8. Annotated Bibliography and Literature Review of Climate Change

1. Climate Change in General

IPCC (2007): *Climate Change 2007: Synthesis Report*. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A.(eds.)]. IPCC, Geneva, Switzerland, 104 p.

This synthesis report summarizes the extensive research results of the three working groups that contributed to this fourth Assessment report of the Intergovernmental Panel on Climate Change. The three working groups: Working Group 1 – The Physical Science Bases; Working Group 2 – Impacts, Adaptation, and Vulnerability; and Working Group 3 – Mitigation of Climate Change, have all produced extensive documents separate from this synthesis report. For example, the report from Working Group 1 goes into great detail about the science of climate change and its past, current and future impacts on the environment and weather patterns; and climate change projections for the next 20, 50, and 100 years.

The Working Group 2 report explores how climate change is impacting, and may impact peoples in their local environments in various geographical locations of the world, including the Circumpolar North (see Anisimov et al. 2007). This report also elaborates on the importance of ascertaining the vulnerabilities of peoples/communities to climate change and how these peoples/communities can adapt to impacts caused directly or indirectly by climate change. Included in this report is a chapter dealing with the health impacts of climate change on people in various localities around the world.

Recommendations and options for mitigating the impacts of climate change are discussed in the report produced by Working Group 3, with an emphasis on the mitigation of climate change impacts on resource development, infrastructure, and on residential and commercial buildings.

2. Climate Change in the North

ACIA (2005): *Arctic Climate Impact Assessment: Scientific report*. Cambridge University Press: Cambridge, United Kingdom, 1042p.

This comprehensive scientific report is an excellent resource that explores the many facets and interconnections of climate change with the ecosystems, as well as cultural systems, of Arctic and sub-Arctic regions from all eight circumpolar nations. Each chapter in this assessment report looks at different aspects of climate change applicable to most northern regions (forestry, agriculture, land management, terrestrial and marine ecosystems, the cryosphere, conservation, vegetation, wildlife, etc.), including two chapters (Chapters 3 and 12) dedicated to the identification and assessment of climate change impacts on, and adaptation strategies available to indigenous peoples living in the North. Further, Chapter 15 of the ACIA addresses in detail the health impacts that are, or may be, associated with climate change in Northern communities. Each of these chapters is referenced below with its own annotation.

Anisimov, O.A.; Vaughan, D.G.; Callaghan, T.V.; Furgal, C.; Marchant, H.; Prowse, T.D.; Vilhjálmsson, H.; and Walsh, J.E. (2007): Polar regions (Arctic and Antarctic), *in* Climate Change 2007: *Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*; Cambridge University Press, Cambridge p. 653-685.

This is a summary of the wide range of scientific (both natural and social) research that has been conducted by scientists pertaining to the vulnerability of Arctic and Antarctic ecosystems and communities to the impacts of climate change, and their capacity to adapt to these impacts. Traditional knowledge is also mentioned as a facet of indigenous cultures that will be impacted by climate change, as well as a means of developing adaptation strategies for indigenous communities to respond to climate change. A brief overview of the direct and indirect health related impacts associated with climate change in circumpolar regions is included in this summary. Further, projected changes to the climates in circumpolar regions and the associated major changes projected for marine and terrestrial environments in these regions are summarized in this chapter.

Berner, J.; Furgal, C.; Bjerregaard, P.; Bradley, M.; Curtis, T.; DeFabo, E.; Hassi, J.; Keatinge, W.; Kvernmo, S.; Nayha, S.; Rintamaki, H.; and Warren, J. (2005): Human Health; *in Arctic Climate Impact Assessment*, Cambridge University Press, Cambridge, United Kingdom, p. 863-906.

This chapter of the ACIA provides a brief overview of the health of Arctic peoples, and explains that socio-economic and environmental conditions are linked with the physical, mental, emotional, and cultural health of these peoples. More importantly, this chapter summarizes the most common and prominent health impacts associated with climate change in the North, from direct impacts (e.g. exposure to extreme weather events, increased exposure to UV-B radiation, and health stresses associated with cold and hot temperatures) to indirect impacts (e.g. changes in the availability, abundance, and quality of country foods; increases in vector and water borne diseases; changes to water quality; and increased accidents on the land due to thinner ice on rivers and lakes in the winter). This source also has recommendations on how communities can identify and monitor indicators of a changing climate and their connections with health related impacts in order to develop effective adaptation strategies to respond to these impacts.

