

Traditional Knowledge Implementation: Accessing Arctic Community Panels of Subject Matter Experts



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List of Abbreviations and Acronyms

ABWC	Alaska Beluga Whale Committee
AEWC	Alaska Eskimo Whaling Commission
ANO	Alaska Native Organization
ASAMM	Aerial Surveys for Arctic Marine Mammals
BASC	Barrow Arctic Science Consortium
BCB	Bering-Chukchi-Beaufort
BLE	Beaufort Lagoon Ecosystems
BOEM	Bureau of Ocean Energy Management
BOWFEST	Bowhead Whale Feeding Ecology Study
BWCA	Barrow Whaling Captains Association
DFO	Department of Fisheries and Oceans Canada
DWM	Department of Wildlife Management
EBS	Eastern Beaufort Sea
HABS	Harmful algal blooms
I-I	Inuvialuit-Inupiat
IK	Indigenous Knowledge
LK	Local Knowledge
LTER	Long Term Ecological Research
NPRB	North Pacific Research Board
NSB	North Slope Borough
NSF	National Science Foundation
NVB	Native Village of Barrow
NVK	Native Village of Kaktovik
OSU	Oregon State University
TEK	Traditional Ecological Knowledge
TK	Traditional Knowledge
UAF	University of Alaska Fairbanks

1 Introduction and Background

1.1 Traditional Knowledge

Traditional Knowledge (TK), also known as Traditional Ecological Knowledge (TEK) or Indigenous Knowledge (IK), was first described by Levi-Strauss (1962) as the “science du concret,” or the science of tangible, personal observation and experience. TK is sometimes used interchangeably with the term Local Knowledge (LK), although TK is exclusive to generational knowledge held by Indigenous peoples, while LK can be used to describe knowledge held by anyone who has a long-term experiential relationship with a place (Berkes, 1999).

No longer relegated strictly to the vocabulary of social scientists, TK has become mainstream to the extent that some funding sources encourage or even mandate researchers to consider TK in their proposals. The federal government and the Bureau of the Ocean Energy Management (BOEM) have recently recognized TK as an important body of knowledge that contributes to science (Lander and Mallory, 2021; Prabhakar and Mallory, 2022). While this trend may be originating from good intent, there are many researchers who previously had never consulted TK and are now trying to understand how to interface with this different way of knowing. Other researchers who do not want to engage with TK may instead attempt to check a box by superficially consulting with TK experts (Menziés, 2004).

Attempting to interface TK and conventional science can create a host of problems, including: Indigenous collaborators feeling overwhelmed by the number and scope of projects that attempt to incorporate TK and the attending number of (often unpaid) community meetings and interviews; the oversimplification or misinterpretation of TK; and the centering of conventional science where TK is applied as an afterthought (Morrow and Hensel, 1992; Nadasdy, 1999). These issues can be partially addressed by the inclusion of TK as early as possible in the process of research design (Isaac, 2015; Brooks, 2022).

Furthermore, not all research done in the Arctic is designed for the communities in which it occurs. This results in research that is extractive, meaning that it takes information from communities without giving back. Brunet et al (2014) conducted an analysis of the journal *Arctic* and found that among articles published between 1965 and 2010, there was little transition from extractive research to research that relied on a relationship of reciprocity and mutual benefit.

1.2 Cooperative Agreement Background

Because both BOEM and the North Slope Borough (NSB) value TK as a priority, the two entities signed a Cooperative Agreement in 2016 to implement TK panels (Kendall et al, 2017). Unfortunately, the implementation of this project experienced many setbacks, mostly due to personnel changes and COVID-19. Due to a lack of progress and personnel changes, the project was rescope in 2019. At that time, it was agreed that panels would be established for two projects. Panels for one of those projects was initiated; it was a study of the ecology of a lagoon system near Kaktovik (with Dr. Ken Dunton) and was funded by the National Science Foundation. The other project was undetermined.

In December of 2021, another meeting was held between BOEM and NSB DWM to get the project back on track following COVID-19, even though COVID-19 restrictions were still in place in many NSB communities. At the December 2021 meeting, it was decided to continue pursuing Dr. Ken Dunton’s project as a TK panel and to pursue two projects in Utqiagvik, an existing project on oceanography that studied what factors aggregated krill within the bowhead feeding area at Point Barrow (Dr. Carin Ashjian, Woods Hole Oceanographic Institute) and a proposed project to examine stable isotopes in bowhead

baleen to study the feeding ecology of bowhead whales (led by Dr. Kate Stafford at Oregon State University). Other projects would be pursued as time allowed.

Due to personnel changes, the scope of the cooperative agreement shifted somewhat over time. The original intent as described in the Description/Specifications/Statement of Work was to: 1) Refine and expand the use of TK in scientific studies; 2) Reach a broader public through an enhanced partnership between communities and researchers; and 3) Demonstrate and promote co-production of knowledge by proactively engaging both scientists and TK holders in the research process. This pilot project resulted in testing various methods, where we learned how best to achieve these broad objectives.

1.3 North Slope Borough

The North Slope Borough is a municipal government including 95,000 square miles and eight communities across the northernmost part of Alaska. The NSB's Department of Wildlife Management (DWM) has a longstanding and close relationship with the communities, formed through decades of working with and for subsistence harvesters. The NSB DWM also has a long history of collaborating with BOEM through a variety of projects, including the Aerial Surveys for Arctic Marine Mammals (ASAMM), satellite-tagging bowhead whales, and a social indicators survey for creating a baseline against which to measure the impacts of offshore development.

The most recent census results put the population of the NSB at 9,503, the majority of whom are Iñupiat, an Indigenous group. The entirety of the NSB is located in the Arctic, which means that its residents face unique challenges around transportation, infrastructure, and other facets of daily life. Food security is a particularly important issue, where the transportation of groceries can only occur via air cargo and is dictated by the weather. Food security is one of the most important issues facing the North Slope communities; however, the focus is not merely on the high cost of transportation (e.g., the cost of fuel and transportation devices such as boats or snowmachines) but on the continuation of higher order concerns such as food sovereignty, the ability for a community to choose to eat traditional foods. The consumption of traditional foods is linked to a reduced risk of diabetes and cardiovascular disease. Furthermore, because traditional foods are a central part of Iñupiat culture, TK is inherently tied to subsistence and food sovereignty (Egeland et al, 2021). The NSB DWM addresses food security and sovereignty by supporting and participating in the co-management of marine mammals under the Marine Mammal Protection Act and supports science-based advocacy of subsistence issues for other species in a variety of other forums, such as the State of Alaska Board of Game and the Migratory Bird Council.

1.4 Project Objectives

The successful application of TK in science that could be used to inform the decision-making processes requires intensive communication, cooperation, and collaboration among scientists, TK holders and local communities. Specific objectives of the cooperative agreement included:

1. Enhance TK authority and integration of TK with science by promoting its dissemination to external scientists through consistent methods and directly involving local subject matter experts. The communities of immediate interest include: Barrow, Kaktovik, and Nuiqsut.
2. Provide a roster of ocean experts from North Slope communities grounded in TK for coordination and communication with BOEM-funded scientists (or possibly other researchers funded by another Federal agency) to access and integrate TK on a more systematic basis for projects undertaken on the North Slope. We will form a panel(s) of these local ocean experts to interact with scientists. The TK experts will receive an honorarium for their engagement. The panel, with support from the NSB DWM, will engage with scientists on specific topics.

3. Enhance dialogue through exchange of information between research scientists and local communities. Enhance our understanding of environmental change and other questions in the Alaskan Arctic.
4. Achieve more efficient scientific research timelines, as currently studies may be delayed more than a year seeking sanctioned TK counsel and approval from a community.

One additional objective of this project that we identified after hosting TK panels is the development of protocols and best-practices for holding TK panels. From the beginning, both BOEM and NSB DWM recognized the need to formalize the process by which TK panels are held and to describe what does and does not work. Hopefully, our lessons will lead to more successful TK panels in the future and better communication and inclusion of TK in general.

2 Methods

2.1 Selection of Panelists

We utilized the expert sampling method to find TK panelists, with NSB DWM employees as informants. Expert sampling is a form of purposive sampling, where subjects are selected based on their expert knowledge. In situations where participants are difficult to find, ‘snowball sampling’ is often useful. Snowball sampling uses a small pool of participants to find (recommend) other participants. We would have liked to better employ the snowball method; however, we did not have the time to sit down with each panel member to get recommendations, mainly due to the busy schedules of participants. We reached out to panel members via email or phone call initially, and then followed up via phone call or text. It may be useful to provide handouts in advance, as some panel members may prefer to read project descriptions before participating in a panel.

We attempted to involve community members without discriminating on basis of language (as many elder and some middle-aged community members learned English as a second language) or communication type, but ultimately chose panelists who we believed could communicate effectively with the researchers. We were also careful to choose participants who we believed would be vocal in a group setting and not hesitate to share their ideas, which may have excluded other individuals.

2.2 Visiting Scientists

The selection of visiting scientists was in large part determined by what research projects presented themselves. Upon agreeing to participate in a TK panel, visiting scientists were given a guidance document and were asked for presentations at least two weeks in advance (Appendix A). This allowed the moderators to preview the presentations in an attempt to help focus them appropriately (please note that only the title page and objectives of presentations are included in the appendices). Scientists were also presented with an agenda.

2.3 TK Panels

The first panel that we, the current PIs, hosted in Utqiagvik (in summer of 2022) was in the form of a focus group. Focus groups are moderated sessions that allow informal dialogue between members who all share something in common (in this case, Iñupiaq traditional knowledge).

Based on our experience with the first panel, we designed the August 2023 panel to function as a semi-structured interview. The semi-structured interview method is more formal than the focus group: a moderator asks the participants a series of pre-determined questions but allows for diversions when relevant but unexpected ideas arise. We hoped that a more structured format would encourage panel members to provide specific recommendations to the presenter. While the conversation had more direction this time, it still regularly diverged from the main topic.

Each TK panel began with the PI and Co PI providing background on the TK panel cooperative agreement between BOEM and NSB DWM. Then all of the attendees introduced themselves, and the researcher presented their work (in some cases using slides), allowing panel members and the PIs to ask clarifying questions. The PIs also asked pre-determined questions of the panel members during the presentation. The conversations were recorded on a digital recorder and later transcribed. The PIs also took notes during the conversation. In most cases, lunch was provided, during which more informal dialogue occurred. We also used the participant observation method, especially during times of informal conversation (i.e., during lunch). Participant observation is simply the practice of observing and taking notes on participant behavior. Sometimes this can elicit more layered and complex information than the interpretation of dialogue alone. At the end of panel sessions, we inquired what the panel thought of the process.

2.4 Post-panel Activities

After each TK panel was complete, NSB DWM staff discussed how well we perceived the panel worked or needed improvement. For panels held in Utqiagvik (i.e., the panels we were directly involved with), we held post-panel interviews with visiting scientists to determine what their impressions of the panel were, if they thought the panel was successful and worth their time, and how they thought the panel could be improved.

3 Results

3.1 Panel #1; Dr. Kenneth Dunton, 4 February 2020, Kaktovik, AK

3.1.1 Proposed Study

The TK panel held on 4 February 2020 in Kaktovik was an introductory panel. The plan was for Dr. Kenneth Dunton from the University of Texas to discuss the Beaufort Lagoon Ecosystems (BLE) Long-Term Ecological Research (LTER) project.

3.1.2 Panel Participants

This panel consisted of three TK experts: Nora Jane Burns, Ian Kayotuk, and Eddie Rexford, Sr. Dr. Ken Dunton was the visiting scientist and also present were Jeffrey Brooks and John Primo of BOEM. Carla SimsKayotuk (PI, NSB DWM) moderated the panel.

3.1.3 Panel Description

This was an introductory panel. There were concerns that the panel was not advertised well-enough, and it was decided that there needed to be better communication with the Native Village of Kaktovik, the City of Kaktovik, and the Kaktovik Iñupiat Corporation. SimsKayotuk discussed consent forms and how panels would be selected in the future. The group review guidelines for panel members and understood it would be a living (changing) document (Appendix B).

3.1.4 Panel Recommendations

The panel recommended better communication with the Native Village Kaktovik, the City of Kaktovik, and the Kaktovik Iñupiat Corporation.

3.1.5 General Impressions

This was an introductory panel, and one of the panel members was concerned that the panel was not advertised well enough. Hence, this panel was a pilot and incomplete.

3.2 Panel #2; Dr. Kenneth Dunton, 27 April 2022, Kaktovik, AK

3.2.1 Proposed Study

Due to COVID-19 restrictions, this TK panel was held virtually on 27 April 2022, at which time Dr. Kenneth Dunton from the University of Texas discussed the Beaufort Lagoon Ecosystems (BLE) Long-Term Ecological Research (LTER) project (Appendices C and D). This is a long-term, ongoing project and was funded by NSF and being implemented.

3.2.2 Panel Participants

This panel consisted of four TK experts: Nora Jane Burns, Ian Kayotuk, Roy Akootchook Jr., and Sheldon Brower. Dr. Ken Dunton was accompanied by three graduate students, Sydney Wilkinson, Danny Fraser, and Kaylie Plumb. Carla SimsKayotuk (PI, NSB DWM) moderated the panel.

3.2.3 Panel Description

Information was exchanged that helped Dr. Dunton and his students improve their sampling, better understand the distribution of fishes, and improve upon the transfer of samples from Kaktovik to the University of Texas. Likewise, community members were intensely interested in what the scientists were learning about mercury in fishes and wanted to help make the projects successful.

3.2.4 Panel Recommendations

A follow-up, in-person meeting was scheduled for June 2022, but was canceled due to lingering COVID-19 travel restrictions. Project PI SimsKayotuk, who has since left the project, also distributed a newsletter to households in Kaktovik that described the BLE-LTER, aimed at raising community awareness (Appendix D).

3.2.5 General Impressions

As we, the current PIs, were not present, we cannot provide further observations or impressions of this panel. We have been unable to locate any notes taken during the panel.

3.3 Panel #3; Dr. Carin Ashjian and Dr. Kate Stafford, 25 August 2022, Utqiagvik, AK

3.3.1 Proposed Study

On 25 August 2022, a TK panel met in Utqiagvik to discuss two research projects by two separate researchers. First, Dr. Carin Ashjian spoke about her work on oceanographic conditions that can lead to the aggregation of zooplankton (mainly krill) northeast of Point Barrow, known as the “krill trap”. At the time, Dr. Ashjian’s project was funded by NSF and in its second year. The project was revisiting work that she had done in the past on the krill trap. The second project was that of Dr. Kate Stafford, who aims to examine baleen to determine broadly where bowhead whales feed and to examine hormones relating to stress and reproduction over time. This project builds from work done by others who determined that baleen holds a continuous record of biomarkers. For example, variation in $\delta^{13}\text{C}$ (an isotopic signature) values are caused by prey changes, and the values may describe the different locations of prey by whales traveling their migratory route. Funding for this research is being sought from the North Pacific Research Board (NPRB). As such, the TK panel had the opportunity to comment on two projects, each at different stages.

