

# Respect, Resilience and Prosperity: Recommendations for a Yukon Water Strategy

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*Jane Glassco Arctic Fellow*

**RESPECT, RESILIENCE AND PROSPERITY:  
RECOMMENDATIONS FOR A YUKON  
WATER STRATEGY**

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# Respect, Resilience and Prosperity: Recommendations for a Yukon Water Strategy

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Jocelyn is currently working on her M.Sc. with the University of Northern British Columbia (UNBC). Her thesis project is investigating the methylation of mercury by bacteria in southern Yukon lake sediments. This project is in collaboration with Aboriginal Affairs and Northern Development Canada, the Champagne and Aishihik First Nation and UNBC.

She obtained her B.Sc. with the University of Victoria in biochemistry and microbiology.

While attending school, she worked on various co-operative projects regarding stem cells in breast cancer malignancy, pine beetle pathogens and forest mycology. She then completed a two-year under-fill position with the Government of Yukon as a hydrology technologist for the Water Resources

Branch. Her responsibilities were to operate and maintain the Yukon's hydrometric, snow survey and meteorological networks. She was also involved in government activities during flooding events.

## *Community*

Jocelyn was born in Whitehorse, Yukon, and is a member of the Champagne and Aishihik First Nation (CAFN), in Haines Junction, Yukon. As one of Canada's few self-governing First Nations, CAFN has strived to conserve its environment and culture while promoting healthy and self-reliant people. Throughout her life, Jocelyn has been a part of the CAFN community and participated in the events hosted to help promote its people's vision.

## *Fellowship Focus*

To utilize her education and experience with water, Jocelyn's project involves recommendations for the Yukon's Water Strategy. Representatives from First Nation's, territorial and federal government, NGOs, industry and community members will be interviewed. Discussed issues include but are not limited to: land-use planning, mining, hydro, climate change and impacts on traditional life styles. Overall, the research is intended to provide an in depth look at how the Yukon's water is currently managed and give insight to challenges and opportunity in development of a Yukon Water Strategy.

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# Executive Summary

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The water of the Yukon is changing. Climate change and our booming resource sector are affecting this natural resource that every being in the Territory is dependent upon. To manage the Yukon's water, the Government of Yukon (YG) has committed to developing a Yukon Water Strategy that concentrates on drinking water source protection, upgrading drinking water and wastewater infrastructure and increasing baseline data collection. While these actions are important and necessary, water has other considerations that must be addressed to achieve an involved and complete water strategy for the Yukon.

This was apparent when the question of water management was discussed with representatives from YG, Yukon First Nations (YFNs) governments, non-government organizations (NGOs), industry and the general public during summer 2011. The people of the Territory interviewed voiced four primary concerns around water:

- Water Use
- Climate Change
- Economic Development
- Capacity

They also recognized fish as an essential element of water management, with the majority of the respondents expressing concern about the fish populations around the Territory.

I have developed several recommendations for a Yukon water strategy based on interviews with the Yukon people and the current policy regime. These recommendations are built firstly on recognition of the changing environment and the need for *mitigation* and *adaptation*; and second, on a framework that uses the four components of the Northwest Territories "Northern Voices, Northern Waters" Water Stewardship Strategy of *work together*, *know and plan*, *use responsibly* and *check progress*. Lastly, I utilized a method of incorporating traditional knowledge as an understanding of *social and political local knowledge* and *ethical-epistemological-cosmological* practices. Fish management is not specifically incorporated into any of the recommendations; however, the inherent correlation between fish and water health cannot be overlooked. Overall, it is apparent that the current system of fish and water management is inadequate, making it essential that the strategy works toward sustaining water and, in turn, fish habitat.

In summary, my recommendations entail the following:

- *Work Together*: involves all primary water concerns and the necessity of tapping the abundant capacity and knowledge within the First Nations and the need to increase partnerships and data sharing with industry, academia and other jurisdictions.
- *Know and Plan*: revolves around increasing data collection, identifying gaps and overlap in legislation, planning for capacity and public education on water issues and identifying and mitigating climate change and industry related vulnerabilities.

- *Use Responsibly*: concentrates on adaptive and preventative licensing policy and practices; identifying and mitigating inefficiencies in water use and capacity and investigating agriculture opportunities and policies.
- *Check Progress*: at regular intervals of all action items as climate change and economic development needs evolve.
- *Social and Political*: looks at utilizing First Nations traditional practices of resilience, sustainability and education in relation to water.
- *Local Knowledge*: involves First Nations collection of regional data, participation in planning and consultation and measure of success of reclamation.
- *Ethical-epistemological-cosmological understanding* revolves around respect for water and the way of community living as one unit with all peoples and the environment.

To ensure water's vital resilience, I present an opportunity for the Yukon's continued prosperity with the creation of a Yukon Water Strategy that respects the desires of the Yukon people, our environment and our economy.

# Introduction

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*“Men of the High North, you who have known it;  
You in whose hearts its splendors have abode;  
Can you renounce it, can you disown it?  
Can you forget it, its glory and its goad?”*

*Robert W. Service  
Men of the High North*

I used to be a tour guide and one of the most frequent questions people would ask me is if I believed in climate change. I would tell them this story about a pond behind my house. We would go there during the summer and catch little frogs. I am sure a couple of my rubber boots are still down a few mud layers in there. That pond would freeze over in the winter, flood in the spring and dry up a little over the summer and then cover with snow once again. I walk by that pond today with my dog and watch it as summer progresses. In the spring, yes it floods, little birds come, but as summer moves on it shrinks and never over the season does it manage to reach the same size it was by the end of those old summers. I am not even sure if there are frogs there anymore. By August you could call it a puddle in grassland. ‘That is climate change,’ I would tell those tourists. The permafrost is melting and the pond is draining. I never see kids there anymore. Sometimes it would be raining when I’m telling them this and I would say, ‘you know, when we were kids, we’d go run around and play in the rain, because it never rained.’ I can assure you kids don’t do that anymore.

To address these changes, the countries of the North established the Arctic Council, a high-level intergovernmental forum that promotes co-operation among Arctic States and indigenous permanent participants.<sup>1</sup> In the Yukon, there are two permanent participant groups, the Arctic Athabaskan Council and Gwich’in Council International. In 2005, the Arctic Council released the Arctic Climate Impact Assessment that looks at the observed and predicted climate impacts in the Arctic. To correlate with climate change, member states are advised to take two actions: mitigation (e.g. limit GHGs) and adaptation (work with residents to develop and manage climate change impacts).<sup>2</sup>

In the Yukon, we are faced with many decisions regarding these changes and central to these choices is water. The water is guidance, fragile and giving. As it provides for us it demands our respect, and how we decide to manage this nurturing resource is going to be received with either gratitude or regret from our descendants.

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<sup>1</sup> Arctic Council, *About Arctic Council* (2007) Retrieved 10/14/2011, <http://arctic-council.org/article/about>

<sup>2</sup> Dickson, C., *Improving the efficiency and effectiveness of the Arctic Council: A discussion paper* (2006) Whitehorse, Yukon: Arctic Athabaskan Council.

So, during summer 2011 I travelled the Yukon and asked questions about our water with Yukoners from federal, territorial and YFN governments, industry, NGOs and citizens. Four primary issues were expressed: water use, climate change, economic development and capacity; central to these four was fish. Fish, were discussed with concern by the majority of the people I spoke with and it can be thought that the wealth and vulnerability of the fish is dependent on the wealth and vulnerability of our water.

The current YG stated a commitment to the creation of the Yukon Water Strategy in their December 1, 2011, Speech from the Throne. Guidance for their overall governance of the Territory is based on four pillars: a better quality of life, the environment, the economy and good government. They are devoted to continuing our pathway to prosperity and with it the need to address the correlating social and environmental impacts.<sup>3</sup>

For the proposed water strategy, they concentrate on three themes:

- Ensure Yukoners have access to safe drinking water through the Rural Domestic Water Well Program and by other means including the development of community wells.
- Increase data collection and information sharing and continue to provide more water information online through sites such as yukonwater.ca.
- Upgrade drinking water and wastewater treatment facilities in Yukon communities to meet new standards for water quality.<sup>4</sup>

While this pathway is commendable, it is unlikely to lead us to prosperity in regards to our water. YG has created many strategies to guide our development, such as the Climate Change Strategy, Energy Strategy and Education Strategy. The latter is an extraordinary document based on extensive consultation and reflection of the Yukon culture, partnerships with industry, First Nations and the communities. It will prepare our children to contribute to the Territory's future and provides several opportunities for higher education in their chosen field. With the Yukon Water Strategy, there is an opportunity to express the same importance of our children with that of our water. The development of a strong, admirable strategy can enable YG to fulfill their four pillars and contribute to the continued overall prosperity of the Yukon people, our environment and our economy.

The Government of Northwest Territories (GNWT) prepared a Water Strategy that combines many of the interests expressed by YG and the interviewees. The "Northern Voices, Northern Waters" – Northwest Territories Water Stewardship Strategy has the vision that, "The waters of the Northwest Territories will remain clean, abundant and productive for all time." To achieve this, the NWT utilizes a drum to signify the unity of the vision and principles with the four components of the strategy: work together, know and plan, use responsibly and check progress.<sup>5</sup> The acclaim of this strategy is that it underwent extensive consultation and reflects the needs of NWT residents along with the economy and the environment. It also concentrates

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<sup>3</sup> Government of Yukon, *"Moving forward together" Speech from the Throne of the 33rd Yukon legislative assembly* (December 1, 2011) Whitehorse, Yukon.

<sup>4</sup> Ibid.

<sup>5</sup> Government of Northwest Territories, *Northern Voices, Northern Waters: NWT Water Stewardship Strategy* (2010) Yellowknife, NWT: NWT Environment and Natural Resources.

on community involvement by emphasizing the strength of traditional knowledge (TK) and need for public education regarding water stewardship.<sup>6</sup>

The importance of TK is becoming more recognized in the development of modern legislation, strategies and action plans. The incorporation of TK in public policy has been challenging due to the differing principles between TK and contemporary public administration. Frances Abele attempts to define TK using three strands of understanding that may allow for the incorporation of indigenous people's "insights and perspectives in 'mainstream' public policy."<sup>7</sup> In this, TK can refer to:

- *A distinctive political and social perspective and set of interests, rooted in shared history: a people's shared way of understanding human life, identifying problems and approaching social resolution;*
- *Local knowledge: the specific and empirical knowledge that arises from long use of a particular place, which is built upon and passed through the generations;*
- *Ethical-epistemological-cosmological understanding of how to live in the world, how best to be human, of understanding responsibilities to others and to the world: to be approached with a broad range of interpretations, but looks to encompass an understanding of relations among all things and approaching human existence.*<sup>8</sup>

Another understanding of this third strand of TK is the commitment to future generations. Traditional culture and modern land claims were both crafted and practiced in consideration of our children to come. Chief Skookum of the Carmacks Little Salmon First Nations expressed this as "the way we think, the seven generations down the road, we want them to have the same kind of life that we had when we were kids." Slowly, mainstream policy is beginning to incorporate this ideal, as it is necessary in our changing world, though it has been practiced by First Nations immemorially.

