Canadian Mountain Network

Yukon Initiating Group

Discussion Paper

June 2017

PLEASE NOTE:
This is a living document. The purpose of this document is to generate additional discussion and solicit feedback to inform the development of a research network that maximizes impacts and benefits to Yukon. Revisions will be made on a regular basis when warranted as additional input is received from Yukon and other stakeholders. For the most recent version, please check http://www.eco.gov.yk.ca/science/canadian-mountain-network-yukon.html.

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Canadian Mountain Network

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Acknowledgements & Contributors
1 Acknowledgements & Contributors

The Yukon Initiating Group (Yukon IG) of the Canadian Mountain Network (CMN) initiative evolved from an ‘Early Leaders’ workshop held at Yukon College in May 2014, organized to explore interest in pursuing a Network Centre of Excellence (NCE) initiative. Participants at this Early Leaders workshop included representatives from Arctic Institute of North America, Aurora Research Institute, Canadian High Arctic Research Station, Council of Yukon First Nations, Government of Yukon, Government of Northwest Territories, University of Alberta, University of Saskatchewan, Yukon College and Yukon Research Centre. Subsequent to this, as the CMN initiative took shape, the Yukon Science Community of Practice (SCOPe) held a workshop in June 2016 to share information and get early feedback on the network. In the fall of 2016, the Yukon IG was formed through a widespread call for members.

This report was authored and edited by a core group of Yukon IG members with input from the Yukon IG and others. This collaborative effort is gratefully acknowledged and one which we plan to expand as this initiative matures.

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Canadian Mountain Network

Yukon Initiating Group

Discussion Paper

Executive Summary
2 Executive Summary

This executive summary outlines the main components and recommendations for a Canadian Mountain Network (CMN) proposal to Networks of Centres of Excellence (NCE) of Canada, from the perspective of the Yukon Initiating Group (Yukon IG).

2.1 What is the CMN?

The CMN is a voluntary alliance dedicated to the sustainability of mountain environments and communities across the country and around the world, established in 2016. The CMN and its administrative centre are hosted at the University of Alberta in the Faculty of Science. (http://canadianmountainnetwork.ca/). The vision of the CMN is to support the sustainability of mountain spaces and the communities who inhabit them by advancing research that:

- is inclusive, co-designed, and interdisciplinary
- recognizes the interconnectedness of mountain environments, their social and economic systems, and their contribution to health and wellness
- meets the needs of diverse mountain communities and their Indigenous peoples

The CMN is coordinating the effort to submit a proposal to NCE of Canada. This federal government program provides funding for the establishment of large-scale research networks. The NCE program bestows long-term funding (renewable for up to 15 years) for academically led multi-disciplinary research into issues of strategic importance to Canadians. (http://www.nce-rce.gc.ca/Index_eng.asp).

This document provides perspective on how to achieve the vision in Yukon. The following summaries (2.1 – 2.5) reflect the more detailed sectoral reports in Chapters 4 – 8.

2.2 Partner Engagement and Benefits

To maximize benefits and impacts of the CMN to Yukoners, the Yukon IG emphatically notes that the need for the CMN to acknowledge how research is done is as important as what research is done. In our research context, it is very difficult to engage with research partners regarding the merits of a particular study question without first considering the process behind the study. The Yukon IG, therefore, makes the following recommendations:

1. **Support the development of local capacity**
   The Yukon science community is ready to actively engage in capacity and partnership development.

2. **Incorporate Indigenous ways of knowing**
   Traditional and local knowledge systems are valid and essential sources of information and are complementary to the scientific knowledge system
3. **Adopt a solutions-oriented approach that is focused on needs**
   In order to advance science that benefits and meets the needs of northerners, emphasize solution-oriented approaches to science, as advocated by the territorial governments (GY, GNWT and GN, 2016; Ogden et al., 2016).

4. **Expand engagement in CMN development in Yukon**
   Recognizing that not all agencies and organizations had the capacity to support engagement with the Yukon IG meetings that took place last fall, it is recommended that the discussion papers be used as a launching point for the next phase of engagement.

5. **Improve research coordination in Yukon**
   Yukon Government, Yukon College and Yukon First Nations need to work together to establish a mechanism to improve research coordination in Yukon. A long-term solution to support engagement of Yukon First Nations in research is required if research and science are to be further developed as envisioned in the new Yukon Government platform.

6. **Recognize, support and cultivate three modes of research**
   The CMN should recognize, support and cultivate different approaches to knowledge generation, anchored by the three modes identified in Box 1, and establish a framework and associated governance structure that implements this model. This way, research projects will begin with a deliberate choice of mode that best fits a particular project’s needs, as well as contributes to the network as a whole. Key stages in doing publicly funded research under each of these modes are compared and contrasted in Table 2.1.

### 2.3 Research Themes

The Yukon IG envisions an inclusive research process where themes and priorities emerge from meaningful engagement of Indigenous, community, and other partners in the identification of issues and development of research questions. Evaluation of improvements to the research process should be a hallmark of the CMN. Yukon IG considers this a priority, believing that Yukon has strengths to contribute and abundant opportunities to advance new approaches.

Climate change, resource development pressures, and social transformation present both challenges and opportunities. Sustainability is addressed, in part, by understanding what makes communities and ecosystems resilient to change and how the capacity for adaptation can be enhanced. The CMN is well positioned to advance solution-oriented science to address decision-making information needs, including basic science, baseline monitoring, integration of existing knowledge, and applied research.
Box 1: Recommended modes of CMN research

Mode 1: Researcher-led research
- initiated and led by CMN researchers and supported by CMN partners
- projects may be co-developed, but are not necessarily co-designed or co-implemented
- dominant mode in the academic world

Mode 2: Partnership-based, participatory research
- initiated, led and supported by multiple CMN partners
- projects are co-developed, co-designed, and co-produced by multiple CMN partners
- projects are well documented in science and technology studies

Mode 3: Community-led research
- initiated and led by communities and supported by CMN researchers
- developed, designed and produced by Indigenous or community partners in the CMN
- emerging as research practice evolves, clearest so far in Indigenous research methodology

Each of these modes need to:
- address a pressing topic that has been identified and endorsed by CMN partners
- include a more diverse group of partners and stakeholders defining research needs and opportunities, and enabling their participation
- include options for research to be led by non-academic partners
- enable a more elaborate mix of knowledge-dissemination products aimed at a diverse audience, such as community members and policy makers
- ensure knowledge transfer to those who will benefit from the research results

Emerging areas of focus for the Yukon include:
- anticipating the most profound changes mountain systems may experience, the challenges and opportunities these present relative to the CMN vision, and identifying research to help Yukoners prepare for them
- establishing baseline conditions and developing robust monitoring strategies to track change
- improving understanding of northern hydrology – implications of changes for water quantity and quality, and permafrost thaw
- provision of ecosystem services by mountain systems and how these may be affected by change
- recognizing and addressing the interplay of health and well-being on the ability of individuals and communities to engage with research and society
- enhancing northern food security
To advance discussions, the Yukon IG recommends:

1. **Develop and clearly articulate a guiding model of sustainability**
   A defining feature of the CMN should be a model of sustainability that is forward-thinking and based on measurable indicators.

2. **Develop approaches to describing themes that encourage truly interdisciplinary research**
   CMN should be positioned to be at the global forefront of inter- and trans-disciplinary solutions-oriented scholarship.

3. **Critically examine and improve the research process**
   A central part of the research platform should be the critical examination and advancement of the research process towards the supported establishment and maintenance of meaningful research partnerships.

4. **Empower Yukon First Nations**
   Promote and empower existing leadership in Yukon First Nations to identify questions and propose ideas that represent their priorities and advance reconciliation.

5. **Develop appropriate evaluation tools**
   Develop evaluation criteria for research projects that push past conventional measures of excellence and reflect the considerations outlined above.

6. **Consider the central theme of change**
   From the perspective of the Yukon IG, anticipating the most profound changes Yukon may experience is a priority. Considering these challenges and opportunities relative to the CMN vision could align community needs and the research that could help with future adaptation.

### 2.4 Capacity and Highly Qualified Personnel (HQP)

In the Mode 1 model of research (Table 2.1), HQPs are primarily the graduate students and post-doctoral fellows who gain skills by doing research. These HQPs will continue to be a dominant output. In addition, we propose an expansion of the skill sets for these HQPs, and the recognition of a suite of other HQPs, mostly non-academic, based on focused training and the recognition of existing knowledge and skills.

1. **Redefine or expand the definition of HQP**
   It is essential for CMN to engage the NCE Secretariat in a redefinition of HQP that respects the current goals of training, but also recognizes needs of Yukon and other northern Canadian regions, such as the provincial north. Yukon IG is aware that other existing NCE’s, such as ArcticNet, have recognized the need for HQP redefinition and anticipate that the NCE Secretariat is aware of this suggestion.

2. **Support excellent HQP development**
   A variety of strategies are suggested, including the development of new certification, mentorship, and residency-based internship opportunities; increased funding for transferrable, soft skills, and field safety training; the development of a student association specific to CMN; and the development of reciprocal relationships and two-way knowledge.
flow between community and territorial agencies and outside universities for equipment, journal access, etc.

3. **Supporting knowledge creation, transfer, and translation**

Suggested strategies include a mandatory Yukon First Nations 101 course for Yukon-based researchers; the recognition of the contribution of local knowledge as a significant in-kind contribution to CMN activities and research projects; and the development of communications and production capacity at CMN headquarters.

4. **Support the development of capacity**

Capacity here refers to a goal of increased long-term capacity to represent a stable and net increase in the number of people living and working in Yukon and similar regions with training and expertise in the skills essential to building and sustaining healthy communities, environments, and economic development. This includes the recognition of Principal Investigators outside of academia; the development of capacity within Yukon First Nations to enable engagement; the creation of long-term employment for HQP, such as a CMN safety office and regional/indigenous research advisor positions in key areas of CMN research; and maintaining a focus on knowledge communication, community-researcher relationships.

2.5 **Infrastructure**

While current research infrastructure in Yukon, as described in this discussion paper, can support an increased level of research activity that would be associated with the CMN, there are some limitations and gaps. If addressed strategically these could greatly enhance the potential activities and benefits of the CMN.

The Yukon IG recommendations include:

1. **Establish regional hubs for CMN activities**

   A CMN regional hub is needed to manage and administer CMN activities in Yukon. This hub should take on the following roles: supporting community-researcher interactions; managing an equipment pool; providing training; supporting field safety and logistics; and supporting archiving and use of data in a regional data centre.

2. **Strategically invest in new facilities**

   Identify key investments that enable the development of research niches by building on existing, specialized areas of research and creating areas of potential research excellence.

3. **Complete a state of monitoring report**

   Initiate a comprehensive assessment of the state of monitoring both network-wide and within Yukon.

4. **Assess infrastructure needs to support enhanced monitoring**

   Facilitate a strategic discussion on infrastructure needs to support enhanced monitoring both network-wide and within the Yukon.
5. **Enhance monitoring networks**
   Develop and build on existing environmental, health and social sciences networks, informed by a Yukon-specific assessment of the state of monitoring.

6. **Enhance coordination and capacity for community-based monitoring**
   Address the need, long expressed, for expanded community-based monitoring networks that incorporate local knowledge and develop capacity at the community level.

7. **Enhance logistical support**
   Support needs for research ranges from enhanced journal access, to accessible technology for local agencies, to coordinated access to remote field camps for non-resident and resident scientists.

8. **Provide access to an equipment pool**
   A repository of common scientific equipment that is managed by a central person and can be accessed by network users, including territorial researchers, would reduce the cost of purchasing and transporting commonly used equipment.

9. **Enhance training**
   Training needs related to research and monitoring infrastructure and equipment, including how to conduct research and monitoring activities in Yukon with respect and reciprocity.

10. **Create a comprehensive inventory of all Canadian mountain research facilities**
    Using the CNNRO/Yukon inventories as a model, a comprehensive inventory could facilitate resource and cost sharing.

**2.6 Research Data Management**

Publicly-funded research programs recognize the need for integrating sound data management practices throughout the data lifecycle to facilitate the collective management of data, and optimally support open-access data storage and management regimes. The CMN builds on that trend by proposing:

- key data principles which will be used to guide the overall management of data
- development and implementation of a network-wide Data Management Plan (DMP) – with opportunity to contribute offered to all CMN stakeholders and partners
- development of data management resources to help researchers, trainees, stakeholders, and partners to build knowledge and capacity regarding data management and planning
- CMN-wide requirements for data capture, storage and management

In addition, the Yukon IG offers the following recommendations relating to the management of CMN research data:

1. **Respect OCAP/TCPS2 principles re: management of traditional knowledge and First Nations data**
   This an pivotal topic that needs to be acknowledged and considered early on. When building any DMP(s) for CMN data, a dedicated section to support the management and use of traditional knowledge and First Nations data should be included.
2. **Develop appropriate best practices and guidelines**
   It is essential that established best practices and guidelines when dealing with traditional and First Nations data, such as those outlined by the First Nations Principles of OCAP, are reviewed and appropriately incorporated into the CMN data policies.

3. **Ensure alignment with Tri-Council responses to Action 65**
   It is important that CMN acknowledges the recommendations made within SSHRC’s “Proposed innovation in response to Call to Action 65” document, and aligns with them as much as possible when developing data principles, governance, and data management plans.

4. **Facilitate stakeholder engagement**
   It is important that CMN engages and works with mountain research stakeholders and partners in the Yukon regarding the management of mountain research data.

5. **Ensure appropriate representation**
   Having a key member(s) from the Yukon on the CMN Research Data Management Committee (RDMC) will be a great asset and can play an integral role in helping to engage mountain research stakeholders in the Yukon.

6. **Engage existing legislation and data**
   CMN should refer to and leverage the Government of Yukon ‘Scientists and Explorers Act’ and its guidance processes in efforts to explore what existing data may be available and accessible.

7. **Build data management capacity in Government of Yukon**
   Where possible, CMN should seek to work with the Government of Yukon to develop and strengthen data tracking and management capabilities in ways that would be of benefit to both.

8. **Require DMPs for funded projects**
   If CMN is funded and becomes a source of funding, it is strongly recommended that it should adopt a policy that it is a requirement of receiving CMN funding to do a Data Management Plan and make appropriately open data accessible.

9. **Enhance access to RDM resources and training**
   Opportunities for mountain research stakeholders to learn more about research data management best practices should be made available. Having access to RDM learning resources and tools is recommended.
### Table 2.1 The research process: partnerships in action. A researcher-led model is depicted beside a partner-driven model and a community-led model.

<table>
<thead>
<tr>
<th>STAGE</th>
<th>MODE 1: RESEARCHER-LED</th>
<th>MODE 2: PARTNER-DRIVEN</th>
<th>MODE 3: COMMUNITY-LED</th>
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<tbody>
<tr>
<td>INFORMATION NEED/OPPORTUNITY</td>
<td>Address a pressing topic that has been identified by CMN researchers, partners and/or communities and endorsed by a diverse group of CMN members through a collaborative process of defining research needs and opportunities that enables rather than excludes participation; includes options for research to be led by non-academic partners</td>
<td>Initiated, led and supported by multiple CMN partners, these projects are co-developed, co-designed, and co-produced by multiple CMN partners</td>
<td>Initiated and led by communities and supported by CMN researchers, these projects are developed, designed and produced by Indigenous or community partners in the CMN</td>
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<td>DESIGN AND IMPLEMENTATION</td>
<td>Initiated and led by CMN researchers and supported by CMN partners, these projects may be co-developed, but are not necessarily co-designed or co-implemented</td>
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| TRAINING OF HQP TO INCLUDE... | • A mandatory course in indigenous peoples’ history, economies, cultures and legal status  
• Training in project development and practices including partnership development, administration of research activities, safety, interpreting research outcomes through diverse media to diverse audiences | • Facilitation, management, administration and execution of research projects  
• Logistics of research implementation, with curriculum shaped to specific project needs  
• Interpreting research outcomes through diverse media to non-academic and academic audiences | • Facilitation, management, administration and execution of research projects  
• Logistics of research implementation, with curriculum shaped to specific project needs  
• Interpreting research outcomes through diverse media to non-academic and academic audiences |
| PRODUCTS                     | Mobilization of knowledge that can lead to intellectual, cultural, social and economic influence, benefit, and impact. Non-thesis research products as equivalent to theses and peer-review publications. |                                                                      |                                                                                        |
| DISSEMINATION/TRANSLATION/INTERPRETATION | Results of research conducted under each of the modes will contribute to society-wide modes of information flow and understanding.  
An elaborate mix of knowledge-dissemination products will be enabled and aimed at a diversity of audiences (notably the communities and policy makers), using many media. |                                                                      |                                                                                        |
| MEASURING SUCCESS            | Success measures include: the ability of network governance to strategically support, promote and incentivize all three modes of research; impacts and benefits accrued by mountain communities from the research process; and excellence in research. |                                                                      |                                                                                        |
Canadian Mountain Network

Yukon Initiating Group

Discussion Paper

Introduction
3 Introduction

3.1 What is the Canadian Mountain Network?

The CMN is a voluntary alliance of partners from universities, governments, Indigenous communities, and businesses dedicated to the sustainability of mountain environments and communities across the country and around the world. Established in 2016, the CMN is in the early stages of establishing a forum for collaboratively addressing the diverse challenges facing mountain regions by harnessing existing capacities and seeking new resources. The Vision is for the CMN to: become a national and global leader in inclusive, co-designed, interdisciplinary mountain research that recognizes the interconnectedness in mountain systems between the environment, economy, and society; encourage an integrated approach for long-term sustainability; and serve the needs of mountain communities. The CMN and its administrative centre are hosted at the University of Alberta in the Faculty of Science. ([http://canadianmountainnetwork.ca/](http://canadianmountainnetwork.ca/)).