Huntington, H.; Fox, S.; Berkes, F.; Krupnik, I.; Whiting, A.; Zacharoff, M.; McGlashan, G.; Brubaker, M.; Gofman, V.; Dickson, C.; Paci, C.; Tsetta, S.; Gargan, S.; Fabian, R.; Paulette, J.; Cazon, M.; Giroux, D.; King, P.; Boucher, M.; Able, L.; Norin, J.; Laboucan, A.; Cheezie, P.; Poitras, J.; Abrahan, F.; T'selie, B.; Pierrot, J.; Cotchilly, P.; Lafferty, G.; Rabesca, J.; Camille, E.; Edwards, J.; Carmichael, J; Elias, W.; de Palham, L.; and Norwegian L.; Qujaukitsoq, U.; Moller, N.; Mustonen, T.; Nieminen, M.; Eklund, H.; Helander, E.; Zavalko, S.; Terva, J.; Cherenkov, A.; Henshaw, A.; Fenge, T.; Nickels, S.; and Wilson, S. (2005): The changing Arctic: Indigenous perspectives; *in Arctic Climate Impact Assessment*, Cambridge University Press, Cambridge, United Kingdom, p. 61-98.

This chapter of the ACIA summarizes the importance of indigenous knowledge when researching climate change, as well as the vulnerabilities and resilience of indigenous knowledge to climate change impacts. Throughout this chapter several case studies are presented, highlighting the perceptions, observations, and experiences certain Arctic indigenous peoples have reported with respect to climate change. One of these case studies (Paci et al. 2005) focuses on the work the Dene Nation's Denendeh Environmental Working Group has done to record Dene observations of climate change. Some examples of climate change observations documented by the DEWG are changes in the distribution and abundance of certain plant and animal species, 'wet' trees in the winter, thinner ice on lakes and rivers, and warmer winters; however, permission from the Dene Nation is needed to access the actual documents that this case study is based on.

Nuttall, M.; Berkes, F.; Forbes, B.; Kofinas, G.; Vlassova, T.; and Wenzel, G. (2005): Hunting, herding, fishing and gathering: Indigenous peoples and renewable resource use in the Arctic; *in Arctic Climate Impact Assessment*, Cambridge University Press, Cambridge, United Kingdom, p. 649-690.

This chapter of the ACIA speaks to the importance of renewable resources to the traditional lifestyles and livelihoods of Arctic indigenous peoples, and what role climate change plays in mediating the relationships indigenous peoples have with the renewable resources they depend on for food and cultural continuity. Indigenous observations of climate change are mentioned; however, the focus of this chapter is on the impacts that climate change is having, or may have on the traditional resource use activities of Arctic indigenous peoples; and the capacity of these peoples to adapt to the environmental and cultural changes associated with climate change. The case studies presented by the authors in this chapter refer to the traditional lifestyles and livelihoods of indigenous peoples who live in the High Arctic, with little mention of climate change impacts on indigenous peoples living in sub-Arctic regions. However, the indirect and direct impacts of climate change, and the adaptation strategies described in this chapter provide invaluable insight for identifying impacts (e.g. changes in certain plant and animal migrations, increased accidents on the land) in sub-Arctic regions, as well as for developing adaptation strategies.

Smit, B.; Hovelsrud, G.;and Wandel, J: (2008). *CAVIAR: Community Adaptation and Vulnerability in Arctic Regions*; University of Guelph, Department of Geography, Occasional Paper No. 28.

This document provides a framework for conducting research related to community adaptation and vulnerability in the Arctic for research projects conducted under the International Polar Year Project: *Community Adaptation and Vulnerability in Arctic Regions* (CAVIAR). Integral to this framework is an approach based on identifying and assessing current and future exposure sensitivities to various environmental, climatic, social, economical, and cultural changes taking place in the Arctic; as well as current and future adaptive strategies available to Arctic communities to adapt and/or mitigate exposure sensitivities. This document also provides a methodological approach for researchers working with northern communities that incorporates expertise from the natural and social sciences, and from traditional ways of knowing. Aspects of the CAVIAR framework and methodological approach have been incorporated in the development of the Health Canada sponsored Jean Marie River climate change project.

