



S&T/Harvard Climate Workshop:

Opportunities for Improved Prevention and Response in the U.S. Arctic and Alaska

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**Science and
Technology**



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Executive Summary

The U.S. Department of Homeland Security (DHS) has broad national security and resiliency mission responsibilities in the Arctic. Rapid climate change in the Arctic is impacting all DHS missions. To examine the policy, mission, and science research requirements necessary to support resiliency and public safety in the face of this rapid change, the Science and Technology Directorate (S&T) co-hosted a workshop on May 8, 2023, with the Arctic Initiative at the Harvard Kennedy School's Belfer Center for Science and International Affairs. The workshop focused on the effects of rapid climate change on the U.S. Arctic and Alaska, with an emphasis on resiliency, public safety, and impacts on Indigenous Alaskan communities. This workshop brought together representatives from S&T and DHS components, other federal agencies, academia, public and private agencies working in Alaska on climate related issues, and representatives and leaders of Indigenous Alaskan communities.

This report summarizes the workshop and indicates possible future directions. Though it contains policy recommendations offered at the workshop from some participants, including some public officials, it does not reflect the official position of DHS or any of its components, or of the U.S. government. It is intended to capture statements and (provisional) positions from the workshop and should be taken as such. In this report, statements and positions should be taken only as those of relevant participants (whether or not they are clearly labeled as such).

Participants in the workshop emphasized that the profound and accelerating effects of rapid climate change are inflicting a great deal of damage on the already limited infrastructure in this region. The damage is affecting the economy of the region, the stability of long-established and important communities, and the physical and cultural health and well-being of the residents. The damage is also hampering disaster relief efforts and adding to the cost of mitigating and preventing further damage. There has been, and will continue to be, widespread destruction of local communities requiring large scale rebuilding, and when the location has become no longer tenable, the wholesale relocation of residents.

The retreat of the Arctic sea ice is opening previously inaccessible areas of the Arctic Ocean to navigation as well as resource exploration and extraction. This is a growing challenge for environmental protection, the regulation of commerce in the U.S. Arctic region, and border security. These new challenges have exposed gaps in communications, weather monitoring, and situational awareness in the region.

The federal government in general, and DHS in particular, are tasked with providing policies and assistance to combat the ongoing climate crisis in this vital region. This will require both prevention and an innovative and flexible response. Prevention will require:

1. Engagement with communities, including the sharing of relevant information.
2. Technical assistance and strengthening supply chains.
3. Continuing research and incorporating Indigenous knowledge.
4. Regulation designed to reduce risks and encourage new solutions.
5. Innovation and technology transfer.
6. Funding to promote protective measures and capacity building.

Initiatives in these categories have helped to orient the work DHS is doing to address climate change and the work of its Climate Change Action Group. Prevention and response will require innovative solutions to difficult problems, going beyond those faced in other regions of the United States, and the diligent application of existing laws to make funding and support available during this cascading disaster. To



reduce the most serious risks and to mitigate harm when it occurs, there must be increased and more effective communications and cooperation with other government agencies, with private and semi-private organizations working on the ground in Alaska, with Federally Recognized Tribes and Indigenous communities, as well as with international partners.

To ensure that federally funded Arctic climate and resilience work respects the unique cultural needs of these communities through the alignment of federal objectives and strategies, it will be important that we seek to understand and ensure the inclusion of Indigenous knowledge in departmental strategic planning, through meaningful engagement with Indigenous communities. As we look to develop the Arctic strategy, we must ensure equity in the incorporation of significant priorities and objectives of Arctic residents, being particularly aware of culturally significant priorities such as subsistence hunting practices, the rapidly changing migration patterns of land and marine mammals (leading to food insecurity), and community infrastructure needs such as improved communications, broadband access, and infrastructure improvements.

The importance of international partners was highlighted by comments from the U.S. Secretary of State, Anthony Blinken, during a recent visit to Norway.¹ In his remarks regarding U.S. collaboration with Norway, he stated, “[a]nd of course, our countries are Arctic allies. I look forward to discussing with the foreign minister Norway’s assumption of the chair of the Arctic Council. We are eager to work with likeminded allies to advance our vision of a peaceful, stable, prosperous, and cooperative Arctic. To deepen our own engagement in the high north, I’m announcing today that the United States will be opening an American Presence Post in Tromsø – our northernmost diplomatic mission and the only such facility above the Arctic Circle.”

The workshop effort aligns with Pillar 2 – Climate Change and Environmental Protection of the U.S. National Strategy for the Arctic Region (October 2022): *The U.S. government will partner with Alaskan communities and the State of Alaska to build resilience to the impacts of climate change, while working to reduce emissions from the Arctic as part of broader global mitigation efforts, to improve scientific understanding, and to conserve Arctic ecosystems.*

In addition, the discussions and presentations at the workshop reinforce the need to complete critical actions identified in the Interagency Arctic Research Policy Committee’s (IARPC) *Arctic Research Plan 2022-2026* (December 2021).

Finally, climate change is a global phenomenon. While impacts in the Arctic are increasing more rapidly than elsewhere, climate change is leaving no area of the Earth untouched. What we can learn about mitigating the impacts of climate change in the Arctic and Alaska will have direct benefits to all the communities we serve. Responding requires a “Whole of DHS” approach, as identified in the DHS *Strategic Approach for Arctic Homeland Security* (2021).

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¹ [Secretary Antony J. Blinken at a Press Availability - United States Department of State](#)

1 Background

The Arctic.² is warming at three to four times the global rate, transforming the region, and threatening both Arctic communities and the global climate more generally. In Alaska, the effects of this rapid climate change are extensive and accelerating. The consequences include:

- Widespread permafrost thaw that damages structures, roads, and pipelines, and triggers the emission of greenhouse gases, toxins, and long dormant viruses.
- An increase in the number and severity of wildfires.
- Changing the migration patterns of marine mammals and fish as well as causing other damage to fisheries that are critical food supplies for Indigenous residents as well as sportfishing and commercial catches.
- The retreat of sea ice, which causes coastal erosion, negatively affects marine ecosystems, and changes weather patterns.