The CMN is coordinating the effort to submit a proposal to NCE of Canada. This federal government program, established in 1989, provides funding to educational institutions, industry, government, and not-for-profit organizations for establishing large-scale research networks. The NCE program bestows long-term funding (renewable for up to 15 years) for academically led multi-disciplinary research into issues of strategic importance to Canadians. NCE funded research benefits Canadians by supporting the growth of Canada’s multi-disciplinary research capacity, generating new knowledge and innovative applications, providing training opportunities to develop a diverse and qualified workforce, and encouraging national and international collaboration between academics, government, non-government organizations, private businesses, and community partners. ([http://www.nce-rce.gc.ca/Index_eng.asp](http://www.nce-rce.gc.ca/Index_eng.asp)).

3.2 The Yukon Initiating Group

The Yukon Initiating Group (Yukon IG) is one of five regional bodies that serves as a point of contact during the initial development of the Canadian Mountain Network (CMN) and a Networks of Centres of Excellence (NCE) proposal. Each Initiating Group has been asked to provide advice in order for the CMN to coordinate activities, leverage resources, create strategic documents, catalogue infrastructure, establish a baseline of mountain research, and develop the NCE Letter Of Intent (LOI).

The Yukon IG is a voluntary advisory body of individuals collectively motivated to develop a research network that maximizes impacts and benefits to Yukon. Drafted discussion papers on five topics provide preliminary feedback to the CMN on its establishment, relevance and potential benefit to Yukon. The intent of the discussion papers is to summarize the outcomes of Yukon IG meetings in fall 2016 and winter 2017 on each of these topics and to stimulate additional discussion.
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<th>TOPIC OF WHITE PAPER</th>
<th>QUESTIONS ADDRESSED IN WHITE PAPER</th>
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<td>1. PARTNER ENGAGEMENT AND BENEFITS</td>
<td>Who is involved in mountain research in Yukon and who benefits?</td>
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<tr>
<td>2. RESEARCH THEMES</td>
<td>What mountain-related research is currently being conducted, and what research needs have been identified but have yet to be funded?</td>
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<tr>
<td>3. RESEARCH DATA MANAGEMENT</td>
<td>How should research data generated by the CMN be managed? What physical, administrative and technical structure is needed in order to share data with both the public and researchers?</td>
</tr>
<tr>
<td>4. HIGHLY QUALIFIED PERSONNEL (HQP)</td>
<td>What needs to be considered in the CMN plan to train HQP to develop needed capacity in Yukon?</td>
</tr>
<tr>
<td>5. RESEARCH INFRASTRUCTURE</td>
<td>What infrastructure is available to support research in Yukon, and what additional research infrastructure is needed?</td>
</tr>
</tbody>
</table>

Each discussion paper has been written using the same template:
- a statement of the problem that the paper seeks to address
- an overview of the process used in the development of the content
- a summary of what the current status is in Yukon and needs that have been identified
- recommendations to the CMN on emerging priorities and additional work that needs to be undertaken
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Canadian Mountain Network

Yukon Initiating Group

Discussion Paper

Partner Engagement and Benefits
4 Partner Engagement and Benefits

4.1 Problem Statement

The purpose of this discussion paper is to discuss how the CMN can be designed and structured to enhance the engagement of and benefits to the people of Yukon. Specifically, this discussion paper will address:

Engagement:
- Who is currently involved in mountain research in Yukon?
- Who is currently benefitting from mountain research in Yukon? Who else needs to benefit?
- Who needs to help shape the direction of CMN activities in Yukon?
- Who has not been involved in the Yukon IG to-date that needs to be or alternatively brought into the loop as an Adviser or Friend of the CMN?

Benefits to Yukon:
- What would make CMN important to Yukon?
- How can CMN, by design, maximize benefits to Yukon?
- In 15 years, what should the CMN have achieved?

4.2 Process Overview

The majority of the information contained in this discussion paper was sourced from a workshop held in Whitehorse on June 23, 2016 jointly hosted by the Science Community of Practice (SCoPe) and Canadian Mountain Network (CMN). Additional insight and information was gained through one-on-one interviews with key informants that were carried out by a Yukon Government Grad Corps intern, as well as through meetings of the Yukon Initiating Group (Yukon IG), carried out in fall 2016, and an e-review of the June workshop proceedings by members of the Yukon IG. The ‘lessons learned’ section is based on a review of the literature. A draft paper was presented to the Yukon IG for review at a workshop in January 2017 and revised based on input received on the draft.

4.3 Lessons learned from the past 15 years of northern research

In 2000, after a decade of declining federal investment in northern research, the Natural Sciences and Engineering Research Council of Canada (NSERC) and Social Science and Humanities Research Council (SSHRC) convened a task force on northern research. Their report described a “state of crisis” in northern science and influenced a decade or more of northern science policy to address the need for a long-term program of capacity building and renewal (Task Force on Northern Research, 2000). The success of subsequent investments in developing northern research capacity has yet to be assessed comprehensively. However, it is clear that subsequent federal investments in Arctic science have been substantial and have helped Arctic science start moving away from the state of crisis. There is also evidence that these investments have had limited geographic focus (on the eastern and High Arctic), have
emphasized capacity building in southern universities, and have had limited success in cultivating local partnerships and capacity. As outlined in the paper Science in the Yukon: Advancing a Vision for Evidence-based Decision Making (Ogden et al, 2016):

- Decisions on investments in northern science, which influences what scientific information is available to support northern decision making, are still made largely outside the North (Ogden and Thomas, 2013; Moffit et al., 2015). Often, the scientific interests and needs of southern institutions are not aligned with those of northern institutions, leaving the latter unaddressed. Nunavut and Yukon Science Advisors have commented on the importance of a northern voice in determining what knowledge is needed, and subsequently what research is funded (Ogden and Thomas, 2013). However, stated science priorities, recognized societal needs, and funding patterns of the major North American and European agencies are poorly aligned (Ibarguchi et al., 2015; Rosen, 2016).

- Much more can be done to increase income, employment, and other benefits from the research enterprise in the North. Carr et al. (2013) provided the first empirical estimate of the local economic impact of publicly funded research expenditures in the territories between 2000 and 2009. The total spending on northern research during this period was estimated to be $284 million, and annual spending peaked in 2009 at nearly $110 million. However, even at its peak, northern research affected the territorial GDP by only 0.04%, income by 0.09%, and employment by 0.11%.

- Nationally, Canada’s R&D effort (as measured by the ratio of government R&D/GDP), declined from 2.1% in 2001 to 1.63% in 2013) alongside a decline in federal in-house R&D (Dufor, 2015). POLAR Knowledge Canada is the new flagship federal northern science agency, intended to strengthen Canada’s international position as a leader in polar science and technology. However, POLAR Knowledge Canada is not resourced to reverse the impact on northern research of these declines nor accommodate the financial needs created by the pending sunset of ArcticNet.

- In Canada’s North, the need to include stakeholders and communities in the scientific process is now almost universally recognized because of the many issues that communities need to address (Southcott, 2011). While universities have received numerous requests to develop new, creative ways of making northern research be more responsive to regional needs, evidence shows that academics have been slow to adapt to this new paradigm. Brunet et al. (2014a), who conducted the first empirical evaluation of the extent to which there has been a paradigm shift towards more participatory approaches in northern research, found only a slight increase in these approaches over the last half century. The importance of fostering meaningful community partnerships has been eloquently articulated by many northern communities and researchers; however, as noted by Brunet et al. (2014b, 2016) and Moffit et al. (2015), there is still much to be done to promote effective partnerships at the community level.
Northern Canada is at the forefront of efforts to advance a participatory paradigm for the conduct of research, one that involves meaningful involvement and engagement of local people. Resetting the relationship with Indigenous peoples, as called for by the Truth and Reconciliation Commission, can be advanced by the science we choose to do and how we do it. It is essential to ensure that scientific and traditional knowledge are equally reflected in northern research and to respect the right of Indigenous governments and peoples to set guidelines for ownership of, access to, and use of their traditional knowledge (GY, GNWT and GN, 2016).

A new process for carrying out research is needed to augment the generally “established” model of publicly funded research. The partner-driven model is flexible in terms of participation and leadership (ranging from “partnership -driven” to “community-led”), but numerous partners are encouraged to participate depending on the scope and focus of research. This process embodies the following characteristics:

- support leadership and capacity at the community level (Brunet et al., 2014b, 2016)
- involve a more elaborate mix of research and associated knowledge-dissemination products aimed at a greater diversity of audiences (notably communities and policy makers)
- require an expanded definition of highly qualified personnel from what is conventionally used and involve hiring community researchers
- involve northern agencies in research priority-setting, proposal review, and funding allocation processes, as well as by allowing non-academic principal investigators to receive funding (Brunet et al., 2016)

4.4 Current Status in Yukon

4.4.1 Who is Currently Involved in Mountain Research in Yukon?

A list of agencies involved or interested in mountain research in Yukon is found in Appendix A. This list is a work in progress. With regards to a developing a mountain research network, balance is sought between building resident capacity, and that of capacity of researchers from outside the territories. Similarly, a balance is also sought between investing in research that addresses needs of communities and local agencies and original research ideas coming from Universities themselves. With respect to the latter, researchers are encouraged to invest in time in explaining why they are doing research and in developing ongoing, long-term relationships with communities and local agencies.
4.4.2 Who is and who should be benefitting from mountain research in Yukon?

The users of the results of mountain research are diverse and include educators, decision-makers and policy analysts in various governments (territorial, First Nation, municipal and federal), industry, and individuals who are out on the land (e.g. hunters, trappers, recreationalists). With regards to a developing a mountain research network, it will be important that the research is particularly beneficial to the various agencies engaged in land and natural resource management and planning as well as the mining and transportation sectors. Further engagement with these sectors is needed to determine what forms of engagement with researchers and research results is desired, and to better understand their needs for scientific information. It is also important that the broader public sees the benefits of the CMN and supports its activities in the territory and that the CMN create opportunities to for youth engagement.

4.5 Identified Needs in Yukon

4.5.1 Shaping the Direction of CMN Activities in Yukon

To date 24 individuals from a variety of agencies signed up to be part of the Yukon IG in response to the June workshop and an email invitation sent out through the Science Community of Practice (SCOPe). The most active members have been those from the Yukon science community including: researchers at Yukon College, the Arctic Institute of North America (Kluane Lake Research Station), the Wildlife Conservation Society, resident University of Alberta faculty, former and current graduate students and science practitioners within Government of Yukon. A number of faculty members from various universities have also engaged in more of a monitoring capacity, perhaps so as to not overshadow the process unfolding locally, in Yukon. The call for members did not result in strong engagement by industry or federal agencies, nor did it result in broad First Nations engagement. However, a number of one-on-one interviews and meetings were set up with representatives from these groups to discuss their interests and needs. Additional work to expand engagement in CMN development in Yukon is needed. Going forward, strong support was expressed for Yukon College to take on a coordinating role and become a ‘hub’ for the CMN in Yukon.

4.5.2 What Would Make the CMN Important to Yukon?

There are two broad areas that would make the CMN important to Yukon: 1) addressing knowledge gaps that are relevant to Yukoners as established through a process that gives local agencies and organizations the opportunity to set research directions; and 2) by creating long-lasting benefits for Yukoners. To be relevant at the local level, local agencies need an opportunity to ask questions and set directions. Local agencies tend to be most interested in solutions-oriented, policy-relevant research that works at the interface of two ways of knowing and incorporates the expertise of those who have spent a lifetime living and working in Yukon. There is a need to address research needs identified locally, such as those established in the
North Yukon Land Use Plan, Yukon Water Strategy, Yukon Science Strategy, Yukon Climate Change Strategy. However, the CMN should also address issues in the health and social sciences, not just environmental and natural sciences.

In addition to filling needed gaps in the knowledge base, CMN needs to advance the way in which research is conducted to ensure long-lasting benefits for Yukoners are created. The CMN must involve Yukoners in a meaningful way and contribute to the development of local research capacity, both human and infrastructure. Benefits may include providing contracts, employment and research opportunities for Yukoners, including opportunities for Yukon-based researchers to work elsewhere in Canada through a visiting researcher or researcher exchange program. Of particular interest are long-term employment opportunities for Yukoners in order to prevent brain-drain (keeping Yukoners in Yukon). Yukon IG hopes CMN will prioritize communication with the local community as benefits may be hard for members of the public to see. CMN is encouraged to provide opportunities for Yukoners to learn about Yukon’s environment, economy, society and cultures through education and outreach programs, and to provide local interpretations of research results at museums, roadside signage, etc.

Ongoing support for the Haines Junction Mountain Festival is also encouraged. The first annual festival was held over the International Mountain Day weekend in December 2016 and was attended by over 250 individuals. The first festival succeeded in achieving a balance between science and local knowledge, indigenous and recreational mountain cultures, past and present mountain stories, as well as providing activities for youth (arts and crafts workshops, avalanche response demonstration, augmented reality sandbox) and adults (hands-on workshops). Also local businesses – including guides, caterers and artists – were engaged in the weekend celebration and welcomed the festival as an economic driver for the community in the off-season.

4.5.3 A Network Design to Maximize Benefits to Yukon

Ensure network governance is effective and has strong regional representation

- create a central office and regional offices to facilitate coordination
- ensure offices are resourced appropriately
- ensure there are regional representatives as well as local community representatives in governance structure
- identify a common vision that is focused (not all things to all people) but is flexible, so that there is potentially something for everyone
- ensure strong leadership that is sensitive to regional differences
- ensure some degree of commonality across Yukon and in other jurisdictions reflecting common and comparable goals but also ensure flexibility for tailor activities to individual locations
- be cost effective – for example, training communities to carry out some monitoring activities is more cost effective than recurring researcher visits
Require knowledge co-design and co-production

- require CMN projects to have at least one local partner
- ensure collaboration at the proposal design stage
- require principal investigators to be proactive in community engagement and train their students to do the same
- provide opportunities for citizen science, and facilitate citizen science connections with other mountain regions
- engage local experts, beyond PhD holders, to participate on graduate student committees
- provide a home for broad and diverse research, from basic to applied applications. For example, the CMN can provide a forum where the results of basic research can be communicated.
- support inter- and transdisciplinarity

Support capacity building

- ensure the capacity being built in Yukon is the capacity that is needed and wanted
- develop training tools and require researchers to include outreach as an integral part of each project and throughout the CMN. Conventionally, separate offices specializing in knowledge exchange and knowledge transfer have been established. This strategy is not recommended by the Yukon IG.
- create an early-career and student association that is open to people outside academia

Support community involvement

- acknowledge that there has been a history of poor community-researcher relationships in the North and ensure there are local benefits alongside meaningful and effective participation
- work to rebuild and improve trust
- provide incentives for involvement at the community level, such as training opportunities, funding to support community monitoring
- provide funding to support for community engagement
- set conditions on research funding that require community engagement to be undertaken, and appropriate data to be made open and available
- ensure there are regular regional workshops that are carried out in community-relevant ways (e.g. travelling potlatch, attend GA’s to get feedback on research directions)
- ensure youth involvement
- learn from the ArcticNet experience

Promote information sharing

- ensure there is an annual CMN-wide science meeting that includes the broader community, including policy makers, resource managers and other representatives
- develop travelling exhibits, similar to those developed by the International Polar Year
- facilitate local and regional connections to international mountain forums
- build capacity outside conventional training of HQP
- support, enable and facilitate connections between communities and researchers
• provide training in science communication, such as Laurentian University’s graduate diploma
• train local people to “speak science” to locals
• create a strong web presence with a central place for disseminating information
• create an ‘ask an expert’ web forum that includes both scientists and local experts
• ensure results are communicated and visible to the general public

4.5.4 A 15 Year Vision

Indicators of CMN success in Yukon were identified in 6 categories:

Knowledge gaps addressed by CMN support decision-making
• policy that guides future development and sustainability of mountain landscapes and systems is informed by CMN research

Resident science capacity is enhanced
• more papers of by Yukon authors are published
• scientific capacity and legitimacy of local Yukon science community is enhanced
• recognition of the expertise and contributions of local experts is strengthened
• opportunities for local experts to lead projects from the Yukon are provided
• awareness of future career opportunities for youth is increased

Data collection and management is improved
• baseline datasets are expanded
• data is more accessible
• data products are generated for different levels of access and to suit various interests such as the GY map viewers
• data management is improved, including within various governments
• comparisons are made between social and ecological systems across a north-south transect

Partnerships are fostered and coordination is enhanced
• community involvement, pride and commitment to research are increased
• connections are made between Yukon communities and the rest of Canada
• science is more accessible to the public through initiatives such as GY’s Science Community Of Practice (SCoPe)

Information sharing, including outreach and training, is improved
• new science curriculum is advanced, including on the land units and experiential science
• mentorship opportunities are increased, including classroom visits
• training opportunities for local people without formal education are provided
• opportunities for academics to be exposed to local and Indigenous ways-of-knowing are provided
Mountain environments, economies, cultures and societies are sustained
- a shared understanding of mountain environments for people in all walks of life is developed, including alpinists, trappers, scientists, and land managers
- appreciation for the value of life in the mountains is enhanced
- mountain culture is celebrated
- health and well-being of mountain communities and people is improved

4.6 Recommendations

As outlined in the paper Science in the Yukon: Advancing a Vision for Evidence-based Decision Making (Ogden et al, 2016), Canada’s North has entered into a period of unprecedented change that presents both opportunities and challenges to northern governments. Similarly, the current focus on reconciliation presents an opportunity and obligation to do research differently. Scientific research and knowledge-gathering activities that provide sound and reliable evidence-based information and contribute to innovative solutions are essential to help manage these challenges.

