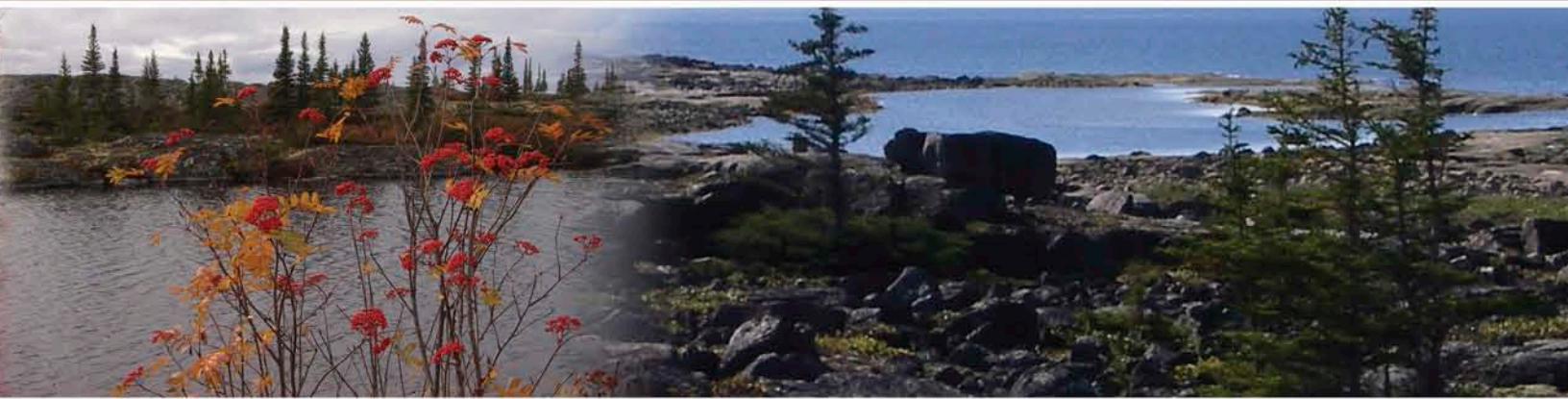


Climate Change in Eeyou Istchee

Identification of Impacts and Adaptation Measures for the Cree Hunters, Trappers and Communities



EYYOUCH KANTOOHOODO EHMAHQOUEECH
CREE TRAPPERS' ASSOCIATION
ASSOCIATION DES TRAPPEURS CRIS



Cree Regional Authority
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Comité consultatif pour l'environnement de la Baie James
James Bay Advisory Committee on the Environment
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Conseil Cris de la santé et des services sociaux de la Baie James
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Cree Board of Health and Social Services of James Bay

The **Climate Change Project** is a joint initiative of the Cree Trappers' Association (CTA), the James Bay Advisory Committee on the Environment (JBACE) and the Cree Regional Authority (CRA) and is funded by Indian and Northern Affairs Canada (INAC). The Cree Board of Health and Social Services of James Bay (CBHSSJB) joined the project during the second year.

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EXECUTIVE SUMMARY

Climate change is affecting Cree subsistence activities, social organization, and development aspirations. This project assesses these impacts and explores the possible response options. Three Cree communities in Eeyou Istchee have been involved (Waskaganish, Mistissini and Whapmagoostui) to identify:

- ❖ the key categories of changes associated with climate change;
- ❖ the potential vulnerabilities to local land uses and society caused by climatic change;
- ❖ the priorities and available options for adaptation actions.

This information was documented in a way that it can evolve continuously as an adaptive planning tool for the Cree Nation as the understanding of climate change progresses, and provide the basis for a climate change approach that could potentially be applied by other Eeyou Istchee communities. This information will also be made available for the use of other communities, governments, academics and organizations as required and permitted.

The three participating communities were selected based on community interest and the two main climatic gradients in the region: north-south, and coastal-inland. This distribution has allowed the consideration of differences in thermal regimes and precipitation distribution, as well as other important considerations such as different wildlife resources and differences between freshwater and sea water environments.

Two series of workshops were held in the project communities. A total of 135 people presented the changes they have observed and 954 observations were collected. Five Cree Local Research Assistants from the three project communities were provided with training in facilitation and participatory research methods, climate change issues and data collection. A Cree GeoPortal website for the sharing and provision of regional and community specific climate change information by community and CTA members was developed as part of this project and an operational site was established. Based on the workshops and interviews completed, three individual community reports on observations and impacts were completed and distributed in the communities in 2010. A final project summary report that includes recommendations for next steps has been completed and distributed.

The realities of a changing climate and of the effects of this change are no longer scientifically in question. The trends towards a warmer and wetter climate in Northern Canada, including Eeyou Istchee, are clear. Some of the major trends and expected impacts in Eeyou Istchee include: the largest changes in climate are expected to occur in the northern portions of Quebec; an average increase in warming of 3.5-6.5°C is forecast by 2050, with warming more pronounced in the winter than in the summer; shorter periods of snow cover and a reduction in the duration and thickness of ice cover on lakes and rivers; larger increases in precipitation is predicted for the more northern parts of the Territory by 2050; and, winter precipitation levels are expected to increase by 12-22.9% in central Quebec.

Climate change will affect ecosystems, plants, animals, forests, and water resources. The following changes may occur in Eeyou Istchee: migration of plant and animal species further north; potential change in habitat distributions for tree species; increased severity of fire seasons and risk of forest fires; increased water flows in rivers and lakes; and, river ice break-ups may occur in the wintertime rather than in the spring and the risk of ice jams may increase in the winter.

The objective of the project was to record the Cree perspective on climate change. This is important because the Cree have very detailed knowledge of the land and are able to observe change at the local level that escapes the scientific observations that are more general in nature. Observations were recorded from the three Cree communities regarding:

- ❖ *changes in weather patterns* including changes in the dominant wind direction, that the weather is harder to predict, later freeze-up and earlier break-up and change in freeze-up and break-up patterns; and, change in rain patterns;
- ❖ *changes in ice quality* on the Bay and in the lakes and rivers including thinner ice, less black ice and a shorter ice season;
- ❖ *changes in snow quality and quantity* including less snow, and softer snow which makes travelling difficult;
- ❖ *new species* in new areas including turkey vultures, coyote, cougar, pelican, crane, deer, snow geese and moose;
- ❖ *changes in animal behaviour* such as more polar bears on the Bay;
- ❖ *change in plant types and distribution*, for example, fewer berries and more trees and new trees in certain areas.

During the community workshops, the participants demonstrated that climate change has had significant direct and indirect impacts on the Eeyou Istchee Cree. Warmer winters, for example, make for late freeze-up/early break-up and create unsafe ice conditions on the Bay, lakes and rivers. This situation has had an impact on hunting and trapping activities, making it harder, more dangerous and more expensive to go on the land. These impacts mean that the Cree are less present on the land, thus creating an impact on land control. The consequences of climate change are not limited to restrictions on land-based activities. Multiple social, cultural, food security, health and infrastructure impacts on the Eeyou Istchee communities were identified.

Three primary recommendations were identified with the communities. The involvement of youth was also considered a major priority and is identified as a 4th recommendation.

1. The creation of local climate change committees was recommended and to also explore the use of existing committees before creating new ones;
2. Develop community based monitoring programs in order to better understand the changes that are/will be happening in Eeyou Istchee;
3. Safety issues were the most important concerns raised during all the workshops and many participants suggested the creation of security and awareness programs. It was recommended that the programs should mainly target the youth and the involvement of the Tallymen and Elders was considered essential as they know the land;
4. Consider the establishment of employment opportunities, internships or scholarships for Cree Youth in areas where climate change monitoring or research is required.

INTRODUCTION

This Climate Change Project is a joint two year initiative (2009-11) of the Cree Trappers' Association (CTA), the James Bay Advisory Committee on the Environment (JBACE) and the Cree Regional Authority (CRA) and is funded by Indian and Northern Affairs Canada (INAC). The Cree Board of Health and Social Services of James Bay (CBHSSJB) also joined the project during the second year.

The purpose of the project is to assess the impact of climate change on Cree subsistence activities, social organization and development aspirations, as well as an exploration of possible responses to these impacts. The project has worked with three communities (Waskaganish, Whapmagoostui and Mistissini) and local CTA hunting and trapping members who are active on the land.

PROJECT GOALS AND OBJECTIVES

The project's intent is to document the information collected and understanding in such a way that it can evolve continuously as an adaptive planning tool for the Cree Nation as the understanding of climate change progresses, and to provide the beginnings of a methodological approach that could potentially be applied by other Eeyou Istchee communities to their own unique circumstances. It is intended that the CTA and the CRA will serve as the future central repositories for this information and knowledge, and will make it available for the use of other organizations, governments, communities, academics and others as required and permitted. The goals of the project are to:

- *improve the understanding of the environmental implications* of climate change in James Bay (Eeyou Istchee) drawing on Cree perspectives;
- *improve the understanding of the human implications* of climate change for Eeyou Istchee, with a specific focus on the impacts on hunters, trappers and other community members;
- *identify the vulnerabilities* of Eeyou Istchee to climate change, as well as the possible avenues for adaptation to its impacts;
- *enhance awareness among the Cree* of the implications of climate change in their territory, and encourage Cree participation in adaptation measures.

Based on these goals the following specific project objectives were outlined and focused on:

1. identifying locally observed climatic impacts in Eeyou Istchee, and defining local problems and challenges;
2. enabling co-production of knowledge based on Cree and “Western” perspectives;
3. examining several specific issues of concern that had already identified by CTA members including, among others: how travel for hunting, fishing and trapping is and will be affected (with a focus on fresh water ice); and, understanding the potential impacts of climate change on food security in Eeyou Istchee due to its consequences on subsistence harvesting;
4. establishing a strong information and dissemination base on climate change in the Cree Territory in a way that it can evolve continuously as an adaptive planning and decision making tool for the Cree Nation as the understanding of climate change progresses;
5. identifying climate change impacts and possible solutions for the CTA and the three project communities;
6. establishing closer on-going working links on climate change activities between the three partner organizations, and other climate change research and adaptation initiatives taking place in the James Bay region;

7. examining the future needs for monitoring related to climate change;
8. contributing to capacity building in the Cree communities in project research, design, implementation and interpretation.

PARTICIPATING COMMUNITIES

In addition to community-level interest, the three participating communities selected (Whapmagoostui, Waskaganish, and Mistissini) were chosen as a function of the two main climatic gradients in the region: north-south, and coastal-inland. This distribution allows the consideration of differences in thermal regimes, precipitation distribution, as well as other important considerations (different wildlife resources, differences between freshwater and brackish environments, etc.).

PROJECT TEAM

The project team was supervised by a **Project Steering Committee** consisting of representatives of the three key project organizations. The committee members are:

- ❖ *Alfred Coonish*, Interim President of Cree Trappers' Association. Alfred Coonish was appointed interim President of the CTA on January 21, 2011 and replaced Alfred Jolly, President of the Cree Trappers' Association (CTA). Alfred Jolly had been elected President of the CTA on August 27, 2009 and had taken over from Isaac Masty who was the President of the CTA at the time of the initiation of this project;
- ❖ *Ginette Lajoie*, Environmental Coordinator for the Cree Regional Authority (CRA);
- ❖ *Marc Jetten*, Executive Secretary of the James Bay Advisory Committee on the Environment (JBACE).

