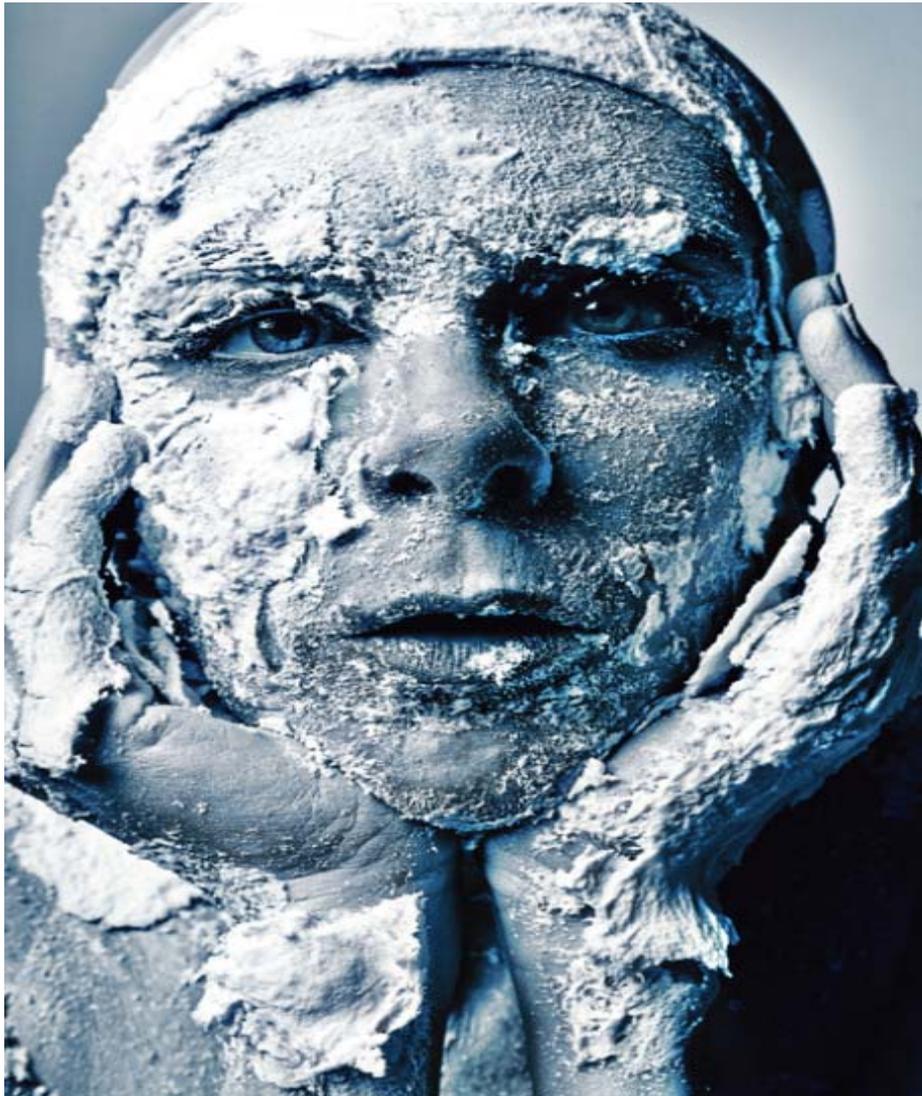


***Extreme Environments:
An Integrated Science Learning Unit for
Yukon Grade 6 Students***



Centre for Youth, Research, Science Teaching and Learning
University of Manitoba

Social Sciences and Humanities Research Council

November 2013

Table of Contents

Topic	Page
Acknowledgments	3
Guiding Principles of the Unit	4
Cross-Curricular Applications	5
Conceptual Ideas and Progression	7
Some Valuable Websites	8
Skills Development	9
Attitudes and Beliefs Development	10
Introducing the North as a “Extreme Environment”	11
Knowledge, Skills and Habits of Mind	20
Traditional Technologies for Our Extreme Environment	56
Other Cultures as Extremophiles	62
Other Living Things as Extremophiles	63



Acknowledgments

In 2008, the Yukon First Nation Education Advisory Committee proposed several goals and priorities for education in the Yukon. Central priorities included the development of curriculum and resources that integrate into curricula, First Nations content, perspectives, values, knowledge *and ways of teaching and learning*. This resource provides teachers with the support for providing learning experiences that allow for learning to be grounded in the heritage of northern students including culturally preferred learning styles rather than just learning about their heritage.

The development of this resource for teachers and students in the northern Yukon has been made possible through the granting agency Social Sciences and Humanities Research Council. Their support has ensured that northern students are provided with the opportunity to learn about their heritage through means responsive to their learning style preferences, especially when they study core curriculum areas such as science. The development of this resource has also been made possible through the support of the Tr'ondëk Hwëch'in community of Dawson City. The elders and community members have given their time and knowledge to ensure that their experiences can be recorded and incorporated into learning activities valuable for their community's children.

As well, the school community of Robert Service School, especially the teachers of the Intermediate grades is thanked for its support in the development of the learning activities outlined in this resource.

Contact details:

Dr. Brian Lewthwaite
Faculty of Education
University of Manitoba

Guiding Principles of the Unit

- Draw upon teaching orientations that are identified as culturally located practices.
- Affirm cultural competencies honored by the local community.
- Provide two-way learning experiences by integrating traditional knowledge, beliefs and values and contemporary scientific knowledge, processes and attitudes.
- Use traditional and contemporary cultural examples as contexts for student learning.
- Include the local community and its people in students' learning opportunities, especially in the use of narratives including local people.
- Foster Han language development where possible.
- Use diagnostic and formative assessment to inform planning and teaching and monitor student learning.
- Engage students by starting lessons by providing first-hand experiences for students or drawing upon common experience.
- When using story to engage students, use the interrupted-story-line as a vehicle to prompt consideration and first-hand investigations.
- Deliberately promote scientific attitudes of mind (curiosity, problem-solving, working to end) student through thoughtful independent consideration of questions and challenges posed.
- Move from the experiential, first-hand experiences to the psychological; that is, after providing concrete experiences assist students in making sense of experiences by using purposeful strategies to promote understanding such as role plays, illustrations and analogies.
- Assist students in their consolidation of ideas only as an extension of the initial experiential and psychological learning experiences.
- Provide opportunities for student-initiated and directed investigations.
- Provide opportunity for students to make connections among science and all other learning areas.
- Foster student independence, creativity and curiosity by providing opportunity for students' ideas and questions and follow-up opportunities for problem-solving and investigation.
- Provide students the opportunity to make connections between what they are learning and career opportunities specific to the local

Cross-Curricular Applications

This unit is developed to reinforce learning outcomes of Science, Social Studies and English Language Arts relating to the Science unit of Extreme Environments, experienced during Grade 6. These include:

Extreme Environments

It is expected that students will:

- Explain obstacles to life and exploration in extreme environments;
- Assess technologies for extreme environments;
- Describe contributions of Canadians to survival and exploration technologies.

The unit is also developed to reinforce or address the learning outcomes of the Social Studies and English Language Arts curriculum of British Columbia (2005). The emphasis in Social Studies on the validation of Aboriginal Cultures and Continuity and Change in Society are emphasized in this unit. As students are engaged in science, they will also be engaged in social studies learning. They will also be developing oral and written language and numeracy skills specific to Grade 6. Students are encouraged to explore the characteristics of extreme environments through the stories and accounts of persons from the community, hands on experiments, and questioning. By hearing these accounts and having their own first-hand experiences, students can develop a rich appreciation of their local environment and the actions that will lead to a safe and productive life in this environment. There are obvious connections to social and environmental change and personal health and well-being. Broaden the focus by adding stories and activities of your own or from the experiential base of your community.

Social Studies Skills and Processes:

It is expected that students will:

- apply critical thinking skills –including comparing, classifying, inferring, imagining, verifying, identifying relationships, summarizing, and drawing conclusions – to a range of problems and issues.
- interpret graphs, tables, aerial photos, and various types of map
evaluate the credibility and reliability of selected sources

- deliver a formal presentation implement a plan of action to address a selected local or global problem or issue
- use an outline to organize information into a coherent format.

English Language Arts: Oral Language (Purposes, Strategies, Thinking and Features)

It is expected that students will:

- Share ideas relevant to class activities and discussions.
- Listen to classmates and others without interrupting.
- Speak respectfully and use appropriate language and tone when disagreeing.
- Speak and listen in partner, small group, and whole class discussion to accomplish a task.
- Contribute relevant responses to class/group discussions.
- Use vocabulary appropriate to topic and audience. (ex. Using the appropriate terminology when referring to the different parts of the body)
- Follow multi-step oral instructions and demonstrations (conducting and experiments to understand how the human body systems function)
- Ask questions, independently or with classmates, to explore a topic further.
- Use new vocabulary introduced in texts and class discussions.
- Build on others' ideas.
- Question and speculate on possibilities regarding the ideas and information presented (e.g., "What if...," "I wonder if...," "What would happen if...")

English Language Arts: Reading and Viewing (Purposes, Strategies, Thinking and Features)

It is expected that students will:

- Follow written procedures
- Extract accurate and important information from text and 'text features', including specific details from graphics.
- Interpret images and make some relevant inferences (e.g. construct meaning from visual texts and identify relevant detail)
- Write down and/or share what they already know about a topic or idea and ask and respond to questions related to the material read/viewed.

Conceptual Ideas and Progression

The recommended sequence for supporting student conceptual development of the human body systems is suggested below. For the most part, the activities and the conceptual and skill development embedded within the activities are sequential. Lower elementary experiences and ideas primarily focus on experiencing and communicating these experiences. Upper elementary experiences focus on understanding and investigating these experiences and appreciating applications of this understanding to their students' everyday world. It is suggested teachers address the following key ideas:

- 1. We live in an extreme environment;**
- 2. There are many stories told about this environment that we can learn from;**
- 3. There are knowledge, skills and habits of mind that support our safety and survival;**
- 4. There are many technologies developed specifically for this environment that support our safety and survival;**
- 5. There are other extreme environments where knowledge, skills, habits of mind and technologies support safety and survival;**
- 6. In our northern extreme environment, we see evidence of knowledge, skills, habits of mind and technologies that support other life forms' safety and survival.**

The central theme in the learning is focused on developing the knowledge, skills and habits of mind that support living safely and successfully in a northern extreme environment.

Some Valuable Websites

National Geographic Adventure Travel

<http://adventure.nationalgeographic.com/adventure/>

National Geographic Alone in the Wild (Yukon Series)

<http://channel.nationalgeographic.com/channel/episodes/can-i-survive/>

National Geographic How to Survive Almost Anything

<http://www.nationalgeographic.com/adventure/survival/skills/>

Discovery Channel The Miracle of Snow

<http://dsc.discovery.com/video-topics/other/snow.htm>

Discovery Channel Survivor Man

<http://dsc.discovery.com/tv-shows/survivorman>

National Geographic Weather 101

<http://video.nationalgeographic.com.au/video/science/earth-sci/weather-101-sci/>

National Geographic The Best Survival Story Never Heard (Antarctic)

<http://video.nationalgeographic.com.au/video/specials/nat-geo-live-specials/roberts-antarctica-lecture-nqlive2/>

National Geographic Life Below Zero

<http://channel.nationalgeographic.com/channel/life-below-zero/>

Skills Development

This unit emphasizes that the learning of science ideas is inextricably linked to the development of the processes of science. As asserted by British Columbia Science Grade 6 (2005), the legislated curriculum for Yukon schools, science experiences should provide opportunity for the development of conceptual understanding within the context of relevant investigative experiences. Although individual scientific process skills may be emphasized in specific activities, they are to be supported more holistically in teacher-facilitated or student-directed inquiry. The skills to be developed are expected to be appropriate to the level of the learner. These skills and a typical developmental sequence are outlined in detail in the Science Grade 6 (2005) guide. These skills involve coordination between cognitive and psychomotor skills. Handling and manipulating equipment require not just the physical ability to perform a task but also the intellect to know how to measure or observe accurately. It is anticipated that by the end of intermediate school, a student might be able to, with assistance, conduct a scientific investigation. This unit provides opportunities for students to work physically and cognitively towards this end.