Keys to success include fostering a strong, locally based scientific community with the capacity to work at the interface of science and traditional knowledge, at the interface of knowledge (both scientific and traditional) with policy, and within the modern northern research paradigm that demands research to be co-designed, co-produced, and shared through meaningful partnerships.

The spectrum of issues important to Yukoners ranges from sustainable resource development to quality health care and education. Tackling these issues requires a strong science base and a capacity to innovate. While Yukon has a long history of scientific activity, the need for relevant scientific information continues to grow. Much of this history has been driven by the research agendas of southern organizations, which are often not aligned with needs identified by Yukoners.

Our ability to cope with the challenges posed by demographic change, accelerating climate change, and globalization is linked to our ability to respond in relevant ways. Science activities in Yukon in the past lacked an overarching strategy often impeded efficient cost sharing. Focusing and connecting future research and innovation to locally established priorities and objectives will foster cooperation in the larger context.

The recommendations below reflect the work of the Yukon IG and are consistent with the Government of Yukon Science Strategy (GY, 2016) and the Pan Northern Approach to Science (GY, GNWT, GN, 2016):

1. Develop local capacity
Human capital is fundamental to any scientific endeavour. It is essential to create and maintain a professional intellectual environment that will attract, promote, and support research and science. Local knowledge creation is recognized as critical to building and sustaining socio-
economic welfare: “In the long run, no region or nation can remain a simple ‘user’ of new knowledge, but also must become a ‘creator’ of new knowledge” (UNESCO, 2015:4).

In Yukon, SCOPe was established in 2013 to promote networking of Yukon’s science practitioners and support their professional development. A 2014 survey of SCOPe members found that over 65% of respondents joined for professional development, and increased opportunities for collaboration and cooperation (Westfall, 2014). The Yukon science community is willing to actively engage in capacity and partnership development.

2. **Acknowledge and incorporate Indigenous ways of knowing**

Traditional and local knowledge systems are valid and essential sources of information and are complementary to the scientific knowledge system. These distinct intellectual traditions were developed in different institutional and cultural settings, generating their own theories about the natural world (Cruikshank, 1981). Local Indigenous knowledge has emerged in recent years at the global science-policy interface as an influential contributor (UNESCO, 2015). Indigenous, local, and traditional knowledge systems are acknowledged as major resources for increasing the effectiveness of efforts to adapt to climate change, but use of these knowledge systems is inconsistent (IPCC, 2014). The Canadian North has been at the forefront of developing respect for Indigenous ways of knowing and incorporating these systems into research projects and decision-making.

The unique context of land-claim agreements in Yukon provides an opportunity to advance work at the interfaces between science, policy and Indigenous knowledge to reflect the northern knowledge-policy interface as a three-way relationship, rather than a two-way one. References including the Guidebook on Scientific Research in the Yukon (GY, 2008), the Handbook for Conduct of Traditional Knowledge Research (Armitage et al., 2015) and the Protocols and Principles for Conducting Research with Yukon First Nations (Yukon Research Centre, 2013) are available to assist researchers in developing reciprocal research relationships.

3. **Adopt a solutions-oriented approach to research that is focused on needs**

In order to advance science that benefits and meets the needs of northerners, territorial governments emphasize solution-oriented approaches to science (GY, GNWT and GN, 2016; Ogden et al., 2016). Furthermore, scientific activities that are linked to established needs are prioritized to address the many issues and challenges facing northern residents.

When framing research questions, solutions-oriented science considers how results can be implemented in policy, practice, and in programs. Research projects that address pressing issues are prioritized. It can include combinations of basic science, such as baseline monitoring, applied research, and the application of existing knowledge through improved knowledge transfer and mobilization (Pope, 2015).
4. **Expand in the development of the CMN in Yukon**
Recognizing that not all agencies and organizations had the capacity to support engagement with the Yukon IG meetings that took place last fall, it is recommended that the discussion papers be used as a launching point for the next phase of engagement.

5. **Establish a mechanism to improve research coordination in Yukon**
Yukon Government, Yukon College and Yukon First Nations need to work together to establish an improved coordination mechanism for research. A long-term solution to support engagement of Yukon First Nations in research is required if research and science are to be further developed as envisioned in the new Yukon Government platform. Such a solution will facilitate long-term, sustained engagement in the development and coordination of research programs in Yukon, such as the CMN. The success of this mechanism will be contingent on location within an appropriate institution(s) and the implementation of an appropriate mechanism for community engagement.

6. **Establish a framework and associated governance structure that puts into action the notion that how CMN research is done is as important as what research is done**
The Yukon IG recommends that the CMN recognize a spectrum of research modes, anchored by the three modes identified here. This way, research projects will begin with a deliberate choice of mode that best fits a particular project’s needs, as well as contributes to the CMN as a whole.

*Mode 1: Researcher-led research*
- initiated and led by CMN researchers and supported by CMN partners
- projects may be co-developed, but are not necessarily co-designed or co-implemented
- dominant mode in the academic world

*Mode 2: Partnership-based, participatory research*
- initiated, led and supported by multiple CMN partners
- projects are co-developed, co-designed, and co-produced by multiple CMN partners
- also well documented in science and technology studies

*Mode 3: Community-led research*
- initiated and led by communities and supported by CMN researchers
- developed, designed and produced by Indigenous or community partners in the CMN
- emerging as research practice evolves, clearest so far in Indigenous research methodology

Each of these modes need to:
- address a pressing topic that has been identified and endorsed by CMN partners
- include a more diverse group of partners and stakeholders defining research needs and opportunities, and enabling their participation
- include options for research to be led by non-academic partners
- enable a more elaborate mix of knowledge-dissemination products aimed at a diverse audience, such as community members and policy makers
- ensure knowledge transfer to those who will benefit from the research results
The key stages in doing publicly-funded research under each modes are compared and contrasted in Table 4.1. Additional information on the proposed research modes framework is provided in Appendix B. This framework could contribute to resetting and reconciling the relationships of researchers and Indigenous peoples, secure practical benefits for mountain communities in areas of urgent concern, and position the CMN to be at the global forefront of inter- and trans-disciplinary solutions-oriented scholarship.
<table>
<thead>
<tr>
<th>STAGE</th>
<th>MODE 1: RESEARCHER-LED</th>
<th>MODE 2: PARTNER-DRIVEN</th>
<th>MODE 3: COMMUNITY-LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFORMATION NEED/OPPORTUNITY</td>
<td>Address a pressing topic that has been identified by CMN researchers, partners and/or communities and endorsed by a diverse group of CMN members through a collaborative process of defining research needs and opportunities that enables rather than excludes participation; includes options for research to be led by non-academic partners.</td>
<td>Initiated, led and supported by multiple CMN partners, these projects are co-developed, co-designed, and co-produced by multiple CMN partners</td>
<td>Initiated and led by communities and supported by CMN researchers, these projects are developed, designed and produced by Indigenous or community partners in the CMN.</td>
</tr>
<tr>
<td>DESIGN AND IMPLEMENTATION</td>
<td>Initiated and led by CMN researchers and supported by CMN partners, these projects may be co-developed, but are not necessarily co-designed or co-implemented</td>
<td>Initiated, led and supported by multiple CMN partners, these projects are co-developed, co-designed, and co-produced by multiple CMN partners</td>
<td>Initiated and led by communities and supported by CMN researchers, these projects are developed, designed and produced by Indigenous or community partners in the CMN.</td>
</tr>
<tr>
<td>TRAINING OF HQP TO INCLUDE...</td>
<td>• A mandatory course in indigenous peoples’ history, economies, cultures and legal status.</td>
<td>• Facilitation, management, administration and execution of research projects.</td>
<td>• Facilitation, management, administration and execution of research projects.</td>
</tr>
<tr>
<td></td>
<td>• Training in project development and practices including partnership development, administration of research activities, safety, interpreting research outcomes through diverse media to diverse audiences.</td>
<td>• Logistics of research implementation, with curriculum shaped to specific project needs.</td>
<td>• Logistics of research implementation, with curriculum shaped to specific project needs.</td>
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<tr>
<td></td>
<td></td>
<td>• Interpreting research outcomes through diverse media to non-academic and academic audiences.</td>
<td>• Interpreting research outcomes through diverse media to non-academic and academic audiences.</td>
</tr>
<tr>
<td>PRODUCTS</td>
<td>Mobilization of knowledge that can lead to intellectual, cultural, social and economic influence, benefit and impact. Non-thesis research products as equivalent to theses and peer-review publications.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DISSEMINATION/TRANSLATION/INTERPRETATION</td>
<td>Results of research conducted under each of the modes will contribute to society-wide modes of information flow and understanding. An elaborate mix of knowledge-dissemination products will be enabled and aimed at a diversity of audiences (notably the communities and policy makers), using many media.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEASURING SUCCESS</td>
<td>Success measures include: the ability of network governance to strategically support, promote and incentivize all three modes of research; impacts and benefits accrued by mountain communities from the research process, and excellence in research.</td>
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</table>
4.7 References


Pope, S. 2015. Implementation science: S&T into action. Presentation to the Yukon Science Community of Practice, 1 April 1 2015, Whitehorse.

Rosen, J. 2016. Arctic research slow to focus on societal needs. Arctic Deeply. Available online: https://www.newsdeeply.com/arctic/articles/2016/01/28/arctic-research-slow-to-focus-on-societal-needs/.


Canadian Mountain Network

Yukon Initiating Group

Discussion Paper

Research Themes
5 Research Themes

5.1 Problem Statement

This discussion paper summarizes input provided to the Canadian Mountain Network (CMN) with regards to research needs in Yukon. Identified needs are summarized according to three high-level themes: Environment, Health and Well-being, and Culture/Society/Economy. Related discussions focused on the research process and on the critical need for integration and linkages across themes, following inter- and trans-disciplinary approaches.

5.2 Process Overview

Sources of information included a review of policies and strategies by the CMN to inform research themes (File et al., January 2016); three Yukon Initiating Group (Yukon IG) meetings in June 2016, October 2016, and January 2017; and additional input from individual representatives. Responses from the pre-meeting information request for the October session were compiled and provided to potential participants in advance of the meeting (Appendix C). Conceptual models of sustainability were discussed in relation to the CMN vision of “research that recognizes the interconnectedness of mountain systems, including the environment, economy, and society, by encouraging an integrated approach for long-term sustainability.” A draft of this discussion paper was presented to the Yukon IG for review at a workshop in January 2017 and revised based on that input.

5.3 Current status of research in Yukon

There is a long history of research in Yukon led by investigators from academic institutions across Canada and from around the world. Much of this has focused on questions in the biological and physical sciences and would be considered basic science. Geographically there has been a bias in concentration of research activity, with a significant portion of the effort focused in the southwest Yukon. This work is well-documented in the primary literature. Growth in Yukon research capacity is evident through activities of the YG Science Advisor’s Office; the establishment of the Yukon Research Centre at Yukon College; development of formal relationships between Yukon College, Government of Yukon and academic institutions outside the territory; and through the initiative and strong partnerships of individual researchers. Community-based and First Nations-led research initiatives are also growing. The implementation of individual Final Agreements has motivated First Nations-led research in particular. Finally, there is increasing recognition of the extensive knowledge held by First Nations that is not captured by conventional scientific disciplines, as well as the temporal and spatial frames of most studies. Accessing such knowledge presents challenges, but it also offers enormous opportunities to benefit from the experience and diversity of cultural adaptations that have shaped socioecological systems for millennia.
Responses to the pre-meeting questionnaire included input from both resident and non-resident researchers and research partners. While generally more applied in nature, a bias remained towards the biological and physical sciences, although interdisciplinary and/or integrated approaches were prevalent (e.g., research questions and/or research developed with local partners and communities, and/or involving multiple disciplinary perspectives). A compilation of this input is available; however, it does not represent a comprehensive survey of current research activities. Input to this process was constrained for reasons of time and timing, such as restrictions in engagement imposed by a territorial election. In addition, key constituencies were under-represented, including Yukon First Nations. Refer to the discussion paper on Partner Engagement and Benefits for suggestions on how this can be addressed.

The Government of Yukon has released a Compendium of Current Research and Monitoring that provides information on activities associated with Yukon Government across a broad range of themes in the natural and social sciences (GY, 2017a). The compendium provides important context and will be helpful in identifying gaps relative to identified research needs and priorities as discussions advance.

While the status of current research provided a backdrop for discussions, the Yukon IG focused largely on research needs and preliminary recommendations. Central consideration was given to issues concerning the framing of research questions, the challenge of transcending conventional disciplinary divides, and the critical need to improve the process of research advancement.

5.4 Identified Research Needs in Yukon

There was strong support for the broad vision of the CMN to conduct research to support long-term sustainability of mountain systems and communities. However, the Yukon IG did not wish to perpetuate models of sustainability that abstracted the economy and society from the environment, such as the overlapping spheres or three-legged stool model (Figure 5.1A). Rather, there was agreement that a nested model, which emphasizes interdependencies, was more appropriate for the Yukon context. In this model, the environment is the supportive foundation on which societies and their economies are built (Figure 5.1B).

Figure 5.1 Potential models of sustainability.
The nested model further illustrates interconnectedness and interdependency when tangible examples are considered, such as health, well-being, capacity, food security, climate change. These issues affect economy, society and the environment simultaneously and resonate with communities. They also illustrate the dynamic nature of underlying systems and their relationships. Related discussions within the Yukon IG focused on moving away from conventional disciplinary framing of research needs, or the WHAT, towards focusing on the WHY and HOW. This new focus would distinguish the CMN in academia and promote advancement of novel areas of research.

5.4.1 Improving the Research Process

The audience for the CMN is local to global. Addressing the mandated need for evidence-based decision-making at the territorial scale (GY, 2016b) is an important niche for the CMN in the Yukon, with implications for the national context. Advancing the process of community-led participatory research through meaningful partnerships at all stages of a project should be a priority of CMN. It is an area of national interest and Yukon has shown leadership in this area in the past. At all scales, a focus on HOW can transform research from an academic undertaking into a process for reconciliation and capacity building, and enable participation that allows the WHAT to be based on community need.

The term “community” in this sense does not refer strictly to local populations; it also includes constituencies with shared interests. An improved research process would enhance the use of knowledge by empowering communities through co-production. Knowledge exchange must be an integral component of the entire research process, rather than restricting those activities to the end of the process. This is fundamentally different from the approach currently employed in most research and is becoming accepted practice across a number of disciplines.

The discussion paper Partner Engagement and Benefits further articulates the argument for change in the way research is conducted, while the discussion paper Capacity and HQP suggests ways local capacity and engagement can contribute to this process. The Yukon IG acknowledges that greater investment of time and finances is associated with building and maintaining partnerships compared to conventional research. This would require appropriate allocation of resources and establishing suitable measures of success. Further framing for this approach could be linked to outcomes and guidance from the 1992 United Nations Earth Summit on the environment and development, where sustainability was a central theme, and Agenda 21 provides guidance on strengthening the role of local authorities (UN 1992; see Section III, Articles 28.1-28.7).

Review of the Integrated Community Sustainability Plans (ICSPs) from Yukon communities and First Nations could help catalyze partnerships (http://www.infrastructure.gov.yk.ca/gtf_icsp.html). ICSPs were developed to address infrastructure needs, but are structured to establish community values and define environmental, cultural, social and economic objectives. Engagement could be fostered by
augmenting previously recognized interests in the ICSPs with the priorities identified by the Yukon IG.

Identification and evaluation of improvements to research process should be a hallmark of the CMN. The Yukon IG considers this a priority area for research and has strengths to contribute in a context that presents abundant opportunities to advance new approaches.

5.5 Additional Research Needs and Priorities

Rapid and sometimes abrupt environmental and social changes are occurring globally, with acute effects prominent in mountain systems, especially those in sub-Arctic/Arctic regions of the world. The drivers of change are having a visible and profound effect on landscapes, on First Nation traditional ways of life, and on the health and economies of all people living in the northern reaches of Canada. These challenges are complex and interconnected (CCA, 2008).

Yukon is uniquely positioned to address questions and help provide answers about the impact of current changes. Yukon has one of the highest proportions of mountainous region of any jurisdiction in Canada, the greatest number of modern land claims agreements, and presents many other exemplary attributes, including:

- the largest non-polar icefield in the world
- the St. Elias Mountains, highest mountain range in Canada, with over 2,000m of relief above similar ranges in Canada
- diverse mountain ranges, from coastal (Pacific and Arctic) to interior, to remnant Beringian ranges, that are the site of several main drainage basins, such as the Yukon and Mackenzie rivers
- landscapes that are unfragmented by human infrastructure
- climate refugia unique in North America
- demonstrated northern agricultural potential with close proximity to communities and favourable climate

The proposed CMN is well positioned to advance research and knowledge gathering that will directly benefit Yukon and meet the “solution-oriented information needs of Northerners” (see GY, GNWT and GN, 2016). This position, in turn, supports evidence-based decision-making (Ogden et al., 2016). Solution-oriented science promotes research projects that will address current issues that have been identified locally and nationally. Solution-oriented science includes basic science, baseline monitoring, integration of existing knowledge, applied research, or a combination (Pope, 2015). By its very nature, this type of science engages Canadians from the start, providing benefit to active partners and broader audiences.