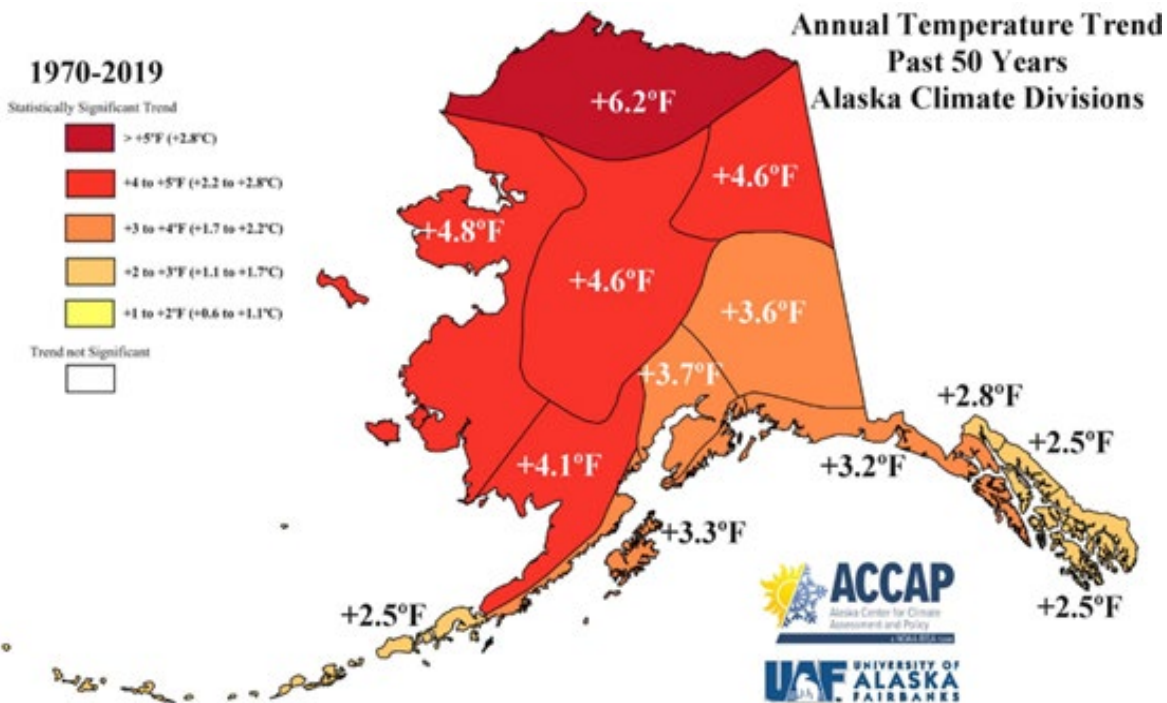


Image credit: University of Alaska Fairbanks Alaska Center for Climate Assessment & Policy

There is an urgent need for the Department of Homeland Security (DHS) (in coordination with other government agencies, private organizations, and state, local, and tribal authorities) to take decisive action to mitigate the damage that is already being done, and to produce policies to prevent, to the greatest extent possible, future damage and disruption resulting from climate change in this vulnerable region.

The S&T/Harvard Workshop on Impacts and Policy Challenges from Rapid Climate Change in Alaska, co-hosted by the Harvard Kennedy School's Arctic Initiative and the Science and Technology Directorate (S&T), was initiated to focus on the challenges posed by these impacts, how DHS and its components are addressing them, and what possibilities may exist for DHS to do more and to achieve better results.

² For definitional purposes, the Arctic consists of the Arctic Ocean, adjacent seas, and parts of Alaska (United States), Canada, Finland, Greenland (Denmark), Iceland, Norway, Russia, and Sweden. <https://arctic-council.org/en/about/states/the-united-states/>



The workshop took place on May 8, 2023, at the Harvard Kennedy School and featured a wide variety of participants representing S&T and DHS components, DHS' Climate Change Action Group, the Arctic Initiative at Harvard Kennedy School's Belfer Center, the White House, the National Oceanic and Atmospheric Administration (NOAA), the U.S. Arctic Research Commission (USARC), the Denali Commission, the Alaskan Native Science Commission, the University of Alaska Fairbanks, and the Alaska Native Tribal Health Consortium.

The workshop was organized into a morning and an afternoon session. The morning session was a series of presentations by stakeholders on the unique nature of the problems faced by the Arctic region generally and Alaska more specifically. The topics were diverse and included representatives from DHS and its components, private organizations working in the region, and representatives of the Indigenous people in Alaska who are disproportionately affected by rapid climate change and the success or failure of policies intended to address those affects.

The afternoon session was divided into four roundtable discussions among all attendees that addressed: the effect of rapid climate change on the oceans, the lack of infrastructure in general and resilient infrastructure more suitable for the harsh environment found in Alaska, the effect of climate change on health and security in the region, and the ways in which the issues raised intersect with S&T's mission.

Under the auspices of the Interagency Arctic Research Policy Committee's (IARPC) *Arctic Research Plan 2022-2026* (December 2021), much work has already begun. The discussions at the workshop both reinforced the need for continuing these efforts and pointed to other areas for DHS and the wider federal government to consider undertaking.

DHS follow up activities, as prescribed by the *National Strategy for the Arctic Region*, will be in "... partnership with Alaska Native Tribes, communities, corporations, and other organizations; the State of Alaska; and public, private, academic, and non-governmental sectors at home and abroad to harness the full range of knowledge and resources required to meet these goals."

This report is divided into two parts. Part I, Opportunities to Respond, focuses on operational awareness and planning, policy, and science issues identified during the workshop. Part II, Read Out, provides a detailed summary of discussions held during the workshop.

2 Part I: Opportunities to Respond

Key areas for action include the need for **operational awareness and planning** for new and future conditions, **policy development**, and focused **scientific research, development, and innovation**.

2.1 Operational Awareness and Planning

Due to changing dynamics, DHS must recalibrate and expand its regional operational aperture to address emerging opportunities and vulnerabilities in the Arctic (The DHS Strategic Approach for Arctic Homeland Security, 2021).