3.3.2 Panel Participants

The panel consisted of Charles Brower, Michael Quunig Donovan, Joseph Mello Leavitt, and Billy Adams. Two other panel members were scheduled but could not attend due to travel or family issues. Also in attendance were Taqulik Hepa (NSB DWM Director), Nicole Wojciechowski (NSB DWM Deputy Director), Andy VonDuyke (NSB DWM Biologist), Todd Sformo (NSB DWM Biologist), and Kayla Scheimreif (NSB DWM Biologist) (Appendix G).

3.3.3 Panel Description

The TK panel was useful, both for visiting scientists and community members. While there was much discussion on the studies that visiting scientists came to present, the conversation also often widely diverged (Appendices E-G). A theme that participants returned to multiple times was how to improve and maintain communication. TK panelists suggested that having more TK panels would be useful for the community; in fact, the TK panelists suggested that regular science meetings for the exchange of information would be useful for the community as well as visiting scientists. Interestingly, both visiting scientists and Traditional Knowledge holders admitted to being intimidated by each other.

The TK panel also expressed a desire to learn more about the effects of killer whales, a desire to have more multi-disciplinary studies (such as Bowhead Whale Feeding Ecology Study also known as BOWFEST), and a desire for both Dr. Ashjian’s and Dr. Stafford’s studies to consider why there were few bowheads near Point Barrow in 2019 (Appendix G).

3.3.4 Panel Recommendations

Based on the feedback of TK experts and researchers at the Utqiagvik TK panel, several research recommendations or specific questions related to research, as well as recommendations for outreach and engagement between researchers and traditional knowledge experts were identified.

Research recommendations included: monitoring of ice and currents north of Niqsiraq/Point Barrow; correlating days when many bowhead whales are harvested and seen with the corresponding environmental and oceanographic data for that day to investigate movement patterns; investigating the reason that some bowhead whales are infected with kidney worms and others are not; asking how

bowhead whales find krill; and asking why bowhead whales have recently been moving so close to shore during their fall migration near Wainwright.

Recommendations for outreach and collaboration included: improving and maintaining communication between community members and scientists; the formation of a centralized organization similar to the now defunct Barrow Arctic Science Consortium (BASC) for the purpose of sharing information with North Slope communities; increased collaboration between Alaska Native Organizations (ANOs) and researchers via a process where ANOs provide research priorities and work with researchers to address them; and the identification of local subject-matter experts who would be willing to advise research projects.

3.3.5 General Impressions

TK panel members found the panel worthwhile and wanted more opportunities to discuss projects with visiting scientists. Visiting scientists indicated that they both (Dr. Ashjian and Dr. Stafford) found the TK panels to be useful. Dr. Stafford appreciated hearing that the TK panel wanted her to examine changes in baleen stress hormones in relation to changes in winter sea ice during 2017-2019, the lack of bowheads at Barrow in 2019, and to years with lots of seismic activity. Because Dr. Stafford's study was in the planning stage, such comments were particularly useful.

Retrospectively, we, the PIs, felt that too many biologists were present, and that they may have been intimidating the TK participants or overwhelming the conversation. This opinion was also later expressed by Dr. Stafford. We, the PIs, also thought that these two visiting scientists were almost too well-suited for participation in TK panels; both scientists have worked in North Slope communities for many years and regularly discuss their projects with the Alaska Eskimo Whaling Commission, Barrow Whaling Captains Association (BWCA), or with whalers while they were doing work on the North Slope. While panel members appreciated discussions with Dr. Ashjian, we do not think interaction with the TK panel altered her study goals or interpretation.

We also felt that both presentations were too long, and this was likely one reason why the conversation quickly went off-script and became wide ranging (Appendices E and F).

3.4 Panel #4; Dr. Lara Horstmann, 8 August 2023, Utqiagvik, AK

3.4.1 Proposed Study

On 8 August 2023 in Utqiagvik, we hosted Dr. Lara Horstmann from University of Alaska Fairbanks (UAF). She presented on a proposed project that would examine environmental stress in pinnipeds, using morphological, physiological, and genetic indicators of stress in museum specimens and subsistence-harvested seals and walruses.

3.4.2 Panel Participants

Eight hunters and subsistence users were invited to participate as TK experts in the panel, of whom four attended: Lewis Brower, Frederick Brower, Ransom Rentenaar, and Charles Hopson. Also in attendance were John Citta (NSB DWM Senior Biologist/PI), Kayla Scheimreif (NSB DWM Biologist/Co PI), Todd Sformo (NSB DWM Biologist), Raphaela Stimmelmayer (NSB DWM Senior Biologist/Research Veterinarian), Lucy Leavitt (NSB DWM Subsistence Research Coordinator), and Frances Olemaun (NSB DWM Outreach Coordinator) (Appendices H-I).

Although we intended to not include as many scientists so as to have more balance in the room, it was important for both the PI and Co PI to join; Sformo was involved as an additional note-taker; and we brought Stimmelmayer in to answer the panel members' questions regarding animal and human health.

3.4.3 Panel Description

While both the TK experts and Dr. Horstmann expressed that they had enjoyed the process and learned from each other, we believe that this panel had more potential for useful exchange than actually occurred. This was due in large part to the style of the presentation, as well as the theme of the project.

We noted that Dr. Horstmann's presentation was organized like a scientific paper, starting with slides introducing the team members, then providing background or theoretical information, before moving on to methods, and finally describing exactly what was being proposed and implications of the research. One of the slides focused on the "One Health" concept, in which environmental, human, and animal health are all considered holistically. As one of the PIs described, this slide was "an open door to talk about trichinosis," which happened to be the primary concern of one of the panel members. Panel members were encouraged to ask questions of the presenter as they arose, so when general or broad-reaching topics such as One Health were presented, the discussion often took a detour. While interesting and edifying, these detours sometimes served to distract the group from what the researcher was proposing.

Repeatedly, we observed that the TK experts were more interested in practical matters (such as disease) than they were in the more abstracted benefits of the proposed work (e.g., lifetime integration of stress in seals and walruses).

We recorded this session, but the recording proved to be of low quality, and we were unable to produce a transcription of this TK panel.

3.4.4 Panel Recommendations

The proposed study integrates stress over very long or uncertain timescales (i.e., the lifetime of a seal) and the panel members had a hard time understanding how it related to specific events, such as seismic surveys. The panel expressed a desire for analyses capable of quantifying stress in pinnipeds that is acute and can be attributed to tangible environmental events. The panel also wanted more sampling local to Utqiagvik. Initially, the group discussed contracting the Native Village of Barrow (NVB) to help with seal sampling. However, it appears that we DWM will incorporate the collection of seal samples into our regular sampling program. After discussions between the DWM and the NVB, it was decided that having two distinct sampling programs would be confusing, so DWM will collaborate with Dr. Horstmann to collect samples.

3.4.5 General Impressions

The TK panel appreciated the opportunity to discuss the project with Dr. Horstmann and expressed a desire for more interactions such as these. Likewise, Dr. Horstmann found the TK panel to be useful as an avenue to collect more samples and for outreach.

We observed that the TK experts were more interested in practical matters (such as disease) than they were in the more abstracted benefits of the proposed work. And while this project was still in the proposal stage, it appeared to us that any change in direction that would arise as a result of the TK panel will be minimal. The researcher had already assembled team members who have very specific interests and skills sets, and the potential funder had already been identified. Although the researcher suggested that

examining metrics of stress that are more acute (rather than integrating stress over a lifetime) is interesting and possible, it seemed to us that this would require a separate project.

This panel generated much discussion among the PIs. We struggled with how “successful” and “worthwhile” this particular TK panel was. Interestingly, both the panel and the visiting scientist thought the panel was successful, even though we think it unlikely that the study will appreciably benefit from TK. The panel was successful at information exchange and did result in the researcher gaining access to more samples.

3.5 Panel #5; Dr. Kenneth Dunton, 10 August 2023, Kaktovik, AK

3.5.1 Proposed Study

Dr. Ken Dunton from the University of Texas held an impromptu TK panel in Kaktovik on 10 August 2023 where he discussed the Beaufort Lagoon Ecosystems (BLE) Long-Term Ecological Research (LTER) project. This is a long-term project with which the community of Kaktovik is very familiar. He focused on the June fish kill in Jago and Kaktovik Lagoons, changes in the timing and decline of Arctic Char harvests, and how to organize informal gatherings of local hunters and fishers with scientists to exchange information on the state of Arctic lagoons. This meeting only ran for about an hour, in contrast to other panels that could extend through the afternoon.

3.5.2 Panel Participants

Kayla Scheimreif (NSB DWM Biologist/Co PI) and Todd Sformo (NSB DWM Biologist) attended virtually and took notes. Unfortunately, due to technological difficulties, we were mostly unable to communicate with the group at Kaktovik. The former PI on this grant, Carla SimsKayotuk (who is no longer employed by NSB DWM), was also present and facilitated the meeting.

3.5.3 Panel Description

Interestingly, although Dunton did not provide background information on the TK panels, his project has been ongoing in the community for so long that there was no confusion within the group as to the focus of his research or why he was there meeting with them. As a result, the encounter felt more like a community meeting than a panel as conceived by this cooperative agreement, but this elicited useful dialogue about TK. We do not describe this panel in depth as it was unplanned, and we had limited opportunity to engage in the panel and study how it was organized and worked.

3.5.4 Panel Recommendations

No specific recommendations were derived from this panel.

3.5.5 General Impressions

Rather than beginning with a researcher presenting slides of data or the history of a project, this meeting centered around panel members sharing observations. In this way, the meeting was less about the project, and more about the community’s observations. Attending researchers then contributed by asking questions, asking about potential samples, and discussing what could be done next time and whether this would be helpful in answering questions that the community may have.

A few days after the panel concluded, we asked Dr. Dunton to share his impression of the meetings. He replied: “To me, this gathering should be an equal exchange of ideas and observations that stimulates

members of the local community to share their knowledge.” As the format of the Kaktovik meetings seemed to lead to a genuine and open exchange between science and TK, we hope that further TK panels will evolve similarly through long-term engagement between community members and scientists. For example, a researcher might say, “I have heard about some local observations on X, and I was wondering about doing research on this subject. Can you tell me more about X and I will ask questions to see if my research background and skills could do justice to this topic.”

3.6 Panel #6; Madison Kosma, 16 November 2023, Point Hope, AK

3.6.1 Proposed Study

The Inuvialuit-Iñupiat Beluga Whale Management Committee (I-I Committee) is concerned over the body condition of Eastern Beaufort Sea (EBS) stock belugas that are harvested off the Mackenzie Delta in summer. This stock of belugas overwinters in the Bering Sea and migrates to the Canadian Beaufort Sea with bowhead whales. The I-I Committee is working with the Department of Fisheries and Oceans Canada (DFO) to try and estimate an index of beluga body condition with a drone. The I-I Committee requested a study to quantify the body condition of EBS belugas as they leave the Bering Sea in spring, so they can determine if belugas are skinny at the beginning of their migration or are getting thin later in summer; the committee specifically requested a pilot project in Point Hope, where both EBS beluga and Bering-Chukchi-Beaufort (BCB) bowhead whales migrate in spring. Madison Kosma is considering graduate studies at Oregon State University (OSU) and has been doing trials estimating body condition of BCB bowhead whales at Utqiaġvik. Madison plans to collaborate with Dr. Kate Stafford at Oregon State University and Dr. Lars Beijder at the University of Hawaii, Manoa. Madison is willing to take this project if the whaling captains of Point Hope think the study is worthwhile and would be possible to accomplish at Point Hope in spring, and if the whaling captains are willing to help with planning.

We were excited about this TK panel, as working in Point Hope is unfamiliar to the visiting scientist (Madison Kosma) and the PIs (Scheimreif and Citta). Furthermore, this was the first study to go before a TK panel where the study would not be possible without local input. Additionally, because the project is not yet funded, the TK panel members would be allowed the opportunity to develop study objectives.

3.6.2 Panel Participants

Eleven whaling captains attended the panel, as well as the son of one of the captains. John Citta (NSB DWM Senior Biologist/PI) facilitated the meeting and Kayla Scheimreif (NSB DWM Biologist/Co PI) took minutes.

3.6.3 Panel Description

After arriving in Point Hope, we met with Mayor Tariek Oviok and set up for the meeting. Eleven whaling captains attended the panel. Madison Kosma presented on a proposed drone project to estimate beluga and bowhead whale body condition at Point Hope during the spring migration. The proposed research is to address a concern of Inuvialuit-Iñupiat (I-I) Beluga Whale Committee and the Department of Fisheries and Oceans (DFO); the Inuvialuit and DFO are concerned that Beaufort Sea stock belugas might be in poorer condition than they used to be. The I-I Committee and DFO would like to know the condition of Beaufort Sea stock belugas as they leave their wintering grounds in the Bering Sea and pass by Point Hope on their way to Canada. During the meeting, we also addressed the possibility of DWM going to Point Hope for harvest sampling in the spring. The whaling captains voted unanimously to approve spring harvest sampling and to pursue the drone project. Details of how to do the drone project will be decided by the Point Hope Whaling Captains over the next winter. (Appendices K and L).

3.6.4 Panel Recommendations

This panel resulted in the following recommendations for how the project could be implemented at Point Hope: 1) advice on how to access the ice edge; 2) hiring a local guide; 3) collecting supplemental data for the BCB bowhead survey; 4) locations to fly the drones. There was less discussion and feedback than expected at this TK panel than what we expected; we believe this was because the TK panel needed time to get to know the presenter and facilitators.

3.6.5 General Impressions

This TK panel was fundamentally different than prior panels DWM moderated in that we needed to establish trust prior to significant conversation or negotiations. Immediately prior to the presentation at the city office in Point Hope, we were told that another group of researchers had come to Point Hope the week prior with a proposed project to put temperature sensors in ice cellars. The hunters suspected that there was an ulterior motive and decided to not allow the research to occur. This conversation alerted us that establishing trust would be a significant task (and responsibility). In prior TK panels, panel members were experienced working with DWM and were familiar with our intentions and commitment. We (John and Kayla) only knew two of the TK panel members prior to this meeting, so trust had yet to be established.

Initially, Madison's presentation and John's questions were met with silence. This was new to us; at home in Utqiagvik, we were used to hunters sharing stories and asking questions. John suggested that Madison explain more about the project logistics and how she avoids disturbing animals when operating the drone. As Madison talked more about her experience operating drones in the Arctic, some of the hunters started to ask questions. They also began to share more of their own knowledge and observations of belugas. The meeting ended with the panel, representing the majority of whaling captains, voting unanimously to approve spring harvest sampling and to pursue the drone project. Hence, we were able to garner enough trust to see the project advance.

During this panel, it became clear how beneficial it is to have one facilitator delegated to running the meeting, and another facilitator to note-taking, with no additional scientists in the room. The meeting ran more smoothly and stayed on track, and we left with robust observations. This panel was also a good example of a concise and focused presentation; because Madison is relatively new to Arctic research and collaborating with hunters, we worked closely with her on developing the presentation.

3.7 Panel #7; Madison Kosma, 13 December 2023, Anchorage, AK

3.7.1 Proposed Study

This is the same proposed study that was introduced during Panel #7 at Point Hope (see section 3.6.1).

