Evaluation of the Yukon Science Strategy

Phase 2 Baseline Science Assessment Report

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DATE: **May 19, 2020**

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Executive Summary

The Yukon Science Strategy

The Government of Yukon Science Strategy was released in 2016 to provide a strategic framework for integrating and enhancing the efficiency and effectiveness of science activities carried out within Government, in order to support evidence-based decision-making. The purpose of this Strategy is to:

- Establish a long-term approach to the development of science capacity in Yukon by outlining a corporate vision, principles and goals for developing, applying, sharing and managing scientific knowledge;
- Provide a strategic and integrated approach to aligning Yukon's competing science and associated policy priorities so that policy is informed by sound science and, in turn, scientific priorities are informed by policy needs; and
- Enable Yukon science initiatives to be connected to established priorities and goals so that investments are made strategically and maximum social, economic and environmental benefits can be realized.

The long-term vision is to support the active pursuit, gathering and storage of scientific knowledge so it can be easily retrieved, transferred, shared and used to support evidence-based decision-making.

The Strategy marks the first all-of-government effort at providing strategic direction for science activity in Yukon. A long-term approach to developing science capacity in Yukon, this new strategy demonstrates that the Government of Yukon values the role of science in informing decision-making and the contribution of science and innovation to the economy. Prior to the Strategy, there was a risk that individual departments were implementing science-related policy and activities that were not only untethered to any core Government priorities but were also possibly duplicative or running counter to other activities taking place elsewhere in Government.

Implementation of the Science Strategy is a shared responsibility within the Government of Yukon (YG). Key actors include the Interdepartmental Science Committee (ISC), the Executive Council Office and more specifically the Office of the Science Advisor, and individual departments. The Interdepartmental Science Committee (ISC) is, at a high level, responsible for the implementation of the Science Strategy. The Executive Council Office (ECO) and more specifically the Office of the Science Advisor (OSA) provides support to the ISC and has lead responsibility for many of the current and potential actions outlined in the Science Strategy Action Plan.

Planned Evaluation of the Strategy

The Government of Yukon intends to conduct a thorough evaluation of the Science Strategy, to be completed by March 31, 2025. The evaluation will assess the relevance and design of the Science Strategy as well as the resulting outcomes. The purpose of this report is to provide an initial baseline against which the progress made by the Science Strategy can be measured in the 2024-2025 full evaluation and to provide evidence to support any potential mid-stream adjustments to the Strategy.

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Method of Study for the Baseline Analysis

In preparing this report, our firm met with the ISC to review the revised methodology report and instruments (developed in Phase 1) and discuss the timing for Phase 2. We then implemented a mixed-methods approach for reporting on the science activities, which included:

- A review of available documentation and administrative data.
- Interviews with 20 key informants drawn from a wide range of sectors in Yukon, including 10 internal Yukon representatives (including OSA and ISC staff), 6 external researchers, and 4 First Nations government representatives.
- A survey of 153 internal stakeholders drawn from a wide range of departments within the Government of Yukon and 25 external stakeholders drawn from a wide range of sectors in Yukon.
- Three separate focus groups involving 13 individuals, both internal and external to the Government of Yukon.
- Two case studies which illustrate some ways in which science is supported, conducted and used in Yukon. Conducting the case studies involved an additional document review and five interviews with key informants most familiar with the projects.

This chapter summarizes the major conclusions of the baseline review regarding the science-related activities of the Government of Yukon and the existing and potential roles of the Yukon Science Strategy.

Science-related Activities of the Government of Yukon

Our conclusions regarding the science-related activities of the Government of Yukon are as follows:

1. **Government of Yukon researchers, policy analysts and decision-makers are involved, as performers, users and funders, in a wide array of science-related activities. These activities produce results that are useful in the development of policy and making of decisions.**

   Government representatives reported involvement in science-related activities in areas as diverse as health, transportation, environment, natural resources, human resources and tourism, often involving multiple disciplines, multiple departments and partners from outside of government. Many representatives are involved in multiple ways in conducting, funding, and using science to inform policy development and decision-making.

2. **The Government of Yukon has placed increased emphasis on evidence-based decision-making, although the extent to which that emphasis has translated into practice varies somewhat across government departments.**

   Since the 2003 devolution process, the Government of Yukon's focus on evidence-based

decision-making has been increasing. This was further reinforced when the current government formed in early 2017. Departmental mandate letters which mention evidence-based decisions, the development of government-wide performance plans, the establishment of an evaluation unit, and the adoption of the Strategy itself all speak to a commitment to accountability and transparency around decisions.

Most representatives agree that there is more discussion and recognition of the value of evidence-based decision-making. However, that has not necessarily translated into practice. More work is needed to ingrain a culture of evidence-based decision-making and accountability, and complementary investments in science, research, data, and Indigenous knowledge are needed to ensure that decision-makers have access to the information needed.

3. **At times, factors such as competing priorities, combined with difficulties in accessing the evidence needed as well as interpreting and applying that evidence, serve as barriers to the application of science in policy development and decision-making within the Government of Yukon.**

Scientific evidence is one consideration, but not the only consideration, that feeds into the decision-making process. In addition to scientific and other forms of evidence, the need for quick a quick decision, public perceptions, pressure from interest groups and political realities also play a role in decisions. These factors are not always problematic, and may be unavoidable – yet concerns remain that in a small jurisdiction like the Yukon they can end up playing an outsized role.

