
Photo: Neal Herbert/NPS

ARCTIC RESEARCH PLAN PUBLIC ENGAGEMENT INPUT SYNTHESIS

August 2020

Introduction

This document synthesizes public comments provided to IARPC via (1) a Federal Register Notice, (2) an online form on the IARPC website, (3) listening sessions, (4) the Collaboration Team Leads Workshop, and (5) verbal comments made at workshops, conferences, and during webinars. The synthesis does not reflect every comment made verbatim or the frequency with which similar comments were made; rather, it intends to capture and communicate the ideas and themes presented through comments made. The themes and topics represented do not indicate consensus on the plan organization, structure, or content; they relay ideas put forth by one or more individuals.[1]

This document should be used to inform the Plan Development Workshop and as an aid to the federal drafting teams. The synthesis has three sections: (1) a synthesis of critical research areas that should be considered in the next Arctic Research Plan;[2] (2) a synthesis of input related to the organization of the plan and the structure of IARPC Collaborations;[3] and (3) a synthesis of comments related to engagement in the process of both plan development and implementation. Comments in their original format can be found in this spreadsheet.

[1]In cases where conflicting comments are made, both comments are included for the consideration of workshop participants and federal drafting teams.
[2]Critical research areas are not prioritized or presented in any specific order.
[3]The terms used in Section 2 are used in the current Arctic Research Plan 2017-2021. For clarification on terms used please refer to the Framework Document and the Terminology Document.

Section 1: Plan Content

Atmospheric Science:

There is the need to sustain long-term atmospheric measurements. Continue ongoing remote sensing observations for key parameters, particularly during polar night. Maintain strategically located surface stations to provide time-series and ground truth for broader-scale satellite remote sensing measurements. Develop new observation technologies with better detection limits. Focus on air quality separate from radiative and cloud impacts. Include work on dust detection, dust plumes, and dust transport at high latitudes and its impacts. More accurately capture surface and boundary layer dynamics of the heterogeneous arctic and sub-arctic landscapes to be able to better predict climate to weather scale processes and impact assessments. Increase research on atmospheric corrosion. Increase understanding of the impacts of Arctic change on atmospheric composition and its global impacts. Continue research on clouds and aerosols. Advance understanding of atmospheric physical processes and the integration from microscale to regional scale physical processes. Consider including research on volcanic eruptions or stratospheric geoengineering. Study the interactions between geoengineering and the Arctic.

Community Health:

Include Indigenous values in wellness indicators. Conduct research about homelessness and housing insecurity. Consider a focus on health, energy efficient, affordable, and culturally appropriate housing. Include research on the impacts of energy development and land use changes to human health. Identify how people get information that impacts their health and tie research to public health advice. Increase observations and understanding of zoonotic diseases. Identify ways to mitigate the negative physical and mental health impacts transitioning to more processed “western” foods in the Arctic. Document the health consequences of lack of sanitation facilities, wildfire smoke impacts, harmful algal blooms, sea ice loss, and resources at risk. Increase understanding of the impacts of mental health including surrounding rapid hazards and disasters. Consider the impacts of increased access to public use trails on public health and climate change and how climate change is impacting current public-use trails. Increase understanding of the dynamics of chemical pollutants for environmental and human health.

Cryosphere:

Include research on the causes and consequences of changing ice conditions and improve predictions of sea ice cover. Increase work on the marginal ice-zone and on waves, sea-ice, and float-ice distribution. Consider new sea ice forecasting and observing methodologies, new technologies, remote sensing, numerical modeling techniques, and observer networks to better understand the role of snow, ice, and permafrost in the Arctic socio-ecological system. There is a need for high spatiotemporal resolution and coincident measurements on land ice change. Increase pan-arctic distribution measurements of additional snowfall on ice and expand terrestrial seasonal snow cover studies to include snow optics, land surface modeling, snow remote sensing, snow simulation in global circulation models, and snow under climate change.

