

DRAFT Arctic Observing Summit DRAFT
DRAFT Food Security Working Group White Paper Synthesis DRAFT
30 March 2020 Draft

To bring light to a currently evolving threat to Indigenous food security, we wanted to first address the ongoing coronavirus (COVID-19) worldwide pandemic. There has been a long history of diseases devastating Indigenous communities as Indigenous communities represent highly vulnerable populations due to lack of infrastructure for running water and sewer, remote locations, and lack of access to health services. As early as March 2, 2020, Indigenous organizations started cancelling large events. For example, the Arctic Winter Games to take place mid-March in Whitehorse, Canada, were cancelled at the beginning of March. The United Nations for Indigenous Peoples Forum taking place in April in New York City, New York, USA, was postponed shortly thereafter. Numerous other smaller meetings, conferences, workshops and other convenings have been cancelled or postponed. Some, as in the case of the Arctic Observing Summit, have moved to alternative, online formats, which present logistical barriers for Indigenous participation. Just 20 days later, a number of Alaska villages are continuing to seek to ban or restrict passenger air travel to attempt to slow the arrival of COVID-19. Many villages have acted quickly in the last week to attempt to stop passenger travel to and from villages by planes and snowmachine. The concerns of our Indigenous communities are grounded in a long history of devastation from exposure and rapid spread of disease among our populations. Many villages were ravaged by tuberculosis and flu epidemics in the past. Elders are very integrated into daily life and many homes are multigenerational with no running water or sewer. Self-isolation is almost impossible. Villages lack any sort of advanced medical equipment or services. In Alaska, routine healthcare is provided by telemedicine or requires patient travel to regional hubs or one of the 3 largest cities in Alaska for treatment: Anchorage, Fairbanks, or Juneau.

Ways of Knowing

The Arctic has been home to Indigenous Peoples for thousands of years and over time have developed complex knowledge systems shaped by an understanding that humans are part of the ecosystem. Several definitions for Indigenous Knowledge are provided at the end of this report. It is important to understand that Indigenous Knowledge applies a holistic view, one in which focus is placed on relationships between components (ICC-Alaska AOS presentation 2016), as opposed to individual pieces. With this understanding, we appreciate that Indigenous Knowledge is often asking different questions than those asked through a scientific lens . We need the questions, observations, and knowledge of Indigenous Peoples in addition to science to understand the changes occurring (ICC-Alaska AOS presentation 2016).

Key components to understand Indigenous Knowledge are: that it is a systematic way of knowing; Indigenous Peoples have their own observational and monitoring approaches, and are often asking different questions than science; and this knowledge, this world view, includes the constant collection of observations and monitoring (ICC Alaska AOS presentation 2016; Jones et al. 2019_014). With these considerations, we can begin to understand that observing through a food security lens, means understanding a holistic way of viewing the world. It also means understanding and respecting that Indigenous Peoples have applied these proven practices for thousands of years (Heath 2019_055; ICC Alaska 2019_028). As the ICC-Alaska workshop report shares,

“Participants stressed that they have demonstrated the ability to protect and live with respect for all of life around them and hold an “...interconnected system view” (Focus Group Participant, 2019). Taking care of the environment - taking care of each other, of the water, land, animals, and plants, is with an understanding that there is a relationship between everything, that everything is interconnected.” (ICC-Alaska 2019_27).

Further, SIKU stresses that, “The value that Indigenous knowledge has in identifying early indicators and creating holistic measures to mitigate changes is critical to adaptation and resilience” (Heath 2019_055).

While there are many ways of observing our environments, for Indigenous Peoples in the Arctic, observing occurs through multiple methods, including those rooted in Indigenous Knowledge, scientific processes and through bringing together IK and science. However, the most dominant forms of monitoring in Arctic observation programs collect quantitative or qualitative data that can be interpreted and evaluated from a western scientific perspective only. Unfortunately and incorrectly, these forms of observing are widely and preferentially valued as more “rigorous” than other forms of observing, not taking into account that Indigenous forms of accountability and rigour in knowledge acquisition are well-established within Indigenous Knowledge contexts (ICC-Alaska 2015; ICC-Alaska 2019_27, 28,30, 31, 34).

Overview of Theme

Indigenous Peoples and organizations have been, and continue to remain, active participants in the Sustaining the Arctic Observing Network (SAON), a joint initiative of the Arctic Council and the International Arctic Science Committee (IASC); and the Arctic Observing Summit (AOS). The value of Indigenous knowledge and world views is understood within SAON as a critical component to a sustained, data-driven pan-Arctic observing system. Furthermore, equity and representation for Indigenous Peoples in Arctic observing and research is a key goal of SAON. As such, Arctic observing must be based on the priorities and self-determination of Indigenous Peoples of the Arctic, and designed to work meaningfully with Indigenous knowledges and world views. The natural environment is critical to the food systems and well-being of Indigenous Peoples across the circumpolar north, and Arctic observing must be based on an understanding, the connectivity across systems critically important to Indigenous food security, and to all aspects of Indigenous lives and livelihoods. The Arctic environment's highly interconnected relationships are interwoven through all aspects of the natural environment, as well as to all aspects of Indigenous natural, cultural, and social aspects of life. In addition to sea ice, oceans, rivers, and climate, wildlife is central to the livelihoods, well-being, languages, traditions, the sharing and retention of Indigenous knowledge of Indigenous Peoples. Therefore, equity in Arctic observing, achieved by observing through an Indigenous food security lens, can be achieved by honoring Indigenous worldviews and systems for observing and decision-making.

The Roadmap for Arctic Observing and Data System (ROADS) is a framework for Arctic observing currently being developed by SAON. Early guidance from the larger observing community strongly advised on the need for the equitable consideration of Indigenous Knowledge alongside western sciences, and for a focus on the specific issues identified as priorities by Arctic Indigenous Peoples themselves. Building equity into such a process in meaningful ways will require strong leadership by Indigenous Peoples, together with researchers and practitioners who are committed to a co-production of knowledge approach (CPK, Behe et al. 2019_34). The CPK

approach is a reflexive and iterative process, involving tools and methodologies that are revisited throughout the process, and not to be taken as check-lists. CPK methodologies include concepts surrounding the recognition of sovereignty, building trust and respect, nurturing relationships, empowerment of Indigenous Peoples, growing capacity, decolonization, and being ethical, deliberate, and intentional. Although CPK has gained momentum in the academic and agency research communities, many still lack an understanding of how to apply CPK to their own projects. When considering how the ROADS process will shape an Arctic observation system, it is important to note that the ROADS framework is not currently designed to engage in non-western, non-academic world views, presenting a fundamental challenge to meaningfully engage diverse ways of knowing in long-term monitoring and research.

The theme of AOS 2020 is “From Observations to Action.” Decisive action, however, is dependent on informed decision-making, which requires a full picture of Arctic systems. An Arctic observing system should, therefore, be built on a range of Indigenous Knowledge systems and sciences, with expert knowledge holders from across these distinct worldviews meaningfully engaged from the onset. Importantly, this is dependent on the means and ability to actively participate throughout the entire process (e.g., design, implementation, decision-making; See Daniel et al. 2016: [Theme 6 AOS Synthesis](#)). Decision-making frameworks for where information is used is also an important consideration that has been a focus of FSWG discussions leading up to the 2020 summit and is reflected in the stories shared by FSWG members (Behe et al. 2019_34; ICC-Alaska 2019_26-28; 30-31; 2019_37). In order to achieve these goals, approaches must include direct and abundant resources that build Indigenous capacity, empower and include Indigenous Knowledge holders and leadership to inform critical observing needs as an integral part and prerequisite of all of the stages (Jones et al. 2019_14).

Food Security Working Group

One of the recommendations for ROADS to achieve equity and representation of Indigenous Peoples in Arctic research is for the observing system to operate through a food security lens (AOS FSWG Recommendation; see [Daniel et al. 2016](#)). In order to refocus ROADS through a food security lens, the Food Security Working Group (FSWG) was established in advance of the 2020 AOS. The FSWG uses a collaborative team approach to guide pan-Arctic scaled observing activities through a food security lens. The FSWG is essential in the ROADS effort because it is the only working group that is focusing on identifying what observations are required for specific societal and Indigenous benefits, and providing insight to high priority areas and concerns. An intent in the ROADS process is for the FSWG to further develop and refine essential Arctic variables (EAVs). However, in order to do this, the FSWG needs to take Indigenous approaches in working towards a larger food security framework. The FSWG currently consists of an international team of Indigenous experts, leaders, and community members, national (and sub-national) agency personnel, and research scientists from Canada, Greenland, Norway, Russia and the United States. A key role of the FSWG is to provide broad and specific guidance on the ROADS processes, connectivity and observations needed in order to conduct observing and monitoring in a way that supports and ensures food security of Indigenous Peoples for future generations.

Defining Food Security from Indigenous Peoples' perspectives

i. Indigenous Rights to Food Security

The Food and Agriculture Organization of the United Nations states that “food security exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO 2002)”. However, non-agriculturally derived foods and traditional foods are often ignored in food security discussions, particularly in northern contexts, ignoring the fundamentally interwoven nature of culture, Indigenous knowledges, governance, and stable environmental conditions that are necessary for sustainable Indigenous food systems (Anderson, 1990; FAO 2006; FAO, 2008; Heeringa et al. 2019). Indigenous rights to food have a particular cultural dimension that is critical to food choices, food preparation and the acquisition of food.

