

The Pacific Northwest's Southern Resident **killer whales** are in trouble. Scientist Deborah Giles says these imperiled whales are telling us what they need to survive. We just need to listen—and act, fast.

BY PAULA MACKAY

ORCA PHOTOS BY JEFF FRIEDMAN

SEA OF HOPE

PAISLEY SKIRT, BLACK TIGHTS, Teva sport sandals—Deborah Giles, PhD, is not your stereotypical old salt of a sea captain. Nor would one expect to see a scrappy terrier mix poised on the bow of a research vessel, the dog's twitchy nose searching the Salish Sea for whale scat. But in her quest to find fecal samples from the Pacific Northwest's Southern Resident killer whales (also called orcas), Giles is a master at skippering her uniquely skilled crew. For more than a decade, she has teamed up with conservation detection dogs and their handlers to collect hundreds of scats from these endangered marine mammals. The resulting data have helped her and fellow scientists unpack the causes of the current Southern Resident crisis and to recommend critical steps toward saving this dwindling population—assuming there is still time.

Giles is science and research director for the nonprofit Wild Orca and a research scientist at the University of Washington's Center for Conservation Biology. The Center is directed by Samuel Wasser, PhD, who pioneered the use of dogs to locate wildlife scats. Giles discovered killer whales at an early age; as a six-year-old schoolgirl in Sacramento, she plucked the black and white crayons from her crayon box and drew her first picture of a wild orca. Later, in high school, Giles celebrated her newly minted driver's license by motoring south to a marine park and protesting killer whales in captivity. She ultimately paired her love for orcas with her aptitude for science to pursue a doctoral degree at University of California Davis,



where she studied how these animals change their behavior in the presence of boats.

Today, Giles is an impassioned voice for the Southern Residents, an extended family of salmon-eating orcas comprising three alphabetically named pods: J, K and L. Together, these pods number a precarious 72 individuals, one of whom, in 2018, hauntingly carried her dead calf around the Salish Sea for 17 days. Known by researchers as Tahlequah, or J35, this mother's well-publicized grief brought global attention to her family's plight.

One breezy afternoon in August 2018,



Left: Deborah Giles, holds a sample of killer whale scat that will be analyzed to determine the animal's identity and health status. Below: Her dog Eba has been trained to locate scat by smell.



I joined Giles and her canine crew for a training session near Washington's San Juan Island, a world-renowned hotspot for watching killer whales in summer. Only three weeks had passed since the exhausted Tahlequah finally relinquished her baby to the saltwater depths, and the orca research community was already dealing with another unfolding catastrophe. A young female named Scarlet, J50, had become perilously thin, prompting veterinarians to try to improve her condition by administering medication and food at sea. I asked Giles, who was part of the emergency response team, to comment on the extraordinary efforts to revive J50.

"If they get antibiotics into her, I think she has a chance at recovery," she told

me as we cruised through the heart of killer whale feeding habitat—no whales in sight. Her reply was clearly rooted in both pragmatism and hope, essential ingredients for a conservation biologist like Giles. "The Southern Residents need every single female potentially capable of reproduction," she said, describing with admiration how J50's birth had been assisted by orca "midwives" who left visible toothmarks on the newborn's body. Tragically, J50 did not survive long enough to make babies of her own. She succumbed to starvation at three years old, a month after my visit with Giles.

The stories of J50 and J35 are rendered all the more heartbreaking by the fact that there will no doubt be other such tragedies in the future. As Giles put it, "I

think what we're seeing is the unraveling of the fabric of this population, driven by the deaths of reproductive females and the lack of food." Indeed, the Southern Residents are hardwired to hunt chinook, or king salmon, which have become frighteningly scarce in recent years. New research shows that the Northwest's salmon-eating orcas are significantly smaller than they used to be, apparently stunted by poor nutrition.

In addition to depleted prey, two other major threats plague the Southern Residents: toxic contaminants and the presence of shipping vessels and their associated noise. In some cases these threats work in alarming synergy. For example, boat noise can mask the sounds emitted by orcas to target their prey, making it even more difficult for them to catch increasingly limited chinook. And hungry whales burn body fat, which releases stored pollutants into their bloodstream.

In March 2018, Washington Governor Jay Inslee established the Southern Resident Orca Task Force to develop a long-term plan for preventing the permanent loss of the population. As an appointed member of both the prey availability and vessel working groups, Giles met regularly with tribal representatives, fishing interests, legislators and a number of other stakeholders for over a year—an eye-opening experience that left her doggedly optimistic. "The governor's task force gave me a glimpse of how we can make

really positive, proactive change across a variety of issues when we work together and have somewhat of a common goal."

The task force published its final recommendations in late 2019, prioritizing the urgent need to remedy the orcas' shortage of food. Recommendations range widely, from restoring chinook habitat and boosting hatchery production, to increasing the amount of water released over regional dams—or even breaching some of those known to impede salmon migration. I spoke with Giles about her insights as a research scientist and an advocate for acknowledging salmon-eating killer whales as fellow stakeholders in fisheries management.

Paula MacKay: Can you describe some of the ways in which scat samples detected by dogs have helped you and your colleagues better understand threats to the Southern Resident population?

Deborah Giles: The first fecal study, conducted by Katherine Ayres, PhD, as a graduate student under [Prof.] Wasser, looked at stress hormones and nutrition hormones. When the whales are getting enough to eat, the short-term disturbance effects of boats do not show up in their stress hormones. Another interesting study, led by Jessica Lundin, PhD, shows how science can inform policy. This research looked at smog that comes off of boats. After boats were required to stay 200 yards from the whales [in 2012], doubling the previous distance, we didn't pick up discernible or dangerous levels of PAH [polycyclic aromatic hydrocarbons] in the fecal samples. [Washington State law now requires that vessels maintain a 300-yard buffer on either side of Southern Resident orcas and a 400-yard buffer in front of or behind them.]