Access to evidence can also be a major constraint. In some cases, needed data has simply not been collected and compiled. In other cases, data has been collected but there may be data or quality issues, it may have been collected for other purposes and not be relevant for Yukon, or the data exists as needed but there is an access issue. This type of access issue was best characterized as a lack of communication and coordination within and between Government departments, as well as external organizations, which can make it difficult for Government of Yukon representatives to first become aware of, and then access, data collected by other departments and agencies.

There can also be challenges in applying the evidence. Government representatives noted that there are not many scientists at the director level or higher and, at times, there can be a lack of understanding of the scientific process, combined with limited experience in interpreting results, which can make it difficult for decision-makers to make fully-informed decisions.

4. **Evidence-based decision-making within the Government of Yukon would benefit from increased investment in science-related activities, further developing internal capacity to perform and apply science, incorporating traditional and local knowledge, and improving communication, coordination, information sharing and data management.**

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The broad consensus among the Government of Yukon representatives and external stakeholders is that making further progress towards evidence-based decision-making will require additional investments in science and research. Government of Yukon expenditures related to science may have increased over the past five years following increased focus on evidence-based decisions from senior leadership, but most participants felt any increase was not significant. Factors that may constrain expenditures include budget pressures, difficulties in leveraging funding from other sources, and competing priorities.

In association with that increased investment, there is a need to expand the Government of Yukon's capacity to effectively manage, perform and apply science. An important component of building science capacity involves having a strong talent base of science practitioners and professionals in place.

Government of Yukon representatives and external stakeholders highlighted the benefits of improving the level of communication, coordination and information sharing across departments and organizations, as well as improving data standards and scientific information management systems. A key part of that is strengthening relationships with Indigenous governments and communities. While progress has been made in incorporating traditional and local knowledge alongside science in the decision-making progress, more work is required around how the Government will reflect Indigenous knowledge, values and actions in decisions.

Role of the Science Strategy

Our conclusions regarding the science-related activities of the Government of Yukon are as follows:

1. **There is a strong need for the Yukon Science Strategy.**

   Most Government of Yukon representatives and external stakeholders, even those who are not familiar with the Yukon Science Strategy, recognize the need for such a strategy which works to enhance the efficiency and effectiveness of science activities in order to support evidence-based decision-making. The goals of the Yukon Science Strategy align well with the key issues constraining evidence-based decision-making and the priorities for improvement identified by government representatives and stakeholders.

2. **The Yukon Science Strategy can play a significant role in promoting and supporting evidence-based decision making in Government of Yukon. However, fulfilling that role may require additional funding and some changes to how the Strategy is implemented.**

   The Government's ECO (Executive Council Office), and more specifically OSA, is well-positioned to oversee the Strategy, given the focus on science and the horizontal nature of the strategy (i.e. its application across all departments).

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Recommendations

Considering the findings presented in this report and main conclusions above, potential actions that could be taken the OSA and others to increase the impact of the Yukon Science Strategy in promoting and supporting evidence-based decision-making include:

Short Term:

- ***Engage in an inclusive and participatory process to revise the Strategy.*** Working with key departmental leaders, as well as external stakeholders and First Nations government representatives, aim to rebrand the Strategy and streamline the goal areas and associated activities/initiatives.

- ***Raise awareness of the Strategy***. Familiarity with the Science Strategy varies widely across government representatives and external stakeholders. Consideration should be given to rebranding the name, perhaps focusing more on evidence-based decision-making given that "science" carries a certain connotation both within government and for important First Nations partners, and creating a champion responsible for engagement and network development within individual Government departments.

- ***Establish priorities***. Rather than pursuing the full, ambitious set of six goals, the OSA and ISC should annually establish clear priorities regarding its plans on a streamlined set of goals.

- ***Increase access to peer-reviewed journal articles*** so that those designing and implementing research projects are in a better position to build on the existing knowledge base.

Medium Term:

- ***Strengthen the governance structure.*** While the ISC has played an important role in development of key initiatives, the level of commitment varies widely by department as reflected in varying levels of attendance and turnover. The governance structure could benefit from increasing the resources and impact associated with the Strategy and defining a more meaningful role for ISC. Consideration could also be given to establishing an external advisory panel or board of academic, industry and First Nations experts to support the Strategy as well as establishment of a research ethics board for Yukon.

- ***Facilitate greater information sharing***. One option is to expand use of the Science Community of Practice (SCOPe) and the Compendium of Current Research and Monitoring. SCOPe is well received and could be more aggressively promoted to a range of target groups. Use of the Compendium appears low and increasing usage would likely require finding options to increase the utility of information provided. Other options include supporting the development of new mechanisms that will facilitate greater communication such as an annual "Science in Government" conference, promoting further use of the Open

Data Portal, ensuring research results are, wherever feasible, made available publicly and communicated in a manner than is understandable for the general public, and finding other avenues to break down information silos that exist within government and across organizations.

- ***Facilitate incorporation of traditional knowledge*.** The OSA has been tasked with further developing an effective approach for respecting and reflecting Indigenous ways of knowing and doing. The importance of this work has been conveyed by senior leadership within the Government of Yukon and among a number First Nations government leaders. This could be supported through a number of initiatives, such as providing training on Ownership, Control, Access and Possession (OCAP) principles to government employees or assisting communities with capacity constraints to increase their ability to participate in research processes.