There is no universal list of scientific process skills. Those identified in this curriculum are not intended to be a linear scope and sequence; instead, they suggest multiple ways in which learning science can be explored. At each grade level, two processes are introduced and then reinforced with the curriculum content in the subsequent grades; but teachers are expected to involve all of the skills their students are capable of using. Process skills are best learned in hands-on activities where students engage in a problem-solving task while doing science. The hands-on model of learning science allows students to construct meaningful connections within the brain. In young children, process skills can be found in the natural practice of manipulating materials while asking questions and being curious. The names of the skills can be used and reinforced by teachers as students use and learn to apply these skills to science activities. The science process names will become familiar to students, enabling them to use the correct vocabulary when they explain their involvement in science and technology inquiries.

Attitudes and Beliefs Development

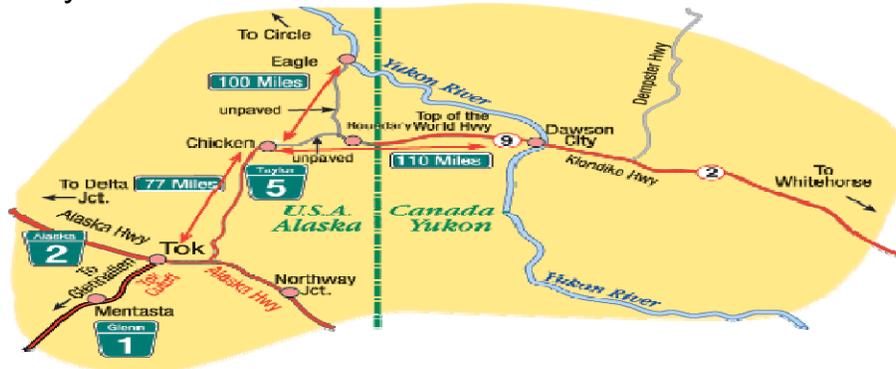
An explicit goal in the development of this resource and the other resources being developed in this northern Yukon project and the accompanying professional development provided for teachers is to use these as a vehicle to contribute to student 'success' in science. Although success in science is often attributed to measurable outcomes such as knowledge acquisition and development, the intent of this development project is much more encompassing. It extends this notion of success to investigate the influence of 'two-way' learning experiences on students' perceptions of success in their personal attitudes and beliefs, especially in how they see themselves as learners in formal learning settings. A key intention of this project is to investigate whether student engagement in learning is influenced by culturally located cultural practices.

What does success in science mean to northern Yukon students? It is anticipated that students will experience success in a variety of ways, beyond the border of knowledge into the domain of attitudes and beliefs. Attitudes are regarded as states of mind, behavior or conduct regarding some matter, as indicating opinion or purpose. The program of study suggested in the activities that follow will foster student curiosity and creativity, and openness to new ideas of thinking. As well students will develop confidence in their perceptions of self as students learning in formal school settings and, especially, in science. Similarly they will develop confidence as evidenced in risk-taking and their effort to conduct science investigations. Their participation in the processes of science will foster their perseverance, precision and objectivity in solving scientific problems. As members of a team they will develop in their respect for and ability to work co-operatively towards purposeful goals with their peers. The central theme in the learning is focused on developing the knowledge, skills and habits of mind, many of which are science based that support living safely and successfully in a northern extreme environment

Above all, it is anticipated that students will develop a more positive sense of themselves in contemporary society as they learn about the inextricable link between science and the world in which they live. It is anticipated that students will see science as part of their life trajectory both in future formal and informal settings as a result of science study that advocates 'two-way' learning

Introducing the Yukon Environment A Conversation with Angie Joseph-Rear

In those days we would go in winter to Eagle in Alaska, down the Yukon River. We would go by dog team – my father, my mother, my sisters and brothers. It was a lot of work to get the whole family there and you had to be well-prepared. There were no roads in those days so you had to be really prepared to travel by dog team. Not like now when you travel by skidoo or truck, when you decide to go today and then you travel right away or maybe tomorrow.



We would leave from Moosehide and we would have to prepare for days. The dogs had to be prepared. They had to be well fed. The harnesses had to be in good shape. We had to take food. We had to take fire starter. We had to take warm clothing. We would take dried meat, pemmican, lard, sugar, flour, and macaroni. The dogs would have fish – salmon – that was good for their energy – they were working dogs. Maybe we would hunt along the way – for small game like grouse, rabbits and ptarmigan, and even set snares. You were on your own.



We would camp at night, maybe in a cabin or a wall tent, maybe even a lean-to made from spruce boughs. If the weather started to turn bad, we would set up camp. You had to be prepared. It was cold, but we were prepared. You always made sure you made good decisions. If you weren't prepared or made bad decisions, then trouble might happen. I do not remember bad things happening.

Introducing the Yukon Environment A Conversation with Victor Henry

I used to haul fuel and supplies by truck in the Yukon. In winter-time you had to be really careful. You had to be prepared for what might come. I would always take food with me, hot drinks, a sleeping bag, warm clothes, even birch-bark fire lighter. The truck had to be checked thoroughly – there was no room for error. The trips sometimes did not take too long. Even though they did not take too long, you had to be prepared. Often there was no one on the highways so you were on your own.



One day I was hauling to Stewart Crossing. When I left Dawson around 1 p.m., it was not that cold, but as I went through Gravel Lake area, it started to get really, really cold. I heard later it was minus -48. I was only about 8 kilometres from Stewart when the truck started to slow down. It wasn't getting any gas. I think the fuel line was freezing up. Soon, the truck came to a stop and it would not start.

I thought about what I should do. I put on all my warm clothing and then decided I'd walk to Stewart. I started to walk and then realized it might take me three hours to get there and it was so cold. I turned around and went back to the truck. I got out my survival gear – rope, an axe, matches, starter, billy, food (Klik), sleeping bag - and lit a fire using the birch bark. It started right away.

I made a lean-to near the fire. It was really warm, even though the temperature was so cold. In the night, no one came. I kept the fire going. I used the food sparingly. Later the next morning another trucker came along and gave me a lift into Stewart. I knew I had made the right decision.

In the two stories there are some **similarities** and **differences** told by Victor and Angie about their experiences. **What are they? In the chart below list the similarities and differences?**

What is the same in the stories?	What is different in the stories?

What is the **main thing** they are both saying? What is their most important message?

From their stories, **what is necessary to survive in a northern extreme environment, at least for a short time?**

What objects should I have with me?	
What knowledge do I need?	
What are some of the skills I need?	
What 'habit of mind' do I need?	

The Yukon Environment: An Extreme Environment

In this unit, we will be studying the Yukon as an **extreme** environment. In preparation for the unit, ask family at home to share stories about life in the Yukon. Get them to tell you stories of experiences they have had that show the extremes of the Yukon environment. The word extreme means “**exceeding the ordinary, usual, or expected**”. Most people are not aware of how cold the Yukon northern region is and the extremes of the temperatures. In fact, the coldest reported temperature in Canada was recorded in Snag, Yukon, 30 km south of Beaver Creek. On February 3, 1947, the record-low temperature for continental North America was recorded in Snag: $-63\text{ }^{\circ}\text{C}$. That same winter, two previous records had already been set: one on December 13 in Mayo, Yukon and another at Snag the day before. Staff at the station made note of various phenomena, particularly sound such as voices being heard clearly miles from their source. There was a clear sky (except for some ice fog), and little wind. There were 38.1 centimetres of snow on the ground, but was fast decreasing. Another town 180 km northeast of Snag, Fort Selkirk, claimed an even lower temperature of $-65\text{ }^{\circ}\text{C}$, but this could not be confirmed.

An **extreme environment** exhibits conditions which **are challenging for most life forms**. These may be extremely high or low ranges of temperature, radiation, acidity, air, water, salt, sulfur, petroleum and many others.

An extreme environment is one place where humans generally do not live or could die there. There are organisms referred to as **extremophiles** that inhabit these spaces and are so well-adapted that they readily grow and multiply.

Examples of extreme environments include the geographical poles and arctic regions, very dry deserts, volcanoes, deep ocean trenches, upper atmosphere, St Elias Mountains, outer space and other planets. The organisms living in these conditions are very well adapted to their living circumstances, which is usually a result of long term evolution.

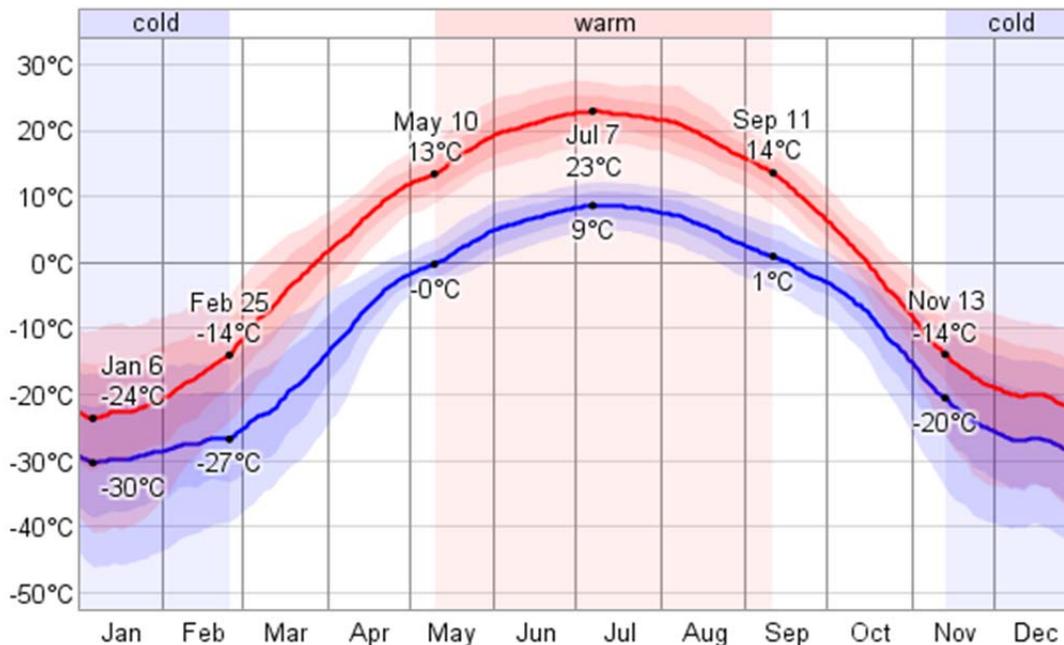
Types of Extreme Environments are alkaline, acidic, extremely cold, extremely hot, or hyper-saline places without water or oxygen. They can also be places altered by humans. Examples of **places altered by humans** are mine tailings or oil impacted habitats. Before humans were around there were extreme environments covering our planet everywhere. Most of the moons and planets in our solar system are also extreme environments. Scientists have found life in these environments and have started to learn new things about earth's history.

Key Learning Words

Use the space below to list all the words you encounter in this unit that have to do with extreme environments.

Temperatures in Dawson: A Land of Extremes

Daily High and Low Temperature for Dawson City, Yukon



1. What is the coldest month of the year?
2. What is the warmest month of the year?
3. What is the average low temperature for January?
4. What is the average high temperature for January?
5. What is the average low temperature for July?
6. What is the average high temperature for July?
7. What is the temperature **difference** between the lowest temperature in January and the warmest temperature in July?

8. For how many months of a year is the lowest temperature below 0 degrees – that is, how many months do we have that are ‘frost-free’?

9. This number of months determines our ‘growing season’. Approximately how many days long is our growing season? This gives us reason for describing our location as ‘extreme’.