Overall, there is an opportunity in the development of the Yukon Water Strategy to embody the four identified issues of water use, climate change, economic development and capacity in conjunction with YGs four pillars of governance. Here, mitigation and adaptation recommendations for the Yukon Water Strategy to address these issues will be made based on interviewee responses and government legislation and strategies. Each recommendation is guided by the four components from the NWT Water Stewardship Strategy and Abele's three strands of TK. As well, the role of fish in water management is discussed in two ways. First, fish are integral to the Yukon people and the environment though culture (both YFNs and non-FNs), tourism and eco-system health. Second, there is a correlation between fish survival and water health that can be considered an indicator of successful water management. It is not intended that fish management be incorporated into the Water Strategy, but to recognize that if the health of the Yukon's fish population is suffering than the current system of water management is failing.

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<sup>6</sup> Merrell-Ann S. Phare, Executive Director and Legal Counsel, Centre for Indigenous Environmental Resources (Aug 4, 2011).

<sup>7</sup> Abele, F., "Between respect and control: Traditional indigenous knowledge in Canadian public policy" (2006) In M. Orsini, & M. Smith (Eds.), *Critical policy studies: Contemporary Canadian approaches*. Vancouver, B.C.: UBC Press.

<sup>8</sup> Ibid

# Land and Water Management: The Legislative and Policy Context

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After the 2003 devolution of responsibilities from the federal to territorial government, the Yukon obtained jurisdiction over its waters. YG manages water through six departments: Environment (ENV), Energy Mines and Resources (EMR), Community Services (CS), Health and Social Services (HSS), the Executive Council Office (ECO) and Highways and Public Works (HPW).<sup>9</sup>

For this study, only Yukon Legislation will be reviewed in depth. Statutes at the international and federal level that apply to water management will be referred to when applicable.

The 1993 Umbrella Final Agreement (UFA) between the GC, YG and YFNs is the primary governance of land allocation, land-use planning, surface and sub-surface rights, water, resource development and fish and wildlife management in the Yukon. Various chapters outline the duties for each of these jurisdictions and each of the signed parties.<sup>10</sup> The *Yukon First Nations Self Government Act* constitutionally establishes signatory YFNs as:

- A legal entity having the capacity, rights, powers and privileges of a natural person;
- The right to enact laws and regulations of a local nature for the good government of its Settlement Land and the inhabitants of such land and for the general welfare and development of the Yukon First Nation.<sup>11</sup>

An example of a law enacted under the UFA is the Champagne and Aishihik First Nation's (CAFN) *Traditional Activities Protection Act*, which requires land developers to apply for a land-use permit from CAFN. The purpose of the Act is to ensure wise management of Settlement Land for present and future generations; consideration of environmental, cultural, historic and socio-economic factors and to protect the culture, traditions, health and lifestyle of CAFN people.<sup>12</sup> All laws established under the UFA are subject to the conflict of laws and therefore any overlapping federal or territorial legislation can be superseded by FNs laws and decisions.

Chapter 12 of the UFA established the Yukon Development and Assessment Board, which was amended to the Yukon Environmental and Socio-Economic Assessment Board (YESAB) under the new Yukon Environmental and Socio-Economic Assessment Act (YESAA) in 2003. YESAA is federal legislation that outlines the approval process for a proposed project through consultation of stakeholders to produce a

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<sup>9</sup> Environment Yukon, *Yukon water: An assessment of climate change vulnerabilities* No. ISBN: 978-1-55362-516-2 (2011) Whitehorse, Yukon: Government of Yukon.

<sup>10</sup> Aboriginal Affairs and Northern Development Canada (1993) Umbrella Final Agreement between the Government of Canada, the Council for Yukon Indians and the Government of Yukon.

<sup>11</sup> Ibid

<sup>12</sup> Champagne and Aishihik First Nation, *Traditional Activities Protection Act* (1998).

decision document that gives recommendations for development of the project.<sup>13</sup> The mandate of the board is based on the following: “the environmental and socio-economic effects of a project are considered; it generally is geared towards the protection of Yukon First Nations values, economies and the participation of all Yukon residents in the assessment process.”<sup>14</sup>

Overall, the board was established to evaluate projects that were triggered by provisions under *YESAA* and to ensure the participation of all stakeholders, especially YFNs in the consideration of the impacts a project might have on the environment, society and the economy.

Section 14.8.1 of Chapter 14 of the UFA states that subject to the rights of water licensees and the Laws of General Application, a YFN has the right to have water which is on, flowing through, or adjacent to its Settlement Land, remain substantially unaltered as to quantity, quality and rate of flow, including seasonal rate of flow.<sup>15</sup> This is regulated by the quasi-judicial Yukon Water Board, which was established under the UFA and is governed by the *Yukon Waters Act*. The role of the board is to “provide for the conservation, development and utilization of waters in a manner that will provide the optimum benefit from them for all Canadians and for the residents of the Yukon in particular.”<sup>16</sup>

This is achieved by reviewing and issuing water licenses with a number of terms and conditions based on stakeholder consultation (governments, NGOs, councils, etc.) and the *YESAA* decision document. As a quasi-judicial board, decisions can be appealed and reviewed in a public hearing.<sup>17</sup> Provisions under a Water License are enforced by water inspectors, who monitor compliance, are able to halt or amend work or charge a licensee for a principle offence.<sup>18</sup>

Currently there are three unsettled YFNs in the Yukon. These groups are still governed under the *Indian Act*. Methods of consultation with unsigned nations are typically through mechanisms established in the UFA (i.e. *YESAA*). YG has made a commitment to work with these nations to obtain land claims and Self-Government agreements. However, there is hesitation from some citizens who view this as signing away their land and therefore, becoming limited and bound to provisions under such agreements. Other methods of moving forward such as 50/50 co-management for land use and consultation may be superior to conventional agreements. As well, there is a feeling from unsigned nations of exclusion from development processes, where they feel there is no opportunity to express their voice and principles.<sup>19</sup>

One of the most significant chapters of the UFA is Chapter 11: Land-Use Planning (LUP). It establishes the central LUP Council and LUP Commissions for each of the planning regions. At this time, only the three northern regions (North Yukon, Peel River and Dawson) have confirmed boundaries, while the other four of

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<sup>13</sup> Government of Canada, Yukon Socio-Economic Assessment Act (2003).

<sup>14</sup> Ibid

<sup>15</sup> Aboriginal Affairs and Northern Development Canada (1993) Umbrella Final Agreement between the Government of Canada, the Council for Yukon Indians and the Government of Yukon.

<sup>16</sup> Environment Yukon, Waters Act (2003).

<sup>17</sup> Bruce Willis, Chair, Yukon Water Board (October 24, 2011)

<sup>18</sup> Environment Yukon, Waters Act (2003).

<sup>19</sup> Hammond Dick, former Tribal Chief, Kaska Tribal Council (August 12, 2011)

the south (Northern Tutchone, Kluane, Whitehorse and Teslin) were only recently recommended.<sup>20</sup> The objectives of LUPs are:

- Development of common LUP process outside community boundaries
- Minimize land use conflicts within and between settlement and non-settlement land
- Recognize and promote the cultural values of YFNs people
- Recognize YFN's responsibility for the use and management of settlement land pursuant to settlement agreements
- Ensure that social, cultural, economic and environmental policies are applied to the management, protection and use of land, water and resources in an integrated and co-ordinated manner so as to ensure sustainable development<sup>21</sup>

The intention is that each regional commission incorporates these objectives into a LUP that reflects the input and consultation of affected stakeholders, YFNs, YG and Yukon citizens. The final recommended plan is then submitted to YG and participating YFNs who either approve or reject the plan with written reasons.<sup>22</sup> This process has proven to be highly controversial, expensive and time consuming.

To date, only the North Yukon Plan has been completed.<sup>23</sup> Its planning process was five years long and it used a significant portion of the finances intended for all of the Yukon's LUPs. The second planning region, the Peel River Watershed, has not advanced as smoothly. The discovery of significant non-renewable resource potential has been the central conflict in the plans progression, where YG and involved FNs have been unable to come to a consensus between resource extraction and environmental and cultural conservation. The public and media have also been involved and the plan has become one of the most controversial issues in the Yukon. The Final Recommended Plan, July 2011, establishes land use management units, where each unit is assigned to a land use category (i.e. Conservation Management Area or Integrated Management Area); it then allows for re-evaluation of a unit's use for future generations.<sup>24</sup> The Final Plan is a document of extensive deliberation in defining the importance and balance of the region's social, economic and environmental values. In the foreword, David Loeks, former Chairman of the Peel Planning Commission explains the path taken to produce the final plan based on sustainable development, where: "(Sustainable development) is often portrayed as a balance between environmental, social, and economic interests. Simple logic dictates that this is better thought of as an optimization of these values, recognizing that sustaining the ecosystem is fundamental. This is readily understood when you consider the reverse: if we fail to sustain the ecosystem, we have no basis for a sustainable society, nor for a sustainable economy."<sup>25</sup>

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<sup>20</sup> Robertson, I.D., *Recommendations for Priority Planning Regions* (2011) Whitehorse, YT: Yukon Planning Council.

<sup>21</sup> Aboriginal Affairs and Northern Development Canada, *Umbrella Final Agreement between the Government of Canada, the Council for Yukon Indians and the Government of Yukon* (1993)

<sup>22</sup> Ibid

<sup>23</sup> North Yukon Regional Land use Plan (2009)

<sup>24</sup> Peel Watershed Planning Commission *Peel watershed planning commission, c/o Yukon land-use planning council* (2011)

Retrieved 11/02, 2011, from [www.peel.planyukon.ca](http://www.peel.planyukon.ca)

<sup>25</sup> Ibid

My writing of this paragraph has changed and evolved more than any other in this document. I've spent hours staring at the page, rereading documents, news articles and editorials, as well as talking to Yukoners to try to find the best way to describe and predict land-use planning and its future. I know that I have to say something, as I am talking about water and this is one of our key management tools. It is a tool that has the ability to reflect the wants of the Yukon people in consideration of future Yukoners by encompassing the fundamental mandate of the UFA, *"Together today for our children tomorrow."* The disagreement and controversy around the Peel has moved beyond arguments about the environment and the economy. It has become about the integrity of the UFA, Land-Use Planning and the partnership between YG and YFNs. It seems that the extent of third-party interest from both the conservation and development sectors has at times muddled the intent of the planning process. Fundamentally, the final decision is that of the affected First Nations, primarily Tr'ondek Hwech'in and the Na-cho Nyak Dun and the Government of Yukon. It can be hoped that the final outcome of the Peel Planning Process fulfills the mandate of the UFA and can be used as a learning lesson for efficient completion of the remaining Land-Use Plans.