Long Term:

- ***Improve the* Scientists and Explorers Act *and associated licensing***. Suggestions include transferring responsibility to the OSA, expanding the mandate to include Yukon-based researchers, revising the process to require more meaningful consultation with First Nations where relevant, and using license data to establish a central database on research permit applications.

- ***Further ingrain the principle of evidence-based decision-making into government processes***. Participants recommended integrating the principle into memoranda to cabinet and the Cabinet Committee on Priorities and Planning (C2P2), decision-templates, mandate letters, and employee performance plans and increasing the transparency of decisions. The principle could be further supported through case studies, promotional materials, training and other support focused on improving science literacy and understanding of the purposes and processes involved in evidence-based decision-making.

- ***Invest in the supporting infrastructure and data standards***, including systems, processes, standards and tools related to the collection, storage, protection, and reporting and data, artifacts and other materials.

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Acronyms

BC	British Columbia
C2P2	Cabinet Committee on Priorities and Planning
CADTH	Canadian Agency for Drugs and Technologies in Health
CAPE	Canadian Alcohol Policy Evaluation
CIHR	Canadian Institutes of Health Research
CMN	Canadian Mountain Network
CMOH	Chief Medical Officer of Health
ECO	Executive Council Office
EMR	Energy Mines and Resources
FASD	Fetal Alcohol Spectrum Disorder
GDP	Gross Domestic Product
GNWT	Government of the Northwest Territories
INAC	Indigenous and Northern Affairs Canada
IRAP	Industrial Research Assistance Program
ISC	Interdepartmental Science Committee
KDFN	Kwanlin Dün First Nation
NCE	National Networks of Centres of Excellence
NSERC	Natural Sciences and Engineering Research Council of Canada
NWT	Northwest Territories
OCAP	Ownership, Control, Access & Possession
OSA	Government of Yukon Office of the Science Advisory
SCOPe	Science Community of Practice
SRED	Scientific Research and Experimental Development
SSHRC	Social Sciences and Humanities Research Council
UFA	Umbrella Final Agreement
WRB	Water Resources Branch
YESAA	Yukon Environmental and Socio-Economic Assessment Act
YESAB	Yukon Environmental and Socio-Economic Assessment Board
YG	Yukon Government

1. Introduction

1.1 Evaluation of the Yukon Science Strategy

The Government of Yukon Science Strategy was launched in 2016 to provide a strategic framework for integrating and enhancing the efficiency and effectiveness of science activities carried out within Government, in order to support evidence-based decision-making. The long-term vision is to support the active pursuit, gathering and storage of scientific knowledge so it can be easily retrieved, transferred, shared and used to support evidence-based decision-making.

The Government of Yukon intends to conduct a thorough evaluation of the Science Strategy, to be completed by March 31, 2025. The evaluation will assess the relevance and design of the Science Strategy as well as the resulting outcomes. The evaluation is being conducted in a series of stages as outlined in the table below.

Timing and Phases Involved in the Evaluation

Phase	Period	Focus
1	2018-19	• Develop the evaluation methodology report and workplan
2	2019-20	• Conduct a Baseline Assessment and prepare a summary report
3	2024-25	• Full evaluation

The purpose of the full evaluation is to assess the relevance and design of the Science Strategy as well as the resulting outcomes. The specific evaluation issues and questions established for the Summative Evaluation (planned for 2024-25) are listed below.

Evaluation Issues and Questions for the Summative Evaluation

Issues	Evaluation Questions
Relevance	1. Is there a continued need for the Yukon Science Strategy? 2. Is the Yukon Science Strategy responsive to the needs identified? 3. Is the Science Strategy aligned with priorities and policies of the Government of Yukon?
Outcomes	4. What progress has been made to date in implementing the Science Strategy and the Science Strategy Action Plan? 5. In what manner and to what extent has progress been made towards achieving the intended outcomes of the Yukon Science Strategy: ▪ Increased evidence-based decision-making ▪ Increased science capacity ▪ Improved data collection and management ▪ Increased private and civil sector science ▪ Improved culture of information sharing ▪ Enhanced science conduct 6. To what extent is this progress influenced by or attributable to the Science Strategy? What other factors have contributed to or constrained the progress made to date? 7. Are there any unintended outcomes, positive or negative, that can be attributed to the Science Strategy?

Issues	Evaluation Questions
Design	8. In what manner and to what extent has the Science Strategy been successful in engaging key stakeholder groups? 9. Has the governance structure and design of the Science Strategy been effective? Are there alternative governance structures and/or approaches that would be more effective or efficient? 10. Is the Science Strategy supported by the tools, resources and other support needed for it to be effective? 11. How effective are existing performance metrics in reporting on the progress made? What improvements should be made?

The evaluation matrix developed for the overall evaluation is provided in Appendix I.

1.2 Purpose of Phase 2: Baseline Analysis

The purpose of this Phase 2 report is to provide an initial baseline against which the progress made by the Science Strategy can be measured in the 2024-2025 full evaluation and to provide evidence to support any potential mid-stream adjustments to the Strategy. Phase 2 has involved a survey of Government of Yukon representatives and external stakeholders, interviews with key informants, focus groups and case studies to develop an understanding of science-related activities in Yukon and the application of science in policy development and decision-making. The baseline assessment has also been initiated to identify various gaps and opportunities for improvement related to science activities in Yukon and to obtain feedback on the Yukon Science Strategy itself.

