Keep it Simple and Be Relevant: the First Nine Years of the Arctic Borderlands Ecological Knowledge Co-op

Joan Eamer
Environment Canada, 91780 Alaska Highway
Whitehorse, Yukon, Canada Y1A 5B7
joan.eamer@ec.gc.ca

Draft – February 29, 2004

Acknowledgements: The Borderlands Co-op is, above all else, a collaborative effort. I would like to acknowledge the many organizations and individuals who have worked on all aspects of the program since 1994. In particular I acknowledge the long-term dedication of Gary Kofinas, Billy Day, Randall Tetlichi, Carol Arey, Annie B. Gordon, Aileen Horler, Robert Charlie, Mike Gill, Scott Gilbert, the Wildlife Management Advisory Council (North Slope), the Gwich'in Renewable Resources Board, the Arctic National Wildlife Refuge, Parks Canada, Fisheries and Oceans Canada, the Yukon Government, the University of Alaska, and Environment Canada, as well as others contributing funding, in-kind support, information and interpretation assistance. Most importantly, this program could not exist without the support and input from the local resource councils and committees, the community monitors, board members, elders and local experts from the communities of the Arctic Borderlands.

1. Introduction

This paper describes and discusses an ecological monitoring program in the western North American Arctic: the Arctic Borderlands Ecological Knowledge Co-op. This program has evolved in structure and scope since its inception in 1994, moving towards greater local control and recently expanding to more communities. The program's focus is on strengthening the role of local aboriginal knowledge in environmental assessment, and in exploring ways to bring local and science-based knowledge together to improve understanding of ecological status and trends.

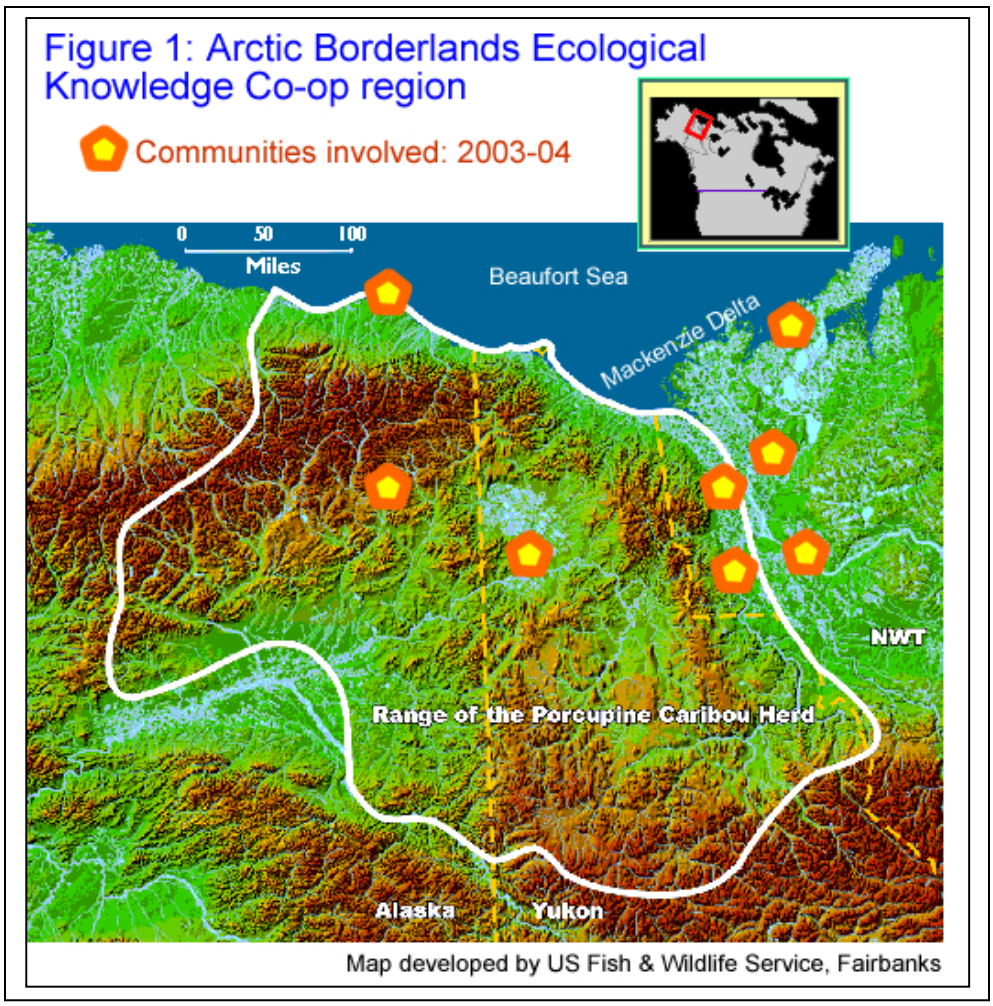
The program has been successful in achieving buy-in from a range of aboriginal organizations, co-operative management boards and Canadian and US government agencies, but we are still faced with challenges in summarizing, interpreting, synthesizing and bringing information into decision-making processes. Key elements of the program are: co-operative decision-making in all aspects of the program's development and organization; involvement at the community level in direction and implementation of the program; and, ongoing communication and discussion about the use of multiple information sources in ecological monitoring.