# How Yukon Uses Water

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*“Everything uses the water so everything has to be respected by water. If we respect water than we respect all of the living things.”*

Testola Smith  
Land Steward, Ta'an Kwäch'än First Nation  
(August 12, 2011)

First Nations people have immemorially respected and honoured the water. Individual spirits owned the rain and snow, and rituals and taboos were followed to give praise and avoid wrath. For example, the Tagish Inland Tlingit would not carry a fish in one hand and a pail of water in the other as it was disrespectful to the fish and would bring rain. The lakes and rivers were the original highway system providing year-round access for transportation, hunting, fishing and berry picking. All villages were found along water and were named for what they gave, such as Kluane Lake, which was known as “Łù'àn Män” meaning "big fish lake" by the Southern Tutuchone.<sup>26</sup>

Today, the First Nation's people of the Yukon have grown apart from their dependency on the land and water as their sole food source, however, the option to hunt, fish and live the traditional lifestyle is essential to maintaining cultural identity. Traditional practice is also physically and mentally healthy for all community members. Events such as fish camps, large game hunts and river and lake excursions help bring together all ages in the expression of being strong First Nations people. The role of water here is a gift and offers guidance. It gives First Nations a link to breathing the piety of land and water that our ancestors lived and left beautiful in thought of us today.

One of my most enjoyable interviews was at Elder May Roberts fish camp outside Carmacks along the river. She spoke of wood camps for the steamships, walking to Tatchun, rafting to Carmacks, and the time before fishnets and motors. *“We used to drink the water, we do not drink it now,”* she told me; she uses a well now. The majority of the Territory's drinking water sources are from groundwater, with a couple of smaller communities using surface water. In Whitehorse and the majority of the larger communities, the local municipality is responsible for distribution of water through large public pipe systems.<sup>27</sup> The three source aquifers in Whitehorse are treated using chlorine and distributed through pump houses.<sup>28</sup> In smaller communities, municipalities or First Nation's distribute water through truck delivery. Finally, several small villages and private owners obtain their water from groundwater wells.<sup>29</sup> Water is tested for bacterial and heavy metal contaminants through YG's HSS and CS departments. YFNs water distribution is regulated and operated through the Federal Government's First Nation's Water and Wastewater Action Plan. There is a

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<sup>26</sup> McClellan, C., *My old people say: An ethnographic survey of southern Yukon Territory, Part 1* (1975) Ottawa, ON: National Museums of Canada.

<sup>27</sup> Environment Yukon, *Yukon water: An assessment of climate change vulnerabilities* (2011) No. ISBN: 978-1-55362-516-2. Whitehorse, Yukon: Government of Yukon.

<sup>28</sup> Yukon Conservation Society, *Water conservation saving tips* (2010) Retrieved 11/12, 2011, from <http://www.yukonconservation.org/waterthree.html>

<sup>29</sup> Community Services Yukon, *Department of Community Services* (2011) Retrieved 11/08, 2011, from <http://www.community.gov.yk.ca/index.html>

regional circuit rider that is responsible for training operators for the local water distribution and wastewater treatment systems.<sup>30</sup>

The Yukon River Inter-Tribal Watershed Council (YRITWC) has a mission, *“to be able to drink the water of the Yukon River within 50 years.”* The Council consists of about 70 Indigenous groups from the headwaters to the mouth of the Yukon River. Some of their activities and challenges include climate change monitoring, water quality testing, contaminated sites, industry development, government relations and, recently, implementing their legal right to water given under treaty and land-claim agreements.<sup>31</sup> <sup>32</sup> The United Nations (UN) Declaration on the Rights of Indigenous Peoples has also acknowledged indigenous rights by giving people the right to their spiritual, historical and cultural practices and the right to their traditional land and resources. It requires states to consult and co-operate with Indigenous groups concerning activities that will affect their inherent and now legal rights.<sup>33</sup>

Along with the First Nations of the North, all Yukoners are dependent on water. Our culture as a Territory is extraordinarily rich with the Klondike discovery, construction of the Alaska Highway and a series of mining cycles since Bonanza Creek; none of these events were possible without water.

This is who we are, Yukoners. We live here because we love its beauty, its spell, its colourful five per cent, the summer, the cold and the outdoors. Water provides the ability to participate in activities such as hunting, fishing, swimming, rafting, canoeing, kayaking, snow sports and hiking. The culture of the Yukon today is based on the days of the '98 Gold Rush and again this closeness to the environment. Several events, such as the Yukon Quest International Sled Dog Race, the Yukon River Quest, the Yukon River Bathtub Race, the Yukon River Rubber Duck Race, the Kluane Lake Fishing Derby and other races such as snowmobile, ski, triathlons and mud bogs, all require water.

*“Every one salmon can produce 8,000 eggs, 400 survive and 50 make it to the ocean. In the end they say only two salmon actually come out of 8,000, it’s amazing.”*

*Coralee James  
Fish and Wildlife Steward  
Ta’an Kwäch’än First Nation  
(August 19, 2011)*

There are many different species of fish found in Yukon waters, such as trout, whitefish, minnows, grayling and salmon. “Fish use a wide variety of habitats at different stages of their lives and at different times of the year. Surrounding forests and wetlands provide food and influence temperature, flow and quality of water. Healthy habitats are needed for fish to complete their life cycle. Just as one weak link in a chain will cause it to break, one lost habitat may cause a population collapse.”<sup>34</sup> The habitat requirements for each fish species vary, but their sensitivity to change is the same. As an example, salmon typically spawn in small streams depending on the flow rate,

<sup>30</sup> Ray Osborne, Circuit Rider Trainer, Indian and Northern Affairs Canada (July 26, 2011)

<sup>31</sup> Ryan Tooey, Manager, Science Department, Yukon River Intertribal Watershed Council (August 19, 2011)

<sup>32</sup> YRITWC, *Yukon River unified watershed assessment* (2002) Anchorage, Alaska, U.S.A.: Yukon River Intertribal Watershed Council.

<sup>33</sup> United Nations, *Declaration on the Rights of Indigenous Peoples*, (2007)

<sup>34</sup> Environment Yukon, *Yukon freshwater fishes* No. ISBN 978-1-55362-461-5 (2010) Whitehorse, Yukon: Government of Yukon.

temperature, and gravel and sediment conditions. Disruption to any of these may lead to unsuccessful spawning, egg incubation or premature departure of small alevin from the gravel bed.<sup>35</sup> Fish also contribute to the food chain and are an important dietary requirement for animals such as bears and wolves. The decaying corpses of salmon provide rich marine nutrients that strengthen the diversity of the ecosystem and enrich the health of insects, vegetation and microbes.<sup>36</sup>

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<sup>35</sup> Ibid

<sup>36</sup> Petticrew, E. L., Rex, J. F., & Albers, S. J., Bidirectional delivery of organic matter between freshwater and marine systems: The role of flocculation in pacific salmon streams (2010) *J. North Amer. Benth. Soc.*, 30(3), 779-786.

# How Climate Change is Affecting Yukon Water

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The International Panel on Climate Change was established through the UN's Environmental Programme. The Kyoto Protocol is the primary international UN statute that legally binds participating developed countries to emission reduction targets with the goal to avoid the threshold temperature increase of 2°C, at which it is hypothesized there is no action possible to prevent further climate change.<sup>37</sup>

As Canada has officially withdrawn from Kyoto,<sup>38</sup> the government is dependent on Canada's Action on Climate Change, which aims at aligning our policies with the U.S. and to reduce our GHG emissions by 17 per cent from the 2005 levels by 2020. They propose to regulate transportation related emissions, research and implement Clean Energy options and play an active and constructive role at the UN Climate Change talks. They have outlined their 2007 Turning the Corner framework to approach reduction of GHG emissions to reach the 2020 goal.<sup>39</sup>

Canada's Northern Strategy addresses northern climate change by a commitment to "Protecting Our Environmental Heritage." They have committed to being a leader in Arctic research by participating in international forums such as the International Polar Year and partnerships to organizations such as the UN and Arctic Council. As well, in August 2010, Cambridge Bay was announced as the location for a world-class Canadian High Arctic Research Station. To protect our environmentally sensitive lands and waters the government has created or extended national park land. They have also recognized the need to clean up abandoned mines and contaminated sites.<sup>40</sup>

YG's Climate Change Strategy and Action Plan (CCAP) outlines the mandate for addressing climate change in the territory. There are four goals and actions:

1. Enhance our knowledge by increasing research capacity in the territory
2. Adapt by assessing vulnerable YG owned infrastructure; create a permafrost inventory; publish a Yukon water risk and vulnerability report;<sup>41</sup> create online water database [www.yukonwater.ca](http://www.yukonwater.ca); and assess the vulnerability of forests
3. Reduce GHG emissions, primarily through government operations and homeowner efficiency incentives

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<sup>37</sup> United Nations, *United Nations framework convention on climate change* (2011) Retrieved 11/13, 2011, from <http://unfccc.int/2860.php>

<sup>38</sup> CBC, *Canada pulls out to Kyoto Protocol* (2011) Retrieved 12/14, 2011, from <http://www.cbc.ca/news/politics/story/2011/12/12/pol-kent-kyoto-pullout.html>

<sup>39</sup> Environment Canada, *Environment Canada - climate change* (2011) Retrieved 11/13, 2011, from <http://www.ec.gc.ca/default.asp?lang=En&n=2967C31D-1>

<sup>40</sup> Aboriginal Affairs and Northern Development Canada, *Canada's Northern Strategy: Our North, Our Heritage, Our Future* (2009) No. ISBN: 978-0-662-05765-9. Ottawa, ON: Government of Canada.

<sup>41</sup> Environment Yukon, *Yukon water: An assessment of climate change vulnerabilities* (2011) No. ISBN: 978-1-55362-516-2. Whitehorse, Yukon: Government of Yukon.

