Arctic Borderlands Ecological Knowledge Society Data As A Source of Local Ecological Knowledge for the Porcupine Caribou Management Board

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Introduction

The Arctic Borderlands Ecological Knowledge Society was created in 1994 with four goals:

- to monitor and assess ecosystem changes in the range of the Porcupine Caribou Herd and adjacent coastal and marine areas;
- to encourage use of both science-based studies and studies based on local and traditional knowledge in ecological monitoring and ecosystem management;
- to improve communications and understanding among governments, aboriginal and non-aboriginal communities and scientists with regard to ecosystem knowledge and management; and
- to foster capacity-building and training opportunities in northern communities in the context of the above goals.

Each year community researchers conduct in-home interviews about weather, berries, fish, birds, caribou, and mammals with local experts in six communities.[1] Interviews typically take less than two hours.

Over the years a number of researchers and agencies have accessed ABEKS data to inform various research projects. In all of these cases the researcher received ABEKS data, analyzed it, and usually provided ABEKS with a copy of their final research report. Unlike academic 'one-off' research projects, the Porcupine Caribou Management Board (PCMB) has regularly received ABEKS data for its use in annually determining the status of the Porcupine Caribou Herd.

The PCMB

Since 1985 the PCMB has been the hub of information and dialogue about the Porcupine Caribou herd. Established in the Porcupine Caribou Management Agreement, the Board is charged with communicating information about the herd and providing recommendations to agencies responsible for its management. The Board strives to keep harvesters, governments, and managing agencies working collaboratively for the health and conservation of the herd. The PCMB is comprised of a Chairperson and eight appointed members, who each represent a government within the herd's range. According to their website,

> *The Board works with the users of the herd and those who study it to gain a better understanding of this dynamic and important natural resource* (Porcupine Caribou Management Board, n.d.).

[1] Aklavik, Fort McPherson, Inuvik, Old Crow, Tsiigehtchic, and Tuktoyaktuk.

In 1987, the Agreement Between the Government of Canada and the Government of the United States of America on the Conservation of the Porcupine Caribou Herd was signed, establishing the International Porcupine Caribou Board (IPCB). The Chair of the PCMB is a member of the IPCB. The Porcupine Caribou Technical Committee (PCTC) is established under this agreement and provides technical support and advice to the IPCB. Between 2000 and 2010 the IPCB had limited activities. During this time the work of the PCTC focused more on supporting the work of the PCMB in lieu of the IPCB.

During this time, the PCMB developed a Harvest Management Plan (HMP) for the Canadian harvest of the Porcupine Herd. Determining the herd's status is a key annual activity and the PCMB relies on the PCTC to provide them with information to help them make this decision. Biologists on PCTC present current information about the herd using six indicators, as outlined in the HMP:

- Estimated herd size
- Harvest Information
- Adult Cow Survival
- Calf Birth Rate
- Calf Survival to Nine Months
- Body Condition.

PCTC presents scientific information along with the context for that information. For example, they may say that they have 85% confidence in the herd size estimate because of conditions during the census. Thus the PCMB has the benefit of technical information with interpretation that helps them know how to weigh and consider that information.

Page 12 of the HMP notes that, "There are many other descriptive indicators that come from people out on the land." These include caribou health, hunting success, and weather. The plan directs the parties to "provide local observations to the annual PCMB harvest meeting."

The PCTC has developed *Indicators for Harvest Management Assessment* that expands the six indicators above into 18 indicators for assessing the herd. Most of these indicators are science-based and are collected by various management agencies. However, five of the indicators rely, in whole or in part, on local knowledge. These are:

#10 –Are hunters' needs met?
#12 –Hunter Assessment of Body Condition
#13 – Health (i.e. reports of abnormalities)
#15 – Snow Conditions
#17 – Weather Events

ABEKS data has been supplied to PCTC for a number of years to meet this local knowledge requirement. However, the PCTC has struggled to evaluate and integrate the

local knowledge data for these five indicators with the rest of their herd assessment. ABEKS data is likely being underutilized by PCMB.

In 2016, Dr. Don Russell and Dr. Linh Nguyen completed an analysis of a selection of the local knowledge data for presentation to PCMB. Through their work ABEKS hoped to step beyond their usual operational norm of offering raw data or data summaries to researchers, and instead analyze the data and provide PCMB with *information*.