A **working level Project Coordination Committee (i.e., the research team)** was also established made up of representatives of the CTA, JBACE, the CRA, the CBHSSJB, Environment Canada and outside experts. The coordination committee consists of:

- | | |
|-----------------------------|---|
| ❖ Rick Cuciurean (CTA) | ❖ Graeme Morin (JBACE) |
| ❖ Marc Jetten (JBACE) | ❖ Jacinthe Lacroix (Environment Canada) |
| ❖ Ginette Lajoie (CRA) | ❖ Thierry Rodon (CIERA, Université Laval) |
| ❖ Nadia Saganash (CRA) | ❖ Catherine Lussier (Consultant) |
| ❖ Chantal Tetrault (CRA) | ❖ Valter Blazevic (Consultant: Strata 360) |
| ❖ Maxine Mark Stewart (CRA) | ❖ John Reid (Consultant: New Economy Development Group) |
| ❖ Reggie Tomatuk (CBHSSJB) | |

WHAT WAS ACCOMPLISHED

WORKSHOPS AND INTERVIEWS

The project was conducted in three communities (Waskaganish, Whapmagoostui and Mistissini) during the period 2009-2011 and key project activities that were completed included a series of community workshops, as well as individual interviews.

1st Round of Workshops and Interviews (2009)

A 1st round of community workshops was held in the fall of 2009 in each of the project communities:

- ❖ Waskaganish on September 22-24, 2009;
- ❖ Whapmagoostui on October 8, 2009;
- ❖ Mistissini on November 11-12, 2009.

The first round of workshops were structured around two activities:

- ❖ A presentation on the current state of knowledge on climate trends in Eeyou Istchee by Jacinthe Lacroix (Senior Science Advisor on Climate Change at Environment Canada), and which was discussed with the participants.
- ❖ Following the presentation, the participants were divided into small groups and were asked to record their observations on climate change. The following checklist was used to guide the discussions and, when it was possible, the information was recorded on maps, or on map referenced index cards.



Thomas Coon translating Jacinthe Lacroix presentation on the science of climate change (Mistissini, November 11, 2009)

TABLE 1: ISSUES CHECKLIST	
ISSUE	SUB-ISSUE
Climate and Seasons	Length; Warmer or Hotter Seasons?
Unusual Weather	Frequency and Intensity of Storms
Snow	Quality and Quantity
Rain	
Lake and River Ice	
Bay Ice	
Tides	
Winds	Patterns; Direction; Strength
Insects	New; Amounts of Mosquitoes and Black Flies; Forest Pests
Fish	Inland Fish; Bay Fish
Big Game	Moose; Black Bear; Woodland Caribou; Migrating Caribou
Birds	Geese; Ducks
Reptiles and Amphibians	
Small Game	
Species Change	Composition; New (ex. Morning Dove); Disappearing
Transportation	Roads; Ski-Doo Trails; Sea Highway; Canoe Routes
Vegetation	Tree; New Plants; Berries; Medicinal Plants
Community Infrastructure	

In addition, individual interviews with Tallymen and Elders were conducted by local researchers trained by the team. During the interviews, the Tallymen and Elders were asked to record on maps their observations of climate change.

Based on the first round of workshops, and the individual interviews completed, a summary of the findings was prepared and published in three brochures (one for each community) and distributed in Whapmagoostui, Waskaganish and Mistissini in the spring of 2010 (please see Annexes A and B). Additional copies were also provided for the CRA, CTA and other organizations.

2nd Round of Community Workshops (2010)

A 2nd round of community workshops was held in the fall of 2010 in:

- ❖ Mistissini on September 1-2, 2010;
- ❖ Whapmagoostui on September 7-9, 2010;
- ❖ Waskaganish on October 25-26, 2010.

These workshops were used to:

- ❖ present the community reports produced in the 1st year of the project (please see Annexes A and B);
- ❖ validate the information collected;
- ❖ present the Cree Climate Change GeoPortal (www.creegeoportal.ca);
- ❖ discuss potential solutions and adaptive actions.



Suzan (Masty) Natachequan
(Whapmagoostui, September 7, 2010)

In addition, the study team met with each community's senior administrators (for example, the Local Health Directors of the CHBSSJB, Public Safety Officers, Police Chief, Fire Department and Local Environmental Administrators). The team also had the opportunity to present the project to the First Nation Councils in Whapmagoostui and Waskaganish.



Waskaganish, 2nd workshop,
October 25, 2010



Whapmagoostui, 2nd workshop, September 7, 2010

LOCAL CREE RESEARCHER TRAINING

Local Research Assistants (one from each project community) were provided with initial training on September 22, 2010 in Waskaganish by the project team in facilitation and participatory research methods, climate change issues and data collection. Local Research Assistant's (LRA) were also trained at Mistissini on November 10, 2009, and Whapmagoostui on October 7, 2009. Once it was recognized that the Local Research Assistants were having difficulty with qualitative interviews, additional training was also provided. Project team members travelled to Waskaganish in October 2009, Whapmagoostui in February 2010 and to Mistissini in January 2010 to train Local Research Assistants, and phone and email contacts were also used to assist and supervise the interviewers.

CREE CLIMATE CHANGE GEOPORTAL

A GeoPortal website for the sharing and provision of regional and community specific climate change information by community and CTA members was developed in 2009-10 as part of this project and an operational site was established (please see Figure 1). Further refinement of the GeoPortal continued in 2010-11. The GeoPortal system can now be used to monitor long term trends (5-10 years) and as a public awareness tool (e.g. communicating updated climatic projections as they become available).

Figure 1: GeoPortal Home Page

The screenshot shows the GeoPortal Home Page. On the left is a green navigation menu with links: HOME, ABOUT, RESOURCES, CONTACT, LOGIN, and COTA MAPS. The LOGIN section includes fields for username and password, and a 'Login' button. Below the menu is a section for 'COTA MAPS' with text about compatibility issues and a link to download Adobe Reader 8. The main content area is titled 'CLIMATE CHANGE' and features a 'CLIMATE CHANGE MONITORING' section with a circular logo. This section contains text about the Cree Trappers Association (CTA), James Bay Advisory Committee on the Environment (JBACE), and Cree Regional Authority (CRA) project. It lists the main purposes of the project and provides a list of five themes for climate change observations: 1) Land; 2) Water; 3) Weather; 4) Wildlife; and 5) Community Infrastructure. Below this is a 'RESOURCES' section with a list of PDF reports: Climate Change Final Report Cree.pdf, Climate Change Final Report_English.pdf, Climate Change Mistissini.pdf, Climate Change Waskaganish.pdf, and Climate Change Whapmagoostui.pdf. The page also features a background image of a road through a forest with autumn foliage and a compass rose graphic. Logos for the Cree Regional Authority and GeoConnections are visible in the bottom right corner.

Source: <http://www.creegeoportal.ca/geoportal> (March 21, 2011)

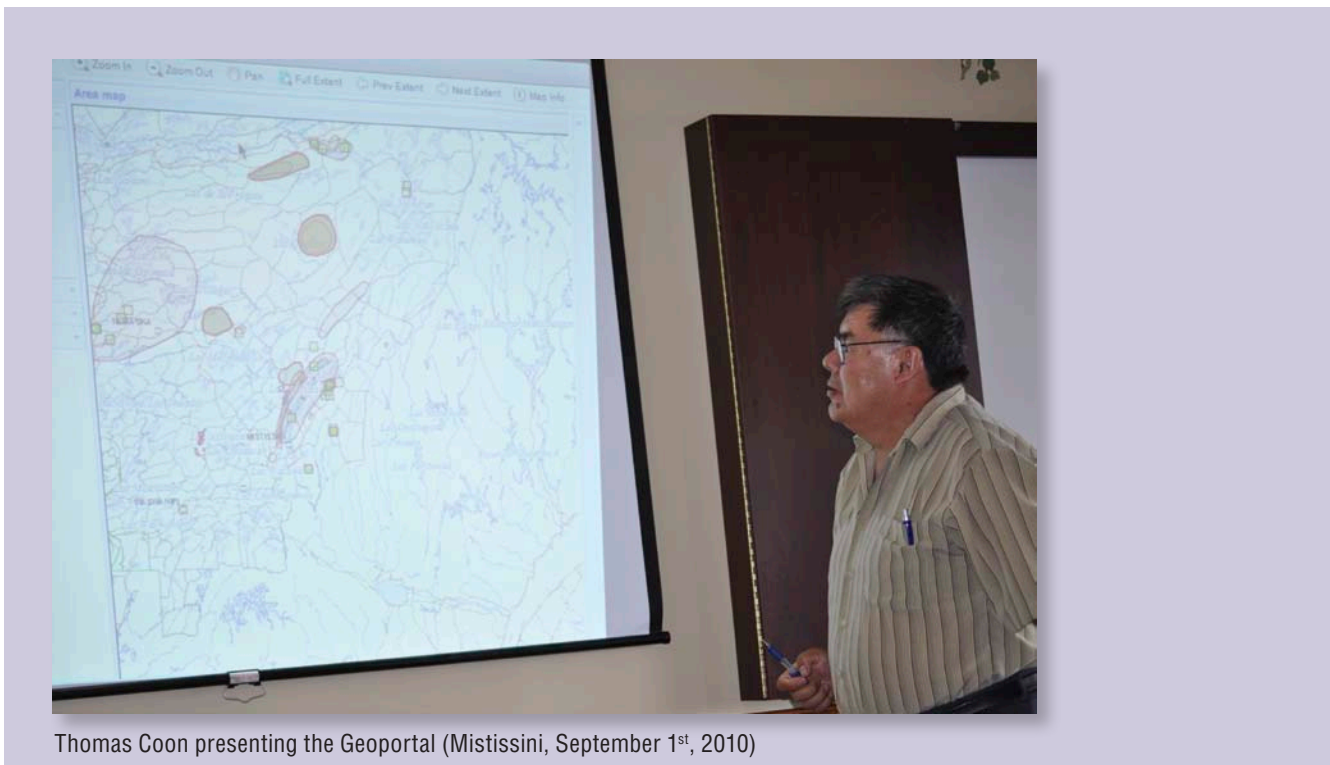
CLIMATE CHANGE DATABASE AND THE CREE GEOPORTAL

A process for the addition of location specific information through the GeoPortal to the CTA database was developed and tested during the community workshops. CTA Local Fur Officers were also trained in 2010 in the use of the GeoPortal including: how reports are made: adding polygons, using the attribute table, etc.

The information collected during the community workshops in 2009-10, and during the individual interviews, was recorded in a database and the geo-localized data was then placed on the climate change section of the Cree GeoPortal Website. Data was recorded on maps during the community workshops, and 15 maps from the three community workshops held in 2009 have been digitized and record 281 observations (8 maps for Mistissini; 1 for Whapmagoostui; and, 6 for Waskaganish). The types of observations obtained during the workshops and interviews were divided into five main themes:

1. Land;
2. Water;
3. Weather;
4. Wildlife;
5. Community Infrastructure.

The climate change database on the Cree GeoPortal now has a total of 954 observations (as of March 2011), coded according to the issues checklist categories above (please see Table 1), and is maintained by the CRA. If community members have observations they wish to note and share, they can now submit information directly to the website and these observations can be regularly posted on the GeoPortal map.