2. The Arctic Borderlands Region

The Arctic Borderlands Ecological Knowledge Co-op (Borderlands Co-op) operates in the range of the Porcupine Caribou Herd (250,000 km^2) and adjacent marine and coastal areas, extending into the Mackenzie Delta (Figure 1). This area is complex in terms of jurisdictions, and is ecologically very diverse. The region contains tundra, taiga and coastal landscapes, mountains, large wetlands complexes, several major rivers, and one of the world's largest river deltas, the Mackenzie Delta. It contains internationally important wilderness and wildlife habitat. The Arctic Borderlands encompasses part of

northern Alaska and, in Canada, parts of two territories: the Yukon and the Northwest Territories.

The human population is predominantly aboriginal: Inupiat (Alaska), Inuvialuit (Canada) and Gwich'in (Canada and Alaska), and the area includes five major land claimant groups, each with their own governance and resource management structures. The communities range in size from fewer than 200 people to about 1000, with the exception of Inuvik, which has over 3000 residents, of which about 2000 are aboriginal. A total of 10 communities, two of which are in Alaska, currently have some involvement with the program.



Caribou have always been a key resource for people in the region. For most of the communities, the Porcupine Caribou Herd (named after the Porcupine River, a tributary of the Yukon River) is a major part of the diet and of the traditional culture. For the communities with coastal homelands, harvesting marine mammals is also important. Fishing, trapping and berry picking are traditional activities for all the communities. The economies of the communities are a mix of on-the-land activities and wage economies. Oil and gas exploration and development are becoming increasingly important in some of

the communities; aboriginal and national, state and territorial governments are important employers. Tourism currently provides limited job opportunities to local residents.

Although most of the Arctic Borderlands is sparsely populated and little-developed, the region is not without its environmental stressors. The migratory Porcupine Caribou Herd's calving grounds are primarily in a narrow section of the coastal plain in Alaska (Figure 2), a wilderness area with petroleum reserves, and the subject of a high-profile, bitter and protracted dispute regarding its ongoing protection. Increased oil and gas exploration and preparations for pipeline development are taking place in the Canadian side of the region. Levels of persistent organic pollutants and mercury (from atmospheric transport) in fish and marine mammals have raised concerns about safety of traditional foods over the past 15 years (Northern Affairs 2003). The Arctic Borderlands is predicted by climate models to be among those regions that will experience the most severe impacts from climate change. Temperatures are measurably warming now, and the extent of permanent sea ice is decreasing. Changes in snow conditions in the Arctic Borderlands may now be contributing to the observed decline in population of the Porcupine Caribou Herd (Griffith et al 1999).

Figure 2: Porcupine Caribou Herd calving grounds

3. Development of the Borderlands Co-op

The Borderlands Co-op grew from a meeting of researchers, government managers and scientists, aboriginal leaders and community representatives in Dawson City, Yukon in the fall of 1994. The purpose of the meeting was to come up with a plan to improve ecological monitoring in the range of the Porcupine Caribou Herd. Although the working relationships among the organizations represented at the meeting were fairly well established, it was clear that there was a rift between many scientists and community representatives in terms of the value and credibility of different types of information. All too often the results of such a meeting are to respectfully acknowledge these differences and proceed with strengthening the science-based program, perhaps increasing communications efforts, leaving the communities frustrated and sidelined. At this meeting people decided to tackle this issue head-on by developing a monitoring program that would strive to improve our collective understanding of ecological status and trends

by making use of local observations, traditional ecological knowledge, science-based research and monitoring, and government records.

Community representatives at the meeting developed a set of guidelines for use in implementation of this new program:

Text Box 1

Borderlands Co-op Guidelines

- Go Slow
- Keep it Simple
- Be Relevant
- Focus on the Long Term
- Economize

These guidelines have stood the test of time well and have been useful in implementing the monitoring program over the past nine years. Every year we review these guidelines to help keep us on track.

It was also decided at the founding meeting that this program would be developed and managed co-operatively, with major decisions being made by consensus at meetings, and with Environment Canada leading, but not "owning" the program. Over the years this has evolved into a more formal model, with a non-profit society administering the program. The gradual growth of acceptance of the methods and results of the Borderlands Co-op cannot be separated from the organizational development. Control and ownership at the community and regional level are an integral part of the program.

Text Box 2

Goals of the Arctic Borderlands Ecological Knowledge Society

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

In a 1996 workshop that was to become the first "annual gathering" of the Borderlands Co-op, participants developed a list of about 70 potential indicators of ecological change for the region and discussed how best to document local knowledge. A pilot project was started over the following year, based on interviews with people who were active hunters, trappers, berry pickers and fishers.

Since then, a gathering has been held each year in one of the participating communities or in the regional centres of Whitehorse and Inuvik. The gatherings are an opportunity for participants to discuss and make decisions about the Borderlands Co-op's programs. Each year an action item list is prepared, and each year the previous year's action item list is reviewed. Directors are elected, the financing is discussed, reports are presented, indicators are reviewed, observations are compared, and the directions, goals and operations of the program are argued over, fine-tuned, and re-affirmed.