Wrona, Frederick J.; Prowse, Terry D.; and James D. Reist (2005): Freshwater Ecosystems and Fisheries; *in Arctic Climate Impact Assessment*, Cambridge University Press, Cambridge, United Kingdom, p. 353-452.

This chapter of the *Arctic Climate Impact Assessment* is very informative regarding baseline information about how climate change impacts various aspects of freshwater ecosystems, and the organisms that inhabit these ecosystems. This source also provides good information pertaining to the impacts of warmer temperatures in lakes and rivers on fisheries.

3. Climate Change in Northern Canada

Berkes, Fikret; and Jolly, Dyanna (2001): Adapting to Climate Change: Socio-Ecological Resilience in a Canadian Western Arctic Community; *Conservation Ecology* 5(2): 18-32.

The research presented in this article is one of the first and best known case studies of climate change research conducted with the community as the subject of, as well as a partner in, the research. The

authors collected accounts of climate change observations and impacts from the Inuvialuit of Sachs Harbor, NWT. Warmer winters, reduction of multi-year sea-ice, changes in animal migration and reproductive behavior, the appearance of new species, and changes in the timing of ice freeze-up and break-up on lakes and rivers were common observations by community members. Impacts caused by climate change identified by the Inuvialuit included unsafe travel routes, reduced access to harvesting areas, changes in the distribution and abundance of wildlife, and an increase in extreme weather events. Berkes and Jolly also describe coping, or short-term, strategies and adaptation, or long-term, strategies that the Inuvialuit have developed to respond to the environmental and cultural changes caused by climate change. Adaptation strategies include food sharing and trading networks with other communities, while coping strategies include changing the times and areas of where animals are harvested, and the species harvested in some cases.

Center for Indigenous Environmental Resources (2006): *Climate Change Planning Tools for First Nations*; Center of Indigenous Environmental Resources, Manitoba.

This is an excellent resource comprising of six guidebooks that outline, step-by-step, how Aboriginal communities can conduct climate change projects to identify and assess climate change impacts, and to develop community adaptation strategies to respond to these impacts. Various methods and activities for starting a climate change project, researching climate change observations and impacts, presenting research results to communities, and developing adaptation strategies are presented that community members (and their research partners) can use to develop and conduct their own climate change projects. Further, research activities that engage youth and Elders are also mentioned, which are important aspects of conducting community research on an issues such as climate change and health. These guidebooks were an essential resource for developing the methodology of this project.

Environment Canada (1997): *The Canada Country Study: Climate Impacts and Adaptation, Canadian Arctic Summary*; Environment Canada, Canada.

This report is about the potential impacts that climate change may have on the people and animals living in the Canadian Arctic, and how people and animals will adapt to climate change. The focus of this report is on what the potential effects a warmer climate will have on the inhabitants of the Canadian Arctic. It is worth mentioning that this source emphasizes potential advantages that a warmer climate might present to industrial and commercial activities. According to this report, as Arctic and sub-Arctic regions become warmer; it could be easier to advance industrial, commercial, and even agricultural interests. However, the traditional cultural activities of northern Aboriginal peoples will for the most part be negatively impacted, especially if there is a decline in the availability and accessibility to traditional country foods. Interestingly, this report indicates that the most sensitive areas to climate change in Canada will be the Mackenzie River Basin and the northern prairies.

Fast, Helen; and Berkes, Fikret (1999): Climate Change, Northern Subsistence, and Land-based Economies, *in Securing Northern Frontiers: Developing research partnerships;* Circumpolar Institute Press, Edmonton: p. 9-24.

This is one of a few available articles that focus on climate change in non-coastal communities living below the tree line, but north of 60°C. In particular, health related impacts of climate change on both the subsistence and wage based economies of northern Aboriginal communities are analyzed. The most significant impact noted is changes to diet, as these communities' subsistence economies account for one quarter to one half of the total economy. With climate change, it is projected that the health of traditional species such as caribou and moose will be impacted directly (e.g. heat, increased snowfall, early freezing

in autumn), or indirectly through environmental changes connected to climate change (e.g. increases in diseases and parasites, competition with new species, changes in water quality). Further, although the tree line is expected to expand 100-250 km, the extent of boreal forest is projected to decrease due to increases in forest fires and insect infestations. In general, small plant and animal species will flourish with a warmer climate (e.g. flowering plants, grasses, insects, beavers), while larger animals and plants will have a much harder time adapting to a warmer climate (e.g. moose, caribou, trees, shrubs).