Thomas Coon presenting the Geoportal (Mistissini, September 1st, 2010)

WHAT WE KNOW FROM SCIENTIFIC RESEARCH

The realities of a changing climate, and of the effects of this change, are no longer in question (Joint Science Academies' Statement, 2005). Scientists now also confirm, with a probability of 90%, that human activities causing greenhouse gas emissions are responsible for this changing climate (IPCC 2007). The trends towards a warmer and wetter climate in Northern Canada, including Eeyou Istchee, are clear – please refer to Annex C and the James Bay Advisory Committee on the Environment's 2007 report for additional information.^{1 2}

Cree community adaptation to a changing climate is now more important than ever, particularly when considering the Cree's dependence and respect for the ecology of the Territory. In light of this need, it is important to recognize the predicted impacts of climate change on the Territory. The following are some of the major trends and expected impacts:

- ❖ The largest changes in climate are expected to occur in the northern portions of the province or Territory;
- ❖ An average increase in warming of 3.5-6.5°C is forecast by 2050, with warming more pronounced in the winter than in the summer;
- ❖ Warming will translate into shorter periods of snow cover and a reduction in the duration and thickness of ice cover on lakes and rivers;
- ❖ Predicted changes in precipitation are less pronounced in the southern parts of the Territory. A larger increase in precipitation, up to ~30%, is predicted for more northern parts of the Territory by 2050;
- ❖ Winter precipitation levels are expected to increase by 12.0% to 22.9% in central Quebec (as opposed to 16.8% to 29.4% in northern Quebec); and, by 1.9% to 3.0% in the summer for central Quebec (as opposed to 3.0% to 12.1% for the northern portion of the province), by 2050 (Ouranos, 2010).

One can get a sense of the predicted changes in temperature and precipitation by comparing the maps in Figure 2.

Climate change will undoubtedly affect ecosystems, plants and animals, forests, and water resources. The following changes may occur on the Territory:

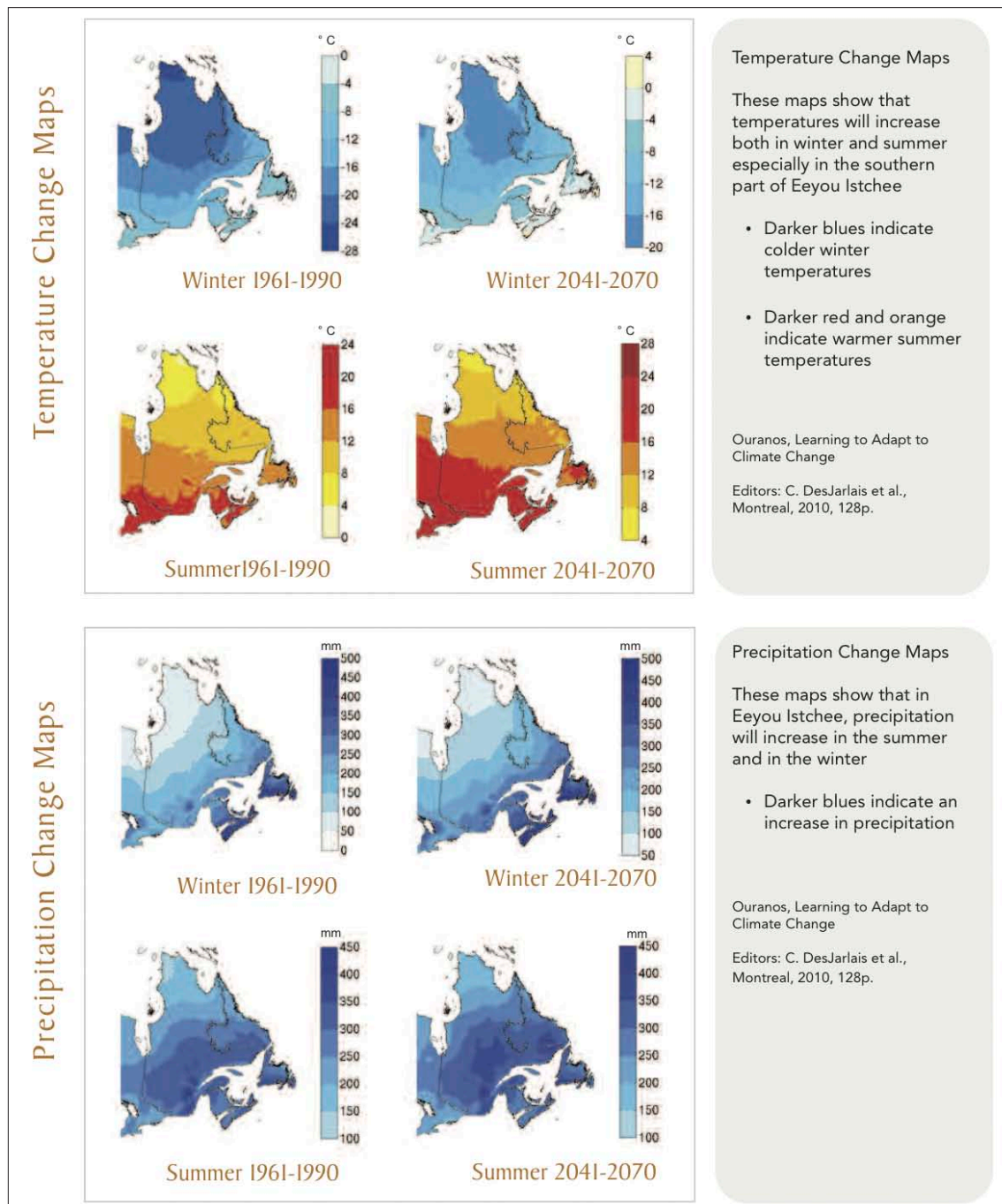
- ❖ migration of plant and animal species farther north. As in the past, these migrations will vary according to the characteristics of each species;
- ❖ potential change in habitat distributions for tree species, which may lead to a new composition of plant communities in Quebec (Forget, et al., 2003; Rizzo and Wilken, 1992);
- ❖ local loss or extinction of plant species that cannot adapt to the rapid changes in climate (Forget, et al., 2003; Thompson, et al., 1998);
- ❖ increased occurrence of southern species in the Territory;
- ❖ climate warming may favour insect epidemics (e.g. the Eastern Spruce Budworm - *Choristoneura fumiferana*) due to milder winters and increased reproductive rates in warmer conditions (Lysyk, 1989; Williams, 1995);
- ❖ Black Spruce (*Picea mariana*), the dominant tree species on the Territory, may display quicker bud breaks in the spring and greater frost tolerance of young buds earlier in the fall (Bertrand & Bigras, 2006);
- ❖ the severity of fire seasons is expected to worsen and the risk of forest fires will generally increase on the Territory in the 21st Century (Natural Resources Canada, 2006);
- ❖ changes in the water flows in rivers and lakes and in the levels of subterranean (underground) water are predicted;

1 <http://www.ccebj-ibace.ca/>

2 If not specifically referenced, any statistics or data offered here are found in the JBACE 2007 report.

- ❖ river ice break-up could very well occur in the wintertime rather than in the spring (Clair, et. al., 1997), and the risk of ice jams may increase in the winter;
- ❖ the coastal areas of the Territory are generally not expected to be at risk from heightened sea levels and increased erosion – partly due to the region’s rapid ‘isostatic rebound.’³ However, local flooding may still occur.

Figure 2: Temperature and Precipitation Change Maps



This figure offers temperature and precipitation averages, for winter and summers, for the period 1961-1990 and the predicted temperature and precipitation averages, for winter and summers, for the period 2041-2070 (Ouranos 2010).

³ 'Isostatic Rebound' is also referred to as 'Post-glacial Rebound' and even 'Continental Rebound'. It refers to the rise of landmasses that were depressed by the huge weight of ice sheets and glaciers during the last ice age.

WHAT WE LEARNED FROM THE CREE OF WASKAGANISH, WHAPMAGOOSTUI AND MISTISSINI

The objective of the project was to record the Cree perspective on climate change. This is important because the Cree have very detailed knowledge of the land and are able to observe change at the local level that escapes the scientific observations that are more general in nature. In this section, we present a summary of the observations, impacts and solutions that were discussed in the workshops and during the interviews. A total of 135 people had the opportunity to present the change they have observed on the land, the following table provides more details by community on the participants and the data collected:

TABLE 2: WORKSHOP PARTICIPANTS AND OBSERVATIONS COLLECTED (2009-2010)				
	WASKAGANISH	MISTISSINI	WHAPMAGOOSTUI	TOTAL
WORKSHOPS AND INTERVIEWS				
Workshop 2009	17	23	11	51
Workshop 2010	11	26	12	49
Interviews	12	14	9	35
Total Participants	40	63	32	135
OBSERVATIONS PROVIDED				
Total Observations	387	371	196	954

WHAT THE CREE HAVE OBSERVED

The following table presents a summary of the observations that were collected during the two rounds of workshops and the interviews with Tallymen and Elders. For a more detailed presentation of the observations by communities please consult Annex A. All the individual observations have been collected in a database that can also be consulted at the CRA.



Mistissini, 2nd workshop, September 1st, 2010

TABLE 3: OBSERVATIONS FROM THE CREE OF WASKAGANISH, WHAPMAGOOSTUI AND MISTISSINI

OBSERVED CHANGE	EXAMPLES
Change in weather patterns	<ul style="list-style-type: none"> • Change in dominant wind direction • Weather harder to predict • Later freeze-up and earlier break-up • Change in freeze-up and break-up patterns • Change in rain patterns
<p><i>In November, we are supposed to have a northern cold wind. But now we have a south wind and in the spring. When you are supposed to get south wind direction, you get north winds. Something is not normal. (Mistissini, 2009)</i></p> <p><i>People used to be able to predict the weather by looking in the sky. It's not working anymore. You can have three temperatures in one day: cold in the morning and warm and then it can drop. You can look and think the weather will be this way tomorrow, but it's not like that anymore. (Whapmagoostui, 2010)</i></p> <p><i>Now we cannot store meat under the moss area; we don't see that anymore. In March we used to have two feet of solid frozen ground; now it is only a few inches not frozen solidly. We used to make an ice hut in the fall, and it would stay until May or June. It doesn't work anymore. Because of the weather change, we need to bring freezers and generators in the camps. (Mistissini, 2010)</i></p>	
Change in ice quality on the Bay and in the lakes and rivers	<ul style="list-style-type: none"> • Thinner ice • Less black ice • Shorter ice season
<p><i>Navigation out on the Bay is becoming dangerous and can leave travelers stranded on ice sheets that have split from the main ice sheets; it is becoming dangerous for the Tallyman of the island to make the first trip onto the ice in order to find a good path of frozen ice for others to utilize. (Waskaganish, 2009)</i></p>	
Change in snow quality and quantity	<ul style="list-style-type: none"> • There is less snow • The snow is softer and makes travelling difficult
<p><i>Snow used to be very predictable, but now in mid-winter the snow seems to be crystallized. Skidoos just sink in the snow because it's powder snow, only the top part is hard. That makes it difficult to travel—changes the way you hunt—changes the way you travel. Even by snowshoe, this is a problem. (Whapmagoostui, 2010)</i></p>	
New species	<ul style="list-style-type: none"> • Turkey Vulture on the Bay • Coyote, cougar, pelican and crane in Waskaganish • Deer and snow geese in Mistissini • Moose in Whapmagoostui
<p><i>Snow geese are new around here. They are abundant. (Mistissini, 2009)</i></p> <p><i>The moose population has been increasing over the past 10 years and more moose have been sighted along the James and Rupert Bay coasts. Moose were usually not very abundant along the coast, but even the woodland caribou have been sighted closer to the Bay. This is a new development observed for the past 20 years. (Waskaganish, 2009)</i></p>	
Change in animals behaviour	<ul style="list-style-type: none"> • More polar bears on the Bay • Black bears are not afraid of human anymore
<p><i>I had to shoot a few polar bears, the last time (9 feet from head to tail). I could see the children and they were in the snow about 500 feet from the camp and I saw the bear walking in the woods— could attack and snatch a child. (Waskaganish, 2010)</i></p> <p><i>The black bear are behaving differently; usually in past don't come close to human activity. But today bear come very close to the camps. (Whapmagoostui, 2009)</i></p>	
Change in plants	<ul style="list-style-type: none"> • Less berries • More trees in Whapmagoostui • Maple trees in Mistissini

WHAT ARE THE MAIN IMPACTS OF CLIMATE CHANGE ON THE CREES

During the community workshops, the participants demonstrated that climate change has had significant direct and indirect impacts on the Eeyou Istchee Cree. Warmer winters, for example, make for late freeze-up/early break-up and create unsafe ice conditions on the Bay and on lakes and rivers. This in turn has had an impact on hunting and trapping activities, making it harder, more dangerous and more expensive to go on the land. These impacts mean that the Cree have had to rely more on food imported from the South and that they are less present on the land, thus creating an impact on food security and land control.