In 2017, we had a paper come out that was the most riveting and distressing to date. That one, led by Wasser, showed that 69% of the females in the Southern Resident population who get pregnant are losing their calves to spontaneous miscarriages, which are significantly driven by nutritional stress. Furthermore, out of that 69%, 33% are losing calves late-term. This is particularly dangerous for the moms because the bigger the baby,

the harder it is to pass the dead fetus.

PM: How does the reproductive situation for the Southern Residents compare with that of other regional orca populations?

DG: The population of mammal-eating killer whales [known as transients] that occurs in the same waters is increasing very rapidly and in a healthy manner, meaning that the females are getting pregnant every three to five years. Those calves are being born alive and they're staying alive, and so are the moms. We haven't done a direct analysis of fecal samples from mammal-eating killer whales. But just last year, we trained my own dog, Eba, for scat work, which has turned out to be amazing. We have not only continued with the Southern Resident fecal collection, but we've added transients and baleen whales. We're really excited about that because, once we have mammal-eating killer whale poop and baleen whale poop, we'll be able to ask broader, ecosystem-based questions.

PM: Such as?

DG: We already know anecdotally why the mammal-eating killer whales are doing so much better. It's because their prey base is so broad—they eat a lot of different species. But looking at their fecal samples will allow us to drill down and see exactly what's going on with their health status and to evaluate ecosystem-related threats like microplastics, fungi and antibiotic-resistant bacteria.

PM: You and other experts have identified the depletion of chinook salmon in the Salish Sea as the most pressing threat to the Southern Residents. Why are the chinook in such rough shape, and what are the ramifications?

DG: We've completely decimated upriver salmon spawning habitats throughout the whales' entire range, from Monterey [California] to southeast Alaska. It's not just the Salish Sea that's a problem; the Southern Residents are wide-ranging animals. L pod goes all the way down to Monterey—possibly lower—and K pod, to Point Reyes. So, we're talking about different habitats at different times of the year.

We also have issues with dams—especially when there is a series of dams, like on the Snake and Columbia rivers. The

Columbia River used to be the biggest producer of salmon in the world. It's thought that [historically] as much as 50% of the salmon in the Columbia came out of the Snake River. These salmon would have been 100-plus pounds. The Southern Residents evolved eating those massive fish; two or three a day would have fulfilled all of their caloric needs. Today, the average chinook is around 15 pounds. Puget Sound chinook salmon average closer to 12 pounds.


If a killer whale needs 300 to 350 pounds of salmon a day for optimal health, that's a lot of small fish. We know from drone studies that it sometimes takes the whales 15 minutes or more to catch a fish. Given the amount of time and energy they are expending to meet their daily caloric needs, they are both time-strapped and nutritionally strapped. Over the course of three decades, the whales went from resting 25% of the time during daylight hours down to 6.9%. My PhD study showed that the time difference has been made up in foraging.

PM: Many orca advocates are pushing for the removal of the four dams on the lower Snake River. Would this be sufficient to turn things around for the chinook population and the Southern Residents?

DG: Those dams need to come down, but even if they came down tomorrow, we're still talking about a long time before enough fish are available to help the whales. Also, it's really important that we recognize the value of the dams to certain people and industries. I'm trying to help bring together people with different opinions about the value of these dams. But I'm lucky that my constituents are the whales.

PM: Do you recommend that people stop eating chinook to help bring them back?

DG: I recommend that they be very clear about where the chinook salmon is coming from and make sure it's sustainably caught. If they hear the term "wild-caught chinook salmon from Alaska," that doesn't necessarily mean it's sustainably caught. In fact, 90-plus percent of fish that receive that label are not from Alaska. Those fish are caught in Alaska, but they're bound for rivers in British Columbia, Washington or Oregon. And



Born in 2001, K33, Tika, (shown here) is the grandson of K12, Sequim, the eldest female in K pod, who's thought to be 48 years old. The smallest of the Southern Resident Killer Whale pods, K has just 18 members.

most of their runs are on the endangered species list to some degree or another.

As consumers, I think it's our job to ask restaurateurs—and fishmongers at our grocery store—these questions: Where are the fish coming from? How are they caught? What kind of by-catch is associated with this fishery? If they can't answer them, then you just say, "I'm not interested in buying it. I want to buy fish from a fisherman who knows these fish."

Salmon-eating killer whales were the original harvesters of Pacific salmon, foraging long before humans were mass-fishing these waters. They deserve to have a place at the table. Right now, in fisheries management, there is no specific harvest level set aside for the Southern Residents, or any marine mammals for that matter.

All of the fish available for catch are divided by fishermen. That's a problem when you have a population of whales that is struggling and trying to recover.

PM: The National Marine Fisheries Service (NMFS) has proposed to protect more than 15,000 square miles of coastal waters as designated critical habitat for the Southern Residents. How would this expansion benefit the whales?

DG: It's going to mean that NMFS can consult on and potentially stop, for example, offshore drilling or other activities that would need a federal permit. I think it should have been expanded a decade ago. We have very solid science supporting the expansion, and from the whales' perspective, it can only be a positive thing.

PM: You're immersed in the Southern Resident crisis every day. What are some of the encouraging thoughts that keep you going in the face of such profound loss?

DG: We're talking about incredibly resilient animals. If we make some big and small changes in the way we're doing business—if we give nature a break from us—wild chinook salmon and the wild animals that rely on them are resilient enough to make a recovery. We just have to undo some of the damage we've done and give them space. We've seen it before, and I truly believe it's not too late. **WH**

To learn more about the Southern Resident Orcas and Giles's work, visit www.conservationbiology.uw.edu and www.wildorca.org.