Figure 3: Annual Gatherings provide an opportunity to review the program and set directions

4. Components of the Borderlands Co-op's Program

4.1 Indicators

The indicators identified in 1996 and reviewed annually ranged from basic environmental measurements (such as temperature and ice-free period) to measurements of potential stresses (such as number of airplane flights) and effects on communities (such as time spent on the land).

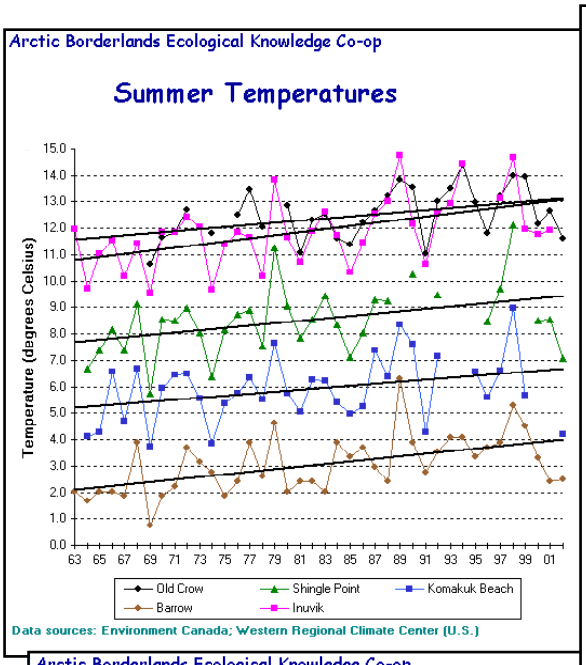
In developing these indicators, we have worked primarily with established datasets, in some cases requesting from the data holders additional data collection or manipulation to make the information more suitable for assessing status and trends. Our indicator set reflects to a large extent what information is available, and we are in the process of doing a strategic assessment of our information to select key indicators and identify key gaps. Developed indicators are all available on the Borderlands Co-op website, and are periodically printed and distributed to Borderlands Co-op participants.

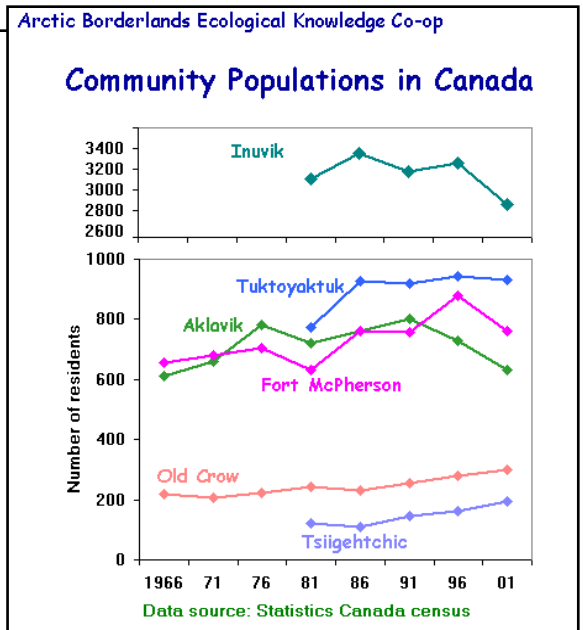
Examples of indicators on the Borderlands Co-op website are shown in Figure 4.

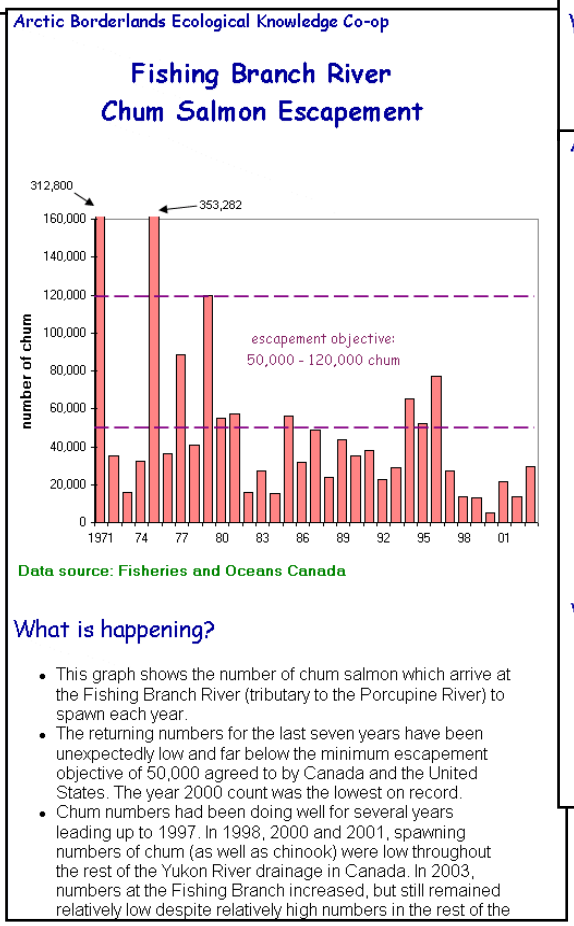
Figure 4: Examples of Indicators (from www.taiga.net/coop/indics).
These are excerpts from 4 indicators. Indicators are presented in a standard format, addressing the questions:

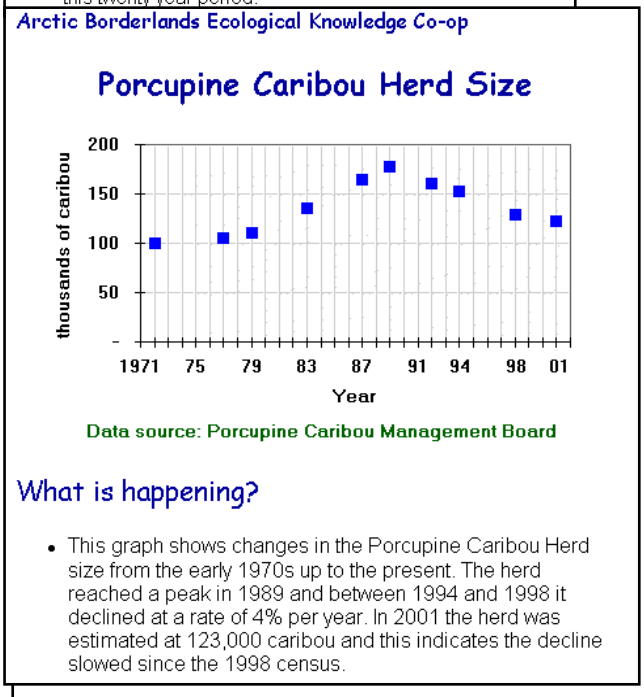
- What is happening? (usually with a display of the data and a description)
- Why is it happening?
- Why is it important?

References and technical information are also included.









4.2 Community-based Ecological Monitoring

Interviews with local experts are conducted annually by community monitors who are selected jointly by the Borderlands Co-op and each local participating organization (for example, the Hunters and Trappers Committee). A training and planning session is held each year with the community monitors to review the program, the contract duties, and to practice interview techniques. The first task for each community monitor is to develop (in consultation with the local organization) a list of knowledgeable, experienced people who have been active on the land over the past year. This list represents the community's selection of their local experts. The target is to interview 20 local experts in each community, each year.

Figure 5: Annie B. Gordon, monitor for the Aklavik Inuvialuit community for 4 years, has reviewed and improved the interview methods.

Prior to each interview the community monitor reviews the basics of the program and discusses how the information will be used. An "informed consent" form with this information is signed, and a copy is left with the local expert. Interviews are confidential (specific responses are not connected with names). This year, to provide an opportunity for better recognition of the local experts, we have asked if people wish to be recognized by name in the "thank-you" section of reports and posters, and we have taken pictures of people who wish their photos to be used. Each local expert receives an honorarium in the form of a coupon for gasoline at the local store. Gas prices are high in the region, and purchasing gas for snowmobiles and vehicles is often a factor limiting people's ability to get out on the land.

The interviews are conducted using an interview form, which has a mix of closed and open-ended questions. An example of a "closed" question is:

- How did the lakes freeze up this year?
    - A quick freeze-up
    - A slow freeze-up
    - Or just an average year?

An example of an open-ended question is:

- From what you have seen, have there been any changes in Jackfish over the past five years or so?

Tape recorders are used only as an optional aid for note-taking for one general question. A map is used for each interview to mark the areas being discussed. The interview methods are reviewed and adapted each year with the help of the community monitors and the local experts, and must be tailored to some extent to each community to reflect the differences in traditional areas and use patterns. The end product is always a compromise among several often-conflicting goals:

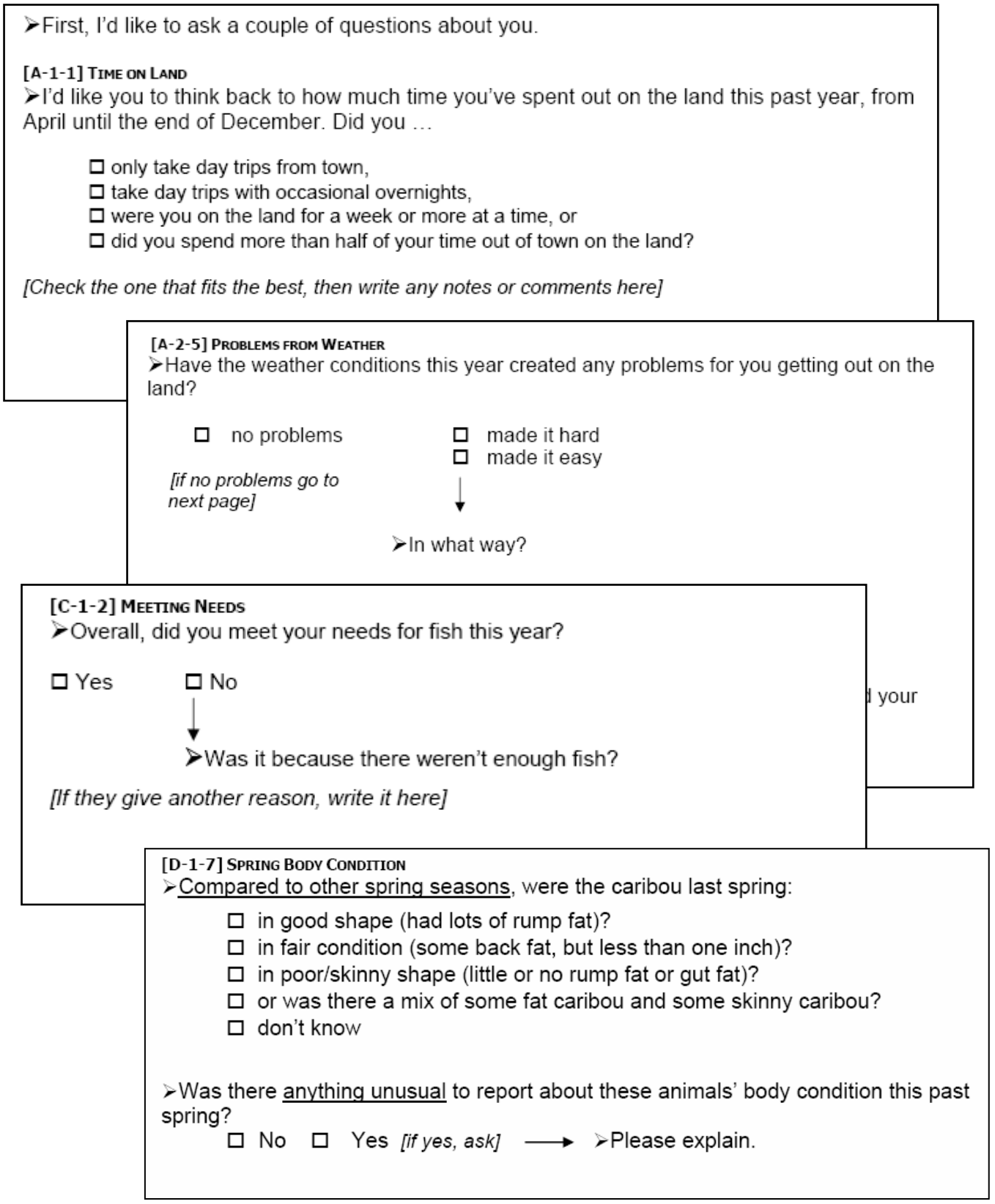
- keep the questions simple and keep the interview interesting and not too long
- be comprehensive
- document information in a way that can be compared across areas and years
- ask questions in ways that are relevant to the people interviewed and draw out observations and interpretations that reflect their traditional knowledge
- cover topics that will elicit observations from male and female experts of a range of ages
- adapt to needs for specific information for understanding issues that arise
- be consistent from year to year.

Observations about fish, berries, caribou, other animals, weather and environmental conditions are documented. Many of the questions draw out observations about changes and interactions among environmental, economic, and community conditions, and the effects of these on people's ability to hunt, trap, fish and collect berries. A few sample questions are presented in Figure 6.

Each community monitor prepares his or her own report on the interview results and presents it at the Annual Gathering. The community monitors' reports, along with added observations from the Annual Gathering, are reviewed by the local organizations and then are compiled into an annual community report co-authored by all the community monitors and widely distributed. A copy of the report is mailed to each person who was interviewed in each community. This annual reporting by the community monitors to all contributors is crucial to the profile and success of the program. It allows people to see how their information is being used in developing a regional picture and it reinforces the community ownership of the results. Figure 7 is an excerpt from a community report.

Results from the interview forms are entered into a Microsoft Access database and the maps are digitized. Summaries are prepared on a topic basis, in large poster format (Figure 8), to compare across years and communities. It has taken several years to develop the methods for managing and interpreting the information, and we are still summarizing and examining the interview results. We have not yet added information from the mapping to these analyses.

Figure 6: Selections from the 2003-04 interview form



➢First, I'd like to ask a couple of questions about you.

[A-1-1] TIME ON LAND

➢I'd like you to think back to how much time you've spent out on the land this past year, from April until the end of December. Did you …

- ☐ only take day trips from town,
- ☐ take day trips with occasional overnights,
- ☐ were you on the land for a week or more at a time, or
- ☐ did you spend more than half of your time out of town on the land?

[Check the one that fits the best, then write any notes or comments here]

[A-2-5] PROBLEMS FROM WEATHER

➢Have the weather conditions this year created any problems for you getting out on the land?

☐ no problems

[if no problems go to next page]

☐ made it hard
☐ made it easy

➢In what way?

[C-1-2] MEETING NEEDS

➢Overall, did you meet your needs for fish this year?

☐ Yes ☐ No

➢Was it because there weren't enough fish?