The consequences of climate change are not limited to restrictions on land-based activities however. There are also social and health impacts on the Eeyou Istchee communities. We explore these multiple impacts in this section.

Impact on Land-Based Activities

The most obvious impacts created by climate change are on land-based activities. Late freeze-up, earlier breakup, unsafe ice, strong winds and unpredictable weather and currents make travel on the land, lakes, rivers, and on James and Hudson Bay more difficult and shorten the seasons for hunting and trapping. One of the most important impacts occurs during the spring goose break when the ice is often not strong enough for travel. People are adapting by using helicopters and planes to access the land but this significantly increases costs as illustrated by the following quotations.

“People used to leave in late August to their trapline and come back in March. Now they leave sometimes up to mid-October, depending on the distance of their trapline from the community, and depending on the transportation they have to use.” (Waskaganish, 2009)

“25 years ago, around 1985, the first week of May, we used to travel along the shore by ski-doo. Since 1990, we stopped using the ski-doo, and started using the helicopter to go to camp. When flying over, year after year, we notice more open water during the same time of the year.” (Waskaganish, 2009)

“More and more, people are building airstrips on their trapline close to their camps, especially when they are coming back to the community in the spring. They are no longer traveling on the land. And this has an impact on them because it’s more expensive. And the government is not helping by putting more restrictions on flying regulations. It raises the difficulties for hunters who want to go on the land.” (Whapmagoostui, 2009)

“4 or 5 years ago, we had to call helicopters sooner than usual because we didn’t want people to go on the ice, we had seen early break-ups and sometimes in the first weeks of May there were break-ups. That had an impact on our activities especially the safety aspect of families going on the land. We had to heavily subsidize the helicopter so that was another impact. Sometimes it takes 2 trips to bring a family back. That increases the cost of our local CTA program a great deal.” (Waskaganish, 2010)

These quotations demonstrate the limitations created by climate change and the associated costs created for both individuals and Cree organizations.

Social and Cultural Impacts

Participants also noticed that climate change creates additional social impacts because land based activities have a social value. “Bush life” and skills are at the heart of Cree culture and society and activities on the land are an important time where Cree values are practised and passed on and this contribute to healthier individuals and communities. The lack of access to the land can thus contribute to an increase in social problems in the communities.

“I think there is a social impact to the lack of easy access to the land. There was an incidence in the community when the kids were setting fires because they were bored. There used to be time when the whole community was empty. For a Cree child or a young person, being able to go on the land is fair play, being able to relax and be out there, away from all the distractions is special, cell phones, etc. it brings families together.” (Waskaganish, 2010)

Food Security Impacts

Food security is defined by the Food and Agriculture Organisation of the United Nations as:

“A condition in which all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.” (FAO)

During the community workshops the participants mentioned that they have noticed a degradation of the animals body conditions (for example, less fat or more parasites and diseases). These changes affect the quality of country food and impact the food security of the Cree.

“The beavers have less fat now since about 3 years ago. One of my coworkers brought a beaver in the first week of February and it was still skinny like in the fall.” (Mistissini 2009)

“Beavers, porcupine and ptarmigan depend on the snow to keep warm during the cold winter season. As a result of less snow during the winter today, these same animals begin to lose body fat. When there is little snow during winter, the porcupine gets cold and begins to lose fat reserves and becomes thin. When there is a lot of snow during the winter, the porcupine will usually retain fat reserves and makes very good eating when caught.” (Whapmagoostui 2009)

For the Cree of Eeyou Istchee, access to country food is a central element of food security. However, climate change makes it increasingly difficult and expensive to travel on the land such that physical access to food becomes limited. The change in animals’ behaviour and distribution also has impacts regarding access to country food – another vulnerability in terms of food security.

Health Impacts

Climate change has an impact on health since it limits access to traditional food and pushes people to rely on store-bought foods, some of which are highly processed. These foods are less nutritious, that is, higher in fat, salt, sugar and containing trans fats. A poor diet is a known contributing factor in pathologies such as cancer, cardiovascular disease, high blood pressure and diabetes.

“What I see is not just impacts on culture and social but health matters; I was talking to older people who said when there is less hunting the food is less healthy, and the more sick people are, diabetes and blood-related sickness, strokes, heart attacks. All the stuff in the store-bought food is not compatible for our body to eat and causes stuff like cancer and arthritis and diseases. There is more of that lately.” (Waskaganish, 2010)

Impacts on Infrastructure

Finally, climate change has an impact on infrastructure. Violent weather and heavier precipitation can cause damage to buildings and other structures. For example, heavy rains cause the overflow of storm drains and sewer systems:

“Two things are happening: creeks are filling with sediments because when new homes construction exposes the silt and the rain wash it to the lake. These particles settle at the bottom and covers the rocks. It is a major impact. At the mouth of the creeks it is very obvious, the turbidity of the lake is much higher. On a week when there was no rain I could see 30 feet down, after a rain, no more than two feet. I did a lot of measurements. The other thing we saw was that the sewer system goes into overflow. Safety department was also measuring it.” (Mistissini, 2010)

The Cree camps have also been impacted by climate change. The shorter season for ice cover increases coastal erosion and some camps have been threatened by this phenomenon. It was also noted by participants that black bears are causing more damage to camps than in the past because they are no longer afraid of humans.



Smokey Hill, Rupert River

COMMUNITY PRIORITIES AND PROGRAMS

During the second round of workshops, we discussed with participants and with local administrators and decision-makers (Local Health Directors, Fire and Police Chief, LEA, Safety Officer and First Nation Councils) what the most important impacts for each community were, and how to address them. This resulted in the drafting of an action plan based on these consultations. Since communities are affected differently by climate change these solutions have to be adapted to the local issues. The draft action plans for each community are presented in Annex B.

The following table presents a summary of the main issues that are common to each of the three communities and the solutions that were discussed during the community consultations:

TABLE 4: SUMMARY OF OBSERVATIONS, IMPACTS AND SOLUTIONS		
OBSERVATIONS	IMPACTS	SOLUTIONS
Change in weather patterns	Safety	Monitoring
Change in ice and snow quality	Access to land Food Security Health Economic	Awareness Training Monitoring
Change in animals and plants	Infrastructure Cultural	Monitoring Wildlife management

The solutions outlined in this table are presented in more detail in the next sections and in Annex B.

The project also gathered information on the monitoring programs already in place. Some programs exist but they are mostly provided on an ad-hoc basis and the data is not systematically collected and is only available locally. The following table summarizes this information:

TABLE 5: EXISTING MONITORING AND ADAPTATION ACTIVITIES IN MISTISSINI, WASKAGANISH AND WHAPMAGOOSTUI	
COMMUNITY	MONITORING AND ADAPTATION ACTIVITIES
Mistissini	<ul style="list-style-type: none"> The ice is monitored in the main channel by a tallyman. It was not performed in 2009 because of late freeze-up. Water temperature in the lake is monitored by the local Environment Coordinator
Waskaganish	<ul style="list-style-type: none"> Niskamoon provided \$ 100,000 for an ice-monitoring program. A team was hired to monitor the ice and put signs on the ice. There is a monitoring report. Public safety is looking at water and ice security. It is getting harder to travel. It is harder to perform search and rescue operations. The First Nation is considering acquiring an hovercraft.
Whapmagoostui	<ul style="list-style-type: none"> Monitor ice conditions in collaboration with the Inuit fire department Search and rescue provide data on ice conditions There is already some efforts being made to trace routes along the bay and rivers for snowmobiles to cross but only on an ad-hoc basis.

SUGGESTED ACTIONS

In this section, we discuss the solutions that could be implemented by the communities that participated in the project. However, these actions could be extended to all the Cree communities interested. The actions presented here are those that were the most commonly discussed during the second round of community workshops:

- Creation of Local Climate Change Committees;
- Monitoring Climate Change in Eeyou Istchee;
- Establishing Security and Awareness Programs.

In the Conclusions and Next Steps section below we also present initial suggestions of potential sources of funding that would allow these recommendations to be implemented.

CREATION OF LOCAL CLIMATE CHANGE COMMITTEES

“We have to put our ideas together and then put it into action. I think first there could be a committee to start it off. They have to have the elders in it because they know the land and they know the ice. Safety has to be there. The Working group will create safety rules. The following institutions should be included: Public Safety, Elders, CTA.” (Mistissini, 2010)

The creation of Local Climate Change Committees was a key action identified by the communities and the research team. These Committees could be first put into place in the three project communities (Mistissini, Waskaganish and Whapmagoostui) and should be based, when possible, on existing committees or structures. In Mistissini, it was proposed to use the Mamou–Wechidodow committee to take charge of climate change issues. The potential members of the Committee could include the Cree Trappers' Association, the Public Safety Officer, the Local Environment Administrator, the Fire and Police Chief, the Cree Board of Health and Social Services of James Bay, the Cree School Board and others.

Additional important roles for the committees would be to *maintain a general awareness of the climate change issue*, and to also learn how other Aboriginal communities are preparing for and adapting to the impacts associated with climate change. The holding of an annual community consultation on the state of the local environment could be a useful activity to document the changes being seen by the community members, and to also provide the opportunity to update the community on the latest science based information being collected in Eeyou Istchee.

An additional important role for the Local Committees would be to identify opportunities for *partnerships and funding* for the implementation of community based monitoring and security/awareness programs, and to enhance the understanding of climate change issues in their communities.

The focus of the committees could be to:

- ❖ *Identify local priorities* to address climate change impacts;
- ❖ Identify *funding sources* and *secure funding* to implement the needed activities;
- ❖ Identify the most effective community specific internet and social media *communication technologies* that could be used in the communities;
- ❖ *Network* with other Aboriginal peoples who are dealing with the same issues;
- ❖ *Follow up* on the adaptive actions identified and implemented;
- ❖ Provide *annual reporting* back to the communities of monitoring results.

MONITOR CLIMATE CHANGE IN EYYOU ISTCHEE

It was recommended by the Communities and the project's research team that monitoring programs should be developed in order to better understand the changes that are happening in Eeyou Istchee. These monitoring programs should be conducted in partnership with research centres, and should put an emphasis on the training of young Cree researchers. The creation of a Cree research institute would allow the Cree Nation to better control both the training and monitoring activities.