PCMB does not require convincing that local knowledge is a valuable and credible resource in caribou management, as their long-standing history of working collaboratively with communities attests. This paper is meant to compliment the paper by Russel and Nguyen to:

- Orient PCMB experts to local knowledge as a line of evidence in resource management;
- Examine the Arctic Borderlands Ecological Knowledge Co-Op data as a line of evidence in the PCMB herd assessment;
- Guide PCMB on integrating ABEKS information into the herd assessment for the above indicators; and
- Initiate feedback from PCMB to ensure that the information as presented was useful, and facilitated ABEKS information being integrated readily into PCMB's work

Local Knowledge In Resource Management

Local knowledge is "expertise acquired in and from the place where that person lives and works" (Wilkinson, Clark and Burch, 2007; 4). Broadly speaking, local knowledge is contextual, experiential, and evolves over time, rather than staying static (Weeks and Packard, 2007)[2]. In the context of resource management, local knowledge is increasingly being understood as a relevant source of information, particularly in situations where scientific knowledge may be limited (e.g. northern regions where data collection often requires substantive budgets). For example, local knowledge can provide information about seasonal and directional movement of a species, abundance (Neis et al., 1999), long-term historical change, and environmental conditions (Johannes, Freeman and

> *"Local knowledge can provide information on the relationship between variables, rather than solely on the variables themselves" (Nichols et al, 2004).*

[2] For a discussion differentiating Local knowledge and Traditional or Indigenous Knowledge, and the rationale for focusing on local knowledge here, see Appendix A.

Hamilton, 2000). Discovering such information via western scientific methods would not only require deep financial pockets, but would take years of research before insights could be offered.

However, the relevance of local knowledge goes beyond "filling in" when scientific knowledge is unavailable or inaccessible. Scientific knowledge alone may fail to address complex environmental problems, and local knowledge can provide a more complete picture of these issues (Wilkinson, Clark and Burch, 2007). For example, Neis et al. (1999) found that local knowledge within the fisheries industry could contribute to a small-scale understanding of population complexities that larger-scale studies often miss due to study design crafted to look at a larger picture. Local knowledge can also provide information on the relationship between variables, rather than solely on the variables themselves, such as the connection between sea ice, climate-related variables, and social, political, and cultural change (Nichols et al., 2004). For example, local knowledge could provide information about how harvesting patterns have changed as a result of new technology, or because of an increase in the price of gas.

It is also important to note that the separation of local knowledge as one thing (holistic, contextual) and scientific knowledge as another (reductionist, objective) is not always clear-cut. For example, a person being interviewed about their local knowledge of a species may also incorporate elements of scientific knowledge into their responses (Wilkinson, Clark and Burch, 2007).

Challenges

The ways in which local knowledge contributes to a more contextual and complete "big picture" understanding of natural resources can mean more effective management policies (Davis et al., 2004). However, while government agencies are adept at integrating technical information into their decisions, local knowledge has been difficult to put into practice. Many of the challenges associated with using local knowledge are methodological issues. While there are a number of articles on the process of collecting local knowledge, significantly less deals with what happens after it is collected. Not only is there a lack of literature that provides direction on *how* to analyze local knowledge (Davis and Wagner, 2003), what little *is* out there offers no clear path forward. Armitage and Kilburn (2015) note the absence in many local knowledge and tk studies, "… of a description of methods that allow reader to understand clearly how the research was undertaken, and to evaluate the quality of its conduct, data, and analysis (xii)." The challenge of using local knowledge in resource management is not in its collection, it is in everything that comes after that.

It is not unusual for managers to struggle when trying to bring together research and monitoring results across a landscape. Dealing with a mismatch in geographic scale (e.g.

local knowledge focusing on specific regions, scientific knowledge focusing on entire ecosystems) or differences in terminology and language (Neis et al., 1999; Nichols et al., 2004) are not uncommon circumstances. Such challenges are not exclusive to the integration of LK and science – for example 'scaling up' of scientific knowledge in the north can be a challenging exercise attempting to patch together outcomes of various research programs with different objectives/ scope and approach).

Local knowledge is often distributed disproportionately within a community, so participants must be specifically selected rather than randomized (Chalmers and Fabricius, 2007). In practice, this means that it is important to target locally-recognized experts for their information instead of a random sample of community members. Research methods statements should be transparent about how study participants were selected, and limitations in the study arising from participant composition should be articulated. Sometimes, especially in resource management, imperfect information is better than no information – excluding local knowledge based on imperfect research methods is not necessarily the only treatment the research merits. Managers need to evaluate local knowledge studies on a case-by-case basis, as they would any research effort.