3.7.2 Panel Participants

The presentation was given on the day of the Eastern Bering Sea Workshop, so panel participants included all of the Alaska Beluga Whale Committee (ABWC) members from the Eastern Bering Sea region. This workshop is concerned with the management of Eastern Bering Sea (EBS) belugas. John Citta (NSB DWM Senior Biologist/PI) helped facilitate the presentation and Kayla Scheimreif (NSB DWM Biologist/Co PI) took minutes.

3.7.3 Panel Description

This panel occurred as a presentation during the Eastern Bering Sea Workshop of the ABWC's annual meeting. We saw this as an opportunity for Madison to present her proposal to hunters from several villages at once. We also value the ABWC's involvement and support, as the Alaskan counterpart to the I-I Committee, which initiated the conversation about drones and beluga body condition. Madison presented a slightly altered version of the slides she showed at Point Hope. Her presentation to the EBS Workshop included more information on her background and what types of studies can be done with drones. This presentation was a longer, more traditional, science presentation, which was appropriate because ABWC is composed of both subsistence hunters and scientists (i.e., scientists are full-members according to ABWC bylaws) and Madison's presentation had to cater to both groups. ABWC agreed to provide a letter of support for the overall work of using drones to assess body condition of beluga whales. They are specifically interested in how this work could help to assess body condition of the Eastern Bering Sea stock. Several hunters contributed ideas on locations and logistics for fieldwork (Appendix M).

3.7.4 Panel Recommendations

Much like the previous TK panel at Point Hope, this panel resulted in primarily logistical recommendations from hunters, including where to survey and how to access survey locations. We attributed this mostly to the fact that Madison's presentation occurred as part of an existing meeting, where the panel members had many issues to discuss.

3.7.5 General Impressions

Because the panel occurred during the ABWC meeting, there was more structure than during other TK panels. Although this led to less discussion, it was more focused. As ABWC delegates, the panel members are very comfortable with the format of presentations and question and answer sessions and may have less trepidation when addressing researchers. We also noticed that there was less of a back-and-forth between panel members, possibly because they are from different regions.

There were two large advantages to having the TK panel in conjunction with a larger and longer co-management meeting. First, Madison had the opportunity to discuss her project with interested panel members outside of her presentation. Madison had discussions on logistics and support with interested subsistence hunters during breaks and during the following day. This gave panel members time to consider her presentation and then discuss it over coffee or snacks during breaks. Second, it allowed Madison to focus her project on specific communities. There are over 20 communities that harvest belugas from the EBS stock; knowing which communities are interested and may have conditions agreeable to doing drone work is a monumental task. By presenting to all the communities at the same time, we saved considerable time and effort. Based upon these discussions, she was able to focus her project on two communities: Elim in the spring and Nome in the autumn. Although getting approval from ABWC is only the first step in the approval process, Madison now knows which communities to approach seeking approval from local governments and has at least one community member, the ABWC delegate, that is already in support of the proposed project.

4 Discussion and Conclusions

4.1 Engagement Between TK Experts and Scientists

We observed that projects varied greatly in the potential amount of engagement that they allowed TK panel members. This raises the important question of when it is appropriate to request that TK panel members invest time in a given project. Let us consider one example, the TK panel held on stress in pinnipeds which allowed little latitude for altering the design or temporal scale. The presenter was willing to consider different studies and wanted to cooperate with the panel members but had already organized a team of experts and written a final draft proposal. She expressed interest in modifying her proposal by studying stress as indexed by asymmetry in whisker growth of seals in the Utqiagvik area. However, we think this is not likely to occur as the researcher would have to write a new proposal, design a study, and obtain funding. Furthermore, panel members quickly focused on other ideas, leading us as the moderators to believe that panel members were not particularly interested in expanding the study. This may be because such an index of stress is somewhat theoretical. Panel members appeared to be more interested in practical issues such as animal and human health and disease (i.e., zoonotic diseases).

That some projects may not benefit from TK because they have limited latitude for change is of particular concern, because we focused on selecting projects that we thought would specifically benefit from TK panels. This is not to say that studies that had limited latitude for change by TK panel members were not popular. Panel members appreciated knowing what projects were being proposed and having the opportunity to discuss projects and share their own insight. On multiple occasions, panel members expressed that they would like to have more opportunities to discuss projects with scientists. In this way, all the TK panels were successful.

4.2 Who Benefits Most?

When considering how successful a particular TK panel was, we asked ourselves “who benefited the most from the TK panels?” Ideally, both TK panelists and visiting researchers would benefit equally. However, this is inherently a difficult question to answer as we represent only one side of the interaction. Here we attempt to examine how the TK panels benefitted the scientists, the TK panel members, and us, the moderators.

In the TK panels held to-date, there were few alterations or improvements of studies due to TK. However, scientists benefited greatly from discussing their ideas with local experts and were given the opportunity to gauge community support. Scientists also benefited by simply talking to panel members. Both panel members and scientists agreed that they were sometimes intimidated by each other, and that discussion helped to reduce this barrier. We even heard this from scientists who had spent their whole career working in the region, and from hunters who had grown up around visiting researchers. Scientists will most definitely advertise the fact that they participated in a TK panel when applying for funding. As such, participating in TK panels will help them accomplish their studies with funding agencies such as NSF and NPRB. Hence, scientists *always* benefited from participation in the TK panel process, even if the panel did not directly improve upon their research.

The benefit for TK panel members is less obvious. It is questionable whether most panels made studies more applicable to local communities. In general, scientists coming to the panels already had study ideas in mind and were understandably resistant to conducting entirely different studies. This is not to say that their studies had no value; rather, panel members were often interested in other topics. One complicating factor was that panel members have a culture of respectful listening and long consideration. As such, the

compressed format of the TK panel is at odds with consensus decision-making that is common in Iñupiaq culture. TK panels lasted from 1 to 4-6 hours at most, and this is likely not enough time to provide all the advice and input that is available from panel members. Ideally, multiple TK panels would be held during all phases of research for each project. Panel members expressed the general complaint that there are few opportunities to discuss studies with scientists; they appreciated participating in the panels and wanted more opportunities to do so. Hence, TK panel members generally felt that the panels were successful.

As the moderators, we sometimes thought that we learned more than the scientists or the panel members. We were able to assess which presentation styles worked well and which ones did not. Many of us report to Alaska Native Organization (ANO) co-management groups, such as the Alaska Eskimo Whaling Commission (AEWC) or the Alaska Beluga Whale Committee (ABWC). Our participation in the TK panels will help us convey information more effectively in the future. Finally, much like the scientists, we also benefited by strengthening our relationships with panel members. In other words, the TK panels provided more opportunities for the moderators to interact with persons we may not typically interact with on a daily basis.

4.3 Role of Moderators

The role of moderators cannot be emphasized enough. Moderators are needed to select TK panel members and organize the meetings; they are also needed to prepare scientists on what to expect and how to present to panel members. Ideally, moderators will review presentations ahead of time, to help scientists make presentations that are efficient and appropriate. Last, we found that almost all visiting scientists wanted moderators present, even when they were familiar with the community and the panel members themselves. The moderators provided emotional support and reassured visiting scientists that the panel members wanted to discuss their research with them and that conversations would be constructive. As mentioned in the Results (Section 3.3.3), visiting scientists were generally apprehensive and intimidated by panel members. Having moderators, who are also scientists, present, helped ease apprehensions.

Moderators are also needed to keep the presentation and discussion on topic. This is inherently difficult because moderators should also typically engage in respectful listening and not interrupt panel members. As such, digressions in the discussion are somewhat inevitable. A good moderator will find ways to steer the discussion back to the topic at hand.

One of the more important roles of moderators is to help clarify misunderstandings between visiting scientists and the panel members. Scientists often unwittingly use jargon that needs to be defined or promote ideas that are foreign to panel members. Moderators should also serve to keep the expectations of both the scientists and panel members realistic and clarify what a study can and cannot accomplish. For example, in one of the panels, moderators had to clarify that the metrics of stress presented could not single out specific stressful events, such as seismic surveys. While this was clear to the presenting scientist, it was not clear to panel members. The TK panel process would fail without dedicated moderators, and moderators should be consistent over time, so they can learn from their mistakes and make the process more successful.

Moderators, however, did not seem to be particularly helpful when conversation steered away from science and into creationism and divinity. In general, Iñupiat are deeply spiritual and tend to see an interconnected world, whereas scientists seeking funding tend to be reductive and prioritize physical and statistical evidence. Related to this, many Iñupiat do not believe that climate change is significantly related to human activity. These issues often result in scientists stumbling or remaining silent in

conversations during co-management meetings and other forums. Moderators need to do a better job at explaining this to visiting scientists so they can be prepared for such questions or concerns in advance.

In the future, one might try running a TK panel with two moderators: a researcher and a TK expert. However, we did find that panels stayed on topic better when only one person was designated as a moderator.

4.4 The Selection of Panel Members

The selection of panel members is critical for successful TK panels but is a difficult task. First, the people that know the most about the land are often out subsisting off of it. Many people are out camping, fishing, or hunting while panels are occurring. Other potential panel members also have jobs and find it difficult to take time off. Culture Camp, a youth camp for Iñupiaq skills and values, was occurring during the same month we scheduled Panel #4, and many of our invited panel members were involved in organizing this.

Second, some of the most knowledgeable people may not speak English well enough to communicate with scientists. Furthermore, some ideas may not translate well into English or vice-versa, creating barriers to communication that are difficult to surmount. As such, we tried to select panel members who we expected would engage with scientists; however, this effectively limits our pool of participants and largely filters out some of the more respected elders in our communities.

Third, because we asked department members and whaling captains for advice on panel members, our selection is inherently biased by the people we asked. We noticed that panels were often composed of friends or relatives of the people we asked for advice. This is not to suggest that our panel members were not appropriate, rather that the panel members could have come from a larger portion of the community if we asked more people for advice on who to invite as a panel member. This issue underscores the importance of developing a wide-ranging list of potential panel members. In the future, we recommend utilizing snowball sampling: asking for advice on panel members in multiple tiers, such that when a panel member is recommended, we specifically ask what panel members they recommend (Bernard, 2006). With that said, our selection of panel members was surely more wide-reaching than if scientists selected their own panel members.

4.5 Expectations of TK Panels

The original intent of developing a TK Panel process, taken from the Specific Objectives of the cooperative agreement (see Section 1.4) included:

1. Enhance TK authority and integration of TK with science by promoting its dissemination to external scientists through consistent methods and directly involving local subject matter experts. The communities of immediate interest include: Barrow, Kaktovik, and Nuiqsut.
2. Provide a roster of ocean experts from North Slope communities grounded in TK for coordination and communication with BOEM-funded scientists (or possibly other researchers funded by another Federal agency) to access and integrate TK on a more systematic basis for projects undertaken on the North Slope. We will form a panel(s) of these local ocean experts to interact with scientists. The TK experts will receive an honorarium for their engagement. The panel, with support from the NSB DWM, will engage with scientists on specific topics (Appendix J).
3. Enhance dialogue through exchange of information between research scientists and local communities. Enhance our understanding of environmental change and other questions in the Alaskan Arctic.

4. Achieve more efficient scientific research timelines, as currently studies may be delayed more than a year seeking sanctioned TK counsel and approval from a community.

We think it is debatable if most of the TK panels conducted to-date have greatly enhanced the “authority and integration” of TK in scientific studies (Objective 1). As stated above, it is debatable if most of the studies will actually incorporate TK in a meaningful fashion. Note that Ken Dutton’s work is an exception; he regularly meets with community members in Kaktovik and considers community concerns within his research. With that said, the process of participating in TK panels inherently elevates the “authority” of TK. This was obvious in that the visiting scientists genuinely wanted their projects to be looked upon favorably by the panel. Furthermore, scientists will likely advertise the fact that they participated in a TK panel when seeking funding and this elevates the authority of TK in the grant funding process.

We provided a roster of experts (Objective 2; Appendix J); however, we hope that better selection of TK panel members will expand the list. We emphasize that having someone listed in the roster does not mean they will be available or willing to participate in future panels.

The TK panels certainly enhanced dialog and information exchange (Objective 3); in fact, this is probably the greatest benefit of the TK panel process. Everyone involved, the panel members, the visiting scientists, and the moderators, appreciated the opportunity to increase dialog and exchange information. From that standpoint, the TK panels were very successful.

The TK panel process created a much more efficient research timeline for the proposed drone study (Objective 4; Sections 3.6 and 3.7). First, there was likely no alternative way (than a moderated TK panel) to secure project approval in Point Hope. We suspect that if the researcher had contacted Point Hope directly, they would have been denied due to there not being a pre-existing relationship and a lack of trust. The TK panel in Point Hope was particularly effective because the majority of whaling captains were panel members, and this allowed them to formally make decisions regarding the research. Second, having a TK panel at ABWC’s workshop for Eastern Bering Sea (EBS) belugas was highly efficient for determining if the drone project could be expanded to the EBS region (i.e., Norton Sound and the Yukon-Kuskokwim Delta, the summer range of EBS belugas). By having the TK panel at an ABWC meeting, the researcher had access to delegates from over 20 communities in the EBS region. This allowed the researcher to determine which communities could logistically support such a project and were likely to be interested, thereby saving time and effort. Having 20 separate community meetings would certainly be cost prohibitive. Furthermore, the researcher was able to secure a letter of support directly from ABWC for their project, both in the EBS region and more generally throughout Alaska. Hence, the researcher was able to secure a letter of support from the primary Alaska Native co-management organization and save valuable time in deciding what communities to focus upon.

With that said, it is unclear if TK panels achieved more efficient research timelines for the other studies considered in this report. This is mainly due to the fact that the Iñupiaq tradition of consensus-based decision-making does not allow the panel members to speak for their entire community. For example, if a project dealing with bowhead whales in Utqiagvik goes before a TK panel in Utqiagvik, the panel is restricted from approving that project by traditions of decision-making. Rather, the project will have to go before the Barrow Whaling Captains Association (BWCA) where all the whaling captains will make the decision together, by consensus. This is one reason why the TK panel in Point Hope was so effective; the panel was able to make decisions because it was composed of the majority of whaling captains in that community.

This is not to say that the other TK panels did not promote efficiency indirectly; TK panels allow for extended discussions that are not possible during formal meetings of the decision-making organization,

such as BWCA or AEWG, due to full agendas, and a number of TK panelists will also likely be members of the decision-making organization (e.g., some TK panelists will also likely be captains in BWCA or AEWG). Panelists will bring their knowledge of the proposed project to the decision-making organization and that organization will know if the TK panel approved of their project.

Regardless of the objectives, virtually all TK panel members and visiting scientists found the panels useful. The opportunity for community members (i.e., the panel members) and visiting scientists to get to know each other and discuss research projects is incredibly important. Furthermore, it is probably unrealistic to assume that having a scientist participate in a single TK panel will result in meaningful use of TK in their work. By the time scientists engage in the TK panel process, they already have an idea to pursue that includes the basic structure of their study, including the question, research team, and how they will fund it. Hence, the best time to incorporate TK is before the research idea is formed, which is much earlier than scientists can reasonably engage in the TK panel process.