The health risks related to eating less country foods are also discussed, such as increases in diabetes, obesity, and cardiovascular disorders; as well as the erosion of cultural values when traditional cultural practices linked with the subsistence economy cannot be practiced because of ecosystem changes caused by climate change. Other health risks associated with climate change mentioned include an increase in UV-B radiation, melting of permafrost, and increases in diseases such as tuberculosis.

Ford, James D.; and Furgal, Chris (2009): Foreword to the special issue: climate change impacts, adaptation and vulnerability in the Arctic; *Polar Research* 28: 1-9.

The concepts of adaptation and vulnerability in relation to climate change are discussed in this article, with an emphasis on the fact that the vulnerability and adaptive capacities of Arctic communities are also heavily influenced by other factors such as livelihoods, access to resources, community assets, globalization, institutional networks, education, gender, ethnicity and socio-economic status. These other factors should be accounted for when assessing the vulnerability and adaptive capacity of the Jean Marie River First Nation to climate change.

Ford, James D.; Pearce, Tristan; Duerden, Frank; Furgal, Chris; and Smit, Barry (2010): Climate change policy responses for Canada's Inuit population: The importance and opportunities for adaptation; *Global Environmental Change* 20: 177-191.

Issues of vulnerability and adaptation in relation to climate change and other environmental and cultural changes in Inuit communities are discussed in this article; however, the central theme of this source is that adaptation strategies can be better developed by northern Aboriginal communities if there is policy intervention at local, regional, and national levels to reduce barriers to adaptation. This information provides a framework for communities that have developed local adaptation strategies and are looking for support (e.g. training, financial, facilities, services, infrastructure, management, research, etc.) from different levels of government to implement short-term and long-term adaptation strategies.

Furgal, C.; and Prowse, T.D. (2008): Northern Canada, *in From Impacts to Adaptation: Canada in a Changing Climate 2007;* Government of Canada, Ottawa, ON, p. 57-118.

Focusing exclusively on climate change in Northern Canada, this source explores the implications that climate change will have on the physical environment, economic sectors, natural resources, and people in Northern Canada. Socioeconomic and health demographic trends for the Canadian territories are also provided in a separate section (e.g. life expectancy, infant mortality, physical activity, lung cancer, heart attacks, accidents/injuries, suicide, etc). There is a specific section that elaborates on the direct and indirect health impacts that climate change is causing, or may cause to individuals and communities, as well as on the development of adaptation strategies to minimize the negative impacts of climate change in northern community contexts.

Guyot, Melissa; Dickson, Cindy; Paci, Chris; Furgal, Chris; and Chan, Hing Man (2006): Local Observations of Climate Change and Impacts on Traditional Food Security in Two Northern Aboriginal Communities; *International Journal of Circumpolar Health* 65(5): 403-415.

This is an excellent resource about how climate change impacts the traditional harvesting activities of Aboriginal people in the Yukon and the Northwest Territories, and provides some initial data about climate change impacts in the Deh Cho Region of the NWT. These observations provide important information about climate change impacts connected with health in the Deh Cho Region, one of only a few sources of this type of information available outside of the Dene Nation. Four major themes were identified – water, weather, changes in harvested species, and ice – based on the observations of informants from the Deh Gah Got'ie First Nation (Fort Providence, NWT), and from the White River First Nation (Beaver Creek, Yukon). These case studies demonstrate the importance of country foods (moose, geese, caribou, fish, berries, etc.) to Aboriginal communities both culturally and nutritionally, and how access to and availability of, country foods is being impacted by climate change. These impacts are not all negative; however, they do mean that harvesters from these two first nations are gradually adjusting what species they harvest, where they harvest these species, and how even how they harvest. Community members are also noticing changes in weather, permafrost zones, waterways, and ice that has delayed or impeded access to traditional harvesting areas during certain times of the year.

Practical indicators for assessing the health impacts to these communities due to changes in food security (such as changes to protein, zinc, and fiber intake based on increase or decrease of harvestable species) as a result of climate change are also presented in this article, and can be applied to other climate change projects linked to health in Aboriginal communities, such as Jean Marie River. The impacts caused by climate change that affect a community's food security impact more than just physical health. Cultural and community health are also affected, as traditional harvesting methods and knowledge change due to the unreliability of previous indicators of climatic and environmental changes, and the availability of country foods also changes in abundance and type.