These programs could, for example:

- ❖ *Collect data* on ice and weather conditions using weather stations, still cameras, ice probes and water level gauges. Useful project examples in Nunatsiavut and Nunavik from which lessons may be learned are described in Box 1.
- ❖ *Monitor the main ice routes* and implement a warning system through the radio, web, etc. A useful example of an existing monitoring system in Nunavik is also described in Box 1.
- ❖ Monitor *polar bear activity* around the communities. An useful example of a Polar Bear and Caribou monitoring program in the Hudson Bay Region of Ontario is described in Box 2;
- ❖ *Habitat/wildlife monitoring* that would increase focus on the protection and conservation of key species that are important to the Cree of Eeyou Istchee, and do so relying upon the conservation knowledge, innovations, and practices of First Nations⁴.
- ❖ Consider completing a climate change vulnerability assessment of species of concern, or of particular interest to the Cree;
- ❖ Involve youth in the monitoring to learn how to collect data and analyze it as Community Researchers. There are or have been a number of climate change programs for Aboriginal Youth Researchers that have taken place recently and from which valuable lessons could be drawn, for example, please see Boxes 2 and 3.
- ❖ An early step in the implementation of community based monitoring to identify changes in changes in Eeyou Istchee lands and waters could be to identify several climate-sensitive indicators of change (*'seasonal signals'*) that could form the basis for individual community monitoring programs. Ideally these indicators would be seen as important and valued parts of the environment in Eeyou Istchee, and could be documented and observed without special technical measurements or equipment⁵, for example, freeze-up and break-up of ice at particular locations, arrival date for certain migratory birds, etc. A number of important ecosystem variables could also be chosen for

BOX 1: MONITORING PROGRAM EXAMPLES

Establishment of Inuit Community Based Ice Monitoring and Surveillance Programs for Human Safety and Security Nain & Hopedale, NL (2008-2009)

This projects research team worked with the communities of Nain and Hopedale in Nunatsiavut to hire four local ice monitors, train them in the use of the ice monitoring stations, install the stations and pilot their operation in the spring of 2009. The training, implementation and monitoring of the ice stations in the two communities worked very well. Excellent data on snow thickness, ice thickness and temperature were gathered during the short season available after station installation. This work is leading to the installation of the stations once again this winter to help develop a local surveillance and monitoring / travel hazards warning system.

Real-time Monitoring for Travel Safety and Food Security in Salluit, Nunavik (2010-2011)

The Makivik Corporation, Nunavik Research Centre and the Qaqqalik Landholding Corporation from the Northern Village of Salluit are conducting a monitoring program in Salluit and the surrounding area. The monitoring program allows community members to evaluate travel safety conditions as they relate to local weather patterns and also to begin a long-term monitoring program of the potential for decreased access to traditional foods, specifically arctic char, which is one of the main sources of food for the local Inuit population.

Climate Change and Health Adaptation Program for Northern First Nations and Inuit Communities, Health Canada. Pan-Arctic Results Workshop. February 7-10, 2011. Ottawa, Canada.

4 Report 5: Climate Change and First Nations: Recommendations for Action: Prepared by CIER for the Assembly of First Nations; March 2006 (<http://www.cier.ca/information-and-resources/publications-and-products.aspx?id=922>)

5 *Guidance Document on Incorporating Climate Change into Community Planning*. Submitted to the Walpole Island First Nation by Resource Futures International. September 2004.

monitoring on a *regular basis*, for example, wetlands. The GIS based GeoPortal could be used to compile this information, serve as a repository of the data for the analysis of long term trends, and also potentially serve as a photo-archive for the changes seen.

- ❖ Provide *annual reporting* back to the communities of the monitoring results.

Role of the Cree GeoPortal

The *Cree GeoPortal* could potentially be used to monitor long term climatic trends (5-10 years) in Eeyou Istchee, as well as being used as a public awareness tool. For example, current climate change projections for Eeyou Istchee and Canada could be provided on the GeoPortal either as a separate map(s) or an overlay, and updated as needed. The GeoPortal could also be used to provide links to other Aboriginal climate change resources.

ESTABLISH SECURITY AND AWARENESS PROGRAMS

Safety issues were the most important concerns raised during all the workshops and many participants suggested the creation of *security and awareness programs*. It was recommended that these programs should mainly target the youth and could be a part of the Cree school curriculum and Ashumi program. It should also involve Tallymen and Elders because they know the land.

BOX 2: COMMUNITY YOUTH RESEARCHERS SURVEY ON POLAR BEAR AND CARIBOU: THE CHANGING WAY OF LIFE IN FORT SEVERN FIRST NATION, ONTARIO (2010-11)

The community of Fort Severn First Nation is conducting a survey of polar bear migration and habitat in their traditional territory. Local guides, youth and Elders are working with researchers to collect, analyze, and share local cultural and traditional knowledge, in order to better understand how the species is being affected by climate change. Activities include open community meetings, Elder/youth interviews, and youth wilderness and traditional teaching trips. Elders are talking with youth about the land and the changes they see. The youth are learning to make videos and share the stories with others for generations to come.

Climate Change and Health Adaptation Program for Northern First Nations and Inuit Communities, Health Canada. Pan-Arctic Results Workshop. February 7-10, 2011. Ottawa, Canada.

BOX 3: CLIMATE AS A HEALTH DETERMINANT IN THE AKLAVIK REGION OF THE NORTHWEST TERRITORIES, 2008-2009

This research project focused on the description of climate change related environmental changes and the way in which these changes play out as health determinants in the Aklavik region. Oriented towards a greater understanding of changing climate in Aklavik, the project utilized community based, youth driven, participatory methods to respond to community requests for the engagement of youth and the promotion of lifelong learning. The project comprised three primary sections entailing the collection, synthesis and dissemination of information regarding climate change as a determinant of health. Through the implementation of classroom-based activities, interviews and retreats/gatherings, the project described climate change as a determinant of health throughout Northern regions, with particular relevance to Aklavik.

Climate Change and Health Adaptation Program for Northern First Nations and Inuit Communities, Health Canada. Pan-Arctic Results Workshop. February 7-10, 2011. Ottawa, Canada.

“The Tallymen who have been travelling all these years must exchange their knowledge with the youth, it’s important for the youth to know the travelling conditions from the elders who have been so many years on the land.” (Mistissini, 2010)

“Young people don’t know their environment, don’t have the traditional knowledge that their Elders had. We need school programs that will teach kids about environment and safety – to help them learn what they need to know about the environment in order to be safe.” (Whapmagoostui, 2010)

Specific security and awareness activities suggested to be carried out included:

- ❖ Exploring *accreditation* possibilities;
- ❖ Exploring school-system based *winter survival training*;

- ❖ Preparing and reviewing *existing emergency response plans* for winter travel and/or provide additional safety equipment, for example, GPS tracking systems. Please see a relevant project example used in another northern community in Box 4;
- ❖ Consider the implementation of preventative adaptation measures to *protect human health* in Eeyou Istchee related to climate change impacts (e.g., early warning systems in First Nations to protect against extreme weather events, natural or human-induced disasters such as forest fires).⁶
- ❖ In regards to *food security*, consider increasing inter-community trade linkages as one way to more broadly share traditional foods and adapt to the changing accessibility to food resources.⁷ Cree youth researchers could also build on the health research work already done in Mistissini,⁸ Chisasibi, Waskaganish, Mistissini, Eastmain and Wemindji⁹ to identify additional solutions (for example, see Box 5).

BOX 4: TRAINING, MONITORING, AND SHARING SEA ICE EXPERTISE ILISAQSIVIK SOCIETY & ITTAQ HERITAGE AND RESEARCH CENTRE, NUNAVUT (2009-2010)

This project implements part of the Clyde River Climate Change Adaptation Action Plan by following up on local community members' concerns with regard to changing sea ice conditions and sea ice safety. To adapt to and address changing sea ice conditions, community members recommended the implementation of sea ice monitoring and sea ice safety training and tools. ITTAQ and Clyde River have continued local sea ice monitoring as well as designed a program to train youth and hunters in sea ice safety and self-rescue. In addition, a sea ice safety reference book was also developed, and a collection of safety tools made available to community members.

Climate Change and Health Adaptation Program for Northern First Nations and Inuit Communities, Health Canada. Pan-Arctic Results Workshop. February 7-10, 2011. Ottawa, Canada.

Expanded Role for the Cree GeoPortal

The role of the Cree GeoPortal could be increased to supplement traditional methods of predicting environmental conditions for safe ice travel. Training programs could also be developed and implemented that could teach Eeyou Istchee youth how to effectively use GIS technology as a backup for assessing locations of inadequate ice cover, snow depth, and changes in migration patterns of typically hunted species.¹⁰

BOX 5: FOOD SECURITY AND CLIMATE CHANGE HEALTH IMPACTS IN OUR COMMUNITY TESLIN, YUKON TERRITORY (2010-2011)

Summer students were hired and trained to do research and interviews with the citizens of Teslin Tlingit First Nations in the Yukon. The students were also trained on using a video camera, with which they developed a 15 minute film on the project and also took many pictures throughout the summer and early fall for the project. The research team also had a one-day workshop for the youth of Teslin on Food security and climate change, and hosted a community presentation on the work that they had been doing and launched the video that they developed. The project is intended to let the First Nation know about the changes to the earth, how it will effect the future of their land, water, animals and the people and what should they do to protect and preserve our land and water.

Climate Change and Health Adaptation Program for Northern First Nations and Inuit Communities, Health Canada. Pan-Arctic Results Workshop. February 7-10, 2011. Ottawa, Canada.

“You see all the James Bay highway maps, we look at the maps for the best route. We could do the same with the GeoPortal. The map could show signs that say “caution” or “thin ice” like skidoo signs. These could be shown on a map. They would be closed in the evening when it is very cold or at times when it is dangerous and Public Safety could be involved.” (Waskaganish, 2010)

6 Report 5: Climate Change and First Nations: Recommendations for Action: Prepared by CIER for the Assembly of First Nations; March 2006 (<http://www.cier.ca/information-and-resources/publications-and-products.aspx?id=922>)
 7 Report 5: Climate Change and First Nations: Recommendations for Action: Prepared by CIER for the Assembly of First Nations; March 2006 (<http://www.cier.ca/information-and-resources/publications-and-products.aspx?id=922>)
 8 <http://www.creehealth.org/clinical-protocols/environmental-health-study-technical-report-mistissini>
 9 <http://www.creehealth.org/research-projects-map>
 10 Report 5: Climate Change and First Nations: Recommendations for Action: Prepared by CIER for the Assembly of First Nations; March 2006 (<http://www.cier.ca/information-and-resources/publications-and-products.aspx?id=922>)

RECOMMENDATIONS

As discussed in the last section three primary recommendations were identified during the community workshops, and are outlined below with suggested specific next steps. The involvement of youth was also considered a major priority and opportunities for their involvement are described in a separate 4th recommendation.

1. CREATION OF LOCAL CLIMATE CHANGE COMMITTEES

Members of the three project communities have been engaged on the issue of climate change during the past two years of the project. The community members have identified the need for the establishment of climate change committees to strengthen the ability of the communities to meet the challenges and opportunities associated with climate change. We recommend exploring the use of existing committees before creating new ones.

Potential funding partners preliminary identified to assist directly, and/or to identify additional funding sources include, among others:

- Indian and Northern Affairs Canada, Climate Change Adaptation Program¹¹;
- Natural Resources Canada (Climate Change Impacts and Adaptation Directorate).

2. IMPLEMENT COMMUNITY BASED MONITORING OF CLIMATE CHANGE

The need for the establishment of community based monitoring systems was identified by the project communities and the research team. A community based monitoring system would provide the communities of Eeyou Istchee with an on-going source of information on important changes in the local environments, strengthen the capacity of the communities to document important changes that are taking place, and clarify the relevance of climate change to the communities.¹² The Cree GeoPortal should be part of the monitoring system.