There is also a concern that picking and choosing useful bits of local knowledge where it is convenient will result in findings that are devoid of context or cultural or political meaning (Holm, 2003). Community knowledge is comprised of complex and diverse ideas and voices: simplifying the idea of 'community' to one homogenous voice obscures the ways in which communities relate to their natural world (Agrawal, 2001). Using a local co-researcher in the research process is one means of ensuring that local knowledge remains whole, instead of local knowledge as collected, organized, and interpreted via various social sciences methods.

Gilchrist, Mallory and Merkel (2005) describe specific methods for collecting and analyzing local knowledge, and argue that the accuracy and reliability of local knowledge should be tested using standards provided by western science. On the other hand, Brook and McLachlan (2005) take issue with this approach. From their perspective, western scientific knowledge should not provide the standards to which local knowledge is based, because western scientific knowledge is not without fault. They propose "a more useful approach might be to examine each knowledge source, in isolation and in relation to the other, without making value judgements about reliability or validity" (Brook and McLachlan, 2005, r3). An example of this approach is the validation process used in the Nanuq Polar Bear Traditional Knowledge study in the Inuvialuit Settlement Region. When interview data was analyzed, there were a number of areas where the prinicipal investigator (PI) was unable to make sense of the data. It seemed that there was no pattern to the responses for some questions. One 'western-science' based approach would have been to present the data in a pie chart, showing number of responses per possible answer, and having the highest number 'win'. Instead, the PI asked a panel of TK experts to comment on the responses. This opened a

conversation which revealed an entirely new level of information about ice and wind, which pulled together a coherent narrative that a pie chart would have completely missed.

Gratani et al. (2011) deal with this issue by using a collaborative validation approach with research participants. They found that the involvement of participants in validating their findings was an important process for scientists to understand, appreciate, and include local knowledge in natural resource management. This validation process was successfully used by the Inuvialuit Joint Secretariat for *Inuvialuit and Nanuq: A Polar Bear Traditional Knowledge Study* (Joint Secretariat, 2015).

The Challenge of Caribou Management

The challenge for PCMB is to integrate local knowledge into herd assessment and harvest management. It must do so in a transparent manner that creates a clear link between all of its lines of evidence, including both scientific and local knowledge, through to its conclusions about the status of the hard and subsequent management recommendations. The sources and strengths of biological data are easily traced and well understood. ABEKS information, as the only source of local knowledge for PCMB, would benefit from that same level of transparency and integration. Evaluating the ABEKS body of knowledge is an important step in achieving this outcome.

Evaluating ABEKS Data As A Source of Local Knowledge about Caribou.

Is ABEKS a credible source of local knowledge? Just because it is a long-term dataset that is convenient to access does not mean it necessarily has value. This section examines the value of ABEKS data by asking a series of questions that illuminate the methods and data controls used in the ABEKS data-gathering process.[3]

1. Does the data confirm a position or theory? Is the data corroborated?

ABEKS interviews 20 local experts per community, and summarizes the data by community. Aside from these summaries, ABEKS has not been in the business of analyzing its data for use by various partners. Normally their process is to provide raw data to researchers who request access to it, once that request has been approved by

[3] A number of these questions are based on a series of questions developed in February by members of Canada's Polar Bear Technical Committee at a workshop about incorporating Traditional Knowledge into their assessments of the status of polar bear subpopulations. These questions were modified to reflect the PCMB case study for ABEKS. Armitage and Kilburn, 2015, was also a valuable resource for this section.

the ABEKS board. Because ABEKS is not in the business of turning their own data into information beyond local summaries, it is difficult to know if the evidence is corroborated.

There is one outstanding example of ABEKS data confirming another narrative: the 2010 data analysis by Russel which indicated that population trends indicated by ABEKS data matched actual trends once an overdue herd count was achieved. On the heels of this corroboration, Russell et al. (2013) noted that the use of ABEKS surveys provided a valuable alternative data source during periods when [population] surveys were not conducted, and at minimum could augment agency estimates of the status and trends in caribou populations when aerial surveys are successfully conducted.

Finally, ABEKS data should 'hang together' by community, and tell a story (or corroborate itself) that is whole for that community. For example, ABEKS data should lead to statements such as "The caribou were close to Community XYZ in spring. " No matter where an expert harvester prefers to hunt, a true expert will be aware of when and where the caribou passed through (or failed to). The summary statements provided by ABEKS to its partners annually are evidence of this kind of corroboration.