1.3 Method of Study

In preparing this report, our firm met with the ISC to review the revised methodology report and instruments and discuss the timing for Phase 2. We then implemented a mixed-methods approach for reporting on the science activities, which included:

- A review of available documentation and administrative data. In addition to preliminary background information reviewed during Phase I, we continued to solicit and add relevant information and documents from key informants, where available.

- Interviews with 20 key informants drawn from a wide range of sectors in Yukon, including 10 internal Yukon representatives (including OSA and ISC staff), 6 external researchers, and 4 First Nations representatives.

Key Informants Interviewed by Type of Organization

Type of Organizations	Key Informants	Percentage
Internal Yukon Representatives	10	50%
External Researchers	6	30%
First Nations Government Representatives	4	20%
Total	**20**	**100%**

A summary of the key informant interviews is provided in Appendix II.

- A survey of 153 internal stakeholders drawn from a wide range of departments within the Government of Yukon. Internal stakeholders most commonly belong to departments including Energy, Mines and Resources (18%); Department of Environment (16%); Executive Council Office (14%); and Health and Social Services (12%). 377 invitations were sent to internal stakeholders, of which 153 completed, yielding a response rate of 41%.

Government of Yukon Representatives Surveyed by Department

Departments/Branch	Number	Percentage
Energy, Mines and Resources	28	18%
Department of Environment	25	16%
Executive Council Office	21	14%
Health and Social Services	18	12%
Department of Community Services	11	7%
Department of Tourism and Culture	10	7%
Highways and Public Works	9	6%
Department of Education	7	5%
Department of Finance	5	3%
Yukon Housing Corporation	3	2%
Department of Justice	3	2%
Public Service Commission	3	2%
Yukon Workers' Compensation Health and Safety Board	2	1%
Women's Directorate	2	1%
Economic Development	1	1%
Yukon Liquor Corporation	1	1%
N/A	4	3%
Total	**153**	**100%**

- A survey of 25 external stakeholders drawn from a wide range of sectors in Yukon. The respondents included representatives from universities and colleges (40%), the Yukon Environmental and Socio-economic Assessment Board (12%), research centres & institutions (12%) and others. 42 invitations were sent out, of which 25 completed, resulting in a response rate of 60%.

External Stakeholder Survey Participants by Organization

Type of Organizations	Stakeholders	Percentage
Universities & colleges	10	40%
Private sector/research contractors	6	24%
Yukon Environmental and Socio-economic Assessment Board	3	12%
Research centres & institutions	3	12%
Associations in the Yukon	2	8%
Government of Canada (Crown-Indigenous Relations and Northern Affairs Canada)	1	4%
Total	**25**	**100%**

A summary of the internal and external stakeholder interviews is provided in Appendix III.

Once the interviews and survey were completed, we met again with representatives of the ISC in late January 2020 to discuss the progress made to date and the plan for focus groups and case studies. With input from the ISC, plans for the focus groups were developed and two case studies were selected. We then:

- Staged three separate focus groups involving 13 individuals, both internal and external to the Government of Yukon. All focus groups were intended to be semi-structured sessions, with

discussion centered around the Strategy while allowing participants to raise and explore issues dynamically. The internal staff focus group included four participants from four different Government of Yukon departments, while the internal decision-makers focus group involved three participants from three departments. Both of these sessions were facilitated to explore the role of science in supporting government decision-making (Strategy Goal #1). The external focus group involved six participants with a range of academic, private sector and NGO representation, and was more focused on exploring issues related to Strategy Goal #4 – Stimulating Private and Civil Sector Science.

- Conducted two case studies. A summary of the case studies is provided in Appendix V. These case studies in no way represent formal evaluations or assessments of the organizations or activities themselves. Rather, they provided an opportunity to more fully illustrate some of the ways in which science is supported, conducted and used in Yukon – and how those activities relate to the Strategy. Conducting the case studies involved an additional document review and five interviews with key informants most familiar with the projects. The case studies selected with the support of the ISC were:

    - Yukon Environmental and Socio-economic Assessment Board (YESAB) assessment of the Newmont-Goldcorp Coffee Gold Mine; and
    - The Canadian Mountain Network's establishment as a Network of Centres of Excellence.

Across all of the methods above, the OSA and ISC were consulted to develop lists of prospective participants, with the aim of ensuring the most appropriate and representative set of stakeholders were sought for each method given the project's timeline, scope and budget. Nonetheless, certain sectors or communities may be underrepresented in this sample, both due to non-response among invitees, and due to bias in identifying participants. It is possible that those who did not participate would have provided different perspectives.

1.4 Structure of the Phase 2 Report

Section 2 provides a brief overview of the Yukon Science Strategy and the context in which it operates. Section 3 summarizes the major findings arising from the various lines of evidence employed in this baseline assessment. Section 4 presents conclusions arising from the baseline review.