Culturally appropriate foods, and the activities required to obtain them form an essential part of cultural identity. As such, Indigenous Peoples' right to food includes the right to culturally appropriate food produced through ecologically sound and sustainable methods, as well as the right of Indigenous Peoples to define their own culturally relevant local and national food systems (Nyéléni Forum on Food Sovereignty 2007). Importantly, Indigenous Peoples themselves are diverse, and so this right is something that must be further defined locally.

However, also important is the right of all Indigenous Peoples to freely define their own food land-use policies. Indigenous Peoples' right to food is widely understood inseparable from their right to lands, resources, culture and self-determination (Kuhnlein et al. 2013). An integral rights-based approach to food security opens constructive dialogue on the policies, regulations, and activities required to ensure food security for all. International agreements establishing Indigenous Peoples' right to food go back to the International Covenant on Economic, Social and Cultural Rights (ICESCR), requiring States to implement the right to food domestically to ensure that Indigenous Peoples food security is part of their governance system (FAO 2008). The right to food is further affirmed by the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (FAO 2008). Because Arctic observing is an important driver of environmental policy-making, the governance obligations of UN member states under ICESCR and UNDRIP. Indigenous Peoples are highly pertinent to environmental observing and the ROADS framework. As such, it is critical that the ROADS process is conducted in a manner to ensure that monitoring activities meet Indigenous Peoples' expressed priorities and perspectives.

ii. Indigenous framings of food security

Food security from the perspective of Indigenous Peoples is holistic and interconnected across different systems (e.g., social, biological, ecological, chemical, physical, cultural, spiritual, health and well-being) (ICC AK. 2015). Food security and food sovereignty is so interwoven into the fabric of Indigenous ways of life, knowing that it cannot be isolated on its own from the environment and activities of Indigenous Peoples on the land and water (ICC Alaska 2020_26). The following perspective is offered from an Inuit regarding management and the health of the ecosystem:

“We are compartmentalizing everything; putting lines where they don't belong. Lines don't belong in the natural world. They don't allow freedom of movement so that everything will survive.” Another participant shared, “...It should be talked about as one environment. Salmon does not know who is regulating or what boundaries are” (ICC 2019_30).

Inuit Circumpolar Council (ICC)-Alaska offers this concise and clear definition of Inuit food security:

“Alaskan Inuit food security is the natural right of all Inuit to be part of the ecosystem, to access food and to care-take, protect and respect all of life, land, water, and air. It allows for all Inuit to obtain, process, store and consume sufficient amounts of health and nutrition preferred foods—foods physically and spiritually craved and needed from the land, air and water, which provide for families and future generations through the practice of Inuit customs and spirituality, languages, knowledge, policies, management practices and self governance. It includes the responsibility and ability to pass on knowledge to younger generations, the taste of traditional foods rooted in place and season, knowledge of how to safely obtain and prepare traditional foods for medicinal use, clothing, housing, nutrients and, overall, how to be within one’s environment. It means understanding that food is a lifeline and a connection between the past and today’s self and cultural identity. Inuit food security is characterized by environmental health and is made up of six interconnecting dimensions: 1) Availability, 2) Inuit Culture, 3) Decision Making Power and Management, 4) Health and Wellness, 5) Stability and 6) Accessibility. This definition holds the understanding that without food sovereignty, food security will not exist” (ICC-Alaska 2019_26).

iii. Threats to Indigenous food security

Climatic changes are impacting Indigenous ways of life, challenging food security, and threatening sustenance and cultural preservation. Myriad examples exist showcasing the vulnerability of Indigenous Peoples and our Arctic communities to climate changes. However, these changes also provide opportunities for long-term food security if addressed in the right ways. Several Indigenous organizations have used Indigenous approaches and methodologies to identify drivers that threaten or reduce food security (ICC Alaska 2015; Heeringa et al. 2019; ICC Alaska 2020_26-28; 30-31). For example, the Inuit Circumpolar Council of Alaska (ICC Alaska) facilitated discussion in which Inuit in Alaska developed their own definition of food security, developed a food security conceptual framework (encompassing all of the components of food security) and identified drivers of food security and insecurity. Through this work, it was clear that effort needed to be placed on governance, on the lack of decision making power and management that Indigenous People's hold and the impact that this has on food security and overall ecosystem health (ICC-Alaska_27-28, 30-31). Similar Indigenous approaches and methodologies should be applied to and inform the ROADS process. In practice, this also means taking different approaches in deciding how elemental decisions are made in decision-making and even how meetings are held.

Observing the environment from a food security lens or a holistic approach will be important given the complex challenges resulting from the impacts of climate change. For example, communities that are physically threatened by erosion and permafrost thaw and at the same time are experiencing changes in biota. Another example highlighting the complex and inter-related challenges in addressing climate change is a story submitted by Austin Ahmasuk (see *Indigenous Examples of Observing through a Food Security Lens* below) that illustrates multiple stresses on the Northern Bering Sea that include (not limited to) fish species extending their range followed by fishing industries. These fundamental changes in the Bering Sea ecosystem have significant impacts on social and cultural practices (cite KAWERAK/BSEG reports). These examples highlight the connected nature of impacts from climate change. To adequately inform

how our communities will adapt and respond will require monitoring or observing multiple variables simultaneously. It will also be important for Indigenous Peoples whose livelihoods are interlinked with the Bering Sea to be a part of the process from the very beginning. This includes the decision-making process in determining, not only what information is needed, but to have an equitable role in determining the process itself.

Multiple threats from climate change offer an opportunity to systematically assess cumulative impacts. Indigenous communities experience the effects from cumulative impacts due to the connectivity of people to the environment and the recognition of people as part of the ecosystem in the Arctic. A food security lens offers an opportunity to observe and monitor multiple variables simultaneously as it focuses on the connectivity across systems in a food security lens (ICC-Alaska 2015). Observing through a food security lens will also promote a system that reflects the reality of the Arctic and the priorities of the Indigenous People who live there.

Indigenous Peoples' perspectives on the ROADS observation framework

Frameworks are shaped by the types of science and knowledge that are used to construct them, and the approaches to monitoring, evaluation and interpretation, and decision-making are developed, refined and informed. The ROADS framework, for example, is informed almost entirely by academic institutional approaches, as is dominated by a single focal species approach, quantitative and sensor-based data collection methodologies, as well as linear hypothesis-driven processes.

As a primary goal of the AOS 2020, the FSWG has developed a framework within which impactful Essential Arctic Variables (EAV) can be assessed jointly between different data users and observing network operators and prioritized. This framework is based on several critical elements identified by the FSWG for inclusion in the ROADS observing system so that the resulting framework operates through an Indigenous food security lens. In previous AOS meetings, the FSWG has provided feedback and suggested action steps on how to assess and prioritize EAVs which remain relevant moving forward. For example, gaps identified in 2013 that remained in 2016 include the need for:

- 1) Indigenous data management protocols (control of and access to data, representation of qualitative data and information in formats beyond western scientifically-derived data, coordination of the varied and numerous data management initiatives, ethical use of Indigenous data and information);
- 2) Indigenous data categorization and interpretation; and,
- 3) Improved standards of inclusivity and equity in research and monitoring in terms of both funding and observing activities.

One approach to data management and stewardship is offered by SIKU (Heath 2019_55), an IK platform that facilitates self-determination for Indigenous communities by leaving the interpretation and stewardship of Indigenous knowledge in the hands of Indigenous land-users themselves. SIKU provides a community-controlled social media platform for documenting IK by Indigenous land-users, who can then share their own georeferenced photos and other sources of data as they choose. At the same time it is an archive for community-led research. The platform provides individual and community controls for data stewardship for use in community-driven monitoring programs, community-led research, environmental stewardship, and co-management planning. Importantly, the SIKU platform has been designed within the context of an extensive Indigenous knowledge network. This network meets regularly at roundtable meetings, and has

formed a Hudson Bay basin-wide consortium. It involves Inuit and Cree from each community, and its secretariat is the Arctic Eider Society, an organization based in Sanikiluaq, Nunavut. Thus observing occurs within a network of accountability to Indigenous communities within the region at various scales.

[SciQ](#), created by Indigenous scholars and youth with the Ikaarvik program in Nunavut, Canada, provides a strong example of best practices in observing programs that involve youth, including a step by step guide for implementation of working with youth in community-driven monitoring and research, in which youth are active partners in a model co-leadership in research in community-driven research with academic collaborators. Ikaarvik is leading in a shift to “community-driven” research from “community-based” as the latter term has been co-opted by outside researchers working in communities for short periods of time, and responding to outside agendas. “Community-driven” research allows for a power shift, for the people who live in the North to determine and act on their own research priorities, and utilize methodologies that properly follow Indigenous Knowledge. Imperative in community-driven research is the inclusion of Indigenous Knowledge in all stages of research, and emphasizes the critical role of IK in interpretation, rather just in the collection of data. Inuit youth act as active partners within community-driven research with academic collaborators. Working with youth in this way has led provided reciprocal benefits to youth in terms of skills development, as well as to foster youth-elder relationships, which helps youth to acquire IK and elders to share their insights across the community (Carter et al. 2019). This co-leadership model has also led to more robust research results, strengthened north-south relations, and enhanced local capacity for leading community-led projects (Henri et al. 2020).

Designing reciprocity in observing should not necessarily be limited to involving youth. Many middle-aged men have experienced negative impacts of government policies including colonial approaches to education, wildlife regulations, and loss of language. These negative impacts have prevented generations of Indigenous Peoples from acquiring Inuit Knowledge. In response, *Unuuq* in Inukjuak, Nunavik, focused on working with middle-aged men in building Inuit Knowledge (Villaseñor-Caron 2016). This work has expanded to involve men and women and boys and girls of all ages in food harvesting, preparation, and manufacturing of traditional tools and other items.