Research is also needed to understand the physical processes behind large-scale changes in the mass balance of glaciers, ice caps, and the Greenland ice sheet. Increase research on glacier processes including surface processes, processes at the ice-ocean interface, and internal responses of ice. It is also important to indicate that many glacial processes remain uncertain. Increase measurements of ice thickness. Better understand ice boundary conditions. Better integrate snow research and the impacts of snow changes. Include research on the impacts of land-terminating glacier change on fisheries. Better understand how glacier change and sea-level rise is impacting northern communities. Consider studying ice-restoration techniques.

Data Management:

Increase use of scalable data. The plan should include guidelines for working with data management and data sovereignty plans. Data integration, scalability and dissemination needs to be improved as well as speed of distribution. Agencies need to work together to make large data volumes distributed, connected, and useful. It is important to have scalable data that allows for meaningful predictions with reduced uncertainty. The plan should support innovations in data collection, curation, management, sharing, discoverability, and access. This includes efforts to support open, searchable, and rapidly accessible cloud hosted data as well as open source code and development of generic data interaction, processing and analysis tools. Consider creating a repository to know what research is being done and by whom.

Ecosystem Changes and Species Management:

Characterize biomes throughout the Arctic and conduct comprehensive studies of the Arctic coastal zone. Include research that enhances ecosystems services and promotes land and ecosystem protection. Research is also needed that focuses on the impacts of climate change including on large-scale ecosystems, biomass shifts, and current and emerging wildlife diseases. Include research that has a species-specific focus, particularly on sentinel species, benthic species, and species listed under the Endangered Species Act or threatened by climate change. Include a particular focus on trophic interactions, species migrations, invasive species, ocean acidification, and harmful algal blooms. Increase monitoring on the expansion of non-Arctic species into the Arctic and better understand impacts for subsistence communities. Model wildlife populations and improve predictive capabilities for assessing sustained yields. Evaluate predator-prey relationships. Improve vegetation models and include terrestrial research including on habitat mapping, vegetation changes, ecophysiological processes, the role of landscape heterogeneity, and the impacts of climate change. Better understand how wildlife is impacted by habitat changes. Increase understanding of how different species are interconnected. Document and track biodiversity in the Arctic and understand how it genetically connects to biodiversity outside of the Arctic specifically looking at connectivity between segments of species distributions.

Emissions and Pollutants:

Evaluate the sources, distribution, and impacts of microplastic pollution in the Arctic. Include research to better understand the impacts of contaminants on subsistence species.

Energy Development, Shipping, Hazard Response, and Mitigation:

Understand the impacts of ice-breaker activities and the impacts of Arctic port development. Include research on the impacts of increased shipping, resource extraction, and tourism as well as the physical and social infrastructure needs of related activities. Define zones for safe shipping for subsistence avoidance including using new bathymetric data. Establish geographic representations of seasonally changing subsistence zones and communication areas around coastal communities for integrated use with a vessel tracking service. Improve oil spill response strategies and infrastructure. Conduct research on the environmental and health impacts of heavy fuel oil spills. Conduct research on technology responses to oil spills during different ice-coverage scenarios. Consider the intersections of research and development in the Arctic. Increase research that supports search and rescue activities in the Arctic. Increase understanding of community risks.

Erosion and Permafrost:

Conduct social and natural research on coastal and river erosion, including a focus on Interior communities struggling with erosion and river safety issues. Work to better understand the current and future threats of riparian and coastal erosion and improve risk analysis and forecasting models. Emphasize more near surface ground layer shifts of seasonally frozen layers. Conduct research on the release of greenhouse gases from permafrost. Conduct integrative modeling of permafrost, soil ecology, and landscape change under climate change with respect to short and long term past climate. Include research on periglacial geomorphology and periglacial processes in permafrost studies. Work to identify data gaps related to the structure and integrity of permafrost due to environmental and climatic changes. Include research on understanding the role of permafrost in subsurface movement of hazardous contaminants. Include research on Arctic hydrology.

