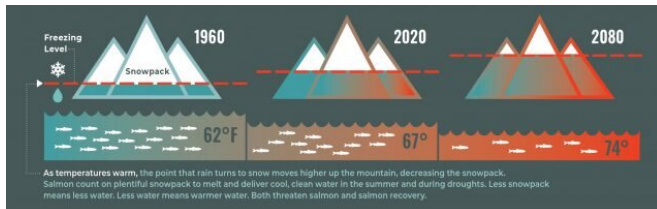


Rising water temperatures could be a death sentence for Pacific salmon

11 February 2021, by Kelcie Walther



Credit: [Washington State Governor's Salmon Recovery Office](#)

In the Pacific Northwest, several species of salmon are in danger of extinction. The Washington State Recreation and Conservation Office has released a report on the state of salmon populations in the state's watersheds—and the findings predict a grim future.

The report was commissioned by the Governor's Salmon Recovery Office, established by the state legislature in 1998 in response to the Salmon Recovery Planning Act. Its findings showed that 10 to 14 species of [salmon](#) in the northwest are "threatened or endangered," and five species are "in crisis."

The findings, though alarming, are in line with population trends over the last few decades. The once prolific salmon populations in Washington State have been declining for years, and populations are now estimated to be at about 5% of historic highs.

The five species of salmon and steelhead that the report found to be most at risk are Snake River spring/summer chinook, Puget Sound chinook, Lake Ozette sockeye, Upper Columbia River spring chinook, and Puget Sound steelhead—a sampling that covers a wide geographic area in the state.

There are a variety of factors at play in the dipping salmon stocks, many of them linked to habitat loss and [climate change](#). In the Northwest, [glacier loss](#) is a pivotal factor. Glaciers feed the rivers in which the salmon spawn with [cool water](#), a process that is critical for the salmon to reproduce successfully. "Melting glaciers means that cool water is no longer available from glaciers at the right time," Daniel Pauly, a professor at University of British Columbia's Institute for the Oceans and Fisheries, said in an interview with GlacierHub. "If you disrupt this cycle, you wipe out the fish."

Average stream temperature in Washington State is projected to warm by between 3.6 and 10.5 degrees Fahrenheit by the end of the century, due to rising air temperature and glacier and snow pack loss.

Increasing [water temperature](#) has a particularly pronounced effect on salmon because of their spawning practices. Salmon are anadromous, meaning they are born and mature in rivers and brooks before migrating to the ocean to live out their adult lives. When it is time to reproduce, salmon return from the ocean to the place they were born—an upriver journey that can be thousands of miles long. After they reach their birthplace and spawn, they die.

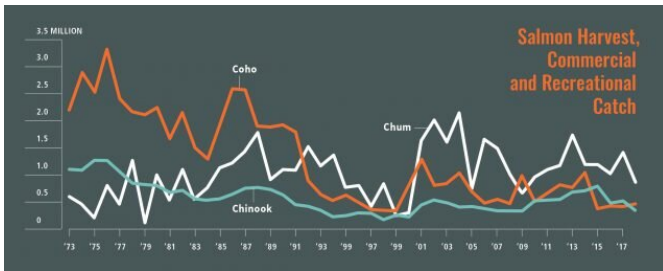
"Salmon are extremely sensitive to temperature," said Pauly, who has researched the effect of temperature change on marine life extensively as principal investigator with Sea Around Us, a research initiative that investigates the global impact of fisheries. He explained that in warmer waters, salmon metabolism increases and they require more oxygen, making the journey difficult for the migrating fish. "When they try to make these already challenging river ascents under oxygen stress, it becomes impossible."

Decreasing salmon populations have ripple effects for other organisms as well. Many predators,

including sea birds, orca whales and grizzly bears depend on salmon as their prey. Even trees suffer. Trees along the banks of salmon-rich rivers in the Northwest get up to 80% of the critical nutrient nitrogen from the decomposing carcasses of salmon that have completed their spawn.

Humans, too, have relationships with salmon for food, culture, and industry. From the mid-nineteenth to mid-twentieth centuries, commercial salmon fishing was a major business and canneries dotted the rivers of Washington. Now commercial salmon fishers struggle.

Salmon have a long history of value. The fish have been central to the lives of the first peoples of the Northwest for millennia. Today, Northwest salmon are just as important to the people of the region as ever.



The harvest of coho and chinook salmon has dropped since the mid-1970s. Credit: [Washington State Governor's Salmon Recovery Office](#)

"All salmon are important to the tribes, the region, and the ecosystem," said David Troutt, a salmon biologist and natural resources director of Nisqually Tribe, told GlacierHub. "But the most important to the Nisqually people are the late/winter chum salmon. They are the center of Nisqually traditions and culture."

In his 34 years working with the Nisqually Tribe, one of the sovereign tribal nations of the Salish Sea, Troutt has witnessed salmon populations drop. "Seeing the rapid and devastating collapse of this incredible and critical salmon in the Nisqually River is heartbreaking," said Troutt. "Their numbers

have gone from regularly exceeding 50,000 adult salmon in the Nisqually to about 5,000 last year."

Troutt sees firsthand the devastation of habitat loss and climate change. "From elevated stream temperatures and lack of flow in the summer, to increased frequency and magnitude of flooding events, to sea level rise and its impact on restoring habitat in the Nisqually delta, to the complete disruption of the food web and offshore flows in the ocean are all killing our salmon," said Troutt. "Some of these factors can be mitigated but others are affecting ecosystem processes on a larger regional/global scale and cannot [be mitigated]."



The Nisqually River near its glacial origins. Credit: [Mount Rainier National Park](#)

The salmon population decrease in the Pacific Northwest is just one example of how climate change is disrupting fish populations around the globe. "People wonder about each species separately," said Pauly. "All fish are affected [by rising temperatures.] We see fish moving towards the poles in both hemispheres. When you model fish behavior as a response to predicted warming of ocean water you see a pattern that shows this movement happening all over the world."

The population changes aren't surprising to Pauly. "This is what happens when temperature increases," he said. "The fish are looking for the temperatures that they are attuned to, and if those

temperatures are farther north, they move farther north. If you make a map from high arctic Alaska to California, the salmon stocks in California are essentially dead. Oregon is not in good shape. Washington is not in good shape. The salmon are not doing well in [British Columbia], either. They are doing well only in arctic Alaska."

Efforts to restore salmon populations are underway across Washington State. Watersheds are being restored. Riparian zones, the banks and vegetation that surround rivers and provide crucial shade and food for young salmon, are being repaired, replanted and protected. Blockages that prevent salmon from navigating waterways to their spawning ground are being removed. Since 2005, 3,300 salmon obstacles, like dams, roads, and water storage have been removed. So far, though, the pace of restoration has been too slow and the salmon are still in grave danger. "The salmon are telling us that we are failing in our recovery efforts," said Troutt.

"By far and away the most promising and sustainable efforts are the community-based, watershed focus, 'bottom up' approach to salmon recovery," said Troutt. "This system has engaged thousands upon thousands of friends and neighbors within their communities to come together and act for salmon."

These efforts, paired with a cooperative global response to climate change, may be just enough to save salmon populations if they are prioritized. "Where people are the source of the problems, they are also the source of the solutions," said Troutt. "Engaged, informed, and enthusiastically energized citizens are the promise that we can restore salmon."

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