

**Building a  
Climate Change Action Plan  
for  
Behchoko**



**Ładı agot'ı naawò  
Changing Times Project**



# Building a Climate Change Action Plan for Behchoko

<b>Planning for Climate Change</b> .....	2
How we got here.....	2
Guiding principles.....	3
<b>Getting ready for climate change</b> .....	4
Thawing permafrost.....	4
Unstable infrastructure.....	4
Disrupted transportation.....	7
Threatened food security.....	9
Altered water quality and quantity.....	9
Animal Health and Invasive species.....	11
Social and cultural impacts.....	11
The need for better climate data.....	12
<b>The positive face of climate change</b> .....	13
Recommended actions.....	14
Short-term implementation activities.....	14
Make plans.....	15
Build partnerships.....	16
Spread awareness.....	16
<b>Appendix A – Eco-Region Classification for Behchoko</b> .....	18

## Planning for Climate Change

The purpose of the Behchoko Climate Change Action Plan is to outline climate change risks to the community, along with strategies and options for dealing with these risks. The plan also considers any opportunities that may be presented by climate change.

This plan is based on the findings of the Climate Change in the Tlicho Region: Scientific and Local Findings<sup>i</sup>. The report should be read by community members and planners for a more detailed explanation of the risks of climate change.

This plan is not final or definitive; as more information becomes available, and as Behchoko grows and changes, the strategies in this plan will need to change accordingly. Some of the long-term concerns, like threats to water quality, are addressed by recommending community based monitoring programs to identify changes that might occur. Behchoko will need to refine this plan and flesh out details in the future. This plan should be reviewed in five years.

Climate change will affect every facet of life in the Tlicho communities. Infrastructure, food security, water quality, transportation systems, and cultural identity are just examples of the many things that will be threatened by climate change. Ultimately, planning for climate change must become common practice for every organization and person in Behchoko. This plan is a starting point, but the themes included in it must be built on and expanded by responsible authorities so that Behchoko can prosper in the future.

Funding for this project was provided by Indian and Northern Affairs Canada's Climate Change Adaptation Program.

### How We Got Here

Tlicho citizens identified the need for climate change planning in their communities during a workshop in Whati in the spring of 2008. Later that year the Tlicho Government entered into a partnership with Ecology North to undertake the Tlicho Climate Change Planning Project. Ecology North is a non-government, non-profit organization based in Yellowknife, Northwest Territories (NWT).

Project staff began work to develop climate change action plans for all Tlicho communities in late 2008 and held the first regional meeting in January 2009. The regional meeting was attended by a twelve-person Community Advisory Committee with three representatives from each Tlicho community. The Community Advisory Committee has met with project staff four times throughout the development of these plans to review project work and make sure the project is representative of Tlicho values, culture and community priorities.

Information for this project has been gathered using several different techniques including elders interviews and public meetings in each Tlicho community, and research and consultation with experts.

Expert consultations have included representatives of the following organizations:

- Tlicho Government
- Government of the Northwest Territories
- Government of Canada
- Tlicho Land Use Planning Consultants
- Private Consultants and Engineers

## Guiding Principles

The Tlicho Climate Change Adaptation Project does not have the resources to fully address the concerns of Tlicho communities, but it is important that community concerns are reflected in the community action plans.

Several general principles have been used to guide the planning process.

- **Build on / work with existing plans** – This refers to land use plans, wildlife management plans, hazardous waste management plans, forest fire emergency plans, etc. Climate change is expected to exacerbate some existing problems (e.g., increase the severity and frequency of forest fires). It is critical to work with other organizations to ensure that climate change is considered in all planning processes, and to ensure that the Tlicho Climate Change Planning project is not duplicating the work of others.
- **Work on existing concerns** – In order to be effective, these plans must be relevant to Tlicho citizens living in Tlicho communities. So these plans must address existing concerns in the community. Some community concerns have been included in these plans even though they relate to issues that are outside community land (i.e., outside the original scope of this project).
- **Work with partners** – This project has limited capacity, as do Tlicho communities. This project has relied on expertise outside Tlicho communities, such as scientists working for the Government of the Northwest Territories (GNWT). As Tlicho communities continue to develop capacity, they should continue this trend of working with outside partners on specific issues whenever possible.
- **Focus on win-win strategies** – By “win-win” we mean an activity or process that has benefits besides climate change adaptation. For example, hazardous waste management and Firesmart forest fire plans are win-win strategies; they are part of the climate change planning process, but even without climate change they are good for Behchoko.

