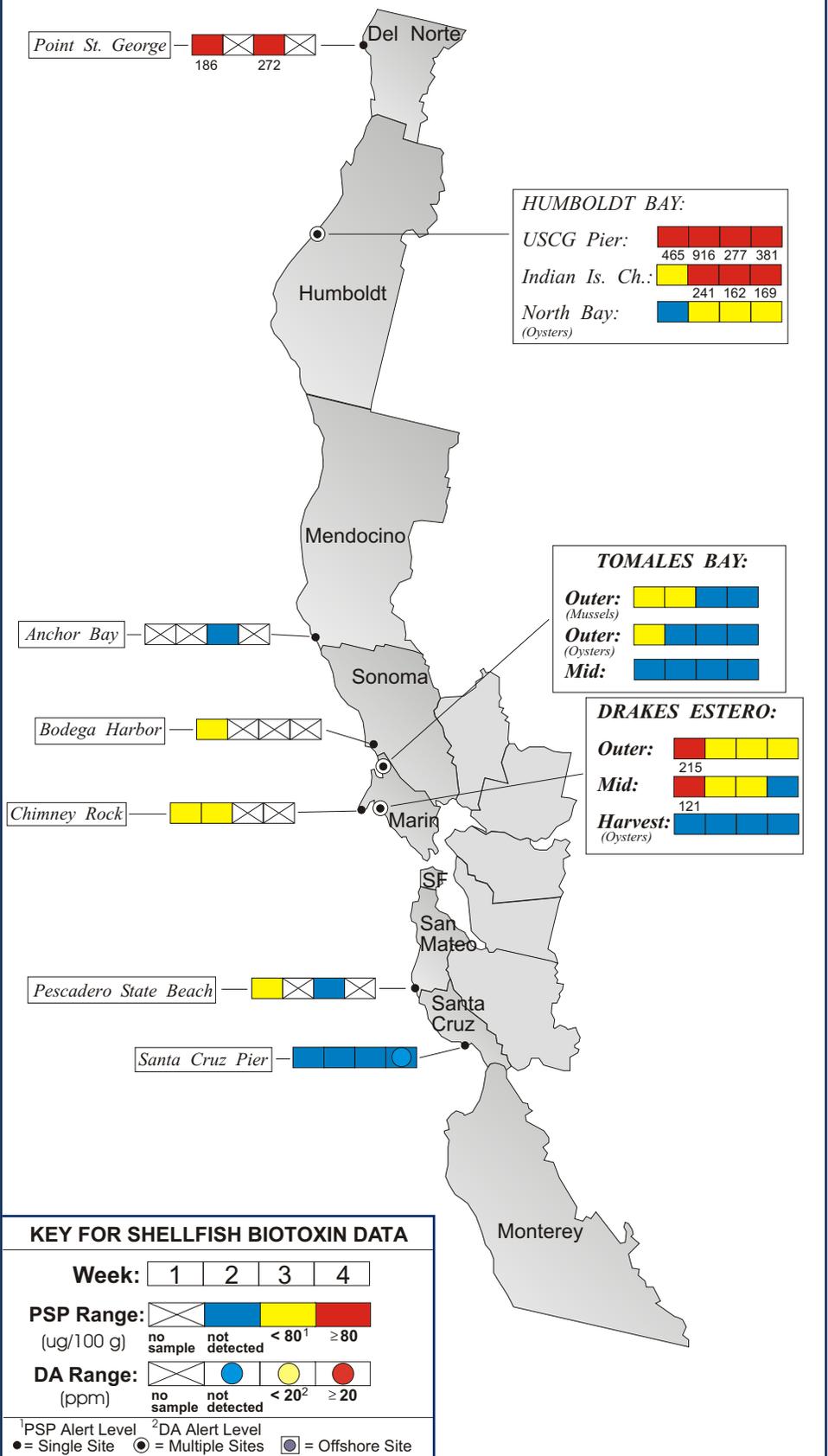


Table 1. California Marine Biotoxin Monitoring Program participants submitting shellfish samples during September, 2009.

COUNTY	AGENCY	# SAMPLES
Del Norte	Del Norte County Health Department	2
Humboldt	Coast Seafood Company	48
Mendocino	CDPH Volunteer (<i>Marie De Santis</i>)	1
Sonoma	CDPH Marine Biotoxin Monitoring Program	1
Marin	Cove Mussel Company	4
	Drakes Bay Oyster Company	25
	CDPH Marine Biotoxin Monitoring Program	2
	Hog Island Oyster Company	9
	Marin Oyster Company	4
	Pt. Reyes Oyster Company	3
	San Francisco	None Submitted
San Mateo	San Mateo County Environmental Health Department	2
Santa Cruz	U.C. Santa Cruz	5
Monterey	None Submitted	
San Luis Obispo	Grassy Bar Oyster Co.	6
	Tomales Bay Oyster Company	10
	Cal Poly	2
Santa Barbara	Santa Barbara Mariculture Company	10
	U.C. Santa Barbara	4
	Vandenberg AFB	1
Ventura	Ventura County Environmental Health Department	1
Los Angeles	Los Angeles County Health Department	1
Orange	Orange County Health Care Agency	1
San Diego	Carlsbad Aquafarms, Inc.	4
	Scripps Institute of Oceanography	1

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 other seafood species such as crab, lobster, and small finfish like sardines and anchovies, therefore these tissues should not be consumed. Sport harvesters are encouraged to contact the "Biotoxin Information Line" at 1-800-553-4133 for a current update on marine biotoxin activity prior to gathering and consuming shellfish.



submit at least weekly samples of shellfish for toxin monitoring. Harvest restrictions or closures are implemented as needed to protect the public's health.