Climate change in the Arctic is creating new conditions that require updates to operational awareness and planning. Comprehensive operational awareness and planning are particularly critical for emergency response. Effects include shoreline erosion accelerated by lack of sea ice binding to the shoreline, subsidence from permafrost thawing, and stronger tropical cyclone impacts due to warmer water in the north-central Pacific such as Typhoon Merbok.



Many Arctic communities and Indigenous villages are both remote and isolated. Providing adequate advanced warnings and conducting effective response operations both today and in the future, as the impacts of climate change increase over the next decades, is critical to the safety and wellbeing of these communities.

The potential for increased tourism in the Arctic, including cruise ships and ocean-borne cargo transit, may create the need to prepare for mass rescue operations in the Arctic. In addition to accidents at sea, the potential for opening up additional fossil fuel and mineral mining operations requires updated planning for preventing, mitigating, responding to, and recovering from environmental disasters in remote and isolated areas under harsh climate conditions. Operational effectiveness will be challenged by a lack of robust and reliable communications in many parts of the Arctic region.

Development of new operational concepts and plans will require extensive coordination and input from Alaska Native Tribes, communities, corporations, and other organizations; the State of Alaska; and the public, private, academic, and non-governmental sectors. Changes in geopolitical dynamics and foreign investments could also impact the future of the Arctic region, including in the areas of national security and energy security.

The development of new operational paradigms in the Arctic resulting from the necessity of adapting to – and mitigating – the impacts of climate change will drive efforts to develop and deploy new technologies for critical infrastructures, especially for novel, climate-smart, food, energy, and water systems. These new systems must simultaneously advance the safety, security, and prosperity of individuals, broadly supporting DHS goals for the entire nation.

Success in these efforts will have a high dependency on developing new approaches to high Arctic communications. Practical solutions are required that are highly reliable, offer meaningful data transmission rates, and are economically affordable by all stakeholders.

2.2 Policy Development

2.2.1 “Acute” vs. “Chronic” Impacts of Climate Change

Many of the impacts of climate change such as thawing of permafrost, shoreline erosion, land subsidence/collapse, sea level rise, and food insecurity, take place over long periods of time. Most of the disaster response policies and plans currently in place are based on the assumption that an infrequent “event” has occurred, and the response will address repairing damage and rebuilding to return the affected area to its “pre-event” condition. Therefore, policy needs to be adjusted or developed to address how federal disaster response resources can be applied to these types of long-term, ongoing, chronic effects that are causing physical and economic damages and injuries, and which may require not the restoration of the previous status quo, but a new, more resilient set of conditions.

2.2.2 Grants Policy

Grants policy, including post-disaster individual assistance, public assistance, pre- and post-disaster mitigation grants, and building resilient infrastructure and communities, requires review to assure unique issues facing Alaska, Arctic communities, and Indigenous peoples are completely understood and comprehensively addressed. Many processes and policies that are effective in the lower 48 states are unsuitable to address the urgent needs that exist in the complex and unique conditions in Alaska. This results in communities not having access to existing resources and programs for which they should qualify. Policy consideration needs to be given to understanding and addressing how underserved, remote, and isolated communities can access grant funding, and how grants can be adjusted to assist communities



that have been lacking necessary basic infrastructure for decades. This should include developing policies to support regional grants.

2.2.3 Department of Homeland Security

The DHS *Strategic Approach for Arctic Homeland Security* was published in 2021. The DHS strategic approach identifies the following three goals:

1. Secure the Homeland through Persistent Presence and All Domain Awareness.
2. Strengthen Access, Response, and Resilience in the Arctic.
3. Advance Arctic Governance and a Rules-Based Order through Targeted National and International Engagement and Cooperation.

DHS should review and update, as needed, its Arctic policies at both the departmental and component levels to account for the chronic and accelerating nature of the climate change disaster, and the complex nature of the support required, with particular consideration to recognizing and incorporating Indigenous knowledge and science. This review and update should reflect the “Whole of DHS Approach.”

Climate change, rising commerce and traffic, and new efforts to extract natural resources in Arctic regions will result in an increase in the quantity and scale of natural and technological disasters. DHS, particularly the Federal Emergency Management Agency (FEMA) and U.S. Coast Guard (USCG), must assure that policies are in place to enable rapid and effective preparedness, mitigation, response, and recovery from disasters of all types in the unique Arctic environment. These actions will help to increase overall resiliency in the Arctic.

2.2.4 Federal Government

The federal government should consider policy approaches that increase coordination and collaboration with Indigenous peoples and communities in Alaska, faithful to the concept of “Nothing about us without us.” This will not only incorporate vital Indigenous knowledge and experience on the ground, but it will assure that the solutions and policies meant to assist the people of Alaska will have the best possible chance to be relevant and effective in meeting the challenges they face. Having the input and “buy in” of the Indigenous people of Alaska will only increase the efficiency and efficacy of the resources expended in this effort. These actions will help to reduce barriers to collaboration. The federal government should consider whether new or revised policies are required to assure engagement of Indigenous people and communities in determining how benefits from new economic opportunities resulting from climate change impacts in the Arctic will be shared. Policy development may be required to address how federal funds can most effectively be matched with state, local, private sector, and other funding.

2.2.5 International Collaboration: Arctic Council

International collaboration will be a critical element in addressing the challenges of climate change in Alaska and the Arctic. DHS should consider deeper engagement with the Arctic Council as part of its international strategy for the Arctic.

2.3 Scientific Research, Development, and Innovation

The Biennial Implementation Plan 2022-2024 for the Arctic Research Plan 2022-2026, produced by IARPC of the National Science and Technology Council (December 2021), has previously identified some of the research needs discussed during the workshop. Areas where the workshop-identified research areas overlap with IARPC implementation plan efforts are noted in Table 1: Selected IARPC research deliverables.



DHS should review its participation and contributions to IARPC research efforts. In a number of research activities with high relevance to DHS missions and responsibilities, a clear DHS lead has not been identified (3.1.1, 4.1.2, 4.2.2) or DHS is not identified to support the research deliverable (4.1.1, 4.2.1) in any manner.