These principles should be considered and applied when implementing and updating the plans.

## Getting Ready for Climate Change

The following section outlines impacts of climate change, their causes, and associated adaptive strategies to deal with these impacts.

These impacts and adaptive strategies should be used as guidelines for further adaptation planning in specific areas, and not as final plans for all community activities. Behchoko should periodically review and revise these impacts and adaptive strategies.

### Thawing Permafrost

Of all the impacts of climate change, permafrost degradation is likely to have the largest physical affect on Tlicho communities, and the highest dollar-value cost. One study has estimated that replacing all of Behchoko's foundations that are built on permafrost could cost upwards of \$3 million<sup>ii</sup>. As Tlicho communities continue to grow it must be efficient and affordable for them to construct infrastructure that will not be compromised by permafrost degradation.

To meet this goal, communities require three things: detailed knowledge of permafrost in the area and its effects on different types of infrastructure; appropriate and affordable construction technologies and techniques, and; capacity to access and utilize the knowledge, skills, technologies and tools necessary to construct permafrost-appropriate infrastructure.

Tlicho communities will need assistance from all levels of government to adapt infrastructure to permafrost degradation in a changing climate. However, there are things communities can do and Community Governments should take the initiative to make sure infrastructure is not at risk of damage due to permafrost degradation.

### Unstable Infrastructure

Behchoko has the most extensive infrastructure of any Tlicho community, including several large buildings, an airport operated by the Community Government and piped water and sewage systems in Edzo. To complicate this the community is comprised of two settlements, Rae and Edzo, separated by several kilometers. Rae and Edzo are located in different eco-regions, which means, as most residents know, there are differences in landscape and ground composition. This means that permafrost degradation and other infrastructure concerns may have to be approached differently in Rae and Edzo.

The biggest threat to community infrastructure will be melting permafrost, which can damage roads, runways, underground pipes and building foundations. Engineers and other experts should be consulted regarding permafrost issues with existing infrastructure (e.g. the sewage lagoon which has experienced slumping berms), and to help asses permafrost conditions with new construction sites such as new subdivisions or large buildings. Behchoko should stay apprised of new developments in adapting infrastructure, such as a new protocol being developed by Engineers Canada to assess

the risk of existing infrastructure to permafrost degradation.

Residents have reported seeing zero-degree weather in February. Weather hovering near freezing for extended periods can be a problem for buildings with flat roofs. This can cause ice to form in low areas of the roof, and create an uneven weight distribution that could damage the roof. The risk of roof damage is low right now, but in the future Behchoko could experience more warm winter weather, and more precipitation, which could cause roof damage.

Due to the large burn near Behchoko in 2008, the threat of forest fires to the community has been diminished, but forest fires may still threaten cabins and other areas on the land. The Government of the Northwest ' Department of Environment and Natural Resources (ENR) can provide residents with information on how they can protect their cabins from forest fires.

The GNWT also provides compensation to hunters, trappers and other people when their valued resources are lost to forest fires, but the GNWT must know about these valued resources before a fire strikes the area. Behchoko should share information about all its valued resources with the GNWT to be eligible for compensation if resources are lost to a fire.

Valued resources include things like cabins, tent camps, grave sites, cultural/heritage sites and any other area that is valuable to the community. Sharing information on these resources with the GNWT will help residents claim compensation if they lose things in a forest fire, and it will also help the GNWT to know where people might be during a forest fire.

To share information on valued resources on the land, or for help with protecting cabins and other areas from fire, Behchoko residents should contact ENR's North Slave Office in Yellowknife.

However, community residents should still take steps to protect cabins and other valued resources outside community boundaries. Residents should also share information with the GNWT about cabins and other valued places on the land to help identify areas that should be protected from fires, and to ensure compensation if property or valued places are lost to a fire.