Fisheries:

Increase understanding and long-term measurements of fish returns and population movement northwards. Conduct research on early marine survival of salmon along the Bering Sea coast and study impacts on food security and ecosystem resiliency. Include research on the genetic variability and resilience of salmon stocks and harvested wildlife populations, develop a database of genetic characteristics of all major salmon stocks in Alaska, and develop genetic methods to assess wildlife populations. Data are needed to understand population dynamics and early marine ecology for important commercial and subsistence fisheries of anadromous species. Include projects that focus on resilience, vulnerability, and mitigation strategies of aquatic farms to increase pressures from ocean acidification.

Infrastructure:

Include a focus on both coastal and Interior region infrastructure and research that ensures infrastructure resiliency. Include research on microgrids adapted for extreme environments, on the design of resilient, renewable, and affordable energy systems, and resource assessments that address known deficiencies in existing data. Conduct research on building infrastructure

including housing design, structure, and efficiency as well as energy planning. In considering housing infrastructure research, shift to a holistic approach that eliminates silos and ensures development does not hurt culture. Ensure that Indigenous Peoples are included throughout planning and execution. Use economic analysis and impact modeling of infrastructure to help decision makers. Increase Arctic research infrastructure and telecommunications. Focus on technological innovations needed for low-cost sustainable infrastructure, particularly transportation infrastructure. Increase broadband data and internet connectivity infrastructure including conducting assessments to promote more equitable implementation of telecommunication access. Research is needed to identify non-traditional methods for sanitation and sewage systems. Consider increasing research on the impacts of infrastructure installations.

Interdisciplinary Research and Socio-Ecological Systems:

Increase multidisciplinary and interdisciplinary research including research that captures process dynamics in each field. Include convergent research on past and present socio-ecological systems. Emphasize social-science data and research infrastructure and consider how to integrate all types of knowledge into data sets. Emphasize finance, business studies and economics in research. Consider research on youth and gender studies, resilience and sustainable development, demographics and migration patterns, globalization and colonialism, on Arctic urban communities, new sources of economic opportunity in the Arctic, and best practices for research.

International Cooperation and Partnership:

Promote international collaborations around research and expand local research engagement to communities across the Arctic. Continue to develop international distributed networks of monitoring systems including autonomous observing systems and qualitative studies in the social sciences. Increase international partnerships (including small scale collaborations) around data collection and incorporate international efforts into the plan. Coordinate with Sustaining Arctic Observation Networks and international efforts to enable pan-Arctic research and coordinate research and data that is being collected by MOSAiC. Consider integrating European Union priorities in the plan. Address the needs of the Bering Strait region and the shared Russian - U.S. Ecosystem. Consider investment opportunities that could provide more knowledge and lower the perceived barriers for global investors to finance initiatives in the Arctic. Increase international collaboration to develop measurements for researching and contextualizing housing crises and shortages, human migration between the urban and rural north, and Indigenous-, gendered-, rural-, and Elder- and youth- experiences with homelessness and housing. Sustain current and support emerging IGAC PACE activities, adding a new focus on air quality in addition to regional air pollution and short-lived climate forcers.

Monitoring, Observation, Modeling and Forecasting:

Expand and sustain observations of the Arctic environment. Use models to inform observations and predictions as well as use sustained observation to inform model development. Consider working with Sea Ice Prediction Network to foster more predictability and prediction studies.