Climate change, resource development pressures, and social transformation present both challenges and opportunities for Yukon communities. While many of these changes are unprecedented, there is also local experience with rapid change. Understanding what makes
communities resilient and how the capacity for adaptation can be enhanced is an important research theme.

Emergent areas of focus in Yukon to date, all of which bridge multiple themes initially envisioned by the CMN, include:

- rapid environmental and social change (driven by climate, resource development)
- resilience and adaption to change (environmental and social)
- interplay of health and well-being with capacity and ability to engage
- baseline environmental data and comprehensive monitoring
- water/hydrology – quantity, quality and permafrost thaw
- food security
- ecosystem services in mountain systems and how these are affected by change

Results of previous outreach activities are here summarized according to initial CMN themes. More extensive and inclusive outreach is necessary to advance discussion of priorities.

<table>
<thead>
<tr>
<th>Examples of research needs pertaining to the environment</th>
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<tbody>
<tr>
<td>• impacts of changing environment on ways of life:</td>
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<tr>
<td>o permafrost thaw impacts on infrastructure, landscapes (including groundwater and habitats), communities, and traditional ways of life</td>
</tr>
<tr>
<td>o extreme events and their impacts on society &amp; culture, including infrastructure, health, well-being</td>
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<tr>
<td>• vulnerability and resilience to:</td>
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<tr>
<td>o climate change (ecosystem-wide)</td>
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<tr>
<td>o human industrial development (ecosystem-wide)</td>
</tr>
<tr>
<td>• sustainability of ecosystem services under changing environmental conditions</td>
</tr>
<tr>
<td>• changing vegetation in mountain habitats and influence on species-specific habitat needs</td>
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<tr>
<td>• sustained water quality and supply, including the impact of environmental changes, such as:</td>
</tr>
<tr>
<td>o human consumption</td>
</tr>
<tr>
<td>o agriculture</td>
</tr>
<tr>
<td>o fisheries</td>
</tr>
<tr>
<td>• glacier mass balance changes and their impact on mountain regimes, water and food security</td>
</tr>
<tr>
<td>• preservation of cultural mountain values in a changing environment, including harvest, recreation, and employment</td>
</tr>
<tr>
<td>• baseline data collection and monitoring</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Examples of research needs pertaining to health &amp; well-being</th>
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</thead>
<tbody>
<tr>
<td>• food security, quality of food and local food production</td>
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<tr>
<td>• mental health and wellness</td>
</tr>
<tr>
<td>• substance use</td>
</tr>
<tr>
<td>• rural and remote health and social service delivery</td>
</tr>
<tr>
<td>• reconciliation</td>
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<tr>
<td>• aging in place</td>
</tr>
</tbody>
</table>
- early childhood development
- traditional values and knowledge complimenting local knowledge in community-based research – methods, suitability, OCAP, TK in decision-making, etc.
- baseline data collection and monitoring

**Examples of research needs pertaining to culture/society/economy**

- northern agriculture and food security
- cost of climate change and the cost of adaptation
- pressures from climate change and development and the impacts on health and traditional lifestyles
- Indigenous knowledge mobilization
- language revitalization
- sustainable economic development
- technology and cold climate innovation
- baseline data collection and monitoring

**Examples of cross-cutting research needs**

- organization, storage, and public availability of scientific knowledge and data so it can easily be retrieved, transferred, shared and used to support evidence-based decision making
  - will optimize and enhance solution-oriented science
- projects that:
  - support the identification of industrial and resource developments that are ecologically sustainable, socially acceptable and economically sound
  - aim to address broad social issues such as mental health, crime, poverty, violence and education in the disciplines of health or social sciences, including systems and implementation
  - foster partnerships and engage multiple parties in collaborative research
  - include local and traditional knowledge
  - help establish and maintain a strong Yukon-based science community
  - support improved coordination between researchers
  - address an established need for information
  - support evidence-based decision-making and capacity building
  - contribute to improving data collection and management
  - stimulate public and private science
  - promote information sharing
- topics
  - food security
  - climate change effects on ecosystems
  - climate change and risk – flood, fire, permafrost melt, hydrology & water quality/quantity, climate extremes, timing of freeze-up and break-up
- relationship building and enhancing communication between researchers and community members (particularly First Nations), as well as other partners such as government and industry
- baseline data collection and monitoring
5.6 Recommendations

Some preliminary recommendations and areas are in need of further exploration:

1. **Develop and clearly articulate a guiding model of sustainability.**
   A defining feature of the CMN should be a model of sustainability that is forward-thinking and based on measurable indicators. The model should reflect the vision of the CMN, and recognize interdependence among components, not simply interconnectedness.

2. **Emphasize integration and encourage truly interdisciplinary research.**
   Interdisciplinary research is needed to find sustainable solutions to the complex challenges facing mountain regions and communities. When developing the central themes for the CMN, ensure they facilitate and advance processes for solving problems that draw on information, data, techniques, tools, perspectives, concepts and/or theories from more than one discipline.

3. **Critically examine and improve the research process.**
   A central part of the research platform should be the critical examination and advancement of the research process towards the supported establishment and maintenance of meaningful research partnerships. The research process should be, where appropriate, partnership-based, community-led, capacity-building, facilitating knowledge exchange, and a contributor to reconciliation.

4. **Empower Yukon First Nations.**
   Promote and empower existing leadership in Yukon First Nations to identify questions and propose ideas that represent their priorities and advance reconciliation.

5. **Develop appropriate evaluation tools.**
   Develop evaluation criteria for research projects that push past conventional measures of excellence and reflect the considerations outlined above.

6. **Consider the central theme of CHANGE – which brings both challenges and opportunities.**
   From the perspective of the Yukon IG, anticipating the most profound changes Yukon may experience is a priority. Considering these challenges and opportunities relative to the CMN vision could align community needs and the research that could help with future adaptation.

**Note:** Subsequent to the deliberations of the Yukon IG, the CMN has used the input from this group to identify themes that address some of the issues touched on here and in other discussion papers developed by the Yukon IG. A next step for the Yukon IG is further evaluation of the proposed themes, provision of addition feedback to the CMN, and potential identification of flagship initiatives that could be advanced in the Yukon.
5.7 References


Pope, S. 2015. Implementation science: S&T into action. Presentation to the Yukon Science Community of Practice, 1 April 2015, Whitehorse.

Canadian Mountain Network

Yukon Initiating Group

Discussion Paper

Capacity & Highly Qualified Personnel
6 Capacity & Highly Qualified Personnel

6.1 Problem Statement

This paper outlines feedback provided by the Yukon Initiating Group (Yukon IG) of the Canadian Mountain Network (CMN) specifically in regards to both capacity development and Highly Qualified Personnel (HQP) programs that will meet Yukon needs. Research activities that take place in the Yukon must support the development of long-term capacity in the territory and must meet capacity needs identified by Yukoners. These goals align with recommendations put forward by the Task Force on Northern Research, in their Final Report “Rebuilding Canada’s Role in Northern Research” (NSERC/SSHRC, 2000), and support the development of strong research streams in Canada’s North.

The current NCE Secretariat definition of Highly Qualified Personnel provides that the “Training Program proposed by the network is expected to add value to the formal training initiatives already available through the academic community and should aim at helping HQP find employment in the Canadian economy” (2015 Networks of Centres of Excellence Program Guide, 2015). Further, the Guide lists as an NCE evaluation element the “ability to attract, develop and retain outstanding researchers in research areas and technologies critical to Canadian productivity, economic growth, public policy and quality of life” (2015 Networks of Centres of Excellence Program Guide, 2015).

We suggest that the heavy emphasis on academic-based (undergraduate and post graduate level) training by the NCE secretariat and in the evaluation of NCE proposals is too narrow and is unlikely to meet the needs for highly-qualified personnel in Yukon and across northern and remote regions in Canada. Further, the current definition of HQP does not recognize alternative forms of knowledge that are essential to the development of a successful, impactful research program under the CMN, and to the training of well-developed, northern-relevant HQP. For example, traditional knowledge holders within Yukon First Nations, land users, guides, pilots, government employees, not-for-profit researchers, and advocacy groups hold non-academic knowledge. Importantly, a definition of HQP should recognize competency as well as capability in both academic and non-academic skills developed through the HQP training process.

The Yukon IG strongly supports the need for a revised definition of HQP that recognizes the inclusion of a range of academic as well as non-academic knowledge and skills essential to building and sustaining Yukon communities and economic development in Yukon. This is absolutely essential to developing and supporting long-term capacity in the territory, and aligns directly with SSHRC’s response to the Truth and Reconciliation Commission’s Call to Action 65 (SSHRC, 2016a; TRC, 2015) and its commitment to Aboriginal Research (SSHRC, 2016b).
6.2 Process Overview

Information used to develop this discussion paper was gathered from two different Yukon IG meetings (June and November 2016). The June meeting was held to introduce the CMN to Yukon stakeholders, potential members and other interested parties. Rotating breakout groups were used to explore several topics, including HQP and capacity building. Comments gathered from this breakout group were the basis for discussions in the November Yukon IG meeting, which focused on capacity building and HQP. Prior to the November meeting, an information request was distributed to the YukonIG (Appendix D). Responses from the pre-meeting information scan were amalgamated with breakout group feedback from the June meeting to develop a set of PowerPoint slides, summarizing responses to provide a starting point for further conversations. It was the fifth in a series of fall meetings of the Yukon IG.

6.3 Current Status in Yukon

Much of the conversation in the Yukon IG meeting about capacity and HQP focused on needs and recommendations. However, some comments with respect to the current status of capacity and HQP in the Yukon were made during the meeting. These include elements related to the following broad themes.

6.3.1 HQP / Training

- There is a wealth of existing knowledge and expertise in the Yukon, based on experience and alternative ways of knowing. These include elders and First Nation knowledge holders, as well as mountain guides, pilots, trappers, biologists, archivists, government scientists, reporters, research station operators, etc. (many/most of whom do not hold graduate degrees). There is a tremendous body of knowledge held by Yukoners.
- Currently, including local people in high-risk field activities (e.g., glaciology research) is challenging because of safety requirements (e.g., participants must have crevasse rescue training to participate in glacial fieldwork). This is a barrier to local participation in some fieldwork programs.
- Examples of successful programs and community-based activities:
  - The Teslin First Nation land stewards program gives participants first-hand experience on the land, and includes formal training for ecological monitoring. This provides a formalized element of recognition to participants upon program completion, builds capacity, and develops HQP.
  - Some programs, such as the NSERC CREATE program and the Northern Research Internships Program (terminated March 2011) include some HQP training through internships or job placements in the territory. This builds capacity. Participants report positive experiences.
  - There is some engagement with high school students in the Yukon (e.g., Yukon Geological Survey Outreach Geologist, Science Adventures program at Yukon College, etc.).
Kluane First Nation high school students involved in a fish study in Kluane Lake were involved in sampling and traveled to a university lab to analyze the samples they collected, through a University of Waterloo project. Engaging students at this level is beneficial for future Yukon capacity building.

Some programs (e.g., Northern Internship Program) fail because of lack of uptake, but when they work, they are very effective in supporting the development of good relationships (e.g., between student researcher and community), which contributes to productive long-term research collaborations.

6.3.2 Knowledge Creation, Transfer, and Translation

- Knowledge transfer is used to support capacity development in the Yukon, especially in Yukon communities and First Nations, and between different communities of practice.
- A lack of baseline information and need for comprehensive monitoring is regularly identified across the Yukon. On-the-land/local training/capacity building can contribute to filling this identified need. Smart programs can create a common knowledge framework across the territory. Many First Nations lead land based and culture camps, and other land-based training programs exist across the North.
- There is the potential to take greater advantage of visiting researchers that spend time in the territory every year. They build knowledge and take it out again with them. Visiting researchers are limited by financial and time constraints, and are often unsure how to engage despite the willingness to do so. Sometimes only the students of a PI will spend time in the Yukon, making long-term relationship building even more difficult.
- Currently, researcher-community relationships are the main avenue for building capacity in the Yukon.
- Yukon Government is largest employer of HQP. There is a growing community of science practitioners as well as Yukoners pursuing post-graduate degrees.
- There are currently barriers to hiring qualified individuals in the territory, including the difficulty in creating positions that can lead to sustainable, long-term employment for HQP.

6.4 Identified Needs in Yukon

Aspirational or broad needs identified related to HQP and capacity development in the Yukon are summarized below. More specific needs are framed as recommendations and listed in the following section.

6.4.1 HQP / Training

- There is agreement that capacity building transcends beyond the traditional definition of HQP. All regions across the North will benefit from a revised HQP definition.
- Broadening the HQP definition to recognize capacity development outside of conventional HQP could let non-academics be co-PIs on research projects, providing flexibility for partnerships including with First Nations and also with those stakeholders and partners currently excluded from full partnership(s) (e.g., municipalities, NGO’s, etc.).
- There is a need to consider longevity and transferability of employment in fields of training CMN focuses on.
- There is a need to ensure that we are building capacity that is actually needed in Yukon. Consider what Yukon will need in terms of capacity and skills required including those outside the immediate realm of research / knowledge gathering (e.g., critical thinking, writing, science communication, policy literacy).
- In the Yukon, we are doing two kinds of HQP training: 1) we are training HQP from the Yukon to build Yukon capacity, and 2) we are also training HQP from outside institutions that will not stay in the Yukon but may continue to build a research legacy. This has good value for Canada. We can continue to do this second kind of training, recognizing those benefits.
- There is a need to continue to train researchers in knowledge communication, research translation, knowledge exchange, and media interactions.
- There is an opportunity to do cascading HQP training – supervisor trains grad student, who in turn engages with high school student. For example, NSERC is including high school students in training programs.
- Supervisors and those doing HQP training will also need training and support, metrics to measure success, and recognition of innovation in training.

6.4.2 Knowledge Creation, Transfer, and Translation

- There is a need to develop a better system to link researchers coming in to the territory with Yukoners working in complementary subject areas.
- Retired scientists, technical, non-technical, and other personnel can help substantially.
- There is interest in the development of citizen science generally, including both Indigenous and non-Indigenous Yukoners, and in developing capacity via supporting the exchange of knowledge that is not generated in a scholarly venue but that can help shape, direct and define scientific research questions as well as First Nation and community priorities.
- There is an opportunity to create more jobs in academia in the Yukon, via the Yukon College university transition and partnerships with other universities (e.g., University of Alberta model). There is potential to further develop the Yukon knowledge economy.
- Research themes can be mined from processes like YESAA 5-year review, which focused on cumulative impacts and socio-economic assessment. This serves both HQP development through the creation of new research questions and Yukon via addressing identified needs.
6.4.3 Capacity Development

- [In discussions of capacity, infrastructure needs to be considered along with training and knowledge flow. To develop either without the other is a failed investment.]
- [The ability of Yukon First Nations to participate in CMN activities in the territory should be further developed. Meaningful engagement will partially depend on the capacity of individual First Nations.]
- There is an opportunity to develop a knowledge service among Yukon communities and Yukoners for researchers, with respect to logistics. For example, Yukon kids know how to dress for cold weather and they can teach new students coming from the south how to do the same. CMN could support the development of logistical training and skill transfer elements in communities. This could translate to training and qualifications for community members – e.g., community members have certification to teach bear safety and bush orientation to new researchers.

6.5 Recommendations

Some key areas of focus and opportunity related to capacity building and HQP were identified by the Yukon IG. These recommendations are intended to be somewhat concrete and actionable, representing potential niche areas of service, development or focus for the CMN with respect to capacity building and HQP development. These recommendations related to the following broad themes.

1. **Redefine or expand the definition of HQP**
   There was consensus among Yukon IG members that the current Tri-Council definition, and the NCE program guidelines, with regards to HQP are narrow. Table 6.1 includes key elements listed in the definitions of HQP for each of the Tri-Council agencies, as well as some high-level recommendations from the Yukon IG regarding elements to be included in a redefinition.

   More detail regarding the Yukon IG’s recommendations, and their relevance to the role of HQP in the research process, is provided in *Appendix D: A comparison of established vs. expanded roles for HQP*. The Yukon IG recognizes that it is essential for CMN to engage the NCE Secretariat in a redefinition of HQP that respects the current goals of training, but also recognizes needs of Yukon and other northern Canadian regions. This has to be done soon, prior to the submission deadlines, to ensure that the CMN proposal can be evaluated objectively. This IG is aware that other existing NCE’s, such as ArcticNet, have recognized the need for HQP redefinition and anticipate that the NCE Secretariat is aware of this suggestion.
Table 6.1 Definitions of HQP compared and contrasted.