<b>Climate Change Impact</b>	<b>Possible Source</b>	<b>Adaptive Strategies</b>
Destabilized building foundations.	Degrading permafrost.	<ul style="list-style-type: none"> <li>Geotechnical studies to learn more about condition of permafrost, and appropriate foundations.</li> <li>Two-year building cycle. Build the foundation and let it sit over winter before constructing the building.</li> </ul>
Ruptured fuel lines between external fuel tanks and houses or other buildings.	Differential shifting of external fuel tank and house cause stress in rigid fuel lines.	<ul style="list-style-type: none"> <li>Consult experts on proper fuel tank and fuel line installation and maintenance.</li> </ul>
Increased damage to roads (potholes, sinkholes, heaving, etc.).	Degrading permafrost.	<ul style="list-style-type: none"> <li>Increased maintenance.</li> <li>Excavate permafrost if it is thin and sporadic.</li> </ul>
Runway integrity compromised from ground settlement.	Degrading permafrost.	<ul style="list-style-type: none"> <li>Increased maintenance.</li> <li>Excavate permafrost if it is thin and sporadic.</li> </ul>
Damage to roofs.	Snow and ice build up on roofs.	<ul style="list-style-type: none"> <li>Monitor snow build up on roofs.</li> <li>Ensure flat roofs have proper drainage.</li> </ul>
Washout of sections of road.	Increased spring run off.	<ul style="list-style-type: none"> <li>Ensure proper drainage.</li> <li>Manage snow build up so spring melt does not impact roads.</li> </ul>
Early release of effluent from sewage lagoons, or overflow from sewage lagoons.	Increased precipitation and growing population filling lagoons past capacity.	<ul style="list-style-type: none"> <li>Monitor lagoon levels and snow build up on lagoon in winter.</li> </ul>
Community infrastructure threatened by forest fires.	Increased instances of forest fires.	<ul style="list-style-type: none"> <li>Engage in community fire planning, like the Firesmart program.</li> <li>Ensure community emergency plans are updated regularly.</li> </ul>
Community members' property threatened by fire when left outside community boundaries (e.g., stored boats, caches, cabins, traps, etc.).	Increased instances of forest fires.	<ul style="list-style-type: none"> <li>Share information on locations of cabins, trap lines, cultural areas and other places of value with the GNWT.</li> <li>Request information on fire protection from ENR's North Slave Office.</li> </ul>



## **Disrupted Transportation**

Behchoko is located on the NWT's all-weather highway system and is not dependent on winter roads. A shorter winter road season will not affect prices in Behchoko as in other communities, but it will limit residents' ability to travel to other communities and to access traditional hunting and trapping areas on Tlicho lands.

Warmer winter temperatures and precipitation changes (including the possibility of more freezing rain) could result in more instances of icy roads and highways in the Behchoko area in the future. This could mean increased usage of gravel, salt and other traction and de-icing aids on Behchoko's roads, the section of Highway 3 between Rae and Edzo and on the airport's runway. Residents have expressed concern that salt used on Highway 3 may be affecting animals in the area. The Community Government may have to work with the GNWT's Department of Transportation to keep roads and highways ice-free without contaminating the local environment.

Climate change will also make it more difficult to travel on the land for hunting and trapping purposes. Increased instances of thin ice, freezing rain, more extreme weather and other changes can make travel on the land more dangerous and can restrict mobility. There have also been reports of varying water levels, and shallow water in areas that are usually deep. This makes it difficult to travel by boat, which can impact harvesting and traditional activities.

<b>Climate Change Impact</b>	<b>Possible Source</b>	<b>Adaptive Strategies</b>
Travel on land becomes more dangerous.	Warmer weather, thin ice, less snow, more extreme and unpredictable weather.	<ul style="list-style-type: none"> <li>Adapt on-the-land activities to changing weather patterns and environmental conditions.</li> <li>Make sure the community has people who can respond to emergencies (e.g. Canadian Rangers) like extreme weather events that leave people stranded on the land.</li> <li>Educate community members on the risks of climate change.</li> <li>Encourage community members to share information on changes and new risks, and facilitate this knowledge exchange through a local radio program, newsletter, bulletin board or other media.</li> </ul>
More stress and damage to vehicles.	Poor road conditions (e.g. more potholes).	<ul style="list-style-type: none"> <li>Increased vehicle maintenance.</li> </ul>
Washout of sections of road.	Increased spring run off.	<ul style="list-style-type: none"> <li>Ensure proper drainage.</li> <li>Manage snow build up so spring melt does not impact roads.</li> </ul>
Driving conditions become more dangerous due to icy road conditions.	Increased freezing rain and warmer temperatures.	<ul style="list-style-type: none"> <li>Use gravel/sand to increase traction.</li> <li>Use salt to combat ice build up.</li> </ul>
Ice build up on runways becomes more frequent.	Increased freezing rain and warmer temperatures.	<ul style="list-style-type: none"> <li>Use gravel, sand and de-icing agents.</li> </ul>
Use of potential contaminants to combat ice build up becomes more frequent (e.g. glycol, salt).	Increased freezing rain and warmer temperatures.	<ul style="list-style-type: none"> <li>Monitor potential environmental impacts of de-icing agents.</li> <li>Contain de-icing agents (e.g. ethylene glycol) after application for proper disposal.</li> </ul>
Increased disruption of air transportation systems.	More extreme and unpredictable weather.	<ul style="list-style-type: none"> <li>Immediately communicate bad weather to all communities, persons and businesses that might be affected.</li> </ul>
Travel by boat becomes more difficult and dangerous, traditional water transport routes may not be viable.	Changing water levels in streams and rivers, and possible formation or disappearance of small lakes and wetlands.	<ul style="list-style-type: none"> <li>Consider finding new areas for harvesting or new ways of travel on the land.</li> </ul>