Improve long-term monitoring of cumulative environmental impacts. Include a focus on biogeochemical processes modeling, modeling of terrestrial ecosystem processes, coastal modeling, land-ocean coupling sea-ice modeling, and modeling of ice floes and leads. There is also a need for small-scale integrated monitoring of ecosystem change. Increase density and diversity of long-term monitoring, year-round measurements, and integrate historic measurements with current measurements. Increase observations of the Arctic surface energy budget. Increase modeling resolution and capabilities to quantify the Earth system models and earth systems responses to forcing. In particular, improve sea-ice components in Earth system models. Also include an emphasis on modeling feedbacks and optimizing the use of observations for model forecast initialization. Include work to identify modeling gaps and reduce modeling errors. Continue campaigns such as MOSAiC and IceSAT-2. Ensure that models that use satellite data and remote-sensing are ground-truthed and continue to support intensive field campaigns. Consider how new technologies can complement, enhance, and increase accuracy of observations. Increase real-time observations and ways to get modeling and forecasting information back to communities in a timely manner. Create knowledge maps that link observations and essential variables with societal benefit areas and understand how specific events and trends can help inform management decisions. Increase observations in areas of high convergence. It is also important to bring together Indigenous Knowledge in consideration with remote and in situ measurements. Connect observations made through citizen science and advance data assimilation. Increase collaboration between modelers and observation scientists and consider opportunities for increasing synergy between in situ observations, models, and remote sensing products. Consider how data-driven modeling can guide process representation in models and how observational data can inform models and observational communities. Clarify capacities and directions for Arctic research and Arctic observing through interoperable sharing of and collaboration around structured information about datasets as well as research activities and observing assets. Establish guidelines for observation and model synthesis. Consider specific modeling and observing collaboration on understanding sea level rise and generating high resolution simulations on sea level rise. Increase predictions, on sea-level rise and extreme weather events and on sea-ice conditions. Include air quality numerical weather prediction and monitoring and predictions on sub-seasonal to seasonal time scales. Integrate remote-sensing and in-situ observations into sea ice models.

Oceanic Processes, High Latitude Systems and Global Linkages:

Improve understanding of the processes driving rapid Arctic climate change and reduce uncertainty in future climate projections. Include an emphasis on the Arctic Ocean as a key component of the Arctic system. Better coordinate research on the impacts of the changing Arctic Ocean including on physical and chemical processes and changes. Increase understanding of linkages and feedbacks between the Arctic and lower latitudes including the role of the changing Arctic Ocean in global earth systems. More clearly specify time scales when conducting sea-level rise predictions. Better understand the local and regional effects of sea-level rise including on sediment dynamics in tidewater systems. Increase understanding on the impact of Arctic change on the eastern coast of North America. Increase data collection to better understand the mechanisms and effects of heat transfer in the Arctic. Increase understanding

of Arctic climate variability and tropical teleconnections. Consider comparative studies between changes in the southern hemisphere and Antarctica. Understand the role of glacier meltwater on oceanic processes. Conduct research on the geophysical aspects of shifts in interaction on global versus local scale. Increase understanding of processes that control upper Arctic Ocean heat content and variability and the connection to Arctic winter climate. Improve understanding of the processes that control the storage of energy in the Arctic Ocean mixed layer.

Technology:

Consider the use of new technologies, particularly those that enable automated observations and data collection such as autonomous rovers. Look at technologies related to improving earth system modeling, ice-sheet and glacier modeling, reanalysis, data assimilation, aerosol modeling, global atmospheric composition forecasts, terrestrial hydraulic cycle modeling, and improving observing systems. Increase use of machine learning and technology to enhance accuracy, timeliness, and quantity of Arctic data. Increase computational infrastructure and use of artificial intelligence. Look at satellite technologies to study polar bears and technologies to support whale detection and migration patterns. Continue research that focuses on the development of technological tools for the prediction and analysis of glaciological hazards, such as sudden glacial outlet events, landslides, or hydrological shifts.

Water and Food Security:

Increase understanding of food security and safety. Research and assessments should be undertaken to identify and remove the primary barriers to meeting basic human rights related to water and food security. Conduct integrative, community-engaged research and assessments to better align research investments with the challenges faced by communities. Understand how erosion and permafrost thaw is affecting fish camps and food security. Enhance understanding of the migration and impacts of pathogens, contaminants, toxins and diseases in wildlife and food sources. Identify water resources and increase baseline long-term stream gauges. Better understand the quantity, quality, and changes of freshwater waters and sediments. Include research on per- and polyfluoroalkyl substances (PFAS) in Arctic foods.