International Institute for Sustainable Development (2000): *Sila Alangotok: Inuit Observations on Climate Change*. International Institute for Sustainable Development, Winnipeg, Full-Length Version (42 minutes), Video recording.

This is a video about the impacts of climate change in the Inuvialuit community of Sach's Harbour, on Banks Island, N.W.T. The information in this video is based on what the Inuvialuit have observed in relation to climate change on Banks Island. The most important climatic changes that the Inuvialuit have observed are warmer temperatures, melting permafrost, lack of sea ice, various changes in animals, and an increasing unpredictability of seasonal weather year after year. There are three preliminary documents that preclude this video, and explain in detail the objectives of the IISD scientists' research project. These documents are the *Inuit Observations on Climate Change: Sachs Harbour, Northwest Territories; Trip Reports: 1, 2, and 3.*

Jean Marie River First Nation (2005): *Tthets'éhk'e Délî Traditional Knowledge Study Regarding the Proposed Mackenzie Gas Project.* Jean Marie First Nation: Northwest Territories.

This study is an in-house document that contains valuable information about Jean Marie River and our experiences with oil and gas development in the Dehcho Region. This study also documents TK of our traditional territory as told in stories from community members who were interviewed for this study. The information gathered also includes stories about changes to the environment and weather, and this study was a major impetus in moving forward to address climate change.

Kochtubajda, B.; Flannigan, M.D.; Gyakum, J.R.; Stewart, R.E.; Logan, K.A.; and Nguyen, T.V. (2006): Lightning and Fires in the Northwest Territories and Responses to Future Climate Change; *Arctic* 59(2): 211-221.

The results of the research presented in this article measured the lightning storm severity in the Northwest Territories in connection with the frequency and severity of forest fires from 1994-1999. July was recorded as the month with the most storm activity and occurrences of forest fires. With a projected warming trend in the NWT to last well into the 21st century, the authors conclude that boreal forest regions will experience increases in the frequency and severity of lighting storms and forest fires, which will have serious consequences for some northern communities. This is based on projections that boreal forest regions will become warmer and drier for longer periods of time in a year. Although Jean Marie River is in a zone that is predicted to have only a slight increase in forest fires in comparison to other regions of the NWT, there are other health impacts that forest fires burning in other areas can cause, such as increased air pollution (and associated health consequences) due to the smoke produced from these fires.

Lemmen, D.S., Warren, F.J., Lacroix, J., and Bush, E., editors (2008): *From Impacts to Adaptation: Canada in a Changing Climate 2007*; Government of Canada, Ottawa, ON, p. 448.

This publication by Natural Resources Canada is an excellent source of information regarding the observed and potential impacts of climate change on the major regions in Canada, including Northern Canada. Although only one chapter is devoted to the discussion of climate change in Northern Canada (Chapter 3), the other chapters are very informative when looking at climate change beyond the regional level, to see how changes at local and regional levels in one region are interconnected with other regions and ecosystems.

Martin, Daniel; Bélanger, Diane; Gosselin, Pierre; Brazeau, Josée; Furgal, Chris; and Déry, Serge (2007): Drinking Water and Potential Threats to Human Health in Nunavik: Adaptation Strategies under Climate Change Conditions; *Arctic* 60(2): 195-202.

The authors of this research investigated how the quality of untreated and treated water supplies is affected by a warming climate, and how this impacts communities in Nunavik that rely on these water supplies for drinking water. Increasingly, the quality of water throughout northern Canada is deteriorating, especially in continuous and discontinuous permafrost zones where the permafrost is melting. The focus of this article is on the correlation between gastro enteric diseases and the deteriorating quality of certain drinking water sources, and locally observed impacts to aquatic environments associated with climate change. In terms of adaptation strategies, proposed strategies for monitoring water quality, raising community awareness regarding water quality and health, water testing, and the collection of health information when gastro enteric diseases are most frequent are provided that can be modified for implementation in other Aboriginal communities in northern Canada.

Natural Resources Canada (2009): The Atlas of Canada: Climate Change; Available at: http://atlas.nrcan.gc.ca/auth/english/maps/climatechange. Accessed: August 26, 2010.

This website provides maps showing how climate change will impact seasonal temperatures, precipitation, forest fires, etc. for the next 50-100 years globally and for Canada; based on projections compiled by the Canadian Centre for Climate Modeling and Analysis's global climate model (GCM).

