PERMAFROST PATHWAYS

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

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ARCTIC PERMAFROST THAW ADAPTATION & MITIGATION POLICY RESPONSES

PRIORITIES RESPECTFULLY SUBMITTED TO THE 118TH US CONGRESS

THE PERMAFROST CHALLENGE. Arctic warming is contributing to the thaw of permafrost–or continuously frozen soil–a phenomenon that disproportionately impacts Alaska Native communities; unfortunately, the rate of thaw and resulting impacts are outpacing US government adaptation response. Moreover, current target global temperature thresholds and carbon budgets do not account for the full spectrum of potential emissions from carbon-rich permafrost thaw or from permafrost-wildfire fire interactions; consequently, US policies are not sufficiently mitigating projected socio-economic costs and environmental harms of permafrost thaw.

OUR GOAL. Woodwell Climate Research Center launched the Permafrost Pathways project in 2022 with funding from the TED Audacious Project—a collaborative funding initiative catalyzing big, bold solutions to the world's most urgent challenges. Through institutional partnerships and collaboration with Indigenous Arctic communities, Permafrost Pathways seeks to harness the combined expertise of leading research institutions and on-the-ground organizations specializing in climate science, policy, and environmental justice to inform and develop adaptation and mitigation strategies to address permafrost thaw.

OUR PROGRESS. As an independent scientific organization, Woodwell Climate Research Center is uniquely positioned to support the US government and Alaska communities in the critical phases of climate adaptation and resilience that precede the "implementation" phase.

ENVIRONMENTAL MONITORING, RISK ASSESSMENT, AND CO-PRODUCED GEOSPATIAL MAPPING

We are conducting site visits to partner communities in Alaska and responding to community requests for weather station installation, soil composition assessment, permafrost coring, water quality testing. These visits provide an opportunity to co-produce knowledge and to integrate Indigenous knowledge and Western science via participatory mapping, and community-led monitoring.

PAN-ARCTIC CARBON FLUX MONITORING AND REMOTE SENSING TECHNOLOGIES.

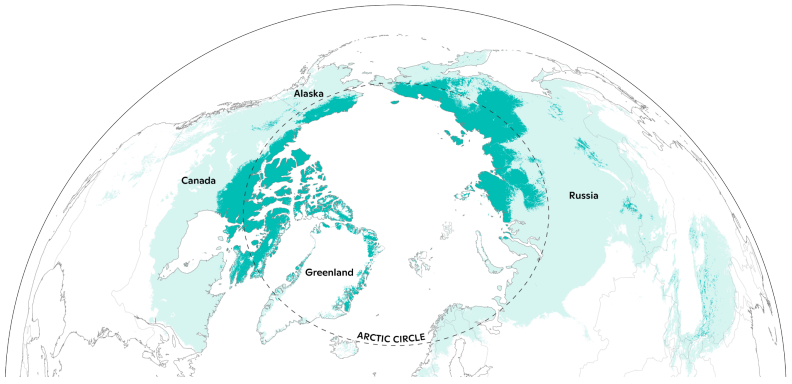
With guidance from our Arctic Carbon Flux Steering Committee—an international team of scientists who work across the permafrost region—we are in the process of installing strategically placed eddy covariance towers, supporting existing towers, and learning best practices for consulting with local Arctic communities living near tower installations. We are also working to combine ground measurement data with synthesized flux data from across the Arctic, satellite remote sensing products, and machine learning to extrapolate and map carbon fluxes at a larger scale across the permafrost region.

TERRESTRIAL ECOSYSTEM MODELS AND PREDICTIVE CLIMATE MODELS

We are helping to bring together international Earth system modeling groups and experts to improve permafrost representation in climate models. We are also developing the first-of-its-kind data assimilation model of Arctic carbon that includes permafrost-related ecosystem processes to improve historical assessments, near-team forecasts, and longer-term projections. We are also integrating permafrost processes into a compact Earth system model (OSCAR) to provide timely information on the impact of permafrost carbon emissions on global climate and remaining anthropogenic carbon budgets.

COST-EFFECTIVE ARCTIC FIRE MANAGEMENT

Record-breaking wildfires across Canada this year decimated North American and Canadian boreal forests that serve as an important land-based carbon reserve and provide insulation for permafrost soil. As the climate continues to warm, the likelihood of fire in these forests increases; burned areas are even more susceptible to permafrost thaw, which releases additional carbon into the atmosphere, accelerating this feedback loop.