<table>
<thead>
<tr>
<th>Key elements of Tri-Council definitions of HQP</th>
<th>Yukon IG recommendations for revised/expanded definition of HQP</th>
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<tbody>
<tr>
<td>• Includes undergrad to post-doctoral level, technical and research personnel</td>
<td>• Recognize HQP as one who is trained through process and emerges with new knowledge and skills</td>
</tr>
<tr>
<td>• Expects theses or comparable contributions, followed by professional careers in natural sciences and engineering</td>
<td>• Recognize development of non-academic HQP (e.g., high school or college-level students in communities, research technicians employed by their First Nations to work with researchers, etc.)</td>
</tr>
<tr>
<td>• Expects advanced training and acquisition of research skills</td>
<td>• Include programs like professional track post-grad degrees (e.g., non thesis-based)</td>
</tr>
<tr>
<td>• Expects mentoring and training to facilitate new researchers’ entry in the field</td>
<td>• Prepare HQP for a variety of career tracks (especially non-academic)</td>
</tr>
<tr>
<td>• Encourages education and outreach, improved teaching and learning</td>
<td>• Recognize non-thesis research products as equivalent to theses/publications</td>
</tr>
<tr>
<td>• Expects knowledge mobilization leading to intellectual, cultural, social and economic influence, benefit and impact</td>
<td>• Include interpersonal and professional skills (e.g., communication, partnership development, proposal writing, budget management) in addition to science skills</td>
</tr>
</tbody>
</table>

(Source: CIHR, 2012; NSERC, 2014; SSHRC, 2016c)

2. Support excellent HQP development
   • **Develop and provide certification to HQP.**
     An HQP certification could assist with formalization/recognition required by Tri-Councils and NCE for HQP status. This could introduce an avenue for more flexible training of non-academic track HQP. In small communities, gaining certified skills can be valuable and lead to other employment opportunities.

   • **Develop more residency-based HQP training opportunities**
     Alternative HQP training, such as NSERC CREATE, provides opportunities for graduate students to live in the locales of their research and be immersed for longer periods in the communities they are based in. This program should be developed with the intention of fostering personal connections and long-term, trust-based research partnerships.

   • **Develop transferrable skills in students**
     Include mandatory training sessions for students that focus on tangible skills needed for success in research but are not typically taught in school, such as plain language writing, budget development, and partnership development. NSERC CREATE has a series of Eye-Opener sessions that could be a model.
• **Develop a training fund for students.**
  This could include all training not supported by researcher grant money, such as safety training, media training, writing courses, project management, conflict resolution, work-life balance, etc.

• **Encourage mentorship within the academic community.**
  Develop a mentorship program that expands beyond the typical student-supervisor mentor relationship, and is mutually beneficial – e.g., between an industry partner and a student (who could become a future employee); between a community member and a student (who could lead their own co-developed research project). Draw on expertise of retired experts and other leaders. Develop a youth advisor who can work on a mentorship program, and connect with potential new HQP, especially non-academic HQP that can contribute to research.

• **Empower supervisors and principal investigators in shifting to these new principles.**
  Support supervisors/principal investigators in efforts to develop excellent HQP under new principles of the CMN. The CMN can support the development of HQP by providing tools and resources to supervisors that encourage the principles of training suggested in this paper.

• **Develop a student association within the CMN.**
  This could link with or build off of APECS, to support longevity, but should avoid a model like the ArcticNet student association, which is directly attached to a funding scheme.

• **Develop reciprocal relationships with partner universities.**
  Encouraging these relationships could encourage the development of Yukon HQP through access to library resources, journals and programs. These relationships could also be used to give local experts recognition, i.e. via adjunct appointments.

• **Recognize and integrate two-way knowledge flow and training elements in mountain environments.**
  These flows include 1) local knowledge and 2) regional/not-regionally-specific knowledge. CMN should facilitate this knowledge flow by bringing students to the North to learn, but also by bringing people who have local knowledge and exposing them to broader systems thinking. The NSERC model is built around taking people from outside the system and bringing them in, but CMN could build additional benefit to Canada by doing the opposite in addition.

• **Build the paradigm of two directions of knowledge flow into the concept of capacity building.** Recognize that unique local conditions defy broad generalizations, so local knowledge is an essential element of growing knowledge in these areas.
3. Supporting Knowledge Creation, Transfer, and Translation
   • **Require that all researchers working in the territory take an online Yukon First Nations 101 course.**
     Course content could include history, context, governance, etc. Participants will be instructed that participation in the course is the first step in learning about and engaging with First Nations.
   
   • **Recognize the contribution of local knowledge as a significant in-kind contribution to CMN activities and research projects.**
   
   • **Develop the communications and production capacity at CMN headquarters.**
     This capacity should be accessible to CMN researchers and students. This could include knowledge translation and communications training and resources, new technology training and resources, alternative media demonstrations, etc. Such an office at CMN could support the development of tangible skills and be a training objective in and of itself. For example, there is wide acceptance among First Nation youth of the use of social media and mixed media as a way of gathering information, documenting, learning, and telling stories that could be built upon.

4. Support the development of capacity
   • **Clearly define what it means to develop capacity.**
     In this regard, the Yukon IG defines a goal of increased long-term capacity to represent a stable and net increase in the number of people living and working in Yukon and similar regions with training and expertise in the skills essential to building and sustaining healthy communities, environments, and economic development. These skills encompass a broad range of practical, abstract, and technical skills obtained through both training and real-life experience.
   
   • **Allow recognition of Principal Investigators outside of academia.**
     Expert, PhD or equivalent experience-level experts with substantial research and northern expertise work outside of academia in many northern regions. Allowing their full participation in CMN activities as Principal Investigators (PI) will strengthen the CMN’s activities, ensure northern leadership in CMN activities, help develop excellent mentorship opportunities, contribute to the development of HQP and capacity in the North, and ensure research is relevant and responsive to northern needs.
   
   • **Commit to supporting the development of capacity within Yukon First Nations to enable engagement with the CMN.**
     Without this, it will be very difficult for Yukon First Nations to be actively involved in CMN activities and CMN will not reach full potential in terms of impact and capacity development.
• **Create regional/indigenous research advisor positions in key areas of CMN research.**
  This scheme could be similar to the Indigenous Research Advisor model that ArcticNet employs.

• **Use knowledge communication and community-researcher relationships as a core area of focus in capacity building.**
  It is possible to fit many types of positions under a “knowledge communication” umbrella.

• **Develop a CMN Safety Office.**
  There is real opportunity for CMN to lead in this regard. CMN could be a leader in developing a culture of safety among HQP that permeates beyond the CMN and is carried into industry and private or professional practice. CMN could set requirements that mandate safety practices throughout the CMN, such as mandatory safety plans for all funding applications

• **Create sustained employment for HQP beyond the CMN.**
  It can be difficult for HQP in the territory to find sustained, long-term employment in their fields of expertise. Continued development of the knowledge economy in the Yukon, supported by CMN activities, will help create sustained opportunities for HQP.

6.6 References


Canadian Mountain Network

Yukon Initiating Group

Discussion Paper

Yukon Research Infrastructure
7 Yukon Research Infrastructure

7.1 Problem Statement

The purpose of this discussion paper is to explore Yukon-specific mountain-related research infrastructure needs and interests. In particular, this paper addresses the availability of infrastructure for the support of research in Yukon and possible areas of additional research infrastructure development in conjunction with the Canadian Mountain Network (CMN).

7.2 Process Overview

The majority of the information contained in this discussion paper was sourced from a Yukon Initiating Group (Yukon IG) meeting that took place in November 2016. The group was canvassed on key issues prior to the meeting, through an information request (Appendix A). The responses were presented and used as the foundation of further discussion. A detailed summary of the feedback received in response to this information request is available separately. Additional insight and information was gained through one-on-one interviews with key stakeholders that were carried out by a Yukon Government GradCorps intern. A draft paper was presented to the Yukon IG for review at a workshop in January 2017, which was subsequently revised.

7.3 Current Status in Yukon

Two online inventories exist that describe some of the existing research facilities and monitoring infrastructure in place in Yukon that can support the activities of the CMN.

- **Canadian Network of Northern Research Operators (CNNRO) Inventory:**
  
  http://cnnro.ca/yukon/

  CNNRO is a network of research support facilities that provide the know-how and infrastructure that make research possible in Canada’s north. This inventory provides detailed descriptions of member research facilities, including the Government of Yukon facilities. In April 2017 (at the time of drafting this discussion paper) 14 facilities were listed in the inventory in Yukon:

  - Arctic Institute of Community Based Research
  - Beaver Creek Permafrost Test Site
  - Gunnar Nilsson & Mickey Lammers Research Forest
  - Herschel Island – Qikiqtaruk Territorial Park
  - H.S. Bostock Drill Core Library
  - Ivvavik National Park (Imniarvik Sheep Creek Base Camp)
  - Kluane Lake Research Station (Arctic Institute of North America / University of Calgary)
  - Old Crow Arctic Research Facility
  - Resources and Sustainable Development in the Arctic
  - Whitehorse – Atmospheric Radionuclides Monitoring Station
• Wolf Creek Research Basin
• Yukon Government Research Farm
• Yukon Research Centre
• Yukon Wildlife Preserve

• Government of Yukon Research Facilities Inventory:
  This inventory describes the nine research facilities managed and/or funded by Government of Yukon. Government of Yukon’s research facilities joined the Canadian Network of Northern Research Operators (CNNRO) in 2015 and are also described in the CNNRO inventory.

Additional research and monitoring facilities that could support CMN activities are being identified through an on-going process (Appendix G).

Lastly, the Yukon IG is aware that a number of monitoring sites and programs have been closed, decommissioned, or underfunded. Exploring the reasons for the decommissioning of these sites and programs, and the potential value of resurrecting these sites or programs to support CMN activities, may be warranted. For example, if there is a goal of enhancing monitoring activities, it may be more cost-effective and efficient to put some of these sites or programs back on line than to start a new program with similar goals.

7.4 Identified Needs in Yukon

A number of needs or priorities for research infrastructure have been identified in Yukon through a prior process (Table 7.1).

Table 7.1 Yukon research infrastructure priorities previously identified.

<table>
<thead>
<tr>
<th>Need or priority for research infrastructure</th>
<th>Identified by (process)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yukon College University transition</td>
<td>Yukon College (Strategic Plan); Government of Yukon (Platform Commitment)</td>
</tr>
<tr>
<td>Heritage resources centre providing Class A collections storage and program service support for Museums (Conservation Lab), Historic Sites (Restoration Shop and (casting lab), and Heritage Resources (Archaeology and palaeontology labs)</td>
<td>Government of Yukon Department of Tourism and Culture and broader heritage community (in planning stages)</td>
</tr>
<tr>
<td>Klondike palaeontology field station</td>
<td>Government of Yukon Department of Tourism and Culture, Klondike Placer Miners Association (in planning stages)</td>
</tr>
<tr>
<td>Establish an open data repository</td>
<td>Government of Yukon (platform commitment/mandate letters)</td>
</tr>
<tr>
<td>Support Yukon First Nations in establishing and administering archives of traditional knowledge</td>
<td>Government of Yukon (platform commitment/mandate letters)</td>
</tr>
<tr>
<td>Enhanced connectivity and bandwidth for all Yukon</td>
<td>Government of Yukon (platform commitment/mandate letters)</td>
</tr>
<tr>
<td>Need or priority for research infrastructure</td>
<td>Raised by:</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Enhanced access to peer-review journal articles, research summaries and science-</td>
<td>Government of Yukon and Yukon College</td>
</tr>
<tr>
<td>for-policy briefs</td>
<td></td>
</tr>
<tr>
<td>Collections/natural history curation space</td>
<td>Yukon College</td>
</tr>
<tr>
<td>Data management infrastructure</td>
<td>Yukon College</td>
</tr>
<tr>
<td>Mobile laboratories</td>
<td>Yukon College</td>
</tr>
<tr>
<td>Differential GPS units</td>
<td>University of Ottawa</td>
</tr>
<tr>
<td>Improved collaboration, communication, data sharing between facilities</td>
<td>University of Alberta</td>
</tr>
<tr>
<td>Increased communication between research facilities and communities</td>
<td>University of Alberta</td>
</tr>
<tr>
<td>Digitization and access to indigenous knowledge that is stored in hard copy</td>
<td>Wildlife Conservation Society</td>
</tr>
<tr>
<td>reports and maps</td>
<td></td>
</tr>
<tr>
<td>Social science laboratory</td>
<td>Various</td>
</tr>
<tr>
<td>Laboratories and sample testing equipment</td>
<td>Various</td>
</tr>
<tr>
<td>Monitoring stations for regional hydrography</td>
<td>Wildlife Conservation Society</td>
</tr>
<tr>
<td>Permanent sample plots for monitoring vegetation changes</td>
<td>Wildlife Conservation Society</td>
</tr>
<tr>
<td>Expanded and well curated collections of biodiversity reference collections</td>
<td>Wildlife Conservation Society</td>
</tr>
<tr>
<td>Continued availability of helicopters in accessible locations.</td>
<td>University of Ottawa</td>
</tr>
<tr>
<td>Technology to support health and social science research (statistical packages,</td>
<td>Government of Yukon, Department of Health and Social Services</td>
</tr>
<tr>
<td>GIS, computer hardware, etc.) and software that allows linkage of</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A number of other needs or priorities for research infrastructure have also been raised that have not been vetted through broader prioritization processes for adherence to established agency priorities (Table 7.2).

Table 7.2 Broad research infrastructure needs previously identified.
<table>
<thead>
<tr>
<th>databases</th>
<th>Various</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coordination of transportation to and from Yukon Research Centre, Kluane Lake Research Station and remote/ mobile camps</td>
<td>Various</td>
</tr>
<tr>
<td>Enhanced network of monitoring stations for regional hydrography (stream flow and temperature; lake level and temperatures)</td>
<td>Wildlife Conservation Society</td>
</tr>
<tr>
<td>Enhanced monitoring of critical environmental changes (permafrost, glaciers, rivers, lakes)</td>
<td>Various</td>
</tr>
</tbody>
</table>

A number of needs related to supporting research and monitoring logistics were also identified, including:

- Access to a centrally maintained and administered equipment pool would benefit both CMN researchers and local agencies in Yukon.
- Equipment pools could be strategically placed in mountain regions across Canada, with due consideration given to associated needs for personnel, maintenance, and training while managing liability.
- An important element of establishing an equipment pool is providing a training program for a broad spectrum of users to ensure equipment is properly used and maintained. This is essential to maximize interoperability and comparison between studies and to ensure safety of the users.

A number agencies and programs providing equipment and logistics support for researchers were cited that may offer some lessons/learned and best practices for the CMN including:

- University NAVSTAR Consortium (UNAVCO) – A non-profit US based university-governed consortium that facilitates geoscience research and education using geodesy. UNAVCO operates and supports geodetic networks, geophysical and meteorological instruments, a free and open data archive, software tools for data access and processing, cyberinfrastructure management, technological developments, technical support, and geophysical training.
- IRIS - Incorporated Research Institutions for Seismology – IRIS, whose members include all US universities with research programs in seismology, facilitates seismological research and investigation by warehousing, supporting and servicing seismic equipment.
- University of Alberta (UofA) Field Research Office (FRO) – The FRO aims to facilitate off-campus research activities, including all types of field, archival, library or other research, as well as field trips and field schools, carried out nationally or internationally. The FRO provides centralized access to all policies and regulations pertaining to field research conducted by faculty and students, access to equipment, training, and field safety forms.
- Polar Continental Shelf Program (PCSP) – operated by Natural Resources Canada, its mission is to provide safe, efficient and cost-effective logistics in support of science and government priorities throughout the Canadian Arctic. The program also administers equipment access.
• University of Tromsø provides exemplary logistical support for research on Svalbard including a health, safety and environment program that provides safety instructions for fieldwork and excursions, as well as guidance for developing field safety plans.

7.5 Recommendations

While current research infrastructure in Yukon, as described in this white paper, can support an increased level research activity that would be associated with the CMN, there are some limitations and gaps that if addressed strategically could greatly enhance the potential activities and benefits of the CMN. Our recommendations include:

1. **Establish regional hubs for CMN activities**
   A regional hub is needed to manage and administer CMN activities in the territory. This hub should take on the following roles: supporting community-researcher interactions, managing an equipment pool, providing training, supporting field safety and logistics, and supporting archiving and use of data in a regional data centre.

2. **Strategically invest in new facilities**
   Identify key investments that enable the development of research niches by building on existing, specialized areas of research and creating areas of potential research excellence.

3. **Complete a state of monitoring report**
   Initiate a comprehensive assessment of the state of monitoring both CMN-wide and within Yukon.

4. **Assess infrastructure needs to support enhanced monitoring**
   Facilitate a conversation on infrastructure needs to support enhanced monitoring both CMN-wide and within the Yukon.

5. **Enhance monitoring networks**
   Develop and build on existing environmental, health and social sciences networks, informed by a Yukon-specific assessment of the state of monitoring.

6. **Enhance coordination and capacity for community-based monitoring**
   A desire has long been expressed for expanded community-based monitoring networks that incorporate local knowledge and capacity at the community level. Community based monitoring programs ensure community participation in monitoring, and support incorporation of the results of monitoring programs into local management and planning initiatives.
7. **Enhance logistical support**
   Support needs for research range from enhanced journal access, to accessible technology for local agencies, to coordinated access to remote field camps for non-resident and resident scientists.

8. **Provide access to an equipment pool**
   A repository of common scientific equipment that is managed by a central person and can be accessed by CMN users would reduce the cost of purchasing and transporting commonly used equipment. This pool would also need to be made available for use by Yukon-based researchers, organizations and governments.

9. **Enhance training**
   Training needs related to research and monitoring infrastructure and equipment includes: use and maintenance of equipment in the equipment pool for a broad spectrum of users, use of GPS reference systems, contributing to using and accessing data centres, field safety, and conducting research and monitoring activities in Yukon with respect and reciprocity.

10. **Create a comprehensive inventory of all Canadian mountain research facilities**
    Using CNNRO/Yukon inventories as a model, a comprehensive inventory facilitates collaboration and cost sharing.