4. Lead Yukon action in response to climate change by working with partners, setting emission targets, creation of the Climate Change Secretariat, and government and community considerations in decision-making

Some ongoing activities include commitments to supporting agriculture, development of emergency response plans and threats, completion of land-use planning under the UFA and working in partnerships to monitor biodiversity of flora and fauna.<sup>42</sup>

Climate change is rooted to the Arctic Ocean and it can be viewed as a poplar tree. It sways in the wind, changes through the seasons, and now it is as threatened as the poplars are by insects that whiten their green leaves. The Arctic Ocean regulates the Earth's climate through the sway of the Arctic Oscillation (AO). This is similar to the El Niño oscillation, except the AO cycles on an annual basis, as opposed to approximately every four years. The rising greenhouse gas (GHG) emissions have changed the sway of the AO. There is a higher rate of eastern cyclones and areas such as the Yukon experience warmer snowbound winters and cooler wet summers.<sup>43</sup> The result of the warming Arctic has been a five to 10 per cent decline in sea ice, changing the once white ice covered pole to blue. As the fresh water stored in the sea ice melts it increases the humidity and cloudiness of the Northern Hemisphere. That excess fresh water is released as snow and rain in northern countries and then delivered back to the Arctic down our grand rivers. The corresponding decrease in the ocean's salinity enables ice formation, affecting currents, the balance of cold and warm seawater layers and the ecology of the Arctic Ocean system. These changes to the Arctic feed back to the south and contribute to the events we have observed as climate change.<sup>44</sup>

During Fred'k Schwatka's 1884 expedition along the mid-Yukon river he wrote, "On the July 16<sup>th</sup> we had a number of disagreeable thundershowers; their rarity on this river making them interesting to note." Our precipitation is expected to change. Summer rains may increase five to 15 per cent with northern regions accumulating less snow and southern regions more snow.<sup>45</sup> When I asked Ric Janowicz, YG's hydrologist, what the change to Yukon's hydrology will be, he suggested winter low flows in the permafrost dominated areas of the central and northern Territory and higher summer peak flows for the glacial dominated regions of the south.

Lawrence Joe, Heritage, Land and Resource Director for the Champagne and Aishihik First Nation (CAFN) spoke of Kluane National Park as "...a land of superlatives, we have the biggest glaciers of the largest non-polar ice field in the Yukon, the world." For these glacial-dominated regions, Janowicz has observed more water from warmer temperatures, melting glaciers and greater than normal snow packs. In 2007, the southern Yukon recorded historical snowpacks at locations such as Atlin and Tagish, which resulted in the

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<sup>42</sup> Environment Yukon, *Yukon government climate change action plan* (February 2009) Whitehorse, Yukon: Government of Yukon.

<sup>43</sup> McBean, G. Arctic climate: Past and present. In C. Symon (Ed.), *Arctic Climate Impact Assessment* (2005) pp. 21, New York, NY, U.S.A.: Cambridge University Press.

<sup>44</sup> Walsh, J. E., Cryosphere and hydrology. In C. Symon, L. Arris & B. Heal (Eds.), *Arctic Climate Impact Assessment*. (2005) New York, U.S.A.: Cambridge University Press.

<sup>45</sup> Environment Yukon, *Yukon water: An assessment of climate change vulnerabilities* (2005) No. ISBN: 978-1-55362-516-2. Whitehorse, Yukon: Government of Yukon.

August Marsh Lake floods.<sup>46</sup> The current high water events disrupt transportation, traditional harvesting of game and berries, ecotourism such as white water rafting, and travel by water to camps and homes.<sup>47</sup> There is some economic benefit to high water, such as hydro production and recharge of industrial and drinking aquifers.<sup>48</sup>

In central and northern regions permafrost is the principal control of hydrology, where there are three zones ranging from north to south: continuous, discontinuous and sporadic. Here, Janowicz explained that the recent change in climate has resulted in permafrost melt and in turn an increase in winter low flows. As permafrost melts, it allows for water percolation through previously impermeable soils.<sup>49 50</sup>

When considering the role permafrost plays, it is about stability. It cements the porous ground. A study done in the Pelly River region found that land and mudslides were typically caused by forest fire, river erosion, weather conditions and long-term climate trends. Many of these slide events either directly or indirectly delivered previously land bound sediments to regional waterways.<sup>51</sup>

Permafrost also stores water, sediment, nutrients and contaminants. It freezes water within the ground and bounds stream channels, ponds and lakes. When melting, it releases its stores to streams including natural contaminants like mercury, GHGs (carbon dioxide and methane) and radionucleotides (radon<sup>222</sup> and lead<sup>210</sup>) as well as synthetic contaminants such as the DDT and PCBs used during construction of the Alaska Highway.<sup>52</sup>

Elders from many northern and central communities such as Ross River and Carmacks commented on the low water and inability to reach their traditional homes via boat or fish small-streams, as they are dry. When I was in Old Crow, Vuntut Gwitchin Chief Joe Linklater talked about changes to the Porcupine River and Old Crow flats. Lakes, he said, are draining and riverbanks are eroding. This has resulted in lower water levels that make boat travel difficult, dangerous or impossible. The impact on infrastructure is also apparent in the Yukon's ice-heaved highway network and the tilted buildings of Dawson City. There is little noted benefit to the decline in permafrost other than the change in water table, which will have an impact on vegetation (favours deep vs. shallow rooted plants) and soil optimization.<sup>53</sup> The impact on infrastructure is being researched and the release of contaminants has only been considered in academic research.

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<sup>46</sup> Ford, G., & Janowicz, R., *Yukon snow survey bulletin and water supply forecast - May 2007*, (2007) No. ISSN: 1705-883X. Whitehorse, Yukon: Water Resources Branch, Dept. of Environment, Government of Yukon.

<sup>47</sup> Art Johns, Member, Carcross-Tagish First Nation Land-Use Team (July 13, 2011)

<sup>48</sup> Environment Yukon, *Yukon water: An assessment of climate change vulnerabilities* (2011). No. ISBN: 978-1-55362-516-2. Whitehorse, Yukon: Government of Yukon.

<sup>49</sup> Ibid

<sup>50</sup> Macdonald, R. W., Harner, T., & Ffe, J., Recent climate change in the arctic and its impact on contaminant pathways and interpretation of temporal trend data (2005) *Sci. Tot. Env.*, 342(1-3), 5-86.

<sup>51</sup> Lipovsky, P., & Huscroft, C., A reconnaissance inventory of permafrost-related landslides in the Pelly river watershed, central Yukon (2006) In D. S. Esmond, L. L. Lewis & L. H. Weston (Eds.), *Yukon exploration and geology*, pp. 181-195. Whitehorse, YT.: Yukon Geological Survey.

<sup>52</sup> Macdonald, R. W., Harner, T., & Ffe, J. (2005). Recent climate change in the arctic and its impact on contaminant pathways and interpretation of temporal trend data. *Sci. Tot. Env.*, 342(1-3), 5-86.

<sup>53</sup> Juday, G. P., Forests, land management and agriculture. In C. Symon (Ed.), *Arctic Climate Impact Assessment* (2005) pp. 781. New York, NY.: Cambridge University Press.

Tr'ondëk Hwëch'in Chief Eddie Taylor commented that "the Yukon River ice used to be 3 or 4 feet thick at Dawson during November in the 70s. Nowadays we'll be lucky if it freezes over right across throughout the whole winter." Janowicz is also responsible for river ice monitoring. Overall, ice formation on lakes and rivers is occurring later in the year and break up earlier in the spring. Ice jam floods are becoming more probable as the rapid snowmelt provides higher water levels when the ice is still very solid. The Yukon River at Dawson and Porcupine River at Old Crow are the most susceptible to floods due to ice jamming. Break-up at Dawson City has been recorded for 109 years, where the mean date for the first 20 years was May 18<sup>th</sup>; that has advanced to May 14<sup>th</sup> in the past 20 years. A total of seven April break-ups have been observed, with six occurring within the last 10 years. Another historic event was the mid-winter breakup of the Klondike River in 2003. This was the first recorded mid-winter breakup in Yukon history.<sup>54</sup>

The severity of events such as these is expected to increase. Transportation is the main impact on Yukoners as many are dependent on the ice for roads, river crossings and hunting. The shorter freeze season also affects animal migrations such as caribou that are dependent on the ice for water crossings.

*"The creeks dried up, you know, and when and where do all the grayling go? They have to go back to the Yukon River, all the fish."*

*Robert Moar  
Director, Lands and Resources, Little Salmon  
Carmacks First Nation  
(July 28, 2011)*

The fish have and will also be affected by the changing climate. The salmon from the Yukon River have one of the longest known migration cycles in the world, travelling up to 2,960 km from their northern spawning grounds to the Central and South Pacific Ocean.<sup>55</sup> The warmer waters and shorter ice cover will impact the fish at all stages of spawning, growth and migration. New juvenile fish will have to compete with increased sedimentation rates, greater risk of disease, adequate food sources and predator abundance. This will result in fewer and smaller adults that will be returning to less optimal or dried up

spawning streams.<sup>56</sup> The higher precipitation, winter low flows, permafrost contaminants, sedimentation and warmer waters will all alter the conditions of these streams.

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<sup>54</sup> Environment Yukon, *Yukon water: An assessment of climate change vulnerabilities* (2011) No. ISBN: 978-1-55362-516-2. Whitehorse, Yukon: Government of Yukon.

<sup>55</sup> Yukon River Panel, *Yukon River panel* (2008) Retrieved 11/12, 2011 from <http://yukonriverpanel.com/salmon>

<sup>56</sup> McDaniels, T., Wilmot, S., Healey, M., & Hinch, S., Vulnerability of Fraser River sockeye salmon to climate change: A life cycle perspective using expert judgments (2010) *J. Env. Man.*, 91, 2771-2780.

# Climate Change Recommendations

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Recommendations made are in expectation of continued commitments and implementation of the CCAP and the proposed Water Strategy.