What has not received sufficient attention is the need for Indigenous-based approaches to the evaluation of observing programs. Projects led by non-Indigenous partners increasingly emphasize the need for co-design, reciprocity and community reporting. However, the success of such projects usually occurs away from communities in academic or policy contexts where Indigenous community members are absent. Wilson and the Ikaarvik program are currently developing an Inuit-specific approach to the evaluation of a community-driven monitoring program as part of a larger initiative to define specific approaches to meaningful self-determination in community-driven sea ice monitoring (Wilson 2019).

The FSWG also provided considerable discussion and guidance in 2013 and 2016 on the difference between Indigenous Knowledge and community-based monitoring, and brings forth the need for Indigenous Peoples and Indigenous organizations to achieve and maintain abundant capacity to meaningfully engage in the ROADS process ([Huntington 2013](#); [Daniel et al. 2016](#); see *Capacity Building* below). We have not seen adequate progress toward achieving true collaboration, equity, or progress toward filling the identified gaps. Thus, we again draw attention

to the previously stated recommendations and strongly recommends the larger IASC community works with the FSWG for developing and making forward progress on a specific plan of action in the next 12 months, and provides dedicated time for an update and evaluation of progress at the Arctic Science Summit Week and Arctic Observing Summit, Portugal, Spain, March 20-26, 2021.

Inclusivity remains a critical need within the ROADS process and should be paramount to forward progress. There are few meaningful opportunities available for Indigenous Peoples, Indigenous organizations, other allies and interested public to come together in the development of ROADS in meaningful ways. Inclusion of these individuals and organizations will ensure that decision-making at each step of ROADS is transparent and equitable. Some areas that need to be considered include transparent processes to: identify how individuals are made aware of convening opportunities (how ‘the right people’ are chosen); how methodologies and protocols are decided on; and what principles are guiding how Indigenous Peoples (and underrepresented and minority groups) are actively engaged in, leading, and decision-making with support from other participants. The FSWG concludes the ‘right people’ must include Indigenous Knowledge holders—including Indigenous youth, local community members designing/participating in observing programs, and early career scientists and those striving to create programs that are rooted in co-production and collaboration (i.e., not ‘ivory tower’ scientists, or dominated by those holding PhDs). All of these participants are necessary to build a community of practice (i.e., Observing from a Food Security Lens) that scales across the observing system. Currently, the process is dominated by those familiar with western processes and practices from which the ROADS process originated. This includes those with: the ability to speak the same language (i.e., wonky, technical and hierarchical); academically trained backgrounds (Indigenous and non-Indigenous), an understanding of the predominant governance system (agency, policy, resource managers); and those who have prioritized this process due to the importance for Indigenous communities (but may not have the full capacity to meaningfully engage). While members of the FSWG are able to understand and engage within this context; it presents huge barriers for equitable inclusion of Indigenous Knowledge holders and community members.

Concrete steps are needed to ensure that we move away from the concept of relying on “knowledge brokers,” acting as a middle-man. Relying on knowledge brokers may not result in equitable participation, particularly by expert knowledge holders and community members. For example, knowledge holders are not directly engaged in important decision-making processes and it could prevent an understanding on the part of researchers of what an Indigenous worldview looks like as most meetings and proceedings are conducted under western constructs and practices. There is also an inequitable emphasis on western science and western processes. To achieve true equity we need to ensure that processes (meetings, decision-making, etc.) are conducted differently with multiple knowledge sources.

Second, Indigenous Peoples have an understanding of the environment that has developed over millennia that is holistic in nature and connects across different systems (e.g., cultural, abiotic, biotic, health and wellness) and holistic in nature. “We have our own way of life, we have our own laws” (ICC-Alaska 2019_28). Within this understanding, there are also practices, rules or “governing” structures that are based on value systems. Inuit participants reflect that many of these values are not reflected in imposed governance structures (ICC-Alaska 2019_28). Indigenous governance and management structures were a significant proportion of white papers and short statements submitted to the AOS 2020 (i.e., ICC-Alaska 2019_27-28, 2019_30-31) and reflect the self-determination of Indigenous-led reform of resource management and co-management. Indigenous governance is characterized by concepts of stewardship, sustainability, insight, and

conservation (ICC-Alaska 2015; Heeringa et al. 2019). Indigenous Peoples are guided by holistic concepts of what governance and management mean from a food security perspective because humans are part of the larger system and thus are not greater than, or more important than the other abiotic and biotic components of the ecosystem they are managing (ICC-AK 2019_27-28; 30-31; [Dalee 2019](#); Carlo 2020). Single species management is the dominant colonial construct governing the management of living resources today. This type of management approach is too narrow to accurately and sustainably manage at the ecosystem level, and does not account for Indigenous ways of knowing.

In terms of decolonizing wildlife governance frameworks, which are tied to how wildlife is understood and observed, decision-makers and policy need to be more accountable to communities (as discussed in ICC-Alaska 2019_37). Relational accountability to communities in wildlife management and, thus, in monitoring is pertinent to designing an observing system that is relevant to communities, and doesn't add to the 'burden of conservation'. There is an opportunity to reframe conceptualizations of wildlife monitoring, conservation and management toward one of co-production in ways that can better contribute to Arctic Indigenous communities' well-being. This synthesis uses the food security framework presented by ICC-Alaska (2015; 2019_26-28;30-31) to provide examples of how to apply this framework in real situations. Real world examples were provided by FSWG members to illustrate the suggested methodology for observing through a food security lens.

Third, the health and safety of our subsistence and cultural resources must be prioritized in the larger observing community. Understanding how climate change impacts human and wildlife health can help lower risks and facilitate adaptation. However, observing for the health, wellness and safety of the greater Arctic systems has been a consistent and long standing gap in the larger observing community. Human health, in particular, has been siloed and addressed separately from environmental monitoring and management of resources, yet Indigenous Peoples' health is inextricably linked to the health and wellbeing of our ecosystems. Health and wellness is one of the six interconnected dimensions ensuring food security in the ICC-AK food security framework (ICC-Alaska 2015). As the impacts of climate change continue to radiate and amplify across the Arctic, human safety is increasingly becoming threatened for Indigenous Peoples ([Lukin 2019](#)). As a next step, we propose developing a food security framework to better connect important variables for observations such as those in health and wellness to other environmental and cultural variables to show connectivity.

Fourth, youth and young adults hold a special role within Indigenous communities. Youth are on the land- hunting, fishing, gathering, processing and providing foods for themselves, their families and friends, Elders, and maintaining continuity in Indigenous ways of life and knowing. Indigenous Peoples recognize that it is everyone within the community's responsibility to pass knowledge down to the younger generations and to bring youth into decision-making spaces so they learn as they will one day be the leaders. The broader Arctic Observing community should similarly recognize the opportunity that lies in Indigenous youth and young adults. Every effort should be made to ensure that youth are included in conversations regarding research, observing, management and governance. For this summit, the FSWG prioritized travel and fundraising for youth participation, which had not been included in the conference organizers or other co-leads' budgets. Youth have been active and vocal participants in the FSWG and the working group feel that the high value that these voices contribute to ROADS necessitated prioritized effort in ensuring they are part of this process. Youth participation is important for several reasons. Foremost, in building our capacity as Indigenous Peoples, organizations and communities. It is

also important to ensure continuity of engagement in the observing community. It is also critical to ensure that youth are part of conversations not only with researchers but with expert Indigenous Knowledge holders to ensure that youth value multiple knowledge systems.

And, finally, the FSWG has a number of lessons learned from the challenges our group that we've faced during this process that warrant being shared here. In addition to the issues surrounding historical trauma and the lack of infrastructure (sanitation, health services, food supply chains) shared above, additional challenges that we face in our day to day business of meaningfully engaging in other processes (e.g., research, regulatory) were amplified. One is the issue of connectivity and the ability of Indigenous communities to meaningfully participate digitally or telephonically. Once government and tribal offices were closed, some participants were unable to access internet connectivity or reliable telephone service at home and were unable to continue their participation. This is also a challenge for on-going regulatory processes that will not include vital voices for activities proposed in Arctic homelands. Indigenous Peoples across the Arctic share the value of home and family. And as a result many working group members had to change their primary emphases in caring for elders and our children. Another challenge is the use and format of engaging via Zoom or such platforms with little familiarity. Indigenous Peoples preference is to get together in person, or to experience visually and by convenience in time when not tending towards others (e.g., such as in a Facebook-like platform). Researchers and academics have had the privilege to utilize such platforms and master them in advancing their work. Many Indigenous Peoples in rural communities don't have access to the internet that allows for such connectivity and are at a disadvantage. Many of these challenges could have been mitigated, provided advance planning. For example, many of the WG would probably have taken a different direction, but it was elevated as we could have gotten broader participation with additional time for planning. These are some of the challenges that we've faced in dealing with this new reality in our ability to meaningfully engage. Many of them are not new, but offer a chance to highlight how they can all be cumulative and impactful. In moving forward, some of these could be addressed by, as a community we advocate for better connectivity. We could also work towards identifying different types of gatherings in the future that more equitably account for these disadvantages. This also presents an opportunity for a paradigm shift in how research and observing is determined in the Arctic. As our communities are based in the places observation systems and research would like to access. This presents an opportunity for researchers to be thinking about taking a true co-production knowledge approach (Behe et al. 2019_34) in approaching the design of observation systems.

