As glaciers retreat, new streams for salmon



Enlarge / Wolf Point Creek is likely the most-well-studied glacier-fed stream in the world.

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Pushing off from the dock on a boat called the *Capelin*, Sandy Milner's small team of scientists heads north, navigating through patchy fog past a behemoth cruise ship. As the *Capelin* slows to motor through humpback whale feeding grounds, distant plumes of their exhalations rise from the surface on this calm

July morning. Dozens of sea otters dot the water. Lolling on backs, some with babes in arms, they turn their heads curiously as the boat speeds by. Seabirds and seals speckle floating icebergs in this calm stretch of Alaska's Glacier Bay.

Some two hours later, the craft reaches a rocky beach where Wolf Point Creek meets the sea. The creek is a relatively new feature on the landscape: Land at its mouth first became ice-free in the 1940s due to the melting and retreat of a glacier. It took shape through the 1970s, fed by a mountain lake that slowly formed as an isolated chunk of glacier ice slowly melted. Wolf Point Creek is special because almost its entire life span — from the first, sparse trickles melting out under the ice edge to a mature stream ecosystem teeming with aquatic life, from tiny midge larvae to small fish, and with willows and alder weaving along its edges — is known in intimate detail, its history painstakingly documented.

Milner, a stream ecologist at the University of Birmingham in the UK, has returned almost annually to this spot since the 1970s to catalog how life — particularly aquatic invertebrates — has arrived, thrived and changed over time. He was here to observe meager midges in 1977 and to spot a hundred prospecting pink salmon in 1989. A decade later, his team cataloged 10,000 of the fish spawning in Wolf Point Creek.

The creek now supports all manner of creatures that make their living on its riches, from tiny algae to midges to salmon and their predators. Salmon will soon be arriving, and some of their ardent fans are here today. As National Park Service boat captain Justin Smith idles the motor, preparing to let the crew wade ashore, he casually mentions that a mother brown bear and cubs were recently sighted. Sweeping the crescent-shaped shoreline from left to right with binoculars, he stops and announces, "There she is," pointing to the far side of the beach. Perhaps 500 meters away, a massive, sandy-brown head chomps on tall grass as three dark brown cubs scamper at her

feet.

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“Do you still want me to drop you off?” Smith asks. Milner nods and vocalizes consent. The wader-clad crew disembarks into shallow water and heads to the beach, backpacks loaded with collecting gear.

This spot—where Wolf Point Creek meets Muir Inlet—is a dynamic place. Once entirely icebound, Muir Inlet is now a watery expanse over 20 miles long. The inlet is part of the even more massive Glacier Bay that boasts more than a thousand glaciers – at least for now. Over the past 200 years, the glaciers here have receded rapidly as the planet has warmed. Alaskan glaciers are among the fastest-shrinking on Earth, making this place a natural laboratory for ecologists.

How will the ecosystems change? Glacial melting is shining a spotlight on the science of ecological succession, the name given to the patterns of arrival of one species after another as they show up in habitats previously lacking in life. There are longstanding ecological debates around succession that the work by Milner and others may help to settle.

And how will salmon adapt? Though wild salmon are known for their homing instincts, not all return to their natal streams. That’s important in a warming climate, because the fish that stray can colonize new streams that form where glaciers are melting—places long covered in ice. As streams in traditional salmon spawning grounds to the south become increasingly inhospitable with warming waters, some fish are, indeed, dispersing to new regions, filling new niches that open up.

New streams are creating conundrums, too, including for Indigenous people whose livelihoods depend heavily upon salmon. Some now find salmon shifting to spawn in places unprotected from development. Tribes and nations may be excluded from fishing access to these new habitats, even when

their rights, on paper, are legally enshrined.

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