BURNING QUESTION

HOW DO SALMON RETURN TO THEIR STREAM OF ORIGIN?

By Gabrielle Plonka

Yukon River salmon are remarkable for their ability to travel upriver thousands of kilometres for the purpose of reproducing. Even more uncanny are the instincts that guide them back to the very stream where they hatched years earlier.

Salmon are driven by an evolutionary strategy to return to their natal streams, according to William Twardek, who completed a Ph.D. focused on salmon migration through the Upper Yukon River and is a fisheries scientist at Ecofish Research, a B.C.-based environmental consulting firm. Going back to a previously successful spawning ground is a tactic for guaranteeing the next generation, Twardek explained.

The salmon's journey unfolds in stages, guided by sensory cues and instinct. In late summer, females deposit eggs on the gravelly bottom of the Yukon River and its tributaries, where they remain through winter. As spring arrives, tiny salmon fry emerge in the stream with acute senses of smell, helping them memorize the chemical bouquet of the sand and other compounds in their birthplace.

During downstream migration, salmon follow the river's flow to deeper waters, marking the path in their olfactory memory. The Yukon River, flowing north and westward across a low plateau, leads them to the Bering Sea off Alaska's coast.

In the ocean, salmon's navigation remains mostly unknown. Geomagnetic fields and celestial cues, such as the sun, stars, and moon, likely guide their coastal movements.

After two to three years, changes in their bodies signal the time to return for spawning. The journey upriver involves recall of those olfactory imprints, Twardek said. Salmon seek familiar traces to find their specific spawning spot, often within kilometres or even metres of their birthplace.

"They'll sort of zigzag through the river looking for these cues," Twardek said.

While most salmon return to their exact natal stream, some venture beyond, exploring new territories. A few discover favourable spots, creating new spawning streams. Others find nothing and return to their intended stream.

Females release thousands of eggs and males release milt to fertilize them. When their mission to reproduce is complete, so is their life cycle.

"It's extremely exhausting swimming that far," Twardek said, explaining that the salmon stop eating over the migration, focusing entirely on travelling, making eggs, and digging a nest for them. "Pretty much all the energy they have left is budgeted for that, and then they die."

The last few years have seen record-low salmon numbers, with only 11,000 chinook salmon crossing into the Yukon in 2022—well below the desired average. Forecasting another low run, salmon-fishing closures and restrictions are in place throughout the Yukon River watershed. Y

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