Fire smoke disrupts air transport and travel on land.	More frequent forest fires.	<ul style="list-style-type: none"> <li>Engage in community forest fire planning.</li> <li>Make sure the community's emergency plan is updated regularly.</li> </ul>
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## Threatened Food Security

Traditional food sources around Behchoko have diminished. Residents have reported declines in caribou, ducks, beavers, berries, rabbits and ptarmigan. There are also reports of sick or contaminated animals. Hunters have said with changing weather patterns, such as warmer winters and more snow, that it is becoming harder to hunt and trap.

Climate Change Impact	Possible Source	Adaptive Strategies
Less country food, and less nutritious food, available due to declining animal populations and less healthy animals.	Populations are stressed by ecosystem changes due to climate change.	<ul style="list-style-type: none"> <li>Monitor health of staple food sources (of populations and individual animals).</li> <li>Mitigate the effects of climate change by reducing greenhouse gas emissions.</li> </ul>
	Populations are stressed or displaced by influx of out-of-place or invasive species.	<ul style="list-style-type: none"> <li>Monitor for and report instances of out-of-place or invasive species.</li> </ul>
	Populations' ranges change and no longer include areas around Behchoko.	<ul style="list-style-type: none"> <li>Monitor the range of animal populations.</li> </ul>
Country food becomes contaminated.	Increased levels of inorganic contaminants in water systems accumulate in animals.	<ul style="list-style-type: none"> <li>Monitor water quality in areas around the community and the Tliche region.</li> <li>Monitor staple food sources for contamination.</li> </ul>
Harvesting on the land becomes more difficult and dangerous.	Extreme weather, warmer temperatures, thin ice, changing water levels, and other factors increase risks associated with being on the land.	<ul style="list-style-type: none"> <li>Share information about dangerous spots on the land.</li> <li>Use elders to teach youth about land safety.</li> <li>Enhance emergency response.</li> </ul>

## Altered Water Quality and Quantity

Protection of fresh water is one of the main environmental concerns of Tlicho residents. Climate change has the potential to affect water quality.

Many of the factors that affect water quality are difficult or impossible to control in a changing climate. Water in the Tlicho region should be monitored, by systematically testing for inorganic and organic impurities, so the Tlicho will know immediately if changes are occurring. This testing should be in addition to current testing by the territorial and federal governments, and should be led by Tlicho communities. It is critically important that Tlicho citizens are able to monitor water quality, throughout their land, at any site that is important to them for harvesting, traveling or cultural or spiritual purposes.

The Wek'eezhii Forum (a partnership between the Tlicho Government, Wek'eezhii Renewable Resources Board, and Wek'eezhii Land and Water Board) is currently developing a community-based water monitoring program for the Tlicho region. This program will develop capacity in Tlicho communities to monitor water quality, and will help ensure that Tlicho citizens have access to information about water near communities and in other valuable areas.

Behchoko residents are very concerned that water around the community could become contaminated. Two concerns are: seepage of contaminants from the dump into the lake (residents say the dump is too close to the lake), and overflow of effluent from the sewage lagoon. These concerns are reflected in sections 2.9 and 8.7 of Behchoko's land use plan<sup>iii</sup>, which state that the dump must not contaminate the lake, and that monitoring should be done to ensure the dump and/or sewage lagoon do not contaminate the lake.

The Community Government should consider undertaking a hazardous waste management plan to help keep potential contaminants out of the dump.