Successful integration of TK into research programs is more likely to happen as scientists repeatedly engage with TK panels and local communities. As such, having repeated encounters between TK panelists and scientists will be useful. The panels held in Kaktovik by Dr. Kenneth Dunton are probably the most successful panels in terms of information exchange and addressing local concerns; Dr. Dunton has met with the local community in three formal panels and numerous other informal public meetings and has been successfully doing research in Kaktovik for over 20 years, by which he has established a relationship of trust. Likewise, the most successful scientists we know who collaborate with NSB (but are not part of the TK panel process) have been coming to the NSB for many years. These scientists typically have their own research projects which may or may not be of interest to the local community; however, they do provide information to the community, ask questions, and seek advice. As an example, Dr. Hans Thewissen comes to Utqiagvik to sample bowhead whales. One of his current projects studies the evolution of brain size in baleen whales; this project is generally not of interest to whalers. However, Dr. Thewissen shows hunters how to extract the ear bones of bowhead whales, which are kept by whaling captains as mementos of each hunt, gives talks on whale biology and ecology, and engages in student exchanges. While many of Dr. Thewissen's projects have not benefited from TK, others are directly driven by TK. For example, whalers maintain that bowhead whales have a sense of smell; this information led to Dr. Thewissen looking for and finding an olfactory bulb in the brain of a bowhead (Thewissen et al., 2011). Hence, TK panels are but a single conversation in what must be a long-term relationship. Expecting an individual TK panel to result in meaningful integration of TK is not realistic, nor should the outcome of single TK panels be a measure of success.

We also noted that while the research that was presented at these panels was meant to merely consider or incorporate TK, there also exists research that is driven by community members and their TK. While these TK panels did not pretend to be this latter type of research, we believe that community-driven research is worth explicit consideration for future TK panels. To have realistic expectations from TK panels, the role of community-driven research and how it relates to TK panels should be clarified prior to funding more panels.

4.6 Recommendations

The following recommendations are meant to make future TK panels more successful.

1. We recommend asking for advice on panel members via snowball sampling, such that when a panel member is recommended, we specifically ask that panel member who they recommend as additional panel members. More work needs to be done on the selection of panel members, especially to include elders and those who speak English as a second language.

2. Visiting scientists need to have presentation guidelines in advance (Appendix A).
3. Moderators need to have the presentations of scientists in advance, so moderators can ensure presentations are suitable for TK panels. Moderators need to be strict with this requirement; if scientists are unwilling to provide presentations in advance, moderators should consider canceling panel sessions. Moderators might also consider restricting the number of slides to a reasonable number, typically five or less, and have a whiteboard handy instead of a computer. Alternatively, the first panel meeting could be based on developing relationships and having conversations, rather than on focusing on a project presentation.
4. When selecting moderators, explore teaming a scientist with a subsistence resource specialist as co-moderators. This may further help bridge any communication gaps between visiting scientists and the TK panel and may also help build trust in some communities.
5. Having more than two moderators is unnecessary and potentially counter-productive. We found that having one moderator was useful for guiding and clarifying discussion and that another was useful for taking notes. However, having too many non-native moderators (or observing scientists) can easily shift the tone of the meeting away from TK. Our impression was that having too many non-native moderators and observers that were scientists made TK panelists less likely to participate in open discussion.
6. Have realistic expectations for individual TK panels. Not every project will be able to incorporate TK and the successful incorporation of TK may take time. Successful TK panels help build familiarity, relationships, and trust between visiting scientists and local communities. Recognize that these relationships are critical and perhaps more important than the project being initially proposed.
7. Schedule follow-up TK panels with the same scientists over time, as an initial requirement. TK panel members expressed a general complaint that they often did not know results of past studies; they wanted information to come back to their communities. Researchers need to keep in-contact with panel members as their studies advance and conclude. Likewise, we think that successfully incorporating TK into research takes multiple panels conducted over many years.
8. Involve scientists in the TK panel process early in their careers and in their research. The sooner that scientists become familiarized with consulting TK, the more that it will be incorporated into their methods. Team an early-career researcher with one who has successfully worked on the North Slope so that new researchers learn from experienced researchers. Additionally, if TK experts can have input into research before proposals are written, TK will be incorporated more fluidly. Indigenous experts must be involved at the earliest proposal development phases (Isaac, 2015; Brooks, 2022).
9. To have realistic expectations from TK panels, the role of community-driven research and how it relates to TK panels should be clarified prior to funding more panels. Community-driven research, where the research questions are locally generated to address local concerns, is fundamentally different than research driven by outside interests, which are more responsive to national policy and funding sources. Visiting scientists, moderators, and panelists struggled at times with how to align local questions and concerns with the questions that visiting scientists wanted to answer and could get funding to answer. Ideally, research projects can accommodate both local and national concerns. However, in-practice, this may not always be possible during individual projects. As such, this leaves us with the question of how best to accommodate local concerns and questions that are raised during TK panels. How to make research more responsive to community concerns will continue to be an issue and deserves more consideration. At this time, it is unclear if community-driven research fits within the TK panel framework or will need a separate framework to be successful.

10. Consider a multi-pronged approach of using TK panels in conjunction with co-management meetings or Alaska Native Organization (ANO) meetings. This is especially true for when researchers are in the initial stages of project design, as the determination of which communities to select for involvement may not be clear. ANO meetings will have delegates from multiple communities present, and a researcher may have the opportunity to interact and discuss project ideas important across entire regions. Furthermore, interaction with individual communities is more likely to be successful if those communities know that the researcher reached-out to the relevant ANO first.
11. Ensure long-term funding. Given the importance of building long-term relationships between scientists and local communities, and the realization that multiple TK panels are necessary to incorporate TK and bring information back into local communities, the TK panel process must be funded over long periods of time to be viable. While individual TK panels were useful, these long-term benefits (i.e., more trust, more incorporation of TK, ability to report back to local communities) require that TK panels be spread out over multiple years. Hence, if TK panels are going to be funded again, we recommend that they be funded for a time span no shorter than the typical duration of a research project (perhaps five to eight years).
12. Consider reassessing the objectives of this cooperative agreement. The original objectives are biased towards supporting scientists, and we think they could be reworked to better support Arctic Indigenous communities by centering TK. As an example, the objective to “achieve more efficient scientific research timelines, as currently studies may be delayed more than a year seeking sanctioned TK counsel and approval from a community” could be replaced with “achieve more efficient scientific research timelines to reduce time spent finding the right TK contacts, and to expedite the process of returning information to the community.” Ideally, the development of new or modified objectives would be done in consultation with Arctic communities.

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Appendix A

Guidance for researchers presenting at Traditional Knowledge Panels

Version 2

8 September 2023

Background: Traditional Knowledge (TK) panels were set up to allow researchers to present ideas to panels of local subsistence hunters who are experts on the biology and behavior of the species they harvest. Local subsistence hunters also have unique knowledge regarding project logistics and local environmental conditions, including how and where to collect samples, and how to make a project successful. Ideally, participating in TK panels makes projects more successful for visiting researchers because they receive local information and ideas for how to make the project work better or be more relevant. Participating in TK panels should also make the projects more relevant and useful to subsistence users because they have the opportunity to modify the study design or ask additional questions that are important to their communities.

Here we provide some guidance for researchers planning to present at a TK panel. Many of these recommendations are good practice for any public presentation; however, some of these topics are specific to Iñupiaq culture.

1. Do not have too many introductory slides. Scientists are used to having numerous introductory slides; however, this encourages tangential discussion, and it may be difficult to regain focus on your project.
2. We recommend having a project title with names and affiliations on the first slide and project goals on the second slide. Methods should follow shortly after.
3. Remember that some panel members may not have learned English as their first language and few panel members are highly experienced at interpreting graphical information. Explain all graphs and charts in detail. Clear communication is critical.
4. Do not use complex scientific jargon unless absolutely necessary (and it is almost never necessary). If you must use jargon, define it clearly.
5. Engage in ‘respectful listening’. It is considered rude to speak over someone who is speaking. Take the time to listen and consider words that are spoken. Sometimes thoughts that initially seem tangential are actually important.
6. In general, do not assume that you know what people think or how they feel about an issue (e.g., climate change, the loss of sea ice, etc.). We often hear local people say that they “do not want to be ‘saved’ by scientists.” Rather, ask panel members what they think and how they feel.

7. Expect digressions. The conversation will likely range far and wide, but often arrives at novel ideas that are useful for a project. Be patient.
8. Please be willing to consider additional hypotheses or study questions. If you are unwilling to make changes to the design or interpretation of your study, you are not fulfilling the goals of the TK panel.
9. Ask questions of panel members. Ask how they recommend improving the project, how they would recommend collecting data, and what they would do differently.
10. Decisions are often made by community consensus; panel members may not answer questions because they have an obligation to discuss questions with elders in their community. Getting approval or answers may take multiple visits.
11. Please provide your presentation to Kayla Scheimreif (kayla.scheimreif@north-slope.org) or John Citta (john.citta@north-slope.org) at least one week ahead of the TK panel so we can review your presentation and make suggestions. Everyone wants the TK panels to be successful and providing your presentation a week ahead helps us prepare presenters for a successful panel meeting.
12. *Relax and have fun!* In our experience, TK panel members want to learn about science, share their perspectives, and be involved. If you are willing to listen and are open to considering new ideas, the panel will be both educational and enjoyable.

Appendix B

Traditional Knowledge Panel-Kaktovik

Nearshore Ecology of the Eastern Beaufort Sea, Alaska

4 February 2020

9-9:15a

Introductions:

Carla SimsKayotuk, NSB Wildlife Department

Jeffrey Brooks, BOEM

John Primo, BOEM

Nora Jane Burns, Interim TK Panel

Ian Kayotuk, Interim TK Panel

Ken Dunton, Beaufort Lagoon Ecosystems, University of Texas

Eddie Rexford Sr., Native Village of Kaktovik (NVK)

9:15-9:30

Background:

Eddie Rexford Sr. had some concerns about the meeting not being properly advertised and the NVK not being in the loop especially as BOEM is to have a government to government relationship with NVK. Carla SimsKayotuk explained that Robert Suydam would be coming in a month or 2 to present the panel and project to the 3 entities for final approval and suggestions on the panel selection. Jeffrey Brooks of BOEM provided additional explanation about the panel.

Rexford expressed his strong feelings that the Tribes jurisdiction and protection of intellectual property was being taken advantage of and that with the North Slope Borough being involved, an effort was needed to make sure that all the appropriate entities in Kaktovik were involved. Rexford was concerned that the panel was being held in secret and that the NVK should be involved in choosing who was on the panel representing Kaktovik. The discussion was tense, but apologies were said, and the meeting continued.

Dunton remembered that about 2 years ago or so that there was a formal presentation in Kaktovik and there was a huge turn out where Qaiyaan Harcharek with NSB Wildlife called in via teleconference. Even though the TK Panel met with Dunton a couple of times no one was compensated, and the panel discussions were very informal, more like an interim panel. We discussed ways to move forward and how to come back and communicate with the NVK, the City of Kaktovik and the Kaktovik Iñupiat Corporation.

9:30-9:45 Consent Form

The consent form was handed out to the TK Panel members. The form was reviewed, and two members signed the form.

9:45-10:00 Process for Selection of Panel Members

BOEM met with Suydam at AMSS before the trip; he indicated the NSB in Kaktovik was planning on having the panel. Before the trip Jeff Brooks called and wrote an email to the NVK office. There was no response from the NVK office because the heat was not working, and everyone was on leave.

SimsKayotuk went over how the members who now serving were selected and how others were asked to be on the panel but could not attend the meeting due to other things that came up last minute. She also explained that the plan all long was to get guidance from NVK and the City council when Suydam came to meet with them. With Rexford's concerns we also discussed as a group about making the TK Panel more informal and just calling on individuals when needed. But all agreed that there needed to be input from the three Kaktovik entities. Dunton suggested that Suydam and BOEM maybe come up with what constitutes a TK panel, should consist of the breakdown of percent of women, men, younger generation, older generation, hunters, a balance and not a political stature. Some guidelines need to be set on the selection. Jeff discussed the scope of the project and how it should have gone. He felt maybe we skipped a step. SimsKayotuk said that she disagreed that it was okay for us to meet as an interim panel and maybe we should have refreshed their memory of the project.

Jeff went on to explain that this is a pilot project and BOEM is excited for this project to be a success and that this will help in setting this up in two other communities pairing up TK panels with scientists and their projects.

10:00-10:45 Draft Guidelines for Panel Members

The group looked over the guideline and thought it looked good and had no suggestions for changes and understood that it is a growing changing document.

10:45-11:00 Break

11:00-11:30 Draft Guidelines for External Scientists

The group looked over the guideline and thought it looked good and had no suggestions for changes and understood that it is a growing changing document.

11:30-Noon Nearshore Ecology of the Eastern Beaufort Sea, Background

Dunton briefly went over the project as all of us in attendance had already been involved in the project. He told us of what they found and saw this last summer and what was coming up.

1:30-4:00 Discussion about Project and Questions from Dunton

It was agreed that the NSB Wildlife needed to come and meet with the 3 entities and figure out a way to select the panel members before this meeting.

4:00-4:30 Next meeting? Interest in visiting study sites?

It was agreed that setting the next meeting would wait until the NSB Wildlife met with the entities in Kaktovik. Dunton expressed his interest in being here in Kaktovik when Suydam comes for this meeting.

Appendix C

AGENDA

TRADITIONAL KNOWLEDGE PANEL - KAKTOVIK NEARSHORE ECOLOGY OF THE EASTERN BEAUFORT SEA, ALASKA

APRIL 27, 2022

5PM at the Teleconference Building

1. Introductions
2. Background
3. Consent forms for TK panel members
4. Guidelines for TK Panel Members
5. Nearshore Ecology of the Eastern Beaufort Sea-Background by Dr Ken Dunton
6. Poster Presentation of the Kaktovik Lagoon Food Web by University Students Danny Fraser and Kaylie Plumb
7. TK Panel members: Share experiences of: 1. Fishing 2. Ocean currents 3. Ice movement behavior 4. Marine mammals 5. Sea birds and waterfowl 6. Sea - run-fish 7. Terrestrial species and 8. Nearshore ecology
8. Set time for next meeting
9. TK Panel members fill out forms if more time is needed.

