

Study finds 'caffeinated' Oregon coast waters

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Sampling areas from Oregon, North Coast

(Phys.org) -- A new study finds elevated levels of caffeine at several sites in Pacific Ocean waters off the coast of Oregon—though not necessarily where researchers expected.

This study is the first to look at caffeine pollution off the Oregon coast. It was developed and conducted by Portland State University master's student Zoe Rodriguez del Rey and her faculty adviser Elise Granek, assistant professor of Environmental Science and Management, in collaboration with Steve Sylvester of Washington State University,

Vancouver.

In spring 2010, Rodriguez del Rey and Granek collected and analyzed samples from 14 coastal locations and seven adjacent water bodies as far north as Astoria, Ore., and as far south as Brookings.

Locations were identified as potentially polluted if they were near wastewater treatment plants, large population centers or rivers and streams emptying into the ocean.



Sampling areas from Oregon, South Coast

The study found high caffeine levels near Carl Washburne State Park (Florence, Ore.) and Cape Lookout, two areas not near the potential pollution sources, yet low levels of caffeine near large population centers like Astoria/Warrenton and Coos Bay.

High levels were also found following a late-season storm of wind and rain that triggered sewer overflows.

Results of the study were published in the July 2012 *Marine Pollution Bulletin*, “[Occurrence and concentration of caffeine in Oregon coastal waters.](#)”

The results seem to indicate that wastewater treatment plants are effective at removing caffeine, but that high rainfall and combined sewer overflows flush the contaminants out to sea. The results also suggest that septic tanks, such as those used at the state parks, may be less effective at containing pollution.

“Our study findings indicate that, contrary to our prediction, the waste water treatment plants are not a major source of caffeine to coastal waters,” says Granek. “However, onsite waste disposal systems may be a big contributor of contaminants to Oregon’s coastal ocean and need to be better studied to fully understand their contribution to pollution of ocean waters.”

Caffeine is found in many food and beverage products as well as some pharmaceuticals, and caffeine pollution is directly related to human activity (although many plant species produce caffeine, there are no natural sources of the substance in the Northwest). The presence of caffeine may also signal additional anthropogenic pollution, such as pesticides, pharmaceuticals and other contaminants.

Even “elevated levels” of caffeine are measured in nanograms per liter, well below a lethal dose for marine life. However, an earlier study by Rodriguez del Rey and Granek on intertidal mussels showed that caffeine at the levels measured in this current study can still have an effect despite the lower doses

“We humans drink caffeinated beverages because caffeine has a biological effect on us—so it isn’t too surprising that caffeine affects other animals, too,” says Granek. Previous studies have found caffeine in other bodies of water around the world, including the North Sea, the Mediterranean, Puget Sound, Boston Harbor, and Sarasota Bay, Fla.

The project was funded in part by an Oregon Sea Grant Program Development Grant and the National Oceanographic and Atmospheric Administration. Granek has submitted a grant to further study septic tanks in coastal areas, which could help identify the extent to which these systems are sources of contamination to Oregon’s marine waters.

Provided by Portland State University

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