[If they give another reason, write it here]

[D-1-7] SPRING BODY CONDITION

➢Compared to other spring seasons, were the caribou last spring:

- ☐ in good shape (had lots of rump fat)?
- ☐ in fair condition (some back fat, but less than one inch)?
- ☐ in poor/skinny shape (little or no rump fat or gut fat)?
- ☐ or was there a mix of some fat caribou and some skinny caribou?
- ☐ don't know

➢Was there anything unusual to report about these animals' body condition this past spring?

☐ No ☐ Yes *[if yes, ask]* ⟶ ➢Please explain.

Figure 7: Excerpt from the 2002 Community Monitoring Report

Berries

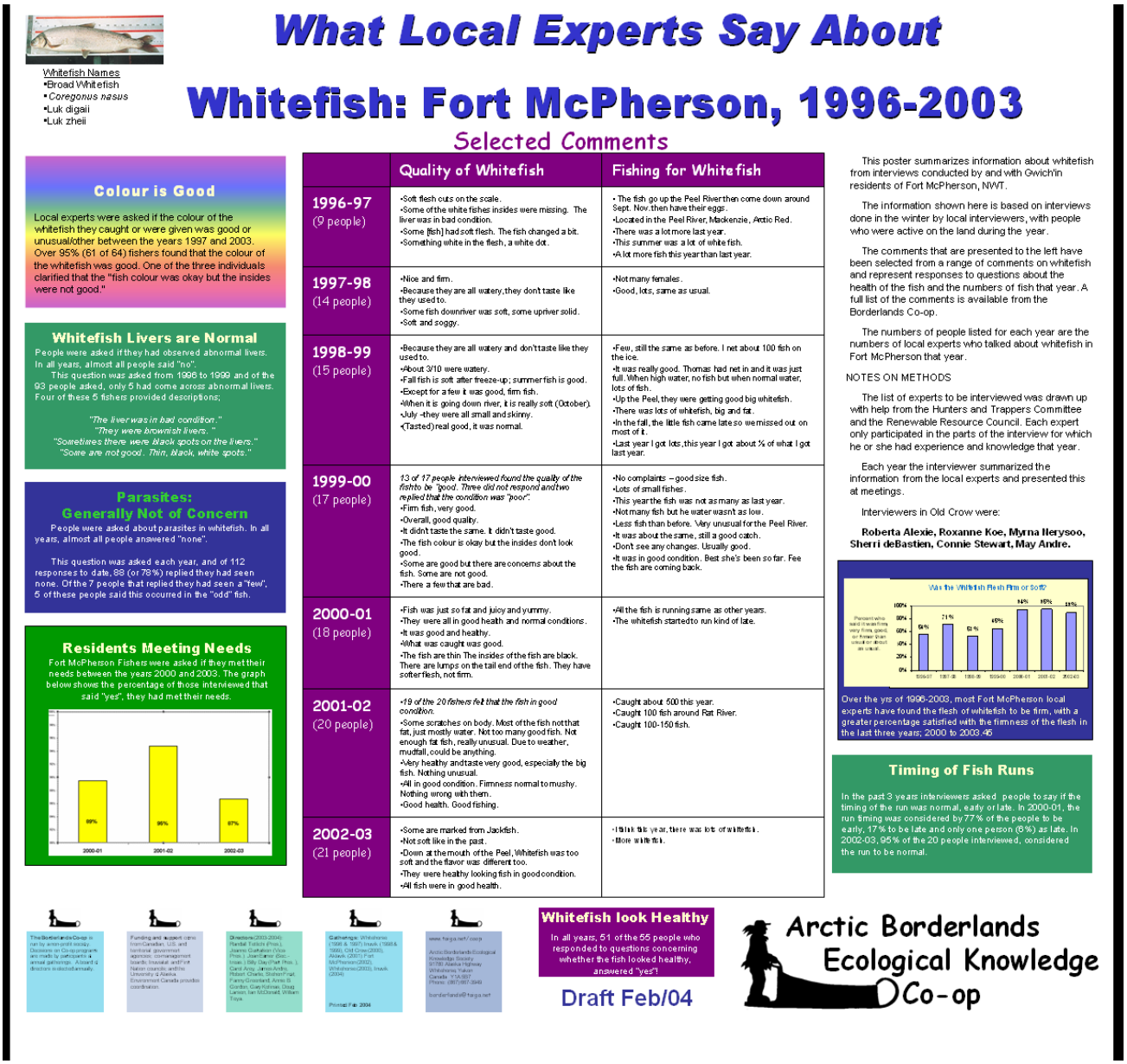
Old Crow

- The berry blossoms started growing because of hot weather and early showers last spring. Then it rained, got damp, then it snowed. This killed and froze the berry blossoms resulting in hardly any berries last summer.
- The few that grew were very small and had an unpleasant flavour. This includes all berries.
- People did not get enough to meet their needs.
- This also created problems for the animals because there was no berries to feed on. As a result the animals turned to grass and roots along the rivers to eat.

Fort McPherson

- This year was a very bad year for berries.
- Elders reported this resulted from extreme temperature changes this summer.
- There was an abundance of cranberries at Rat River. These were under shrubs, willows and trees.

Figure 8: Example of a Results Poster from the Community-based Monitoring Program. These posters summarize and compare information on a topic, either across years in one community (this example) or across communities for one or more years. Basic information about methods and about the program is included on all posters.