2. The Government of Yukon Science Strategy

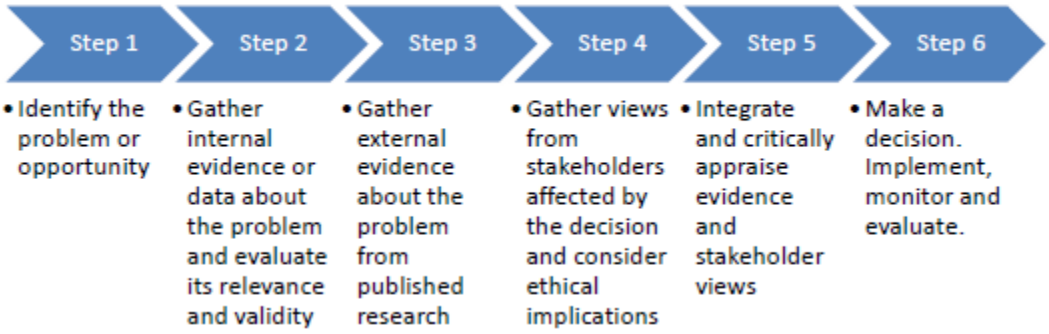
2.1 Evidence-Based Decision Making

Since April 1st, 2003, when it assumed land and resource-management duties previously carried out by the federal government, the Government of Yukon has placed increasing emphasis on evidence-based decision-making and the vital role of the public service in reaching fair, evidence-based and balanced decisions. This emphasis has more recently been made explicit through departmental mandate letters, performance plans, and numerous public communications and policies.

An evidence-based approach to decision-making is intended to enable government to make better informed decisions about legislation, policies, programs, services, and other initiatives. Adopting this approach requires access to science, research, monitoring data, Indigenous knowledge and other information that can feed into decision-making and policy development and implementation. The data may inform the decision-maker about the characteristics and significance of an issue, the effectiveness and efficiency of existing approaches to addressing the issue, potential alternatives, and the views of experts and key stakeholders.

A standard model for evidence-based decision-making is presented in the graphic below.

The Standard Model for Evidence-based Decision Making[1]



As indicated, the steps involved in evidence-based decision-making may include identifying the problem or opportunity, gathering internal and external evidence and input from stakeholders, analyzing the information, and making a decision, implementing it, and monitoring and evaluating the results. Evidence-based decision-making can facilitate greater transparency with the public, aid in the identification of emerging issues, and foster a policy-development environment which is more inclusive of scientific evidence and advice.

It should also be noted that Government of Yukon recognizes the importance of both scientific evidence and Indigenous knowledge in supporting decision-making. Currently, the OSA is working with Yukon First Nations to develop a corporate approach to respecting and reflecting Indigenous knowledge, perspectives, values and ways in government actions and decisions. Beginning in 2018, the OSA has been having

[1] Peter M. Tingling and Michael J. Brydon, Decision-Based Evidence Making Necessarily Bad?, MIT Sloan Management Review, Summer 2010

conversations with Yukon First Nations and Transboundary Aboriginal Groups, as well as with Government of Yukon employees, to guide its work on a corporate approach to respecting and reflecting Indigenous knowledge, perspectives, values and ways in government actions and decisions. A sub-group of First Nations government employees has been working closely with the OSA throughout this period. A draft report reflecting what was heard within YG and in conversations with Yukon First Nations, and a paper that identifies some potential foundational concepts and actions, have been shared with First Nations leadership. The OSA is currently planning next steps, including collaborative work with First Nations governments and knowledge holders on guiding principles and implementation. This work is expected to further strengthen Government of Yukon's commitment to evidence-based and balanced decision-making.

2.2 Science in Yukon

For the purposes of northern Canada, the 2016 Pan-Northern Approach to Science, to which Government of Yukon is a signatory, defines science as "including research, baseline studies, effects monitoring, traditional knowledge studies, and community-based monitoring in a range of fields, including social sciences, physical and natural sciences, archaeology, engineering and health sciences." This broad definition incorporates many different methodologies and research approaches used to collect valuable information on the physical, biological and human environments of the North. Science is a system that requires the following elements to be achieved to maximize impacts and benefits of scientific endeavours to people, environments and economies of the North:

- Clear articulation of needs and priorities;
- Effective outreach and communication;
- Ongoing capacity building and training;
- Effective data management systems;
- Necessary research infrastructure;
- Appropriate and stable financial support; and
- A supportive policy environment.[2]

Science has historically played an important role in Yukon, thanks to its remote and isolated geography, and economic reliance on the development of natural resources. The first Government of Yukon science policy, released in 1986, arose from the government's recognition that science, research and technology are "prime movers of economic revival and socio-economic growth." The initial strategy focused on developing local scientific and technological capabilities and enabling government to take a more active role in determining the nature and scope of science within its jurisdiction.[3]

The importance of science in Yukon continues today as researchers aim to gain a better understanding of the unique natural, social and health conditions in the north. The Government of Yukon undertakes and oversees a broad range of scientific activity from geology, wildland fire management and climate change to research in health and social sciences and even specialized northern approaches to infrastructure development and maintenance. Others, including representatives from Yukon College, Yukon First Nations governments and communities, researchers from other parts of Canada and outside of Canada, and the private sector, are also active in undertaking research in the territory.