2. Are the methods documented and defensible?

Armitage and Kilburn (2015:6)) note:

> "Most community co-researchers who lack formal social science training or interview experience are able to administer structured interview questionnaires. However, they often have trouble with semi-structured or semi-directive methods. …The quality and utility of any study depends on the training and experience of the research team, and it a false economy to cut corners with respect to it."

ABEKS provides community researchers with a training manual for delivering the survey questions, and support as required. The manual is clear and conveys in plain language how to select participants and conduct the surveys. In the absence of supervising the interviews in person, the training manual and support provide a way of setting a standard for how the survey is conducted. Renewable Resource Councils and Hunter and Trapper Committees are expected to meet a professional standard in their selection of participants. Researchers are held to a professional standard in the conduct of the interviews. The methods are clearly documented and easily defensible by a professional research standard.

Researchers understand the rationale for selecting experts, and the consequences of making inappropriate selections. They are also trained to focus portions of the questionnaire on the expertise of the harvesters they are interviewing. For example, if

someone has not harvested caribou during the year, they will not be asked the questions related to caribou.

Data collection methods are applied consistently from one interview to the next, across all communities because each co-researcher has been trained the same way and uses the same methods manual. If research methods are conducted as described in the training manual, then the methods are defensible.

3. **How did the knowledge holders acquire their knowledge?**

Participants in ABEKS interviews are selected for their expertise, and identified through the HTC, RRC, and the researcher. Thus experts may have acquired their knowledge in various ways – education, experience, through employment or on-the-land programs, or a combination of all or some of these. ABEKS does not provide profile information of their interviewees, including how they obtained their expert knowledge, though data about time on the land is collected.

4. **How are interviewees selected and interviewed?**

The ABEKS training manual provides clear instructions for how the interviewees should be selected and interviewed. This manual is publicly available, and instructs interviewers to consult with their local RRC/HTC Coordinator or Chair. In order for researchers to get paid, they must produce their completed interviews and local expert list to the RRC/HTC Coordinator or Chair. This provides a second check-in about the validity of the expertise used in the survey.

Interviews are conducted in people's homes. A single interview usually takes less than 2 hours. This aligns with Tobias (2009), who notes that participant fatigue begins to negatively impact response after two hours.

The community researcher uploads survey responses directly to the database. Researchers strive to complete 20 interviews per topic, recognizing that someone with expertise about caribou might not be an expert about birds.

5. **How was language addressed?**

Surveys are conducted in English. ABEKS has not had problems locating 20 English-speaking experts in order to complete the surveys in any community. Given the regional context, it is not believed that this creates a bias within the respondents.

6. **Did the study address understanding, and consistency in the use of, common terms?**

The language of the questionnaire is clear and leaves little room for misunderstanding terms. Researchers use booklets with photos to help identify birds, however there has been increasing feedback that identification of types of fish would be better reflected if visuals or photos accompanied the interviews.

The ABEKS recently revised their survey instrument, in collaboration with the Yukon Bureau of Statistics. This process helped to purge unnecessary and leading questions, and provided a thorough review of the survey instrument.

7. **Was the process of validation documented in the methods?**

Yes. The survey instrument forces respondents into pre-determined responses (such as yes/no, more/less etc.) for many questions. This minimizes the potential for errors arising from interpreting long narratives, for example. Constraining answers to predetermined responses allows for statistical tools to be used in data analysis.

Moreover, the program requires communities to review draft results to validate or identify unusual findings/results for correction.

8. **Is the way in which the information is summarized, analyzed, and interpreted, appropriate?**

ABEKS normally does not analyze or interpret its own data, beyond presenting summaries of its survey results. It is assumed that researchers accessing ABEKS data are analyzing and interpreting the data appropriately.

In terms of PCMB, it seems that the timing of ABEKS data is out of synch with the information needs of PCMB prior to their annual harvest management meeting. Until this issue of timing is addressed, ABEKS data will always be one year out of date for this important meeting.

Russel and Nguyen (2015) use simple mathematical tools and basic statistical analysis to analyze the caribou data of interest for PCTC. These methods are clearly described in their reports.

9. **What is the relevance of the study to the decision at hand?**

The four goals of ABEKS are perfectly aligned with using data from its survey to provide PCTC with information they can use in determining the herd's status. This is not a case of local knowledge collected for one purpose being taken out of context and used to support decision-making for another reason.