<b>Climate Change Impact</b>	<b>Possible Source</b>	<b>Adaptive Strategies</b>
Increased turbidity and increased organic contaminants in water.	Erosion and groundwater flow increase turbidity of water.	<ul style="list-style-type: none"><li>▪ Ensure water treatment plants have capabilities to deal with increased water turbidity.</li><li>▪ Ensure water treatment plant operators have knowledge, skills and tools to deal with increased water turbidity.</li></ul>

More inorganic contaminants in water.	Permafrost melt, forest fires, and other factors release inorganic contaminants into water.	<ul style="list-style-type: none"> <li>▪ Ensure community's source of drinking water is monitored for contamination.</li> <li>▪ Monitor water sources outside the community that are regularly used by people on the land.</li> <li>▪ Increase community's capacity to monitor water quality.</li> </ul>
	Melting permafrost allows water to drain from contaminated sites (e.g. dumps) into local water systems.	<ul style="list-style-type: none"> <li>▪ Segregate hazardous waste from local dumps.</li> <li>▪ Clean up existing sources of potential contaminants around the community and on the land.</li> </ul>
Sources of drinking water on the land diminish.	Permafrost melt causes existing small lakes and wetlands to drain.	<ul style="list-style-type: none"> <li>▪ Share information on changing water patterns.</li> <li>▪ Bring containers that can be filled with drinking water at reliable sources.</li> </ul>

## Animal Health and Invasive Species

Species monitoring must occur with a focus on two separate groups: native species and out-of-place species. Native species are those that belong in the Tlicho region. Out-of-place species are those that have migrated in or been introduced to the Tlicho region.

There is a great deal of concern in Tlicho communities about the health and abundance of native species like caribou, ducks and rabbits. Some residents are concerned that the animals they harvest are already contaminated with pollution from existing developments like mines and sewage lagoons. Climate change will potentially cause bio-accumulation of heavy metals and other contaminants in animals. Climate change can also affect the health of native species, thereby reducing the amount of nutrients they provide to Tlicho citizens. The health of animals in the Tlicho region should be monitored, including periodic testing for contaminants.

As the climate changes, it will affect the ranges of native species in the Tlicho region. Monitoring of population sizes and migrations is important to ensure the food security of the Tlicho.

Out-of-place species can disrupt natural ecosystems and displace native species. Ongoing monitoring for out-of-place species is necessary so that their populations can be controlled as soon as they are detected. Tlicho citizens must be incorporated in these monitoring efforts as they spend much of their time on the land, and are already familiar with the native species.

Climate Change Impact	Possible Source	Adaptive Strategies
Invasive species proliferate in the Tlicho region.	Changing climate makes the Tlicho region suitable habitat for foreign species that are introduced.	<ul style="list-style-type: none"> <li>▪ Create and enforce rules governing the types of species that can be brought into the Tlicho region.</li> <li>▪ Create and enforce rules designed to prevent foreign species from being unintentionally introduced to the Tlicho region (e.g. require cleaning of equipment before it is brought into the region).</li> </ul>
	Climate changes and other factors allow/force non-native species to migrate into the Tlicho region.	<ul style="list-style-type: none"> <li>▪ Ongoing community-based monitoring programs to determine when new species arrive in the Tlicho region.</li> </ul>

### Social and Cultural Impacts

Climate change will have social impacts to human health and Tlicho culture. The following table covers some potential social effects of climate change that may occur over the long term.

<b>Climate Change Impact</b>	<b>Possible Source</b>	<b>Adaptive Strategies</b>
Increased UV radiation threatens human health.	Changes to snow, ice and cloud cover.	<ul style="list-style-type: none"> <li>Promote proper skin and eye care, such as use of sunblock and sunglasses.</li> </ul>
Increased instances of smoke in the air threatens human health.	Increased instances of forest fires.	<ul style="list-style-type: none"> <li>Make sure the community's emergency plan is updated regularly.</li> </ul>
Loss or decline of traditional medicines from the land (e.g., spruce gum).	Changes to ecosystems and forestry due to climate changes.	<ul style="list-style-type: none"> <li>Monitor changes on the land.</li> <li>Encourage elders to pass on traditional ecological knowledge to youth.</li> </ul>
New diseases / increased instances of disease.	Warmer temperatures, changing climate and new species.	<ul style="list-style-type: none"> <li>Encourage people to share information about instances of illness with community leaders and health authorities.</li> <li>Work with other authorities to monitor disease in the Tlicho region.</li> </ul>
Loss of economic opportunities related to harvesting (e.g., trapping, outfitting, etc.).	Decline in animal populations and poor health of animals.	<ul style="list-style-type: none"> <li>Look for new economic opportunities like tourism, marketing of arts and crafts and harvesting of morel mushrooms.</li> <li>Encourage local production of food and energy to reduce reliance on expensive imports.</li> </ul>

Adaptation to climate change is an ongoing process, and adaptation strategies used by communities will change as new information becomes available. A key part of adaptation is ensuring that new environmental data and information is collected and analyzed so that climate change can be properly considered in future decision making. This is especially true in the Tlicho region as there is currently a lack of baseline climate data and a lack of future climate predictions.