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2 A Pan Northern Approach to Science, April 2016

3 Science in the Yukon: Advancing a Vision for Evidence-based Decision Making by Aynslie E. Ogden, Michael Schmidt, Bob Van Dijken and Lacia Kinnear

The potential has been identified for Yukon to further develop its capabilities in particular research niches through building on existing, specialized areas of research strength and creating areas of research excellence. Examples of possible research niches include Indigenous knowledge mobilization and transfer, climate change, northern agriculture and food security, remote and rural systems and service delivery, and mining (remediation, geoscience, and environmentally sensitive practices).

2.3 The 2016 Government of Yukon Science Strategy

Overview

The Government of Yukon Science Strategy was released in 2016 to provide a strategic framework for integrating and enhancing the efficiency and effectiveness of science activities carried out within Government, in order to support evidence-based decision-making. The purpose of this strategy is to:

- Establish a long-term approach to the development of science capacity in Yukon by outlining a corporate vision, principles and goals for developing, applying, sharing and managing scientific knowledge;

- Provide a strategic and integrated approach to aligning Yukon's competing science and associated policy priorities so that policy is informed by sound science and, in turn, scientific priorities are informed by policy needs; and

- Enable Yukon science initiatives to be connected to established priorities and goals so that investments are made strategically and maximum social, economic and environmental benefits can be realized.

The long-term vision is to support the active pursuit, gathering and storage of scientific knowledge so it can be easily retrieved, transferred, shared and used to support evidence-based decision-making.

The Strategy marks the first all-of-government effort at providing strategic direction for science activity in Yukon. A long-term approach to developing science capacity in Yukon, this new strategy demonstrates that Government of Yukon values the role of science in informing decision-making and the contribution of science and innovation to the economy. Prior to the Strategy, there was a risk that individual departments were implementing science-related policy and activities that were not only untethered to any core Government priorities but were also possibly duplicative or running counter to other activities taking place elsewhere in Government.

Guiding Principles

The Strategy has established ten guiding principles, intended to help focus and prioritize areas of science activity undertaken within the Government of Yukon:

- Recognize the importance of science and innovation;
- Incorporate traditional and local knowledge;
- Focus on needs;
- Support improved coordination;
- Provide appropriate resources for scientific activities;
- Keep pace with development;

- Keep current with scientific advances;
- Promote health and social sciences;
- Foster partnerships; and
- Establish and maintain a strong Yukon-based science community.

Goals

The Strategy seeks to enhance the Government of Yukon's ability to access, apply, and develop scientific knowledge and to support new research and development activities by advancing work in six key goal areas:

- **Goal 1: Support decision-making** (desired outcome: increased evidence-based decisions): To develop scientific knowledge and science-based solutions to support and enhance decision-making and innovation within the Government of Yukon.

- **Goal 2: Build science capacity** (desired outcome: increased science capacity): To develop science capacity in order to enhance the Government of Yukon's ability to access, apply and develop scientific knowledge.

- **Goal 3: Improve data collection and management** (desired outcome: improved data collection and management): To enhance the use of data standards and improve scientific information management systems so data can be easily retrieved, transferred, shared and used.

- **Goal 4: Stimulate private and civil sector science** (desired outcome: increased private and civil sector science): To stimulate private sector research, innovation and commercialization activities in order to support the growth and development of the knowledge sector in Yukon.

- **Goal 5: Promote information sharing** (desired outcome: improved culture of information sharing): To promote the sharing and distribution of scientific information generated in Yukon in order to raise awareness of the Government of Yukon's science expertise, activities, facilities, interests and needs and to enhance science literacy.

- **Goal 6: Manage and enhance science conduct** (desired outcome: enhanced science conduct): To identify and address science policy needs that enable scientific activity, enhance scientific coordination, ensure the effective oversight of scientific activity, and facilitate and promote scientific excellence.

2.4 Action Plan for the Science Strategy

An action plan was developed to support implementation of the Science Strategy, covering the four-year period from 2017-18 to 2020-21. The Action Plan (*Science Strategy Action Plan: Advancing a Vision for Evidence Based Decision-Making in Yukon*, June 2017) identifies, for each of the six goals, science activities that were currently underway as well as a series of strategic initiatives and priority actions that will be undertaken by the Government of Yukon.[4] For each action, the Plan identifies the lead department, assisting departments and status (e.g. on-going or to be determined). In total, the Action Plans identified 51 planned actions grouped into 18 strategic initiatives and 51 on-going activities grouped into 19 strategic initiatives.

[4] The Plan notes that implementation of actions is subject to the availability of resources.

2.5 Implementation of the Science Strategy

Implementation of the Science Strategy is a shared responsibility within the Government of Yukon. Key actors include the ISC, the Executive Council Office and more specifically the Office of the Science Advisor, and individual departments.

- The **Interdepartmental Science Committee** (ISC) is, at a high level, responsible for the implementation of the Science Strategy. As outlined in the ISC's Terms of Reference, Committee members are responsible for:

    - Leading Departmental-level discussions on Science Strategy and Research Strategy implementation;
    - Coordinating their Department's implementation activities;
    - Providing an annual report on implementation activities;
    - Coordinating their Department's reporting on current research activities;
    - Bringing departmental positions and perspectives so they are reflected in the work of the Committee;
    - Recognizing the Government of Yukon's corporate goal to advance strategic corporate initiatives through interdepartmental cooperation;
    - Contributing to interdepartmental discussions to advance the goals of the Science Strategy;
    - Contributing to the development of Government of Yukon positions; and
    - Keeping key departmental contacts informed on Committee progress and developments.