10. **Is the level of uncertainty in the information explicit and transparent?**

In conveying interview data to user groups and partners, ABEKS is transparent about the number of surveys conducted and the methods used. How researchers choose to analyze this data should be reviewed on a case-by-case basis.

Analysis of ABEKS Caribou Questions

This section reviews each of the five caribou indicator questions, in an effort to draw a link from the response data to the summary statements and information that ABEKS can supply to PCMB.

#10 –Are hunters' needs met?

PCTC's data sources for this indicator are ABEKS questions #F3.a, F3b., and F3c:

F3.a: Were your household's needs met for caribou this year?
☐ Yes. Go to F3.b.
☐ No. What prevented your Porcupine caribou hunting needs from being met? (check all that apply)
☐Not enough caribou ☐Availability/ location of caribou ☐No time ☐Cost of gas/ equipment ☐Not enough shared caribou ☐Other (Specify:_____)

F3.b. Did you go out to hunt for caribou this year?
☐ Yes (go to F3.c)
☐No. Main reason why not? (circle only ONE). ☐No time ☐cost of gas/equipment ☐not enough caribou ☐caribou too far/bad location ☐Illness/ health ☐Had enough caribou ☐Other Explain:_____

F3.c If yes – Did you get any (harvest) caribou?
☐Yes
☐No (go to F5a)

ABEKS data for this indicator should align with harvest information brought to PCMB by Parties to the Harvest Management Agreement. If these two lines of evidence do not align, managers could investigate the following:

- Ask the Parties to validate their harvest data. Is the harvest data reliable this year? What changed or should have changed since last year's reporting?
- Ask ABEKS to review their survey data. Was there a problem with the survey or data analysis?
- Why are the numbers not in alignment?

Hypothetical examples of statements that ABKS could derive from responses to F3.a, F3.b, and F3.c and present to PCMB are:

1 – Few households were able to meet their needs from Porcupine caribou this year. For three communities this was because the caribou were too far from the community to be hunted. The other three communities reported that there were not enough caribou. Only 12% of respondents who went hunting for caribou this year were successful.

2 – Most households (92% of respondents) were able to meet their Porcupine caribou needs this year.

#12 –Hunter Assessment of Body Condition

Data from ABEKS question F4 is used by PCTC to inform Hunter Assessment of Body Condition. The question involves populating a series of grids about overall condition through the year, size through the year, and physical abnormalities through the year. ABEKS data summaries include statements like, "Few have cysts, some have swollen joints" (ABEKS 2013; 39).

F4. The following questions are about body condition & health of caribou you observed in each season over the past year.

Overall Condition	Winter	Spring	Summer	Fall
Excellent (E)				
Good (G)				
Mixed (M)				
Fair (F)				
Poor (P)				
Don't know				

Size	Winter	Spring	Summer	Fall
Muscular/Fit/Strong				
Skinny/Lean				

Average				
Fat				
Don't know				

Physical Abnormalities	Winter	Spring	Summer	Fall
Cysts, white spots in meat				
Sores & puss				
Wounded/limping				
Swollen joints, testes or glands				
Bad liver				
None of these				
Don't know				

Data from F4 could be used by PCTC to direct future research or communications efforts. It could also be used in statement such as:

1- Many respondents reported caribou with bad livers. Several liver samples were analyzed and deemed to be very high in ___, which may indicate_____. Future research to help understand what is happening with this issue could be _____. Meanwhile, those who consume caribou livers should be reminded not to eat unhealthy-looking livers.
2- Caribou were described by most ABEKS survey respondents as being in excellent condition throughout the year.

#13 – Health (i.e. reports of abnormalities)

Date from question F4 informs the health indicator. Aside from overall condition, size, and a list of physical abnormalities, there is no other question to evoke responses for caribou health in an open-ended way. If harvesters see abnormalities outside of those listed above, they would not be captured in the ABEKS survey.

#15 – Snow Conditions and #17 Weather Events

Questions B1a, B1b., and B2 all inform the snow conditions and weather events indicators.