Appendix C (Continued)

MINUTES

Traditional Knowledge Panel - Kaktovik and Nearshore Ecology of the Eastern Beaufort Sea
Alaska - Beaufort Lagoon Ecosystems, University of Texas

April 27, 2022

Meeting started at 5:15pm; Invocation by Nora Jane Burns

1. Introductions: TK Panel Members: Nora Jane Burns, Ian Kayotuk, Roy Akootchook Jr., Sheldon Brower; Beaufort Lagoon Ecosystems: Dr Ken Dunton, Students: Sydney Wilkinson, Danny Fraser, Kaylie Plumb; NSB DWM: Carla Sims Kayotuk
2. Carla gave a brief background of the BOEM cooperative agreement project. Its goal is to better integrate the traditional/indigenous knowledge with science.
3. Guidelines for TK members: Handed out before the meeting. Brief explanation given.
4. Ken gave a brief explanation of the project which is funded by National Science Foundation. He is happy to have more members on the TK panel and looks forward to learning and working with them to collect data.
5. Presentations from the students: Danny focused on the Arctic Lagoon Benthos giving comparisons between the Kaktovik and Jago Lagoons. Shallow areas of both lagoons are the same, but the deeper areas are not. Roy Jr asked if there could be pictures and a list of Iñupiaq names alongside the English ones so they could understand what they are talking about. Nora Jane asked if the fresh water coming out from the rivers would have an effect on the invertebrates. Discussions of what other new things are being seen and caught in nets. Roy wondered if we would be able to catch crab out in the ocean. Discussion of where flounders have been caught.
6. Sydney's presentation focuses on "Resource use by Arctic Fishes Across Beaufort Sea, all lagoons" comparing fishes that differ in resource use. She found that there are differences in lifestyles of the fishes. This was a collaborative project with the NSB and other people like Carla and Nora Jane. She is looking to collecting more fish of the same size. Sheldon had a question on the arctic cisco, the ones at Griffin Point were bigger and had more fat content than what they catch here on the island. Ken wonders if that was a place for younger fish living in a protected area. Ken thinks Venessa would have a better answer.
7. Roy wonders if it is because the land is changing. Discussion of how it has really changed due to erosion. Sheldon brought up saffron cod and how there are lots of them and not so much tom cod. Roy brought up how they eat around ice bergs, and we don't have that anymore, it's all young ice chunks that come to shore. Discussion of parents fishing them. The discussion moved on to us starting to catch salmon, how some are ordering bigger mesh nets. Ken informed everyone of a paper telling of the first documentation of chum salmon spawning in the Beaufort Sea and was caught here in the Kaktovik lagoon. This fish was caught in 2017.

Salmon is now documented to be overwintering here. TK panel had some other questions and Venessa would be a better person to ask these questions and should be invited to our next meeting. Discussion of the different fishes the TK panel members are now catching and where they were normally caught or seen.

8. Ken brings up mercury being seen in saffron cod and four horn sculpin and wonders why we are not seeing it in the arctic cisco. They would like to sample arctic char and flounders.
9. Discussion of what could be causing this. There is another person from Ken's university who is writing a grant to study this more in depth. They would like more fish early in the season so they can test them. Carla brought up how she thinks the fish are running earlier as we are not catching arctic char with our rod and reels like we use to at the end of June beginning of July. Danny asked if they should be collecting sediment samples too.
10. Discussion continues of what fish is coming down the rivers and where we catch certain fish. Nora Jane brought up the big book that documented the elder's stories and would be a good source to get information. Roy wants to find out where the mercury [is coming from].
11. Discussion on how to collect the samples and how to get them to Sydney. The next meeting will be scheduled for when Ken and his group will be here in 3rd to 4th week of June 2022.

Appendix D. Beaufort Lagoon Ecosystem Newsletter

Appendix D

The Lagoon Exchange:

Kaktovik Community Information 4th Annual Newsletter – Winter/Spring 2022



Beaufort Lagoon Ecosystems (BLE)

Long-Term Ecological Research (LTER)

Connecting with Arctic coastal ecosystem in transition since 2018

Greetings, Kaktovik!

Last year the COVID-19 pandemic forced us to again cancel the 2021 Kaktovik Oceanography Program. While we really miss visiting Kaktovik and interacting with the students, we also understand the importance of preventing the spread of COVID-19 and especially protecting elders. We will continue to work with leaders in Kaktovik to determine when it is safe for us to return to work with you all.

Last August a small group of five BLE LTER researchers were granted permission to travel to Kaktovik and Jago Lagoons in our research boat. Camping on the boat let us continue our long-term studies without adding COVID risk to the community. We were very appreciative. Thank you!



Who are we?

We are a team of scientists from universities across the US and Canada, many of whom have worked in the Arctic for decades. We wish to exchange information on coastal ecosystems with you, address issues of local concern, and provide the children of Kaktovik with educational and field research opportunities. Other scientists across the world are interested in this research. We share with them that this science is happening from the traditional lands of the Inupiat where people maintain a rich subsistence and cultural connection to their environment.

Schoolyard Program

Since we are unable to spend time with the students at HKS, the BLE has developed an alternative to our “Schoolyard” program started last year. Interested teachers are encouraged to contact us!

Topics by grade level:

ECE: Amazing Invertebrates

1st – 2nd: Owls & Owl Pellets

3rd – 5th: Alaska’s Invertebrates

Middle School: Coastal erosion, owls, and invertebrates

High School: Microbes & DNA extraction

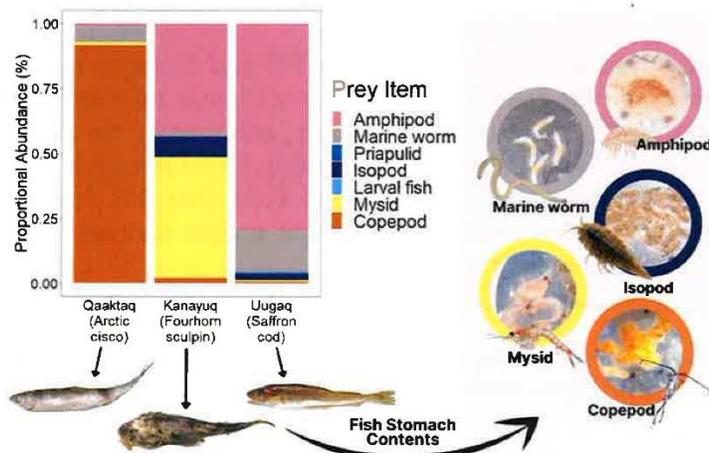


Kaktovik Science in the Spotlight!

A central focus of our shared research is understanding food webs, or put another way, figuring out “who eats who?”. Kaktovik fishers have expressed concern about warming temperatures and reduced sea ice on their fishery harvests, a key part of subsistence. The links between fish and their prey is the focus of Sydney Wilkinson’s research as a college student at the University of Alaska Fairbanks. Sydney wants to understand how the diets of fishes are different even when they all live together in the same lagoons.



Based on stomach contents of fish collected by residents of Kaktovik and Utqiagvik, Sydney found that Arctic cisco had a diet of small invertebrates from both freshwater and marine environments, especially copepods, which swim in the water. In contrast, Fourhorn sculpin and Saffron cod eat strictly marine prey, including amphipods and mysids, which live on the seafloor. Because Kaktovik fishers have shared their concerns about mercury, we are also measuring mercury levels to find out if the levels are concerning and if diet differences across fishes are linked to mercury levels. More to come this spring!



Marine worms (polychaetes) and crustaceans, including amphipods, isopods, mysids and copepods are the most common food items of fish in the lagoons.

We thank Carla SimsKayotuk, Nora Jane Burns, Todd Sformo, Trent Sutton, and Vanessa von Biela for fish collections across the Beaufort Sea coast for food web studies. We are working in cooperation with the Kaktovik Traditional Knowledge Panel, the Kaktovik Inupiat Corporation (KIC), the Ukpeaġvik Inupiat Corporation (UIC), the North Slope Borough School District (NSBSD), the US Geological Survey (USGS), the Bureau of Ocean Energy Management (BOEM), and the United States Fish and Wildlife Service (USFWS). The National Science Foundation (NSF) funds our research. For questions contact Nathan McTigue at mctigue@utexas.edu.

Appendix E. Ashjian presentation, 25 August 2022.

Got Krill? Thirteen years (and counting) of exploring the Barrow/Utqiagvik bowhead whale feeding hotspot



Carin Ashjian, Bob Campbell, Steve Okkonen, Phil Alatalo, Craig George, Kate Stafford



How it all began

It all began in May 1997 at a workshop in Virginia Beach, VA when Sue Moore and Ev Sherr came up with the idea that Carin would lead a program to investigate (drum roll):

Why do bowhead whales stop near Pt. Barrow each year during their fall migration?

Research Questions

- Do bowhead whales stop at Pt. Barrow because they can find dense patches of their krill prey?
- How do these patches form?
- How do the ocean conditions, and amount of whale prey, vary between years?
- How might climate variability change this?

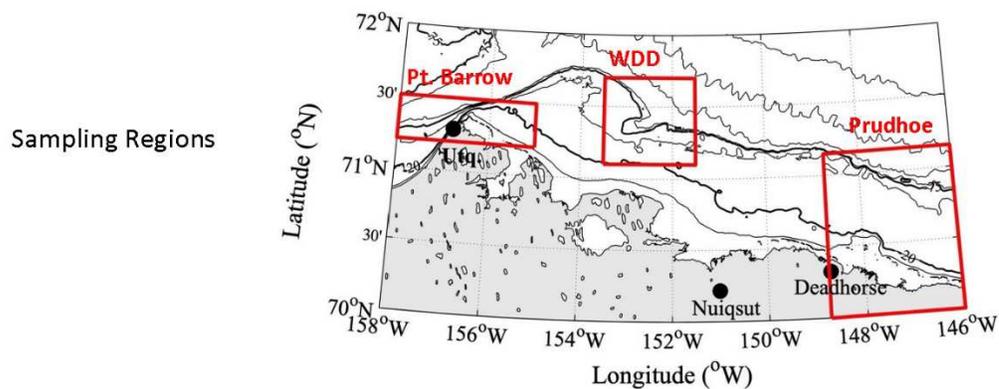
Our Present Project

- In July of last year (2021) we were funded by BOEM to study if there have been changes in the availability of krill that could affect bowhead whale migration and distribution pattern
- BOEM needs this information to responsibly manage environmental impacts on human, marine, and coastal environments in regions where offshore energy and marine mineral resource development may occur.

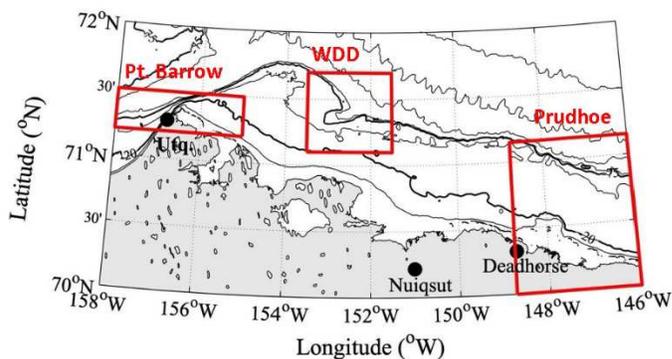


Research Goals

- Renew sampling near Pt. Barrow to understand year-to-year changes in bowhead whale prey, and thus whale presence, during this period of environmental change
- Expand sampling further to the east and in a Beaufort shelf-break depression (WDD) to better understand how physical processes impact whale prey distributions on the Beaufort Shelf



What will this tell us?



R/V Annika Marie (43' Long)

- Supply (size, numbers) of krill near Pt. Barrow
- Wind-driven availability of krill (KRILL TRAP) on the shelf east of Pt. Barrow
- Supply of whale prey (plankton) to Central Beaufort
- Wind-driven availability of plankton for efficient whale foraging near Stefansson Sound

Are there additional questions that you would like to see us study?

Do you have information on where bowheads congregate on the Beaufort Shelf to the east of Pt. Barrow?

For fall whaling, do you think that there has been a change in the amount or type of prey in the whales' stomachs?

If there was a lot more ice east of Pt. Barrow in fall, were the whale stomachs still full? And were the whales still feeding when you were hunting them?

Did your parents or grandparents tell you anything about the whale stomachs from the times before Craig George?

Appendix F. Stafford presentation, 25 August 2022



Can baleen be used to look at changes where bowheads eat, and changes in stress and sex hormones in bowheads?

Clarissa
Texeira



Kate
Stafford

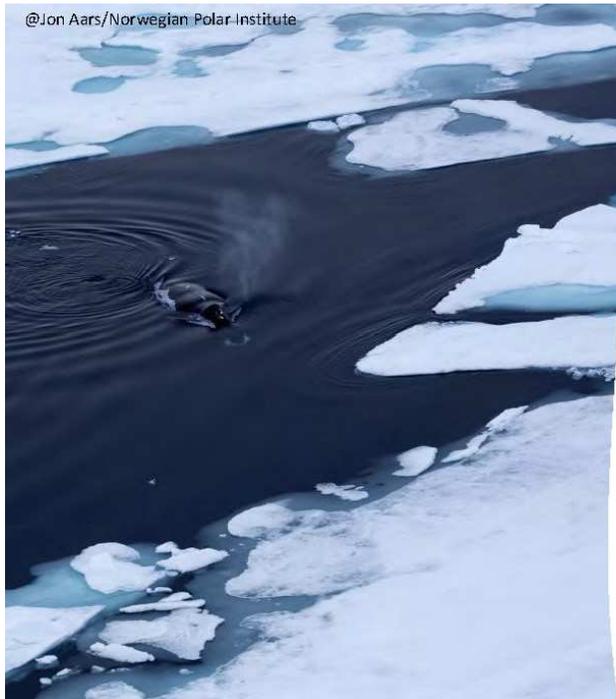


Kathleen
Hunt



John Citta Raphaela
 Stimmelmayer

@Jon Aars/Norwegian Polar Institute



Have recent warm ocean conditions (especially 2017-2019) shifted Bowhead whales' winter range and timing of migration?

Can we see evidence of changes in pregnancy and/or stress over time in large adults?

Information from baleen from subsistence harvested animals may help answer some of these questions

What we'd like to do



Use archived baleen taken from large adult whales during subsistence harvests from 2011-present to study 1) long-term patterns in bowhead whale hormones (sex and stress)
2) Carbon and Nitrogen values to tell us when and where bowheads eat

Questions

- Is this useful?
- Are there questions that can be answered in the baleen that are of higher priority?
 - Hormones
 - Female calving interval
 - Male maturity
 - Stress
 - Noise
 - Entanglement
 - Killer whale rake marks



Questions

- **Stable isotopes**
 - Is the food bowheads are eating changing?
 - Is the food found in different areas?
 - Are bowheads spending more time in the year in the Beaufort Sea or the Bering Sea?
- **What are your concerns for bowhead feeding and health?**
 - How can these be addressed?

What are changes that you have seen that we could try to answer with baleen?



Appendix G. Transcript/Notes from Panel #3

TK Panel

August 25, 2022 NSB DWM Conf. Room

TK Panel

August 25, 2022 NSB DWM Conference Room

Present: 4 Panel Members, Carin Ashjian, Kate Stafford, Taqulik Hepa, Nicole Wojciechowski, Andrew VonDuyke, Todd Sformo, Kayla Scheimreif

[Introductions. I didn't have a recording for the first part of the conversation – so notes are sparse.]

Panel Member 1: I'd like to know what's going on at the northern end of the point? What is happening with ice and currents?

Panel Member 2: There's changes with killer whales and other changes happening. We're later than we need to be with killer whale research especially. We need more input from elders on what changes have been occurring.

Panel Member 3: We already have a lot of TK documented, but we need more collaboration between people like Braund and oceanographers.

Panel Member 4: DWM could visit elders in their homes, and record and archive their knowledge. You could revive Saturday talks that Barrow Arctic Science Consortium (BASC) did; you could host a "men's night" where you would provide a different topic from scientists to discuss and provide feedback on.

Carin: NSF used to have Arctic-wide meetings; that's where I met Glenn and Ann and how I got started doing research here. We need those kinds of on-the-ground connections between scientists and locals. BOEM might be willing to fund a similar incubation project.