Creating an Observing from a Food Security Framework

NOTE: THIS SECTION IS CURRENTLY UNDER DEVELOPMENT AND WILL BE INFORMED BY THE DISCUSSIONS AT AOS

i. Six Dimensions of Food Security

1) Availability— The ability of the Arctic ecosystem to maintain a high variety of life (biodiversity), allowing adequate transfer of nutrients and energy. It is the knowledge of seasons and how to collect, process, store and consume traditional foods, allowing for Inuit to eat what has been gathered from the previous season and harvest a variety of medicines. Inuit Culture – Food is the cornerstone of our culture and self- and shared identity. Harvesting traditional foods is how cultural values, skills and spirituality are learned – this is how all learn to be within their environments and

to be part of the ecosystem. The relationship between Inuit and all else that makes up the Arctic environment aids in the maintenance of cultural and environmental integrity (ICC Alaska 2015).

2) Indigenous Culture– Food is the cornerstone of our culture and self- and shared identity. Harvesting traditional foods is how cultural values, skills and spirituality are learned – this is how all learn to be within their environments and to be part of the ecosystem. The relationship between Inuit and all else that makes up the Arctic environment aids in the maintenance of cultural and environmental integrity (ICC Alaska 2015.)

3) Decision-Making Power and Management– The Alaskan Inuit ability to use and value IK to manage daily activities; to build and rely on self-governance across space and time; for Alaskan Inuit to use their knowledge system in synergy with other knowledge systems, such as Western science, to equitably manage human activities within the Arctic environment and to better understand changes occurring; to apply holistic knowledge to understanding the Arctic environment through IK philosophies and methodologies; the ability to manage activities within the Arctic in a way that ensures younger generations will have healthy and nutritious foods to harvest; for Alaskan Inuit to have control over their own fate and to use their cultural value system (ICC Alaska 2015).

4) Health and Wellness– Physical health of all life within the Arctic and of the land, water and air; adequate passage and absorption of nutrients throughout the Arctic ecosystem; mental health related to community and household relations and self- and cultural identity; environmental integrity and productivity to withstand pollution, habitat destruction and other disturbances (ICC Alaska 2015).

5) Stability– The ability of the puzzle pieces (systems) to adjust to each other as shifts within the ecosystem occur. The ability to maintain sustainability through the management of human actions that support and ensure younger generations will have sufficient healthy food to harvest and that all the pieces of the puzzle remain connected. Stability is obtained through a level of Alaskan Inuit mental security and is in reference to the legal protections for the environment against harm caused by pollutants. Mental security is also in reference to legal protection against forced assimilation, which allows for the maintenance of a level of cultural confidence and hope (ICC Alaska 2015).

6) Accessibility– The ability to live off the land, ocean and air and to obtain sufficient access to a diverse source of healthy food, water, animals, plants, fish, ice, etc. The ability to maintain Inuit traditional economic practices, such as trading, sharing and providing foods and medicines. It is the ability to access and maintain an economic system based on cash in connection to an Inuit traditional economic system. It is the ability to obtain skills, tools and technologies needed to collect, process and store traditional foods (ICC Alaska 2015).

ii. Indigenous Stories of Observing through a Food Security Lens

Storytelling is an important aspect of Indigenous ways of knowing and being. Storytelling not only holds important lessons but also exemplifies Indigenous values. One of the most effective ways to show what we mean by observations through a food security lens, we offer these stories that interconnect the six dimensions of food security (ICC Alaska 2015) and illustrate the important elements in each of these systems that would be important for observations.

Greenlandic experience of colonial structures and discussions of power and participation in policy making and management of total allowable catch. - Juno Berthelsen

Money, power, and the co-production of knowledge in Arctic research - Kaare Sikuaq Erickson

Practical application of Indigenous knowledge to state and federal agency decision-making - Eva Burk

Climate-driven disruption in the Bering Sea: an ecosystem in peril - Austin Ahmasuk

The role of community programs in food security: a case study of Ilisaqsivik Society in Clyde River, Nunavut - Shari Fox

These examples provide several cross cutting themes. Each story highlighted the many different formats, parameters, and multiple dimensions that Indigenous Knowledge brings to a particular topic, problem, or question. Through each story there are important elements to note, the importance of: 1) being on and connected to the land; 2) having access to traditional foods; 3) wellness, 4) the concept of reciprocity. and 5) the importance of values. Indigenous Knowledge arises through land use, relationships between people, and between people and the land. We can't have Indigenous Knowledge without land use, language and relationships. The power of each element together forms a foundation that supports human and ecosystem health (thus supporting the six dimensions of food security). As has been mentioned in a number of different ways, the stories also show the often detrimental impacts of dominant culture decision-makers questioning the value of Indigenous Knowledge and as a result this important information is completely disregarded, ignored or given less weight or value to quantitative data. Existing decision-making structures have a long history of, and continue to, minimizing and disregarding Indigenous voices and data, information and Indigenous Knowledge. Indigenous Peoples seek equitable power in management and governance of natural resources as an integral component of holistic wellbeing of the ecosystem, including for our communities.

Conceptualizing food systems with Indigenous Knowledge holders has provided an approach to more effectively framing and understanding the cumulative impacts of environmental (natural and anthropogenic) change - something that has been challenging for the general scientific community to do comprehensively in ways that address priorities and concerns of Indigenous Peoples (Arragutainaq 2014; Sheremata et al. 2019).

Key Recommendations for the ROADS process from Indigenous Peoples

SAON's vision is for a connected, collaborative, and comprehensive long-term pan-Arctic Observing System that addresses societal needs. It is necessary to detail where observing and data management efforts need to go and how all partners will collectively achieve the broader ROADS goals. SAON and partners, IASC and the International Study of Arctic Change (ISAC) use the following guidance principles for the ROADS process: 1) *Support equitable partnership and funding for Indigenous Peoples' active participation, from inception through implementation;* 2) *Complement and integrate, without duplication, the current planning approaches used by existing*

networks (regional to global), activities and projects; and, 3) Support stepwise development through a flexible, collaborative and evolving structure that allows “bottom-up” identification of themes and focus regions. These principles fit into the FSWG’s developed framework for an Arctic Observing system through a food security lens but are only representative of specific pieces of the framework. Thus, the FSWG has generated the following recommendations to advance the ROADS process in a way that is informed by the FWSG approach.

Capacity Building

The FSWG strongly recommends that abundant resources be dedicated to support capacity building for Indigenous Peoples and organizations to engage in this process equitably. Indigenous capacity building that is supported by agency and academia has been previously recommended (Huntington 2013; ICC-Alaska 2015; Daniel et al. 2016; Behe et al. 2019_34) and still remains a serious limitation to fully realizing co-production of knowledge and Indigenous leadership in research today. Indigenous organizations need to receive support to build capacity (i.e., funding, training, equitable access to resources) in order to participate equitably in every step of the ROADS process. It is additionally important for Indigenous organizations and communities to define what they need in terms of capacity development, and the appropriate approaches needed to build that capacity (e.g., Raymond-Yakoubian and Daniel 2018) *Until such a time that Indigenous Peoples have the support, encouragement and capacity-building assistance from other stakeholders and decision makers to lead the efforts, observing systems will continue to lack the holistic worldview necessary for a responsive, strong Arctic observing system. equitable partnership of Indigenous Peoples.*

Indigenous-led observing and research

All individuals involved in any manner in the development and implementation of the ROADS need to support Indigenous-led observing and research. “Indigenous-led” includes having Indigenous Peoples serve a major and meaningful role, with the support of agency, researchers, managers, practitioners, and others, in the entire process- from the generation of ideas (i.e., Indigenous Peoples should be developing the questions that need to be answered, identifying what gaps need to be filled, etc.) to data collection and ownership to use in decision making at all levels. Furthermore, it is important for any Indigenous-led observation and research to equitably include community members (e.g., expert Indigenous Knowledge holders, community leadership, community youth, hunters and their families) in a leadership (i.e., Principal Investigator) role. All too often, researchers may reach out to an Indigenous individual (whether a scholar, knowledge holder, etc.) and think that this is adequate (e.g., “check the box”). However, strong leadership needs to come directly from the communities. This can most easily be remedied in amending the current trajectory of EAV identification, assessment and selection. Indigenous-led efforts require non-Indigenous recognition of the value of Indigenous Knowledge and use of a framework that adopts an Indigenous Knowledge perspective (e.g., ICC food security framework as presented in this synthesis versus current SAON ROADS Societal Benefit Areas framework). The ROADS process also needs to recognize that Indigenous Peoples may be interested in observations that come from an Indigenous perspective, a science perspective, or through a co-production knowledge approach equitably including multiple knowledge systems. Recognizing these different needs also means that Indigenous observations don’t fit in a one-size-fits-all approach.

Youth involvement in observing and research

Youth and young adults are critical to include in observing efforts from inception to implementation. Oftentimes, youth are invited into the process but not provided adequate resources, space, nor guidance to feel comfortable contributing in a meaningful way. Given adequate support, time and space, Indigenous youth in the Arctic are in the perfect position to be effective bridges between their communities and observing, and are fully prepared to be leaders today, not simply waiting to be the leaders of tomorrow. Several ongoing programs could be used for guidance in shifting to a paradigm that places high importance and focus on youth. SIKU and SciIQ both provide insight to a paradigm for research that properly respects and applies in a practical way IK as these were developed and are driven by Indigenous Knowledge holders.