Wildfire:

Include research that is aimed at assessing and investigating techniques and technologies to assist with wildland firefighting across the state of Alaska including but not limited to geospatial models to predict and track fire progression, and engineering techniques to assist wildland firefighters with on the ground abatement strategies.

Section 2: Plan Organization and Structure

Content and Structure of Specific Goals: Consider keeping the current goals. Additional goals could include education research in the Arctic, research and development around restoring and protecting sea-ice, sub-seasonal prediction, big data and the impacts of extreme events on Arctic communities, and a specific goal on citizen science and community initiated research. Update permafrost research goal, and update marine ecosystems goal with newer citations.

Collaboration Teams:

Teams are seen as a productive space for collaboration but conducting an evaluation on how well Collaboration Teams work and how they can be less siloed should be considered. Collaboration Teams do not necessarily need to mirror the goal structure of the plan, they could be organized around ideas. There needs to be more cross-cutting collaboration, linkages, and meetings among teams, including collaboration teams and various types of self-forming teams. Consider that cross-cutting teams can also become siloed and maybe less flexible. An option is to have cross-cutting teams and goal-specific teams or have one goal embrace multiple teams. Collaboration Teams require a computer and connectivity in order to participate, this can be exclusive of those in remote communities. Consider if the Environmental Intelligence Team should be interwoven into other themes. It would be useful to include the EPA and State of Alaska in the Atmosphere Team. The Coastal Collaboration Team is important, and oceans need to be better considered across IARPC's work. There is value in having Observing, Modeling, and Data Teams separate from the thematic teams to do cross-cutting work and to emphasize the importance of these areas. The Modeling Team is well suited to integrate Arctic physical processes in the Earth system context. Consider making modeling and observing Collaboration Teams rather than sub-teams of the Environmental Intelligence Team. New Collaboration Teams could include: a convergence and co-production team, a sustainable economies team, a socio-ecological intelligence team, a local capacity building team, a team focused on issues raised by Indigenous communities.

Convergence Research:

Promote a wider adoption of convergence research by organizing the plan around convergent themes that address social needs and are developed in coordination with stakeholders and Arctic residents.

Cross-Cutting Themes and Interdisciplinarity:

Consider organizing the plan to facilitate greater interdisciplinarity, focusing on cross-cutting themes and research areas. Enhance mechanisms that support shared, integrated programs or joint research projects across agencies. Cross-cutting themes are more likely to keep things open and help with consistent engagement on broad objectives, but they also run the risk of becoming siloed and are less flexible. Specifically, consider a cross-cutting theme on how the changing cryosphere impacts northern communities.

Equity and Inclusion:

The plan should consider language to address systematic and institutional racism. It should also lay out steps for increasing diversity in Arctic research fields.

Evaluating Success:

Think about how to measure accomplishments and successes in a simple and comprehensive way within the plan. Performance elements could be useful for measuring success, although challenging because it is not clear when a performance element has been completed. Measuring success could benefit from more actionable and measurable goals and performance elements. It is important to be careful not to simply box-check performance elements to measure successes but also to engage with agencies on performance elements.

General Plan Structure:

The plan should not be an update to the old plan; it should consider new frameworks. Consider a plan that promotes a holistic approach to research and focuses on interconnectivity across systems, co-production of knowledge, and convergence. Early in the plan, clearly define the geographic scope of the Arctic, as defined by IARPC. Consider if the plan could be presented in a more consolidated way. Continue to ensure that work is truly interagency.

New and Emerging Themes:

The plan should be well-developed but have space and flexibility for emergent issues, ideas and topics, not just pre-established issues. Include education in the plan including how community well-being is directly relevant to education. Incorporate social science throughout the plan, not as an add-on. Find ways to highlight art and humanities across the IARPC enterprise. Specifically, consider how art and humanities can support a more holistic approach to Arctic research, promote diversity, equity, and inclusion, and enhance communication. Consider including gender issues in the plan.