Being Prepared and Respectful

Based on an interview with Dick Field of Dawson City

I was raised to respect the land we live in. You always have to be prepared when you head off on trips because this land is unforgiving. You are not a wise person if you don't give it the respect it requires. I was raised that way, but an event occurred in my life when I was a young man that taught me I wasn't that respectful or wise.



We were living in Aklavik and there was still ice on the river after breakup. I was the driver of a boat and my sister was in it. We got caught in the ice and the boat capsized from the pressure of the ice floes and she drowned. It was an event that shouldn't have happened because I shouldn't have been out in the water when it was still with ice. It was too dangerous but I did not listen to what I knew was good advice. I knew that but I didn't listen to what I knew.

They looked for my sister in the ice. It was a very difficult time for everyone. I will never forget that day. It should not have happened.

That simple error cost me and my family greatly. That event reminds me through my entire life to not just be prepared but also respectful. When you are preparing, you are showing respect.

Based on an interview with Alfred Kendi of Fort McPherson

You learn that you have to respect the weather. It is not something you can just ignore. You grow up in the north hearing stories about how people have got in trouble and there have been tragedies because people have taken the weather for granted.

I know my father told me that I had to respect the environment and be sure to just ask God for travelling safety because things can change so much and so fast. It's like if you see yourself better than the environment or stronger than it, you are asking for trouble. Be careful, be well planned, be respectful, be wise - don't take things for granted - that is what is important. If you don't know how to get somewhere, just don't head off thinking you will get there. You need to ask for advice.

I think the story of the Lost Patrol and the death of the RCMP going from Fort McPherson to Dawson City is an important one. The police were told to be careful and not be too confident in their own ability. I think they might have been too confident and should have listened to advice.



The "Lost Patrol" had set out from Fort McPherson, N.W.T., Dec. 21, 1910, heading for Dawson, Yukon Territory, a trek of roughly 800 kilometers (500 miles). Failing to find their way through the mountains, the lost patrol had turned back to Fort McPherson in a desperate race against cold and starvation. The grisly discoveries of the bodies of Taylor and Kinney, then Carter and Fitzgerald, were all made within 50 km of Fort McPherson on March 21-22, 1911. They are now buried in Fort McPherson.

Based on an Interview with Zachariasie PANIPPAKUTTUK of Igloodik

To understand the tragedies that happen in the north you need to understand SILA. Across the north people refer to SILA.

It is more than the weather; it is more like the person who is the weather. It is greater than us all. It is like it is the person who is in our atmosphere.

SILA is an old word. I am not certain what it is but SILA has to do with anything outdoors including the weather. A child must understand the outdoors and being sent outside to see SILA in the morning was part of the training. Upon returning indoors, we would always be asked how the weather was (SILA). We would say SILAALUK to describe the atmosphere and the sky above us or the surrounding.

The word SILA is used much in the language of the north, especially amongst Inuit. From the word SILA we can have meaning meanings, for instance SILAITTUQ a person who is not very smart or has a small amount of SILA. SILATUJUAALUK means a wise person, or a person with huge SILA. This is the type of an individual who has a reasoning capacity of the huge mass of SILA. That person has spent much time observing others and listening to others - always being open to learn.

But being smart and wise was about being respectful and prepared – not being overly confident. Too many people today are SILATTUQ. It can't be learned from a book. Schools do not teach someone to be SILATUJUAALUK.

SILA could be angry. When there was bad weather it was always believed to be associated with someone breaking a taboo. Taboos are things that cannot be done. Should someone breach a certain taboo, their life would change. Perhaps they would get some kind of an illness or it might have an effect on the game animal that they hunted or it might change the weather because one person had breached a taboo. This was the most common occurrence when certain taboo had been breached. This is what was believed.

If someone was not being prepared for a trip they were without having SILA and something bad could happen.

There are knowledge, skills and habits of mind that support our safety and survival in extreme environments

Understanding Frostbite:

This is a story I would like to tell young people, but I would prefer for my name not to be mentioned.

I was in Mayo. I travelled to Mayo in winter to get a job at the Keno mine. I met some young people there who were also there to get a job. In those days you just needed to show up and they would hire you and put you to work. Someone had alcohol and I drank some. In fact, I drank too much. It was night time and there was much drinking.

For some reason I decided to go outside. I only had my jean jacket on and it was very cold, maybe -30 degrees. Even though I had on light clothing, I felt warm and sleepy and decided to sit down in the snow to rest.

I woke up much later. It was still night time. I could not feel my fingers. I touched my face and I could not feel my face, or my ears.



I went back to the house where we had been drinking and the party was still on. They said my face was all white. It was frozen.

The next day my fingers and face was so painful. They started to blister. I went to the doctor and he said I had frostbite. He told me I would lose my skin and maybe one of my ears. He gave me penicillin because he said infection might set in.

I went to work but for days it was very painful. The skin did come off, but I did not lose my ears. They went black. I know there are many people that have lost toes and fingers or even frozen to death because of doing what I did. I am very fortunate I did not die.

Frostbite is literally the freezing of body tissue (usually skin). The body is mainly composed of water and so, below 0 degrees, if parts of our body are exposed to the air, they will freeze. Fingers, toes, ears, and the nose are the areas most vulnerable to frostbite.

There are three degrees of frostbite, including:

- **Frostnip**, which usually affects the face, ears, or fingertips. While the skin may feel numb, frostnip does not lead to permanent tissue damage.
- **Superficial frostbite**, in which the outer skin is affected.
- **Deep frostbite**, in which the skin and underlying tissue freezes. Permanent damage is possible, depending on how long and how deeply the tissue is frozen.

Frostbite is caused by either prolonged exposure to cold temperatures or shorter exposure to very cold temperatures.

What are the symptoms?

Many people with frostnip or frostbite experience numbness. A "pins and needles" sensation, severe pain, itching, and burning are all common when the affected area is warmed and blood starts flowing again. Skin may look white, grayish-yellow, or even black with severe frostbite, and it may feel hard, waxy, and numb. Blistering is also common.

Who is at risk?

Anyone can end up with frostbite if exposed to frigid conditions for too long. Naturally, those who work outside in the cold or engage in cold-weather sports may be vulnerable if they aren't adequately prepared.

Tips:

1. Do not expose skin to the air for any long periods of time.
2. *DO NOT* allow thawed tissue to freeze again. The more often tissue freezes and thaws, the deeper the damage. If the victim will soon be exposed to freezing temperatures again, wait to treat frostbite.
3. *DO NOT* use any heating devices, stoves, or fires to treat frostbite. Victims cannot feel the frostbitten tissue and can be burned easily.
4. In a pinch, body heat can be used to thaw mild frostbite or frost nip (tissues that are not quite frozen yet). For example, place mildly frostbitten fingers under the arm to keep warm.

Understanding Hypothermia: An adapted story from Victor Henry

We were travelling from Dawson to Stewart by dog team. I had my team and my father had his. It was a cold day in spring. In some places there was open water so we needed to be careful.



We were getting close to Stewart and I could see where we needed to get to. My father was in front with his team. I could see a shorter way across the river and decided to go that way.

The ice broke below me and the toboggan plunged into the river. The dogs did not break through; it was just the toboggan.

I held on tightly and the dogs kept pulling and soon they pulled me through onto the ice. I was soaking wet and cold. I travelled on for a while and then I began shivering. I knew I was in trouble. My gear was all wet and I did not have fire starter or matches in my sled.

I was getting colder. I was shivering and I felt like my sight was becoming blurred.

Fortunately I met my father. He was glad to see me, but he was also mad that I was so unwise.

He knew I needed to be near a fire and get out of the wet clothes. We pulled up on the banks of the Stewart River and found shelter. My father got the fire going and made a lean to. He made hot tea, but by that time I was not coherent. He said it was like I was drinking. He took off my wet clothes and dried them off.

It could have been much worse. I think if I was on my own it would have been tragic.

Hypothermia occurs when the body's temperature falls below 35 °C. Severe hypothermia can be fatal without prompt medical treatment. Symptoms of hypothermia include feeling cold, pale skin, shivering, loss of concentration, drowsiness, confusion, dizziness, slurred speech, dilated pupils and slowed breathing. First aid for hypothermia includes keeping the person still and not massaging or rubbing the affected person.

Hypothermia occurs when the body's temperature falls below 35 °C. The human body has a number of systems that maintain a constant core temperature of around 37 °C. A person doesn't have to be in subzero temperatures to risk hypothermia – it often happens in temperatures ranging from 0 to 10 °C

Some situations can cause the body to lose more heat than it can generate. These situations can include:

- Prolonged exposure to cold conditions
- Being in cold water for a long time
- Spending excessive time in wet clothes
- Lying immobile in cool air or on a cold surface

If a person cannot generate enough heat from muscle activity to replace that being lost, or if they are not wearing suitable clothing to protect from heat loss, then hypothermia can occur.

Signs and symptoms of hypothermia

The first warning sign of hypothermia is uncontrollable shivering. The person stops shivering as they progress into severe hypothermia. The person may fall into a coma as the body temperature falls below 32 °C.

Once the brain cools to around 30 °C, the structure that regulates body temperature (hypothalamus) stops working. The person's breathing and heart beat slows severely until it becomes undetectable. The heart no longer pumps blood effectively and the body is starved of oxygen. This is eventually fatal without prompt treatment. However, people with severe hypothermia can demonstrate an amazing capacity to recover if managed correctly.

Stages of hypothermia symptoms

The symptoms of hypothermia can progress slowly and people are often not aware they need medical help. The stages can include:

- Feeling cold
- Shivering
- Loss of concentration, poor judgement
- Loss of control over fine motor coordination – for example, the muscles of the fingers
- Drowsiness
- Confusion, irritability
- Dizziness
- Loss of physical coordination, unsteady on feet
- Slurred speech, speech difficulty
- Slowed breathing
- Dilated pupils
- Coma
- Death.

First aid for all cases of hypothermia

- Don't massage or rub the person – and do not allow them to help you. Keep them still or they risk a heart attack. If they move, the muscular activity will pump cold blood from their arms and legs into the central circulation and cause their core temperature to drop even more.
- Move the person out of the cold – if this is not possible, protect them from wind, cover their head and insulate their body from the cold ground.
- Remove wet clothing – replace with a dry covering, preferably warm. Cover the person's head.
- Try to warm the person – but do not apply direct heat. Apply warm compresses to the neck, chest wall and groin. Do not use hot water, a heating pad or a heating lamp to warm the person. Do not attempt to warm the arms and legs – this will send cold blood back to the heart, causing body temperature to drop further.
- Share body heat – to warm the person's body, lie next to the person, making contact. Then cover both bodies with a blanket or get into a sleeping bag if possible.

- Don't give alcohol – it lowers the body's ability to retain heat. If the person is alert and is able to swallow, have them drink warm, non-alcoholic beverages. Do not offer liquids if vomiting.
- Do not leave the person alone – stay with them at all times.
- Continually monitor breathing – if the person's breathing stops, start cardiopulmonary resuscitation (CPR) immediately if you are trained. If unsure, dial triple zero (000) – operators will advise you what to do. Continue CPR until the person starts breathing on their own or until medical assistance arrives.
- Don't assume the person is dead – CPR can be lifesaving for a person with severe hypothermia who may appear to be dead. They may not be breathing, have no pulse, be cold to touch, have fixed pupils and be rigid – but they may still be alive.