Health and safety of Arctic Indigenous Peoples

The observing community, at large, must acknowledge and address the central concerns of health and safety from Indigenous Peoples perspectives. Health, wellness and the safety of resources are connected to multiple systems and are integral to observing from a food security lens. These variables remain a critical gap in the Arctic observing community and AOS and should be meaningfully addressed in the ROADS process. The ICC-AK food security report (2015) defines health and wellness as: “Physical health of all life within the Arctic and of the land, water and air; adequate passage and absorption of nutrients throughout the Arctic ecosystem; mental health related to community and household relations and self- and cultural identity; environmental integrity and productivity to withstand pollution, habitat destruction and other disturbances.” Taking a food security framework, through this and the other five dimensions (ICC-AK 2015) of food security could inform multiple variables connected across different systems (e.g., biotic, cultural, abiotic) that are important to health and wellness. We recommend that the next AOS to meaningfully include this aspect in the next summit. The importance of an Indigenous food security lens of the health and safety of our resources remains a critical gap and warrants attention by the broader Arctic Observing community. The Arctic observing community has not historically addressed these types of observations in the past, and might be something the next AOS could address. We hope that, especially given the recent global developments with COVID-19, that the important discussions surrounding this should help inform Next Steps in the ROADS process..

Summary and Conclusions

In summary, the FSWG encourages all individuals involved in any manner in the development and implementation of ROADS to *support Indigenous capacity building*, Indigenous-led observing and research- *including youth involvement* moving forward, *consider Indigenous health and wellness* in the variable setting process of ROADS, and *shift to observing from a food security lens framework*. Indigenous People-led observing includes having Indigenous Peoples serve a major and meaningful role, with the support of agency, researchers, managers, practitioners, and others, in the entire process- from the generation of ideas (i.e., Indigenous Peoples should be developing the questions that need to be answered, identifying what gaps need to be filled, be actively involved in collaborations, and directing research and monitoring system) to data collection and ownership to use in decision making at all levels. Until such a time that Indigenous Peoples have the support and encouragement from other stakeholders and decision makers to lead the efforts, observing systems will continue to lack equitable partnership of Indigenous Peoples. Further, ROADS should acknowledge and address the central concerns of health and safety of Indigenous resources. Health and wellness is an important aspect of food

security from Indigenous world views and remains a critical gap in the broader Arctic observing community and should be prioritized.

DRAFT

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Glossary of Knowledge-Related Terms

The Indigenous Peoples in the Arctic Council define Indigenous Knowledge as:

“Indigenous Knowledge is a systematic way of thinking and knowing that is elaborated and applied to phenomena across biological, physical, cultural and linguistic systems. Traditional Knowledge is owned by the holders of that knowledge, often collectively, and is uniquely expressed and transmitted through indigenous languages. It is a body of knowledge generated through cultural practices, lived experiences including extensive and multigenerational observations, lessons and skills. It has been developed and verified over millennia and is still developing in a living process, including knowledge acquired today and in the future, and it is passed on from generation to generation.” [citation needed]

Kawerak, Inc. Internal White Paper, May 2017, provide the following definitions:

TRADITIONAL KNOWLEDGE: “Traditional Knowledge (TK) is a living body of knowledge which pertains to explaining and understanding the universe, and living and acting within it. It is acquired and utilized by indigenous communities and individuals in and through long-term sociocultural, spiritual and environmental engagement. TK is an integral part of the broader knowledge system of indigenous communities, is transmitted intergenerationally, is practically and widely applicable, and integrates personal experience with oral traditions. It provides perspectives applicable to an array of human and nonhuman phenomena. It is deeply rooted in history, time, and place, while also being rich, adaptable, and dynamic, all of which keep it relevant and useful in contemporary life. This knowledge is part of, and used in, everyday life, and is inextricably intertwined with peoples' identity, cosmology, values, and way of life.

Tradition – and TK – does not preclude change, nor does it equal only 'the past'; in fact, it inherently entails change.” To reiterate, all Traditional Knowledge holders are indigenous.

Raymond-Yakoubian, Julie, Brenden Raymond-Yakoubian and Catherine Moncrief. The incorporation of traditional knowledge into Alaska federal fisheries management. *Marine Policy* 78 (2017): 133.

INDIGENOUS KNOWLEDGE: Indigenous knowledge can be described as a body or system of knowledge that any Indigenous person has. This is in contrast to Traditional Knowledge which is specialized knowledge, with a strong connection to heritage, on a topic or topics. Indigenous Knowledge is a broader term, which encompasses Traditional Knowledge as well as other forms of knowledge. All Indigenous people have Indigenous Knowledge, but only some of them have Traditional Knowledge. We do not presume that there is a similarity/commonality between the bodies and systems of knowledge held by all indigenous groups.

LOCAL KNOWLEDGE: The term “local knowledge” is often used by others as an alternative to scientific knowledge and Traditional Knowledge, as a way to incorporate the knowledge of (mostly non-indigenous) people/communities into policy and management. The Social Science Program no longer uses it except when forced to (when it is used in law/regulations or in particular agency funding applications). This is because the SSP has terms which cover the knowledge of the people Kawerak acts on behalf of - that is, TK and IK - so there has been no need for developing terms related to other things/people. Most often the form that this term takes in those instances are LTK, where it has been used to combine local and traditional knowledge in contradistinction to scientific knowledge.

SUBSISTENCE: “By the term “subsistence,” the authors employ the senses commonly used by indigenous residents of this region (as opposed to, for example, the State of Alaska's understanding). The indigenous perspective encompasses hunting and gathering related activities which have a deep connection to history, culture, and tradition, and which are primarily understood to be separate from commercial activities.” Subsistence and food security are not the same thing. However, they are both entailed within each other. For example, the ability to practice subsistence and have access to subsistence resources is a main element of food security. While subsistence may not be the ideal term to describe what the concept means to people in our region, it is the term that is most frequently used.

Raymond-Yakoubian, Julie, Brenden Raymond-Yakoubian and Catherine Moncrief. The incorporation of traditional knowledge into Alaska federal fisheries management. *Marine Policy* 78 (2017): 133.

Key Questions from AOS 2016

What steps need to be taken to encourage using science and IK through a holistic lens for CBM programs?

(e.g., a food security lens, ICC-AK 2015)

- How do we operationalize information generated to inform decision making across all scales?
- What steps need to be taken to connect IK holders and community/regional organizations with scientists to establish CBM programs that take an approach of co-production of knowledge?
- What steps need to be taken to encourage and establish an approach for the co-production of knowledge?
- What needs to happen in order to mainstream an ethical understanding and use of IK?
- What steps need to be taken to develop regional research Internal Review Boards?

The Role of Community Programs in Food Security: A Case Study of Ilisaqsivik Society in Clyde River, Nunavut

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Ilisaqsivik Society, founded in 1997, is a community-initiated and community-based Inuit organization and registered charity located in Clyde River (Kangiqtugaapik), Nunavut (population ~1,000). Ilisaqsivik is dedicated to promoting community wellness by providing space, resources, and programming that helps families and individuals find healing and develop their strengths. Ilisaqsivik runs dozens of community programs at its wellness centre and out on the land every year.

Almost all of the programs at Ilisaqsivik embed a food component within them. Food programs at Ilisaqsivik experienced an increase starting in 2004 when the Ilisaqsivik Board of Directors became interested in more land programming, teaching land skills to youth, and more country food distribution in the community. It started a 'Father/Son' hunting program, a program that continues to this day, and other food programs were initiated, including the Canadian PreNatal Nutrition Program (CPNP), an after-school program (healthy snacks), Moms/Parents and Tots program (healthy snacks), and school breakfast program. These programs all offer healthy snacks or meals to children and other community members, ensuring access to healthy and adequate food to participants. By 2017, the centre had launched 25 additional programs offered over the year that added to access to food in both direct and indirect ways. Programs that directly address food security include hunting trips that bring country food to the community and programs like the after-school program and the breakfast program that offer daily meals and snacks. Indirect programs teach skills that support harvesting and hunting activities (e.g. hunter apprentice programs for youth) or teach other skills such as sewing clothing or making tools for hunters so they can go out, or money management including how to shop efficiently at the store. Programs like teaching youth hunting skills address food security both directly and indirectly, as they build skills and provide country food at the same time.

Organizations like Ilisaqsivik, organizations that know a community and work with and for community members to address wellness issues from the ground up, have great reach and deep impact. For example, between all of Ilisaqsivik's food-related programs, over 450 community members access direct food programs each day. Youth who started out as participants in hunter apprentice programs are now, years later, instructors in the same program.

Organizations like Ilisaqsivik are critical in communities everywhere for improving food security. These organizations do so in both direct (food programs) and indirect (skills building and wellness programs) ways. Both approaches are central to improving food security at the community level and building community wellness more broadly. Providing access to healthy meals, while also developing individual, family, and community strengths is an approach that works on multiple levels and draws on local knowledge and social/cultural values. There is a dire need for investment in these organizations that are embedded in communities, understand their own communities, and work at the frontlines of food security and food sovereignty and building resilience to deal with all wellness issues for individuals and families.

Climate Driven Disruptions in the Bering Sea

An ecosystem in peril

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The Bering Sea is one of the most productive ecosystems in the world; Indigenous Peoples have lived in the Bering Sea region for millennia along with countless species of seabirds, marine mammals, and fish. Spanning from Alaska to Russia and influenced by the Arctic and North Pacific oceans, the Bering Sea provides critical cultural and subsistence value for coastal communities, as well as jobs, food, and exports that boost our national economy. The Bering Sea is a distinct and dynamic region containing some of the world's largest and most profitable fisheries, producing approximately 40% of U.S. seafood landings (and over half of Alaska's commercial fisheries activity) and over 25 million pounds of subsistence foods for Alaskans. Bering Sea fisheries also provide over 10,000 full-time equivalent jobs, generating economic value extending beyond Alaska to other states.