Piloting fire suppression as a cost-effective natural climate solution and safeguard for public health. In direct response to our research and collaboration, in January 2023, the US Fish and Wildlife Service (FWS) enhanced

the fire suppression status of 1.8 million acres of the Yedoma permafrost-rich land on the Yukon Flats National Wildlife Refuge (YFNWR). This decision was made in consultation with the Alaska Fire Service and Alaska Native communities living in the area and represents the first time a government agency has designated land to specifically protect carbon and permafrost from fires.

Supporting a community of practice among experts and co-production of knowledge. We are working with FWS, the National Academy of Sciences, Environmental Defense Fund, and Alaska Venture Fund, and other collaborators to convene fire science experts and those with local and Indigenous Knowledge of boreal fire dynamics to explore alternative management approaches.

COLLABORATIVE ENGAGEMENT WITH INDIGENOUS ARCTIC COMMUNITIES, PERMAFROST RESEARCHERS, AND US GOVERNMENT EXPERTS.

- COMMUNITY-LED ADAPTATION PLANNING. As impacts of a warming Arctic and permafrost thaw render lands increasingly hazardous and not habitable, Alaska communities are making difficult decisions about where and how to live; this decision-making is often made while communities are experiencing health and safety crises, are recovering from recent environmental shocks, and/or are mitigating risks of future disasters. Despite varying support from relevant agencies, it is communities that are ultimately tasked with navigating available government programs, developing fundable projects, and submitting grant applications.

OUR PROGRESS

- Providing space for community-consultation and inter-/intra-agency coordination. We are inviting Alaska Native communities to convene with federal agencies, Arctic researchers, and other experts with support from Harvard Kennedy School, Alaska Institute for Justice for knowledge-exchange to better enable community-led adaptation.

OUR PROGRESS

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- Supplementing scientific and technical needs of federal and state agencies conducting single risk assessments. We are meeting with federal agencies, including US ACE, USDA (NRCS), DHS (FEMA), and NOAA to discuss ongoing environmental assessments and data collection in Alaska communities. We are also working with federal agencies, policy experts in Alaska and the greater US on to share information gathered and lessons learned on how best to assess multiple and compounding risks.

POLICY ENGAGEMENT AT US-NATIONAL, PAN-ARCTIC, INTERNATIONAL FORUM

PRIORITIES FOR CONGRESSIONAL ACTION.

1. NATIONAL GOVERNANCE FRAMEWORK FOR CLIMATE RISK AND COMMUNITY-LED ADAPTATION

Advance legislation that provides a whole-of-government approach to climate risk-mitigation and community-led adaptation.

2. INVESTMENTS IN PERMAFROST THAW MONITORING, MODELING, AND MITIGATION

Support funding for government agencies with a mandate to support disaster preparation, response, and recovery and for continued strategic Arctic research

3. INCREASED VISIBILITY OF ARCTIC CLIMATE SECURITY CHALLENGES AND BEST AVAILABLE SCIENCE

OTHER CONSIDERATIONS:

PERMAFROST BY THE NUMBERS

	15%	Of Northern Hemisphere land that is underlain by permafrost (*i.e.*, perennially frozen ground).
	144+	Of Alaska Native communities that are environmentally threatened by permafrost thaw, flooding, or erosion.
	$3.45 billion	Over the next 50 years will be required to relocate Alaska infrastructure due to permafrost thaw, flooding, erosion.
	0	Alaska Native communities facing imminent threats that have successfully relocated.
	1.4 trillion tons	Of carbon stored in permafrost soils (**2x** the amount currently in the atmosphere).
	20-25%	Of our remaining carbon budgets could be taken up by permafrost emissions under 1.5°C and 2°C scenarios
	2 of 11	

1/2

Of the average annual US fire CO2 emissions are from Alaska.

<4%

Of the **$3 billion** federal fire suppression funding is directed to Alaska,

4. <u>Designate (and fund) the Denali Commission as the "coordinating entity" to assist Alaska Native communities facing environmental threats, including permafrost thaw, erosion, and flooding.</u>

   Per the recommendation of GAO (2022), Congress should consider establishing a coordinating entity to align various federal agency actions relevant to adaptation in Alaska. The Denali Commission's broad authority, collaboration with federal agencies involved in adaptation in Alaska, and flexible funding structure makes it well-suited to serve as the hub for inter-agency coordination; however, the Commission currently does not have explicit statutory authority to coordinate federal assistance from multiple agencies and has limited funding and resources that would enable it to do so. With this authority, the Denali Commission could also serve as the receiving entity for a single committed funding source (estimated at $80 million annually) to fully cover the costs of protection in place, managed retreat, and community-driven relocation; it may also continue to receive and reallocate additional funds from relevant agencies engaged in risk assessment, adaptation planning, and implementation.