7.6 References


CNNRO (Canadian Network of Northern Research Operators). Inventory of northern research facilities. Available online: [http://cnnro.ca/](http://cnnro.ca/)


GY (Government of Yukon). Planning for a Yukon Heritage Resources Centre.


Canadian Mountain Network

Yukon Initiating Group

Discussion Paper

Research Data Management
8 Research Data Management

8.1 Problem Statement

The purpose of this paper on research data management is threefold. It will provide:

- High level information regarding the research data management (RDM) landscape and some of the specific RDM initiatives in Canada
- A general synopsis of some of the identified RDM needs of Canadian Mountain Network (CMN), highlighting those which relate specifically to the Yukon region
- An overview of the recommendations and some of the identified ‘next step’ initiatives which are being undertaken by CMN to help address RDM needs

8.2 Process Overview

The information contained in this discussion paper comes from a variety of sources. A Yukon Initiating Group (Yukon IG) meeting held on November 14, 2016, targeted research data management for focused discussion, allowing for feedback and input from Yukon stakeholders. Additionally, a number of research data management discussions have also taken place at other regional IG and general CMN meetings throughout 2016. Additional input has been received from local, national, and international RDM related working groups and initiatives.

8.3 The Canadian Research Data Management (RDM) Landscape

The Canadian RDM landscape has witnessed a marked shift in recent years regarding research data management, with stakeholders, disciplines, and regions of all kinds recognizing RDM as an essential component to conducting sound and responsible research. There are now a number of national level organizations in Canada, such as the Canadian Association of Research Libraries (CARL), Research Data Canada, and Compute Canada, which are actively developing, promoting, and supporting best practices in research data management. Such best practices encompass the entire data lifecycle and are aimed at supporting both immediate research data management needs and the promotion of research data sharing, as well as long-term storage, preservation, and discovery.

8.3.1 Portage Network

One of the key organizations at the forefront is CARL’s Portage Network. Launched in 2014, this research data platform is dedicated to the shared stewardship of research data in Canada. The Portage Network is developing a national research data culture, fostering a community of practice for research data, and building national research data services and infrastructure. Portage operations are organized around two major components: a National Network of Expertise and infrastructure platforms.
**National Network of Expertise**

There are currently six established Portage Expert Groups made up of skilled professionals across Canadian research institutions spanning a variety of essential research data areas:

- research data management (RDM) planning
- data preservation
- data discovery
- RDM training
- research intelligence
- data curation

Additional Expert Groups soon to come include research data and ethics, metadata, and data repositories. The immediate goals of the Portage Expert Groups are to develop RDM related resources, as well as to provide expert advice and practical help to assist with the management of research data through all stages of the data lifecycle. This expertise is being made available in both English and French to anyone working in a Canadian university or research institutions.

**Infrastructure Platforms**

Portage is taking a lead role in working with research institutions, regional library consortia, and other infrastructure partners to develop the various infrastructure and service components needed for enabling researchers to identify and implement key data management planning, access, preservation, and discovery strategies. One of the major components developed by Portage is the **DMP Assistant**, a national, open, bilingual data management planning tool to assist researchers in identifying optimal strategies and services for managing research data throughout the data lifecycle.

**Data Management Plan (DMP) Assistant**

The **DMP Assistant** acts as a living data management-planning document, walking users step-by-step through RDM topics via a series of questions, allowing them to capture important information and note key questions and challenges that need to be addressed. The **DMP Assistant** offers users a platform to help them fulfill data management planning requirements of funders, is able to be securely shared among research teams, and is freely available to all researchers in Canada. Data management planning for the CMN and its stakeholders will use the **DMP Assistant**.

8.3.2 Tri-Council Statement of Principles on Digital Data Management

One of the key catalysts for the recent shift towards the increasing focus upon the importance and necessity of RDM comes from the research funders.

Funding organizations and agencies at different scales (local, regional, national) and across disciplines more commonly require data management planning and research data management as essential components of any research that they fund. Most notably are the Tri-Council Agencies: the Natural Sciences and Engineering Research Council of Canada (NSERC), the Canadian Institute of Health Research (CIHR), and the Social Sciences and Humanities Research Council of Canada (SSHRC). These major federal granting agencies promote and support research, research training, knowledge transfer, and innovation within Canada.
While each of these funding organizations has had varying requirements relating to the management of research data for some time, they collectively released (July 2016) the Tri-Agency Statement of Principles on Digital Data Management that outlines expectations regarding RDM well as the shared responsibilities between researchers, communities, institutions and funders. It is anticipated that this statement is to serve as a precursor to more established and directed policies to come in the near future.

8.3.3 SSHRC: Guidelines for the Merit and Review of Aboriginal Research & TRC Call to Action 65 Response

SSHRC has developed a set of Guidelines for the Merit and Review of Aboriginal Research\(^1\) to ensure that their principles for merit review are upheld, and that Aboriginal research incorporating Aboriginal knowledge systems is recognized as a scholarly contribution. The guidelines provide support for Aboriginal research to be conducted thoughtfully, with sensitivity, and with consideration for who conducts the research and why and how it is conducted. These guidelines are meant to complement information contained within the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2) and, specifically, Chapter 9: Research Involving the First Nations, Inuit and Métis Peoples of Canada\(^2\).

In November 2016, the Royal Commission on Aboriginal Peoples (RCAP) 20th anniversary forum was held at the University of Manitoba. The forum brought together stakeholders from across Canada to connect and have dialogue focused, in part, on how engagement, research, and policy changes can be utilized in moving forward positively and strengthening the foundations of healthy First Nations, Métis and Inuit communities. At the forum SSHRC responded to the Truth and Reconciliation Commission of Canada’s (TRC) call to action 65 which reads: “We call upon the federal government, through SSHRC, and in collaboration with Aboriginal peoples, post-secondary institutions and educators, and the National Centre for Truth and Reconciliation and its partner institutions, to establish a national research program with multi-year funding to advance understanding of reconciliation” (TRC, 2015) SSHRC’s response document indicated that engagement with Indigenous and postsecondary academics, administrators, elders and other leaders, and students yielded a number of ideas on how to respond to TRC Call to Action 65 (SSHRC, 2016).

Among the ideas that SSHRC proposed in the response were potential elements for a national research program to advance understanding of reconciliation, with some of these being related directly to research data and their management. Specifically, it was highlighted the efforts should be made to:

- gather, protect and provide data and analysis of value to Indigenous communities and to scholars working with these communities
- draw on experience with the Research Data Centres, organized in collaboration with Statistics Canada, and coordinate with organizations such as the National Centre for Truth and Reconciliation

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Reconciliation, First Nations Information Governance Centre, and Inuit Knowledge Centre.

It is important the CMN acknowledges these recommendations and aligns with them as much as possible when developing data principles, governance, and data management plans.

8.4 Current Status in Yukon

A Yukon IG meeting held on November 14, 2016 included a session dedicated to the discussion of CMN RDM. The purpose of the RDM session was to connect and engage with mountain research stakeholders in the Yukon regarding the collection, use, and management of mountain research data. The session helped to identify and understand the perspectives of mountain research stakeholders in the Yukon, and the feedback garnered will be used to help inform the RDM planning activities of the CMN. During the session’s discussions, a number of key topics were touched upon, including such things as stakeholder engagement regarding RDM, the need to acknowledge and address the management of traditional knowledge and First Nations data, data storage and access, and data re-purposing (Table 8.1).

8.5 CMN & RDM: ‘Next Step’ Initiatives

In efforts to address early on some of the research data management needs of the CMN, there are a number of key initiatives that will begin to come underway in 2017. Below is a brief summary of these.

8.5.1 CMN Data Principles

At this early stage the CMN is not yet ready to begin creating a detailed data management plan. CMN is, however, at a stage where key data principles can be identified that will help guide the management of data. These principles can then be used both to strengthen the letter of intent (LOI) for the NCE proposal as well as to act as standards for informing the development and implementation of data management plan(s), data policies, and a Research Data Management Committee (RDMC) Terms of Reference. Over the coming months leading up to the submission of the LOI, the CMN Data Principles will be drafted. This work will in part be informed by looking to existing research data principles and governance such as those set forth by the Tri-Agency Statement of Principles on Digital Data Management, the Statement of Principles and Practices for Arctic Data Management, and the Portage Network Principles.

8.5.2 CMN Research Data Management Toolkit

In early 2017, work will begin on the development of a toolkit of RDM resources. These will help researchers and stakeholders directly involved in developing CMN DMP’s and also be used as learning tools to help all researchers, trainees, and stakeholders build knowledge and capacity regarding data management and planning. There will be general discussions regarding what the toolkit should consist of and how it will be promoted and made accessible. The identification of key components and compilation of resources are essential to the development of the toolkit.
<table>
<thead>
<tr>
<th>Topic</th>
<th>Key discussion notes</th>
<th>Additional Comments &amp; Future discussions</th>
</tr>
</thead>
</table>
| **RDM Stakeholder engagement** | * It is important that CMN engages mountain research stakeholders in the Yukon regarding the management of mountain research data  
* Mountain research stakeholders in the Yukon can play an important role in helping to guide CMN data management planning activities  
* As work progresses there will be more opportunities for engaging Yukon stakeholders regarding the management of CMN research data | * A CMN research data management committee will be established for providing guidance, expertise, and governance regarding the management of CMN data.  
* Having a key member(s) from the Yukon on the research data management committee will be a great asset and can play an integral role in helping to engage mountain research stakeholders in the Yukon |
| **Sensitive data:**  
  ● Traditional Knowledge  
  ● First Nations data | * It is critical that CMN look to adhere to established best practices and guidelines when dealing with traditional knowledge and First Nations data, such as those outlined by the First Nations Principles of OCAP  
* The management of traditional knowledge and First Nations data is an extremely important topic that needs to be acknowledged and considered very early on  
* Any CMN data management plans should include a section dedicated to the management of traditional knowledge and First Nations data | * The topic of appropriate management of traditional knowledge and First Nations data will be brought forward to the CMN Data Management Committee for discussions  
* When building any data management plan(s) for CMN data the inclusion of a dedicated section to support the management and use of traditional knowledge and First Nations data will be discussed and should be implemented |
| Government of Yukon Scientists & Explorers Act | Data storage and access:  
‘Is either a centralized or distributed data storage facility model envisioned?’ |  
CMN will refer to and leverage the Government of Yukon ‘Scientists and Explorers Act’ and its guidance processes in efforts to explore what existing data may be available and accessible  
Where possible, CMN will seek to work with the Government of Yukon to develop and strengthen data tracking and management capabilities |
|---|---|---|
| ● The Government of Yukon Scientists and Explorers Act\(^3\) mandates that researchers from outside of Yukon engaged in social and natural science research must obtain a scientists and explorers license  
● There may be opportunities for CMN to use Science and Explorers Act Guidebook on Scientific Research in the Yukon\(^4\) to help gather information on data which may be potentially available  
● It is possible that there are opportunities for collaboration between CMN and the Yukon Government to develop and strengthen data tracking and management capabilities that would serve both groups. | ● The model(s) for storing and access are to be determined  
● Data and data types have not been identified at this stage. These will be discussed in detail pending a successful application for funding  
● Ethical considerations will need to be attended to regarding storage and access of data collected from human participants. These will be discussed at the early stages of data management planning.  
● Different options, pros/cons of either model; possible that a hybrid model will be explored | ● There are many details to consider regarding data storage and access, and so this is something that will be on future agendas of the CMN Research Data Management Committee to be discussed |

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\(^3\) [https://tc.beta.gov.yk.ca/sites/default/files/Scientists_and_explorers_Act.pdf](https://tc.beta.gov.yk.ca/sites/default/files/Scientists_and_explorers_Act.pdf)

| **Data re-purposing** | • Yukon stakeholders agreed that the concept of data re-purposing is great  
• Important to recognize that data involving information collected from human participants may require informed consent relating to their re-purposing beyond the scope within which they were originally collected  
• It was noted that there is substantial data collection occurring in the Yukon but no real infrastructure in place to help with their management, archival, and potential re-purposing  
• Historic data can be extremely valuable for informing and contributing to primary research conducted by mountain researchers  
• If CMN is funded and becomes a source of funding, it was recommended that it should adopt a policy that it is a requirement of receiving CMN funding to complete a DMP and make appropriately open data accessible  

| **Data management planning (DMP)** | • DMP’s are a formal way of documenting how data will be handled throughout the research lifecycle, including active phases and beyond into preservation and appropriate open access  
• Good data management planning can be a competitive advantage in a funding proposal. Increasingly, DMPs are being viewed by funders as important components to successful applications  
• A DMP can help to ensure compliance with funding agency policies  

| **Sound management of research data throughout the data lifecycle will be a basic tenet of the CMN Data Principles**  
• The recommendation that projects funded by CMN should be required to complete a DMP is a good one, and will be brought forward to the CMN Research Data Management Committee for discussion pending a successful application for NCE funding | • It was noted that the Yukon stakeholders were supportive and very interested in learning more about DMPs and the Portage DMP Assistant  
• In the near future there will be some opportunities for learning more about DMPs, as well as applied information resources via the *CMN Research Data Management Toolkit* to help researchers complete them |
8.5.3 Map of Mountain Research Data Management Ecosystem

The CMN would benefit greatly by developing a comprehensive ‘map’ of core mountain research projects and their data that exist regionally, nationally, and internationally. Additionally, this map would include information regarding their approaches to life-cycle data management, sharing and stewardship, offering points of reference and examples. Ultimately, a platform offering both high level and granular details is envisioned. The mapping will ideally identify hosting organizations, as well as associated infrastructure, analytics platforms, and applications. Work on developing this mapping platform began in early 2017.

8.5.4 Network Building: Data Expertise

The true power of a network comes from having a wide range of engaged stakeholders and building up a network of connections and expertise. By including mountain stakeholders across regions with data and data management expertise in the CMN, the CMN will be in better position to identify data related challenges and needs, as well as the optimal strategies and resources for addressing these. Additionally, this network can play an integral role both in strengthening the LOI, as well as the overall capacity of the CMN. Ongoing efforts towards identifying organizations and stakeholders that CMN should have contacts within and a plan for building up the CMN will continue in in the early months of 2017 leading up to the LOI submission.

8.6 Recommendations

There are a number of recommendations relating to the management of CMN research data that have come to light as a result of the Yukon IG meeting and consultations. Briefly, these are summarized below.

1. **Management of traditional knowledge and First Nations data**
   This an extremely important topic that needs to be acknowledged and considered very early on. When building any data management plan(s) for CMN data the inclusion of a dedicated section to support the management and use of traditional knowledge and First Nations data should be implemented.

2. **Develop appropriate best practices and guidelines**
   It is essential that established best practices and guidelines when dealing with traditional and First Nations data, such as those outlined by the First Nations Principles of OCAP, are reviewed and appropriately incorporated into the CMN data policies.

3. **Alignment with Tri-Council responses to Action 65**
   It is important that CMN acknowledge the recommendations made within SSHRC’s “Proposed innovation in response to Call to Action 65” document, and aligns with them as much as possible when developing data principles, governance, and data management plans.
4. **Stakeholder engagement**  
It is important that CMN engages and works with mountain research stakeholders and partners in the Yukon regarding the management of mountain research data.

5. **Appropriate representation**  
Having a key member(s) from the Yukon on the CMN Research Data Management Committee (RDMC) will be a great asset and can play an integral role in helping to engage mountain research stakeholders in the Yukon.

6. **Engage existing legislation and data**  
CMN should refer to and leverage the Government of Yukon ‘Scientists and Explorers Act’ and its guidance processes in efforts to explore what existing data may be available and accessible.

7. **Build data management capacity in Government of Yukon**  
Where possible, CMN should seek to work with the Government of Yukon to develop and strengthen data tracking and management capabilities in ways that would be of benefit to both.

8. **Require DMPs for funded projects**  
If CMN is funded and becomes a source of funding, it is strongly recommended that it should adopt a policy that it is a requirement of receiving CMN funding to do a DMP and make appropriately open data accessible.

9. **Access to RDM resources and training**  
Opportunities for mountain research stakeholders to learn more about research data management best practices should be made available. Having access to RDM learning resources and tools is recommended.