Due to the pronounced impact of climate change in high latitudes, the Bering Sea is warming at a significantly faster rate than more temperate zones. Indicator species such as plankton, seabirds, and marine mammals are showing signs of stress and population decline under warmer, more acidic, and increasingly ice-free ocean conditions. These unprecedented environmental changes are compounded by other human-driven stressors, including marine traffic (shipping and tourism), commercial fishing, mining and marine debris (derelict fishing gear and plastic pollution). Further compounding this stress is the lack of holistic, inclusive; comprehensive integrated monitoring, observation, research and response efforts, which has had the effect of excluding coastal community members and Tribes from the decision-making process.

Commercial fishing, while important economically, can disrupt the region's delicate food web by removing large volumes of fish species and damaging fragile benthic habitat. An increase in marine traffic heightens the risk of major events like oil spills and whale strikes and introduces millions of gallons pollution from the discharge of wastewater, chemicals, and trash. Marine pollution includes the millions of tons of plastic spilling into the ocean every year, which pose a significant threat to wildlife and ecosystem health, even in the remote Arctic. Indigenous residents have noticed and it appears at least some discussion at the North Pacific Fisheries Management Council is slowly recognizing there has been a shift in the carrying capacity of the Bering Sea.

Together, climate change and these stressors are accelerating the decline of the Bering Sea ecosystem. There is an urgent need to adopt precautionary management measures for those development stressors, and conserve biodiversity and subsistence opportunities. Resource managers must address these changes, and leaders must act to stop carbon proliferation to prevent the ecological collapse.

This paper is intended to serve as a basis for discussion and to provide a local and indigenous perspective. It synthesizes the causes and evidence of ecological peril in the Bering Sea and identifies the need for a precautionary approach to resource management.

The Problem

The Bering Sea is an exceptional ecosystem of tremendous ecological, economic, and cultural importance. In addition to supporting some of the largest fisheries in the world and providing critical habitat for marine and terrestrial plants and wildlife, the Bering Sea region encompasses the communities of numerous Central Yup'ik, Cup'ik, St. Lawrence Island Yupik, and Inupiaq people and tribes that reside between the southern Chukchi Sea and the Aleutian Islands. These Indigenous Peoples have an innate connection to the land they have stewarded for millennia and live a low-carbon lifestyle, but are especially vulnerable to the impacts of climate change that they did little to create.

Climate change is an existential threat to the Bering Sea ecosystem, and is now coupled with several concurrent and compounding human-caused stressors, including marine traffic, commercial fishing, marine debris and marine mammal unusual mortality events that occurred in 2011 and 2019. Alaska Native marine mammal subsistence hunters have witnessed startling changes to marine mammal health. Salmon are dying due to heat stress not long after they enter river ecosystems startling communities across the region. Together, these stressors exceed the capacity of current resource management, and demands systematic management approaches to preserve long-term ecosystem health.

These human-ecosystem interactions threaten the entire Bering Sea, but are especially concerning in biologically diverse areas with uniquely high ecological value-- and are exacerbated by the lack of community-based comprehensive and integrated monitoring, observation, research and response systems. For example, the Pribilof Islands marine ecosystem is a biologically rich microcosm of the Bering Sea, and offers important evidence of the environmental changes that have already occurred and those that are underway. One key indicator is the pup production of northern fur seals, which has been declining on St. Paul at an approximate annual rate of 4% per year.³ Similarly, Pribilof Island seabirds had low reproductive success in 2018, with fewer numbers of breeding birds and a delayed breeding season.³ In addition, Pribilof Island blue king crab stocks have been depressed since crashing in the 1980s.⁴ Though not as well studied those same stressors are occurring in the northern Bering Sea.

Climate Change/Ocean Acidification

As part of the fastest-warming region on Earth, the Bering Sea is in peril, which may have ripple effects around the world. Local and traditional knowledge, together with national and international research, suggest that the region is undergoing an unprecedented environmental shift, with troubling consequences for the marine ecosystem. Over the past five years, the winter atmospheric conditions that influence the region have been significantly different from the historical norm. Sea surface temperatures in the northern Bering Sea have been as much as 5°C warmer than the historical average. The lack of winter sea ice in most of the Bering Sea defies previous climate forecasts, which predicted that we would not see these conditions until 2050. Meanwhile,

observations and data indicate that the distribution, population size, and survival of key marine species are changing drastically, with increasing reports of massive die-offs of seabirds and marine mammals.

Like most modern environmental challenges, these disruptions in the Bering Sea are driven by climate change. Left unchecked, our consumption of fossil fuels will have countless negative impacts not just to the Bering Sea ecosystem, but also to the entire country. Management agencies should contribute to climate change mitigation by advocating strongly for the regulation and reduction of carbon emissions.

Marine Traffic/Shipping

While some decision-makers celebrate the fact that the loss of Arctic sea ice creates new “opportunities” for marine shipping and tourism, military exercises, resource extraction and more, there is significant cause for concern that these new activities will cause additional harm to the Bering Sea ecosystem. A rise in vessel traffic not only increases the likelihood of major events like oil spills and whale strikes and entanglements, but also raises the risk of pollution from the discharge of wastewater, chemicals, and trash. The continued use of carbon-intensive Heavy Fuel Oils (HFOs) is polluting the Arctic and reducing air quality, while also contributing to climate change and ocean acidification.

The less visible impacts of marine shipping have the potential to disrupt the delicate food web of the Bering Sea. Vessels discharge both sewage and greywater directly into the water when beyond the regulatory 12 mile legal threshold established in Article 3, Part II of the United Nations Convention on the Law of the Sea. Vessel discharge is difficult to mitigate because of the remoteness of the area with little enforcement being carried out it will be difficult to hold vessels accountable. Vessel hulls and ballast water can transport invasive species, which can take over a habitat and destroy a region’s biodiversity. Although Alaska’s historical sea ice and cold-water temperatures have previously made it an “oasis” from invasive species that is changing due to climate change and growth in vessel traffic. The Alaska Department of Fish and Game has identified over 15 species of marine invertebrates and aquatic plants that pose a “high risk” of being transported from Canada or the Lower 48, including green crabs, zebra mussels, and spiny water fleas.¹²

Another concern surrounding increased marine traffic is the effect of ship noise and vibration on marine mammals, who use sound to communicate, feed, navigate and reproduce. Marine mammals exposed to noise from marine traffic can suffer from increased stress levels, hearing loss, changes in behavior, injuries or death. Constant noise could force marine mammals out of their usual habitat, potentially reducing their ability to find prey.

Although there are still gaps in our understanding of how increased marine traffic will affect the Bering Sea ecosystem, we know this activity poses enough risk to warrant regulatory caution. From vessel speed limits to restricted areas to a prohibition on HFO use in the Arctic. There are too many options for decision-makers to mitigate the impacts of vessel traffic on the irreplaceable Bering Sea ecosystem but it appears the best option is to engage with indigenous communities early and often.

The need for collaborative research

As Indigenous Peoples, we have lived in the Arctic for millennia. As stewards of our lands and waters we have developed inextricable connections that form the foundation of our own understandings of our environments, including marine, freshwater, terrestrial, atmospheric, and ice. Our knowledge has been passed down from generation to generation, and is continually updated, adapted, and reshaped as our individual and collective experiences and observations inform them. Our view of the ‘ecosystem’ is holistic and recognizes different systems, and the connections between them, such as the physical, biological, chemical, social, and cultural systems. Human and non-human persons and connections of all kinds are known and respected. Importantly, our view includes humans as part of this highly interconnected system.

Alaska Native organizations and communities are extremely concerned about environmental and other changes happening in the Arctic and are eager to contribute. The “race” to the Arctic research must consider the indigenous roles our communities and experts can offer. Our desire is to work to create a collaborative, effective, and widely beneficial understanding of the Arctic and have meaningful involvement in research to better understand the changes we see first-hand.

Commercial fisheries dynamics will affect the health of the Bering Sea

Commercially important species like Pacific cod and Pollock have historically been confined in the southeastern reaches of the Bering Sea.³ In recent years, however, species have moved into the northern Bering Sea. One indication of this northward shift is in the collapse of the Pacific cod fishery in the Gulf of Alaska, which was closed for the first time in December 2019 in response to record low numbers. Since 2012, the center of the Bering Sea Pollock population has moved northward at a rate of 18 miles per year.⁴ Researchers have observed a sharp decrease in the availability of prey for young walleye Pollock in southern waters of the Bering Sea during warmer years, which limits the survival of Pollock during the first winter and decreased recruitment over consecutive years.

Changes in the abundance, distribution, and energy content of forage fish may affect the survival and growth of apex predators like seabirds and marine mammals. Survival rates are generally highest when ample food is available, while disease and starvation rates increase when food availability is low.

It is critical that resource managers consider the ways that human consumption of marine resources can exacerbate climate impacts and further disrupt the Bering Sea ecosystem.

Marine Debris/Plastics Pollution

Despite its small population and remote location, Alaska’s coast is littered with marine debris. Human created waste that is deliberately or accidentally deposited in oceans and waterways. Marine debris is generated by marine traffic, weather events, and ocean currents, which transport large volumes of debris from as far away as Asia. Growing populations, increased maritime activity, and consumer preference for plastic-based single-use products have resulted in a rapid increase in marine debris, which threatens wildlife and ecosystem health. Over one million

pounds of marine debris have been collected from the Bering Sea coastline, including St. Lawrence Island and the Pribilof Islands.

Most marine debris contains plastic. Each year millions of tons of plastic leak into the ocean from coastal regions alone— equivalent to dumping the contents of one garbage truck into the ocean every minute. Without significant action, worldwide there may be more plastic than fish in the ocean, by weight, by 2050. According to the UN, marine plastics pollution costs an annual \$13 million per year in damage to marine ecosystems, including impacts to marine productivity, fisheries, and tourism. In addition to the direct economic costs, marine plastic pollution has adverse impacts that are more difficult to quantify, including effects on human health, food chains, and other essential economic and societal systems.

