

PERMAFROST PATHWAYS

Connecting Science,
People, and Policy for Arctic
Justice and Global Climate



Northern wildfires, carbon, and health

Managing Arctic-boreal wildfires to protect carbon, permafrost, and public health

Rapid climate warming at high latitudes is accelerating wildfires, generating large and growing emissions of harmful carbon and smoke. Currently, carbon and smoke impacts from fires are not metrics for fire management. Alaska produces half of U.S. wildfire carbon emissions, yet receives less than four percent of federal fire management funding. Woodwell Climate Research Center (Woodwell Climate), including the Permafrost Pathways initiative, and partners are working to change this. Arctic-boreal fire management can be a cost-effective way to protect permafrost and stored carbon, and to reduce the impact of wildfire smoke on air quality and human health. There is a need for forward-looking policy, coordination, and additional resources to better manage wildfires in Alaska, Canada, and, ultimately, across the Arctic-boreal region.

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THE THREAT OF INTENSIFYING ARCTIC-BOREAL WILDFIRES

Arctic and boreal regions store an immense amount of carbon. Boreal forests alone house roughly two-thirds of global forest carbon and protect much of the world's permafrost soils, playing a critical role in mitigating global climate change.

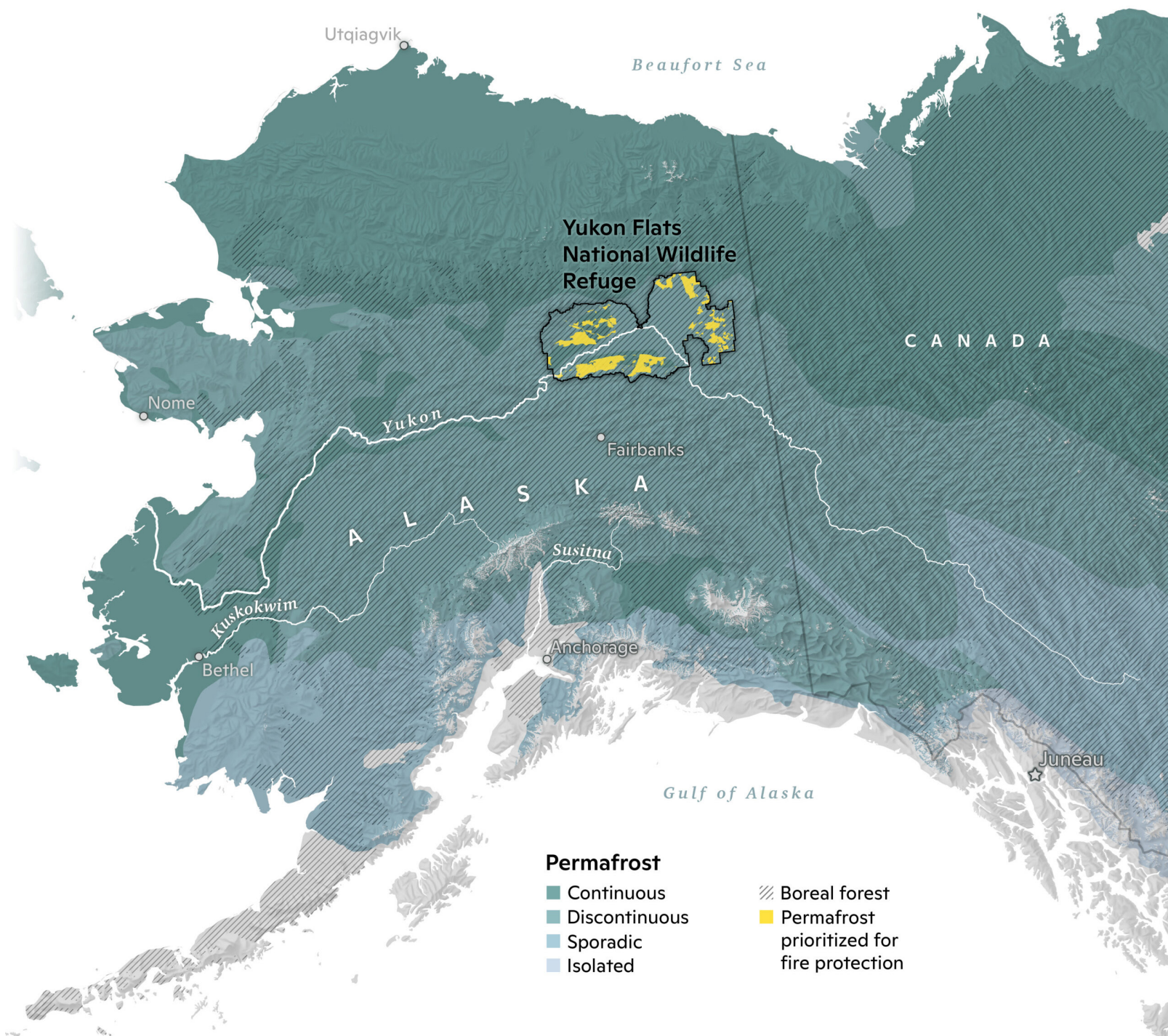
Yet rapid climate warming at high latitudes has led to a growing intensification of Arctic-boreal wildfires, with the average annual burned area today roughly twice what it was in the mid-20th century. These larger, severe wildfires combust and release large quantities of ancient carbon stored within soils and warming permafrost into the atmosphere. For example, massive wildfires across Canada in 2023 released more carbon than every country's annual fossil fuel emissions except China, the U.S., and India (Byrne et al, 2024). Smoke from these increasing Arctic-boreal wildfires travels hundreds to thousands of miles,

impacting the health and well-being of people across the continent, particularly rural and Indigenous communities in the north.