SECTION B: Unusual , Extreme and Rare Weather Events
B1.a Now think about unusual, extreme or rare weather events. Can you recall any such events for: (Circle yes or no for each season)

Winter (Jan-March)	Yes	No
Spring (April – June)	Yes	No
Summer (July – Sept)	Yes	No

Fall (Oct-Dec)	Yes	No	
If all "no" skip to B.2)			

B1.b Please tell us the month(s) when you observed any of the following unusual, extreme or rare weather related events? (✓✓each weather event under the month it occurred, or No unusual if none. Each month should have one or more option checked)

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Colder than normal												
Hotter than normal												
More snow than normal												
Less snow than normal												
Torrential Rain												
More Thunder storms												
Icing Event (rain that freezes on snow/ makes crust)												
Really Frosty												
More Wind												
Drought - Very dry conditions												
Other (Specify):												
No unusual, extreme or rare weather this month												

B2. Are there any other particular things that you noticed about weather this past year? ❍ **Yes** ❍**No → Go to C1** ❍**Don't know**

B2b. IF Yes → Specify:

Answers from some months for this question should correlate with responses to #10 in cases where respondents have reported weather as a reason for not harvesting.

All of the ABEKS survey questions provide information on *trend*. This can be useful when technicians look at the trends with other indicators. How does what local knowledge have to say about trend relate to what quantitative data indicates? Where the trends align, managers can have confidence about their assessments. Where the trends diverge, managers know where to investigate further.

Discussion

Local knowledge is a valued source of information for the PCMB. Since 1994, ABEKS has been collecting local knowledge about a number of indicators of the Porcupine Caribou Herd. This paper examined the integrity of the ABEKS data, to understand its value as a data source. By examining the methods used in the survey, and exploring the individual caribou questions, the authors concluded that ABEKS data is defensible and valid when the methods described in the training manual are adhered to. Data derived from questions B, F3, and F4 are appropriate for rendering local voices and local knowledge about Porcupine caribou into a form that is useful for PCTC. Ideally the data would be summarized and analyzed each year in a timely, consistent manner and presented to PCTC in a format that speaks directly to their information needs. The report would:

- provide summaries (by community and total) and statistical analysis of the responses, including # of respondents for each community and each question;
- point to areas where the responses validate each other (for example, respondents saying that they could not harvest because of weather should be aligned with responses to the question about weather events);
- point to areas where the responses diverge from each other (for example, if Inuvialuit and Gwich'in respondents from Aklavik have very different responses, further investigation may be warranted. Russell (2015) notes in a comment to Figure 7, that "Although there were no obvious trends we did note that 2011-2012 interview year was a year of reduced abundance for all seasons and cohorts." Stating lack of trend is one way to indicate an area that could warrant further investigation.
- clearly state where propositions and theories have been drawn from the data but not tested with respondents. For example, Russell (2015), states, in discussion about the data analysis, "…although [caribou] availability and meeting needs remained high, estimates did not track the increasing trend in caribou numbers. We assume that these results could reflect a threshold population size above which caribou availability and the ability of hunters to meet their subsistence needs do not increase."

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Appendix A: ABEKS: TK or Local Knowledge?

A number of academics have observed that TK[4] research is a distillation of knowledge embedded within complex social relations and knowledge structures (Armitage, 2015). Local knowledge is "expertise acquired in and from the place where that person lives and works" (Wilkinson, Clark and Burch, 2007; 4). The difference between the two is striking: while traditional knowledge approaches the world from an indigenous perspective, local knowledge is based on observations and experiences that are divorced from their cultural context.

Armitage (2015) reminds us,

> "Although they are widely supported by local HTCs and community members at large because they directly involve local TKHs in data collection, community or hunter-based monitoring programmes document TK superficially and only in strict accordance with scientific categories and documentation protocols (eg. Bell and Harwood 2012; Weaver 1991). Similarly, data documented through a logbook and sentinel fishery programs are of interest to fisheries scientists studying stock abundance and distribution, but the data cannot be considered fishers' TK except in the more superficial way (Purps et al, 2000; Zwanenburg et al. 2000)."

ABEKS collects local knowledge from experts in communities within the range of the Porcupine Caribou Herd. Many of these experts are traditional knowledge holders. However, the ABEKS survey instrument is designed to ask about activities and observations; it does not ask questions that would elicit TK as a response. Responses are predetermined in the survey instrument or questions require a number as a response. There is no room in the survey instrument for probing or comment outside of these responses. There is also no contemplation in the ABEKS process of the intellectual property rights and different validation or participant vetting process that a TK study would likely demand. ABEKS does an admirable job of collecting local knowledge annually, using consistent and defensible methods.

[4] "Traditional knowledge is a cumulative body of knowledge, know-how, practices and presentations maintained and developed by the peoples over a long period of time. This encompasses spiritual relationships, historical and present relationships with the natural environment, and the use of natural resources. It is generally expressed in oral form, and passed on from generation to generation by storytelling and practical teaching. (Smith 2006,i).