Nicole: NSF has tried to create Arctic hubs – could we write a letter to NSF/BOEM to create something like BASC that would be staffed by local people?

Panel Member 1: How do bowheads know where the krill are?

When there's east wind in the fall, ice gets packed up on the east side, and whales come in. If there's ice, they follow the ice, if not, they follow the islands, but only if there's snow. If there's no snow, then they're way far out.

Taqulik: We need locals organizing and coordinating the science – UIC Science staff all live in Fairbanks and Anchorage. There's a disconnect.

Panel Member 4: Now in Wainwright they're getting bowheads on the beach – why? What changed?

Kate: Orange blubber translates to more copepod consumption. Does higher copepod consumption mean that whales are more likely to get pregnant (thus the association between orange blubber and pregnancy)? [copepods have more oil than krill]

Panel Member 4: Is Harmful Algal Bloom (HABs) worse here? Was the anomalous event in 2019 due to no cold water moving north meaning no krill? Could we use drones during a krill trap? Could we look at good whaling days (where lots of whales were observed) in comparison to krill trap conditions that have been recorded?

Carin: We get out of here before Cross Island whaling starts, so I'd like to ask the people there about where they think whales concentrate. Last year we learned that when the ice retreat is late the krill are bigger (we saw larger and older krill). There was a big storm on September 5 last year, then it was calm the next day, and those are perfect krill trap conditions. We went out and saw hundreds of bowheads on the shelf. We saw more krill last year than we had previously, and lots of humpbacks.

Panel Member 4: Five bowheads were landed last year on the last day of whaling. It was snowing like crazy, but you could immediately see sixty blows once we got past Plover Point. It was snowing so hard that you could only see the footprint of the whale we were following. There must have been hundreds of whales. James Pebley and Ned Arey harpooned whales within twenty minutes of being out there. Then we were on the phone with Wainwright to get three more strikes transferred, and we used those strikes too. All of those whales were harvested within six miles of the Point. I don't think I've seen it like that since BOWFEST. I had sixty blows in one picture or something like that. They were within four hundred yards of the beach. It would be interesting to know the weather patterns for that day.

Carin: If you find out what day it was, we can get you the information we have.

Panel Member 4: And one time Panel Member 3 was in the front of my boat, and we were going out to Cooper Island (we knew whales were there). Even before we rounded the tip of the islands - we were still in Elson Lagoon - we were chasing a whale. It was dark out. It was super windy and rough. So I'd like to know about the weather from last year - what caused the whales to be near shore. And also about the different pushes of the migration too, you know, sometimes you see the injutuks at a certain time. We might see only 10 or 15 and then later a whole big pod comes through.

Panel Member 3: I couldn't harpoon it that time because I was on the wrong side. It was a rainy day. We lost the whale because it went into the rough.

Kate: We have to go back and like Panel Member 2 said, talk to people's grandparents. Because things have obviously changed, but the whales are still coming.

Panel Member 4: The first year I was a captain in fall 2016, when I caught my whale ice was jam packed on the west side, and it opened enough just enough so I could tow my whale in.

Taqulik: It could be good to have a post-season debriefing between the whalers and scientists to compare what everyone saw.

Panel Member 1: What do they call those currents - we saw one maybe nine miles NE of the Point - we thought it was from the Canyon - it wasn't rolling like waves. It was clear on one side, and then when we got closer, we could see the water coming up.

Carin: My guess is that it's the Alaska Coastal Current. Maybe the wind was coming from the opposite direction?

Panel Member 1: There was no wind. We tried to go inside to chase the whales, but it was too dangerous to chase the whales there.

Panel Member 3: We did that too.

Panel Member 1: Yeah, it's scary. The Eskimos know they're there – we call them uigaaks.

Carin: We heard of something called the Hell Hole. It was like a circle of currents. Some weird stuff happens in the Canyon.

Panel Member 1: It was water going up like this, a ball here, and another ball coming up over here, just all over the place. We never caught the whale. Some of the whales actually went across it and went on the clear side across from the current. I think someone actually ended up getting a whale on the other side. I was talking to some people in Canada, and they have a name for it, it happens over there.

Kate: I wonder if it's from melt water? Like it makes the water really clear?

Carin: Or an internal wave? It's like a vertical current.

Panel Member 3: Almost like a wall, right?

Panel Member 1: Exactly. And when the old people are talking about that current, they say you can actually go around it, so you don't have to go through.

Carin: We'll ask Steve because we're not physical oceanographers. I wonder if it has something to do with the location relative to the topography.

Panel Member 1: I've only seen that once though. They say there's three of them. If you go further out and further out, you'll find three of them.

Panel Member 3: Once we found a dead spot where there was lots of trash. Pallets and stuff.

Kate: Maybe a spot where two currents come together.

Carin: There are little eddies you can see on some satellite images from a good clear day. You can see the swirls of sea ice.

Panel Member 1: Another question I have, is where is all this information going to be piled up? Everyone ends up doing the same research over and over.

Carin: We write papers, which is not going to be very helpful to most people, probably. We do try to come back and tell you what we find. Most data are archived in the Arctic Dataset, it's publicly available. It's in Santa Barbara

Kayla: Panel Member 1, is there something that you think would be helpful in terms of outreach?

Panel Member 1: Like I said earlier, I want to know what's happening north of the Point. When the heavier ice is going to come in.

Kate: Would a Beaufort-side sea ice radar be helpful? We can talk to Seth Danielson at UAF and see if that's something he can set up.

Panel Member 1: Yeah, we need to know what's going on out there. I don't see the sea ice miraging anymore. I barely see any heavier ice miraging out there anymore. You used to be able to tell if you look at the Point when its miraging, you can tell if the channel is skinny or if it's going to hit. You look at the color of the ice. The younger ice doesn't like to mirage over the horizon. Only the heavier ice mirages over the horizon. Usually 35 miles out you hit heavier ice.

Kate: We saw some funny mirages out there with three reflections of ice in the sky.

Panel Member 1: The current is something that needs more understanding. There's easier ways to do it but people have to do it all the time, like a sounding line. When I'm in doubt – that's what your sounding line is for. That's very important. Even seal hunters check on the current.

Panel Member 4: That's something that my uncle Chris – because he's our utuqqanaaq (elder)... he's always got a rope with a shackle. He'll even leave it out.

Panel Member 1: I always ask for a tight gauge, but they never got me one.

Carin: I think Steve had one in Elson, back in 2006.

Panel Member 1: I think I saw that, ASRC gave us a GPS and it had some data in there, I think it was from the tight gauge.

Panel Member 3: We deployed like sixteen drifters here. One – volleyball sized – had a sail. The other one didn't have a sail; it was the size of a medicine ball. We did that here, at Point Lay, Wainwright, and Kaktovik. That was a long time ago.

Carin: Yeah, I think that was when we were working here last time.

Taqulik: That was funded by Shell.

Andy: Leandra had animations of those drifters. I animated some tagged seals – it would be great to overlay the two – the patterns look very similar. We could do this with bowheads too.

Panel Member 3: The villages are looking forward to doing something like that.

Carin: So there were no bowheads tagged in 2019? It would have been really cool to see where a bowhead tagged in Kaktovik, for example, would have gone that year.

Panel Member 3: The whalers wanted to put some tags on.

Panel Member 4: It's funny that the guys who were so against tagging were the ones who wanted to tag.
Kate: I guess it shows we can all learn and adapt.

Taqulik: Trying to figure out 2019 is so important, because that was also the year that our Canadian colleagues tagged belugas and more than half of them passed within a couple of days. They're trying to figure out why, because they attached the tags more carefully than they had in the past, they even monitored them with drones, but something was different.

Panel Member 3: Yeah, something was off, right.

Taqulik: It's still a mystery – what happened in 2019 that was so different.

Panel Member 3: Yeah, the Canadian government did that. They tagged twenty belugas and sixteen of them got. But they monitored them more.

Taqulik: Everything was by the book and plus some. Panel Member 3: Maybe they know something that we don't.

Panel Member 4: At Endicott or Milne Point, did they have any kind of hydrophone out in 2019? Kate: Just one right by North Star, too close to shore.

Panel Member 4: I'd be really interested to know if there's any acoustic data from 2019 that you could go back to and see what was different. You know, were they seismic-ing in Canada? Deterred the whales all the way out?

Panel Member 1: The open water seems to start in the springtime when there's a lot of east winds. Boy, we get so much water now, we used to be able to see the pack ice, now it's just miles and miles and miles of water.

Carin: That's true – Steve found that in the spring when there's strong winds for many days from the East, the ice retreats earlier, it gets pushed north earlier like you said.

Panel Member 3: We had weird ice here this past spring. It went out in December and got mushed up out there, mugalik (mushy bad ice) and napasaluq (pointy ice), that pointy ice everywhere and a big clump of it decided to land in front of us, and it was like that from Hollywood all the way to the Point. That ice went out there and came and got locked in. We thought it would go out in June, but it didn't go out until really late June, July. First week of July it finally went out. And there was really big ridges, when we did the polar bear work, maybe twelve miles north of the Point. There were a lot of polar bears early this winter. They harvested five at Point Hope. The bears came over here in January, February, but they were mostly over there. We wanted to go seal hunting but instead we focused on polar bears because it wasn't safe, and we had no trails. So one day we decided to go polar bear hunting, and somebody looked to the left and said hey look at the water out there! So we all went back and focused on the seals. Then we went seal hunting. So one year we thought we were going to get 15 or 20 polar bears and it only ended up being like three. The seals were really fat, right Panel Member 4? They were really healthy. Seals everywhere.

Panel Member 4: I think we got twenty something in one day, in a couple hours.

Panel Member 1: I saw a polar bear a month ago, by where you do your boating, right by the mouth of the river that goes to Opik. I thought it was a swan. But me and George Neakok, we were all wet, I said hey

that's a boat, I was going to go to it, but then we saw that it stood up and put up its arms and dove into the water.

Panel Member 4: There was a big bear on Cooper Island last weekend. Andy: Maybe trying to get spotted seals.

Panel Member 4: We went to Atqasuk last weekend, we saw a bearded seal, maybe past Nimrod Bodfish's. It was starting to get dark, and Carl Kippi and Donna were behind us, just twilight, we could see it going off the sandbar.

Panel Member 3: When did you guys see the humpback?

Kate: Last year, but I heard that people have been seeing them this year. Panel Member 3: This past spring would have been a really good census.

Kate: Except the lead was so wide open –

Panel Member 3: But there were whales everywhere. And when we were doing the polar bear work – March 22 I remember – there were belugas out there already.

Panel Member 4: There were a lot of whales out there at the edge of the ice.

Panel Member 3: They landed a whale April 16. Then right after that, there were whales everywhere.

Panel Member 4: There was one right there when we were cutting it up.

Panel Member 1: That one year it was so cold that the maktak froze, we couldn't do anything with it, so finally someone brought a chainsaw to put lines on the maktak.

Panel Member 3: You said when the ice is here longer, the krill tend to be here more?

Carin: The krill are bigger. So when the ice stays longer, the water stays here, and the krill stay in the water. They're ones that were born and brought into the Chukchi the year before. So they're older and bigger. This is our theory. This is in August when we're here sampling. Then in September there's a switch from big krill to little krill, because that ice will eventually move to the north. If the ice retreats early, then the larger krill and that water and that ice pass have already passed by Point Barrow when we're sampling, and we see smaller krill in the warmer water and no ice.

Panel Member 3: In Nuiqsut they do their Qaktuq fishing, their Arctic Cisco fishing, and they called and said there's a lot of krill coming out of the hole.

Carin: That could have been krill that came the previous year and stayed under the ice over the winter.

Panel Member 4: They were the big ones.

Carin: Right because they were older. They could have also come in the long way, which goes up along Chukotka, through Herald Canyon and around. Krill can live to be three years old. It seems that they

probably don't reproduce successfully, so it's a dead end. They come up through the Chukchi and that's it. There's not a whole family of krill that start growing up here.

Panel Member 4: I wonder if it could be beneficial for you all to stay longer, or work in colder water, to see other things. But maybe you like to keep the dates the same for comparison? If you wanted to stay longer, with the footprint you guys have, which is really small, I think you could go to the captains' associations and ask to extend your season. And maybe they (at Cross Island) have questions they want answered.

Carin: We use ice retreat as a marker. Last year we came about a week later than usual, and we left around September 9. We sampled at Prudhoe first so that we're done before Cross Island whaling. [Transition to Kate's presentation]

Kate: This project hasn't yet been funded. I'd like to get your guys' feedback on this. We'll be using baleen, which we only have because whaling captains allow us to sample it, to look back on the last fifteen, twenty years of the whale's life. Baleen holds a record of hormones, like testosterone for males and progesterone for females. It also holds what we call stable isotopes, of carbon and nitrogen, which are molecules in our food and come in a couple different forms. Depending on whether you have a heavy carbon or a light carbon, that can tell us what food animals are eating and where they're eating.

So I had a salad for lunch, Panel Member 3, you probably had pork ribs, so my stable isotopes would look pretty different from yours depending on what we're eating. But stable isotopes move out of us pretty quickly, but baleen holds a permanent record of what the whales have been eating, where they've been swimming, and what their stress levels are. [holds up baleen] Panel Member 1, this was one of your whales. You can drill holes and use this powder, like drug testing in hair, and look at years in the life of the whale. As an example, I've put tape on the baleen with different years. It's not precisely accurate, it's just an example.

But using the eyes, you can get an age for the whale and use that to get years on the baleen. And if you look at progesterone, a hormone that indicates pregnancy, you can see how often the whale has been pregnant. We can ask, is their calving interval changing? Because you guys are seeing more calves, the aerial surveys are showing more calves. With a bowhead plate, you can look at the last twenty years of their life. Because I'm really interested in singing patterns, I want to ask if the testosterone patterns in male baleen match the singing behavior we observe. The other thing you can do with hormones is look at stress. Here's an example of cortisol in a whale harvested in 2017. It had lots of fishing gear wrapped around it and was very thin. You can see the cortisol levels spike in the last years of the whale's life. One of the things we would like to do, is with the department, look at hormones and stress in baleen. Especially looking at whales harvested after 2019. We can ask did they feed more in the Bering Sea or in the Beaufort Sea?

Kayla: The hormones are also really important to the AEWG and the department because we can take that information to the IWC and show them that we have updated information on age at maturity. We can see age at maturity where the progesterone spikes in the baleen. And they are always looking for us to provide updated information. That would give us updated information on age at maturity and calving intervals. That would show that we take the research seriously and will help keep us relevant.

Andy: Don't they use age at maturity and reproductive rate in the SLA to set the quota?

Kayla: And if they decided to do an implementation review, we would be able to say, we have this data already that is needed for the IR.

Panel Member 3: So you are seeking approval to do this research? And for how long do you want to do the research?

Kayla: Kate already did get a letter of support from the AEWG.

Kate: We can ask when and where have whales changed their feeding, and what this will mean for subsistence access? Can we look at stress hormones? How often do they reproduce? What if we compare bowheads from the last ten years to whales from twenty or thirty years ago, to get a feel for long term, decadal changes in bowhead behavior? We can ask about calving intervals. I'm personally interested in testosterone and singing. Panel Member 3: Can you do this for other animals too?