Table 1: Selected IARPC research deliverables

Deliverable	DHS Lead Agency / Interagency Lead	Expected Completion Date (MM/YY)
Priority Area 1: Community Resilience and Health		
1.3.1 Synthesize and expand upon existing efforts to create data visualization maps of areas at high risk for coastal erosion, permafrost thaw, and flooding within specified future time periods (e.g., 10 years, 50 years, 100 years) to identify at-risk areas and inform investments in climate-resilient infrastructure.	FEMA / DOI-USGS (lead); NASA (lead)	10/24
Priority Area 2: Arctic Systems Interactions		
2.2.4 Continue coordinated interdisciplinary Arctic marine climate and ecosystem observations and share data and promote synthesis of field observations.	USCG / DOC-NOAA/OAR (lead); NSF (lead)	10/24
3.1.1 Conduct a study to create an asset map of existing infrastructure as a baseline for understanding how to help the community be more resilient to climate impacts. Facilitate sharing resources about and mitigation techniques for known threats to infrastructure impacted by climate change.	CISA* / Denali Commission (lead)	10/23
4.1.1 Conduct a study identifying where information used in decision-making and planning can be improved through access to new or additional data sources. This study should consider a wide range of activities associated with ongoing responses to common and emerging hazards, including risk reduction efforts and emergency preparedness and response.	DHS not referenced / DOI-BIA (lead)	4/23
4.1.2 Share findings of deliverable 4.1.1 as a means (1) to spur additional research and science communication aimed at addressing unmet needs for planning, prevention, response, and recovery; and (2) to inform time-sensitive decision-making and planning processes.	DHS Policy* / DOI-BIA (lead)	10/24
4.2.1 Undertake a study to identify the top 10 threats/hazards to communities and critical remote state and federal government infrastructure in the State of Alaska that should be included in the Statewide Threat Assessment. This might include coastal and river erosion, flooding, thawing permafrost, and changes in the seasonal snowpack.	DHS not referenced / HHS-NIH/NIEHS (lead)	4/23
4.2.2 Upon completion of 4.2.1, establish a data collection and collation plan, to include mechanisms to collect threat/hazard data that may not be readily available.	DHS* HHS-NIH/NIEHS (lead)	10/24
4.2.3 Collect and integrate disparate threat/hazard information and perform modeling and analysis to understand where natural and human-made threats and hazards pose a risk to Arctic communities.	DHS-FEMA / Denali Commission (lead); HHS-NIH/NIEHS (lead)	10/24
4.3.1 Conduct a study focused on expedient and enduring cold regions infrastructure, including water and wastewater, energy, and temporary and enduring structures. Results will be disseminated into a report that will identify and provide background information on the variety of available and emerging water/wastewater, energy, and structure technologies and best practices.	DHS-CISA; DHS-USCG; / DOD-USACE (lead); DOT (lead)	10/23
4.3.2 Conduct a study that looks at novel materials that could be used to improve resilience for physical infrastructure from the effects of hazards. Areas of interest include energy, communications, and transportation infrastructure. Share findings in a report.	DHS-CISA; DHS-USCG / DOD-USACE (lead); DOE-AE (lead)	10/24

*a clear DHS lead has not been identified or DHS is not identified to support the research deliverable in any manner.



In addition to the research areas identified by IARPC and included in Table 1, workshop discussions identified other areas of research, development, and innovation needed to support the DHS Arctic mission. These include the following:

- Develop an *Adaptive Risk Management and Engineering* approach for evaluation of proposed Arctic mitigation and related efforts. Create objective and meaningful metrics and measures for success and include input from the social sciences to understand and serve the unique and varied cultures that are impacted. As part of this initiative, integrate Indigenous sciences and approaches with more traditional methods in developing new and novel means to address climate impacts in the Arctic.
- Research possible alternatives to permafrost ice cellars for food storage.
- Develop new materials and methods for permafrost construction methods.
- Conduct research to achieve a deeper understanding of shoreline erosion in Alaska and the Arctic in collaboration with federal agencies such as NOAA and the U.S. Geological Survey.
- Consider adapting the Advanced Circulation model developed by the DHS Coastal Resilience Center of Excellence to Arctic basins.
- Assess the need for a new class of hydrologic and hydraulic models to address low velocity, high sediment load flooding hazards that also accounts for permafrost conditions and land subsidence. Such models may be supportive of FEMA needs to update and develop Flood Insurance Rate Maps for the National Flood Insurance Program as well as general needs for flood hazard and risk assessments in support of state and local hazard mitigation plans.
- Collaborate with international partners, in particular Norway, to develop technologies needed for high Arctic communications supporting a wide range of missions, including search and rescue, alerts, warnings, and notifications to remote and isolated villages, and other critical communications.
- In support of search and rescue and other missions, research standards for survival gear and operational equipment under Arctic conditions. Develop a test and evaluation program for survival gear and operational equipment intended for Arctic use. Assess possible collaboration with Norway regarding Arctic test ranges.
- S&T should consider collaboration with Norway on the DHS Arctic Center of Excellence. Assessment of potential for joint research efforts leveraging Norway's institutions and capabilities at locations such as Tromsø and the Svalbard archipelago. Such collaboration could possibly be undertaken in partnership with NOAA.
- Create a catalog of data and knowledge repositories to support climate change and resiliency research in Alaska and the Arctic.

3 Part II: Read Out

3.1 Current Climate Science and Understanding the Impacts on Alaska

All the emerging information concerning climate change in the Arctic has shown the detrimental impacts that have occurred. The Arctic is warming three to four times faster than the rest of the world, out-pacing predictions, and the increasing rate of change is a key driver of the indicators being observed. This is an issue beyond just temperature, encompassing all the variables affected by temperature, including changing ocean currents and weather patterns, coastline erosion and sea level rise, ocean acidification, changing wildlife patterns (including the health and distribution of fishing and hunting stocks), melting glaciers causing increased river flows, and subsequent bank erosion and resultant landscape destruction.



