

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

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Invasion From the Sea



Scraping marine life off the section of dock from Japan that washed up on the Oregon coast.

A 66-foot long concrete and steel floating dock washed onto the Oregon coast near Agate Beach in early June. The Japanese consulate in Portland confirmed that the dock was one of four used by commercial fishermen for unloading squid and other catch at the port of Misawa, that had been ripped away from the coast during the March 2011 tsunami. It took about 15 months for the floating structure to make the roughly 5000-mile trip across the north Pacific, traveling about 10 miles a day.

Scientists from Oregon State University's Hatfield Marine Science Center discovered that the dock contained an estimated 100 tons of encrusting organisms, or about 13 pounds per square foot. These included several species of barnacles, as well as mussels, starfish, urchins, anemones, worms, limpets, snails and algae - dozens of species.

Although most of the individual species are unique to Asia, this smorgasbord of marine organisms is similar to what you might find on a wharf or piling along the coast of California.

The Oregon Department of Fish and Wildlife set to work scraping and bagging all of the organisms in order to minimize the potential spread of non-native species. But they also were clear in pointing out that there is no way of knowing if any of

the hitchhiking organisms or their eggs or larvae had already jumped ship and headed for new homes along the west coast.

Invasive or introduced species are not a new issue or concern. In the San Francisco Bay-Delta, the problem dates back to at least the California Gold Rush, when barrels of eastern oysters were shipped west to San Francisco aboard transcontinental trains. Some of them, along with the eastern seaweeds they were packed in, found their way into bay waters and proliferated.

The problem got progressively worse over the years, however, as San Francisco Bay and its shipping channels and ports became a center for global shipping for the western United States. Today an estimated 7,000 cargo container ships and about 10,000 tankers call at ports in the Bay-Delta.

Each of these ships contains 10 to 12 million gallons of ballast water, pumped on board from some foreign port. The ballast water keeps the ships stable when they are empty but is discharged on reaching port. And that ballast water contains organisms and eggs and from those distant waters.

As a result, San Francisco Bay is now widely recognized as the most invaded waterway in the world. More than 240 animal and plant species are reported to have taken up new homes and are thriving in the waters from the Farallons to Sacramento.

Asian clams, Chinese mitten crabs, Amur River clams, New Zealand carnivorous sea slugs, Black Sea jellyfish and Japanese gobies are just a few of the exotics that now inhabit the bay and its adjacent waters. In individual parts of the Bay-Delta complex, invasive species may make up 40-100% of the common species and up to 97% of the total number of organisms.

And the problem in San Francisco Bay isn't diminishing. Between 1851 and 1960, there was about one new introduced species each year. From 1961 to 1995, however, they came at rate of about one every three and a half months.

We continue to bring in more and more imports by sea, our cars, computers, clothes, and sports equipment, as well as 50% of our oil, some 10 million barrels each day, comes into US ports. Although research is underway to determine the effectiveness of treating ballast water so as to disinfect it before it's discharged, there is a long way to go before this is a common practice or required.

While the initial arrival of tsunami debris has brought the issue of invasive or introduced marine species into a more public light, we have been surrounded by introduced terrestrial plants for well over a century.

Some of these were intentionally brought to the Americas from Asia and Europe and form integral parts of our agricultural economy- citrus, avocados, olives, figs, and artichokes, to name a few. Then there are the others, so invasive and ubiquitous that many new residents are probably unaware that they were introduced from somewhere else: Scotch and French broom, acacia, eucalyptus, pampas grass, ice plant, poison hemlock and thistles, to name a few.

So while the Oregon Department of Fish and Wildlife were attempting to be very thorough in their systematic annihilation of every living organism on that floating dock, the cat may have been out of the bag for some time. Ninety-five percent of all of our imports to the US come by sea and whether the larvae or eggs are discharged in ballast water, or from a bit of tsunami debris, they are all invasive species, some of which present serious problems, all of which are very difficult to control.