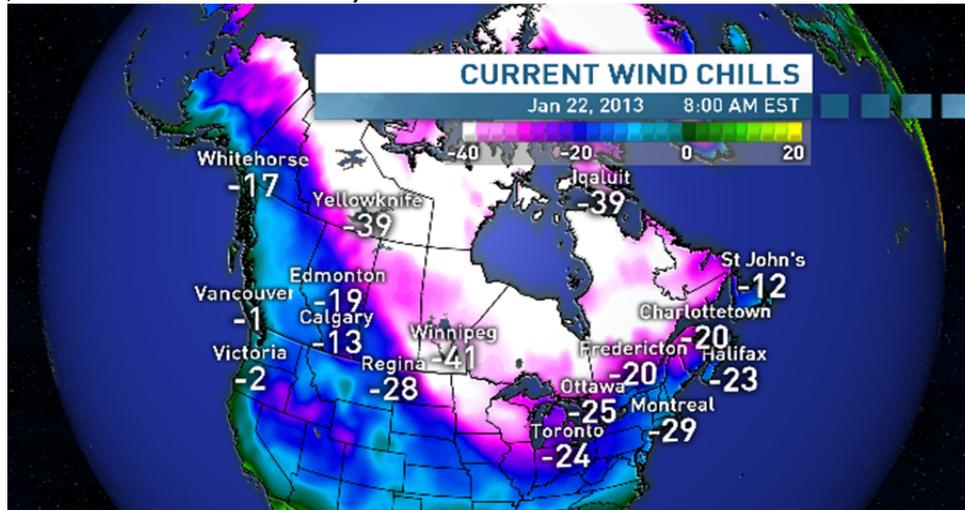
Preventing hypothermia when outdoors

Exposure to cold weather, even for a short time, can be dangerous if you are not prepared. Shivering and feeling cold or numb are warning signs that the body is losing too much heat.

- Avoid prolonged exposure to cold weather.
- Be alert to weather conditions that may increase the risk of hypothermia and act accordingly; for example, seek shelter during a snowstorm.
- Wear several layers of clothing to trap body heat, rather than just one bulky layer. Natural fibres like wool are better at holding heat.
- Use a weatherproof outer layer to stay dry.
- Use gloves, scarves and socks, with spares to replace when wet.
- Wear insulated boots.
- Wear warm headgear – a lot of body heat is lost through the scalp.
- Make sure your clothes and boots aren't too tight. If your blood circulation is restricted, you are more prone to hypothermia.
- Drink plenty of fluids and eat regularly.
- Take regular breaks to reduce the risk of physical fatigue.
- Keep your eye on exact body temperature by taking a clinical thermometer in your first aid kit.
- Change out of wet clothes straight away.
- Make sure your kit includes a good supply of waterproof matches.
- When participating in any outdoor activity that has the potential risk of hypothermia, such as bushwalking or mountaineering, use the 'buddy system' and check each other for warning signs. You may not be able to recognize your own symptoms of hypothermia due to mental confusion. First aid training is strongly advised.

Understanding Windchill: A Story from Alfred Kendi

We do not get winds that often in the Yukon in winter. That is good because that is when you really have to be careful of frostbite. The worst windchills are more in the NWT and Nunavut. It's not just the cold, it's the wind that is important to be concerned with.



I recall travelling in the Ogilvie - Blackstone country and the winds came up. I was travelling by dog team into the wind. I covered my face except for my eyes and face. It was a very strong wind and the visibility was poor, but I wanted to get to camp at Ogilvie.

Every once in a while I would take my mitt off to feel my nose, just to make sure it wasn't frozen. One time I waited too long and when I touched it, I could no longer feel it. I knew it was frozen.

I stopped the dog team and warmed up my nose with my hand and then covered my nose with my parka.



In the days that followed, my nose was painful and then it turned black and peeled. It had not been frozen long, but it still caused damage.

Understanding Insulation; An adapted story from JJ Van Bibber

Maybe the most important thing to understand is that you try to keep your body as removed from the cold as possible – that means from the air, the water or the ground. There has to be something between you and the cold.



In a lean to, you have spruce boughs on the snow to separate your body from the snow. Maybe you put a caribou hide down on the spruce bough for extra insulation. The hides could go on the ground or maybe even be the cover for the tent – that keeps the warm inside from escaping.



You had to keep your body warm. Many layers of clothes, something windproof on outside and something like wool on the inside. Same for boots. The outer boots were best waterproof because of overflow on the ice. The inside had to be wool liners. If it was too tight you would cold fast. It could not be too tight. It had to be layers and you had to keep dry.



Too many times you would see frost bite on feet and fingers. Usually too cold or wet and cold. You must get shelter fast and warm up if you get cold.

A Cold Wind Blowing



*The sun was warm but the wind was chill. You know how it is with an April Day
When the sun is out and the wind is still, You're one month on in the middle of
May. But if you so much as dare to speak, A cloud comes over the sunlit arch, A
wind comes off the frozen peak, And you're two months back in the middle of
March.*

From *Two Tramps in Mud Time* (1936) Robert Frost

When we think of sensations that stir people to write poetry, a bitter wind doesn't exactly spring to mind. On the contrary, it is almost universally despised, because it makes outdoor life in the Canadian winter less comfortable, and in many cases, much more dangerous.

We hear about **wind chill** on radio and television weather forecasts all winter long. But what is it??

Canada took the lead in an international effort to develop a **new wind chill formula**. In April 2000, Environment Canada held the first global Internet workshop on wind chill, with more than 400 participants from 35 countries. Almost all agreed on the need for a new international standard for measuring and reporting wind chill that was more accurate, easy to understand, and incorporated recent advances in scientific knowledge.

In 2001, a team of scientists and medical experts from Canada and the U.S. developed a new wind chill index, which is based **on the loss of heat from the face** - the part of the body that is most exposed to severe winter weather. The research agency of the Canadian Department of National Defence, with its knowledge of how troops are affected by cold weather, contributed to the effort by conducting experiments using human volunteers. They were dressed in winter

clothing, with only their faces exposed directly to the cold, and exposed to a variety of temperatures and wind speeds inside a refrigerated wind tunnel. To simulate other factors affecting heat loss, they also walked on treadmills and were tested with both dry and wet faces.

The new wind chill index developed from this research is expressed in temperature-like units. However, since the wind chill index represents **the feeling of cold on your skin, and is not actually a real temperature**, it is given without the degree sign (for example, "Today the temperature is -10°C , and the wind chill is -20 "). This index is also being used in the United States, but is provided on the Fahrenheit scale. The coldest wind chill in Canada (on record) occurred at Kugaaruk (formerly Pelly Bay), Nunavut, on January 13, 1975. On that day, the air temperature was -51°C , and the winds were 56 km/h, resulting in a wind chill of -78 . To compare, this would have been -92 under the previous wind chill calculation system.

Warning!

Wind chill warnings are issued by Environment Canada at varying values, depending on where you happen to be. In parts of the country with a milder climate (such as southern Ontario and the Atlantic provinces except Labrador), a wind chill warning is issued at -35 . Further north, people have grown more accustomed to the cold, and have adapted to the more severe conditions. Because of this, warnings are issued at progressively colder wind chill values as you move north. Most of Canada hears a warning at about -45 . Residents of the Arctic, northern Manitoba and northern Quebec are warned at about -50 , and those of the high Arctic, at about -55 .

So how do we protect ourselves against wind chill? Basically, the answer is to stay dry, and remove the wind component using shelter or clothing. Cover exposed areas, and minimize the time that bare skin is open to the elements by wearing gloves, mitts, scarves and hoods (incidentally, the fur around the hood of your favourite down parka is not there for looks - it creates a large boundary layer around the face to help reduce the effect of cold and wind).

Awareness and education are also important in preventing injuries related to cold, and Environment Canada has produced some great tools to help. First, you have to be aware of what you're dealing with for actual wind chill. This is available in two ways; by accessing weather reports, or determining the value from the new Wind Chill Calculation Chart from Environment Canada (Figure 1). The average person's skin begins to freeze at a wind chill value of -25 , and freezes in minutes at -35 - keep these numbers in mind as a rough guide. To more accurately determine the risk, Environment Canada has produced a chart to help calculate the approximate exposure time before frostbite occurs (Figure 2).

Figure 1: Wind Chill Calculation Chart

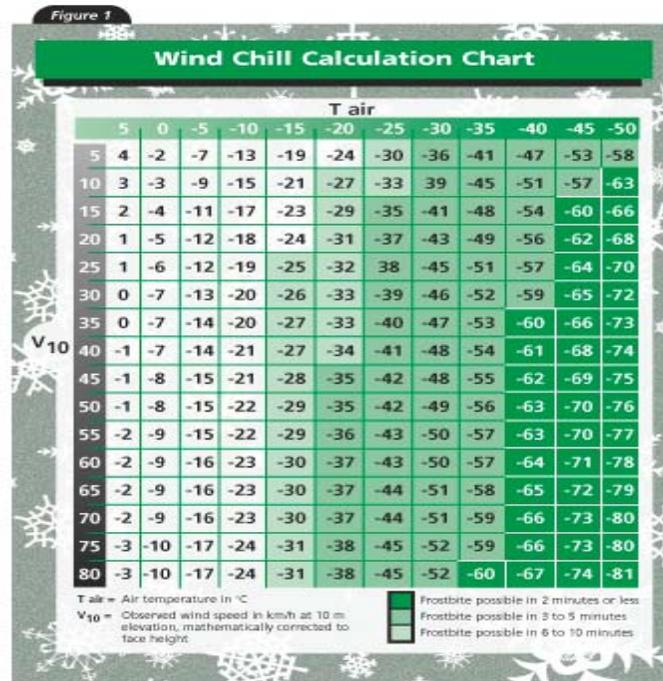
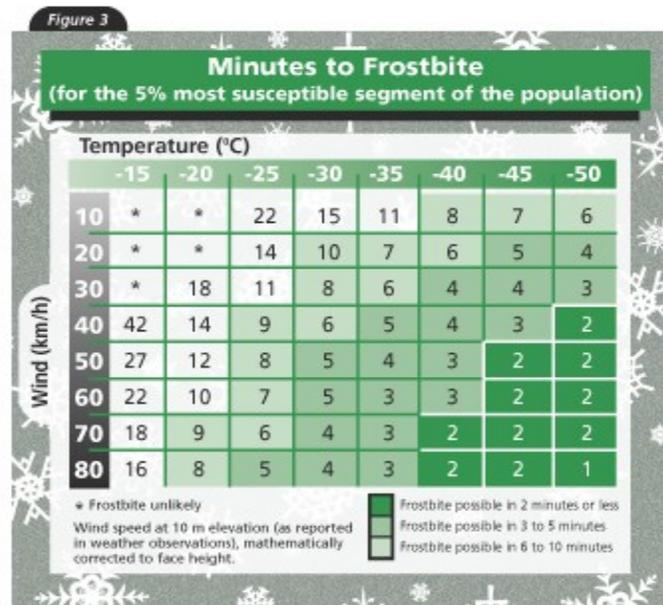


Figure 2: Minutes to Frostbite (for the 5% most susceptible segment of the population)



Working Out Frostbite:

1. It is -40 and you decide to run to your house at lunchtime. It takes 9 minutes to run to your house from school. Will you likely get frost bite?
2. It is -15 and you are outside in a 10km/h breeze. Are you likely to get frostbite?
3. It is -30 and you are on a skidoo that is travelling at 60 km/h . How long will it take you to get frost bite?
4. At what temperatures and windspeeds do you need to be really aware of the possibility of getting frostbite?
5. You can walk to most places in Dawson in 15 minutes. At what temperatures and windspeeds do you need to be very careful of getting frostbite in 15 minutes?
6. Explain why some people choose to drive their vehicles much slower in winter when travelling.
7. Explain the why the truck below has the front-end cover.



Keeping Your Body Warm: An Investigation

Ever wonder why you wear two or three layers of clothing when you want to go outside and be active? These clothes are actually great *insulators*, which mean they're made from materials that keep your body temperature from dropping. In this insulation experiment, you'll learn which fabrics help keep you warm on an icy winter day. Some weather conditions, such as rain, wind, and snow cause our bodies to lose heat. If you don't select the right materials to keep your body warm and toasty, you'll start to shiver from the cold. Wearing warm, insulating clothes allows you to stay outside even longer.

Part 1:

Problem:

Which type of fabric insulates heat the best?