Additionally, sea ice is shrinking and becoming thinner, removing buffers that slowed or prevented storms from moving from the ocean to land, changing the marine life ecosystem, creating sea level rise, and opening new areas to navigation and the potential environmental and national security impact that follows. Further, sea level rise is not uniform, and parts of Alaska are experiencing it much faster than the global average would indicate.

3.1.1 Permafrost Thaw

Another powerful indicator and destructive process associated with rapid warming is permafrost thaw. 80% of Alaska is in the permafrost zone and 30% of the state has near-surface permafrost. The consequences of this thawing are many and widespread. The term **Usteq** has been coined to describe the catastrophic ground collapse caused by the compounding effect of permafrost thawing and related flooding, which accelerates additional thawing. This collapse of the soil damages structures, pipelines, roads, and other infrastructure. It can cause lakes to empty, landslides, and geological accidents. Permafrost thaw also releases greenhouse gases as well as previously sequestered viruses and bacteria, damages ecosystems, and threatens biodiversity through habitat loss and invasive species migrating north. To date, 73 communities in Alaska have been identified as facing imminent threat from permafrost thaw.

3.1.2 Policy Challenges and Responses

The speed at which climate change is occurring in Alaska is outrunning the limited policies and responses that are currently in place. The supporting infrastructure does not exist to deal with the rapid changes that are occurring, ever widening the gaps between needs and responses. The scale and scope of the support required is also insufficient. Some communities that have existed for thousands of years will need to be relocated. Where do they go? Will all the infrastructure that they will need at their new location be constructed? What is the impact on traditional cultural norms, which are of vital importance to the residents? Many of these communities are not accessible by road systems and the relocation site may also not have a road network in place.

It is also important to include the affected populations in the assessment, planning, and implementation of solutions and responses that will impact their communities for generations. A wealth of local information and practical knowledge can be brought to bear, avoiding costly and needless mistakes, and preventing unnecessary conflicts between government agencies and local communities.

Emergency management plans for communities in the Arctic have gaps, including accurate assessment of flood hazards. Flooding has been historically underreported in native Alaskan communities. Consequently, flood hazards have not been comprehensively studied or addressed. The Arctic environment requires consideration of new policies that align to the unique conditions of native and rural Alaskan communities.



10% of Households Received FEMA Assistance

Interpretation and Translation

SBA Disaster Assistance

**Evaluation Criteria for FEMA
Individual Assistance**

- Contractor Estimates Required
- Arctic Entries Determined Not

Eligible

Image Credit: Alaska Institutes for Justice

Following Typhoon Merbok in 2022, only 10% of affected homes received FEMA assistance due to a variety of factors unique to Alaska and the Alaskan way of life. Inadequate resources for translation and interpretation prevented many from applying. Many who are subsistence hunters and fisherman listed their income as zero, which flagged the application for potential fraud. Fish camps used by communities to gather fish in the summer months are misclassified as “summer homes” by FEMA and denied funds. Many grants and loans require contractor estimates as part of the process, but there are no contractors in much of rural Alaska to provide these estimates. Structures that collapse from chronic ongoing permafrost thaw, without a specific disaster event date range, do not qualify for disaster funds. Even when policies are in place, there is a desperate need for translation and interpretation services to get information out to the affected communities. Deadline accommodations/adjustments are necessary to allow for the additional time these challenges require.



3.1.3 Healthcare

Climate change is a healthcare emergency, in no small part because a healthy biosphere is vital to human health. Communities are threatened by food insecurity, the toll of community damage and lifestyle decay, the release of dormant bacteria, climate change-related damage to sewage drainage systems, declining air quality, and the loss of housing and infrastructure.

Identifying health effects of climate change in Alaska



Image credit: Local Environmental Observer (LEO) Network

In a region that already lacks sufficient health resources and the infrastructure necessary to provide it, the increasing strain caused by climate change-related health issues could push the system beyond the breaking point. Health care can also be affected by deficiencies in other, seemingly unrelated areas. For example, during the COVID-19 pandemic, important guidance on how to protect yourself from infection was distributed via the internet in the form of PDFs. Many Alaskan communities have no internet access and no way to receive critical information in that format.

3.1.4 U.S. Arctic Research Commission

USARC is an independent federal agency created by the Arctic Research and Policy Act of 1984. There was optimism that their most recent report touched on much of what was being discussed at the Climate Workshop, indicating that there is some consensus around what needs to be done. The report highlighted five goals/recommendations for more research and resources:



1. Environmental Risks and Hazards.
2. Community health and wellbeing.
 - a. Maternal health.
 - b. Suicide rates.
 - c. Improved telecommunications to facilitate access to health care.
3. Infrastructure to restore and maintain communities.
4. Understanding and supporting the unique economics of the north.
5. Research cooperation locally and internationally.

3.1.5 National Oceanic and Atmospheric Administration

Around Alaska, 66% of the waters are unmapped despite being a resource rich, strategically important region. In fact, Alaska eliminated their coastal management program in 2011. Retreating sea ice will bring significant increases to navigation in these waters.

Weather forecasting in Alaska is hampered by inadequate measurements. Training and maintaining weather staff for Alaska is very difficult – most are recruited and trained in the lower 48 and then sent up north. An effort should be made to find and train local Alaskans to fill these roles. This would also help address the need to incorporate local and Indigenous knowledge and experience. Weather forecasters strive for 96 hours of lead time when alerting the approach of major weather events, but this is not sufficient with Alaska's diverse, rural population, already struggling with inadequate infrastructure. Typhoons are a manifestation of tropical depressions and are becoming more frequent in the Arctic region.

NOAA also has a key role in managing fish stocks. Changes to fish stocks, including migration, increased competition, and conflict are mounting problems and will have an impact in the near future.

3.1.6 The Denali Commission

The Denali Commission is an independent federal agency with the mission to provide infrastructure, job training, and support economic development. Because of their broad authorities, they can take funding transfers from other agencies and funding designed for long-term projects, then distribute the funds as needed. The funds can also be used as a non-federal match for federal funds. They are helping communities put together disaster plans and are assisting the U.S. Army Corps of Engineers to map flooding and sea level rise.