By mid-century, smoke from intensifying wildfires is projected to increase by more than 100 percent in interior Alaska, posing significantly greater risks of respiratory and cardiovascular illness (Woo et al, 2020).

PROTECTING CARBON, PERMAFROST, AND PUBLIC HEALTH THROUGH FIRE MANAGEMENT

Today's Arctic-boreal fire management practices, both in Canada and Alaska, result in unintended harm to climate and public health because they are focused solely on other values at risk, primarily lives and property, and not on carbon or smoke.



That means wildfires in areas distant from human settlements are allowed to burn, irrespective of their impacts on climate or air quality.

Groundbreaking work by Woodwell Climate and collaborators offers a new perspective on Arctic-boreal wildfires, turning a climate and health problem into a potential solution. Our research indicates that adding dedicated resources for fire management in Alaska to protect carbon and permafrost could be a highly cost-effective way to keep substantial amounts of carbon in the ground. Specifically, we find that current fire management in Alaska is effective at reducing wildfire carbon emissions at a cost of ~\$13 per ton CO₂ of avoided emissions, comparable to or more cost-effective than many other climate mitigation measures (Phillips et al, 2022).

Limiting catastrophic wildfires through targeted suppression, cultural burning, and other fire management approaches would provide a significant natural climate solution while supporting a suite of health and well-being benefits for both Indigenous communities in these regions and broader populations.

ADVANCING FIRE MANAGEMENT SOLUTIONS THROUGH RESEARCH AND PARTNERSHIPS

Yedoma, a type of ancient permafrost prevalent in Alaska, the Yukon, and Eastern Siberia, has particularly high ice and carbon content and is highly vulnerable to post-fire thaw and degradation, causing the release of carbon emissions.

In January 2023, the U.S. Fish and Wildlife Service (USFWS), in consultation with the Alaska Fire Service (AFS), elevated the fire suppression status of 1.6 million acres of Yedoma permafrost-rich land on the Yukon Flats National Wildlife Refuge in interior Alaska. This decision was made in consultation with Indigenous

residents who live within the refuge and are impacted by increasing smoke pollution and disruption to their subsistence activities. It also addresses a growing concern for the loss of old-growth habitat for wildlife within the refuge.

This first-of-its-kind decision by a federal agency to prioritize carbon and permafrost protection from intensifying wildfires is both an important precedent and a test case. In support, Woodwell Climate scientists are collaborating with USFWS and AFS to assess both the efficacy and cost-effectiveness of valuing carbon and permafrost protection on the refuge. With partners at the Cary Institute of Ecosystem Studies, we are mapping the vulnerability of Alaskan boreal forests to future fire risk and carbon loss. In tandem with the Alaska Venture Fund, the Earth Fire Alliance, state and federal land management agencies, fire protection agencies, and Indigenous community leaders, we are working to build consensus solutions that respond to the rapidly evolving needs for fire management to protect carbon, health, and other values being threatened by escalating wildland fires.

PRIORITIES FOR U.S. FEDERAL POLICY

Every year, Alaska wildfires are responsible for, on average, nearly half of all U.S. fire carbon emissions. Yet the state receives less than four percent of all federal resources allocated for fire management (Phillips et al, 2022).

This persistent discrepancy harms communities in and far beyond the Arctic-boreal region. Forward-looking federal policies and investments are needed to keep wildfires in Alaska and across the Arctic-boreal region at ecologically appropriate levels. Doing so can help keep carbon in the ground, protect permafrost, and limit the multitude of other damages that escalating wildfires inflict on local and global communities.

WE CALL ON CONGRESS TO:



Support fire management research and technology development, including for the continued modernization of wildfire detection and projections, and mapping carbon, permafrost, and wildfire smoke vulnerability.



Support enhanced collaboration with Canada and other Arctic-boreal nations to jointly address the climate and public health threats of escalating wildfire, and support Pan-Arctic wildland fire management initiatives and information sharing.



Direct the Department of Interior (DOI) to guide the establishment of a federal framework for identifying 'carbon' and 'smoke exposure/human health' as metrics for fire management priority-setting in Alaska.



Permanently authorize and robustly fund the Wildfire Suppression Authorization Reserve Fund and identify other federal budget priorities for protecting carbon and public health from escalating Arctic-boreal wildfires.



Invest in and remove legal barriers to Alaska Native fire stewardship.

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