- The **Executive Council Office (ECO)** and more specifically the Office of the Science Advisor (OSA) provides support to the ISC and has lead responsibility for many of the current and potential actions outlined in the Science Strategy Action Plan. Examples of activities undertaken by the OSA include:

    - Analyzing and sharing knowledge about developments in science and technology;
    - Developing initiatives to enhance Yukon's science and technology capacity;
    - Building relationships with nations, governments, organizations, institutions and holders of traditional and community knowledge; and
    - Contributing to the achievements of intergovernmental, international and circumpolar forums, committees and working groups.

    There is a focus on building strong partnerships with other governments and organizations to identify and address knowledge gaps of importance to Yukoners and ensuring Government of Yukon helps develop and implement scientific solutions that improve Yukoners' quality of life. Some of the key elements of the Action Plan for which ECO has lead responsibility include:

    - Maintaining the Compendium of Current Research and Monitoring. The Compendium contains information on projects underway in the fields of agriculture and forestry, business and economy, climate change, earth sciences, environment, health and well-being, heritage and culture, housing and infrastructure, and social sciences.

    - Facilitating the SCOPe which provides members of Yukon's science community with an opportunity for to learn from each other and develop themselves personally and professionally. SCOPe activities may include brown bag lunch talks, field tours, informal discussion groups, workshops and networking opportunities, such as Science After Hours.

- Maintaining a registry of Government of Yukon research facilities with the Canadian Network of Northern Research Operators;

- Advancing or supporting existing initiatives including the cooperative agreement signed with the University of Alberta and Yukon College, establishment of the Canadian Mountain Network in Yukon, supporting the renewal of ArcticNet and the expansion of its activities into Yukon, the Pan-Northern Approach to Science, and the Northern Scientific Training Program;

- Developing policies, templates, tools, checklists and protocols and identifying best practices (e.g. in working with traditional and local knowledge) that can be shared across departments; and

- Evaluation of the Science Strategy.

Going forward, some of the planned initiatives which would be led by ECO (subject to the availability of funding) include leading the development of Government of Yukon's Approach to Traditional Knowledge, establishing research chairs at Yukon College, establishing a Yukon Research Fund, and potentially assuming administration of the Yukon *Scientists and Explorers Act* following its planned review.

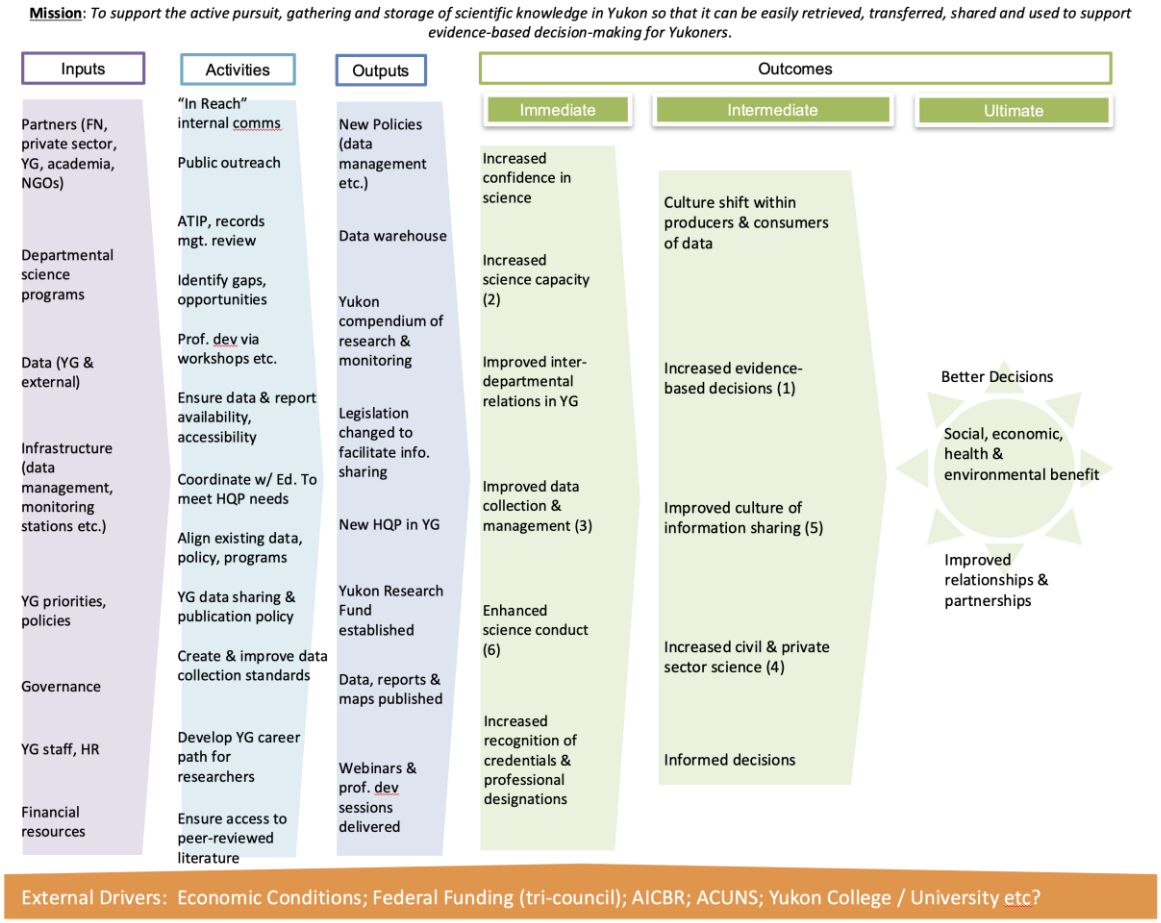
- **Individual departments within the Government of Yukon** will take a key role in implementing key elements of the Strategy and Action Plan. For example, individual departments may have lead responsibility for developing and administering internal research plans and agendas; specific science projects, surveys, evaluations and performance measurement; related programming; research partnerships; participating in multi-jurisdictional projects, strategy development, and data management; and information systems as well as supporting research infrastructure (e.g. research chairs, centres or field stations) funded by the department.