3.2 Indigenous Alaskan Perspectives

3.2.1 Alaska Native Science Commission

Up to 40% of communities will require relocation. When a community is relocated from where it has been for centuries, there are significant challenges because it takes people from their home and puts them into a place where they feel “othered.” An example is the community of Newtok, which has unsuccessfully attempted to relocate multiple times. This has created divisions, especially between the youth and elders of the community. Relocation can bring:

- Loss of land and food security.
- Loss of culture and ties to place.
- Loss of graves and sacred sites.
- Loss of languages.
- Loss of identity.
- Loss of ceremonies.



- Loss of traditional knowledge.
- Loss of traditional medicine.
- Loss of local elders, youth, and jobs.
- Loss of hope.
- Loss of trust between government and community.

A key position change with Newtok is finding a director who can speak the same language as the agency and match resources. Overall, the government needs to better understand the linkage between community health, public health, and national security. There is major concern for health issues especially in young people, where many young boys would not even be physically eligible for a military draft. Providing hope for future generations is essential. Indigenous Alaskans come from strong communities and have lived through the harshest conditions and most difficult climates. Resilience is part of their culture, but there is, of course, a limit to that resilience.

3.2.2 Center for Alaska Native Health Research at the University of Alaska Fairbanks

Indigenous peoples should be a partner in the decision-making process when it comes to the climate crisis. There needs to be room for them at the table, to be meaningfully involved, and to share their personal experiences in a meaningful capacity.

3.2.3 Alaska Native Tribal Health Consortium

The Alaska Native Tribal Health Consortium serves over 189,000 Alaska native and American Indian people from more than 200 communities across the state, with 11 distinct cultures, 229 federal tribes, and 20 recognized languages. Most of these communities are inaccessible by road. Right now, the tribes are competing with one another to save themselves, some get funded, and some do not. The reality of relocation is that when the funding is not properly allocated and the planning is insufficient, you get a community that has a “new side” and an “old side.” It becomes a divided community, and the “old side” is one environmental disaster away from crumbling. The culture is disrupted by policy when people make decisions for communities without consulting them or taking the time to understand their unique needs and priorities.



Image credit: Alaska Native Tribal Health Consortium



They would like to see healthy communities and coordinated efforts. There is much devastation throughout the state, but the culture is so rich that there is still hope and strength. Indigenous people are optimistic, but it gets harder every season when the resources they look forward to are no longer available. Indigenous communities are connected to their food and traditional foods cannot simply be replaced with cereal and rice.

Adaptation is the result of risk assessment plus planning and implementation. “Planning” is a word that has been used for years in Alaska, but now it needs implementation. There is still a chance to prepare for systemic change and make a difference.

3.3 DHS Policies and Programs in Alaska

3.3.1 Office of Cyber, Infrastructure, Risk and Resilience Policy

The topic of climate change was not on the agenda just three years ago, but now DHS has issued a strategic framework for addressing climate change that sets out to:

- Empower individuals and communities to build climate resilience.
- Build readiness to respond to increases in climate-driven emergencies.
- Incorporate foresight and climate science into strategy, policy, programs, and budgets.
- Invest in a sustainable and resilient DHS.
- Develop a climate change-informed DHS workforce.

FEMA represents the boots on the ground, but DHS also has teams focused on infrastructure and security. Climate has affected human migration patterns and is placing stress on borders. Climate change will also affect geopolitical competition in ways that will affect the homeland (the USCG is the DHS lead on this sector of the issue). The Department is doing its part to work on broader national strategy, working on its own Arctic Action Plan, and working on addressing specific efforts within the Arctic.

3.3.2 U.S. Coast Guard

The USCG has over 2,000 active-duty personnel who reside within Alaskan communities. In addition to the wide-ranging and critical on-duty services these personnel provide, off-duty they are full participants in the communities in which they live – raising families, participating in schools and civic groups, and other activities.

Fundamentally, USCG is an operational agency whose role is to preserve and protect maritime transportation, protect the environment and its resources, prepare for disasters, provide disaster response, and defend the nation’s interests in the maritime region.

In February, USCG released its *United States Coast Guard Climate Framework*, which contains three lines of effort:

- Build climate resiliency into our workforce, infrastructure, and assets.
- Plan for and respond to more frequent weather emergencies and long-term climate trends.
- Develop and leverage partnerships to enhance, enable, and ensure maritime safety.



USCG is also faced with new threats such as Russia and China dual flagging their fishing fleet to enable ships to serve as both fishing and military boats. This presents a challenge to fishing fleets and stability across the waters.

3.3.3 Federal Emergency Management Agency

FEMA is usually thought of in the response phase, but there is a resilience side of FEMA as well that has a lead role coordinating before and after disasters. FEMA works with other federal agencies as well as state and local governments, to identify hazards, develop mitigation plans, and build resiliency. Post-disaster, FEMA works with state and local partners during recovery efforts to increase community resiliency. Indeed, FEMA has increased focus on preventing emergencies, not only responding to them.

FEMA also has a strong focus on coordination with state and local partners. This starts with reviewing the needs that have already been identified and working with communities to understand their specific needs. Once needs are well understood, FEMA works with state governments and local communities to creatively use available resources to address identified challenges. Gaps will remain, and there will be hurdles along the way, but FEMA is committed to creating community-specific solutions. It is FEMA's goal to build better relationships with this nation's Indigenous communities.

Agency partners have different levers to pull in this effort and they are figuring out how best to use them to create the systems necessary to move forward long-term. For example, some homeland security grants have specific requirements that make it practically impossible for Indigenous Alaskan communities to apply. This is something they are hoping to fix.

There are many organizations engaged in resiliency that have yet to find the best way to join forces and address these issues together. It is urgent to get the collaboration element right.

3.3.4 U.S. Cybersecurity and Infrastructure Security Agency

What does it take for Americans to live the lives they choose, where they choose to live them?