## Drum

### *Work Together*

- Facilitate and obtain information from all water stakeholders, particularly First Nations regarding climate change observations, at risk areas and regimes and areas of import
- Promote and engage industry, other jurisdictions, NGOs and academia to participate in data-sharing partnerships

### *Know and Plan*

- Promote academics to research identified topics of import from information gathering for particular regions or hydrological regimes

### *Use Responsibly*

- Ensure licenses and plans reflect current and predicted climate change potential for area to be developed

### *Check Progress*

- Review and reform changing needs for academia, emergency measures and conservation
- Correspond adjustments to water-use licenses as new information becomes available

## Traditional Knowledge

### *Social and Political*

- Examine the historical resilience of First Nations people to live on a changing landscape and correlate findings with climate change

### *Local Knowledge*

- Collect regional local knowledge from all First Nations in regards to drainage systems and landscapes (as described under first bullet of *Work Together*)

### *Ethical-epistemological-cosmological*

- Engage First Nations in understanding respect for water and ways to nurture its changing body and mold an evolving mutual relationship

# How Our Economic Development Prospects Use Water

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Canada's Northern Strategy aims to "promote social and economic development" by funding and aiding industry through the Canadian Northern Economic Development Agency (CanNor). CanNor was established as the primary federal body for funding northern economic development activity. YEC recently received a CanNor grant to research two options for alternative clean energy production. This waste-to-energy project will investigate the feasibility of converting municipal garbage to energy and the Energy Charrette and Research Project will be used for research and public engagement, as well as investigating other opportunities for energy production (i.e. hydro, solar, wind and geothermal).<sup>57</sup>

In the Yukon, the current government has published several reports, strategies and a commitment in their platform to actively promote Economic Development in the territory. Through the Economic Development Strategic Plan for 2010-2013 they aim to facilitate development opportunities for activities such as mining, tourism, research and innovation, and filmmaking and sound recording. They also commit to ensuring local business can take advantage of the opportunities created by large industry. Similarly, with the First Nations they will help facilitate access to project structure and financing, and work with YFN development corporations to increase organizational capacity and support creation of economic development strategies.<sup>58</sup>

In conjunction with the intended mushroom of economic development, in 2009 the government implemented an Energy Strategy for the Yukon.<sup>59</sup> Four priorities were set out: conserving and using energy more efficiently; increasing the supply and use of renewable energy; meeting current and future electricity needs; and managing responsible oil and gas development.

## Mining

*"There is a substance that, unfortunately, many people consider much thicker than blood and much heavier than water, that is, gold."*

*William Ogilvie  
The geography and resources of the Yukon basin*

Mining and exploration has once again become the predominate industry in the Yukon, allowing for economic growth and job availability. The impact of mining on water resources depends on the type of mine and operation.

Placer mining is the root of the Territory's past. Without the discovery of Bonanza Gold by placer mining, the Rush of '98 would have not occurred and mining would

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<sup>57</sup> Yukon Energy, *Yukon energy* (2011) Retrieved 11/14, 2011, from [www.yukonenergy.ca](http://www.yukonenergy.ca)

<sup>58</sup> Government of Yukon, *Department of economic development strategic plan* (2010) Whitehorse, Yukon: Department of Economic Development.

<sup>59</sup> Government of Yukon, *Energy strategy for Yukon* (2009) No. ISBN: 1-55362-402-5. Whitehorse, Yukon: Energy, Mines and Resources, Government of Yukon.

not be so rich in our history. Placer mines use water extensively in practice and in September 2010, accounted for 93 per cent of the licensed water use the Yukon.<sup>60</sup> Miners also require a Placer License under the *Placer Mining Act*, which “gives rights to seepage water on claim and to use so much of the water necessary to the working of the claim as determined by the mining inspector.” It also enables the ability to apply for a grant of right to divert water and sets out reclamation requirements.<sup>61</sup> Placer mines impact water by the physical disruption of small streams and release of large amounts of sediments.

In March 2010, there was a total of 83,077 quartz claims in the territory, followed by 108,261 newly staked claims in 2010-2011 to give a new total of 191,808.<sup>62</sup> Within the two years, the Yukon has rapidly entered its next mining boom. Hard rock quartz mines use water to extract minerals such as gold, silver, zinc, lead and copper from ore. Wastewater from milling operations is stored in tailings ponds until treated and discharged to nearby waterways or reclaimed. All mines are required to obtain a Quartz License under the *Quartz Mining Act*, which gives limited surface rights and provisions similar to the Placer License regarding grant to use of water and reclamation requirements.<sup>63</sup>

The need for responsible mine reclamation, planning and implementation is recognized as an essential process in a mine’s life. Concern regarding water and reclamation entails groundwater contamination and leeching of contaminants from tailings ponds. Without reclamation, expensive monitoring and clean up becomes the responsibility of the federal and territorial government. The most notorious example of this is the Faro Mine. The lead, zinc, silver and gold mine was in operation under multiple owners from 1960-1998. Waste rock at the mine today has the potential to generate bacterially produced acid and release metals into the environment. Sulphur stored in the rock provides energy to bacteria, to create heat and release acid and metals from the rock. This is known as Acid Rock Drainage. Due to the immense amount of rock stored, it is expected that the mine will take more than 100 years to be deemed adequately reclaimed at a current estimated cost of \$700 million. The last owner of the mine in 1998 was protected under the *Companies’ Creditors Arrangement Act* and placed into receivership making reclamation of the mine the responsibility of YG.<sup>64</sup>

Mining is also affected by climate change. Pearce *et al.* (2011) completed several case studies of climate change vulnerabilities to Canadian mines and found five key issues:

1. Mines are affected by climate events that are indicative of climate change
2. Most mine infrastructure has been designed assuming that climate is not changing
3. Most industry stakeholders view climate change as a minor concern
4. Limited adaptation planning for future climate change is underway
5. Significant vulnerabilities exist in the post-operational phase of mines<sup>65</sup>

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<sup>60</sup> Environment Yukon, *Yukon water: An assessment of climate change vulnerabilities* (2011) No. ISBN: 978-1-55362-516-2. Whitehorse, Yukon: Government of Yukon.

<sup>61</sup> Government of Yukon, *Yukon legislation website* (2011) Retrieved 11/06, 2011, from <http://www.gov.yk.ca/legislation/index.html>

<sup>62</sup> Economic Development Yukon, *Yukon Economic Outlook 2011* (May 17, 2011) Whitehorse, Yukon: Government of Yukon.

<sup>63</sup> Energy Mines and Resources Yukon. (2011b). *Minerals*. Retrieved 12/4, 2011, from <http://www.emr.gov.yk.ca/mining/>

<sup>64</sup> *Faro mine remediation project* (2011) Retrieved 11/12, 2011 from <http://www.faromine.ca/index.html>

<sup>65</sup> Pearce, T. D., Ford, J. D., Prno, J., Duerden, F., Pittman, J., Beaumier, M., et al. (2011)

Some examples of climate change effects on Yukon mines include the untreated release of water from the Minto Mine storage pond to the Yukon River during two extreme rain events in 2008 and 2009. Clinton Creek, an abandoned asbestos mine near Dawson, created approximately 60 million tonnes of waste rock, which slid and blocked off the creek and created the artificial Hudgeon Lake. Over the years, permafrost melt has resulted in failure of the tailings dumps and massive sedimentation and destruction of the fish habitat in upper Clinton and adjacent Wolverine Creek.<sup>66</sup>

The proposed Carmacks Copper heap leach mine in the Carmacks region was controversially denied a Water Use License from the YWB after YESAB had approved the project. The copper in the tailings had the ability to destroy the salmon's sense of smell, which they are dependent on to find their home spawning stream.<sup>67</sup> The decision from the YWB clarified the licensing process for proponents when designing their mine to ensure environmental protection and avoid the need for a court proceeding.<sup>68</sup>

Lab tests have also shown that chemical ions found in mine tailings have a negative impact on salmon egg fertilization (most toxic to least are calcium, potassium, magnesium and sulfates). Also interesting is that the effects varied by species, where Coho were the most sensitive followed by Chinook and then Pink.<sup>69</sup> Release of sediment from both placer and hard rock mines is also a large concern as spawning success is reduced in affected streams.<sup>70</sup>

## Hydroelectric

In conjunction with a mining boom comes overwhelming pressure on the Yukon's energy resources. Currently, Yukon Energy Cooperation (YEC) generates 116MW of power through hydro, diesel and wind. There are three main hydro-dam facilities: Whitehorse Rapids, Aishihik and Mayo.<sup>71</sup> The Director of YEC's Resource Planning and Regulatory Affairs, Hector Campbell, spoke with me about some of YEC's challenges and plans. Five years ago, he said YEC predicted that there was enough renewable energy on the grid to last until 2020, however, the quick onset of mining and a growing population has advanced this threshold by five years, indicating a possible deficit of available energy by 2015. Therefore, YEC has been actively investigating other avenues of energy production. The first method is to upgrade and enhance existing hydro facilities. One example is the Mayo B powerhouse, which is not expected to have any further impact on the environment and will generate three times more energy.<sup>72</sup> Other projects such as the Gladstone Diversion concept will divert the headwaters of Gladstone Creek from Kluane Lake, and the Yukon River drainage system to Sekulmun, then Aishihik Lake and the Alsek drainage. There are many things to consider with this idea, including the removal of water from one basin to another, heritage sites, fluctuating water

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<sup>66</sup> Ibid

<sup>67</sup> Robert Moar, Director, Lands and Resources, Little Salmon Carmacks First Nation (July 28, 2011)

<sup>68</sup> Bruce Willis, Chair, Yukon Water Board (October 24, 2011)

<sup>69</sup> Stekoll, M. S., Smoker, W. W., Failor-Rounds, B. J., Wang, I. A., & Joyce, V. J. (2009). Response of the early developmental stages of hatchery reared salmonids to major ions in a simulated mine effluent. *Aquaculture*, 298, 172-181.

<sup>70</sup> McDaniels, T., Wilmot, S., Healey, M., & Hinch, S., Vulnerability of Fraser River sockeye salmon to climate change: A life cycle perspective using expert judgments. (2010) *J. Env. Man.*, 91, 2771-2780.

<sup>71</sup> Yukon Energy, *Yukon energy* (2011) Retrieved 11/14, 2011 from [www.yukonenergy.ca](http://www.yukonenergy.ca)

<sup>72</sup> Ibid

levels of Aishihik, and an increase in energy production. A lower impact completed project is a third underground turbine at Aishihik, which increased production by 7.5 MWs but further decreases water levels and fluctuations for the lake. Other renewable options such as wind, geothermal and solar are being investigated to compliment the current energy grid.<sup>73</sup> Tying into the B.C. or Alaskan electric grid is another proposal.<sup>74</sup> This can be viewed as a two-way street. The benefit to the YEC system includes the ability to purchase power when short and the ability to sell off excess power. The potential disadvantage would be the need to provide partnering grids with power when they are short, which may again lead to an energy shortage for Yukon in the future.