Newton, John; Paci, C.D. James; Ogden Aynslie (2005): Climate Change and Natural Hazards in Northern Canada: Integrating Indigenous Perspectives with Government Policy; *Mitigation and Adaptation Strategies for Global Change* 10: 541-571.

In this source the authors argue the need for government policy concerning climate change and natural hazards in northern Canada to be focused on the development of adaptation strategies that help communities to live with climate change, rather than the creation of government programs and initiatives focused on mitigation measures to reduce a community's contribution of greenhouse gases. The authors also mention the importance of including indigenous perspectives in the formulation of adaptation strategies at local, territorial, and national government levels. A brief history of the Dene Nation's involvement in researching Dene perspectives of climate change, and how TEK plays a major role in this research, is also included.

Northwest Territories Environment and Natural Resources (2008): *NWT Climate Impacts and Adaptation Report 2008;* Government of Northwest Territories, NWT.

This concise document is an excellent source of information concerning the impacts of climate change in the Northwest Territories, adaptation strategies that the territorial government is considering developing to respond to impacts, and future planning of adaptation strategies in response to future impacts caused by the continued trend of a warming climate. The impacts being caused by climate change are categorized in this report under the following themes: permafrost, ice conditions, precipitation and water, forests, wildlife, culture and heritage, and human health. These categories provide pertinent themes for analyzing the accounts provided by interviewees from Jean Marie River. Moreover, recommendations on how to adapt to some of the impacts being caused by climate change are given, including adaption strategies recommended by the NWT's Department of Health and Social Services (HSS) to promote good physical health. For example, if caribou populations in traditional harvesting areas are decreasing, then concentrating more on fish can offset the lack of essential nutrients that are usually obtained from caribou.

Parlee, Brenda; O'Neil, John; and Lutsel K'e Dene First Nation (2007): "The Dene Way of Life": Perspectives of Health from Canada's North; *Journal of Canadian Studies* 41(3): 112-133.

This source is not about climate change, but rather a look at trying to define what health means to the Dene of Lutsel K'e First Nation. While some people interviewed associated health with injuries and disease, many others thought of health as leading a healthy life by following "The Dene Way of Life". The results of this research identified three themes that indicators of health provided by community members can be grouped under. These themes are self-government, healing, and cultural preservation; and the indicators are related to many aspects of daily life in Lutsel K'e, linking health to tangible elements and processes present at individual, household, and community levels. Included in the accounts provided by community members are narratives that make up a discourse about the significance of Dene values, knowledge, and institutions. The work also exemplifies how small and remote northern Aboriginal communities are resilient to the social, economic, and cultural pressures in relation to the development of natural resources.

The importance of this document to the Jean Marie River climate change research project is that this work provides indicators of what it means to be healthy from a Dene perspective, which is important when determining how climate change is, or may affect the individual, community, cultural, and environmental health of a Dene First Nation, such as Jean Marie River.

Patino, Lorena (2010) ***Understanding Climate Change Adaptation and Adaptive Capacity – Synthesis Report.*** **Government of Canada: Canada.**

This brief report provides some valuable insights on going beyond adaptation strategies and for communities to move forward with adaptive management and 'mainstreaming' the issue of climate change into other aspects of community planning that are, or will be, impacted by climate change. In addition, examples of collaborative approaches to adaptive management are provided.

Pearce, Tristan D.; Ford, James D.; Laidler, Gita J.; Smit, Barry; Duerden, Frank; Allarut, Mishak; Andrachuck, Mark; Baryluk, Steven; Dialla, Andrew; Elee, Pootoogoo; Goose, Annie; Ikummaq, Theo; Joamie, Eric; Kataoyak, Fred; Loring, Eric; Meakin, Stephanie; Nickels, Scott; Shappa, Kip; Shirley, Jamal; and Wandel Johanna (2009): Community collaboration and climate change research in the Canadian Arctic; ***Polar Research*** **28: 10-27.**

This is an excellent document for outlining important considerations for researchers to address when conducting climate change research (or any other type of environmental research) in collaboration with Aboriginal communities in northern Canada. Case studies from five Inuit communities are used to demonstrate how researchers can engage northern Aboriginal communities on climate change projects in an effective manner, which keeps the communities involved and benefits the community through such ways as raising awareness of the issue(s) and the dissemination of research results to the community. The methods of community engagement outlined in this article are seen as essential for researchers to conduct effective and successful climate change research in partnership with northern Aboriginal communities, and these methods have provided guidance in developing the Jean Marie River climate change project.