Potential partners to support these activities include, among others:

- Environment Canada (EC) Funding Programs¹³: An important initial contact would be with the Canadian Wildlife Service in the Quebec Region, and the EC Green Source Funding Database is also a potentially useful resource to identify funding sources;¹⁴
- Ouranos (Consortium on Regional Climatology and Adaptation to Climate Change);¹⁵
- ArcticNet has a program on climate change monitoring;¹⁶
- INRS (Institut national de la recherche scientifique) eau, terre et environnement;¹⁷
- Natural Resources Canada (Climate Change Impacts and Adaptation Directorate);
- Environment Canada's EcoAction Community Funding Program;¹⁸
- Environment Canada Environmental Damages Fund;¹⁹
- the Canadian Foundation for Climate and Atmospheric Sciences (CFCAS).²⁰

11 Decision on program renewal expected in March 2011. Also consider the INAC First Nations Infrastructure Fund for funding infrastructure solutions (<http://www.ainc-inac.gc.ca/ih/ci/fni-eng.asp>)

12 *Guidance Document on Incorporating Climate Change into Community Planning*. Submitted to the Walpole Island First Nation by Resource Futures International. September 2004.

13 <http://www.ec.gc.ca/financement-funding/Default.asp?lang=En&n=3A49CF19-1>

14 <http://www.ec.gc.ca/financement-funding/default.asp?lang=En&n=768DAFB1-1>

15 <http://www.ouranos.ca/en/>

16 <http://www.arcticnet.ulaval.ca/>

17 <http://www.ete.inrs.ca/ete>

18 <http://www.ec.gc.ca/ecoaction/default.asp?lang=En&n=FA475FEB-1&printfullpage=true&nodash=1>

19 <http://www.ec.gc.ca/edf-fde/default.asp?lang=En&n=BD1220D8-1>

20 <http://www.cfcas.org/about/>

3. ESTABLISH ICE MONITORING AND SAFETY PROGRAMS

Safety issues were the most important concerns raised during all the workshops and many participants suggested the creation of security and awareness programs. It was recommended that the program should mainly target the youth and could also be a part of the Cree school curriculum and Ashumi program. The involvement of the Tallymen and Elders was considered essential as they know the land. Several ice monitoring programs exist in other Aboriginal communities in Canada (please see examples provided above), and the members of the research team have also preliminarily identified a number of additional organizations involved in the planning and implementation of ice monitoring. The Local Committees may wish to consider contacting these organizations to obtain further specific information and assistance, and the research team can provide the names and contact information of key individuals to contact within these organizations.

Potential partners for this activity include:

- Cree School Board;
- Ministère des Transports du Québec;
- Health Canada (First Nations and Inuit Health Branch, Climate Change and Adaptation in the North).²¹

4. INVOLVING CREE YOUTH

Consider the establishment of employment opportunities, internships or scholarships for Cree Youth in areas where monitoring or research is required. The types of monitoring or research required could include:

- Involving youth in the monitoring to collect data on seasonal and ecosystem indicators, for example, using weather stations, still cameras, ice probes and water level gauges;
- Compiling monitoring data and analysing trends, and maintaining a GIS based data base;
- Monitoring the main ice routes and implementing a warning system through the radio, web, etc.;
- Preparing and presenting annual monitoring reports to the communities;
- Supporting the Local Climate Change Committees by exploring and compiling information on other Aboriginal climate change initiatives.

Key potential partners to support the involvement and training of Cree youth, in addition to the partners listed above, could include:

- the Cree Human Resources Development Board;²²
- ArcticNet;²³
- Institut national de santé publique du Québec (INSPQ);²⁴
- Centre for Northern Studies at the University of Laval;²⁵
- Environment Canada's Science Horizons Program;²⁶
- Environment Canada International Environmental Youth Corps (IEYC).²⁷

21 Decision on program renewal expected in March 2011.

22 <http://www.chrd.ca>

23 <http://www.arcticnet.ulaval.ca/>

24 <http://www.inspq.qc.ca/>

25 <http://www.cen.ulaval.ca/en/page.aspx?lien=index>

26 <http://www.ec.gc.ca/scitech/default.asp?lang=En&n=B58899DC-1> (possibly ending March 2011)

27 <http://www.ec.gc.ca/education/default.asp?lang=En&n=6DA60166-1>

NEXT STEPS

The following table identifies the next steps that will need to be taken in order to implement the recommendations presented in the last section.

TABLE 6: IMPLEMENTING A CLIMATE CHANGE STRATEGY FOR EYYOU ISTCHEE	
ACTIVITY	RESPONSIBILITY
Present project results and recommendations to Cree organisations, in order to identify an organisation willing to take leadership of the climate change adaptation strategy, and to create a regional working group with the mandate to support and coordinate local climate change initiatives.	Research Team
Identify local Cree organizations willing to participate in the project.	Regional Working Group
Develop partnerships with research centres to support and expand systematic Ice Monitoring and Safety Programs (Ice monitoring is taking place at present but it is only conducted on an ad hoc basis).	Regional Working Group and Local Climate Change Committees
Find funding opportunities to support the regional working group and local climate change committees and to finance monitoring programs.	Regional Working Group
Develop awareness and safety programs that could be used in the school and the communities of Eeyou Istchee.	Regional Working Group with local and regional Cree partners
Integrate youth training and capacity building into all proposed project activities.	Local Climate Change Committees, Cree organizations and Regional Working Group
Encourage the use of the climate change application on the GeoPortal in local schools, community centres, and elsewhere to increase awareness (e.g. partners' and communities websites, radio announcements, local newsletters, 'The Nation').	Local Climate Change Committees and Regional Working Group

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ANNEX A: SUMMARY OF COMMUNITY OBSERVATIONS

ANNEX A: SUMMARY OF COMMUNITY OBSERVATIONS

CLIMATE CHANGE IN MISTISSINI – RESULTS OF THE WORKSHOP

The workshop was held in November 2009 at the Mistissini Lodge. A total of 29 participants from the community were present and shared their knowledge and observations on changes in the climate over the years.

Here is a summary of observations made by participants, and a few examples of impacts that these changes in weather patterns have on land use.

TOPIC	CHANGE/OBSERVATION	IMPACTS
Weather patterns	<ul style="list-style-type: none"> • Winter is two months shorter. • The wind is changing. • There is no severe cold before snow falls so the ground is not frozen before freeze up. • There are more forest fires now. 	<ul style="list-style-type: none"> • Harvesting levels are impacted. Fur needs cold temperature to be prime. Less time to set the traps. It all affects the bank account. • You cannot keep geese and meat in the ground anymore because it is not frozen. • It was easier to sleep outside in winter because it was not as humid.
Water temperature/ level	<ul style="list-style-type: none"> • Currents are changing in Mistassini Lake. • Warmer water means earlier ice break-up. • In some lakes the water levels are lower and the ice is thick. 	<ul style="list-style-type: none"> • Warmer water increases the size of waves in summer and fall. • Changes in ice and temperature make it harder to trap beaver and set fish nets in winter.
Snow	<ul style="list-style-type: none"> • The snow is softer and it melts fast because the ground is not frozen and there is no ice between the layers. • The snow melts as it falls and drains into the lake. • There used to be 4 layers of snow – now there is less. Snow was much deeper. • Sometimes when the snow collapsed it used to make a sound; not anymore. • There is more slush in the spring. 	<ul style="list-style-type: none"> • You can't walk without snowshoes on the hard snow in early spring. • Transportation and hunting patterns are affected. • It is now difficult to use any mode of transportation, even snow shoes. It is also harder for the animals to travel. • When we go out in the spring to cut wood, the skidoo sinks in the snow. • You can get stuck travelling in slush.
Rain	<ul style="list-style-type: none"> • There is more rain and it comes down more heavily. • It rains for shorter periods. • Thunderstorms are not as strong as before. • There are more lightening storms. • It rains until Christmas time. • There is more drizzle. 	<ul style="list-style-type: none"> • You cannot paddle in the rain anymore, it comes down too hard. • We used to sleep and hunt without tents anywhere. We cannot do that anymore. You can't get the fire going so you get cold and sick. • When it drizzles it goes through your body.
Wind	<ul style="list-style-type: none"> • It is windier and the wind is stronger. • The wind from one direction blows for longer periods. • The winds are reversed: we get south winds in November and north winds in spring. • In the fall, the wind coming from the north is colder and more humid. Changes in wind patterns seem to affect currents in Mistassini Lake; it looks like a tide. 	<ul style="list-style-type: none"> • Winds blow the snow away so there is no snow accumulation. • The wind pushes water currents that in turn push the ice towards the ground, creating ice pile-ups. • The wind creates larger waves on Mistassini Lake in the fall.
Freshwater	<ul style="list-style-type: none"> • Currents are much stronger than they used to be in Mistissini Lake. 	



Mistissini Continued

TOPIC	CHANGE/OBSERVATION	IMPACTS
Ice	<ul style="list-style-type: none"> • Freeze up of the lake is delayed by one month. • In the past you could walk on the ice one day after it froze, not anymore. • At the beginning of freeze up, there is no more clinging of the ice on the rocks along the shore. Now it just freezes over. • On the lake, there used to be 3-4 feet of ice, now it is 2 feet or so. • The ice is softer and breaks easily (white ice). Even if it is thick. • Black ice now forms in strips instead of being like a mirror; it's not as solid. • The ice melts faster and breaks up easily in the spring. It melts from top and bottom because the ground is not frozen. • In spring the ice no longer needs wind to break up; it melts from the water itself because of water movements. • Ice is piling up now during winter. 	<ul style="list-style-type: none"> • We have to wait longer to go out on the lake. • For a plane, you needed 8 inches of ice in the past; now you need 12 inches. • There are negative impact on harvesting activities and travelling. • Accidents happen where creeks come out in the lake. • People used to be a lot more familiar with their hunting territory and the land when they walked more. Today you see more of the territory with the skidoo but you have less time to observe the land. • Because the ice is unsafe, it is harder to travel to the trapline by land. We use helicopter now; it is more expensive. • When travelling on the land, using unsafe trails is dangerous for younger people and people with less experience.
Animals	<ul style="list-style-type: none"> • New kinds of ducks were seen, cougars, eagles, swans, vultures, there are less birds, less snakes, less frogs. • Animals are less scared. 	<ul style="list-style-type: none"> • Eagles scare away the geese.
Geese and waterfowl	<ul style="list-style-type: none"> • Generally, there are more geese on the territory and less ducks and partridge. 	<ul style="list-style-type: none"> • It's harder to know when the geese will be flying. Negative impact on goose hunting.
Fur-bearing animals	<ul style="list-style-type: none"> • There are less beavers in some areas and they are not as fat. • Marten is more abundant and is not as wild. It will look back at you. • There are less rabbits, muskrats, minks, lynx, but there are more wolves than before. 	<ul style="list-style-type: none"> • Change in the taste of rabbit- sauce not as thick when cooked. • Changes have impacts on food quality and taste.
Bear	<ul style="list-style-type: none"> • There are more bears and they are not as wild as before. 	<ul style="list-style-type: none"> • Bears wreck camps. • Bear meat tastes different.
Moose	<ul style="list-style-type: none"> • There are more moose. • Male hides are thin in the fall. • Females still breast-feed in September. • Increase of white lumps on moose liver, especially female. 	<ul style="list-style-type: none"> • Positive because less work to treat the hides. Used to chase moose for days for it to have a thinner hide.
Fish	<ul style="list-style-type: none"> • There is less fish and the flesh is less fatty than before. • There are less minnows, less trout, more suckers. 	<ul style="list-style-type: none"> • Less fish – important element of Cree diet.
Plants, berries and trees	<ul style="list-style-type: none"> • Are subject to weather changes. • Plants used to grow larger leaves. • There are less berries. 	<ul style="list-style-type: none"> • Less berries has an impact on animals who feed on them, like the bear. Medicinal plants seem to be damaged by overheating.