4.3 Making Use of Research Results

One of the long-standing complaints from communities is that researchers come into the region, work for a bit, then leave, and communities do not receive the results of the research. Increasingly researchers are reporting back to the communities, but it remains difficult for all parties to keep track of and find relevant information from past studies. Because of the importance of the Arctic Borderlands to wildlife, and because of the history of major petroleum-related development proposals, there has been a lot of research conducted in the region. To address needs for better access to and better understanding of research results, the Borderlands Co-op:

- developed an online database of information sources for the region
- produced a summary of what is known about contaminants from atmospheric transport in the region

These can be viewed at www.taiga.net/coop/reference

5. Putting it Together

The Borderlands Co-op uses the following conceptual models to explore how its information and knowledge from different sources are related and how the program components contribute to understanding ecological status and trends. These relationships are described in more detail in Kofinas et al (2002)

Figure 9 shows relationships among

- observations made by experienced people on the land over the year,
- traditional ecological knowledge,
- science-based monitoring and government records and
- science-based research

Figure 9: Borderlands Co-op Knowledge Base: differing traditions, tools and contributions
Examples are in brackets.

	Local and Traditional Ecological Knowledge (TEK)	Science-based
data, observations	On-the-land observations [caribou availability, caribou body condition, snow conditions] ↔	Monitoring and records [caribou population census, precipitation, ice and snow records]
↓ interpretation, theory, integration	TEK-based ["Sometimes caribou winter on the coast when snow is late and sea ice is off coast, then they are fat because they get the best food – we see this more now than before"] ↔	Statistical analysis and interpretation based on research [caribou herd population trends and habitat use; climate trends]

Figure 10 shows how we view the components of our program fitting together to achieve our goals of synthesizing information from different sources and improving communications and understanding of ecological status and trends.

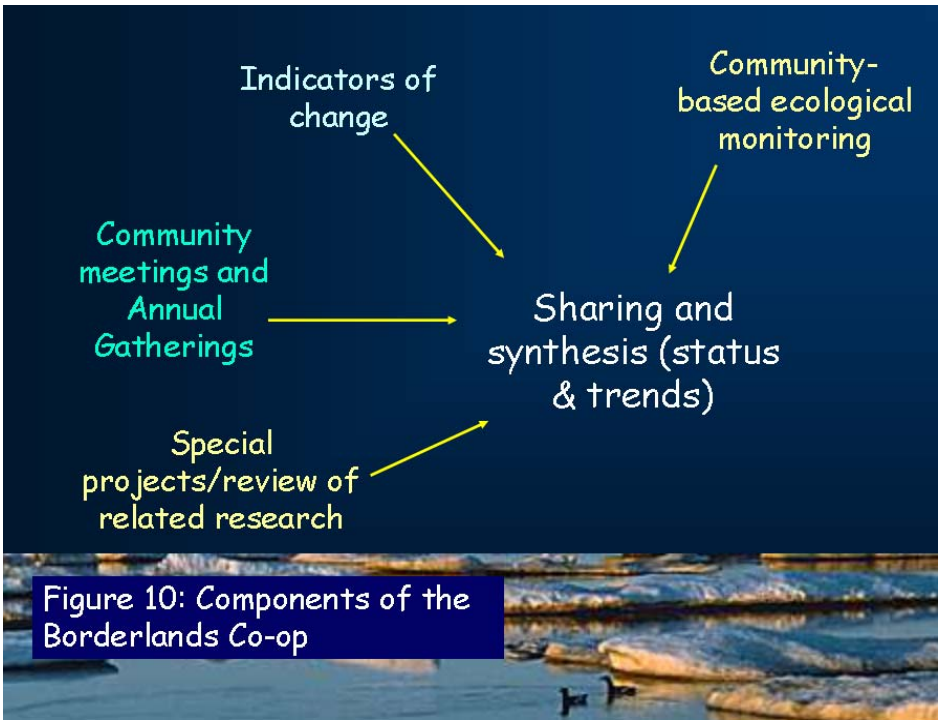


Figure 10: Components of the Borderlands Co-op

The following examples illustrate ways in which these relationships of knowledge types and program components have been used:

Providing direction for research and making it relevant

Local experts from the community of Old Crow, Yukon, observed that the lakes in Old Crow Flats were drying up. Scientists followed up on (and confirmed) these observations with remote-sensing studies and ground-truthing. Further work will track this trend to see if it continues, and will look at the ecological implications.

Bringing local knowledge into policy discussions

Observations about impacts of a changing climate documented through the community-based monitoring program have been brought to the policy-discussion level in Canada by government representatives and by representatives of aboriginal organizations.

Following up on community concerns

In the first three years of the community-based monitoring program, local experts in three communities identified an unusual number of diseased-looking livers from one species of fish. There was concern that these fish were contaminated and unsafe for human consumption. The Borderlands Co-op, through a partnership with a government agency, followed up with a testing and analysis program. Experienced local fishers submitted "good" and "bad" livers for analysis. It was determined that contamination was not the source of the problem. This was communicated through the Annual Gathering and

community meetings. In recent years the incidence of diseased livers has dropped, and concern is rarely expressed. We continue to track this through the community-based monitoring program.

