

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

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Red Tide in the Morning, Birds Take Warning



*Foam on the beach at Aptos Seascape
Photo by Tom Jorde*



Akashiwo sanguinea

Paddling out around the wharf in mid-September I encountered distinctly reddish brown water, which is usually a good indication of an algal bloom. I contacted a

colleague, Raphe Kudela, who spends the better part of most days working on or worrying about different types of algal blooms and their causes and impacts. He responded immediately that the color was consistent with *Akashiwo sanguinea*, a dinoflagellate, which can also produce thick foam along the shoreline. *Akashiwo* is actually a Japanese word for red tide.

He asked if I could collect a water sample on my next paddle so he could check its origin. As he suspected, it was nearly 100% *Akashiwo*. This particular bloom has stuck around the northern bay for over a month now, although the recent storm seems to have dissipated some of it.

A month later, in mid-October, I received a message and photographs from a new friend who lives on the bluff at Aptos Seascapes. He had noticed a very thick band of greenish foam along the shoreline. It smelled like decaying plant material. A sample of the water confirmed it was our friend, *Akashiwo*, again.

These large blooms occur when environmental conditions, usually a large supply of certain nutrients or fertilizers and water temperatures, are just right. They typically occur off California in the fall, so this year's event is not a real surprise. This microscopic organism is found globally, however, in both temperate and tropical waters, and almost always in coastal or estuarine locations.

There are a number of different algae or dinoflagellates that produce blooms and which can be relatively harmless, but others that can be harmful or toxic to fish, marine birds, marine mammals and even humans. The extended bloom of *Pseudo-nitzschia* along the west coast last fall and winter, which produced the toxin domoic acid, was responsible for the closure of the Dungeness crab fishery for months.

Akashiwo produces amino acids, which are water-soluble, but blooms of this organism have been considered non-toxic. During a Monterey Bay bloom in late-2007, however, protein derived from a bloom breakdown coated the feathers of marine birds and led to the loss of their natural water repellency and insulation. Many birds became severely hypothermic and subsequently died. This event was the first documented case of its kind anywhere, although previous events elsewhere simply may have gone undetected.

The 2007 bloom affected fourteen different species of marine birds, and 550 stranded live and 207 dead birds were recovered and examined. They all had pale yellow-green material on their feathers from the algae. Some of these birds had just completed their southward migration and were in poor nutritional condition prior

to the bloom. With rinsing, rehydration, warming and nutritional supplements, however, a high percentage of birds recovered and were subsequently released.

Northern Monterey Bay has been identified as an incubator for red tides, due to a combination of relatively weak circulation and the accumulation of fertilizers or nutrients from terrestrial runoff that can lead to these plankton blooms. One question that has been pondered by scientists like Raphe Kudela for some time now, is whether or not these algal blooms, whether harmful directly (such as *Pseudo-nitschia*) or indirectly (such as *Akashiwo*), are increasing in frequency and duration.

Is the gradual warming of the oceans and an increase in nutrient content of coastal waters from fertilizer runoff and waste water discharge significantly affecting the production of these blooms such as the one we have been experiencing this past month?

One of the challenges in answering this or similar questions where human impacts are a possibility, is how many years of records or observations does it take until scientists believe that they have enough information to say with certainty, that yes, conditions have changed and we need to figure out how to reverse the trend.