CLIMATE CHANGE IN WASKAGANISH – RESULTS OF THE WORKSHOP

The workshop was held in September 2009 at the Kanio Kashee Lodge. A total of 13 participants from the community were present and shared their knowledge and observations on changes in the climate over the years.

Here is a summary of observations made by participants, and a few examples of impacts that these changes in weather patterns have on land use.

TOPIC	CHANGE/OBSERVATION	IMPACTS
Weather Patterns	<ul style="list-style-type: none"> The cold weather only starts in January. The creeks thaw early in March, and Spring comes early in the bay. The weather seems to come from the south. The freeze up is different and the ice melts faster. 	<ul style="list-style-type: none"> People used to leave late in August to their trapline. Now they leave sometimes up to mid-October. Some trails can't be used anymore. We have to find new routes and make new trails.
Water temperature/ level/tides	<ul style="list-style-type: none"> Tides are not as strong as before. Currents are especially strong in some areas of the bay. 	
Snow	<ul style="list-style-type: none"> It settles later in winter and melts faster in the spring. There is less snow overall and there are changes in the thickness of the snow. There are less snowstorms but they are stronger. There are no more snowstorms in springtime. 	<ul style="list-style-type: none"> Hunters don't have snow to make their blinds.
Rain	<ul style="list-style-type: none"> There is less rain than before but there can be heavy rain in December. Thunderstorms are less frequent but more powerful. There is more freezing rain. 	<ul style="list-style-type: none"> When there is freezing rain in the fall it freezes the willow and the moose cannot eat as much. When there are less storms, the growth of plants is slower.
Wind	<ul style="list-style-type: none"> Winds are more frequent and come from the North-West. They seem to be stronger with big gusts of up to 100 km. There used to be tornados back then. 	<ul style="list-style-type: none"> Strong winds blow trees down and roof tops off. When there are strong winds the water levels are higher. The blue geese feeding grounds are lost, so the geese move to inland lakes and wetlands in the fall.
Ice (Lakes)	<ul style="list-style-type: none"> Ice on the lakes freezes earlier than on rivers and stays frozen longer, but the freeze up is still late and the thaw early in spring. 	
Ice (Bay)	<ul style="list-style-type: none"> There are gradual changes in the bay ice: it freezes solid later (Jan & Feb), Ice is breaking up earlier. The currents open the ice earlier and ice along the coast is also breaking earlier. Water is warmer and ice along the coast breaks earlier. There are more and more areas with open water in May. Water coming out of the river is warmer and it impacts the bay. Although it varies with the amount of snow in a given winter, there is no more piling up of ice in May in front of the community in the bay; the ice just melts. Known openings in the ice are getting larger and the ice is thinner every year. 	<ul style="list-style-type: none"> Transportation on the bay in winter is different now - trails in spring and winter are affected. We can only go in December to the trapline; that is a month later than it used to be. Travel is dangerous – river mouth is most dangerous spot. There are dangerous places because the ice breaks up earlier, making travel impossible. The travel season on ice is reduced to one month only. People have fallen through the ice. Because of such an incident the CTA started the helicopter monitoring program during school break and goose break. Winter travel and trapping are impacted.



Waskaganish Continued

TOPIC	CHANGE/OBSERVATION	IMPACTS
Coastal Erosion	<ul style="list-style-type: none"> Started ten years ago. Strong wind, high tide and strong storms, especially in the fall. Occurring more often now. Wind always from North-West. There is also river erosion along the Rupert. 	<ul style="list-style-type: none"> Cause coastal erosion.
New animals	<ul style="list-style-type: none"> Animals move more than before and are less scared. New animals are appearing or increasing such as pelicans, coyotes, racoons, bald eagles, egrets, vultures, cranes, swans, long neck geese, frogs, porcupines, belugas. More sightings of wolves looking for food near community. 	<ul style="list-style-type: none"> Geese don't land on the shore of Rupert Bay because of the eagles.
Geese	<ul style="list-style-type: none"> All the geese used to come up North between April & May but now the long neck geese travel North in June; some have problems flying as they already start moulting. Geese no longer have any landing area on the shores around the bay. There are less geese around the bay in the fall. 	<ul style="list-style-type: none"> Hunters kill less geese now because their feeding ground disappeared. Several outfitters have abandoned their outfitting camps (#37, #38, #39, #40).
Fur-bearing animals	<ul style="list-style-type: none"> The beaver seems to decline all the time. The lynx, marten and rabbit populations have also decreased. 	
Polar Bear	<ul style="list-style-type: none"> Polar bears hit the coast for 10 years. now. There are more sightings on Charlton Island in winter and spring time. 	<ul style="list-style-type: none"> Ransack the camps. Dangerous for people.
Bear	<ul style="list-style-type: none"> Elders say when the weather is poor, there is less vegetation, fewer blueberries. So the bears don't have enough food and scavenge near community and shore land. With early thaws, bears come out early, because their dens get flooded; or because they lack food and are near campsites. 	
Moose	<ul style="list-style-type: none"> Moose are now seen along the shores of the bay. Before there was no moose in that area. 	
Fish	<ul style="list-style-type: none"> Fish populations have changed. Fish is affected by climate change because it does not have a place to cool off when the water gets too warm. Sturgeon is not as big as before but it shows up in areas where it was not caught before. Whitefish comes in about 2 weeks later than usual in the last 2-3 years. It is not as big and fat as before. 	<ul style="list-style-type: none"> People no longer go out fishing in the bay.
Plants, berries and trees	<ul style="list-style-type: none"> Wetlands are drying up and there is an overgrowth of vegetation. There are less birch trees around the bay and some plants grow higher. The vegetation grows rapidly and blueberries grow more. 	<ul style="list-style-type: none"> Geese don't feed along the shore anymore because of the vegetation growth. This has affected ptarmigan and rabbit food as well.



CLIMATE CHANGE IN WHAPMAGOOSTUI – RESULTS OF THE WORKSHOP

The workshop was held in October 2009 with 3 participants from the community who shared their knowledge and observations on changes in the climate over the years.

Here is a summary of observations made by participants and a few examples of impacts that these changes in weather patterns have on land use.

TOPIC	CHANGE/OBSERVATION	IMPACTS
Weather Patterns	<ul style="list-style-type: none"> The intensity of the sun is very high. It is more difficult to predict the weather now. The stars were used as markers for temperature. In the past the length of seasons used to vary. There is underground water coming out from the bank before there was only one outlet now there are several water outlets coming out from the bank. 	<ul style="list-style-type: none"> There are mudslides along the Great Whale River and trees falling as a result. The permafrost seems to be melting. Something is happening under the community. Is it the permafrost? Areas where permafrost is melting can be very dangerous for the hunter they can fall. Houses are deteriorating much faster. There are health issues.
Water temperature/ level/tides	<ul style="list-style-type: none"> 30 years ago didn't see sand banks now we see them. Bottom of river also changing and pathways are shifting. The water level is lower. 	<ul style="list-style-type: none"> With more sand banks coming in you must find your way now.
Snow	<ul style="list-style-type: none"> The snow is different every year. Sometimes there is a lot and sometimes not. Sometimes there is less snow on the coast than inland. 	
Wind	<ul style="list-style-type: none"> Now sometimes the wind comes and has an effect on the water level it pushes the water up like a high tide. There used to be wind of up to 90 miles an hour and it would have the same effect of creating like a high tide. Today the same thing happens but only with a 50 mile wind. 	
Ice (lakes and rivers and in general)	<ul style="list-style-type: none"> Small creeks are no longer frozen there is snow on top but it's not frozen under the snow. Ice is not as hard as it used to be. Depending on the slush and thickness of ice melting will be faster or slower. Layers in the ice are softer and thinner. Ice breaks much earlier in early May. 	<ul style="list-style-type: none"> There are a lot of accidents on those creeks. People no longer travel on the land. More and more build airstrips on their trapline close to their camps. It is more expensive and hunting activities are more localized in the areas where the plane can land. In spring we lost two very experienced hunters that fell through the ice.
Ice (bay)	<ul style="list-style-type: none"> The Inuit hunt in the bay and observe that ice is thin and very soft. 	<ul style="list-style-type: none"> Travel routes are closer to the shore where there are dangerous areas. In this time of year they used to be able to go out into the bay but now they can't anymore.
Coastal erosion	<ul style="list-style-type: none"> Across the river at shoreline there used to be sand now it's all mud. 	<ul style="list-style-type: none"> On the river shore when you set up nets they get caught in the mud. Muddy river shores are dangerous for children at low tide.

Whapmagoostui Continued

TOPIC	CHANGE/OBSERVATION	IMPACTS
Animals	<ul style="list-style-type: none"> Swans are seen more often even here in the village. A red breasted bird as big as snow goose was killed. It was never seen before. There are more mice. A huge bird was seen. People thought it was a black bear sitting on the ice they were going to hunt it but when they approached it flew off. 	
Geese and waterfowl	<ul style="list-style-type: none"> The flight patterns have changed. We don't see snow geese anymore. Geese go inland now. Baby ducklings have a slower growth and baby snow geese are starting to have too much lice. We can't eat them. During migration the geese fly at night. The geese are skinny now when they come back from the north. The Inuit say there are no more ducks in areas of the bay. 	<ul style="list-style-type: none"> With eelgrass disappearing there is no more food for the waterfowl. Now the ducks taste different. In some areas we used to see ducks migrating in the fall; there were many in bay but no more. Now you can kill only 6-10 where before you would get 50 and more.
Fur-bearing animals	<ul style="list-style-type: none"> There are more foxes. The quality of foxes' furs is not the same. Foxes are not scared. 	<ul style="list-style-type: none"> Why do we see more and more skinny animal? Why does fish have burnt spots? Why do animals all of sudden all get sick?
Polar bear	<ul style="list-style-type: none"> There are more and more polar bears. Polar bears are not afraid. 	<ul style="list-style-type: none"> Polar bears come close to the camps and are dangerous.
Bear	<ul style="list-style-type: none"> Black bears behave differently and come very close to camps. 	<ul style="list-style-type: none"> Bears are more dangerous.
Caribou and moose	<ul style="list-style-type: none"> There are less caribou because there is less vegetation. Caribou becomes fatter when mosquitoes go away. Now the insect season is longer and the caribou can't get fat. 	<ul style="list-style-type: none"> The taste of caribou has changed. It used to taste better. Caribou are very impacted; they are skinnier and have less meat.
Fish and marine mammals	<ul style="list-style-type: none"> The fish are smaller. At the mouth of the river we see more sucker and less white fish. Before there were many different kinds of seals and there was a current where they liked to play in. They are not seen anymore. At the mouth of the river water is getting shallow. Beluga no longer come in. The bigger fish is not found in certain lakes anymore. Recently there seems to be more sightings of sturgeon and sea dogs. 	<ul style="list-style-type: none"> Now when they boil fish you don't see that white nutritious stuff anymore. Fish are not as healthy as before.
Plants berries and trees	<ul style="list-style-type: none"> Trees look sick; there is that rusty colour on them. There is less vegetation especially less eelgrass. Eelgrass was much higher a long time ago. It is food for ducks and geese. 	<ul style="list-style-type: none"> Browning of the trees may affect water the land and animals as it falls. It might affect the geese as they feed along the Great Whale River. Offspring of geese don't have time to grow to their fullest potential. Usually the vegetation is at its fullest potential when eggs hatch. Now the vegetation is dying when eggs hatch. They don't get the necessary nutrients needed to grow. Now the ducks taste different.