Materials:

- Styrofoam cups of the same size and shape
- Hot Tap Water – but not hot enough to burn
- Thermometer
- Different kinds of materials: Wool, Cotton, Denim, Lace, Fleece, Nylon
- Timer
- Notebook and pencil

Procedure:

1. Do this as a class investigation whereby each pair of students test one fabric and puts their answers on the table below drawn on the board.
2. Before diving into the directions, think about the kinds of clothes you usually wear on a cold day. Look at the fabrics you have. What fabrics make you feel warm? In the table, rank them from keeps you the warmest (1) to the coldest.
3. Look at a variety of squares of fabrics. Wool, cotton, denim, lace, fleece, and nylon are all good choices. Have a small hole in each fabric that a thermometer can poke through.
4. Place one cup on the table for each fabric that your class plans to test. Add an extra glass to be used as your control for the experiment. This cup will get water of the same temperature as the other glasses, but won't be wrapped in a fabric.

5. Fill each cup with water to the same level, possibly to within 1 cm of the lip of the cup.
6. Place the thermometer in each cup. Slide the fabric on and ensure the seal between fabric and cup is secure.
7. Record the temperature of the water in each cup.
8. Record the temperature of this water every minute for 15 minutes.
9. Wait a total of 15 minutes.
10. Record the results in your notebook. Make sure you can answer the following questions: Which cup kept in the heat? Which lost most heat? Did any of the glasses hold temperature throughout the experiment?

Results:

Material	Best to Worst	Start	1 m	2 m	3 m	4 m	5 m	6 m	7 m	8 m	9 m	10	11	12	13	14	15	Best to Worst
		0																

Summary:

Write a paragraph to explain your results

Fabrics like wool and fleece are great insulators and will keep your body warm over an extended period of time. Fabrics like lace and cotton don't hold heat well, and won't keep your body warm very long.

Why?

To insulate something means to use a material that allows the least amount of heat to escape. Wool fibers are woven tightly together, and are much thicker than other materials, such as cotton. They don't allow much heat to escape, which means they are great insulators. Fabrics like cotton and lace are breathable fabrics, meaning they allow a great deal of heat to escape. They may be comfortable to wear, but they won't keep you from turning into an icicle on a cold day.

Pat 2: Dressed for the Cold: Layering for the Best Combination

Now that you know which fabrics keep water warm the best, try another insulation experiment to see how different combinations might work.

Use the planning sheet on the next page to help plan your investigation. Then record your results in the space below.

Try three of four combinations such as fleece and wool.

Combination	Rank from Best To Worst	Start Temperature	Final Temperature	Rank from best to Worst

What have you learned from this investigation?

Our Dressed for the Cold Investigation Planning Sheet

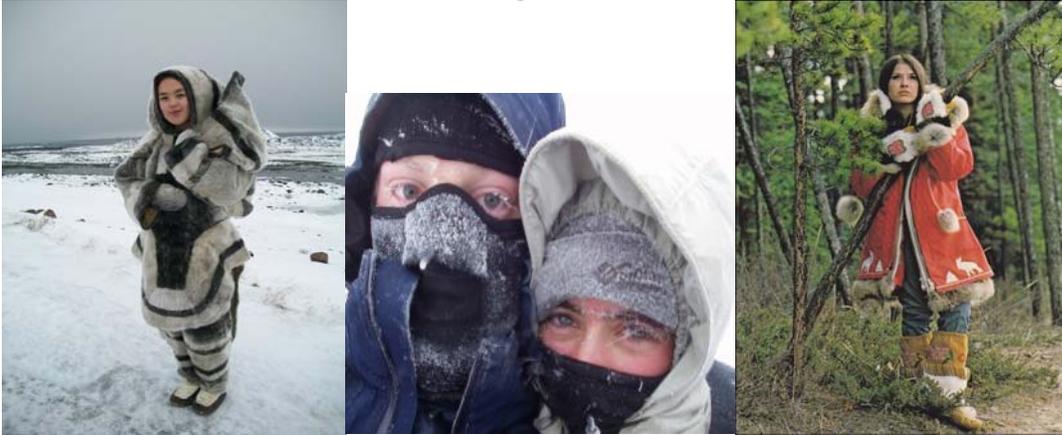
What is the question we want to answer?

How will we carry it out? Draw a picture or explain what you are going to do to answer the question?

Use this to help you think about how you will carry out the investigation.

What will you change?	What will you keep the same?	What will you measure? How will you measure? How often will you measure?
	<div style="border: 1px solid black; height: 37px;"></div>	
	<div style="border: 1px solid black; height: 37px;"></div>	
<div style="border: 1px solid black; width: 142px; height: 37px;"></div>	<div style="border: 1px solid black; width: 188px; height: 37px;"></div>	<div style="border: 1px solid black; width: 152px; height: 37px;"></div>
	<div style="border: 1px solid black; height: 37px;"></div>	
	<div style="border: 1px solid black; height: 37px;"></div>	

Dressing for the Cold



Boots

Folks new to the Yukon will have to rethink the way they dress from the ground up. Your old sneakers and cotton socks will not adequately protect your feet from sub zero temperatures! Wool socks are much warmer than cotton, so change your socks first. Warm boot options include bunny boots, pac boots (Sorels), mukluks, insulated boots, and wool boots. Wool felt insoles increase warmth and can be added to any pair of shoes/boots with enough room. Plastic bag vapor barriers over your socks are an effective way to increase the warmth of your footwear in an emergency.

Legs, Arms, and Trunk

Dress in layers – hopefully you have heard this before. Thermal long underwear is available in a variety of weights. Make sure you have several pairs so you can mix and match and have a clean pair now and then. In town you can wear cotton and silk layers, but in the outdoors you should stick to synthetics (polyester, polypropylene, etc.). Bulky outer layers trap warm air near your body – examples include flannel lined pants, wool pants or sweaters, and fleece with a puffy (fiberfill or down) parka on the outside. The Yukon is rarely windy, but if you are in a windy area you will need a wind proof layer for every part of your body to reduce wind chill.

Hands

Gloves are needed when you want to perform manual tasks in the cold while still protecting your hands. In colder conditions, or over extended periods, mittens are better since they keep fingers together and trap heat more effectively than gloves. Avoid touching cold metal and liquids (fuels and alcohol) that can instantly freeze your bare skin.

Head and Neck

Are major areas of heat loss. In cold weather you will want to cover your neck with a scarf, balaclava, or neck gaiter. Two layers on your head are ideal in extreme cold; possibilities include a hat and a balaclava or a hat and a jacket hood. In extreme cold or wind, you will need to protect your nose and cheeks from freezing. Balaclavas, wind proof face masks, or scarves will all protect your face from the cold. A balaclava is an excellent survival item – we highly recommend you carry one in your backpack or coat pocket.

OUTDOOR IN THE COLD —WHAT SHOULD I WEAR?

While active —When you are actively skiing or snowshoeing you do not want to overdress. You can quickly overheat and then get wet from sweat. You will not want to wear too many layers, but you may need to protect your ears, hands and other parts from the wind. You burn calories quickly in cold temperatures. If you're headed out for several hours you will need to stop to eat and drink. Keep a warm puffy (down or fiberfill) coat handy to put on when you stop for a quick snack. With a warm coat, you will not cool off too much during your brief stop.

Around camp —When it is extremely cold, it is difficult to stay warm if you are inactive. At night and in the morning, you generally want to be in your tent as soon as you cease to be active. Around camp you will want to wear many warm layers on every area of your body. Of course your head is very important - you will want two layers over your head as well as something to lock in the heat around your neck. Your feet and hands are the most likely to be cold – put another layer on your core (torso, head and neck). You will want very warm boots with a lot of insulation – especially on the bottom. You also need to keep the insulation in your boots dry - this can be done in several ways: you can keep the insulation dry to begin with by lining your boots with a plastic bag vapor barrier (this is very warm, but sweaty), or you may be able to remove the liners of your boots and dry them (somewhat) inside your sleeping bag at night (put dry wool socks in your boot liners to help absorb some of the moisture).

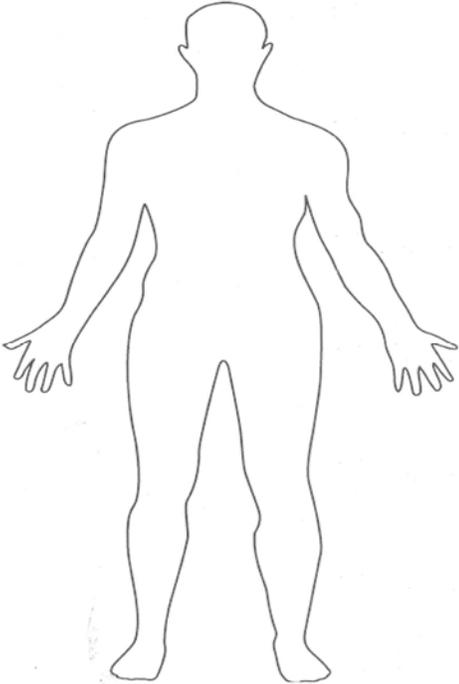
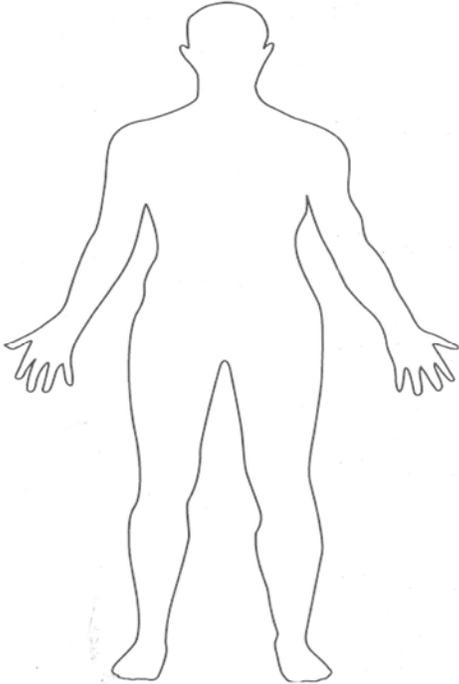
Anticipate Transitional times —In the cold of early morning you will want to wear most of your clothes. But as soon as you start moving (i.e., skiing) for the day you will warm up quickly and will want to efficiently take off extra layers to avoid overheating. Too many people don't bother taking off (or later putting back on) that extra layer to be comfortable – but you will pay the price with sweat soaked clothing that is uncomfortable and can eventually lead to hypothermia. In the evening as the day grows colder - put on more layers before you get cold, and avoid becoming hypothermic!

Sensitive parts —Your body's extremities are vulnerable to frostbite. Be sure to protect your sensitive parts with proper clothing [Windproof hat, face mask to protect your cheeks and nose, windproof underwear, windproof mittens, and warm boots that are not too tight].

You know that your head can lose a lot of heat —when you are cold throw on a hat/balaclava (or more hats). If you are active and hot, change your hat for a headband. Often just adding or removing a hat or something like a lightweight vest can be the difference between being just right instead of too cold or too hot. Cold weather clothing is a complex system because you need to balance varying temperature and weather, different levels of activity (heat output) and your own behavior with the clothes you have.

Cold weather clothing is a system: you need to develop a system that keeps you cool when you are active and you warm when you are not!

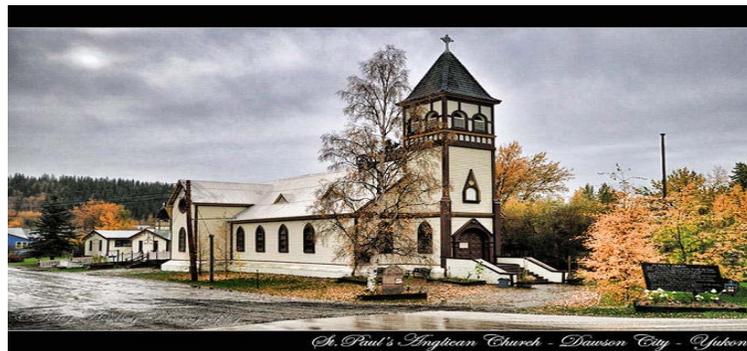
In the space below are two human figures. Dress one for a -40 day, the other for a -10 day. Assume on both days, you will be active.