The U.S. Cybersecurity and Infrastructure Security Agency (CISA) currently has a regional resiliency assessment program in place for Alaska. However, the issue with these assessments is that they may overlook what communities struggle with on a day-to-day basis. CISA wants to make a difference in the lives of the citizens they are working to serve. This requires that CISA work closely with state and local community partners as well as critical infrastructure sector members, to develop programs that address and solve their problems.

3.3.5 Science and Technology Directorate

S&T is actively working to find solutions to the issues of climate change, using engineering to address these challenges. Research is focused in these areas:

- Community resilience.
- Optimal ways to drive down future risks at the local level.
- Engaging with Native and rural communities to understand their unique challenges and priorities, and actively leveraging Indigenous and local community knowledge.
- Infrastructure resilience, self-healing.
- Insurance industry valuation formulas that monetize resilience and innovations in infrastructure.
- Prize challenges to encourage innovation from external sources and encourage cooperation on ideas and solutions at the community level.
- Engaging and utilizing local residents for support of scientific monitoring initiatives.



3.4 Issues to Consider

3.4.1 Ocean Issues

The discussion was wide-ranging and addressed many different aspects of the effects of climate change on ocean-specific issues.

The future “ice-free” Arctic will not actually be completely ice-free, and it will not replace the Panama Canal, but it will experience greatly increased sea traffic and resource exploitation. This will necessitate better weather forecasting capabilities to provide the increased warning time necessary given the realities of the limited response capabilities in the Arctic. This will require improved and expanded monitoring and observational capabilities.

The situation is driven by economics, not just sea ice. In the Arctic, there is a “hidden federal reserve” of abundant natural resources, including copper, oil, and gas. Much of this area is unmapped, and we may also be looking at the central Arctic Ocean for fishing. Addressing the natural resources in this region should be among our top concerns. Engaging Indigenous community members as equal partners in the assessment, planning, and reaping of benefits as we work to address these challenges will go a long way to rebuild and strengthen relationships. This also complicates the role of USCG’s efforts to enforce the Polar Code. There has been a push to create more marine protected areas; however, it is often a challenge to economic development because fishing is such an economic driver. There is no coastal management program in Alaska, which is intensifying this friction.

Environmental protection and fisheries management is hampered by the lack of a complete and accurate coastal survey of Alaska. We need to fundamentally understand where the fish are going and how climate change is affecting fish, marine mammals, and wildlife migrations throughout Alaska. Ocean issues are impacting Indigenous peoples. Coastal communities need to better understand what is happening off their coasts. This includes better information on shoreline erosion and increased flooding risks from all causes. A coordinated management of coastal spaces is needed. This kind of effort was rebuffed in the 2000s, but



ALASKA NATIVE
TRIBAL HEALTH
CONSORTIUM

Image credit: John Jones, Alaska Native Tribal Health Consortium



it needs to be revisited. Historically, Alaskan governments and communities have not been accepting of outside input on state policy. Close collaboration, transparency, and setting clear goals that will benefit communities will improve the likelihood of success in developing and implementing these kinds of cooperative projects.

Consideration should be given to the lead agency for these types of initiatives. For example, could DHS lead such an effort from the perspective of security and disaster response?

Although Starlink is making progress closing communication gaps in the Arctic, we are lacking situational awareness in the Arctic space due to a lack of communications and monitoring infrastructure in the region.

There is a national security risk created by the increasing ability for ships to move along ice-free Arctic coastlines, exacerbated by the threat of smaller ships turning off their Automated Identification System and “going dark.” Currently, the Border Patrol presence in this region is very small.

There are a lot of cooperation agreements in place with the other Arctic countries, and yet there is a need for better harmonizing and coordinating of Arctic weather forecasting among all Arctic nations. Russia is a major player in the Arctic region but is no longer actively involved after the Arctic Council decided to stop engaging with Russia. This is impacting monitoring, forecasting, and security. Data about the Arctic space is missing - how do we (and local communities) deal effectively and efficiently with Arctic issues when one of the largest players is no longer participating? Oil and trash spills crossing international boundaries are more and more likely in this region.

It is anticipated the Bering Strait will rapidly evolve as an economic, research, and security corridor. DHS needs reliable, timely, and accurate data to make good decisions and that data should include how other countries will react to these same changes. On a more positive note, the United States and Canada have had some success working on bilateral ocean issues.

FEMA is taking issues of resiliency and disaster response in Alaska very seriously. This includes working with Indigenous communities in Alaska as well as other states and territories. However, FEMA will need to increase the number of FEMA staff to support all 500+ tribes. Additional analysis is needed to determine how many staff positions are required, and how many to deploy in each specific area. FEMA has projected they need to expand their tribal advisor workforce by 60%. This effort may move slowly as the hiring and training of additional tribal advisor staff will be a complex process. FEMA also has a focus on emphasizing equity as a core attribute of emergency management. FEMA is working to coordinate all efforts, but the issues facing the region are very complex and it is difficult to identify and connect meaningfully with all agencies, potential partners, and stakeholders.

Top-down command and control cannot get us where we need to go, so we need to empower everyone to deal with these issues.

3.4.2 Infrastructure Issues

There is almost no maritime infrastructure around the U.S. Arctic and Alaska. DHS will have to be involved in the funding of that infrastructure, working closely with the Department of Interior (DOI) and Department of Transportation (DOT). Infrastructure in Alaska needs to be leveraged to meet many needs. A port serves many functions and is a hub of social and economic activity, including the fishing industry, logistics and supply, education, and transportation. We need to un-silo systems to understand and facilitate their interconnectedness. For example, when you build a new sewage treatment plant, you also need to increase the power infrastructure to adequately supply it.



It is also important to understand the unique challenges to infrastructure in this environment. An example would be the widespread use of Diesel generators in Alaska because they are rugged and continue to work even in extreme weather conditions. They cannot be replaced with greener systems that are unable to operate in those conditions.