Scott, Daniel; and Lemieux, Christopher (2007): Climate change and protected areas policy, planning and management in Canada's boreal forest; ***The Forestry Chronicle*** **83(3): 347-357.**

In this article an overview of future climate change impacts on Canada's boreal forest is given. The authors describe how climate change will impact the distribution, availability and abundance of plant and animal species indigenous to boreal ecosystems, as well as species that may become new arrivals to these ecosystems due to a warming climate; providing insight into how the health of boreal forest ecosystems will be impacted by climate change. The authors suggest that a warmer climate in boreal forest ecosystems will lead to a loss of biodiversity, as pioneer and invasive species will come to dominate the currently diverse ecosystems. This will also happen in the lakes and rivers, where warm water species will encroach on the habitats of cold water species with warmer water temperatures, driving cold water species northwards.

In relation to protected areas planning, climate change will have a significant impact on the current policies, processes, and procedures used to create and manage protected areas in boreal forest ecosystems. Currently, such planning is done on the premise that landscapes are relatively static, naturally changing very little over time. However, current climate change is altering boreal landscapes at a more rapid pace and the planning of protected areas needs to account for climate change impacts in order to establish adaptation strategies that ensure the loss of biodiversity in boreal ecosystems is kept at a minimum. With Jean Marie River in the process of establishing a protected area (The Five Lakes Area of Interest), it is important for this First Nation and the NWT PAS Secretariat to identify environmental changes associated with climate change so that these changes are addressed and accounted for when establishing the boundaries and management for this potential protected area.

Séguin, Jacinthe; and Berry, Peter (2008): Human Health in a Changing Climate: A Canadian assessment of vulnerabilities and adaptive capacity – Synthesis Report. Health Canada: Canada.

This is an excellent resource that summarizes vulnerabilities and adaptive capacity to climate change from a number of community contexts from many regions throughout Canada. Moreover, the multiple ways that climate change has on a variety of aspects directly and indirectly related to health is a primary focus to show how interconnected these two issues are. There is also valuable information about enhancing the adaptive capacity of communities when responding to climate change. Chapter 7 in this report is devoted exclusively to health related climate change impacts on communities and the environment in northern Canada. Unfortunately, there is very little community specific information, especially for Dene communities.

Standing Committee on Energy, the Environment and Natural Resources (2009): *With Respect, Canada's North: Sixth Report of the Standing Committee on Energy, the Environment and Natural Resources;* the Senate of Canada, Canada.

This report summarizes the experiences and interactions of the Standing Committee on Energy, the Environment and Natural Resources Members with northern residents during a 2007 visit by this committee to Canada's Western Arctic. Issues of the development of natural resources and climate change and the impacts they are causing, or may cause to northern residents and the environment are mentioned in this report. In terms of climate change, the report highlights that northern residents and governments should be more concerned with adapting to a changing climate and environment, rather than coming up with ways to mitigate the impacts of climate change; as the anthropogenic causes of climate change are primarily due to industrial activities in non-Arctic regions. Of particular note in this report, with respect to the Jean Marie River climate change project, are the observations by northern residents of new species of animals such as magpies, crows, elk, cougars, and white tail deer in boreal forest regions. The appearance of these new species may also have negative impacts on the health of animals indigenous to the Western Arctic. For example, some white tail deer are known by biologists to carry parasites that are lethal to animal species in the North; and the mountain pine beetle infestation may expand to forested areas in the NWT and Yukon.

Turner, Nancy J. and Clifton, Helen (2009): "It's so different today": Climate change and indigenous lifeways in British Columbia, Canada; *Global Environmental Change* 19: 180-190.

Although this source is set in the context of British Columbia (northern Pacific Coast), the content of the research is very relevant to northern Aboriginal communities located within boreal forest areas of Canada, such as Jean Marie River. This article's relevancy is in relation to the importance of traditional ecological knowledge (TEK) as another way of knowing and perceiving the environment and seasonal weather patterns, as well as for observing and assessing climate change. Indigenous observations of climate change and its impacts on the land and people in the Hartley Bay area of British Columbia are included that are similar to climate change observations and impacts in northern Canada below the tree line. From these accounts, indicators based on TEK used for assessing the connections between climate change impacts and environmental health (e.g. water quality, health of wildlife and vegetation, and weather patterns and events) are discussed; indicators that could be used, with some modification, in the assessment of the environmental health of other ecosystems. Moreover, the authors provide possible recommendations on how TEK can be applied as part of developing adaptation strategies for coping with and mitigating climate change in the context of other concurrent environmental and social changes being caused by industrial development, resource management, and globalization.

