

Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Director, Institute of Marine Sciences, UC Santa Cruz.

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An Algal Bloom of Epic Proportions

The entire west coast is experiencing a harmful algal bloom of unprecedented size that extends from Central California to Washington State. The concentrations of one toxin, domoic acid, appear to be the highest ever recorded in Monterey Bay and off Central California. This is cause for some caution, particularly for those of us who eat stuff from the sea.

Officials in California have warned against eating recreationally harvested mussels and clams, commercially caught anchovies and sardines, or the internal organs of commercially or recreationally caught crab taken from the waters off Monterey and Santa Cruz counties.

Further north, Oregon has closed the entire coast to razor clamming and also halted all shellfish harvesting along the northern Oregon coast. Washington has also closed their waters to razor clamming, a significant economic loss. Elevated toxin levels led shellfish managers to close the southern Washington Dungeness crab fishery, a multi-million dollar business and the largest closure on record.

It's not completely clear yet whether there is a connection between this massive harmful algal bloom and the warm water offshore. UCSC oceanographers are involved in this search for connections and have been regularly analyzing samples of seawater, diatoms, fish and shellfish in the Monterey Bay area, a hotspot for the algae that produces domoic acid.

Massive blooms of phytoplankton, or microscope floating algae such as diatoms, are common along the central coast of California in the late spring and summer. Just like the weeds emerging in your garden in the spring, when the weather warms and nutrients are provided by coastal upwelling, the plants in the coastal ocean bloom like a huge garden.

Certain kinds of algae turn the surface waters a reddish color, and are known as red tides, although these particular algae aren't harmful and have nothing to do with the tide. Other species also produce potent toxins and can proliferate when

conditions are ideal. One diatom in particular, *Pseudo-nitzschia*, produces the nasty neurotoxin, called domoic acid, which can cause serious problems higher up the food chain.

Pseudo-nitzschia is filtered out of the water by both shellfish and small fish like sardines and anchovies. While these animals don't appear to suffer any ill effects from their diet, trouble begins for those organisms, marine birds or mammals, and even people, who consume the contaminated fish, shellfish, or crustaceans.

Domoic acid is a toxin that affects the nervous system of higher animals, causing dizziness, partial paralysis, and even death. These impacts have been observed for decades in seals, sea lions, and marine birds. The likely presence of the toxin in mussels is also why public health officials post beaches along the California coast at certain times of the year.

The Public Health Department analyzes mussels and other shellfish, such as clams and scallops, for the presence of domoic acid and also Paralytic Shellfish Poisoning (PSP), another common toxin.

Commercial shellfish harvesters are also required to provide shellfish samples weekly to the Public Health, which are analyzed for the presence of toxins. If high enough levels are detected, warnings and quarantines are issued to protect the shellfish consumers as well as the recreational fishers.

This is not something to treat lightly; the message on the posted signs is serious business. Symptoms of domoic acid poisoning can occur within 30 minutes to 24 hours after eating contaminated seafood. In mild cases, the symptoms may include all of your favorite things, vomiting, diarrhea, abdominal cramps, headache and dizziness, and may disappear after several days of misery.

In severe cases, however, a consumer may experience breathing trouble, confusion, disorientation, cardiovascular instability, seizures, permanent loss of short-term memory (a condition known as Amnesic Shellfish Poisoning), coma or even death.

One of the critical questions that ocean scientists are trying to answer now is whether the climate change patterns now being observed, including warmer temperatures, changes in wind patterns, ocean acidification and other factors will bring more frequent harmful algal blooms. In the meantime, best to take the warnings seriously.