FIRE & ICE

Last year, more than 10 million acres burned in the United States, making 2017 the second-worst wildfire season in recorded history.

There were many contributing factors — unusually strong winds, high temperatures, and the century of fire suppression that has allowed biomass to build up on forest floors.

One surprising culprit? Arctic sea ice.

The newest findings from UNC Greensboro Professor of Geography Paul Knapp are what he likes to call "accidental science."

DENDROCHRONOLOGY **Knapp directs the Carolina Tree-Ring Science Laboratory at UNCG.**

In 2015, Dr. Knapp and his colleague Dr. Peter Soulé, a faculty member at Appalachian State University, were in Montana studying alpine larch — a conifer native to northwestern North America. While working on another project, they noticed that wide tree rings corresponded with years of increased wildfire activity in the Northern Rocky Mountains.

From there, they decided to take a look at the relationship between the tree rings and levels of sea ice. The two confirmed that wider rings corresponded with years of low sea ice, which led them to the next logical question: Is there a relationship between fire activity and Arctic sea ice?

According to their recently published study — which examined Arctic sea ice extent and wildfire activity for seven regions in the western U.S. from 1980 to 2015 — the answer is yes: The rapid decrease in Arctic sea ice in recent years has likely helped create the conditions for increased wildfire activity, specifically in the northwestern United States.

Knapp explains that when Arctic sea ice is lost, the jet stream becomes wavier, creating ridges with high pressure and troughs with low pressure. These ridges are forming over the Northwest, resulting in very warm, dry conditions that set the stage for increased wildfire activity.

"What's going on at high latitudes is clearly impacting what's going on at mid-latitudes," he says. "It's not compartmentalized."

And it's expected to get worse. The melting of Arctic sea ice is — no pun intended — a snowball effect. The more the ice melts, the faster it melts. In January 2018, the satellite-recorded sea ice levels were the lowest they've ever been during early winter.

However, the Arctic sea ice satellite record only dates back to 1979. The next step for Knapp and his team is to gain a broader understanding of these ice levels over a longer period of time.

Once again, alpine larch happens to be the perfect tool. First, it's a highly responsive species — its rings reflect temperature very well. Additionally, the average tree lives to be 500 years old, with some trees living to be close to 1,000 years old.

Knapp and Soulé hope to dig deeper into the precise relationship between the ring patterns and Arctic sea ice over the known record. They can then use that formula with older alpine larch to develop a proxy sea ice record dating back to the 1500s or even earlier.

"Many scientists suspect this decrease in Arctic sea ice is highly unusual," he says. "However, creating a proxy record would allow us to really put these conditions into context."

By Alyssa Bedrosian • Portrait photography by Martin W. Kane
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