Unpaid mortgages of any new YEC infrastructure become the responsibility of Yukoners. During periods such as the current economic growth, there is a balance between the benefit of industry contributions and the hangover cost after development decline. For example, the Aishihik dam was constructed to serve the growing population in Whitehorse and the Faro mine. The abrupt closure of the mine in 1998 resulted in a significant mining hangover as YEC lost 40 per cent of its sales with one customer, which resulted in a rate increase from the Yukon Electrical Company Ltd. to all users.<sup>75</sup> The Carmacks to Stewart Transmission line is an example of a mutually beneficial partnership project between YEC, the GC and Minto Mine. It provided both the mine and the community of Pelly Crossing with hydropower as opposed to diesel and tied the two existing Yukon grids together.<sup>76</sup>

Climate change is also going to play a role in the future of hydroelectric energy generation. Efforts to reduce GHG emissions from fuel such as diesel have put emphasis on hydropower. As stated earlier, it may be that water levels are higher, which will increase power generation. This will be relevant primarily to the Whitehorse Rapids facility, though future glacial inputs to all three systems are currently unknown and being researched. Dams may also be required to pass extra water during extreme high-water events such as in 2007. The other two hydro dams are in regions that are expected to have an increase in peak low winter flows and potential decrease in snowpack. This may result in limited recharge of the lake reservoirs and lower power generation capability. The potential increase in wind is favorable for wind options but may also cause power outages from downed transmission lines and increased lightning events.<sup>77</sup>

The people living near hydro dams have noticed several impacts in their surroundings. The most significant influence on the environment is the unnatural fluctuation of water levels and regional flooding. This has adverse effects on all associated flora and fauna. At Aishihik the dam draws water levels so low that it has negatively impacted the vegetation, animals and people of Aishihik Village. Historically established berry patches have disappeared, trap lines are no longer producing and new mud flats and gravel bars impede lake access.<sup>78</sup> The whitefish population has notably declined since construction. When boating on low water days, residents find fish stranded on land from the rapidly receded water.<sup>79</sup> The Whitehorse Rapids and

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<sup>73</sup> Ibid

<sup>74</sup> Energy Mines and Resources Yukon, *Energy Strategy for the Yukon - Progress Report 2010* (2010). Whitehorse, YT.: Government of Yukon.

<sup>75</sup> Hector Campbell, Director, Resource Planning and Regulatory Affairs, Yukon Energy Corporation (July 25, 2011)

<sup>76</sup> Yukon Energy, *Yukon energy* (2011) Retrieved 11/14, 2011 from [www.yukonenergy.ca](http://www.yukonenergy.ca)

<sup>77</sup> Hector Campbell, Director, Resource Planning and Regulatory Affairs, Yukon Energy Corporation (July 25, 2011)

<sup>78</sup> Lawrence Joe, Director, Heritage, Lands and Resources, Champagne and Aishihik First Nation (October 19, 2011)

<sup>79</sup> Ibid

Lewes River dam system control the water levels of the southern lakes, the headwaters of the Yukon River. I had a wonderful afternoon on a 30°C day in Carcross speaking with Elders Art Johns and Patrick James about their home. They concentrated our talk to the dam and told me about how the lakes were before. There was a huge muskrat population on Nares Lake, plenty of fish and they knew how the water was going to fluctuate throughout the year. Today, their “bread basket,” as Art put it, has changed. Now, they no longer see muskrat because they freeze in their push-ups when the water drops; they rely on their brothers and sisters of the Atlin Taku for fish and are unable to hunt by boat during high water, as the animals cannot access the flooded shoreline. In Aishihik, the whitefish population has notably declined since construction. When boating on low water days, residents find fish stranded on land from the rapidly receded water.<sup>80</sup>

Both the Whitehorse Rapids and Aishihik facilities are equipped with fish ladders to allow the fish upstream during their summer and fall migration. The Mayo dam does not have such a structure and YEC compensated by creating salmon spawning habitat downstream of the dam.<sup>81</sup> The Whitehorse Fish Ladder was constructed in 1960 and was successful in providing returning salmon with a safe route around the dam. Unfortunately, when they return as small fry in the spring, the ladder is frozen; therefore, their survival is dependent on their choice between the spillway or turbines. YEC has placed a net over the turbines, however, the energy efficient hole size is not small enough to prevent fish passage.<sup>82</sup> The proposed Gladstone Diversion will also impact the trout population of Kluane Lake. The lake trout may spawn either in the flowing creek or near the outlet of the creek. During the annual Canada long weekend fishing derby, the outlet of Gladstone creek is recognized as a hot spot, as the fish reside there for the cooler waters and nutrient input.<sup>83</sup>

## Oil and Gas

*“I guess the biggest thing for Kluane First Nation right now is the proposed pipeline. Right over my shoulder is where the idea is for it to lay on the bottom of the lake.”*

*Luke Johnson  
Deputy Chief, Kluane First Nation  
(July, 21, 2011)*

In this era of limited oil and gas, the pressure to extract the Yukon’s resource is going to affect water. Potential regions include onshore areas in the Liard, Whitehorse and Eagle Plains Basins, and offshore in the Beaufort Sea. There is an estimated onshore and offshore potential of 17 and 40 trillion cubic feet, respectively, of natural gas, and 800 million and 4.5 billion barrels of oil. The oil and gas industry uses a significant amount of water for processing and in turn generates large amounts of wastewater. Currently, Kotaneelee is the

Yukon’s only producing natural gas field. It is located in the far southeast corner of the territory and has been in decline since 1999.<sup>84</sup> Previously, the Eagle Plains Basin has had the most development interest until the January 2012 Request for Postings where there were 12 requests to investigate the feasibility for oil and

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<sup>80</sup> Ibid

<sup>81</sup> Yukon Energy, *Yukon energy* (2011) Retrieved 11/14, 2011, from [www.yukonenergy.ca](http://www.yukonenergy.ca)

<sup>82</sup> Thomas Moston, Attendant, Whitehorse Rapids Fish Ladder (August 23, 2011)

<sup>83</sup> Paul Birkell, Elder, Champagne and Aishihik First Nation (July 1, 2011)

<sup>84</sup> Economic Development Yukon, *Yukon Economic Outlook 2011* (May 17, 2011) Whitehorse, Yukon: Government of Yukon.

gas rights in the Whitehorse Trough.<sup>85</sup> Twenty public opinion e-mails were sent to EMR during the February 2 – 27<sup>th</sup> consultation period regarding Natural Gas development in the Whitehorse Trough. Of these, five were from Europeans concerned about wilderness loss and one was in favour of development.<sup>86</sup> In April 2012, YG announced that it would not be issuing any oil and gas exploration rights within the Whitehorse Trough. This decision was based on the level and concern around oil and gas development expressed through the public consultation process.<sup>87</sup>

YG's present push for liquefied natural gas is to compliment Yukon Energy's current energy network and create enough energy to prepare for the impending shortage. I support the development of our natural gas in a manner that is in conjunction with completion of LUPs and diligent mitigation and understanding of operations under cold climates and extreme conditions. At this time, I do not support hydraulic fracturing, as there are too many unknowns. It is similar to the ignorant dumping of used oil into pits; hydraulic fracturing is an uncertain and controversial process. Currently, the U.S. Environmental Protection Agency is working on a key study, set for release at the end of 2012 to further our understanding of hydraulic fracturing and its effects on the environment and drinking water.<sup>88</sup> I would recommend YG build upon this study and further investigate any implications and how they may change in our robust northern landscape to ensure the natural gas extraction method is environmentally feasible before they are permitted in the Yukon.

All oil and gas projects are regulated under the *Yukon Oil and Gas Act (YOGA)*, which outlines the responsibilities, operations, regulations and monitoring of production activity.<sup>89</sup> The Act has several provisions to enable integrated management providing joint regulatory and beneficiary agreements between YG, affected YFNs and the licensee. In promotion of Oil and Gas development, EMR is currently working on modernizing *YOGA*, its regulations and best management practices.<sup>90</sup>

Future production of Oil and Gas prospects in the Yukon will be influenced by approval of either the Alaska Highway Pipeline Project (AHPP) or the Mackenzie Gas Project (MGP).

The AHPP is proposed to pump natural gas from Prudhoe Bay to Fairbanks along the Alaska Highway through the southern Yukon and northern B.C. to Boundary Lake, AB., for distribution to U.S. markets. If approved, the awarded company anticipates construction and commissioning to occur from 2014-2021 and operation from 2021 and beyond. There would be 2,762 km of underground 1.2 m diameter pipe travelling through 25-acre pumping and chilling stations approximately every 100 km and spill monitoring apparatuses at regular intervals. Each 100 km of line is expected to take two to three months to construct.

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<sup>85</sup> Energy Mines and Resources Yukon, *Interest expressed in southern Yukon oil and gas rights* (2012a) Retrieved from 2/22, 2012, from <http://www.gov.yk.ca/news/12-014.html>

<sup>86</sup> EMR 2012b

<sup>87</sup> EMR 2012a

<sup>88</sup> Environmental Protection Agency, *Natural Gas Extraction – Hydraulic Fracturing* (2012) Retrieved 3/19, 2012, from <http://www.epa.gov/hfstudy/>

<sup>89</sup> Energy Mines and Resources Yukon, *Yukon oil and gas: A northern investment opportunity, May 2011 edition* (2011c) No. ISSN 1710-6109. Whitehorse, Yukon: Government of Yukon.

<sup>90</sup> Energy Mines and Resources Yukon, *Energy Strategy for the Yukon - Progress Report 2010* (2010). Whitehorse, YT.: Government of Yukon.

At water crossings, such as the southern end of Kluane Lake, the pipe will be laid on the lake bottom. Small streams will be dug to bury the pipe and reclaimed after construction. The entire stretch of pipeline is to be reclaimed on the surface and the pipe is to forever remain in ground.<sup>91</sup> The MGP has not proposed to cross Yukon land, however, if affected regulators and stakeholders approve, it will increase oil and gas feasibility in the Yukon. For example, projects operating on the Dempster Highway could transport their product north to contribute to the pipeline in Inuvik.<sup>92</sup> There is one existing pipeline, the Pointed Mountain Pipeline, which serves the Kotaneelee gas fields and transports gas south to Fort Nelson.

As the burning of fossil fuels drives climate change, the development of oil and gas would not correspond with any commitment made by Canada or the Yukon to reduce GHG emissions. Though the majority of the product will be shipped to U.S. and Asian markets, its production in the North will ultimately contribute to global GHG emissions and in turn facilitate climate change.

The impacts of climate change may also affect oil and gas operations. Water availability and permafrost melt both have the ability to impede production and pose a threat to infrastructure.