Flexibility is important. When required to rebuild destroyed roads to new DOT standards, it was found to be so expensive that the roads were not rebuilt. Alaska needs appropriate technologies, not systems designed elsewhere that are inadequate or impractical, like schools designed in and for Seattle, or heavy machinery that cannot function in the extreme environment. Additionally, maintenance and operations are the primary causes of failure with infrastructure in Alaska. We need to not just “bring in” solutions and then leave, but train people within communities to maintain these solutions. That will also provide jobs and opportunities for the people living in those communities, while ensuring the long-term cost/benefit of the infrastructure investment. The money for maintenance and training needs to be built into the funding.

More resilient communities make a more resilient Arctic.

Resiliency is about building in co-benefits with infrastructure. When we relocate communities, we must anticipate the future risks in the new location and find ways to mitigate and avoid them. It is vitally necessary that resources are available at both the old and new relocation sites. The United States has a great opportunity to model how to handle internal relocation that works with, and for, the Indigenous community.

We should support Indigenous peoples in place as far as it is feasible. Solutions that would move all at-risk people into a single community should not be considered. There are fundamental differences between remote communities (e.g., Nome, a larger but regionally isolated city of 4,000 people) and rural communities (e.g., 400 people spread out over a large area).

In some communities, 80% of food is self-produced. When a disaster comes, there is no current system that accounts for those losses or addresses that gap. Key things that should be asked are: Who is the infrastructure serving? Have the local communities assessed their own needs? How can we work with that information? What are the workforce needs? What are the healthcare needs? In many places when assistance is being provided, there is such a lack of infrastructure and complementary resources that the assistance is inadequate or ineffective. This is specifically true regarding connectivity. Communication and broadband interconnectedness that is taken for granted in the lower 48 simply does not exist in remote locations such as Alaska.

The cost of building infrastructure in Alaska is much higher than elsewhere. It is remote, with limited roads and existing infrastructure to build on, and communities that are far-flung and culturally unique. All these factors and more contribute to higher cost, but the cost will only increase more with time and the cascading effects of climate change. The limited or non-existent tax base in parts of Alaska means that projects are not eligible for matching funds. Wealthier areas in other parts of the United States, with high tax bases and existing infrastructure will always be more appealing to fund because the funding will “go further” and bring more “bang for the buck.” It will be necessary to carve out funding for the U.S. Arctic and not force them to compete with other U.S. cities and regions.

3.4.3 Other Health and Human Security Issues

Human health, wildlife health, and climate health are all inter-related and cannot be considered in isolation.



Permafrost thaw is releasing pathogens, carbon, and methane as well as breaking pipelines, wrecking roads, and walkways, and disabling frost cellars for food storage. It is a slow-moving infrastructure and health disaster. There will also be excess mortality from heat.

FEMA is working to adapt to these slowly unfolding disasters that lack specific targets of funding. It will not work to just wait for a big disaster and then build it back the way it was before. It is not about responding just to the disaster; it is about exposing the vulnerabilities that allowed the disaster to happen in the first place.

Community aides are the backbone of the Alaskan health care system. These aides are already in all the individual communities. The aides know everyone, and everyone knows them. These community aides are a very important source of information, an early warning system, and a valuable resource for solutions that will make the biggest impact on people's lives.



Providing hope to future generations

Image credit: Patricia A.L. Cochran, Alaska Native Science Commission

Whatever decisions are made that will affect and impact these local communities, it is vital that young people and community members, who will bear the brunt of any changes and policies that are made, be present at the table.

3.4.4 Science and Technology Directorate Crosscuts

S&T needs to do the research to validate the data about upcoming crises. S&T also needs to focus more of its research on sociological data, and targeted outreach and collaboration to better understand these communities, their priorities, and foster enduring resilience. What does resilience look like? Are we building for 2030 or 2100? The risk tolerance for cutting-edge research needs to be greatly increased to allow for more and better research because we are dealing with existential threats.

Risk assessments must be standardized and provided with proper oversight to streamline, optimize, and accelerate funding efforts, and to create real, apples-to-apples comparisons between projects to drive appropriate priorities.



The grant process for addressing these challenges would benefit from simplification to make it more accessible to these communities, and to allow added flexibility to incorporate novel and innovative solutions to Alaska-specific problems.

Finally, there needs to be a greater respect for, and integration of, Indigenous science and knowledge. Indigenous science is based on generations of experience and brings vital information to the discussion. Strength and resilience are found in a harmonious blending of “western” science and traditional understanding. There are many examples of Indigenous communities, using grant money to solve problems in novel and creative ways that would never have been thought of by outside policy makers and scientists. We can learn much from working with, and learning from, residents of other Arctic countries, especially Canada.



Image credit: Alaska Native Tribal Health Consortium

4 Summary

The challenges of the rapid advance of climate change in the U.S. Arctic and Alaska are immense and the consequences are falling disproportionately on the Indigenous peoples of Alaska. These crises are also happening very quickly, and not at “government speed.”



The federal government in general, and DHS in particular, are tasked with providing policies and assistance to combat the ongoing climate crisis in this vital region. This will require both prevention and innovative and flexible responses. Prevention will require:

- 1) Dissemination of relevant information to communities.
- 2) Technical assistance and strengthening supply chains.
- 3) Continuing research and incorporating Indigenous knowledge.
- 4) Regulation designed to reduce risks and encourage new solutions.
- 5) Innovation and technology transfer.
- 6) Funding to promote protective measures and capacity building.

Initiatives in these categories have helped to orient DHS' work on climate change and the work of its Climate Change Action Group in particular.

It is possible that the legal authorities that DHS has to respond to challenges in Alaska and the U.S. Arctic are not commensurate with what is needed. These existing authorities may need to be clarified or redefined. Addressing the crises occurring right now in Alaska and the U.S. Arctic require improved and more frequent communication with stakeholders. It requires better communication within DHS internally and with other organizations, including the private sector, NOAA, DOI, DOT, the State of Alaska, the Denali Commission, other Arctic nations, and with the residents of the affected areas. Engagement and partnership with Indigenous communities given their knowledge and science, their traditions and culture, their experience dealing with the changes happening around them, and their identified needs and concerns must inform, and be central to, the solutions and policies we develop to help them address their needs.