Performance Elements:

Performance elements are often too specific and defined and therefore do not fit well with all activities. Some performance elements are task oriented while others are designed to be more ongoing and overarching. Consider tightening up the performance elements. Performance elements are useful to frame reporting but they could also be used to frame efforts on the ground, identify gaps, and support decision-making. Consider if performance elements can be more fluid and updated throughout the plan implementation and what it means to complete a performance element. There could also be required reporting on relevant successes of performance elements. Consider combining modeling performance elements and including social science research needs across performance elements. Performance elements should better engage the state and local residents across the Arctic as well as lower latitude residents. Add performance elements specific to understanding subsistence production across years and enhancing opportunities for harvesting subsistence resources, and monitoring of harmful algal blooms.

Policy Drivers:

Maintain current drivers in the new plan, only add new drivers if they are distinct and have a similar focus on societal importance. In particular, 'enhancing the health and well-bring of Arctic residents' should remain a critical policy driver and include information on knowledge sovereignty, research sovereignty, food security, climate change impacts, and cultural heritage. An additional driver could be focused on Arctic change and loss of sea ice.

Research Priorities and Goals:

It is important to have aspirational, long-term, and short term goals. The plan could be simpler by focusing on more achievable, reasonable, and practical goals. Goals could also be more consistent in scope. Broad goals are important and should persist from plan-to-plan, but objectives could lay out more specific timelines and measurable activities. Intentionally map goals to drivers and introduce each goal with a succinct statement of need tied to the relevant policy drivers. It is also important to ensure that goals are things that scientists and agencies can actually do. For example, the Health and Well-Being goal is the shared responsibility of Tribal, local, state, and federal entities but federal entities, however, the federal government does not direct these other governance structures. Consider expanding the plan beyond basic research to include applied research, solution-based science and research based on needs of Arctic communities. The plan should also ensure that research priorities are directly tied to community needs and local priorities as well as support decision making. Consider using more of a place-based approach to identifying place-based challenges that need federal and academic expertise to solve.

Resources Supporting and Informing the Plan:

It would be helpful to have links to relevant and long-lived strategic plans in the plan. Explore if it is possible to show how money and funding follows the plan. Include a discussion of funding sources used to support research in the plan including a discussion of redirecting funds to Indigenous-led organizations.

Section 3: Plan Development Process and Sustained Engagement[4]

Capacity Building:

Consider ways to build STEM capacity among Arctic peoples and communities. Prioritize training the next generation of Arctic researchers including in convergence and in field experiences.

Co-production of Knowledge:

The plan should include a greater adoption of the co-production of knowledge approach. Consider if the plan itself could be co-produced. The plan should focus on community-

[4]For more discussion on sustained engagement also see the Equity and Inclusion White Paper.

driven research and community-identified challenges. It is important to define terms such as Traditional, Indigenous Knowledge, local knowledge, and co-production of knowledge. The plan should also outline specific steps that it will take to promote and support co-production of knowledge. It is important to invest in information sharing activities that promote co-development of knowledge approaches with Indigenous communities. Sustained efforts to incorporate Indigenous Knowledge is critical, starting with establishing the questions identified in "Requests for Proposals", through to informing the review criteria for project selection and the implementation of work, as well as the vetting and sharing of final results. Indigenous Knowledge should also inform the development of workshop agendas and be reflected in the makeup of organizers, attendees and invited speakers for these events. Appropriate statements on how science efforts are informed by Indigenous Knowledge should also be included on the supporting websites, documents, and communication materials for science projects as well as published results when efforts have concluded. Consider promoting co-production of knowledge training for researchers living outside of the Arctic that includes training on self-determination, a history of Arctic Peoples, the history of colonialism and research in the Arctic, decolonization training, and cross-cultural communication, cultural awareness, and sensitivity training components. Include research on co-designed community networks.

