Salmon in near-shore Pacific are contaminating killer whales

Killer whales, the planet's most contaminated wild creatures, are ingesting chemicals from Chinook salmon in polluted Puget Sound, Vancouver Island area. Contaminants in Pacific Ocean need more attention, scientists say.

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The most contaminated wildlife on Earth – killer whales in the Pacific Northwest — are picking up nearly all their chemicals from Chinook salmon in polluted ocean waters off the West Coast, according to a new scientific study.

The whales, which feed in coastal waters from British Columbia's Queen Charlotte Islands to the San Francisco area, were declared an endangered species in the United States and Canada after their numbers shrank.

These killer whales, called southern residents, live in waters straddling the U.S.-Canada border and spend summers hunting salmon around Washington's Puget Sound and Vancouver Island. A healthier population, called northern residents, feeds on salmon off more remote parts of British Columbia.

The two populations are only about 200 miles apart, but it makes a world of difference: The southern whales are up to 6.6 times more contaminated with polychlorinated biphenyls (PCBs) than the northern ones.

"Southern resident killer whales are really urban whales compared to their

northern counterparts," said Peter Ross, a research scientist at the Canadian government's Institute of Ocean Sciences who led the new study. Ross is one of the world's leading experts on contaminants in marine mammals.

Their summer habitat around Puget Sound is "a hot spot for PCBs" as well as "lots of other contaminants," including dioxins and chlorinated pesticides, Ross said. The Chinook salmon they eat inhabit ocean waters and rivers polluted by agriculture, pulp mills, other industries, military bases and urban runoff.

Ross and his colleagues discovered that 97% to 99% of contaminants in the Chinook eaten by these whales originated from the salmon's time at sea, in the near-shore waters of the Pacific. Only a small amount came from the time the salmon spent in rivers, although many of the rivers are contaminated, too, Ross said.

"Salmon are telling us something about what is happening in the Pacific Ocean," Ross said. "They are going out to sea and by the time they come back, they have accumulated contaminants over their entire time in the Pacific Ocean."

The southern resident killer whales also have to eat about 50% more salmon because the salmon around Puget Sound have a lower fat content. That means they are hit with a double whammy--not only is their prey about four times more contaminated, but they have to eat more of it. Combined, that means they are 6.6 times more contaminated than their northern counterparts. The males carry almost 150 parts per million of PCBs, the highest concentration recorded in a wild animal.

People eat the same salmon consumed by the killer whales. But the whales eat immense volumes--more than 500 pounds per day--so their exposure is much higher. The state of Washington has issued some local fish advisories, including a recommendation that people limit eating Chinook from Puget Sound to one meal per week.

The new study "underscores the global nature of contaminant dispersion," the authors wrote in their report, published last week in the journal Environmental Toxicology and Chemistry. PCBs and other pollutants come not just from local

sources on the West Coast; they also move globally via oceans and winds. Air carrying soot, metals and chemicals from Asia takes just eight days to cross the Pacific and reach the North American coast.

"It's increasingly clear that salmon acquire the majority of POPs (persistent organic pollutants) during their growth period at sea and that more research is needed on the extent of Pacific Ocean food web contamination," they said.

Killer whales are perched at the very top of the food web, which makes them susceptible to pollutants in the ocean. Industrial compounds and pesticides such as PCBs, DDT and brominated flame retardants build up in food chains, their concentrations multiplying each step up from prey to predator.

The three pods of whales that make up the southern resident population are an icon of the Seattle/Vancouver Island area and a popular tourist attraction around the San Juan and Gulf Islands. Their numbers dropped by 20% between 1996 and 2001.

They were declared endangered under Canada's Species at Risk Act in 2004 and under the U.S. Endangered Species Act in 2005. The U.S. government acted four years after conservation groups filed suit seeking protection of the whales.

Eighty-three whales are now in the southern population, down from 99 in 1996, while the northern population, which lives largely in the Straight of Georgia, has more than 200. Seven of the southern whales, including some breeding females, died last year.

The cause of their decline is unknown, but U.S. federal biologists with the National Oceanic and Atmospheric Administration say reduced salmon supplies, pollutants and disturbance from ships and recreational boats are possible causes.

Ross said each one of those factors is "significant enough to reduce the population." Chinook populations have declined. Also, PCBs are known to suppress immune systems of marine mammals.

The amount of PCBs found in the southern killer whales is higher than the levels that damage immune systems in seals and probably contributed to a massive die-off of European harbor seals killed by a virus epidemic in the late 1980s. Seals, however, may be more prone to mass mortalities than killer whales because they collect on rocks in large groups.

Deaths of the southern whales cannot be blamed on a specific chemical or pathogen but it is likely that immune suppression plays a role, Ross said. Some of the whales have died from infections. In many cases, they die at sea and their carcasses are never found.

The northern killer whale population--which the Canadian government has designated as a threatened species--also is contaminated with PCBs that exceed the amount known to harm immune systems.

PCBs were banned in the late 1970s but they persist in ocean and river sediments. A projection by Canadian scientists shows concentrations won't fall below the amount that suppresses immune systems until 2063 for the southern residents and 2030 for the northern ones.

NOAA's recovery plan for the species, released last year, includes cleaning up old pollution and reducing new pollutants, enhancing salmon populations and evaluating whether to regulate vessel traffic in the region.

In October, Canada's Department of Fisheries and Oceans was sued by six environmental groups for deciding not to protect the whales' critical habitat.