-10 Degrees	-40 Degrees
	

Wedding in November: *An Account of a wedding by Rita Drugan of Dawson City.*

I was married in Dawson City in November in 1945. Everyone said that we should wait until the summer to get married. I thought, well, November is usually not that cold. Sometimes in November, just after Halloween, it can still be good weather.

We decided to get married at St Paul's Anglican Church. Both my husband and I had gone to school at St Paul's Hostel. It was at this school I learned to play piano as a teenager.



Boy, did we get the weather wrong. During the week of our wedding the weather changed and the temperature dropped. On our wedding day it was -67 degrees Fahrenheit. This is -55 degrees Celsius. It was one of the coldest days in Dawson's history.



It was so cold that day. The cars and trucks would not start. The church was so cold and it was hard to heat. Friends from Pelly Crossing could not travel to the wedding. But the worst thing was my wedding dress cracked. It was made of a synthetic fabric (like a plastic material) and it cracked because of the cold. I was just outside for maybe 5 minutes but in that time, the dress froze and became very brittle and cracked in many places. It was a good day, but a bad day. We should have listened.

Caught in the Cold: An adaptation of a story from Dean Arey

A memory I will never forget is how a short skidoo ride after school just about cost me my life.

It was in the dark season but not that cold. I got home after school and decided I would go on a short run out onto the river and then onto a trail that loops back through town. It was about 4 p.m. when I left and it was already getting dark. I had my running shoes and jeans on and a light ski jacket and light gloves. I wasn't going far.



I was about 10 minutes by skidoo from town when I ran off the trail and into deep snow. The skidoo and sun and I couldn't get out. My feet and hands were cold already. I had to act fast.

I was already cold and I had to get to town and it was getting dark. I figured if I had driven for 10 minutes it would take me at least an hour to get to town. I think it was -25 degrees Celsius and there was a breeze.

Although there was trail, I often broke through the trail as I walked. I didn't have long johns and every time I broke through the snow, my legs were in direct contact with the snow. It felt like my legs and feet were frozen - my hands too. I pushed on only because I knew town wasn't far. About half way I wondered if I'd make it. I was crying because of the cold. I was crying because I thought the worst might happen.

Just at that time, a guy from town came down the trail from where I had come. I only knew him by sight. He knew what had happened.

I got on his skidoo and we were at my house in three minutes. But, boy, was that cold. I stumbled into the house. Mom was home. I was home.

Be Prepared for the Extreme

Finish this story:

Esther and James are going to go skidooning after school in the winter dark season when it is windy. School has just finished in the afternoon and they decide to go to a place a few kilometers from the town on their own. They run out of the school to get their family skidoo when the school day ends excited about their ride. **Make one story about the bad choices they make and one about good choices.**

Good Choices:

Bad Choices:

Stories from the Community about Our Extreme Environment

Is there a story in your family about an encounter with our extreme environment? You are required to document the story of someone in the community who has had an experience that shows the extreme nature of our environment. Listen, carefully, to the story. Try to visualize the story. A visual image of the story will help you to both remember it and retell it. If possible and permitted, you may ask for the story to be audio-recorded and, maybe, visually recorded.

In a story, the story teller will likely tell you:

1. Where the event occurred;
2. When the event occurred;
3. What caused the event;
4. The outcome of the event; that is, what happened in the end; and, possibly,
5. What was learned from the event, which means, how might have this situation be prevented, or, if the experience occurred again, what might be done differently to prevent this from happening.

Ask this person to share their story. In their story look for these details. If they don't tell you these details, you might ask for these details.

One you have listened to the story, you are required to retell the story through a medium of your choice as discussed with your teacher.

Options include, a written narrative with illustrations; a diorama – a physical model representation; or a digital production.

Your account of the event will be presented to your class, and, then, a different audience.

From the presentations, as a class identify what the important messages and themes emerging from the presentations.

Eating and Drinking for Survival

Go back and read the stories from Angie Joseph-Rear and Victor Henry about what foods to eat in the northern extreme environment.

In the space below make a list of the foods they eat and drink.

Food	Drink

What do these foods have in common?

Your body is like a woodburning stove that requires huge quantities of fuel, so choose foods that have a lot of fat and calories. Even people today taking survival courses feed people foods like pots of pasta and fatty meat, with a pound of butter and a pound of cheese mixed in. Snacks consist of pilot biscuits or bagels with cream cheese, bacon, and a slice of cheddar cheese. Again, your body's furnace will burn through all this, especially if you are active.

Many people keep a thermos of hot, sweet tea or hot chocolate and a few tablespoons of butter added in. This "hypothermia drink" provides fast-burning sugars (chocolate) and slow-burning fats (butter), while providing metabolic fuel in between meals and helping with hydration.

Today people still swear by pemmican and Scottish shortbread or fried doughnuts, commercial or homemade.

Notice that the foods are high in energy, but not just simple sugars. Fatty foods are really important.

Making Pemmican: A Story by Mary McLeod

In early days there are two ways to save food: dry it or freeze it. Today we have other ways but still drying and freezing are used. We mainly use moose and caribou and salmon. The moose came from river valley. The caribou came from down river before Eagle, but now these caribou are gone and we get them up Dempster way.

For pemmican, you dry meat muscle after boiling it in water. Boiling makes the meat shred easy so it can be made into small bits. The muscle from the legs and the body are best. Maybe caribou or moose or even bear meat could be used. After boiling, the meat is pounded with moose or caribou fat and some salt. The crushed meat is mixed with fat and maybe even berries. It is best if you can't see the lumps of fat from around kidneys of moose or caribou. Then this is flattened. I hear some people then used to put this in intestine (to make like sausage). Then when you travel around, you don't need fire. You have your meat ready.



You can take fish meat too and dry it. It has to be cut in strips. Then pound it with fish eggs and stoneberries and moose fat. You use the fat from around the moose kidneys. Some people add raisins and sugar, but you don't need to do this.

You can take salmon meat and mix it with blueberries. Just stir it and because it has oil in it, you don't need to add fat. To store food, you can put dry fish, dry meat and dry berries up high in a cache.

Fresh meat and berries can be put in a hole in the ground, like cellar. You put moss cover in inside cellar and it keeps things good. At Eight Mile we put cheese cloth around meat before it was covered by moss. The cellar was near permafrost, so in summer it was always cold. In winter, it was frozen.

Making Pemmican: www.youtube.com/watch?v=hGJ4l_vg4YA

The Importance of Good Water: A Story from Victor Henry

You know everyone says never drink 'yellow snow' and laughs. You know, eating snow that has dog or animal urine on it. Well, that is only half of the story. It is an important message. You should not drink dirty snow or dirty ice.

When you are travelling – and even outdoors – especially if you are active – you have to drink water or you will get dehydrated. We think we only need water when we are thirsty but even in winter we need water because we are losing so much from sweating. We don't think of it but even when we see our breath in the cold, the water from our body is freezing in the air. The frost that forms around our scarf or on our face is from the moisture in our body. So we have to ensure we don't dehydrate. We must replace that water. If we do will begin to have headaches and much worse.



You shouldn't eat snow. When you eat snow, your body has to melt the snow first to make it into water and this takes away valuable energy. It is best to melt the snow first over a fire. Why make your body melt it when a fire can melt it first. Also, the cold snow can make your body core temperature lower.

We never melt glacier snow that has colour in it, like yellow or brown. You see that in many places here. That has impurities in it and you can get diarrhea and when you are in winter, that is the worst thing you want. Get the now from below the surface and closer to the ground where it is already compacted – more dense.



So, when outside in winter re-hydrate even though you might not be thirsty and, don't eat yellow snow!

Woman Survives After 49 Day Ordeal!

A Canadian woman who was last seen in mid-March in Baker City, driving with her husband to Las Vegas, was discovered alive Friday in Nevada, severely malnourished but in relatively good shape. Rita Chretien, 56, was found by hunters near her van on a remote logging road in northeastern Nevada. She was airlifted to a hospital in Twin Falls, Idaho, for treatment. She survived 49 days in the wilderness by eating snow, her son, Raymond Chretien, told The Oregonian.

"We're stunned," he said. "We haven't fully digested it. This is a miracle."

The news was bittersweet, however, because his father, 59-year-old Albert Chretien, is still missing (and now pronounced dead). Raymond Chretien said he had pretty much lost hope of seeing either of his parents again.

They took off March 19 from their home in Penticton, B.C., just north of Oroville in north-central Washington, heading to Las Vegas for a trade show. They were last seen that afternoon at Jackson's Food Mart in Baker City, where they bought gas with a credit card. They were captured on a video surveillance camera. Raymond Chretien said they traveled to Nevada the same day, meandering over back roads to soak in the scenery. But their van, a tan 2000 Chevrolet Astro, got stuck in the mud, and they couldn't dislodge it. Rita Chretien told her son that they simply had made a series of bad choices. Three days later, Albert Chretien ventured out to seek help. His wife stayed put in the van. Figuring neither might make it out alive, Rita Chretien kept a journal to let her family, friends and the world know what had happened to them.

"I don't believe they were prepared for winter weather," Raymond Chretien said. "They don't go camping."

The two hunters discovered her about 3:30 p.m. today, according to Detective Jim Carpenter, spokesman for the Elko County Sheriff's Office. Chretien told her son that she probably would not have lived more than another two or three days. Over the 49 days, she lost about 30 pounds. When the two hunters tried to feed her, she couldn't keep it down. She's not optimistic about her husband's fate.

"He didn't have shelter," Raymond Chretien said. "It's her belief that he didn't make it."

The couple, who own a commercial excavating company, left their home in Penticton about 6:30 a.m. March 19 and made it to Baker City between 3:30 and 4 p.m., according to Baker City police. When they didn't return home as planned on March 30, the family alerted Canadian authorities, and a massive search was launched that went on for more than a week. Officials from the **Royal Canadian Mounted Police** took part in the effort, headquartered in Baker City. Raymond Chretien rented a plane early on, fearful that searchers would not use planes.

The search was scaled back after about two weeks and discontinued April 21 pending any new information.

"We had all concluded that there was very little chance left," Raymond Chretien said. "We know that there's a miracle here."

Be Prepared: Passport to Survival - Knowledge

Below is a checklist of the knowledge necessary for me to live for a limited time in a northern environment. You will need to show this understanding by orally or in writing answering the points listed. Once done, tick off the statement.

	I know why the northern Yukon is an extreme environment.
	I know what I should keep in a travel survival kit.
	I know the meaning of the word windchill.
	I know the cause and stages of hypothermia and how to treat and prevent it.
	I know the causes of frostbite and to prevent and treat frostbite
	I know what layering 'up' and 'down' means and what the best system of layering.
	I know what foods would be best for supporting survival in an extreme environment.
	I know the habits of mind that are beneficial to my beneficial

Building a Quinzee

<http://www.youtube.com/watch?v=MniKeLZGsCY>

A quinzee is a simple shelter made by hollowing out a big pile of snow. They can take several hours to build, but are an effective way to stay warm when camping in the winter. Here's how to build one.

BUILDING A QUINZEE

Step 1: Shovel a pile of snow into a mound at least a metre high and big enough around to hold two people once it is hollowed out. Mix snow of different temperatures to cause it to harden, or "sinter." Flip the snow over so it mixes when you pile it into a mound.

Step 2: Shape the mound into a dome and allow it to sinter for a few hours. Then begin to hollow out the mound.

Dig a small entrance on the downhill side. Smooth out the walls and ceiling. The walls should be at least 20 cm thick. Poke measuring sticks through from the outside of the mound, so you will know to stop hollowing out the inside when you see the ends of the sticks. Hollow the shelter out from the top down.

Step 3: Use the last foot of snow to make elevated snowbeds. Dig a narrow trench between the beds all the way to the ground. This allows cold air to flow down and out of the quinzee. Poke a small ventilation hole near the top of the dome.