Communication and Engagement:

Engagement and communication plans need to be integrated throughout the plan. For example, increasing data dissemination and communication of health-related activities and results back to communities. The plan should include a plan for improved science communication and research on how to get science knowledge to non-scientists. Consider how the information produced from the plan is useful to a broader group of people. Consider increasing engagement with additional federal agencies, non-feds, the private sector, academia, state level agencies, NGOs, coordinating bodies, and management agencies as well as residents of the lower latitude states. There needs to be a better articulation of the value of IARPC as well as the difference between IARPC and IARPC Collaborations. Feedback from stakeholders on how effective the current plan is would be helpful. Consider if there is a way to expand the plan development process beyond a 'feds-only' approach. Mentorship of early career scholars and ways to connect students to research in the plan should also be emphasized.

Distrust of the Federal Input Process:

There is a strong public distrust of federal solicitations for public input in rural Alaska and this is the root reason that local people in rural Alaska are reluctant to take part in the "co-production" of Arctic research. People distrust this process because they are faced with extensive and persistent inquiries to provide input, comments, and concerns for federal input solicitations and feel as though their concerns are ignored or taken out of context and used against them. There is a general burn out on the "Notice and Comment" process. This burnout and loss of trust has major implications on how locals engage with federally funded Arctic research. Rural residents also feel that many federal agencies and researchers duplicate similar studies, and that federal agencies should work together to avoid unnecessary duplication of similar research.

Equity and Capacity Building:

Ensure the equitable inclusion of both Indigenous Peoples' knowledge systems and science in addressing research questions and during all steps of the research process. There also needs to be a recognition within the research community of Tribal sovereignty and how that relates to decision making in the context of research. It is critical to continue discussions about how to support and increase the means and ability of Indigenous communities and knowledge holders to participate in research-related activities. This includes providing equitable funding, training, and educational resources, working together with mutual respect and trust, and an awareness of and sensitivity to Indigenous worldviews, knowledge systems, processes, and values. There is also the need to expand the capacity for regional non-profit and non-governmental organizations to effectively work with communities on research issues. This also includes the rigorous inclusion of Indigenous People and organizations in seats of power related to research decision-making. Federal agencies that are a part of IARPC should consider paying local observers to collect data and invest in regional liaisons to promote two-way information exchange.