5. <u>Funding Increase funding for federal programs that are successfully supporting community-led risk assessments, community adaptation planning, and the implementation of protect in place, managed retreat, and relocation activities.</u>

   The USDA NRCS has effectively leveraged its programs, including the Emergency Watershed Protection Program, to support planning and implementation for Alaska Native communities facing imminent environmental threats; the Denali Commission's Village Infrastructure Program and Center for Environmentally Threatened Communities have delivered risk assessments and planning support, and the Bureau of Indian Affairs' Tribal Climate Resilience Annual Grant Award Program includes a category of funding specifically for Tribal communities to address environmentally-threatened

infrastructure. Additional funding for these programs may be used to formalize the incorporation of Indigenous knowledge and deliver capacity building and technical training to local communities for risk assessments, land use planning, grant writing, and contracts/project management.

6. Coordinate with agencies to statutorily amend or otherwise waive hazard mitigation planning requirements, eligibility requirements, and funding thresholds for federal grant programs that are not accessible to rural and insular Alaska Native communities.

   Despite the availability of existing federal programs dedicated to supporting hazard mitigation planning and funding resilience projects for Alaska communities affected by permafrost thaw, significant barriers to accessing these programs remain. Many of these barriers are well-documented: for example, most environmentally-threatened Alaska Native communities lack a valid (non-expired) FEMA-approved Hazard Mitigation Plan, as is required under the Stafford Act; HUD's Indian Community Development Block Grant Imminent Threat grants are generally provided to communities that have already secured other funding sources; and cost-share requirements of the FEMA BRIC program and the non-federal match requirement for US ACE programs are prohibitively high for most communities in Alaska.

   Where Federal agencies have the discretion to do so, they should systematically waive requirements that are posing undue burdens on the most environmentally threatened Alaska Native communities. Regulatory reforms and guidance for insular and rural communities may address challenges unique to Alaska (*e.g.*, not only do the costs of construction projects in Alaska exceed those in the lower 48, but financial resources of tribal and local governments are comparatively lower, as most do not own taxable property.) Where requirements are imposed in statute, however, Congress should consider eliminating requirements altogether or providing waiver flexibilities to allow agencies to provide equitable, flexible assistance that serves the needs of Alaska Native communities.

7. Form an interagency task force to analyze and propose a more effective methodology for assessing risks from compounding and slow-onset environmental hazards (including permafrost thaw, erosion, flooding, and "Usteq").

   Environmental threats to Alaska Native communities are unique to those living in the lower 48, due largely to the existence of permafrost and the interaction of permafrost thaw with other natural disturbance and risks. While there are ongoing discussions to streamline and simplify risk assessments, adaptation planning, and implementation of protect in place, managed retreat, and voluntary relocation across the US, discussions about Alaska specifically will reference existing assessments. These include reports that rank communities according to environmental vulnerabilities. As rates of permafrost thaw, erosion, flooding, and land degradation will vary, such ranking systems have the potential to mislead government funding efforts. Assigning funding for an inter-agency task force to work with independent researchers on a more effective set of parameters for assessing these slow-onset risks that pose both protracted and immediate threats to the health and safety of communities may help to increase the efficacy and accessibility of key federal programs.

8. Establish a national governance framework to manage future protection in place, managed retreat, and community-driven relocation.

   Efforts to support adaptation planning via "demonstration communities" and relocation pilot projects under the White House National Climate Task Force's Voluntary Community-Driven Relocation Subcommittee offer a critical opportunity to facilitate, guide, and collect information on government programs that are responsive to climate-forced displacement. Among the most important lessons learned from these projects, however, are the respectful roles and coordination of various agencies, including FEMA, DOI, BIA, Denali Commission, and USDA, among others. It is important to develop a governance framework that can designate these roles in the context of future relocation efforts—findings from this Subcommittee as well as the forthcoming Unmet Needs report (referenced above) may offer a concrete blueprint for this framework.

OUR SUPPORT. Woodwell Climate Research Center scientists are available to provide peer-reviewed research, articles, fact-sheets, testimony, or informal advice on environmental monitoring, modeling, and assessment of permafrost; and supporting co-production of knowledge with communities most affected by permafrost thaw (and pursuing adaptation planning for protection in place, managed retreat, or voluntary relocation).

For more information, we invite you to reach out to Dr. Susan Natali, snatali@woodwellclimate.org.