Step 4: Building a quinzee will make you sweat. Prevent hypothermia by changing into warm dry clothes after you finish building your shelter. Make sure you mark your entrance in case it gets covered with snow while you are away having fun. Keep a small shovel inside in case you need to dig your way out



WINTER CAMPING TIPS

- Jell-O gelatin mix makes a great hot drink. Store Jello-O powder in refillable backpacking tubes and add it to hot water. Try cherry Jell-O in instant hot chocolate! Eat your meals from their packages. Vacuum-sealed meals and packages of oatmeal can be opened and used as "bowls." If you don't rip the top off completely, you'll have only one piece of trash to dispose of. Bury your water jugs in a snowdrift. The snow insulates the water and keeps it from freezing.

Starting a Fire from Fire Starter

http://www.youtube.com/watch?v=-T1pXOC_AkU

http://www.youtube.com/watch?v=fUbrs_B0bZo

- Gather all of your wood first. Organize it by piece size so that you'll have just the right piece when you need it. Even wood buried under a layer of snow can be dry enough to burn, especially if the snow is light and fluffy, which means that it has less moisture content. The worse the snow is for making snowballs, the better your chance of finding dry wood. Look for dry wood in protected areas, like under thick vegetation or in the hollow of an old tree stump.
- Try wood from different places around your site. Keep track of what wood you found where, so that if some of it goes up well and some of it simply smolders and smokes, you'll know where to return for more of the good stuff.
- Dry spruce needles, birch bark and spruce whiskers are the best fire starters. Laundry lint, a Q-tip with the oil (or petroleum jelly), old guidebook pages can also be used.



- Don't forget your stove fuel: a dash of gas can give your fire the kick it needs to get going. For safety's sake, put the fuel on the fire before you light it, never after. Then toss in a match—and STAND BACK!
- If the snow isn't too deep, dig a hole to make the fire on solid ground. If the ground is completely covered with very deep snow, tamp down the snow so it's a solid, hard platform. (This will also form a depression, which will act as a windbreak.) Then put a layer of wood down on the snow, and build the fire on that. (Otherwise, the fire will sink into the snow and go out before it even gets going.)
- When the fire is roaring, put any damp wood around it. The heat from the fire will dry it out, and you'll have a stash of dry wood for later, or for morning.
- **Make a firestarter kit out of a material of your choice. Put at least two kinds of natural firestarters in it as well as some waterproof matches and a striker.**

Footprints in the Snow: Can You Identify them?

Being able to identify animal tracks is both fun and important, especially if you are on your own for several days. The most common tracks in the northern Yukon are rabbits, foxes, wolves, martens, and birds, such as ptarmigan. Match the animal with the track. Look at the animals before and then draw a line from the animal to the print. You may need to check your answers by Googling “lynx print” or “wolf print”.



Science Learning Activity:

Draw and identify tracks that you see on your Palooza. What do the track patterns tell you about the movement of the animal – fast, slow, one direction, many directions?

Science Learning Activity: Wet or Dry? Cotton or Wool?

Aim: In this investigation we will find out what kind of material and whether the material is wet or dry is the best insulator.

Method:

1. Pour a cup of water into in a balloon.
2. Place a thermometer in the balloon and tightly seal it with a twist-tie
3. Place a dry wool sock on the balloon.
4. Repeat for each of the materials you have including wet socks as well
5. Record the temperature of each material and balloon now and every 10 minutes.





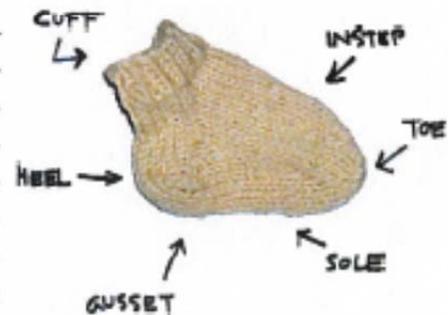
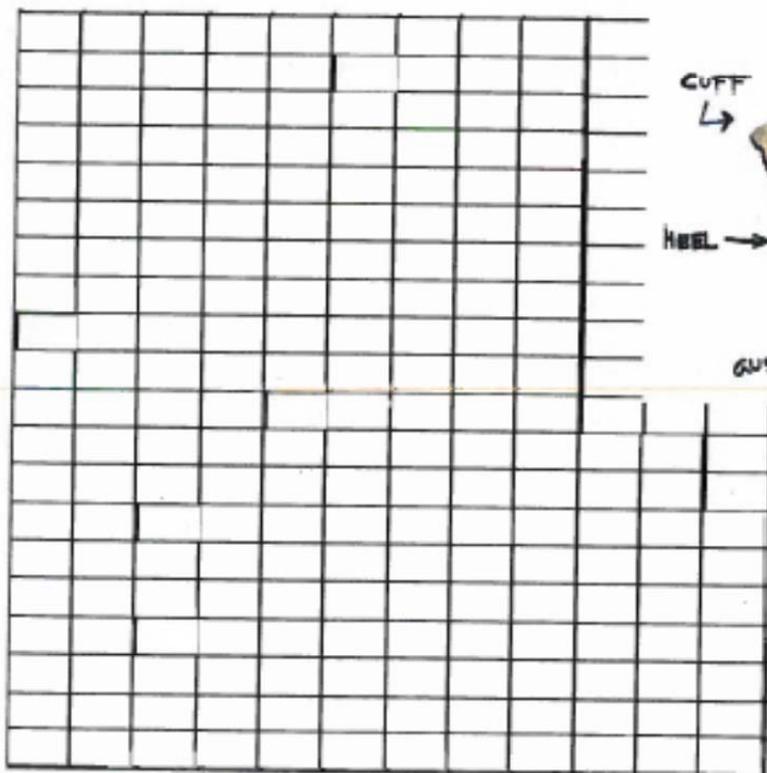
Name(s): _____



Sock Temperature Analysis

Sock Type	Initial Temperature °C	10m	20m	30m	40m	50m	60m	1:10	1:20	1:30
Cotton Dry										
Cotton Wet										
Synthetic Dry										
Synthetic Wet										
Wool Dry										
Wool Wet										

Temp (C)



Time (min)

Science Learning Activity: Insulation and Snow



In this investigation you will be looking at the temperature of snow in the snow.

1. Place a metre stick in the snow.
2. Measure the temperature of the snow just below the surface
3. Record both the temperature of the height
4. Dig down in the snow about 20 cm and repeat.
5. Continue to take the temperature of the snow at various depths all the way down to ground level
6. Graph the results

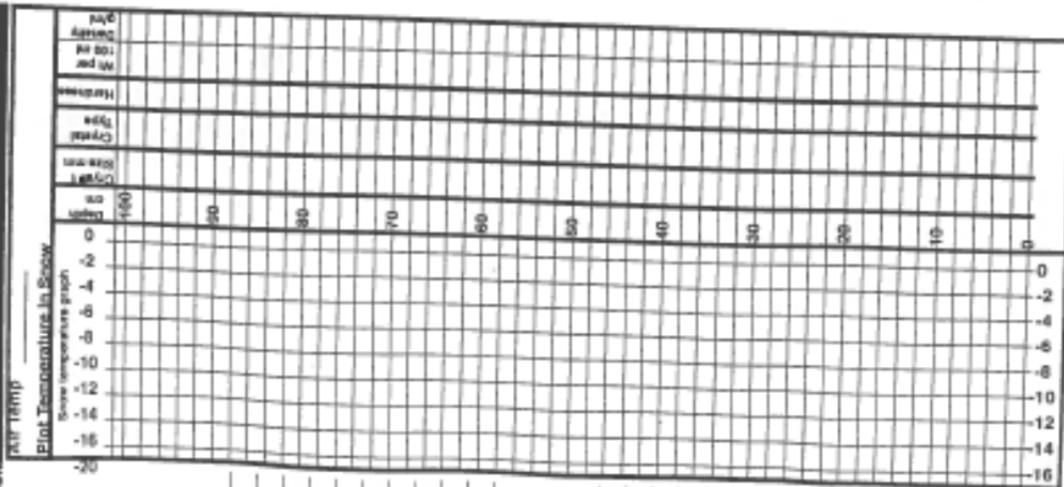
Questions to Consider?

1. How does the temperature change as you move closer to the ground? Does it get warmer or colder?
2. How is this knowledge important to us and other animals and plants when it comes to survival in winter?

School Nature Studies

SNOW PROFILES

Date _____
 Time _____
 Observers _____
 Location _____
 Slope _____
 Aspect _____
 Weather _____
 Max. temp. _____
 Min. temp. _____
 Cloud cover _____
 Cloud type _____
 Wind direction _____
 Wind speed _____
 recent snowfall history _____

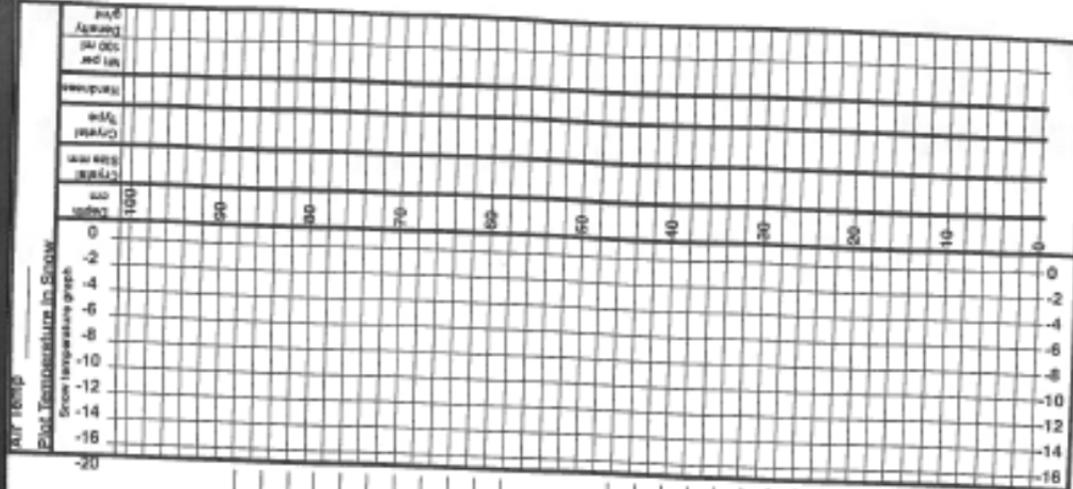


Comments:

School Nature Studies

SNOW PROFILES

Date _____
 Time _____
 Observers _____
 Location _____
 Slope _____
 Aspect _____
 Weather _____
 Max. temp. _____
 Min. temp. _____
 Cloud cover _____
 Cloud type _____
 Wind direction _____
 Wind speed _____
 recent snowfall history _____



Comments:

Simulation Game: Extreme Environment Adaptations

7. In this game there are predators (foxes, lynx, wolves, marten) and prey (ptarmigan). For every 10 student prey is there is one predator. They prey stand on one line and the predators stand in between the two lines.

8.



9. The first round of the game starts by the prey running to the other line and trying not to get caught.

10. If someone (a prey) gets 'caught' they stand out of the game, but if they get cold they can substitute one of the predators.

11. If only one prey is caught per round, the prey gets one point. If two or more prey are caught, the predator gets a point.

