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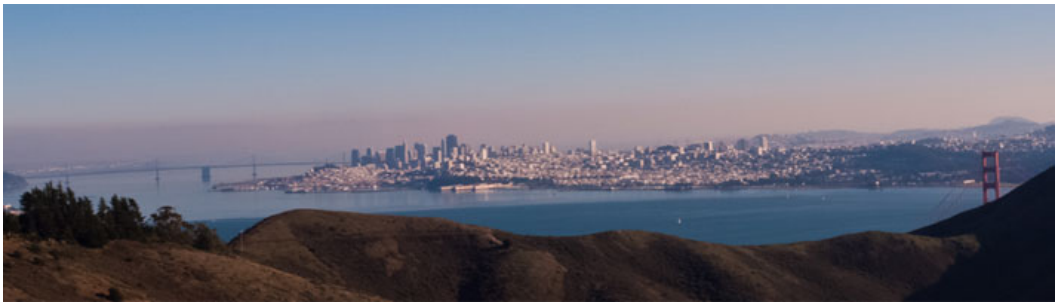
Banned Scotchgard chemical still contaminating San Francisco seals



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San Francisco Bay, on the edge of a metropolitan hub, is contaminated with wastewater, runoff and other pollution sources.

By Jane Kay
Environmental Health News

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SAN FRANCISCO, Calif. – In a shallow arm of the bay, where Pacific tides cause hardly a ripple, hundreds of harbor seals lounge, mate and bear young. With placid expressions on bewhiskered faces and bulky bodies reclining on shorelines, the seals belie a disturbing burden they carry.

Living on the edge of a metropolitan hub, these seals are under scrutiny by scientists. There's a mystery afoot in San Francisco Bay: A manmade chemical, pulled from production 12 years ago, is still turning up at high levels in the seals.

Once the prime ingredient in Scotchgard, a chemical known as PFOS has remained elevated in these harbor seals even though it has declined in sea birds that share their fish diet.

San Francisco Bay's harbor seals have some of the highest PFOS levels in the world, and the chemical isn't following the pattern of slow decline of other persistent pollutants.

"It's a real conundrum. What are the sources of these compounds? How are they getting into the food web? " said Margaret Sedlak, a program manager at the San Francisco Estuary Institute, which tracks chemicals in the bay.

PFOS, perfluorooctanesulfonic acid, is toxic, mobile and virtually indestructible. And it accumulates in the tissues of people and wildlife around the world, including whales, polar bears, sea turtles, bald eagles and pelicans.

The chemical's persistence in the bay's seals foreshadows potential effects for generations to come. And because the seals are top predators that feed on fish, they take up many contaminants and serve as barometers of the health of other marine life along the West Coast.

Suzanne Manugian, The Marine Mammal Center

These San Francisco Bay harbor seals are contaminated with some of the world's highest levels of perfluorinated chemicals.

"It's a real conundrum. What are the sources of these compounds? How are they getting into the food web?" –*Margaret Sedlak, San Francisco Estuary Institute*

Yet, despite the high levels of PFOS, virtually nothing is known about whether the chemical is harming the bay's seals and other creatures. Some scientists cite evidence in other animals – sea turtles, dolphins and sea otters – to suggest that it may be impairing their immune systems.

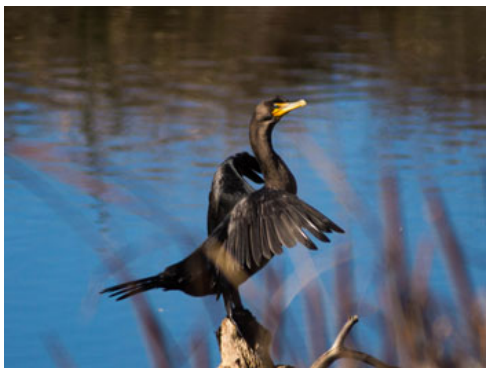
"We can't get rid of it. It builds up in the environment. It's like filling a bathtub, turning on the water, and walking away," said Oregon State environmental chemist Jennifer Field.