The proposed underground pipelines are especially vulnerable to climate change. The pumping energy required to move oil through the pipeline is optimal when oil travels at warmer temperatures. Unfortunately, no available insulation technologies can prevent permafrost melt of surrounding soils. The structural integrity of permafrost is essential to prevent any rupture of the underground pipes. Chilled oil pipe systems pump refrigerated oil but are still subject to impacts from permafrost melt and resultant frost heaves. The other option is an above ground pipe, which involves significant cost, hinders animal movement and requires additional reclamation measures. These systems are also vulnerable to increasing soil and air temperatures and permafrost instability.<sup>93</sup>

The obvious impact of oil and gas development on fish is the loss of habitat due to water diversion and contamination. The potential for this, as in mining, is dependent on the procedure used for extraction. Controversial natural gas recovery methods such as hydraulic fracturing can possibly contaminate ground water resources, which could flow to surface waters and upset fish habitat. The diversion of water from fish bearing streams would presumably undergo similar water licensing processes as mining practices. Outside of provisions under the water license, there is no grant for water use capability under the *YOGA*, and any water use associated with well operations is subject to the regulations.<sup>94</sup>

The affect and required reclamation for pipeline construction on fish bearing waters will have to undergo significant study before final approval.<sup>95</sup> Locations, numbers, preferred habitats, food sources and spawning requirements will need to be reviewed for each stream crossing and applicable mitigations measures applied after construction to maintain the integrity of the fish populations.

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<sup>91</sup> TransCanada, *Alaska pipeline project* (2011) Retrieved 11/14, 2011, from [www.alaskapipelineproject.com](http://www.alaskapipelineproject.com)

<sup>92</sup> Energy Mines and Resources Yukon, *Yukon oil and gas: A northern investment opportunity, May 2011 edition* (2011c) No. ISSN 1710-6109. Whitehorse, Yukon: Government of Yukon.

<sup>93</sup> Instanes, A., Infrastructure: Building, support systems and industrial facilities. In C. Symon (Ed.), *Arctic Climate Impact Assessment* (2005) pp. 907. New York, New York, U.S.A.: Cambridge University Press.

<sup>94</sup> Government of Yukon, *Yukon legislation website* (2011) Retrieved 11/06, 2011, from <http://www.gov.yk.ca/legislation/index.html>

<sup>95</sup> Luke Johnson, Deputy Chief, Kluane First Nation (July, 21, 2011)

The largest concern in pipelines is failure and resultant leakage. Significant oil and gas spill events and the resultant environmental impacts are frequently portrayed in the media. These have substantial adverse effects on the surrounding environment and contamination can be transported away from the initial site through waterways. It will be important to ensure accountability of pipeline operators in the event of a spill. The history of a company and their record must be considered during the approval process, regardless of their commitment to spill avoidance.

## **Agriculture**

There is a correlation between agriculture and climate change. Currently, the Yukon's soil productivity and growing season does not allow for a viable agriculture industry. However, as the growing season lengthens, precipitation increases and permafrost melts, better growing conditions are anticipated.<sup>96</sup> At this time, there is some agriculture activity in the Takhini River Valley and a few other river valleys such as the Dezadeash, Pelly, Stewart and Liard.<sup>97</sup> Other factors will be transportation costs and food security. The majority of our food is obtained from the southern U.S., B.C., Prairie provinces and overseas. As fuel prices increase, the Yukon may have to become more dependent on locally grown food. The Yukon *Agriculture Development Act* establishes the Agriculture Development Council, which is responsible in conjunction with the YWB for water irrigation requirements. With the present minimal activity, the Act is under development as it does not include any regulations or enforcement requirements and is concentrating on development initiatives.<sup>98</sup>

## **Tourism**

Ecotourism uses water in a sustainable manner. Many outsiders visit the Yukon to experience the vast wilderness and beauty it has to offer. Activities such as outfitting, white water rafting and guided excursions (i.e. canoe) require the current pristine environment that is now accessible. However, over-development may jeopardize the Yukon's reputation as an untouched place. As well, uneducated tourists may unknowingly contaminate water by not practicing a leave-no-trace philosophy.

## **Forestry**

Forestry was previously practiced in the southeast Yukon. Again, as the climate warms, our forests are more likely to produce larger trees. Forestry is a heavily researched industry and best management practices and preparation will have to be considered to mitigate negative impacts on local hydrology, water quality and ecosystems.

## **Bulk Water**

Yukon Spring is currently the only operating commercial bottled water industry in the Yukon, however, there are currently two bottling water use licenses issued. Currently, Yukon Spring's water license allows for

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<sup>96</sup> Juday, G. P., Forests, land management and agriculture. In C. Symon (Ed.), *Arctic Climate Impact Assessment* (2005) pp. 781. New York, NY.: Cambridge University Press.

<sup>97</sup> Energy Mines and Resources Yukon, *Agriculture - Energy Mines and Resources - Government of Yukon* (2011a) Retrieved 11/12, 2011 from <http://www.emr.gov.yk.ca/agriculture/index.html>

<sup>98</sup> Government of Yukon, *Yukon legislation website* (2011) Retrieved 11/06, 2011 from <http://www.gov.yk.ca/legislation/index.html>

withdraw of 150m<sup>3</sup>/day from the spring.<sup>99</sup> Yukon Spring treats water from a spring using ozonation within the Whitehorse city limits that is discharged from a wetland.<sup>100</sup> This is optimal as wetlands are recognized as active purification and sediment storage bodies.<sup>101</sup>

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<sup>99</sup> Yukon Water Board, *Yukon water board* (2011) Retrieved 12/3, 2011 from [www.yukonwaterboard.ca](http://www.yukonwaterboard.ca)

<sup>100</sup> Yukon Spring, *Yukon CA bottled drinking water supplier products, water cooler servicing, bottled water delivery, water analysis reports* (2009) Retrieved 12/6, 2011, from <http://www.ykspring.com>

<sup>101</sup> Zedler, J. B., & Kercher, S., Wetland resources: Status, trends, ecosystem services and restorability. (2005) *Annu. Rev. Ecol. Sys.*, 30, 39-74.

# Economic Development Recommendations

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## Drum

### *Work Together*

- Earnest commitment to efficient and productive completion of land-use planning
- Partnerships with industry, academia, First Nations for continuing research through the Yukon Cold Climate Innovation Centre

### *Know and Plan*

- Identify and upgrade past, current and proposed industry infrastructure that is vulnerable to climate change impacts on water
- Identify water management legislation gaps and overlap (including First Nations)
- Allow for modern research and understanding of the effects of hydraulic fracturing and incorporate into the permitting process

### *Use Responsibly*

- Assess current and proposed industry water use needs and feasibility in consideration of unknown climate change impacts
- Investigate feasibility and technology for agriculture – concentrate on water requirements and potential impacts on watersheds and ecosystems

### *Check Progress*

- Reassess water needs and vulnerabilities as new knowledge becomes available

## Traditional Knowledge

### *Social and Political*

- Understand and apply ideals of historical success in sustainable lifestyles

### *Local Knowledge*

- Incorporate local knowledge in decision-making, regulating reclamation success and pre and post-impact assessments

### *Ethical-epistemological-cosmological*

- Respect First Nations dependency on water and incorporate in decision-making provisions and approvals

# How Water Management Strains Our Capacity

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Capacity is an issue in the Yukon due to the rapid pace of economic development and population growth. Infrastructure, government operations and business capacity have all been overextended, especially in Whitehorse. Without sufficient infrastructure and human resources, any decision made may not be adequate to ensure responsible water management.

YG has many programs in place to develop their workforce, such as succession planning, employee development programs and educational leave. YG has also undertaken several initiatives to increase capacity in First Nation's governments. Partnership programs such as the Executive Development and First Nations Governance and Public Administration pilot projects between Yukon College, YG and CAFN are positive examples created to address capacity issues. These courses target executives and senior management staff to enhance the operation of First Nations governments.<sup>102</sup> While this is beneficial to YFN governments, it is recognized that education opportunities around YESAA and water use license reviews are lacking as majority of the applications are highly technical and require baseline knowledge of engineering and environmental workings.<sup>103</sup>

For youth, there are several high school environmental and outdoor education programs beginning in Grade 8. When I spoke with students from the Experiential Science 11' (ES11) class they discussed the generation gap and differences in their ideals concerning conservations and sustainability. They are fully aware of how the decisions being made today will impact their lives in the future. For example, they were in support of higher cost but more sustainable options for energy and industry development. As well, they were interested in developing more self-containing communities to combat climate change and infrastructure needs, such as water and wastewater distribution.<sup>104</sup> Other programs are available to recruit post-secondary students to YG and the general workforce such as the Student Training and Employment Program and Yukon Summer Career Placement Program. Post-secondary graduates are also eligible for under-fill positions through the general and YFN GradCorps programs.<sup>105</sup> In regards to the First Nations GradCorps it is positive in that it provides experience for YFN graduates; however, it also removes those young people from the YFN government workforce where capacity is more limited. There is also apprenticeship training opportunities and training facilitated through YG.<sup>106</sup>

To prepare Yukon residents for a position within the mining sector, the Yukon Mine Training Association was established to act as a link between the mining industry and YFNs. This program is an example of

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<sup>102</sup> Executive Council Office Yukon, *First nations governance and public administration* (2011) Retrieved 12/6, 2011 from <http://www.eco.gov.yk.ca/glcd/fngpa.html>

<sup>103</sup> Bruce Willis, Chair, Yukon Water Board (October 24, 2011)

<sup>104</sup> Experiential Science '11 Students, Winter 2011 Semester (June 8, 2011)

<sup>105</sup> Public Service Commission Yukon, *Education - Government of Yukon* (2011) Retrieved 12/6, 2011, from <http://www.education.gov.yk.ca/>

<sup>106</sup> Ibid

addressing a need, promotion of YFNs, and an integrated partnership, as both the federal and territorial governments provide funding.<sup>107</sup>

## Infrastructure

Mine development and exploration has brought a bustle of activity and change to the Territory. Many Yukoners have noticed increased small aircraft and semi-truck traffic, higher housing cost, lower vacancy rates and small business success, all brought on by industry development.<sup>108</sup> The Yukon's roads are seeing more traffic resulting in the increased frequency of road and bridge maintenance and safety precautions such as snow removal. This puts pressure on HPW, which is responsible for the Yukon's highway networks, including bridges, culverts, frost heaves and pothole repair.