12. Whoever loses the round gets to introducing or taking away an adaptation or for that round. Examples might include:

- a. **The predator or prey get slower**
- b. **The predator or prey eyesight is reduced (close eyes)**
- c. **The predator has no teeth (no arms)**
- d. **The predator or prey their sight**
- e. **The predator or prey become less agile (can only run in a straight line)**
- f. **The predator or prey must travel in packs (link arms)**
- g. **The predator or prey motion changes (must hop)**
- h. **The predator or prey lose their forward motion (can only move backwards)**

Be Prepared: Passport to Survival - Skills

Below is a checklist of some of the skills necessary for me to live for a limited time in an extreme northern environment. You will need to demonstrate these skills to your teacher or community member. Once done, tick off the

	I can put together a travel survival kit
	I can make a 'combustion' kit
	I can make a lean-to and organize it well to be well insulated
	I can dress in a 'system of layers'
	I can boil a billy starting from snow and make a hot energy drink
	I can make a high energy soup in a billy
	I demonstrate the habits of mind that are beneficial to my beneficial

WINTER PALOOZA: A ROBERT SERVICE SCHOOL EXAMPLE

As a culminating activity in this unit, students of Grade 6 participate in a Winter Palooza that is a partnership between Robert Service School, Yukon Education, Parks Canada and Tr'ondëk Hwëch'in. The two-day activity involves a range of activities that works towards students achieving and demonstrating the knowledge, skills and habits of mind seen as essential as foundational for fostering an individual's ability to live safely and successfully in the northern extreme environment, at least, for a short time.

Support for an event such as this can be found through the Yukon Education, Experiential Education Co-ordinator, who, at time of this document's development, is Jesse Jewell. This individual has a variety of human, physical and educational resources likely able to assist a teacher in their development and implementation of such a program.

The two days of activities might include:

1. Building a quinzee;
2. Building a lean to;
3. Starting a fire;
4. Boiling a billy of water from ice;
5. Making an energy drink from the boiled water;
6. Making an energy soup;
7. Identifying animals from tracks;
8. Selecting a site to set a snare and setting a snare based upon track evidence;
9. Skinning and cooking small game on an open fire;
10. Participating in a variety of collaborative activities that develop understanding of scientific principles such as insulation; adaptation, and the influence of the environment on survival.
11. Demonstrating through the days habits of mind that are supportive of an individual's ability to live safely and successfully in the northern extreme environment.

There are many technologies developed specifically for this environment that support our safety and survival

In this section we focus on the items that this community has used to serve its needs to live within this extreme environment. You will be going to the Tr'ondëk Hwëch'in cultural centre to see many of these artifacts and learn of their traditional sources and uses. In advance, read the article below to get a sense of how dependent the Tr'ondëk Hwëch'in were so dependent on the caribou and so resourceful in its use.

Caribou have been hunted for many years, especially with First Nations people. The First Nations in the Dawson area were exceptionally skilled at using different parts of the animals that they hunted for a variety of functions. No part of the animal went to waste, which made it even more valuable to hunt. For centuries northern First Nations have relied on caribou for their survival. They used parts of the Caribou that belong to the skeletal system, muscular system, digestive system, and nervous system. While you read, try to identify which system the parts of the caribou mentioned came from!



Food Source:

Caribou meat is an excellent nutritious food source. It is very high in protein and low in fat. The organs of the caribou are also eaten, and offer many nutritional benefits. The organs of the caribou were also used as dog food. Many First Nations people also ate the marrow of bones. Bone marrow (the spongy part of bone that is inside) is very high in protein, iron, calcium, and good fats. Bones and marrow can also be boiled to make soup broth.

Clothing:

Some of the warmest traditional First Nations clothing is made from caribou hide. Caribou are built to survive harsh northern winters, and this makes their fur and hide perfect for making clothing that will help humans

outlast the winter as well. Coats, shirts, hats, mitts, parkas, mukluks, moccasins and much more can be made out of Caribou.



Building Materials and Tools:

Various materials to better daily life were made from different parts of the caribou. The Tendons found in a caribou legs are very strong and were made into sinew. Sinew is a type of rope. It is very strong, and was incredibly useful for many different daily jobs. Sinew was also used as thread to sew clothing.



Bones of a caribou are very strong. They were often made into tools for scraping hides, making cutlery, fishhooks, and needles. All of these tools were necessary for daily survival in the north.



Furs and hides were important in constructing shelters. They were put over pole frameworks of houses. They acted as an insulator to keep heat in, and wind out. They would have been sewn together using sinew (made of tendons) and needles made of bone.



Transportation:

Harsh northern winters and difficult terrain made travelling challenging to First Nations people. Luckily they were very skilled at using different parts of the animals they hunted to craft various forms of transportation. For example, the antlers of the caribou were often traditionally used as the frame of boats canoes and kayaks and hides were used as the skin of canoes. Antlers were also used in sleds, and for harnesses.



In the past, snowshoes were made with a wooden frame, and rawhide lacings. The lacings were often constructed from caribou hide. Snowshoes were essential for First Nations people living in the north. They were a necessary mode of transportation in the winter to hunt, trade, and trap. They made getting around much easier.



Can you think of any other traditional uses of caribou???

Visit to the Dänojà Zho Cultural Centre Cultural Centre

You will be looking at the exhibits in the Centre and listening to the stories about what items were traditionally used by Tr'ondëk Hwëch'in. By using words and pictures, complete the chart below.

Category	Where did the items come from (source)?	Which items are still used today?
Clothing?		
Food?		
Travel?		
Shelter?		

Visit to the Dänojà Zho Cultural Centre Cultural Centre

1. What items at the Centre are still in use today?

2. Why have these items continued to be used?

3. Why are many of these items no longer in use?

4. There are constantly new developments in technology that demonstrate our ongoing efforts to live more comfortably and efficiently in a northern extreme environment. Most of these changes are now **minor changes (example, a new product line of fabric or jacket) rather than major changes (invention of the snowmobile)**. Under each section below, identify two examples of **recent technology developments** that are used to support our living in our northern extreme environment:
 - a. **Transportation:**

 - b. **Heating:**

 - c. **Clothing:**

 - d. **Shelter:**

Other Cultures as Extremophiles

Select a culture group around the world that also lives in an extreme environment – desert, extreme cold, extreme wet, extreme winds – and are ‘extremophiles’ like the residents of the northern Yukon.

Use the following organizer to assist you in your analysis of this culture group.

Name of group:

Location:

Extreme conditions they experience

Shelter:

Clothing:

Transportation:

Special physical adaptations of their race:

Special behaviour adaptations of their race:

Any other interesting facts:

Main ways life is similar to northern Canada:

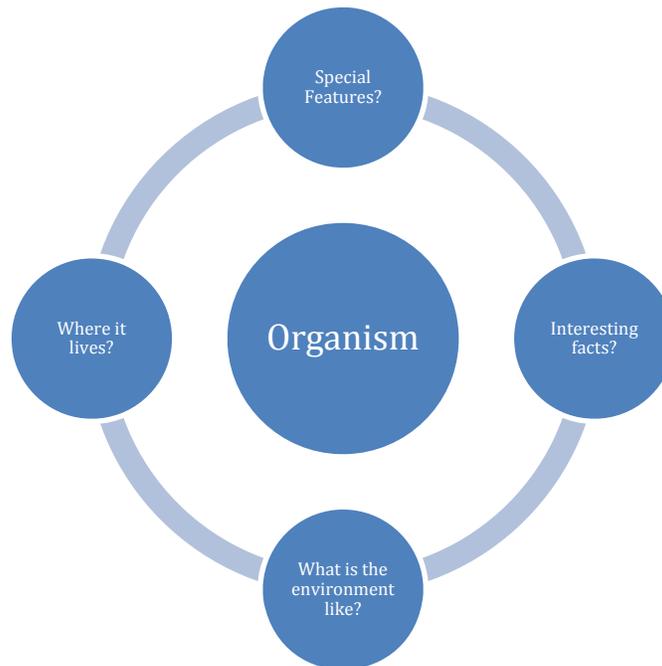
Main ways life is different to northern Canada:

Other Living Things as Extremophiles

In this unit we have looked at the north as an extreme environment, how we must live in order to survive in this environment and the technologies that support life within this environment.

We now turn to look at **other animals** that live within this northern environment and other animals that live in extreme environments around the world. By so doing, we realize that our northern Yukon environment is, in fact, not that extreme.

Look up the word '**extremophile**' on Google, and research an example of the organism. Use the organizer below to help you in your research.



Summary

In this unit we have looked at the northern Yukon as an extreme environment. You should now understand that:

1. We live in an extreme environment;
2. There are many stories told about this environment that we can learn from;
3. There are knowledge, skills and habits of mind that support our safety and survival;
4. There are many technologies developed specifically for this environment that support our safety and survival;
5. There are other extreme environments where knowledge, skills, habits of mind and technologies support safety and survival;
6. In our northern extreme environment, we see evidence of knowledge, skills, habits of mind and technologies that support other life forms' safety and survival.

We have also looked at how our First People, the Tr'ondëk Hwëch'in traditionally lived in this area and continue to do so with the many others from around the globe. As well, we have looked at many organisms that are well-adapted to this extreme environment. It is possible we are all extremophiles - people and other living things that inhabit these spaces and are so well-adapted that they readily grow and multiply.

These things not only have the physical capabilities, but also the knowledge and skills and habits of mind that ensure survival in this environment.

Out of Territory

(After your principal has reviewed the application submit to school council and your superintendent at least 4 weeks prior to the trip date. You are only required to submit your application to school council if your trip is greater than one day)

Done	N/A	Forms and Required Documentation
<input type="checkbox"/>	<input type="checkbox"/>	Form #3 Complex Field Trip Consent
<input type="checkbox"/>	<input type="checkbox"/>	Form #4 Risk Analysis
<input type="checkbox"/>	<input type="checkbox"/>	Form #5 Medical Form signed and completed by a Parent/Guardian
<input type="checkbox"/>	<input type="checkbox"/>	Form #6 Contingency Plan
<input type="checkbox"/>	<input type="checkbox"/>	Form #7 Volunteer
<input type="checkbox"/>	<input type="checkbox"/>	Form #8 Use of Private Vehicles
<input type="checkbox"/>	<input type="checkbox"/>	Form #9 Billeting
<input type="checkbox"/>	<input type="checkbox"/>	Form #10 Firearms
<input type="checkbox"/>	<input type="checkbox"/>	Form #13 Travel Detail
<input type="checkbox"/>	<input type="checkbox"/>	Form #14 Travel Authorization and Claim
<input type="checkbox"/>	<input type="checkbox"/>	Form #15 Application for Extended Coverage Outside Canada
<input type="checkbox"/>	<input type="checkbox"/>	Equipment List attached
<input type="checkbox"/>	<input type="checkbox"/>	Participating Student List attached
<input type="checkbox"/>	<input type="checkbox"/>	Students will require travel medical insurance for travel outside of Canada
<input type="checkbox"/>	<input type="checkbox"/>	Camping? Canoeing? Kayaking? Hiking? Cycling? Cooking? Skiing & Snowboarding? Please review each appendix relevant to your trip and attached to your application
<input type="checkbox"/>	<input type="checkbox"/>	First Aid and other certifications required. See Policy Pg 4. Attach photocopies
<input type="checkbox"/>	<input type="checkbox"/>	Travel in possible avalanche terrain. Contact Offsite Review Committee 667-5607
<input type="checkbox"/>	<input type="checkbox"/>	Culture Camp? First Nations Perspectives Review Committee review required. Contact FNPP 456-6752
<input type="checkbox"/>	<input type="checkbox"/>	You need written parent/legal guardian permission to take a minor across an international border. Students will also require a passport

Regardless of the type of field trip you are planning, please fill in the information requested below:

Grade(s): _____ Trip date(s): _____ to _____

Names of other teachers and participating employees: _____

Male/female chaperone (required for overnight): Yes Not required

I have printed off and packed blank Incident Report Forms #12 (all trip types) and blank Daily Trip Log Forms #11 (only multi day trips).

Trip Authorization
Principal Date: _____ Signature _____ (Simple, Complex & Out of Territory)

School Council Date: _____ Signature _____ (Complex & Out of Territory)

Superintendent Date: _____ Signature _____ (Complex & Out of Territory)

Final approval by Principal:

Complete the day of, or the day prior to departure. Destination temperature _____ wind-chill _____

Due to unforeseen circumstances and/or unmanageable risks I do not give permission for this trip to proceed.

Signature _____ Date _____

Have a great trip!
Full Field Trip Policy: www.education.gov.yk.ca/policy/field_trip.html
Off-Site Review Committee Chair at the Department of Education (867) 667-5607