"Nature can't degrade it, and it ends up in biota. Until we cut off the supply, you just keep adding it to the total burden on the global environment."

A stubbornly persistent chemical

What makes perfluorinated chemicals (PFCs) so stubbornly persistent is that they contain fluorine bonds, which are the shortest and strongest of chemical bonds. These same characteristics make them popular with manufacturers as coatings because they repel oil and water, stabilize heat and act as leveling agents to ingredients in cookware, textiles, carpeting, paper and other products.

3M Company began selling Scotchgard made with PFOS in 1956. Nearly half a century later, after studies showed it was accumulating in human tissues, the company agreed to stop producing the chemical by 2002.



Amit Kotwal/flickr

Levels of PFOS in the bay's double-crested cormorants have plummeted.

The halt seems to have been a boon to San Francisco Bay birds. Eggs laid by double-crested cormorants on south bay islands contained average PFOS levels of 1,250 parts per billion in 2006, among the highest found in wildlife worldwide. Three years later, they remained high, at 1,240 ppb. But by 2012, the level had plummeted by 70 percent to 385 parts per billion.

No one knows why the decline in birds was so steep and so sudden.

In harbor seals, the story was different. The average level of 1,040 parts per billion in the blood of south bay seals in 2004 was also among the highest in the world for marine mammals. But unlike the birds, the levels from 2010 and 2011 have remained high.

"We don't know how they're picking up the PFOS. Is it the food they're eating, the water they're swimming in, the mud they're resting on, the air they're breathing?' said Denise Greig, a marine mammal biologist with the California Academy of Sciences and Sausalito's Marine Mammal Center who took the seals' blood samples.

PFOS has been found in topsmelt and silverside, two fish eaten by seals and cormorants.

"We can't get rid of it. It builds up in the environment. It's like filling a bathtub, turning on the water, and walking away." –*Jennifer Field, Oregon State University*

Duke University chemist Craig Butt said chemical levels can rise and fall in species depending how they're metabolized, concentrated, degraded and eliminated in animal tissues and the broader food web.

Contaminants can build up in the southern tip of the bay where the seal colony congregates because it doesn't get a vigorous flush of fresh and tidal waters.

"Contamination could be patchy," Greig said. But the south bay's harbor seals consistently show elevated levels. "It does imply there is a PFOS source in the south bay."

Butt agreed, saying that the continuing high levels are a strong sign that local sources remain.

"We can say that the sources of PFCs are still continuing in San Francisco Bay," he said.

In the rest of the world, PFOS levels in wildlife do not show a consistent trend, at least not yet. The chemical decreased in Arctic ringed seals, leading scientists to credit the phase-out. At the same time, Northwest Atlantic harbor seals showed no decrease. In humans, PFOS levels have dropped, according to nationwide monitoring.

Immune-suppressing effects?

Biologists have long puzzled over why the harbor seal colony congregating in the bay's Mowry Slough has remained stable since the 1970s while other California populations are burgeoning.

But no one has evaluated whether PFOS, or other contaminants in the bay, could be to blame. Studying marine animals is difficult and costly, and there are no plans to test them for health effects.

There have been no die-offs, disease outbreaks or reproductive failures among the bay's seals. But even without dramatic signs of damage, their health could be compromised by PFOS in a serious yet subtle way, said Margie Peden-Adams, a research professor at the University of Nevada at Las Vegas who has studied effects of PFOS on turtles and bottlenose dolphins.

"We don't have a population where there is clearly something wrong," she said. "We're dealing with something that's ubiquitous but not a spill. The data that we do have suggest it is possible that the bay seals' health may be impaired."

San Francisco Bay Conservation and Development Commission

Harbor seals congregate in the southern end of San Francisco Bay.

One of the rare studies that linked elevated PFCs to immune suppression leading to infectious disease in marine mammals was a case of female otter deaths on the California coast.

"We're trying to understand how PFCs affect the immune system," said Kurunthachalam Kannan, a researcher on environmental pollutants at Wadsworth Center, New York State Department of Health, and professor at SUNY at Albany.

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