The table below lists the references in the same order as listed above, and the major topics they cover.

Table 8: References and their relation to climate change and health

Title of Reference	Climate Change	Observations	Impacts Change	Adaptation Strategies	Physical Health	Community Health	Environmental Health	Cultural Health	Traditional Knowledge
Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.	✓	✓	✓	✓					✓
Arctic Climate Impact Assessment: Scientific report.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Polar regions (Arctic and Antarctic).	✓	✓	✓	✓			✓		✓
Human Health	✓		✓	✓	✓	✓	✓	✓	✓
The changing Arctic: Indigenous perspectives.	✓	✓	✓	✓			✓	✓	✓
Sila Alangotok: Inuit Observations on Climate Change.	✓	✓	✓	✓		✓	✓	✓	✓
Hunting, herding, fishing and gathering: Indigenous peoples and renewable resource use in the Arctic.	✓	✓	✓	✓	✓	✓	✓	✓	✓
CAVIAR: Community Adaptation and Vulnerability in Arctic Regions	✓		✓	✓					
Freshwater Ecosystems and Fisheries	✓	✓	✓	✓			✓		
Adapting to Climate Change: Socio-Ecological Resilience in a Canadian Western Arctic Community	✓	✓	✓	✓					✓
Climate Change Planning Tools for First Nations.	✓	✓	✓	✓		✓		✓	✓
The Canada Country Study: Climate Impacts and Adaptation, Canadian Arctic Summary	✓		✓	✓	✓		✓		
Climate Change, Northern Subsistence, and Land-based Economies	✓	✓	✓	✓	✓	✓	✓	✓	✓
Foreword to the special issue: climate change impacts, adaptation and vulnerability in the Arctic.	✓	✓	✓	✓					✓
Climate change policy responses for Canada's Inuit population: The importance and opportunities for adaptation.	✓		✓	✓		✓			
Northern Canada.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Local Observations of Climate Change and Impacts on Traditional Food Security in Two Northern Aboriginal Communities.	✓	✓	✓		✓	✓	✓	✓	✓
Tthets'éhk'e Délî Traditional Knowledge Study Regarding the Proposed Mackenzie Gas Project.	✓	✓				✓	✓	✓	✓
Lightning and Fires in the Northwest Territories and Responses to Future Climate Change.	✓	✓	✓				✓		
From Impacts to Adaptation: Canada in a Changing Climate 2007.	✓	✓	✓	✓	✓	✓	✓	✓	✓
Drinking Water and Potential Threats to Human Health in Nunavik: Adaptation Strategies under Climate Change Conditions.	✓		✓	✓	✓	✓			
The Atlas of Canada: Climate Change.	✓		✓				✓		
Climate Change and Natural Hazards in Northern Canada: Integrating Indigenous Perspectives with Government Policy.	✓		✓	✓				✓	✓
NWT Climate Impacts and Adaptation Report 2008.	✓	✓	✓	✓	✓	✓	✓	✓	✓

Title of Reference	Climate Change	Observations	Impacts Change	Adaptation Strategies	Physical Health	Community Health	Environmental Health	Cultural Health	Traditional Knowledge
"The Dene Way of Life": Perspectives of Health from Canada's North.					✓	✓	✓	✓	✓
Understanding Climate Change Adaptation and Adaptive Capacity – Synthesis Report	✓		✓	✓		✓			✓
Community collaboration and climate change research in the Canadian Arctic.	✓			✓					✓
Climate change and protected areas policy, planning and management in Canada's boreal forest	✓		✓	✓			✓		
Human Health in a Changing Climate: A Canadian assessment of vulnerabilities and adaptive capacity – Synthesis Report	✓	✓	✓	✓	✓	✓	✓	✓	✓
With Respect, Canada's North: Sixth Report of the Standing Committee on Energy, the Environment and Natural Resources.	✓	✓	✓	✓	✓	✓	✓	✓	
"It's so different today": Climate change and indigenous lifeways in British Columbia.	✓	✓	✓	✓					✓