The other major impact of industry on Yukon infrastructure is again the energy requirement. As discussed earlier, YEC has needed to advance their anticipated energy deficit by five years. Therefore, hydrodams, diesel infrastructure and personnel are under pressure to provide enough energy for today while investigating opportunities to increase production for the near future.<sup>109</sup>

## Human Capacity

*“Frankly, there is too much noise out there, too much development and not enough capable and qualified people to handle everything.”*

*Bruce Willis  
Chair, Yukon Water Board  
(October 24, 2011)*

Even more strained than Yukon infrastructure are qualified personnel at all levels of government. Currently, there are approximately 90 boards and committees for all operations in the Yukon, about 20 of which are related to land and water management.<sup>110</sup> Representatives are typically from federal, territorial and YFNs governments as well as other experts and stakeholders, depending on the nature of the board.

In regards to water management, ENV's Water Resources Branch is responsible for operation and maintenance of the Yukon's snow survey, water quality and hydrometeorological networks, industry licensing (excluding water licenses issued by the YWB) and monitoring and enforcement of licenses (including water licenses issued by the YWB). They are also required to participate in consultation processes under YESAA and in LUP.<sup>111</sup> There are three water inspectors, who are responsible for the monitoring and enforcement of all water licenses issued under the *Waters Act*. The time required for travel to licensee sites, inspection and report writing is a significant load for the water inspectors, along with the redundant government administrative requirements.<sup>112 113</sup> Similar issues are faced by the hydrology section, such as time constraints for travel, data collection, report

<sup>107</sup> YMTA, *Yukon mine training association* (2010) Retrieved 12/6, 2011 from <http://yukonminetraining.com>

<sup>108</sup> Karen Batgailis, Executive Director, Yukon Conservation Society (July 12, 2011)

<sup>109</sup> Hector Campbell, Director, Resource Planning and Regulatory Affairs, Yukon Energy Corporation (July 25, 2011)

<sup>110</sup> Bruce Willis, Chair, Yukon Water Board (October 24, 2011)

<sup>111</sup> Heather Jirosek, Program Advisor, Water Resource Branch, Environment Yukon (July 27, 2011)

<sup>112</sup> Ibid

<sup>113</sup> Bruce Willis, Chair, Yukon Water Board (October 24, 2011)

preparation and administrative measures. EMR is also inundated with lands applications, quartz and placer mine license requirements (issue and inspections) and updating regulatory processes either in need or in preparation for development. These are just a few examples of branches overwhelmed by economic activity. Another factor is that many of the above-mentioned personnel are also expected to participate in YESAA on behalf of YG. Professionals and experts within the public sector, such as biologists, hydrologists, economists and health and social services, are all required to comment on new proposals submitted to YESAA. LUP also accounts for another requirement from YG employees.

First Nations governments are still relatively new and are working towards efficient operations, developing strategies, statutes and building capacity. This is a challenging task for any new government and the recent escalation of resource development has made this undertaking even more difficult. First Nations governments are similarly required to submit comments for license and assessment applications located within their traditional territory. YESAA applications are highly technical as they describe in detail the proposed operation, environmental protection and reclamation activities. The FNs need to obtain qualified personnel to not only address all of the applications but also to competently interpret and comment on any perceived negative influences the project may have on their land, water and citizens.<sup>114</sup> <sup>115</sup> The ability of FNs governments to attract and retain qualified employees has proven to be challenging due to the educational level of citizens and competition with other employers such as YG and industry.

In regards to LUP, many YFNs struggle with the rate of development as LUP has not yet begun for their territory. Unfortunately, the LUP process has proven to be extremely time-consuming and expensive, which is contrary to the current boom of non-renewable development. Therefore, emphasis has been placed on the YESAA process to ensure responsible consultation and management of areas proposed for development. The two methods oppose each other in that LUP is based on the original desires of the affected FN instead of driven by the desires of the developer.<sup>116</sup>

This inability of FN to proficiently participate in planning and consultation processes may result in the unadvised approval of projects that may negatively impact the affected water resource. To the YFNs, any change to the water contributes to a loss of use further than just quality and quantity.

There is a lack of qualified local personnel to carry out industry related activities. Many large-scale projects fly in their employees from southern jurisdictions directly to the camps, typically on a two-week-in two-week-out rotation.

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<sup>114</sup> Patrick James, Chairman, Carcross Tagish First Nation Land-Use Team (July 13, 2011)

<sup>115</sup> Bruce Willis, Chair, Yukon Water Board (October 24, 2011)

<sup>116</sup> Ed Shultz, former Chief, Council of Yukon First Nations (July 12, 2011)

# Capacity Recommendations

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## Drum

### *Work Together*

- Identify overlap and opportunities for shared or partnered activities (e.g. monitoring)
- Investigate reassigning roles among all governments to share capacity
- Seek partnered funding resources (e.g. for monitoring training and operation sharing)

### *Know and Plan*

- Determine capacity deficits at all levels of government and industry operations
- Identify education gaps and implement appropriate programs at all levels of education

### *Use Responsibly*

- Identify inefficiencies in funding and personnel resources and required measures to increase productivity
- Identify redundancies amongst operations

### *Check Progress*

- Routinely re-evaluate efficiencies of new and existing programs and amend as needed

## Traditional Knowledge

### *Social and Political*

- Apply youth-elder mentorship and the inherent differences in ideals and utilize in decision-making, succession planning and training

### *Local Knowledge*

- Embrace the wealth of knowledge and available capacity in partnership within the First Nations communities and governments

### *Ethical-epistemological-cosmological*

- Understand and apply ideal of community and responsibility to all peoples and the environment as one unit

# Conclusions

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Working towards sustainable and integrated management of water in the Yukon is a complex task as all are dependent on it in many ways to maintain the varying values of our lives. To address the needs of water, the Yukon's Water Strategy is an opportunity to ensure continuity of how we utilize water today by drawing on the wealth of knowledge and resources available within and outside of the Territory. The water is changing and we will be forced to change our practices with it or we may lose what we depend on. In consideration of the water strategy, the recommendations made in this study concentrate on prospering through the joint desire to work together in acquiring all available knowledge to enable comprehensive decisions and plans for future generations. There is currently a missed prospect by each jurisdiction working independently towards their own plan for water management. It is not feasible as water is the one diverse resource that is naturally shared amongst all jurisdictions. The creation of this envisioned Yukon Water Strategy would help guarantee the longevity of our nurturing resource and its availability for all uses, be it social, cultural, environmental or economical and it would be a reflection of the diversity of the Yukon people. That achievement of endurance would be passed to and respected by the generations to come and allow for generation-to-generation sustainability and continuation of the immemorial evolution and practice of the people of the Yukon.

# Acronyms

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AHPP – Alaska Highway Pipeline Project  
AANDC – Aboriginal Affairs and Northern Development Canada  
AO – Arctic Oscillation  
BC – British Columbia  
CAFN – Champagne and Aishihik First Nations  
CanNor – Canadian Northern Economic Development Agency  
CCAP – Climate Change Action Plan  
CS – Yukon Community Services  
EcDev – Economic Development Yukon  
ECO – Yukon Executive Council Office  
ENV – Yukon Environment  
EMR – Yukon Energy, Mines and Resources  
HPW – Yukon Highways and Public Works  
HSS – Yukon Health and Social Services  
GC – Government of Canada  
GHG – Greenhouse Gas  
GNWT – Government of Northwest Territories  
LUP – Land-Use Planning  
LSCFN – Little Salmon Carmacks First Nations  
MGP – Mackenzie Gas Project  
NGO – Non-Government Organization  
NAFTA – National American Free Trade Agreement  
NWT – Northwest Territories  
TKFN – Ta’an Kwäch’än First Nation  
UN – United Nations  
UFA – Umbrella Final Agreement  
US – United States of America  
YESAA – Yukon Environmental and Socio-Economic Assessment Act  
YESAB – Yukon Environmental and Socio-Economic Assessment Board  
YEC – Yukon Energy Corporation  
YFN – Yukon First Nations  
YOGA – Yukon Oil and Gas Act  
YG – Government of Yukon  
YWB – Yukon Water Board

# Interviewees

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Batgailis, Karen – Executive Director, Yukon Conservation Society (July 12, 2011)

Birkell, Paul – Elder, Champagne and Aishihik First Nation (July 1, 2011)

Campbell, Hector – Director, Resource Planning and Regulatory Affairs, Yukon Energy Corporation (July 25, 2011)

Charlie, Tootsie – Elder, Ross River Dene Council (August 12, 2011)

Daku, Mary – Elder, Whitehorse Rapids Fish Ladder (August 23, 2011)

Dick, Hammond – former Tribal Chief, Kaska Tribal Council (August 12, 2011)

Experiential Science '11 Students, Winter 2011 Semester (June 8, 2011)

James, Coralee – Fish and Wildlife Steward, Ta'an Kwäch'än First Nation (August 19, 2011)

James, Patrick – Chairman, Carcross Tagish First Nation Land-Use Team (July 13, 2011)

Janowicz, Richard – Hydrologist, Water Resources Branch, Environment Yukon (September 2, 2011)

Jirosek, Heather – Program Advisor, Water Resource Branch, Environment Yukon (July 27, 2011)

Joe, Lawrence – Director, Heritage, Lands and Resources, Champagne and Aishihik First Nation (October 19, 2011)

Johns, Art – Member, Carcross-Tagish First Nation Land-Use Team (July 13, 2011)

Johnson, Luke – Deputy Chief, Kluane First Nation (July, 21, 2011)

Linklater, Joe – former Chief, Vuntut Gwitchin First Nation (June 28, 2011)

Moar, Robert – Director, Lands and Resources, Little Salmon Carmacks First Nation (July 28, 2011)

Moston, Thomas – Attendant, Whitehorse Rapids Fish Ladder (August 23, 2011)

Osborne, Ray – Circuit Rider Trainer, Indian and Northern Affairs Canada (July 26, 2011)

Peterson, Winnie – Member, Teslin Tlingit Council (August 5, 2011)

Phare, Merrell-Ann S. – Executive Director and Legal Counsel, Centre for Indigenous Environmental Resources (Aug 4, 2011)

Roberts, May – Elder, Little Salmon Carmacks First Nation (July 28, 2011)

Skookum, Eddie – Chief, Little Salmon Carmacks First Nation (July 28, 2011)

Shultz, Ed – former Chief, Council of Yukon First Nations (July 12, 2011)

Smith, Testola – Land Steward, Ta'an Kwäch'än First Nation (August 12, 2011)

Taylor, Eddie – Chief, Tr'ondëk Hwëch'in First Nation (August 19, 2011)

Tooey, Ryan – Manager, Science Department, Yukon River Intertribal Watershed Council (August 19, 2011)

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