Improving understanding of status and trends of ecosystems

The Porcupine Caribou Herd has been the subject of extensive research and monitoring over the past 25 years. The communities who are users of the Herd hold knowledge based on centuries of observations. Caribou hunters observe and interpret the conditions they encounter each year while going about their activities on the land. These sources of information and interpretation are often at different temporal and spatial scales and inform one another. Examples:

- Science-based methods provide estimates of herd size and calf survival and on how snow conditions affect these; local observations and traditional knowledge provide understanding of how caribou movements and feeding patterns are influenced by snow conditions;
- Science provides regional trend information on climate variables; local knowledge provides information on trends and quality of snow and forage in some key habitat areas.
- Harvest study records provide (often poor) records of total harvest. The community-based monitoring program provides information on whether each community has met its seasonal needs for caribou.

6. Some Lessons Learned

The development of this program has not been a steady progression – there have been difficulties obtaining support, financing, agreement on direction, and acceptance of the results. Nonetheless, the years have seen a steady growth in support and success of the Borderlands Co-op. Some of what we have learned:

1. Keeping things simple and relevant to local concerns and needs, though not always easy, is crucial to the success of community-based programs.

2. Development of a core set of people dedicated to the program is crucial. We have been fortunate in having strong supporters who are community leaders, elders, government managers and academic scientists.

3. Frequent reporting on the program and the results is very important. To reach all participants and interested parties, we use multiple means of communicating – newsletters, inexpensive photocopied reports, results posters, a web site (www.taiga.net/coop), and presentations at meetings.

4. The organization of the program cannot be separated from its methods and results. Establishing a balance of power and ownership that communities, agencies and councils are comfortable with is essential. For us, this is constantly evolving – as the profile of the program has risen, the need to structure and define the management of the program has grown.

5. The community-based monitoring program presents significant challenges for data management and results interpretation. We did not put sufficient effort initially to addressing this, but we now have a system that allows us to access the results efficiently and to develop useful summaries that recognize the constraints and limitations imposed by the methods.

6. Attention needs to be given to balancing the need for consistency and quality control with the need for local participation and ownership. At the outset we recognized that involvement and control at the community level were essential for this program – though this has meant some inconsistencies in the documenting of local knowledge (with annual review of the methods, separate interviewers in each community, and often new people each year). This is part of the program, and needs to acknowledged when summarizing and interpreting results.

7. The tension between science and traditional knowledge remains as part of the program. Results do not always agree; people remain entrenched in their views and traditions. This needs to be revisited periodically and examined openly. Text Box 3 is an excerpt from a discussion at the 7th Annual Gathering.

Text Box 3: Selection from Discussion on Knowledge, 8th Annual Gathering, Ft. McPherson, 2001

Randall Tetlichi:
I spent 90% of my time growing up with my grandparents. They taught me about a lot of stuff. I notice in the traditional world, it's all based on how am I going to do this. They never asked why. People at my age level are the last ones to say 'how'. Traditional knowledge is passed on through generations. Experiences from elders that they're passing down to me and to other people. You never hear them say 'why?' Didn't ask why I use snowshoes to get a moose, it's by knowledge that was passed down. Traditional knowledge is using the knowledge that we have.

Science is always asking why. Traditional knowledge is all connected with the universe. Science wants to know why it works.

A good thing today is that people have to come together. We have to know why and how. We have to double understand. Growing up I just had to understand my way. Now it's a total different world. I have to train my mind to remember, but I also have to train my mind to understand science. Now I have to double understand and pass the knowledge on. The young people have to double understand, use that knowledge-- how, and why.

Not too long ago Mike would say, "My way's the best". Charlie would say, "My way is right, your way is bad". In the past there was a lot of judgement. The old people tell me, let's work with the white people and work together to move forward.

Discussion
Common to all knowledge is how we believe the world works based on what we see. Often we wonder if our explanations are right. As part of that, we have to look at what we want. Underneath are the things that we assume but don't talk about. Language contains a lot of unspoken assumptions. "How" makes sense if the world is changing at a slow rate. When it is faster, "why" is more important. Or maybe "why" is used because people wanted to change the world.

References

Northern Affairs Program. 2003. Canadian Arctic Contaminants Assessment Report II. Government of Canada, Ottawa.

Griffith, B. D. Douglas, D. Russell, R. White, T. McCabe and K. Whitten. 1999. Effects of recent climate warming on caribou habitat and calf survival. Invited Paper, Workshop on Biota and Climate Change, Ecol. Soc. Amer. Ann. Meet., Spokane, WA, 11 August 1999

Kofinas, G., Aklavik, Arctic Village, Old Crow, and Ft. McPherson. 2002. "Community Contributions to Ecological Monitoring: Knowledge Co-op-Production in the U.S.-Canada Arctic Borderlands." Pages 54-91 *in* I. Krupnik and D. Jolly, editors. The Earth is Faster Now: Indigenous Observations of Arctic Environmental Change. ARCUS, Fairbanks.