**8.7 References**


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Appendices
### Appendix A: Who is Involved in Mountain Research in Yukon? (Partner Engagement and Benefits)

#### A-1: Aboriginal governments and organizations and public advisory bodies established under the Umbrella Final Agreement

<table>
<thead>
<tr>
<th>Organisation/Body</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Council of Yukon First Nations</td>
<td><a href="http://cyfn.ca/">http://cyfn.ca/</a></td>
</tr>
<tr>
<td>Training Policy Committee</td>
<td><a href="http://tpcyukon.ca">http://tpcyukon.ca</a></td>
</tr>
<tr>
<td>Yukon Environmental and Socio-economic Assessment Board</td>
<td><a href="http://yesab.ca">http://yesab.ca</a></td>
</tr>
<tr>
<td>Yukon First Nation Chamber of Commerce</td>
<td><a href="http://www.yfncc.ca/">http://www.yfncc.ca/</a></td>
</tr>
<tr>
<td>Yukon Fish and Wildlife Enhancement Trust</td>
<td><a href="http://yfwet.ca/">http://yfwet.ca/</a></td>
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<td>Yukon Fish and Wildlife Management Board</td>
<td><a href="http://yfwmb.ca/">http://yfwmb.ca/</a></td>
</tr>
<tr>
<td>Yukon Geographical Place Names Board</td>
<td><a href="http://yukonplacenames.ca">http://yukonplacenames.ca</a></td>
</tr>
<tr>
<td>Yukon Heritage Resources Board</td>
<td><a href="http://yhrb.ca">http://yhrb.ca</a></td>
</tr>
<tr>
<td>Yukon Land Use Planning Council</td>
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<tr>
<td>Yukon Salmon Sub-Committee</td>
<td><a href="http://www.yssc.ca/">http://www.yssc.ca/</a></td>
</tr>
<tr>
<td>Yukon Surface Rights Board</td>
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<tr>
<td>Yukon Water Board</td>
<td><a href="http://www.yukonwaterboard.ca">http://www.yukonwaterboard.ca</a></td>
</tr>
</tbody>
</table>

#### A-2: Academia

<table>
<thead>
<tr>
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<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAlberta North</td>
<td><a href="https://www.ualberta.ca/arctic/north">https://www.ualberta.ca/arctic/north</a></td>
</tr>
<tr>
<td>Arctic Institute of North America</td>
<td><a href="http://arctic.ucalgary.ca/">http://arctic.ucalgary.ca/</a></td>
</tr>
<tr>
<td>Centre for Northern Innovation in Mining, Yukon College</td>
<td><a href="https://www.yukoncollege.yk.ca/programs/pages/about_cnim">https://www.yukoncollege.yk.ca/programs/pages/about_cnim</a></td>
</tr>
<tr>
<td>Cold Climate Innovation, Yukon College</td>
<td><a href="https://www.yukoncollege.yk.ca/research/projects/cold_climate_innovation">https://www.yukoncollege.yk.ca/research/projects/cold_climate_innovation</a></td>
</tr>
<tr>
<td>Northern Environmental and Conservation Sciences Program (Joint UofA- YC Degree)</td>
<td><a href="https://www.yukoncollege.yk.ca/programs/info/environmental_and_conservation_sciences">https://www.yukoncollege.yk.ca/programs/info/environmental_and_conservation_sciences</a></td>
</tr>
<tr>
<td>Resources and Sustainable Development in the Arctic (ReSDA), Yukon College</td>
<td><a href="http://yukonresearch.yukoncollege.yk.ca/resda/">http://yukonresearch.yukoncollege.yk.ca/resda/</a></td>
</tr>
</tbody>
</table>
The Arctic Institute of North America has archived the listing of all permitted research projects in the Yukon in their Arctic Science and Technology Information System (ASTIS) database. Click on “Search” button, select “G0811 - Yukon” in Geographic Code.

Yukon Research Centre, Yukon College
https://www.yukoncollege.yk.ca/research/pages/about_us

* Various departments and faculties including agriculture, glaciology, meteorology, ecology, conservation biology, natural resource development and management, planning, hydrology, geography, geology, etc.)

A-3: Industry and Industry Associations

<table>
<thead>
<tr>
<th>Company/Group</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atco Electric Yukon</td>
<td><a href="http://www.atcoelectricyukon.com">http://www.atcoelectricyukon.com</a></td>
</tr>
<tr>
<td>Carcross Tagish Management Corporation</td>
<td><a href="http://www.investcarcross.ca">http://www.investcarcross.ca</a></td>
</tr>
<tr>
<td>Chief Isaac Group</td>
<td><a href="http://chiefisaacgroup.ca">http://chiefisaacgroup.ca</a></td>
</tr>
<tr>
<td>Dana Naye Ventures</td>
<td><a href="http://www.dananaye.yk.net/">http://www.dananaye.yk.net/</a></td>
</tr>
<tr>
<td>Dechenla Lodge</td>
<td><a href="http://www.dechenla.com/">http://www.dechenla.com/</a></td>
</tr>
<tr>
<td>Edmonton Northern Partnership</td>
<td><a href="http://www.edmontonnorthernpartnership.ca/">http://www.edmontonnorthernpartnership.ca/</a></td>
</tr>
<tr>
<td>Northern Vision Development Corp</td>
<td><a href="http://nvdlp.com">http://nvdlp.com</a></td>
</tr>
<tr>
<td>Northwestel</td>
<td><a href="http://www.nwtel.ca/">http://www.nwtel.ca/</a></td>
</tr>
<tr>
<td>Tourism Industry Association of Yukon</td>
<td><a href="http://www.tiayukon.com/">http://www.tiayukon.com/</a></td>
</tr>
<tr>
<td>Vuntut Development Corporation</td>
<td><a href="http://www.vuntut.com">http://www.vuntut.com</a></td>
</tr>
<tr>
<td>Yukon Agriculture Association</td>
<td><a href="http://www.yukonag.ca/">http://www.yukonag.ca/</a></td>
</tr>
<tr>
<td>Yukon Chamber of Commerce</td>
<td><a href="http://www.yukonchamber.com/">http://www.yukonchamber.com/</a></td>
</tr>
<tr>
<td>Yukon Chamber of Mines</td>
<td><a href="http://www.yukonminers.ca/">http://www.yukonminers.ca/</a></td>
</tr>
<tr>
<td>Yukon Energy Corporation</td>
<td><a href="https://www.yukonenergy.ca/">https://www.yukonenergy.ca/</a></td>
</tr>
<tr>
<td>Yukon Fish and Game Association</td>
<td><a href="http://yukonfga.ca/">http://yukonfga.ca/</a></td>
</tr>
<tr>
<td>Yukon Indian Development Corporation Ltd.</td>
<td><a href="http://yidc.ca">http://yidc.ca</a></td>
</tr>
<tr>
<td>Yukon Outfitters Association</td>
<td><a href="http://www.yukonoutfitters.net/">http://www.yukonoutfitters.net/</a></td>
</tr>
<tr>
<td>Yukon Trappers Association</td>
<td><a href="http://yukonfga.ca/support/yukon-trappers-association/">http://yukonfga.ca/support/yukon-trappers-association/</a></td>
</tr>
<tr>
<td>Yukon Wood Products Association</td>
<td><a href="http://www.yukonwoodproducts.org/">http://www.yukonwoodproducts.org/</a></td>
</tr>
</tbody>
</table>

A-4: Non-Government Organizations

<table>
<thead>
<tr>
<th>Organization</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpine Club of Canada (ACC) Yukon Section</td>
<td><a href="http://www.accyukon.ca/">http://www.accyukon.ca/</a></td>
</tr>
<tr>
<td>Arctic Institute of Community-Based Research</td>
<td><a href="http://aicbr.ca/">http://aicbr.ca/</a></td>
</tr>
<tr>
<td>Canadian Network of Northern Research Operators</td>
<td><a href="http://cnnro.ca/">http://cnnro.ca/</a></td>
</tr>
<tr>
<td>Canadian Parks and Wilderness Society Yukon</td>
<td><a href="http://www.cpawsyukon.org/">http://www.cpawsyukon.org/</a></td>
</tr>
<tr>
<td>Ducks Unlimited</td>
<td><a href="http://www.ducks.ca/places/yukon-northwest-territories/">http://www.ducks.ca/places/yukon-northwest-territories/</a></td>
</tr>
<tr>
<td>Klondike Snowmobile Association</td>
<td><a href="http://ksa.yk.ca/">http://ksa.yk.ca/</a></td>
</tr>
<tr>
<td>Yukon Conservation Society</td>
<td><a href="http://yukonconservation.org/">http://yukonconservation.org/</a></td>
</tr>
<tr>
<td><strong>Various Health and Social Service NGOs</strong></td>
<td><a href="http://www.ykhealthguide.org/community/whitehorse_services/">http://www.ykhealthguide.org/community/whitehorse_services/</a></td>
</tr>
<tr>
<td><strong>Various Yukon Museums, Interpretative and First Nation Cultural Centres</strong></td>
<td><a href="http://www.yukonmuseums.ca/">http://www.yukonmuseums.ca/</a></td>
</tr>
<tr>
<td><strong>WildWise Yukon</strong></td>
<td><a href="http://wilsewise.ca">http://wilsewise.ca</a></td>
</tr>
<tr>
<td><strong>Yukon Avalanche Association</strong></td>
<td><a href="http://www.yukonavalanche.ca/">http://www.yukonavalanche.ca/</a></td>
</tr>
<tr>
<td><strong>Yukon Bird Club</strong></td>
<td><a href="http://yukonbirds.ca/">http://yukonbirds.ca/</a></td>
</tr>
<tr>
<td><strong>Yukon Historical and Museums Association</strong></td>
<td><a href="http://heritageyukon.ca/">http://heritageyukon.ca/</a></td>
</tr>
<tr>
<td><strong>Yukon Invasive Species Council</strong></td>
<td><a href="http://www.yukoninvasives.com/">http://www.yukoninvasives.com/</a></td>
</tr>
<tr>
<td><strong>Yukon Wildlife Preserve Operating Society</strong></td>
<td><a href="http://www.yukonwildlife.ca/">http://www.yukonwildlife.ca/</a></td>
</tr>
</tbody>
</table>

**A-5: Municipalities**

| **Association of Yukon Communities** | [http://www.ayc-yk.ca/](http://www.ayc-yk.ca/) |
| **City of Whitehorse** | [http://www.city.whitehorse.yk.ca/](http://www.city.whitehorse.yk.ca/) |
| **Village of Carmacks** | [http://www.carmacks.ca](http://www.carmacks.ca) |
| **City of Dawson** | [http://www.cityofdawson.ca/](http://www.cityofdawson.ca/) |
| **Town of Faro** | [http://www.faroyukon.ca/](http://www.faroyukon.ca/) |
| **Village of Teslin** | [http://www.teslin.ca/](http://www.teslin.ca/) |
| **Town of Watson Lake** | [http://www.watsonlake.ca/](http://www.watsonlake.ca/) |

**A-6: Science Education**

| **Science Adventures, Yukon College** | [https://www.yukoncollege.yk.ca/research/pages/science_adventures](https://www.yukoncollege.yk.ca/research/pages/science_adventures) |
| **Yukon Experiential Learning School Programs (on the land, field trips)** | [http://jjewell.yukonschools.ca/](http://jjewell.yukonschools.ca/) |
| **Yukon Schools** | [http://www.yesnet.yk.ca/schools/](http://www.yesnet.yk.ca/schools/) |

**A-7: Territorial government**

<p>| <strong>Department of Community Services</strong> | <a href="http://www.community.gov.yk.ca/">http://www.community.gov.yk.ca/</a> |</p>
<table>
<thead>
<tr>
<th>Department of Tourism and Culture</th>
<th><a href="http://www.tc.gov.yk.ca/">http://www.tc.gov.yk.ca/</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Science Community of Practice</td>
<td><a href="http://www.eco.gov.yk.ca/science/scope.html">http://www.eco.gov.yk.ca/science/scope.html</a></td>
</tr>
<tr>
<td>Women’s Directorate</td>
<td><a href="http://www.womensdirectorategov.yk.ca/">http://www.womensdirectorategov.yk.ca/</a></td>
</tr>
</tbody>
</table>

**A-8: Federal government**

<table>
<thead>
<tr>
<th>Canadian Northern Economic Development Agency (CANNOR)</th>
<th><a href="http://www.cannor.gc.ca/eng/1351104567432/1351104589057">http://www.cannor.gc.ca/eng/1351104567432/1351104589057</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Environment and Climate Change Canada</td>
<td><a href="https://www.ec.gc.ca/cc/">https://www.ec.gc.ca/cc/</a></td>
</tr>
<tr>
<td>Natural Resources Canada</td>
<td><a href="http://www.nrcan.gc.ca/home">http://www.nrcan.gc.ca/home</a></td>
</tr>
<tr>
<td>e.g. Geo-Mapping for Energy and Minerals Program, Polar Continental Shelf Program, Geological Survey of Canada</td>
<td></td>
</tr>
<tr>
<td>Department of Fisheries and Oceans</td>
<td><a href="http://www.dfo-mpo.gc.ca/index-eng.htm">http://www.dfo-mpo.gc.ca/index-eng.htm</a></td>
</tr>
<tr>
<td>Department of Indigenous Affairs and Northern Development Canada</td>
<td><a href="https://www.aadnc-aandc.gc.ca/eng/1100100010002/1100100010021">https://www.aadnc-aandc.gc.ca/eng/1100100010002/1100100010021</a></td>
</tr>
</tbody>
</table>

**A-9: International**

<table>
<thead>
<tr>
<th>Alaska Department of Fish and Game</th>
<th><a href="http://www.adfg.alaska.gov/index.cfm?adfg=home.main">http://www.adfg.alaska.gov/index.cfm?adfg=home.main</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>NASA Arctic Boreal Vulnerability Experiment (ABoVE)</td>
<td><a href="http://above.nasa.gov/">http://above.nasa.gov/</a></td>
</tr>
<tr>
<td>Northern Boreal Landscape Conservation Cooperative (US Fish and Wildlife Service)</td>
<td><a href="http://nwblcc.org/">http://nwblcc.org/</a></td>
</tr>
<tr>
<td>USArray</td>
<td><a href="http://www.usarray.org/Alaska">http://www.usarray.org/Alaska</a></td>
</tr>
<tr>
<td>Yukon River Panel</td>
<td><a href="http://yukonriverpanel.com">http://yukonriverpanel.com</a></td>
</tr>
</tbody>
</table>

**A-10: Individuals**

<table>
<thead>
<tr>
<th>Elders</th>
<th>Recreationalists</th>
<th>Local science practitioners</th>
<th>Wilderness tourism operators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers</td>
<td>Tourists</td>
<td>Local researchers</td>
<td>Youth</td>
</tr>
<tr>
<td>Outfitters</td>
<td>Trappers</td>
<td>Small business owners</td>
<td>Etc.</td>
</tr>
</tbody>
</table>
Appendix B: Mountain NCE Research Modes
(Partner Engagement and Benefits)

The CMN aims to support the sustainability of our mountain spaces, and communities who inhabit them by advancing research that:

- Is inclusive, co-designed, and interdisciplinary
- Recognizes the interconnectedness of mountain environments and their social and economic systems
- Meets the needs of diverse mountain communities and their Indigenous peoples.

Achieving this vision requires CMN to acknowledge that how we do research is as important as what research we do. The CMN recognizes three valid modes of research exist along a spectrum. The CMN approach emphasizes that a deliberate choice be made at the onset of a project by research partners as to which mode best fits a particular project’s needs, as well as its contributions to the CMN as a whole. Modes 1 and 2 are well-documented in peer-reviewed literature on science and technology studies. The third mode appears to be emerging as research practice evolves and is clearest so far in Indigenous research methodology (e.g. Wilson, 2008).

Mode 1: Researcher-led research
Mode 1 projects are initiated and led by researchers. They involve carrying out research on pressing topics that have been identified and endorsed by network partners, including researchers themselves. Participation of network partners alongside the lead researcher is more limited in this type of project because they have chosen to take a less direct role in designing and implementing the research. Mode 1 projects may be co-developed, but are not necessarily co-designed or co-implemented. **When would the CMN advance a Mode 1 project?**

- a researcher from any network partner organization is leading a project that addresses a pressing need for information that has been identified by network partners, including researchers
- when there is limited capacity and need for network partners to participate directly in the project alongside lead researchers
- network partners are confident that the research results will be effectively communicated to the broader community because the research team has a strong track record in effectively communicating results

Mode 2: Partnership-based, participatory research
This mode may be deemed to be suitable when network partners are interested in collaborating on all stages of a research project, and when partners either have the capacity to be involved and/or the project proposal addresses capacity limitations to ensure partners are able to be involved. Mode 2 projects are co-developed, co-designed, and co-produced by multiple network partners, including researchers and knowledge-users such as communities, industry, governments, Indigenous organizations, and non-governmental organizations (NGOs).
When would the CMN advance a Mode 2 project?

- A number of network partners are interested in participating in a collaborative project.
- Logistics allow a number of partners to be directly involved in all aspects of the research.
- The project is co-designed and co-produced by engaged partners.
- The topic being explored benefits from this level of collaboration because it enhances the ability of the research to be relevant and applied and there is a need to build capacity to implement the results.
- Where projects incorporate Indigenous ways of being, knowing, and doing but capacity for communities to take the lead has yet to be built (and such capacity-building can be a project objective).
- Network partners are confident that results will be effectively communicated to and taken up by partners because the research process is collaborative with partners.

Mode 3: Community-led research

This mode describes research projects in which researchers shift roles from driving projects to supporting community partners. Often these are led and conducted by Indigenous researchers according to Indigenous methodologies that progress Indigenous ways of being, knowing, and doing in a modern and constantly evolving context. Mode 3 projects will likely most often be developed, designed, and produced by Indigenous partners in the network. Importantly though, this mode is not necessarily limited to indigenous contexts.

When would the CMN advance a Mode 3 project?

- when project methods go beyond community-based, participatory research and put communities into the lead roles, supported by researchers
- when two-way capacity-building between researchers and community members is built into the project
- when projects incorporate key elements of Indigenous research methodologies such as relationality and reciprocity
- when projects seek to contribute to creating sustainable social and economic opportunities, advancing Indigenous self-determination, and strengthening resiliency in mountain communities and their supporting ecosystems
- where projects incorporate Indigenous ways of being, knowing, and doing

What do the modes have in common?