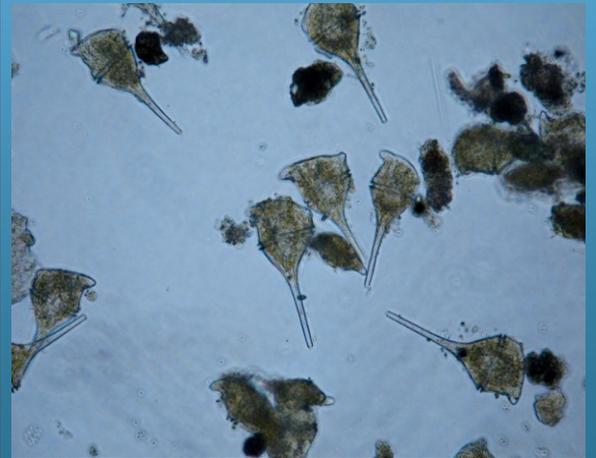
Consumers of Washington clams, also known as butter clams (*Saxidomus nuttalli*), are cautioned to eat only the white meat. Washington clams can

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

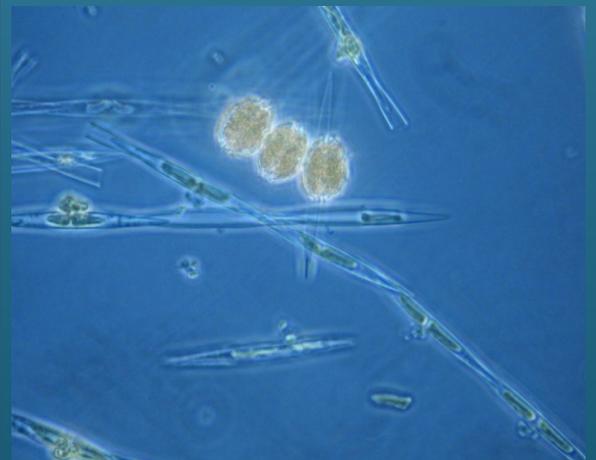
Table 2. Agencies, organizations and volunteers participating in marine phytoplankton sample collection during September, 2009.

COUNTY	AGENCY	# SAMPLES
Del Norte	Del Norte County Health Department	4
Humboldt	Coast Seafood Company	4
	Bureau of Land Management	2
Mendocino	CDPH Volunteer (<i>Marie De Santis</i>)	3
Sonoma	CDPH Volunteer (<i>Cathleen Cannon</i>)	1
	CDPH Marine Biotoxin Program	1
Marin	CDPH Volunteers (<i>B. Anderson, C. Strobel, M. Siegel</i>)	7
	Cordell Bank National Marine Sanctuary	1
	Drakes Bay Oyster Company	12
	CDPH Marine Biotoxin Program	5
San Francisco	Hog Island Oyster Company	4
	CDPH Volunteer (<i>E. McNaughton</i>)	2
	San Francisco Health Department	3
San Mateo	CDPH Volunteer (<i>Kathleen Abadie</i>)	2
	San Mateo County Environmental Health Dept.	3
	The Marine Mammal Center (<i>Stan Jensen</i>)	4
Santa Cruz	U.C. Santa Cruz	1
	U.C. Santa Cruz	5
	San Lorenzo Valley High School	2
	California Department of Parks and Recreation	1
Monterey	The Marine Mammal Center (<i>Nancy Scarborough</i>)	1
	Monterey Abalone Company	2
San Luis Obispo	CDPH Volunteer (<i>Renee and Auburn Atkins</i>)	1
	Morro Bay National Estuary Program	4
	Monterey Bay National Marine Sanctuary	4
	Tomales Bay Oyster Company	5
	Tenera Environmental	4
Santa Barbara	The Marine Mammal Center	9
	(<i>Tim Lytsell, P.J. Webb, Debbie Davis</i>)	
	CDPH Volunteer (<i>Sylvia Short</i>)	5
	Channel Islands National Marine Sanctuary	4
	National Park Service	1
Ventura	Santa Barbara Mariculture Company	5
	U.C. Santa Barbara	5
	CDPH Volunteer (<i>Fred Burgess</i>)	3
Los Angeles	Ventura County Environmental Health Department	1
	Catalina Island Marine Institute	2
	City of Los Angeles Environmental Monitoring Div.	3
	Los Angeles County Health Department	1
	Los Angeles County Sanitation District	4
Orange	Southern California Marine Institute	1
	Guided Discoveries, Tole Mour	9
San Diego	Orange County Health Care Agency	1
	Ocean Institute	1
	Carlsbad Aquafarms, Inc.	2
	Scripps Institute of Oceanography	4

PHYTOPLANKTON GALLERY



The dinoflagellate *Ceratium divaricatum* was abundant at several locations, sometimes producing visible red tides.



Two of our toxin producers, *Alexandrium* and *Pseudo-nitzschia*, co-occurred in samples from Morro Bay.



A tangled collection of the dinoflagellate *Ceratium macroceros* from a Catalina Island sample.