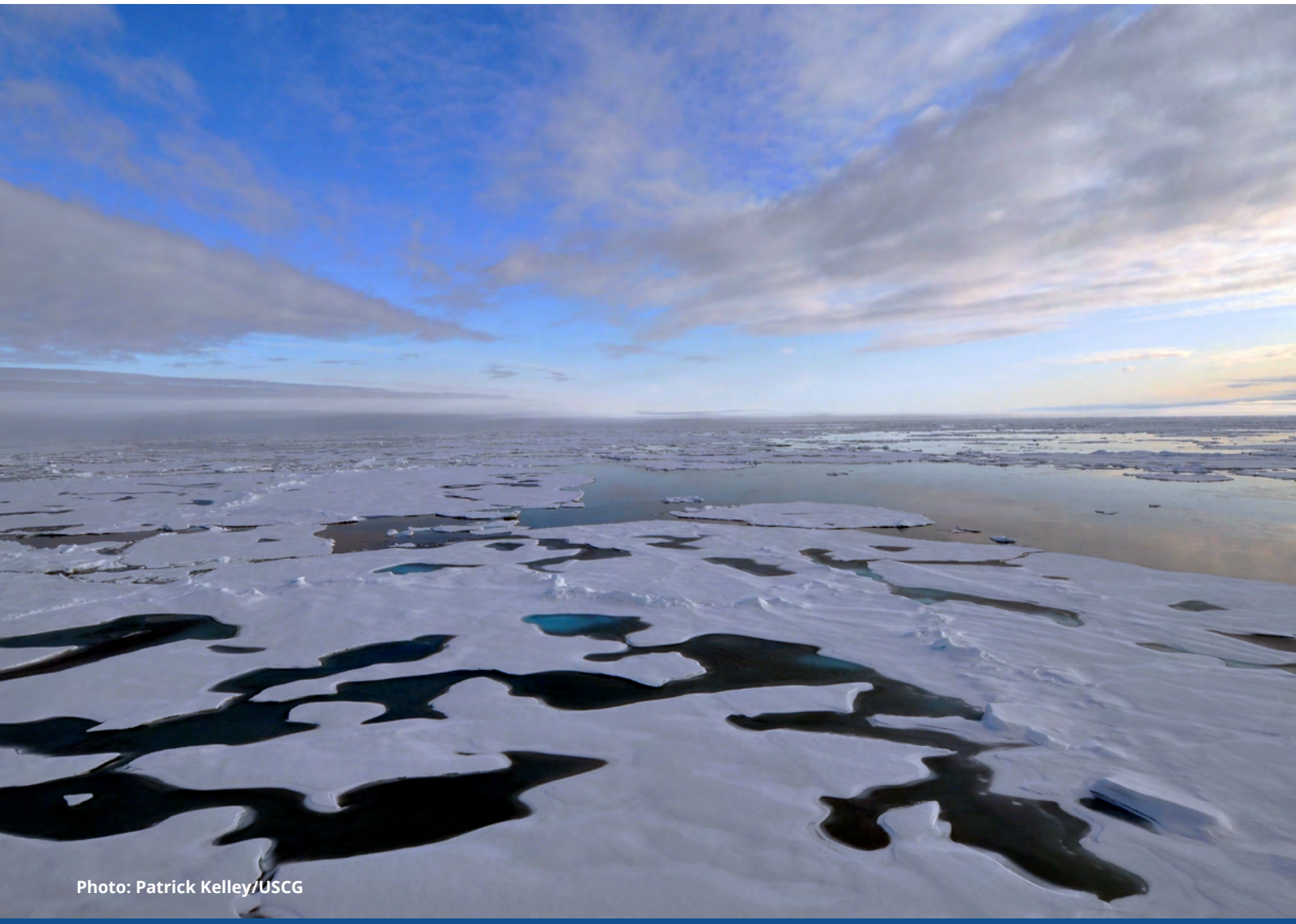
Indigenous Engagement:

The plan should adhere to the Principles for Conducting Research in the Arctic and also consider that many communities have their own guidelines or protocols related to research. There needs to be true, equitable collaboration with Indigenous Peoples, Tribes, and communities. More extensive outreach and engagement needs to be conducted and the plan should consider how to work with communities and how to bring information back to communities, with respectful consideration of the following: seasonal timing, weather, remoteness, lack of internet, community schedules, and community interest in participation. Tribes need to be consulted throughout the process and on any decisions or research that may impact their well- being or way of life. It is important that meaningful engagement with Tribes, as defined by Tribes, occurs prior to and throughout the development of research planning, including research questions and priority development. Indigenous engagement should be sustained throughout the formation and writing of the plan, possibly with a team focused specifically on this. The plan should also create more pathways for Tribal organizations to play a leading role in the development and writing of the plan as well as be a part of the Plan Development Steering Group and drafting teams. Indigenous-led regional organizations should also be leading or co-leading processes to identify research priorities. When working with and reaching out to communities consider local sensitivities, timing of outreach and using a partnering approach. There needs to be more than three months of notice given to communities when their input and participation is required. It is also important to work around summer months and when communities are practicing their subsistence activities. This is especially important with Covid-19 causing food shortages. Community members should be compensated for their time working with IARPC.

Timeline and Process:

Consider reevaluating the IARPC 5-year timeline process and if the Plan could be updated every 10 years, in order to focus more on implementation. The majority of time is spent on planning and writing rather than implementing, perhaps a bigger staff is needed for implementation, tracking performance measures, making performance measures available to the public, and proper and early engagement with local Arctic entities. People who contribute should be provided follow up on how their input was considered or implemented. The engagement timeline with Indigenous communities also happens too late and on too much of a restricted timeline and this process needs to be adapted especially in light of COVID-19. Make the "performance measure process" transparent and available to the public.

This document was prepared by Sorina Stalla on behalf of the IARPC Plan Development Steering Group.



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