Although this is a Tlicho project led by the Tlicho Government there is a duty for governments at all levels to ensure that accurate information on current conditions, and reliable predictions of future conditions, are available to Tlicho communities so they can properly prepare for the effects of climate change.

### **The Need for Better Climate Data**

There is no long-term data on climate or weather in the Tlicho region. This has made it impossible to quantify trends in temperature, precipitation, and other determinants of climate. Similarly, reliable predictions of future climate, based on climate modeling work, are not available for the Tlicho region.

Detailed climate change planning is difficult without knowing what to expect of the

future climate. There is an immediate need for regional climate models that will give planners and decision-makers in the Tlicho region a concrete idea of what to expect in the future, and hence what to plan for.

There is also a need for more data collection on weather in the Tlicho region. This data is important not only for analyzing trends in climate over the long term, but also for weather forecasting purposes. If extreme weather events become more frequent in the Tlicho region, residents should have access to accurate and timely data on weather throughout their land to ensure they can travel, hunt and live safely.

## The Positive Face of Climate Change

Climate change will have many adverse impacts for Behchoko and other Tlicho communities, but there will be benefits as well. Planning for climate change is not just about preparing for the negative impacts, its also about planning to take advantage of any opportunities presented by climate change.

Milder winters will be more comfortable and could increase opportunities for tourism. Being the only Tlicho community on the all-weather highway system, Behchoko is uniquely positioned to market itself as a tourist destination showcasing Tlicho culture and traditions. Behchoko should consider strategies to attract tourists and travelers who are passing on the highway.

Warmer winters will also reduce heating costs, and could present new opportunities for heating infrastructure. If oil prices climb in the future it may become more economical for Behchoko to heat buildings using electricity (e.g. by using ground-source heat pumps). Behchoko's uses hydro-electricity, which is not affected by oil prices. Switching to electric heating would also reduce greenhouse gas emissions.

Behchoko must consider the opportunities presented by climate change and encourage activities that take advantage of these opportunities.

Climate Change Opportunity	Possible Source	Adaptive Strategies
Longer construction season.	Longer summers.	<ul style="list-style-type: none"> <li>▪ Take the time to plan new infrastructure to withstand the effects of climate change.</li> </ul>
New species available to harvest.	Game animals may extend range into the Tlicho region.	<ul style="list-style-type: none"> <li>▪ Encourage hunters to share information about new species on the land.</li> <li>▪ Educate people on how to hunt and butcher buffalo.</li> </ul>
Increased opportunities for local agriculture (growing fruits and vegetables).	Warmer temperatures, including earlier spring and later fall.	<ul style="list-style-type: none"> <li>▪ Promote and support development of community and individual gardens and greenhouses (education, funding support, etc.).</li> </ul>



		<ul style="list-style-type: none"> <li>Find different types of produce that grow well in the community and that can be stored easily.</li> <li>Find tasty ways to cook local produce (e.g. by cooking it with country food).</li> <li>Community compost projects to produce good soil for local agriculture.</li> </ul>
Decreased heating costs.	Warmer winters and shoulder seasons.	<ul style="list-style-type: none"> <li>Consider new heating methods (solar walls, south-facing windows, electric heating, etc.) that are cheaper, more energy efficient and that can be used when it is not too cold out.</li> </ul>
More morel mushrooms available for harvest.	Possibility of increased forest fires.	<ul style="list-style-type: none"> <li>Organize community mushroom harvests. Make sure there are facilities in the community to properly dry and store mushrooms.</li> </ul>
More firewood available from burned areas.	Possibility of increased forest fires.	<ul style="list-style-type: none"> <li>Consult with Environment and Natural Resources on how to sustainably harvest fire wood from burns and other areas.</li> <li>Encourage community members to replace old wood stoves with high efficiency ones.</li> </ul>
Possibility of increased tourism.	Warmer temperatures.	<ul style="list-style-type: none"> <li>Ensure community has the facilities to accommodate tourists (e.g. hotel, restaurant and museum or cultural displays).</li> <li>Consider marketing Tlicho culture by giving tours of the land and selling arts and crafts.</li> <li>Develop a plan to promote tourism in the community and the Tlicho region.</li> <li>Make services and souvenirs available on the highway for travelers.</li> </ul>

## Recommended Actions

The following recommendations are suggested as ways to begin implementing this plan, to increase the adaptive capacity of Behchoko, and to ensure climate change is considered in future decision-making.