All CMN research projects are pressing topics that have been identified and endorsed by CMN partners. Researchers may not just be from traditional academic settings. For example, NGOs, Governments, Colleges, and Indigenous groups may lead or co-lead CMN projects. Results from research conducted under each of the modes will contribute to society-wide modes of information flow and understanding.
How do partners decide which mode best suits a CMN project?
The choice between which of these three modes a project will follow needs to be deliberate, inclusive, and informed. The network governance structure needs to incorporate the capacity to realize those three decision attributes at both the project and network-level, as well as to strategically support, promote, and incentivize all three modes of research. This meta-level decision capacity positions the CMN to be at the global forefront of inter- and trans-disciplinary, problem-oriented scholarship.

Why does this approach help us to advance sustainability and resilience in mountain regions?
The issues facing mountain regions are complex and interconnected, including climate change, resource development, and social transformations. Research that benefits and meets the solution-oriented information needs of mountain residents is needed. Solution-oriented science considers, from the beginning, how the research can best support those who have identified a pressing need for information on which to make more informed decisions. The research questions themselves are selected to address the most pressing issues and can include basic science (e.g. baseline monitoring), better application of existing knowledge (e.g. improving knowledge transfer and mobilization), applied research, community-based research, or a combination of the above, depending on the specific needs driving the research.

Resetting the relationship with Indigenous mountain peoples, as called for by the Government of Canada’s Truth and Reconciliation Commission and endorsed by the Tri-Council agencies, can also be advanced by the science the CMN supports and how CMN research is carried out. The CMN recognizes the need for Indigenous self-determination in research and will strive to advance reconciliation by embracing the important role Indigenous partners play in shaping research questions, leading research projects according to their own traditions, and acting on the results to advance sustainability of their communities. The CMN supports Indigenous peoples’ right to set guidelines for ownership of, access to, control of, and possession of their traditional knowledge and other data collected with their involvement or consent.

References

Appendix C: Yukon Initiating Group Information Request – Research Themes

Theme:  
1. Environment  
2. Health and well being  
3. Culture/Society/Economy

1. What research is currently underway in Yukon’s mountains and mountain communities on this theme? (Please fill in one table for each project)

<table>
<thead>
<tr>
<th>Research project:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Discipline(s)</td>
<td></td>
</tr>
<tr>
<td>Researcher(s)/Institution(s)</td>
<td></td>
</tr>
<tr>
<td>Location:</td>
<td></td>
</tr>
<tr>
<td>Status of project:</td>
<td></td>
</tr>
<tr>
<td>References (e.g. websites, reports):</td>
<td></td>
</tr>
</tbody>
</table>

2. What research needs or priorities have already been identified in Yukon through collaborative, participatory processes on this theme? (Please fill in one table for each process)

| Name / date of process: |  |
| Who was involved: |  |
| Research needs identified: |  |
| References (e.g. websites, reports): |  |

3. What other gaps exist in our knowledge base on this theme? (Please fill in one table for each gap)

| Gap in knowledge base: |  |
| Why is this a gap? |  |
| Who might consider this a gap? |  |
| Suggested researchers/ institutions/disciplines: |  |
| Have any studies / reports been done that point to these gaps/priorities? |  |
| Priority level (high, medium, low): |  |

4. What would you consider to be the top three research priorities under this theme?
Appendix D: Yukon Initiating Group Information Request – Highly Qualified Personnel

Information Request: Capacity-Building/HQP

1. What does capacity building mean in a Yukon context?
2. What capacity needs to be developed?
3. How can the Network contribute to developing this capacity?
4. How should the network train and prepare graduate students for employment outside academia? Would you consider this type of training a valuable service?
5. Highly qualified personnel (HQP) is defined by the Tri-Council as individuals with university degrees at the bachelor’s level and above. For the Yukon, how would you redefine this?
Appendix E: A comparison of established vs expanded roles for HQP

<table>
<thead>
<tr>
<th>HQP IN RESEARCH PROCESS</th>
<th>ESTABLISHED ROLES</th>
<th>EXPANDED ROLES IN CMN</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFINING HQP</td>
<td>• Includes undergrad to post-doctoral level, technical and research personnel (NSERC) • Includes students and post-doctoral level (SSHRC)</td>
<td>• Recognize HQP as one who is trained through process and emerges with new knowledge and skills</td>
</tr>
<tr>
<td>ATTRACTING HQP</td>
<td>• The ability to attract, develop and retain outstanding researchers in research areas and technologies critical to Canadian productivity, economic growth, public policy and quality of life (NCE Secretariat) • Receiving an award should enable new investigators to launch research careers (CIHR)</td>
<td>• Two-way capacity-building between researchers and community members is built into the project • There is an avenue for both south-to-north and north-to-south HQP movement and knowledge flow</td>
</tr>
<tr>
<td>TRAINING AND DEVELOPING HQP</td>
<td>• Encourages improved teaching and learning (NSERC) • Promotes acquisition of research skills in social sciences and humanities (SSHRC) • Activities should result in the training of research trainees, students and other HQP engaged in research projects (CIHR) • A critical mass of researchers and an atmosphere conducive to research are required to build capacity (Sergott et al., 2006) • Under operating grant funding, training of HQP is neither a stated objective nor an expectation (CIHR) • Training strategies that expose HQP to the full range of economic, social, and ethical implications of the CMN’s research by involving them in activities from the initial research discovery to its application through to practical social and economic benefits (NCE Secretariat) • Salary support enables institutions to retain researchers who in turn train HQP (CIHR)</td>
<td>• Recognize development of non-academic HQP (e.g., high school or college-level students in communities, research technicians employed by their First Nations to work with researchers, etc.) • Include programs like professional track post-grad degrees (e.g., non-thesis-based) • Include interpersonal and professional skills (e.g., communication, partnership development, proposal writing, budget management) in addition to science skills • Include broader recognition and empowerment of local expertise as valuable for developing HQP</td>
</tr>
<tr>
<td>RESEARCH DESIGN</td>
<td>• Mentoring and training facilitate new researchers’ entry in the field, thereby increasing research capacity (Bryar, 2010) • Introducing pilot measures to support research by and with Aboriginal Peoples (SSHRC)</td>
<td>• Reflect role of non-academic HQP as supervisors, partners and mentors as and where appropriate • Recognize that mentorship can be distinct from supervisor/student relationship (outside of authority relationships), and can contribute significantly to an HQP’s own path of discovery – mentorship can have a very influential role on a developing HQP</td>
</tr>
<tr>
<td>RESEARCH IMPLEMENTATION</td>
<td>• Introducing pilot measures to support research by and with Aboriginal Peoples (SSHRC)</td>
<td>• Projects incorporate Indigenous ways of being, knowing, and doing as and where appropriate • Projects support necessary capacity for non-academic HQP to be engaged in research implementation, as appropriate</td>
</tr>
<tr>
<td>PRODUCTS</td>
<td>• Expects to mobilize knowledge that can lead to intellectual, cultural, social and economic influence, benefit and impact (SSHRC)</td>
<td>• Recognize non-thesis research products as equivalent to theses/publications (including communication products)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>DISSEMINATION, TRANSLATION, INTERPRETATION</td>
<td>• Encourages education and outreach (NSERC) • With more time devoted to research, researcher would be expected to produce a greater number of publications and engage in knowledge translation activities (CIHR)</td>
<td>• Alternative communication forms are recognized (e.g., social media, videography, artistic renderings) • Communication beyond the academic audience is encouraged e.g., to communities, individuals, applied users</td>
</tr>
<tr>
<td>MEASURES OF SUCCESS</td>
<td>• Training program adds value to the formal training initiatives already available through the academic community and should aim at helping HQP find employment in the Canadian economy (NCE Secretariat) • The multidisciplinary and multi-sectoral nature of a network provides unique mentorship and training opportunities to maximize HQP retention and integration in all facets of the workforce (NCE Secretariat) • Number of students with advanced training in science and engineering (NSERC) • Number of theses or comparable contributions produced (NSERC) • Transition to professional careers in natural sciences and engineering (NSERC)</td>
<td>• Recognize that development of HQP is only one way of measuring impact, capacity development • Prepare HQP for a variety of career tracks (especially non-academic) • The network governance structure incorporates the capacity to realize choice of modes for how research is conducted, and how HQP is developed, at both the project and network level • The CMN is able strategically support, promote, and incentivize HQP development in all three modes of research</td>
</tr>
</tbody>
</table>
Appendix F: Yukon Initiating Group Information Request - Research facilities/infrastructure

The Canadian Mountain Network considers research facilities/infrastructure to include:

- Remote field research offices (e.g. field stations)
- Analytic laboratories
- Private sector facilities
- Arts and culture facilities
- Indigenous / traditional knowledge archives
- Public archives
- Environmental monitoring infrastructure (e.g., weather stations or stream-gauges)
- Tourism facilities
- Recreational facilities
- Facilities used by Yukon researchers outside Yukon (i.e. data warehouses, national archives)
- Other Yukon facilities?

1. Existing facilities: Are there any Yukon Research Facilities / Infrastructure that have not captured in either of these inventories? (Please fill in one table for each facility)
   a) Canadian Network of Northern Research Operators Inventory: http://cnnro.ca/ (Select Yukon in the “Our Facilities” menu)

<table>
<thead>
<tr>
<th>Name of facility:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility manager:</td>
<td></td>
</tr>
<tr>
<td>Location:</td>
<td></td>
</tr>
<tr>
<td>Website:</td>
<td></td>
</tr>
</tbody>
</table>

2. Have any needs or priorities for research infrastructure been identified in Yukon through a prior process? (Please fill in one table for each process)

<table>
<thead>
<tr>
<th>Name / date of process:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Who was involved:</td>
<td></td>
</tr>
<tr>
<td>Research infrastructure needs identified:</td>
<td></td>
</tr>
<tr>
<td>References e.g., websites, reports:</td>
<td></td>
</tr>
</tbody>
</table>

3. What other needs exist for research facilities/infrastructure (Please fill in one table for each need)

| Research facility/infrastructure need: |  |
| Why is this a need? |  |
| Who might consider this a need? |  |
| Have any studies / reports been done that point to this need? |  |
| Priority level (high, medium, low): |  |

4. What would you consider to be the most important research facility/infrastructure need(s) in Yukon?
### Appendix G: Yukon Research Facilities and Infrastructure

#### G-1 Research Facilities in Place in Yukon to Support CMN

**Note:** This list is incomplete; please contact aynslie.ogden@gov.yk.ca or any other member of the Yukon IG to add other research facilities – Thank You

<table>
<thead>
<tr>
<th>Research Facility</th>
<th>Operated by (Location)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arctic Institute of Community Based Research (AICBR)²</td>
<td>AICBR</td>
</tr>
<tr>
<td>Beaver Creek permafrost test site¹,²</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Community-based monitoring initiatives</td>
<td>Various see <a href="http://www.arcticcbm.org/index.html">http://www.arcticcbm.org/index.html</a></td>
</tr>
<tr>
<td>Departmental research facilities</td>
<td>Government of Yukon (Various locations)</td>
</tr>
<tr>
<td>First Nations Initiatives</td>
<td>Yukon College</td>
</tr>
<tr>
<td>Gunnar Nilsson &amp; Mickey Lammers Research Forest¹,²</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Herschel Island – Qikiqtaruk Territorial Park researcher accommodations¹,²</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>H.S.Bostock core library¹,²</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Indigenous / traditional knowledge archives</td>
<td>Yukon First Nations (Various locations)</td>
</tr>
<tr>
<td></td>
<td>First Nation of Nacho Nyak Dun</td>
</tr>
<tr>
<td></td>
<td>Council of Yukon First Nations</td>
</tr>
<tr>
<td></td>
<td>Kwanlin Dün First Nation</td>
</tr>
<tr>
<td></td>
<td>Little Salmon/Carmacks First Nation</td>
</tr>
<tr>
<td></td>
<td>Ta’an Kwäch’än Council</td>
</tr>
<tr>
<td></td>
<td>Tr’ondëk Hwëch’in First Nation</td>
</tr>
<tr>
<td>Ivavik National Park (Imniarvik Sheep Creek Base Camp)²</td>
<td>Parks Canada</td>
</tr>
<tr>
<td>Keno City Mining Museum</td>
<td>Keno</td>
</tr>
<tr>
<td>Klondike History Library &amp; Archives</td>
<td>Dawson City Museum (Dawson)</td>
</tr>
<tr>
<td>Klondike Palaeontology Field Station (under development)</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Kluane Lake Research Station¹,²</td>
<td>Artic Institute of North America (Kluane Lake)</td>
</tr>
<tr>
<td>Museums, interpretive centres and cultural facilities (where research translation and communication can take place)</td>
<td>Various e.g. Da Kų Cultural Centre (Haines Junction)</td>
</tr>
<tr>
<td>Old Crow Arctic Research Facility²</td>
<td>Vuntut Gwitch’in Government Natural Resources Department (Old Crow)</td>
</tr>
<tr>
<td>Oral history recording studio</td>
<td>Trondek Hwech’in First Nation (Dawson)</td>
</tr>
<tr>
<td>Permafrost Health Program – borehole monitoring network</td>
<td>University of Alaska Fairbanks</td>
</tr>
<tr>
<td></td>
<td>Yukon Geological Survey</td>
</tr>
</tbody>
</table>
### G-2 Monitoring Infrastructure That is in Place in Yukon to Support CMN

**Note:** This list is incomplete; please contact aynslie.ogden@gov.yk.ca or any other member of the Yukon IG to add other research facilities – Thank You

<table>
<thead>
<tr>
<th>Monitoring infrastructure</th>
<th>Operated by (Location)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air monitoring at Little Fox Lake and Alert</td>
<td>CYFN and Northern Contaminants Program</td>
</tr>
<tr>
<td>Aquatic invasive species monitoring&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Archaeological site inventory program&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Arctic Borderlands Ecological Knowledge Co-Op (ABEKS)&lt;sup&gt;1&lt;/sup&gt;</td>
<td>ABEKS</td>
</tr>
<tr>
<td>Biodiversity Assessment and Monitoring</td>
<td>Yukon Research Centre, Yukon College</td>
</tr>
<tr>
<td>Canadian National Seismic Network</td>
<td>NRCAN – GSC (Various Locations)</td>
</tr>
<tr>
<td>Congenital anomalies surveillance Yukon&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Community-based monitoring initiatives</td>
<td>Various see <a href="http://www.arcticcbm.org/index.html">http://www.arcticcbm.org/index.html</a></td>
</tr>
<tr>
<td>Divide weather station</td>
<td>University of Ottawa (Kluane National Park)</td>
</tr>
<tr>
<td>Eagle Plains and Liard baseline data collection&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Energy monitoring of 6 super insulated row housing units and 8 multi-residential living</td>
<td>Government of Yukon</td>
</tr>
</tbody>
</table>

<sup>1</sup>For more information see Inventory of Government of Yukon Research Facilities http://www.eco.gov.yk.ca/science/index.html
<sup>2</sup>For more information see Canadian Network of Northern Research Operators http://cnnro.ca/yukon/
<table>
<thead>
<tr>
<th>units in Whitehorse$^1$</th>
<th>Government of Yukon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish habitat management system for Yukon placer mining monitoring program$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Fishing Branch River baseline groundwater monitoring$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Forest health monitoring program$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Government of Yukon weather stations$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>GPS / GNSS Networks</td>
<td>NRCan – GSC and CGD (Various Locations)</td>
</tr>
<tr>
<td>Kaskawulsh Glacier weather station</td>
<td>University of Ottawa (Kluane National Park)</td>
</tr>
<tr>
<td>Kusawa Lake and Lake Laberge lake trout mercury monitoring</td>
<td>CYFN and Northern Contaminants Program</td>
</tr>
<tr>
<td>Local Environmental Observer (LEO) Network</td>
<td>Various observers (various locations) <a href="https://www.leonetwork.org/en/">https://www.leonetwork.org/en/</a></td>
</tr>
<tr>
<td>Mackenzie Mountains EarthScope Project</td>
<td>Yukon Research Centre, Colorado State University, and University of Alaska Fairbanks</td>
</tr>
<tr>
<td>Multiple sensors (GPS/GNSS, Weather, other)</td>
<td>Arctic Institute of North America (Kluane Lake Research Station)</td>
</tr>
<tr>
<td>National Air Pollution Surveillance (NAPS) Network$^1$</td>
<td>Environment and Climate Change Canada</td>
</tr>
<tr>
<td>Northern HRV monitoring in Whitehorse and Cambridge Bay$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Permanent sample plot monitoring$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Private sector facilities</td>
<td>Various</td>
</tr>
<tr>
<td>Porcupine caribou herd contaminants monitoring</td>
<td>CYFN and Northern Contaminants Program</td>
</tr>
<tr>
<td>Tourism indicators$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>USAArray Transportable Array Seismic Installation</td>
<td>IRIS (Various locations)</td>
</tr>
<tr>
<td>Whitehorse Atmospheric radionucleides monitoring station</td>
<td>Health Canada</td>
</tr>
<tr>
<td>Wildlife key areas$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Wildland fire history$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Wood bison monitoring programs$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Yukon biodiversity research and monitoring programs$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Yukon elk population monitoring$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Yukon fisheries stock assessment and monitoring$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Yukon grizzly bear monitoring programs$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Yukon labour market information web portal$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Yukon monthly statistical review$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Yukon moose monitoring programs$^1$</td>
<td>Government of Yukon</td>
</tr>
<tr>
<td>Yukon socio-economic web portal$^1$</td>
<td>Government of Yukon</td>
</tr>
</tbody>
</table>
Yukon thinhorn sheep monitoring programs
YukonWater: water data catalogue

For more information see Government of Yukon Compendium of Current Research and Monitoring [website](http://www.eco.gov.yk.ca/science/index.html)