Kate: Yes, you can do it with anything that has keratin, like fingernails or hair. You can also look for stress hormones in poop and blubber, and you can look for stable isotopes in blubber, but the body turns those things over much faster, whereas baleen gives you a long-term record. It does wear out and keep growing, but you can get the last ten to twenty years of the whale's life. You would take a couple of samples per year, and that's about two hundred samples per plate. I'd like to do the drilling here; we could train local people to help drill and talk about what it (the research) means.

Panel Member 4: You could get interns who are going out to study science to help with drilling. I find it really interesting that you can tell where it was eating.

Kate: Yeah, broadly you can. You can see the isotopes here [refers to graph] of the copepods and krill.

Panel Member 3: Because federal funding is tied up in ANOs, are you taking away money from those organizations?

Andy: With the ice seal committee and other marine mammal co-management organizations, they get money from section 19 funding. It's a dedicated pot of money for co-management. So the only people taking money away from ANOs are other ANOs.

Todd: Are you looking at carbon and nitrogen ratios in copepods and krill with this also? Kate: Not in this project.

Carin: Actually, we do. But the C:N ratio is C and N content. It changes seasonally. Todd: Do you see a change that can be attributed to climate change?

Carin: That's a question for Steve. We haven't done isotopes. So if you're talking about C:N ratio, we do that, but only in the fall. We can ask Steve.

Panel Member 1: Are krill edible for humans?

Kayla: Craig has made a krill stir fry.

Carin: We're not so good at digesting the chitin, and we can't peel them, like we do shrimp.

Panel Member 3: We talk about what causes this stuff but we're still not too good at figuring it out, we still don't know what causes you and me. There's still questions about the causes, right? And now we have kidney worms in our bowheads. Is there something we can do about this?

Kayla: We could probably look at stress in whales that have kidney worms versus those that did not.

Kate: But the question is where those worms are coming from.

Panel Member 3: Everyone likes to eat the kidneys. And now they're showing up in the belugas.

Panel Member 1: I was told they're not showing up in the iñutuks yet.

Kayla: I guess you could compare isotopes between whales that had kidney worms and those that didn't? I'm not sure.. people talk about them using different feeding areas.

Panel Member 4: Maybe the ones that have worms are traveling further south, or further to Russia.. if we had some tagging data on these.

Kate: It seems that you'd have to satellite tag some whales and then harvest them.

Andy: I have a question about the testosterone. Is your interest in that mainly for the age at maturity, for life history questions? Or do you see a relationship between testosterone levels and calling rate that might affect our ability to detect them? Do you think there could be a management implication to testosterone in baleen and singing? Like you might only be detecting a certain proportion of whales?

Kate: There's a difference between calling and singing. We think that it is only the males that sing. It might be a display. But we don't know. We know that in humpbacks it is males, but this is because people can dive and observe the whales.

Andy: Do you think stress could have an effect on their singing? Or on mating opportunities?

Kate: Maybe – mating is stressful. It costs a lot.

Kayla: I have one more question for you, Carin. John had mentioned that we might pull the ADCP for you. John was wondering if the pings would have an effect on marine mammals.

Kate: We'd be using the ADCP to listen for killer whales. The ADCP is almost like a sonogram. It uses a really high frequency sound to make a picture. We can't hear it, and the whales can't hear it at 300 kHz. It's well above their hearing range. Like a dog whistle, they can't hear it, but a harbor porpoise might be able to, because they have really high frequency hearing.

Panel Member 3: How about belugas?

Kate: It's even too high for belugas.

Taqulik: So what is the purpose of the machine?

Kate: It can tell you current speed and direction, and also it can bounce off of zooplankton. Think about it like a fish finder looking up. It can bounce off of only really small things. Because it's high frequency and not very loud, it cannot go very far. Just in a small beam going up from the ADCP.

Carin: It's not very strong. It's not like a seismic sound. Because krill are moved mostly by currents, ADCP can't affect krill distribution.

Panel Member 3: Can the krill hear it? Is there an effect on the krill?

Kate: Probably not.

Carin: It won't redistribute the krill because although they can move up and down in the water column they are mostly moved around by the current.

Panel Member 1: We asked a seismic guy about how seismic sounds affect the krill. I forget how he put it, but he said it affects the krill. He said they're harmed in some way, but they didn't know how.

Kate: Some Australian scientists put krill in a box and exposed them to seismic sounds, but I don't remember what happened to them.

Carin: It's kind of hard to study. But we know that the intensity of the sound and the wavelength is totally different from seismic.

Kate: Because for something to be able to affect us we have to be able to hear it.

Panel Member 3: What about fish finders?

Kate: I think it's too high frequency for whales. It's about how loud something is, in addition to the pitch.

Panel Member 4: Tagging whales with you guys really helped me to be a better hunter, to better recognize the dive patterns of the whales. We've been pretty successful for a young crew, and a lot of that has to do with working with scientists.

Taqulik: It's about informing both ways, and that's the purpose of this panel.

Kate: I've learned so much from you guys out on the ice. I'm really grateful to be able to come up here and learn with you guys.

Panel Member 3: We'd like to see more ethical, equitable engagement between ANOs and scientists.

Carin and Kate: What recommendations do you have to do that?

Panel Member 3: Like this today and working more with the ANO groups like the AEWG. The BARC (BASC) was really good at this for a long time. The organization changed, right? We're still trying to find that middleman.

Kayla: The AEWC did pass a resolution to set up something like this, where scientists who want to do research here can present their idea to a panel, get feedback, find out what questions locals want answered, and make sure it hasn't been done before. But I'm not sure what phase they're at with that.

Panel Member 3: And like we were talking about with those overlapping funders.. to try to find money to do another BOWFEST.

Kate: If we did something like BOWFEST again, how could we do it so that it is more equitable and informed by the community?

Panel Member 3: Come back every year.

Kate: I come back twice a year.

Panel Member 3: Bring Mark and everybody else. Everything has changed over the past ten years: migrations, conditions, animal behavior.

Panel Member 1: I think the way to get the community more involved is door prizes. They always go for door prizes.

Todd: Could we write up results of today as an editorial? Something about how to engage in the community to make sure it's fair? This would be a product of the incubator, to show what progress is being made. This is the stuff that never comes out unless someone writes something out.

Panel Member 1: That guy Ned Rozell, the science writer from the Arctic Sounder – he does a real good job.

Andy: Back to ANOs – the ABWC supports a lot of research, but the Ice Seal committee does not yet. There could be more collaboration with outside researchers. The ANOs and researchers could be working together to get funding.

Taqulik: The agencies often have priorities that get directly funded. But with the ANOs, their research priorities are 1) different from scientists' priorities, and 2) unfunded. So the research groups could be working together with ANOs to secure funding. At the NARL 75th celebration I talked about ICAS's research priorities and how we can work with them to fulfill those. So we have a list. When I mentioned that, one of the scientists asked if they could have access to that list, so that they can be addressing relevant research priorities. ANOs could make a similar priority list – researchers could choose something from the list to address, and they would work together to get funding. Todd Atwood said he would like to do this as well.

Kate: I think we're all interested in the same questions, just coming at it from a different angle.

Taqulik: One thing they're always lacking in population models is the traditional knowledge aspect. The more information we have the better. Up until recently, they've been missing local knowledge.

Panel Member 3: We're not always going to make everyone happy. There's always a lot of questions: how we can incorporate our traditional knowledge or indigenous knowledge into research or science. We're at that beginning stage of trying new things with it. Like Stephen Braund's work.

Kate: It's sad that it's taken so long to take these first steps.

Panel Member 3: We hope to do more work with you guys.

Taqulik: Stephen Braund was tasked to list the first ten subsistence harvested species in the villages. Then he would ask people - who are the experts on these different species? And then those experts would recommend others. It's a very comprehensive list for the NPRA villages that researchers could refer to when doing research. This was maybe twenty years ago.

Carin: This goes back to the need to have the contact person to connect scientists with experts in the community.

Panel Member 4: I think we need to do more of this, and to include more elders.

Carin: The AEWG meeting is very structured. We need a place like this where people feel free to discuss and collaborate.

Research recommendations and other questions:

1. Radar or other monitoring of ice and currents north of Point Barrow (Seth Danielson?)
2. Compare good whaling days with environmental and oceanographic data
3. What causes uigaaks or vertical currents?
4. More research on killer whale distribution, how it is changing, and effects on bowhead population
5. What causes kidney worms
6. More documentation of TK (visiting and recording elders especially)
7. How do bowheads know where the krill are?
8. Why is Wainwright able to harvest bowheads so close to shore now? What changed?
9. What is the significance of orange blubber?
10. Are there acoustic data from 2019 that can help explain the unusual fall migration? Other recommendations:
11. Revive "Saturday (science) talks"
12. Create centralized organization like BASC for sharing information, and for introducing new scientists to the North Slope (Nicole suggested trying to get NSF or BOEM behind the idea of a BASC-like organization, staffed by locals)
13. More collaboration between ANOs and scientists. For example, ANOs provide scientists with a list of priorities, and scientists choose a priority to address through research, and the two can work together to obtain funding.
14. Make list of local subject experts to refer to during research activities

[Kayla's recommendation for future TK panels: fewer DWM scientists, more TK experts; more formal process for selecting members; more and better follow-up with attendees]

Appendix I.

Agenda for Panel #4

Utqiagvik Traditional Knowledge Panel for the BOEM-funded project:

“Traditional Knowledge Implementation: Accessing Arctic Community Panels of Subject Matter Experts” Agenda

8 August 2023 10:00 am Introductions and review agenda

10:30 am Background on the project and the role of the panel

11:00 am Dr. Larissa Horstmann: Trait-based stress attributes of northern pinnipeds in a rapidly changing environment

12:00 pm Lunch at Iḷisaḡvik

1:00 pm Continue presentation and dialogue

3:30 pm Feedback from TK experts and presenter on the panel process 4:00 pm Adjourn

Appendix I. Horstmann presentation, 8 August 2023

Trait-Based Stress Attributes of Northern Pinnipeds in a Rapidly Changing Environment

Proposal for Submission to the National Science Foundation



Sylvia Brunner
(NMMNHS)



Amy Hirons
(NSU)



Lara Horstmann
(UAF)



Greg O'Corry-Crowe
(FAU)

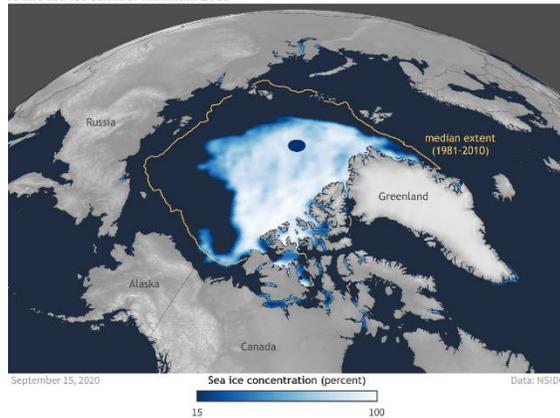


Casey Youngflesh
(CU)

Contact: lara.Horstmann@alaska.edu

The Elephant in the Room

Arctic sea ice summer minimum 2020



- We know climate is changing and sea ice is disappearing
- We don't know the consequences:
 - Are animals becoming stressed?
 - Are they healthy?
 - Are animals resilient?

Why Skulls?

- How do we study effects and impacts of climate change?
- Will animals collected today tell us what impact climate change has on them? What do we compare this to?
- How do we access animals BEFORE rapid sea ice loss, BEFORE legacy contaminants, BEFORE regime shifts?



Broader Implications

- Quantify stress-attribute profiles for 1,000 individuals
- New or updated vulnerability and/or resilience scenarios
- Additional tools to combine with TK
- ***
- Adding new specimens
- Data-sharing and joint publication of results for ISC-priority areas
- Student participation - undergrad, MS, PhD (preferably AK Native students)
- High schoolers, e.g., RAHI
- Translations of results to Iñupiaq and Yup'ik
- Sharing project progress/findings and new co-management observations



(Image: NOAA Fisheries)

Appendix J. Kosma presentation, 16 November 2023



PROJECT GOAL

BELUGA WHALE BODY CONDITION:



- SAME POPULATION IN POINT HOPE AS HARVESTED IN CANADA
 - CANADIANS THINK BODY CONDITION DECLINING
 - INTERESTED IN BODY CONDITION OF BELUGAS LEAVING BERRING SEA
- INUVIALUIT-INUPIAT BELUGA WHALE MANAGEMENT COMMITTEE SUPPORT WORK

OUR QUESTIONS FOR YOU?

- ARE BELUGAS SKINNER?
- IS THIS WORK A GOOD IDEA?
- IS THIS WORK POSSIBLE HERE?
- IF YES, WHERE CAN WE DO IT AND NOT DISTURB HUNTING?
- IF YES, WHO SHOULD BE THE CONTACT PERSON FOR THIS WORK?
- HOW DO YOU THINK DRONES CAN HELP?
- ARE THERE ANY LOCALS WITH DRONES?
- DO YOU HAVE ANY CONCERNS?
- YOUR QUESTIONS FOR US...

Appendix K. Minutes from Panel #6

November 16, 2023

Point Hope

Madison Kosma: “Drones: A new tool; beluga and bowhead whales”

Moderators: John Citta and Kayla Scheimreif

Prior to holding the panel, we prepared at the city office and met Tariek Oviuk, the mayor of Point Hope. He told us that just the other week a group of researchers had come to Point Hope with a proposed project to put temperature sensors in ice cellars. Mayor Oviuk said that the hunters suspected that there was an ulterior motive and decided to not allow the research to occur.

As panel participants entered the city office, John passed out W9 forms so that the hunters could receive their stipends from the NSB. One of the hunters didn't accept the forms or engage with John as he greeted him. We (John and Kayla) only knew two of the TK experts already and had some trepidation around this meeting. We anticipated that this panel would be very different from ones we had held previously, where the TK panel participants knew us and understood our affiliation. The meeting began at 18:15. John introduced the TK project, himself, Kayla, and Madison.

Madison began her presentation talking about how she started working with drones and in Utqiagvik. She then stated the goal of the proposed project and asked the hunters if this is something they might be interested in supporting at Tikigaq, if they thought any changes should be made to the proposal, or if they were interested in something else entirely. The room was quiet. Then John elaborated on why we want to implement this project. He explained that the population of belugas that is hunted at Tikigaq migrate with bowheads in spring and are hunted by the Inuvialuit in July and August. The Inuvialuit are concerned that the belugas are skinnier, and that their diet is shifting from arctic cod to saffron cod and pollack. They think the belugas may not be as healthy as they once were, and that it might be due to their spring habitat. They want to know what the belugas look like in the spring when they are being harvested at Tikigaq. John adds that Tikigaq's representative to the Inuvialuit-Inupiat (I-I) beluga whale committee, Leonard Barger, said the belugas aren't any skinnier. He then asked the captains if they thought the belugas are skinnier.

Then the captain (Panel Member 1) who had not filled out the form answered John, saying that the belugas look the same as they always have. Panel Member 2 added that the belugas are generally fat, though he's seen some younger ones that are skinnier.