Some of these recommendations can be undertaken by the Community Government of Behchoko, but other recommendations will require collaboration with other Tlicho communities and different levels of government. However, Behchoko will have to take

the lead on activities that are important to the community, and needs to play an active role in climate change planning and adaptation.

### **Short-term Implementation Activities**

The following activities have been identified as priorities for Behchoko. The Community Government of Behchoko should consider implementing the following recommendations within the next two years.

- **Assess and Replace Rigid Fuel Lines** – Ground shifting due to melting permafrost can stress fuel lines and cause them to break, leading to fuel spills. Behchoko should consult with experts about replacing rigid fuel lines with flexible ones.
- **Communicate Hazards on Land** - Find ways to share information about bad weather and dangerous spots on winter roads and on the land (e.g. thin ice, overflow, bad weather, etc.). Travel and hunting may become more dangerous in the future and good communication is one way to keep people safe. This will help ensure that Behchoko can continue to safely harvest country food.
- **Forest Resource Assessments and Harvest Planning** – Wood is a good source of local energy. To make sure long-term wood harvests are sustainable Behchoko should consult with the GNWT's Department of Environment and Natural Resources to complete a forest resource assessment and build on it to form a sustainable wood harvesting plan.
- **Efficient Wood Stoves** - Replace existing wood stoves with high efficiency ones. Behchoko may also want to expand the use of wood pellet stoves in the community.
- **Protect Valued Places from Fires** – Behchoko should let Environment and Natural Resources' North Slave Office know of any cabins, trap lines, harvesting areas and other valued resources on the land. This will help ENR to know where important places are when fighting fires and will help community members gain compensation if valued resources are lost to a forest fire.
- **Hazardous Waste Management Plan** – Potential contaminants like batteries, mercury (from household thermostats and other sources), and waste oil should not go to the local land fill. These hazardous materials could cause water contamination in the future. Behchoko should consult with ENR on developing a plan to properly dispose of hazardous waste. Behchoko should consider working with other Tlicho communities on a joint hazardous waste management plan for the region.
- **Permafrost Risk Assessments** – Behchoko should consult with experts to assess the vulnerability of community infrastructure to melting permafrost.
- **Clean Up Garbage on Land** – Funding should be sought to pay young people to clean up garbage and waste left on the land near the community.

### **Make Plans**

Climate change will likely exacerbate existing problems in Behchoko and other communities. Part of preparing for climate change is ensuring that the community is prepared to deal with existing issues like threats from forest fires and other emergencies.

- **Community Emergency Plan** – This plan should be updated at least once per year. Part of emergency planning is taking an inventory of the community's skills and facilities (e.g. people with medical training, transportation infrastructure, heavy equipment, etc.), these factors change more quickly than climate. Regular review will help ensure the plans accounts for any new risks of climate change. Municipal and Community Affairs (GNWT) can help communities prepare emergency plans.
- **Forest Fire Planning** – Behchoko should consult with ENR's North Slave Office regarding the Firesmart guide and other community fire protection tools to help protect the community from wild fires.
- **Tourism Plan** – There could be more traffic on NWT highways in the future due to increased tourism and a larger population. Behchoko should utilize its position on the highway to offer services to travelers and to generate tourist revenue in the community.

## **Build Partnerships**

Behchoko should seek out partnerships with people and organizations who can help with issues related to climate change planning. Forming good working relationships with others will help to increase the adaptive capacity of the community. It is very important that Behchoko works with other Tlicho communities, the Tlicho Government and other authorities on Tlicho lands. These are some suggestions for valuable partners that Behchoko should try to work with in the future.

- **ENR North Slave Office** – This office is located in Yellowknife and is responsible for the Tlicho region. The office can help the Community Government of Behchoko with community fire protection planning. The office also registers cabins and other valued resources on the land to help harvesters receive compensation if their property is damaged during a forest fire.
- **Tlicho Communities and Tlicho Government** – Workshops and meetings on climate change adaptation should be held with representatives of these organizations to learn about adaptation and to cooperate on common initiatives.
- **Arctic Energy Alliance** – They can help with community energy planning and are knowledgeable about energy conservation, energy efficiency and renewable energy.
- **Ecology North and Other NGOs** – Non-Government organizations such as Ecology North are valuable partners when working on issues related to climate change, energy, and the environment.
- **Wek'eezhii Forum's Water Monitoring Program** – This program will involve all Tlicho communities. Behchoko should support this program and get involved as it will help ensure water quality is protected in the Tlicho region. The Wek'eezhii

Forum is a partnership between the Tlicho Government, the Wek'eezhii Renewable Resources Board, and the Wek'eezhii Land and Water Board.

