With fewer salmon to eat, Southern Resident killer whales spend less time in the San Juan Islands

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As a key food supply declines, the endangered population of Southern Resident killer whales, known to frequent the Salish Sea off the coasts of

Washington and British Columbia, is spending far less time in that region, a new study shows.

The Salish Sea around the San Juan Islands has traditionally been a hotspot for the whales. The Southern Residents would spend the summer months feeding on Chinook salmon, much of which belonged to the Fraser River stock that passes through the islands on its way to spawning grounds upriver.

But 17 years of whale sighting data shows that as the Fraser River Chinook salmon population dropped, the time spent by the Southern Residents around the San Juan Islands also declined—by more than 75%, said Joshua Stewart, an assistant professor with Oregon State University's Marine Mammal Institute and the study's lead author.

The findings were just published in the journal *Marine Mammal Science*. Co-authors of the paper are Jane Cogan, an independent researcher in Friday Harbor, Washington; John Durban, a professor with MMI who is also affiliated with the nonprofit SeaLife Response, Rehabilitation and Research (SR3); Holly Fearnback of SR3; David Ellifrit, Mark Malleson and Ken Balcomb of the nonprofit Center for Whale Research; and Melisa Pinnow of San Juan Orcas, a website dedicated to identification of individual orcas.

"This is an endangered population that is in decline with only 73 whales remaining, and prey limitation appears to be an important factor," Stewart said. "A huge part of these whales' time used to be spent feeding in this area."

This new study shows that as the whales' primary summer feeding grounds are becoming less reliable and productive, they are having to search elsewhere for prey, raising further concerns about the health of the population.

The Southern Resident killer whale population is comprised of three matriarchal pods—J, K and L—that have traditionally been seen in the Salish Sea region between April and October. The J pod is more frequently found in the Salish Sea throughout the year, while the K and L pods cover a wider geographic range, particularly in winter and spring.

"Research we are conducting on body condition using drones is revealing that the summer is an essential feeding period when the Southern Residents load up on returning salmon before the slimmer winter months," said Fearnbach.

The Southern Resident population has been in decline since 1995 and is listed as endangered under both the U.S. Endangered Species Act and the Canadian Species at Risk Act. Past research has shown three possible drivers of the whales' decline: limited availability of their primary prey, Chinook salmon; vessel disturbance in the Salish Sea; and high levels of pollutants in their core habitat, Stewart said.

Understanding the Southern Residents' foraging behavior is important for developing strategies to support the recovery of the species. Fraser River Chinook salmon are the largest and highest quality salmon in the Southern Residents' foraging range.

The fish help the whales build up blubber stores in the summer to get through the winter and early spring when prey are of lower quality and harder to find, Stewart said.

In an effort to learn more about the links between the Southern Resident whales' foraging behavior and the abundance of Fraser River Chinook salmon, Stewart analyzed nearly 20 years of whale sighting data compiled through reports from naturalists and researchers throughout the Salish Sea. The data collection was led by the Center for Whale Research and augmented by Pinnow and Cogan, who collected

observation information from naturalists and the public.

"Working with the Center for Whale Research and a broad network of researchers, naturalists and citizen scientists, we were able to generate a far more detailed accounting of the Southern Residents' movements and occupancy around the San Juan Islands and their traditional summer habitat," Cogan said.

A key piece of the data collected by the team was sighting information for individual whales, obtained from photographs by scientists and the public and hydrophone detections that could be linked to each pod.

Cogan's data showed that the number of days each pod of Southern Resident killer whales was present in the San Juan Islands declined each year between 2004 and 2020. J pod was generally present in the area more frequently than the other two pods, with a high of 164 days in 2005 and a low of just 36 days in 2017. L pod was present in the core habitat for only 10 days in 2019, compared with a high of 103 days in 2004.

Comparing the whales' presence with data on Chinook salmon returning to Fraser River tributaries for the same period of time showed a strong relationship between the whales' presence and the salmon returns. In years of higher salmon returns, whales were present more often; when salmon returns were lower, the Southern Residents spent less time in the area.

"They went from spending the majority of their time in this habitat, to just a fraction of their summer," Stewart said. "This shift is likely an effort to find alternative food sources."

Durban, who conducts drone-based health assessments of the whales with Fearnbach, said the loss of salmon is already impacting the health of the whales. A recent analysis of Durban and Fearnbach's body

condition data revealed that the condition of the whales, particularly J-pod, is better when there are more Chinook returning to the Fraser River.

"This further suggests that lack of prey is likely the biggest stressor for these whales," said Durban, a population ecologist. "The other stressors—pollutants and vessel disturbances—are compounded by the lack of prey. If there are fewer fish, disturbance by vessels may become more disruptive to their foraging success."

The Marine Mammal Institute is part of OSU's College of Agricultural Sciences and based at Hatfield Marine Science Center in Newport.

More information: Traditional summer habitat use by Southern Resident killer whales in the Salish Sea is linked to Fraser River Chinook salmon returns, *Marine Mammal Science* (2023).

Provided by Oregon State University

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