Globally, approximately 20% of marine debris is generated at sea. Abandoned, lost, or discarded fishing gear, also known as derelict fishing gear, is one of the most pervasive and harmful types of marine debris, and is the most common type of marine debris found in the Bering Sea region. Due to the high level of fishing activity in the region, fishing nets (trawl, seine, and gill nets), lines, and plastic bands are frequently adrift or washed ashore. These materials can entangle animals and result in death through starvation, strangulation, or predation. Although less common in the Bering Sea marine ecosystem, marine debris also originates from land-based sources and includes cigarettes, plastic bags, and food and beverage packaging and accessories. This trash is either littered directly into rivers or oceans or it spills out from inadequate waste management systems.

Marine debris poses a serious threat to wildlife and ecosystem health. Since the early 1930s, Pribilof Islands fur seals have been observed entangled in marine debris, although this has become more common since the 1960s, when greater fishing activity brought more fishing nets to the region. Evidence of bowhead whale entanglement has been observed as far north and Saint Lawrence Island. Marine debris is dangerous to marine life not only because of the risk of entanglement, but also because small pieces of debris may be mistaken for food and eaten, causing starvation, internal blockages, and death. Whales, walruses, and sea lions are all prone to ingesting and tangling in marine debris near the Alaska coast. According to National Geographic, 90% of seabirds currently eat plastic and nearly all of them will eat plastic by 2050.

Tribal Sovereignty and building Meaningful Role for Tribes in Management

The United States must not turn its attention away from meaningful tribal involvement in coastal and maritime management. Contemporary ecosystem management recognizes the importance of local communities' participation in effective management and if sought collaboratively could address many national interest concerns. If a program existed for states to include local communities to collaborate with the federal government in managing the nation's coastal areas and resources better management will result. In July of 2011, after 32 years of active participation, Alaska became the only state to withdraw from the coastal zone management program. This significantly disenfranchised communities and tribes and eliminated the state's ability to manage its coastline and marine resources. Though the ACMP was not perfect it left a subsequent void from actively participating in the monitoring, observation, and research of coastal areas and precludes any meaningful role in decision-making. It also gave full authority and control to

political appointees subject to the influence of major resource development corporations. An initiative to restore the ACMP was blocked by oil, mining and other powerful corporations.

On January 21, 2015, President Obama signed an Executive Order 13689, titled “Northern Bering Sea Climate Resilience Area”, creating a tribal role in the future of the northern Bering Sea . Unfortunately, it was barely formed before it was abolished by the Trump Administration. This needs to be reconstructed with stronger pillars for Tribal management. For Bering Sea communities and tribes to again have authority in coastal and marine resource management, they must have an active role as sentinels in the monitoring, observation, and research of coastal and marine areas, and have the opportunity to bring these findings and their traditional knowledge to decision-making bodies.

Critical Next Steps

Coastal communities, tribes, and ocean conservation organizations are coming to agreement the Bering Sea is in peril, due in large part to the human-created stressors described in this paper. We are facing an ecological crisis that requires timely action and change in management strategies and practice, as well as precautionary measures to strengthen the resilience of the Bering Sea ecosystem. This includes the incorporation of community observations, tribal perspectives, and indigenous knowledge and integration with Western science.

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Eva Burk: Indigenous Knowledge and Co-Management IFSS

I recently had the chance to sit in the sauna with Dr. Reverend Anna Frank, a knowledgeable Elder from Minto, and another Alaska Native woman, in between our generations. We talked about all kinds of issues but Dr. Reverend Anna Frank was adamant that I attend the upcoming Board of Game meetings to defend her proposal. Alaska Department of Fish and Game (ADF&G) proposed to reauthorize antlerless (cow) hunts but did not include a quota for ceremonial harvests, which would have technically kept them illegal. In the past several years, ceremonial hunts were made illegal and hunters only found out once they called ADF&G to apply for permits. However, ADF&G did make an exception and allowed all ceremonial hunts to take place.

Dr. Reverend Anna Frank ensured we had a proposal together in time for their deadline and Tanana Chiefs Conference did an excellent job of gathering youth and key tribal leaders together to present hours of public testimony. In accordance with this guidance, my official position in public testimony is that: I oppose proposal 140 (ADF&G) and support proposals 141 (Tanana Rampart Manley Fish & Game Advisory Committee), 142 and 143 (Dr. Reverend Anna Frank) regarding reauthorizing antlerless (cow) hunts and protecting ceremonial harvests. Full proposals can be found here: http://www.adfg.alaska.gov/static/regulations/regprocess/gameboard/pdfs/2019-2020/proposals/fairbanks_120-154.pdf.

I sat through my first round of Alaska Board of Game public testimonies on Saturday, March 7, 2020 and made the following notes from my family and community testimony:

- There are discrepancies between biologists' "estimates" and local observations;
- ADF&G has failed to truly consider and/or validate Indigenous knowledge;
- There is a clear violation of tribal consultation requirements;
- Food sovereignty and security are impacting local village's sustainability;
- Racism, income inequalities, pressure from outside hunters and cultural disrespect (e.g. wanton waste of moose meat by non-Alaskan hunters) are still largely apparent;
- Villages would gladly accept any unwanted meat taken by out-of-area hunters and this should be investigated further as a way of building good faith and a reciprocal relationship;
- Native youth are being empowered and their testimony was respectfully considered;
- There are relationships between board of game members and the Native community that can be strengthened and be a place to build from, to truly incorporate Indigenous knowledge into the operating standards of the ADF&G; and
- The Native communities need to continue efforts such as the TCC Hunting and Fishing Task Force to continue empowering youth and educating their people on the appropriate way to engage with the ADF&G.

I tried to note the positive as well as the areas that can be improved upon. I would like to see state and federal agencies truly incorporate Indigenous Knowledge into their decision-making (e.g.

ADF&G and United States Fish and Wildlife Service [USFWS]). This can only be done through co-management and forming working relationships, establishing goals and measuring progress.

My trapping friend attended the final Board of Game meeting and noted that proposal 140 passed because ADF&G cited low birth weights and twinning ratios. I find this odd because proposal 140 largely based its validity on traffic safety (mostly along Parks Highway) and there was significant testimony against the hunts. I heard hours of testimony that moose numbers were low in comparison to history and the pressure from outside hunters was overwhelming. I also thought how are they consistently and accurately able to measure low birth weight or twinning ratios? What about how the vegetation was affected by the random snow, rain and freeze-thaw cycles of winter 2018-2019 and the lack of rain in spring 2019? What about the large fire near Nenana (in the game management unit the proposal affected) and the lack of new growth that I see on the trapline trail? What about the late fall rains that can make travel to the preferred vegetation harder for calves? Is it ok to hunt cows when they could be pregnant? Is it ok to hunt cows other than for ceremonial purposes? If climate change is affecting moose habitat and nutrition, is the appropriate measure to hunt more cows to “stabilize a growing population and keep it within the capacity of the habitat?” (ADF&G 2011).

I recently went trapping with my dad and this same friend - I brought this proposal up again because my friend just believed ADF&G without question. I wanted to discuss what could cause low birth weights or twinning ratios and the appropriateness of cow hunts. My dad said Native people never took cows unless they were barren and only for survival or ceremonial purposes. The moose will present itself to you when you are in need. Barren cows have a distinct color and noticeable fat that sways when the cow walks. Also, a cow will lose fat and luster as it reproduces/ages and accordingly, likely produces smaller cows. We talk a lot about climate change impacts ranging from snow and ice trails, river travel, water depths, vegetation, temperature, precipitation and animal behavior. To him, there are too many factors that can cause drastic changes in short time periods. He says the moose reproduce well when they feel safe which is not easy right now because their environment is changing rapidly, which stresses them out and will affect their reproductivity. He stated that twins are rare and the twinning ratios should be about 1 in 15, whereas ADF&G states 15-20% indicates a healthy population, based on 30 years of radio collar data (ADF&G 2011). It should be noted here that Indigenous people have been observing and sharing data with each other for 10,000 years. We do this for survival and do not take our science lightly as our livelihood depends on it.

The Yukon Department of Environment, Fish and Wildlife Branch in Whitehorse, Yukon states the following about cow hunts:

All cow harvests should be avoided:

- Cow harvest is associated with a high risk of population decline. Cow harvest has a greater impact on populations than bull harvest because it also represents a potential loss in calves/reproductive capacity of the population.
- The harvest of 1 cow is equal to the harvest of 3 bulls.
- More than 80% of adult cows produce calves each year. Cows without calves (“dry cows”) are generally those that have lost their calf and will reproduce again in subsequent years (Yukon Environment 2016).

From what I have been taught by my Elders, relationships with animals based on values and reciprocity are the only way to approach management or co-management. From my research, I understand that co-management can only work if all partners have equal voices. Also, co-production of knowledge, led by Indigenous researchers with rights to data ownership, provides the foundation to build true co-management strategies and partnerships.

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Additions from Ikaarvik

Ikaarvik prefers the term “community-driven” research to “community-based” as we feel that the latter term has been co-opted by outside researchers working in communities for short periods of time, and responding to outside agendas. “Community-driven” research allows for a power shift, for the people who live in the North to determine and act on their own research priorities, and utilize methodologies that properly follow Indigenous Knowledge. Imperative in community-driven research is the inclusion of Indigenous Knowledge in all stages of research, and emphasizes the critical role of IK in interpretation, rather just in the collection, of data.