## **Spread Awareness**

Climate change must be considered in all activities if climate change planning is to be successful. This means that community members must be educated on the effects of climate change and strategies to adapt to these changes.

- **Elders and Youth Working Together** - Encourage elders to work with youth to pass on traditional knowledge about harvesting and safe travel on land
- **Encourage Healthy Living** – Exercise and healthy living includes taking part in traditional activities like cutting wood and hunting. It also means putting a focus on Tlicho language and culture. Health and happy communities are better able to deal with climate change and other issues than unhealthy communities.
- **Mainstream Climate Change Planning** – Decision makers and residents must be made aware of the risks of climate change and of Behchokos Change Action Plan.
- **Infrastructure Maintenance** – Degrading permafrost can affect building foundations, fuel lines and other personal property. Behchoko could benefit from having tradespeople who are educated about the risks of degrading permafrost and building/maintenance techniques to adapt to degrading permafrost.
- **Environmental Monitoring** – Climate change could affect water quality and contaminant levels in country food. Behchoko should promote youth to gain knowledge and skills about environmental monitoring so the community will have the capacity to detect changes in the environment.

# Appendix A

## Eco-Region Classification and Climate for Behchoko

According to the GNWT's Department of Environment and Natural Resources, the four Tlicho communities fall in the Taiga Shield and Taiga Plains ecological regions of the NWT. The Department has produced reports on the ecological regions, and their sub-regions, that include climatic information based on existing data (where available) and regional (ecodistrict) climate modeling work conducted by Agriculture and Agri-Foods Canada in 1997.

Behchoko is located on the border of the two ecological regions. Rae is located in the Taiga Shield Ecological Region<sup>iv</sup>, and Edzo is located in the Taiga Plains Ecological Region<sup>v</sup>. The following charts give information on the climates of the two ecological regions (and sub-regions), but this information should not be interpreted as saying Rae and Edzo have different climates. Rae and Edzo are very close together and share the same climate.

### Taiga Shield Ecological Region

Community	Sub-Region	Climate Characteristics	Low	High
Behchoko (Rae)	High Boreal – Great Slave Lowlands	Mean Annual Temp (C)	-6.0	-3.0
		January Mean Temp.	-28	-26
		July Mean Temp.	15	16
		Mean Annual Precipitation (mm)	280	360
		Wettest Period	June through November	
		% Precip. Falling as Rain	50	
		% Precip. Falling as Snow	50	
		Mean Annual Daily Solar Input (mJ/m <sup>2</sup> /day)	10.5	11.0
		December Mean Daily Solar Input (mJ/m <sup>2</sup> /day)	1.0	1.5
		June Mean Daily Solar Input (mJ/m <sup>2</sup> /day)	21.5	22.0

## Taiga Plains Ecological Region

Community	Sub-Region	Climate Characteristics	Low	High
Behchoko (Rae)	High Boreal – Great Slave Plain	Mean Annual Temp (C)	-4.5	-2
		January Mean Temp.	-28	-24
		July Mean Temp.	15.5	17
		Mean Annual Precipitation (mm)	300	390
		Wettest Period	June through November	
		% Precip. Falling as Rain	55	
		% Precip. Falling as Snow	45	
		Mean Annual Daily Solar Input (mJ/m <sup>2</sup> /day)	10.5	11.0
		December Mean Daily Solar Input (mJ/ m <sup>2</sup> /day)	1.0	1.5
		June Mean Daily Solar Input (mJ/m <sup>2</sup> /day)	21.5	22.0

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Ecosystem Classification Group. 2007 (rev. 2009). *Ecological Regions of the Northwest Territories – Taiga Plains*. Department of Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT, Canada. viii + 173 pp. + folded insert map.

- i Climate Change in the Tlicho Region: Scientific and Local Findings
- ii Potential Cost Impacts for Adaptation of Building Foundations in the Northwest Territories
- iii Behchoko Community Plan
- iv Ecological Regions of the Northwest Territories - Taiga Shield
- v Ecological Regions of the Northwest Territories - Taiga Plains