ANNEX B: COMMUNITY DRAFT ACTION PLANS

Figure 3: Draft Mistissini Action Plan – September 2010

MISTISSINI CLIMATE CHANGE WORKING ON AN ACTION PLAN- septembre 2010

OBSERVATIONS	IMPACT	Type of Impact	POSSIBLE SOLUTIONS	RESPONSIBILITY
<ul style="list-style-type: none"> Late freeze-up/ early break-up Changes in snow quality and quantity Changes in ice quality 	Dangerous travelling conditions	Safety Food Security Economic Health	<ul style="list-style-type: none"> Monitoring Awareness/Training programs Safety leader with each travelling party Life jackets in winter 	Fire department is monitoring after freeze up Band Council can request funds
	Shorter hunting season	Food Security Health		
	Less land use means less control	Political/Cultural		
	Travel to blinds unsafe	Safety Economic	<ul style="list-style-type: none"> Build goose ponds and flyways in safer locations Study on Goose Pond (Ducks Unlimited) 	
<ul style="list-style-type: none"> More violent weather 	Impact on infrastructures (community and on the land) Overflowing sewage and rain drainage system Silt in the lake from development Diminishing quality of tap water after rain (report from Rod Quinn)	Infrastructure Economic Health	<ul style="list-style-type: none"> Monitoring better weather (wind measures and maybe a weather station in Mistissini) Evaluation of sewer and rain drainage system 	Env. Coordination
<ul style="list-style-type: none"> More forest fires 	Loss of property, resources Health hazard	Safety Economic Health	<ul style="list-style-type: none"> Monitoring Insurance program? Preparedness programs 	SOPFEU CRA works with the First Nation Council on the Emergency plans for each community – it will be presented to the communities
<ul style="list-style-type: none"> Less ducks Less partridge less rabbits less muskrats beaver not as fat worms in caribou Less fish Less berries 	Traditional food diet affected	Food security Health		
<ul style="list-style-type: none"> Arrival of geese unpredictable 	Planning affected	Food Security Health	<ul style="list-style-type: none"> Monitoring 	
<ul style="list-style-type: none"> Changes in medicinal plants (quality and quantity) 	Loss of healing practices (Cultural)	Cultural	<ul style="list-style-type: none"> Recording healing practices Murray's camp CIHR Team in Aboriginal Anti-diabetic Medicines: http://www.taam-emaad.umontreal.ca/index.htm 	

Figure 4: Draft Whapmagoostui Action Plan – September 2010

WHAPMAGOOSTUI CLIMATE CHANGE WORKING ON AN ACTION PLAN – SEPTEMBER 8-9, 2010

OBSERVATIONS	IMPACT	TYPE	POSSIBLE SOLUTIONS	RESPONSIBILITY
<ul style="list-style-type: none"> Late freeze-up/early break-up Changes in snow quality and quantity Changes in ice quality (thinner) Bad ice along the coast Weather harder to predict 	Dangerous traveling conditions	Safety Food security	<ul style="list-style-type: none"> Monitoring of ice conditions along main traveling path on the bay and inland Promoting the use of flotation suit for people traveling by skidoos on the Bay Developing an awareness program in the community and in the school Building more Landing strips in camps 	Police and Safety department are marking ice path on an ad-hoc basis. The program could be made permanent if we secure funding
	Shorter hunting season	Economic		
	Less land use means less control	Political Cultural		
	Access to camp in spring is dangerous because of thin ice	Safety Economic		
<ul style="list-style-type: none"> Change in river level Sand bar in the River Beluga are rare in the river 	Dangerous traveling conditions	Safety	<ul style="list-style-type: none"> Installing channel marker in the River 	
	Lost of a resource ?	Food security?		
<ul style="list-style-type: none"> Skinier Caribou Less snow geese 	Access to resources	Food security	<ul style="list-style-type: none"> Exchange with other communities Sending hunting parties to get caribou for the communities 	Done on an ad-hoc basis by some hunters
<ul style="list-style-type: none"> More polar bear More black bear Change in black and polar bear behaviour 	Danger to people and property (camp)	Safety	<ul style="list-style-type: none"> Monitoring polar bear around the community 	
<ul style="list-style-type: none"> No more seals Whitefish and trout are smaller More sucker fish 	Lost of resources	Food security		

Figure 5: Draft Waskaganish Action Plan – October 2010

WASKAGANISH CLIMATE CHANGE PROJECT: WORKING ON AN ACTION PLAN – OCT. 25-26, 2010

OBSERVATIONS	IMPACT	TYPE	POSSIBLE SOLUTIONS	RESPONSIBILITY
Thinner Ice Earlier Break-up Late Freeze-up More open water in the Spring	Dangerous traveling conditions	Safety Food security Health	<ul style="list-style-type: none"> Monitoring of ice conditions along main traveling path on the bay and inland Promoting the use of flotation suit for people traveling by skidoos on the Bay (Whapma) Developing an awareness (certification?) program in the community and in the school Ice roads follow-up website 	Band Council CTA Committee with elders, tallyman
	Shorter hunting season	Economic Food security Health		
	Less land use means less control Access to camp in spring is dangerous because of thin ice	Political Cultural Safety Health Economic		
Stronger Wind	Dangerous traveling conditions	Safety Food security Health	<ul style="list-style-type: none"> Warning system 	
	Impact on infrastructures	Infrastructure		
Shorter ice cover	Coastal erosion	Infrastructure	<ul style="list-style-type: none"> Protection of coast around village and camps Relocation of camps 	
Less Caribou Change in geese behaviour	Access to resources	Food security Health	<ul style="list-style-type: none"> Exchange with other communities 	
More polar bear Change in black bear behaviour	Danger to people and property (camp)	Safety	<ul style="list-style-type: none"> Monitoring polar bear around the community 	

ANNEX C: THE SCIENCE OF CLIMATE CHANGE IN THE NUMBERS

The impacts of climate change are sometimes difficult to forecast and anticipate. The concentration of greenhouse gases, temperature and precipitation all act on ecosystems. The interactions between these factors are complex and hard to predict. Nevertheless, the James Bay Advisory Committee on the Environment (JBACE), a supporting partner in the current project, produced a report outlining the impacts and trends of climate change on the James Territory (JBACE, 2007).²⁸ This report offered an overview of the scientific predictions and data available at that time. Since then, many different organisations and institutions have continued work on the subject. In addition to what was outlined in *What We Know from Scientific Research* section above, other trends and expected impacts of climate change are presented here.

It is first important to consider global and national trends:

- ❖ Global surface temperature increased $0.74 \pm 0.18^{\circ}\text{C}$ during the 20th Century, is likely to rise a further 1.1 to 6.4°C during the 21st Century (IPCC, 2007);
- ❖ In the Northern Hemisphere, the past century was the warmest in the past 1,300 years, while eleven of the past twelve years have been the warmest since 1850. Here, the average increase in terrestrial temperatures is expected to be 3°C by 2100 (IPCC 2007);
- ❖ In Canada, 2010 was confirmed as the hottest year on record by a full 3°C , and four of the ten hottest years have occurred within the last decade (Environment Canada, 2010).

HABITATS AND FORESTS...

Apart from a migration of plant and animal species farther north, habitats and forest growth patterns and rates are also expected to change. One may expect:

- ❖ A change in wildlife habitats and the composition of plant communities which, in turn, may affect certain animal species' life habits – or 'phenology'²⁹ (Einum and Fleming, 2000; Thomas et al., 2001). For example, a study found that climate warming promoted an increase in the abundance of spruce cones, which ultimately entrained a precocious reproduction date for a population of red squirrels (Réale et al 2003; and Berteaux et al., 2004). These sorts of changes will undoubtedly affect local wildlife and the hunters and trappers that rely on them;
- ❖ A general increase in tree growth **may** occur due to greater temperatures, precipitation levels, and increased CO_2 – particularly for Black Spruce (*Picea Mariana*) and Grey Pine (*Pinus banksiana* – also known as Jack Pine), which exhibit increased radial growth with earlier growth seasons (Hofgaard et al., 1999);
- ❖ It is possible that the growth of trees on the Territory will not increase drastically, as increased temperatures may serve to decrease the amount of moisture available for the trees due to evaporation, effectively counteracting the effects of increased precipitation (Forget et al., 2003).

28 If not specifically referenced, any statistics or data offered here are found in the JBACE 2007 report.

29 Phenology is the study of periodic plant and animal life cycle events (e.g. growing season, reproductive season, etc.) and how these are influenced by seasonal and interannual variations in climate.

FOREST FIRES...

The impact of an increase in temperatures on forest fires is particularly difficult to confirm. The increase in precipitation, for instance, could well reduce the occurrence of forest fires. However, Natural Resources Canada (2006) indicates that the severity of fire seasons is expected to worsen and that the risk of forest fires will generally increase on the Territory in the 21st Century. Similarly, another study conducted in the Waswanipi area found that:

“... the August fire risk would double (+110%) for 2100, while the May fire risk would slightly decrease (-20%), moving the fire season peak later in the season. Future climate change would trigger weather conditions more favourable to forest fires and a slight increase in regional fire activity (+7%). While considering this long-term increase, inter-annual variations of fire activity remain a major challenge for the development of sustainable forest management” (Le Goff et al., 2009)

In clearer terms, the incidence forest fires may increase in coming years and occur later in the season, while the large year-to-year differences in fire distribution and severity will affect the planning of forest-related activities for all.

FROM THE SCIENCE OF CLIMATE CHANGE TO THE CREE

On a final note, it is very important to remember that the Cree people will be affected by all of the expected impacts due to climate change on their Territory. Here, the following table outlines several examples of the indirect socio-economic impacts that may affect the Cree given the different environmental and biological shifts that may occur.

TABLE 7: ³⁰ CHANGE AND SOCIO-ECONOMIC IMPACTS FOR THE CREE	
ENVIRONMENTAL / BIOLOGICAL IMPACT OF CLIMATE CHANGE	EXAMPLES OF SOCIO-ECONOMIC IMPACTS FOR THE CREE
Changes in productivity of the forests (i.e. growth, distribution, etc.)	<ul style="list-style-type: none"> • Changes in the production of timber and income value.
Increase of greenhouse gases in the atmosphere	<ul style="list-style-type: none"> • Introduction of mitigation policies of carbon credit-permits creating a carbon sequestration market.
Increase in forest disturbances (i.e. fires, insects, etc.)	<ul style="list-style-type: none"> • Loss of forest products and non-commercial goods.
Migration of ecozones ³¹ to the North, climatic and ecosystemic changes, and in specialized species	<ul style="list-style-type: none"> • Changes in the appreciation of land and land use options. • Economic restructuring leading to social and individual tensions and other social problems. • Changes in non-commercial values of natural resources. • Disintegration of parks and natural reserves, and an increase in conflicts regarding land use.

³⁰ This table is based on data made available by Natural Resources Canada (2006).

³¹ An 'Ecozone' refers to an area of land exhibiting consistent historic and evolutionary distribution patterns of terrestrial plants and animals. Here, the 'migration of the ecozone' refers to a shift of the familiar James Bay plants and animals northward in response to warmer and wetter conditions.