John then described how we can determine how old, harvested belugas are to look at body condition in different age classes. He explained how belugas can be aged with eyeball lenses and teeth and mentioned that a 120-year-old very skinny beluga was found and that maybe the skinny belugas are just old animals. He explained that we can only do this work at Tikigaq or at Utqiagvik, and since we do a lot of work at Utqiagvik the I-I committee suggested we come here.

After more silence, John suggested that Madison talk more about how the project would work and how to not disturb the animals when using drones. Madison then described how to estimate body condition with drones and how to not disturb whales when observing them with drones. Panel Member 3 asked how far off the ice edge we would fly the drones. Madison responded that she feels comfortable flying two miles off the ice edge in Utqiagvik. The smaller drone can be flown four miles. She acknowledged that the ice conditions are different here, and asked how far hunters have to go to get to the lead. Panel Member 2 answered that hunters usually have to travel about five miles but that it depends. He asked Madison what her procedures (for working with whalers) are in Utqiagvik.

Madison replied that the most important part is communication with hunters. Last year we were able to fly before anyone got to the ice edge. We ask permission, and if anyone wants us to take down the drone we take it down. We make sure the communication is strong and we recognize that whaling is the top priority.

John replied that in the past Craig (George) was talking about teaming up with a particular captain, and asked if that happened this year. Madison replied that yes, at first we were on Fred's (Brower) trail up north but then everyone ended up using the same trail.

John added that we don't know how it works here in Tikigaq so if the hunters wanted to pursue the project they would make the rules. Panel Member 4 asked if the data will be accessible to everyone. Madison responded that it will be accessible, although she hasn't processed the data from Utqiagvik yet, and added that transparency is a top priority. She is going to send a drive of information to Utqiagvik that can be used for outreach.

Panel Member 3 asked how big of a crew Madison would have. She said that it has been three people: a drone pilot, someone looking for bears, and someone looking for whales. Panel Member 3 asked if we would hire locals to take us on the ice and look for bears. Kayla responded that we would like to but that it has been difficult to hire people during whaling season. John added that Madison could include this in her proposal.

Panel Member 3 asked what Madison found when she studied humpback whales. Madison described how there were three whales that learned when salmon smelt were being released from the hatchery. Humpbacks are used to feeding on schooling fish like herring. They use a hunting technique of blowing bubbles to entrap fish, which doesn't work as well on salmon smelt because they don't school. The humpbacks realized that this technique wasn't working so they used their pectoral fins to push the fish into smaller bubble traps. It was clear that this was really calculated. More recently Madison was using the drone to do body condition work in humpback whales. Calves weren't surviving and body condition wasn't good, so they were measuring them in Hawaii and up in Alaska, to determine where the whales are putting on weight. They saw that they weren't putting on weight until late in the fall. Madison described how interesting it was to see the mom and calf migrate from Hawaii to Alaska and how the mom shrinks while the calf grows. She added that they have about six years of data, and that drones are also being used to get a better look at entanglements.

Panel Member 5 asked if Madison got data that can be used for the bowhead census. John replied that we'd like to see if there's data we can get with drones that we couldn't from the ice edge. We don't know if a drone will help with the census or not, but we'd like to look into it.

Then John talked about the possibility of the NSB DWM doing harvest sampling in Tikigaq, and that maybe we could bring Madison with us to see how things work here. We don't understand how things work here the way we do in Utqiagvik.

Panel Member 1 commented that last year someone asked about NSB DWM doing harvest sampling here. John explained how we were going to come to Tikigaq to sample this year but couldn't because of family emergencies.

Panel Member 6 asked what samples the NSB DWM takes. John explained that we take eyes for aging; measurements like length and girth that tell us about body condition; blood; blubber; muscle; every tissue that we can. He added that our veterinarian (Raphaella Stimmelmayer) wants kidney samples. Panel Member 4 asked when we would need permission or an answer from the Tikigaq whaling captains. John

said that we don't need an answer now, but that it could be beneficial to get an answer soon to help Madison get funding if the project was approved.

Panel Member 5 asked how Madison did this work in Utqiaġvik. John replied that we have gone to a whaling captains' meeting, and they require us to do the work on a "downstream" trail and to communicate with captains. He explained that we wanted to come to Tikigaq and present this project prior to a whaling captains' meeting because the TK panel project is about to conclude.

Panel Member 1 asked where the funding for the TK project is from. John replied that it is funded by BOEM which does oil and gas leasing on the North Slope. There was generally concern around where the honoraria for the panel participants was coming from, and why someone would want to pay them for this. John reiterated that we want to compensate them for their time. In addition, two participants (Panel Member 6 and Panel Member 7) expressed concern around the purpose of the project and what would happen with the data, particularly if it could be used against the community. Madison responded first by explaining her relationship with hunters at Utqiaġvik and confirmed that she was interested in supporting the whalers and the science, not extremist environmental groups. John stated that he and Kayla work for the NSB DWM, and that it is their job to work with the whalers. He added that he can never guarantee that information will not be used against the whalers. The panel participants seemed to appreciate Madison's and John's responses.

Panel Member 5 mentioned that he just saw belugas today heading south. Panel Member 6 added that last year when seal hunting in January he saw hundreds and hundreds of belugas heading south.

Panel Member 2 asked about the population size of belugas. John provided a review of beluga stocks found in Alaska: the last population estimate for Beaufort Sea belugas was in the early 2000s and was close to 40,000. NOAA counted Beaufort Sea belugas in Canada in the summertime in 2019. They haven't released the numbers yet, but they said they're the same as they have been. They've been promising the population estimates for a long time but haven't provided them yet. They think Norton Sound belugas are around 14,000 and NOAA is working on another aerial survey now. The ABWC wasn't happy with the surveys and told them to fly the transects again this summer.

Panel Member 2 commented that for a few years (2018-2021) they weren't seeing many belugas and then finally started seeing more normal numbers a few years ago. Panel Member 5 added that those years when there weren't many belugas, Panel Member 6 flew his drone and saw more further out while the lead was closed.

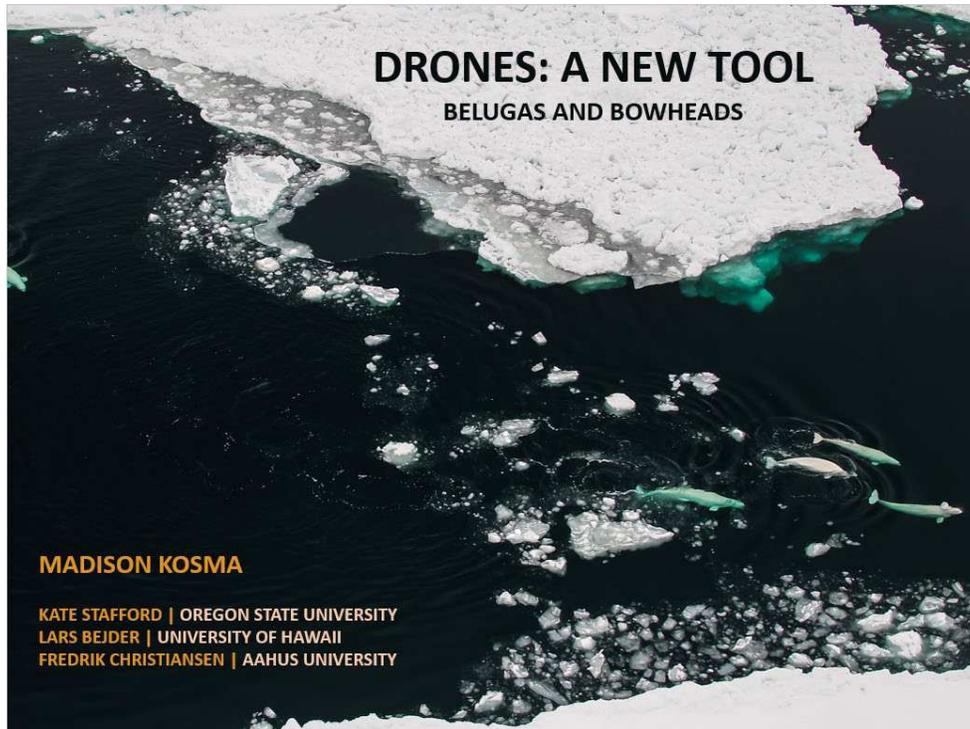
Panel Member 2 said that he heard that belugas got stuck in the ice in the Chukchi a few years ago. John said that something like that may have happened in Kotzebue Sound. Some people think they harvested too many, and some people think the population was affected by was ice entrapment.

Panel Member 2 said that it was good to hear that beluga populations are generally doing well. John mentioned that the ABWC is trying to figure out if they should have guidelines for hunters, and how to create management plans. He said that this is driven by the people of Norton Sound, not the federal government. The only beluga stock in Alaska that is really in trouble is the Cook Inlet stock. The stock reduced due to too much harvest and it's not coming back. No one understands exactly why, but lots of people were coming down from other parts of the state and hunting there and selling meat and maktaaq. Panel Member 1 asked if the belugas are not reproducing. John replied that belugas are very social, and some people think when you take too many animals out of the population communication is lost between the older and younger whales.

Panel Member 7 asked if the project doesn't get voted on before the spring, would it be detrimental to the overall project? John responded that yes, it would be helpful to have an answer as soon as possible for funding purposes and so that Madison could pursue other avenues if the captains decide that they don't want this project to occur in Tikigaq. The hunters started talking about how the project could work in Tikigaq. A few people mentioned that the drones could be flown west or upwind of hunting. Finally, Panel Member 4 proposed that the captains vote on the project. The project was approved unanimously.

The meeting concluded at 7:36.

Appendix L. Kosma presentation, 5 December 2023



PROPOSED BELUGA STUDY:

Estimate body condition of beluga whales

- 1. Comparison: Beaufort Sea belugas in spring (May: Point Hope) and summer (July: Canada)**
 - *Got permission from Point Hope last month for spring*
- 2. Comparison: summer Eastern Chukchi Sea belugas (July: Point Lay) with summer Beaufort Sea belugas (July: Canada)**
 - *Need to discuss with Native Village of Point Lay and hunters*
- 3. Calibration work at Point Lay with harvested animals**
 - *Need to discuss with Native Village of Point Lay and hunters*
- 4. Expansion to Eastern Bering Sea belugas?**
 - Comparisons:
 - one place in the same season to look at trends
 - Different seasons to get seasonal variations

Appendix M. Minutes from Panel #7

December 5, 2023

Anchorage

Madison Kosma: “Drones: A new tool; beluga and bowhead whales”

Moderator: John Citta

Madison Kosma described how she has tested obtaining body condition with drones at Utqiagvik, flying at about 100 ft. She explained how the Iñupiat-Inuvialuit beluga management (I-I) committee is concerned about beluga body condition and would like to understand the body condition of belugas in the spring. Madison explained how we can use drones to calculate body volume and mass for body condition indices with a 3D model. Her proposed work is to compare body condition of Beaufort Sea belugas in spring and summer; compare body condition of ECS belugas in summer with body condition of Beaufort Sea belugas; and calibrate body condition measurements at Point Lay. She asked if the work should be expanded to include EBS belugas, and also to hunter-operated drones. John Citta clarified that while the Canadians are concerned about body condition there isn't much evidence for declining body condition.

Panel Member 1 added that the Black River area, right below the Yukon, might be a good area to do drone work because there are always belugas there. Kathy Frost (ABWC Secretary) asked if the water is clear, and Panel Member 1 said no. Kathy asked if there was any place with clear water to do the work. Tom Gray (ABWC Chairman) suggested the western side of Norton Sound, if one could work around the windy weather.

Panel Member 2 said that the water outside of Stebbins is blue in the spring (May/June) when the herring are running, and that it is easy to see the whales. Tom suggested talking to the pilots at Bering Air to see if they had suggestions. Kathy asked if any of the hunters would be interested in working with Madison on such a study. Panel Member 2 said that he would be interested. Panel Member 3 said that they would be interested at Elim. The village is at the edge of a cliff, and the beluga swim right along the edge. They don't hunt all of the time even when belugas are there because sometimes it is too rough. He added that there are drone operators in Elim. John Citta added that if the ABWC writes a letter of support it would help Madison to obtain funding. Tom said that there are lots of opportunities to do drone work with whales when they are feeding on tomcods close to the beach. Madison thanked the ABWC for offering to provide a letter of support.

Appendix N. Roster of Subject Experts

The following experts have knowledge of a variety of different species; their inclusion in this list does not indicate they are willing to participate in future TK panels. Contact information is available upon request from NSB DWM. We aim to develop this list via snowball sampling in the future.

Point Hope

Attungana, John
Barger, Leonard
Hank, Aquilluk
Kinneveau, Herbert
Lane, Jacob
Nashookpuk, Christopher
Oviok, Tariek
Rock Sr., Rex
Tuzroyluk, Lenora
Tuzroyluk Sr., Michael

Point Lay

Itta, Ira
Lampe, Warren Harding
Lisbourne, Robert
Rexford, Julius
Tracy Jr., Bill

Wainwright

Aguvluk, Raymond
Ahmaogak, Jason
Bodfish, Alvin
Hopson, John
Nayakik, McRidge
Nayakik Jr., Walter
Oktollik, Enoch
Panik, Jack
Tagarook, Benjamin

Utqiagvik

Adams, Bernadette
Adams, Billy
Adams, Quincy
Ahsoak, Herman
Arey Sr., Ned
Bodfish, Kyle
Bodfish, Ricky
Brower, Charlie
Brower, Eugene
Brower, Frederick
Brower, Lewis
Donovan, Michael
Edwardsen, Martin
Frantz, Brower

Appendix N. Roster of Subject Experts (Continued)

Utqiaġvik (continued)

Kaleak Sr., Alex
Leavitt, Jerica
Leavitt, Joe Mello
Leavitt, Lucy
Leavitt, Qaiyaan
Nageak, Ernest
Nayakik, Carl
Patkotak, Crawford
Pebley, James
Rentenaar, Ransom

Atqasuk

Bodfish Sr., Paul
Bodfish Jr., Paul
Kippi, Wanda

Nuiqsut

Brower, Carl
Ipalook Sr., Herbert
Kaigelak, Bernice
Nashoalook, Dorcas
Napageak Jr., Thomas
Nukapigak, Eli

Kaktovik

Brower, Archie
Gordon, Chris
Kaleak, George
Kayotuk, Lee
Rexford Jr., Eddie
Rexford, Fenton
SimsKayotuk, Carla
Solomon, Glen

Anaktuvuk Pass

Hugo, Esther



U.S. Department of the Interior (DOI)

DOI protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.



Bureau of Ocean Energy Management (BOEM)

BOEM's mission is to manage development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way.

BOEM Environmental Studies Program

The mission of the Environmental Studies Program is to provide the information needed to predict, assess, and manage impacts from offshore energy and marine mineral exploration, development, and production activities on human, marine, and coastal environments. The proposal, selection, research, review, collaboration, production, and dissemination of each of BOEM's Environmental Studies follows the DOI Code of Scientific and Scholarly Conduct, in support of a culture of scientific and professional integrity, as set out in the DOI Departmental Manual (305 DM 3).