Ikaarvik believes that true, equal inclusion of Indigenous Knowledge in research depends on the understanding that IK is not simply data – properly understood, it provides guidelines for ways of working together and building the relationships necessary for mutual understanding. Ikaarvik youth have developed a Nunavut-specific handbook that they have called ScIQ (science + IQ) which follows the Inuit societal values as a way of laying the groundwork for the creation of better Arctic research. They have “interpreted” the 8 values of Inuit Qaujimajatuqangit into steps that an outside researcher can follow before, during and after their research. In a powerful role-reversal, Indigenous youth are now in the position to inform outside researchers how to conduct their work; using IK as the ground rules for working together benefits not only the local people, but science as a whole. Research become more efficient, cost-effective, relevant and frankly BETTER when two ways of knowing are merged. More information can be found at:

Link to ScIQ: <https://ocean.org/wp-content/uploads/ScIQ-Report-and-Recomendations-lores.pdf>

Ikaarvik would like to invite the AOS to consider ways that all Indigenous youth have the support, time and space to participate in research. Indigenous Northerners are in a powerful position to use two ways of knowing, and youth are in the perfect position to facilitate the two-way transmission of knowledge between their communities and researchers. Having “a foot in two worlds” is an incredible strength and uniquely qualifies Indigenous youth to be the bridge towards creating observing systems.

Juno Berthelsen

Greenlandic experience of colonial structures and discussions of power and participation in policy making in management of total allowable catch.

Greenland is populated by around 90% Indigenous people with many of them being descendants of both Inuit and colonial settlers from Denmark and Western Europe, and the Indigenous population is therefore a group with highly mixed heritage. The concentration of mixed individuals of European/Inuit descent is mainly to be found in the capital, Nuuk, as well as some of the other bigger cities, such as Sisimiut and Ilulissat, and are in general considered to be the elite in Greenlandic society, because of better access to higher education and leadership positions with considerable power in decision-making processes. The influence of European and Danish presence today and throughout colonial history has had implications on traditional Inuit worldviews and cultural practices and values, and this is especially apparent in Nuuk, where European and Danish influence is heaviest.

Today, Greenland's economy relies mainly on fishery, which accounts for around 90% of Greenland's exports. Fishing on the scale we see today is not part of a precolonial Inuit practice, but is rather a consequence or outcome of the introduction in the 20th Century of Danish fishing traditions as a business strategy to establish and uphold a Western capitalist economic model in Greenland. Most Indigenous people outside of Nuuk rely on fishing for their economies, while a smaller and decreasing number rely on subsistence hunting. There is an issue with both fishing and hunting that connects to colonial structures established throughout Greenlandic colonial history, and that revolves around who decides which animals can be caught or hunted as well as the quantity of that wildlife. Today, there is collaboration and communication between the Greenland Institute of Natural Resources and Greenlandic fishermen and hunters around observations of wildlife and recommendations of quotas. In recent years there have been disagreements on the numbers or quantities of both fish and sea mammals, such as halibut, cod and belugas, and there have been heated debates around whose observations and recommendations to follow.

A new fisheries law was proposed some years back that seeks to distribute fishing quotas more fairly to fishermen around the coast instead of to the centralized fishing companies, such as the government-owned Royal Greenland. Even though the government, which is heavily influenced by an administration that is dominated by Danish people in leadership positions, has promised to consider the small-scale fishermen, they seem to favor the big centralized fisheries, in that raised quotas for halibut, for example, have been extended to Royal Greenland. The law is still under process. The process of Total Allowable Catch (TAC) decision-making is complex (Jacobsen & Raakjær, 2012), but the discussion should include conversations about centralization of power which is a legacy of colonial structures that involve decision-making processes around utilization of natural resources, which are characterized by unequal power relations. The reason why it is so important to include conversations of colonial structures is that Greenland is an example of how we as Indigenous people can gain more self-determination and political sovereignty, but yet still carry on colonial legacies. Growing up in Nuuk, especially growing up in a poor family without many resources, can make it very hard to go hunting and if you do not have adequate access or ability to go hunting for your own food, you are left with the option to eat imported Western food. The country food that you can buy is typically very expensive, and that makes it very hard for people with low income to eat anything but a Western diet, which is disconnected from our Indigenous food culture. With the urbanization that is happening in

Greenland, resulting in the slow depopulation of smaller towns and settlements that keep our Indigenous cultural practices alive such as harvesting country food, it becomes necessary to address different aspects of colonization that spurs that development. A way of dismantling this colonial structure is to keep our Indigenous knowledge relevant and vibrant and that starts with making sure Indigenous people's voices are heard and recognized, which makes knowledge co-production immensely important.

A positive example of knowledge co-production is seen in the case of Fishermen and hunters in Attu, West Greenland, who have been providing input into the local Natural Resource Council for several years (Nordic Co-operation, 2018). This project documents their observations and wide-ranging knowledge of local nature and feeds it into research aimed at developing new ways of managing living resources, and the observations demonstrate how democratic participation enhances knowledge of the marine environment, improves management and enhances the sense of responsibility for and ownership of nature and the environment. This project won the Nordic Council's Environmental Award in 2018 and has inspired similar projects in Finland and Russia and looks to spread to other countries.

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As U.S. academic scientists attempt to co-produce knowledge with Indigenous communities in the Arctic on a wide scale, both scientists and Indigenous communities look for past examples of co-production of knowledge as models to learn from. Successful co-production of knowledge between Arctic researchers and Arctic Indigenous peoples is very rare and examples can be hard to find. One example that is commonly referred to as a gold standard model is the co-production of knowledge between marine wildlife biologists and Inupiat whalers in Utqiagvik in the late 1970s and early 1980s that resulted in an accurate bowhead whale census that allowed for the hunting of bowhead whales by the Iñupiat of Utqiagvik. However, when you take a closer look, this example is not a fairytale.

Commercial whaling caused an international decline of whale populations during the 19th and 20th centuries. In 1977, the International Whaling Commission (IWC) implemented a ban on Indigenous hunting of bowhead whales in northern Alaska. This ban was based on a bowhead whale census that was conducted by two U.S. federal (NOAA) scientists who camped at the edge of the shore fast ice near Utqiagvik and counted 1,000 bowhead whales pass them during one spring migration. Local Inupiat whalers knew that the NOAA census was inaccurate and that thousands more bowhead whales passed the scientists either under the ice or out further offshore. Science is based on observations. Indigenous knowledge is based on networks of observations. The IWC and the U.S. Government considered the observations and findings of the two NOAA scientists as “scientifically valid,” and they disregarded the local Iñupiat observations and knowledge, which was based on personal observations, the shared observations of others in their knowledge sharing network (community), and the shared observations and lessons passed from generations before them. Essentially it came down to the observations of two individual scientists over one season versus the observations of hundreds of Iñupiat over many seasons.

The bowhead whaling ban could have completely devastated the Iñupiat communities that rely on whaling to survive. However, this was prevented due to one thing: the Iñupiat communities on the North Slope of Alaska were able to pay for their own, more accurate science. The Iñupiat of the North Slope utilized Alaska State law to create the North Slope Borough (NSB) and to tax the Prudhoe Bay oil fields that were established in the 1970s. This tax base allowed for the NSB to hire their own scientists to move to Utqiagvik and work with the Iñupiat community to conduct a more accurate bowhead whale census that incorporated both Iñupiat knowledge and marine wildlife biology. The new bowhead census showed that the Iñupiat whalers were correct and that the NOAA census underestimated the bowhead population. The IWC lifted the whaling ban and gave the local Iñupiat power over future bowhead whale censuses. The Iñupiat had to pay millions of dollars to hire their own scientists to prove their observations were valid, and they continue to pay for their own marine scientists to maintain the right to harvest bowhead whales.

The production of knowledge depends on who holds the power. By paying for the scientific research out of pocket, the Iñupiat whalers took complete control of the research questions, the research methods, the interpretation of data, and provided this data to relevant entities to utilize in local, national, and international policy-making. In Arctic research, scientists generally hold the power. First, and most importantly, the process in which scientists secure funding is highly competitive and can force scientist to make unrealistic promises to funders and partnering organizations. In addition to controlling the budget, scientists generally control the formation of the research questions and the strict research agenda. The example of the co-production of

knowledge between Iñupiat whalers and western scientists in Utqiagvik in the 1970s and 1980s cannot be replicated unless Indigenous people have control over research. I do not foresee this happening in academic Arctic sciences, so I believe the phrase “co-production of knowledge” should not be used to refer to research under the complete control of academic scientists and funders. Most scientists and funders mean very well, however the current power structures at hand do not allow for true “co-production of knowledge” in Arctic research.

Check your bags at the front door? Not here. The words that people use matter. A common characteristic amongst Iñupiat leaders and Elders is the ability to listen carefully and choose your words wisely. Most do not speak for the sake of speaking. Silence is okay and it doesn't always need to be filled with verbal communication. Scientists know that words matter as well and they are more careful with the words they put on paper. The words *co-production of knowledge*, *Indigenous Knowledge*, and *Traditional Knowledge*, each carry heavy baggage. Many non-Indigenous scientists use these terms without fully understanding their deep and complex histories and they don't understand what these terms mean to the specific Indigenous peoples they are working with. Most scientists simply don't have the time, capacity, or willingness to unpack all of baggage that comes with using these terms. The co-production of knowledge is *much* more complicated than you would expect. Formalizing this process in any project takes an extreme amount of time and energy. Nevertheless, the time and energy required is worth every second and every penny, and the results of true co-produced knowledge generates deep and enriched results and tangible positive impacts. Fully understanding these concepts is crucial for mutually beneficial co-production of knowledge. Yet there are other variables that are required for this process to work including: research needs to be relevant to locals' lives; open lines of communication are required through relationships and trust; and the specific project must provide equitable resources, (Erickson 2020).

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