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Ocean warming has decimated fish parasites. Why that's actually bad news.

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By Responsible Seafood Advocate

A century of preserved fish specimens offers rare glimpse into long-term trends in fish parasite populations

New research from the University of Washington (UW) shows that fish parasites plummeted from 1880 to 2019, a 140-year stretch when Puget Sound – their habitat and the second-largest estuary in the mainland United States – warmed significantly.

The study, which was published in the ***Proceedings of the National Academy of Sciences*** **(http://dx.doi.org/10.1073/pnas.2211903120)**, is the world's largest and longest dataset of wildlife parasite abundance. It suggests that parasites may be especially vulnerable to a changing climate.

"People generally think that climate change will cause parasites to thrive, that we will see an increase in parasite outbreaks as the world warms," said Chelsea Wood, lead author and a UW associate professor of aquatic and fishery sciences. "For some parasite species that may be true, but parasites depend on hosts, and that makes them particularly vulnerable in a changing world where the fate of hosts is being reshuffled."

A researcher holds open a preserved fish specimen that has been inspected for parasites. The study included eight fish species and 699 fish specimens, which yielded more than 17,000 parasites. Photo courtesy of Katherine Maslenikov/UW Burke Museum.

While some parasites have a single host species, many parasites travel between host species. Eggs are carried in one host species, the larvae emerge and infect another host and the adult may reach maturity in a third host before laying eggs.

For parasites that rely on three or more host species during their lifecycle – including more than half the parasite species identified in the study's Puget Sound fish – analysis of historic fish specimens showed an 11 percent average decline per decade in abundance. Of 10 parasite species that had disappeared completely by 1980, nine relied on three or more hosts.

"Our results show that parasites with one or two host species stayed pretty steady, but parasites with three or more hosts crashed," said Wood. "The degree of decline was severe. It would trigger conservation action if it occurred in the types of species that people care about, like mammals or birds."

Wood said that the result is "worrying news" for ecosystems: "Parasite ecology is really in its infancy, but what we do know is that these complex-lifecycle parasites probably play an important role in pushing energy through food webs and in supporting top apex predators."

The study focused on eight species of fish that are common in the behind-the-scenes collections of natural history museums. Most came from the UW Fish Collection at the Burke Museum of Natural History and Culture. The authors carefully sliced into the preserved fish specimens and then identified and counted the parasites they discovered inside before returning the specimens to the museums. Wood's study is among the first to use a new method for resurrecting information on parasite populations of the past.

To explain the parasite declines, the authors considered three possible causes: how abundant the host species was in Puget Sound; pollution levels; and temperature at the ocean's surface. The variable that best explained the decline in parasites was sea surface temperature, which rose by 1 degree Celsius (1.8 degrees Fahrenheit) in Puget Sound from 1950 to 2019.

"Our result draws attention to the fact that parasitic species might be in real danger," Wood said. "And that could mean bad stuff for us – not just fewer worms, but less of the parasite-driven ecosystem services that we've come to depend on."

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