  In addition, some of the activities undertaken by individual departments represent platform commitments, where the results, lessons learned or resources developed will be shared with or will benefit other departments. All departments are expected to align their existing science activities with the vision, guiding principles and goals of the Government of Yukon Science Strategy.

2.6 Program Logic Model

These six goals are reflected in the logic model for the strategy, provided below, which identifies the connections between the inputs and anticipated activities of the Strategy with its tangible outputs and intended shorter and longer-term outcomes. The logic model is a foundational document which explains the *theory of change* for the Strategy, including the range of stakeholders, policies and resources involved in implementing the Strategy.

Logic Model for the Science Strategy



The logic model illustrates how the wide range of activities outlined in the action plan for the Strategy contributes to achievement of the intended goals in the immediate and intermediate term, which over the longer term lead to better decisions and improved relationships and partnerships reflected in social, economic, health and environmental benefits.

3. Major Findings From Phase 2

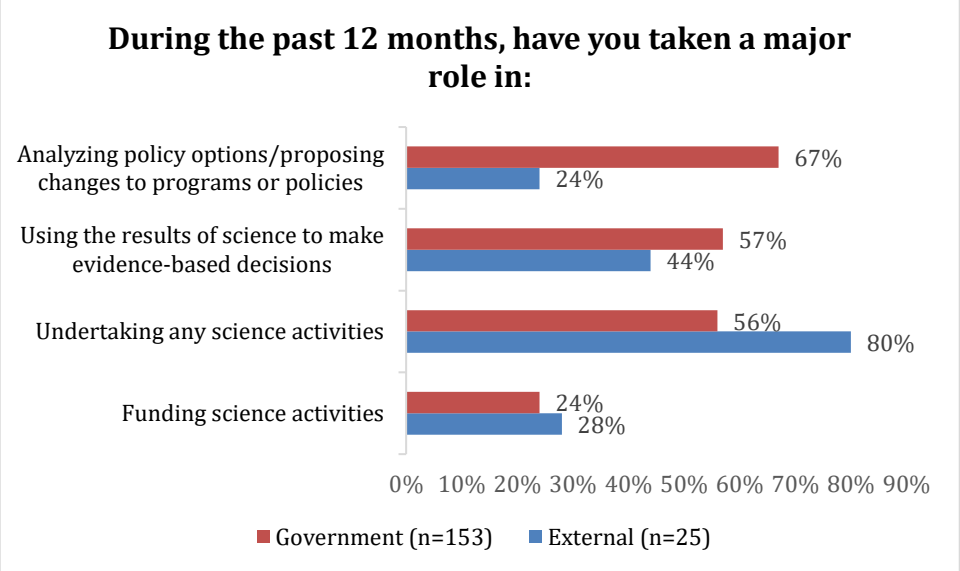
This chapter presents the major findings of the baseline assessment. The chapter first summarizes findings regarding science-related activities and the application of science to decision-making in Yukon. It then discusses the key issues and potential opportunities for improvement that were identified and summarizes findings regarding the Science Strategy itself.

3.1 Overview of Science-related Activities

This section describes the involvement of government representatives and other stakeholders in science-related activities, examples of science-related activities, and common sources of funding and performers for those activities.

1. **Most Government of Yukon representatives and external stakeholders are involved in one or more types of activities related to the funding, conduct and use of science.**

   During the past 12 months, 67% of the 153 Government of Yukon representatives surveyed fulfilled a major role in analyzing policy options and/or proposing changes to government programs or policies based on the results of science, 57% were involved in using the results of science to make evidence-based decisions, and 56% were involved in undertaking science activities. Twenty-four percent played a role in funding science activities.



   During the past 12 months, 80% of the 25 external stakeholders who were surveyed played a major role in undertaking any science activities; 44% were involved in using the results of science to make evidence-based decisions; 28% played a role in funding science activities; and 24% took a major role in analyzing policy options and/or proposing changes to programs or policies.

   Apart from these roles, some Government of Yukon employees reported also having been involved in providing leadership or oversight of science-related staff or activities, engaging communities on scientific and research issues, and delivering education, training, presentations and workshops on

science-related topics. Some external stakeholders have also been involved in education activities (particularly the representatives from universities) as well as in working closely with communities to discuss needs and present research results.

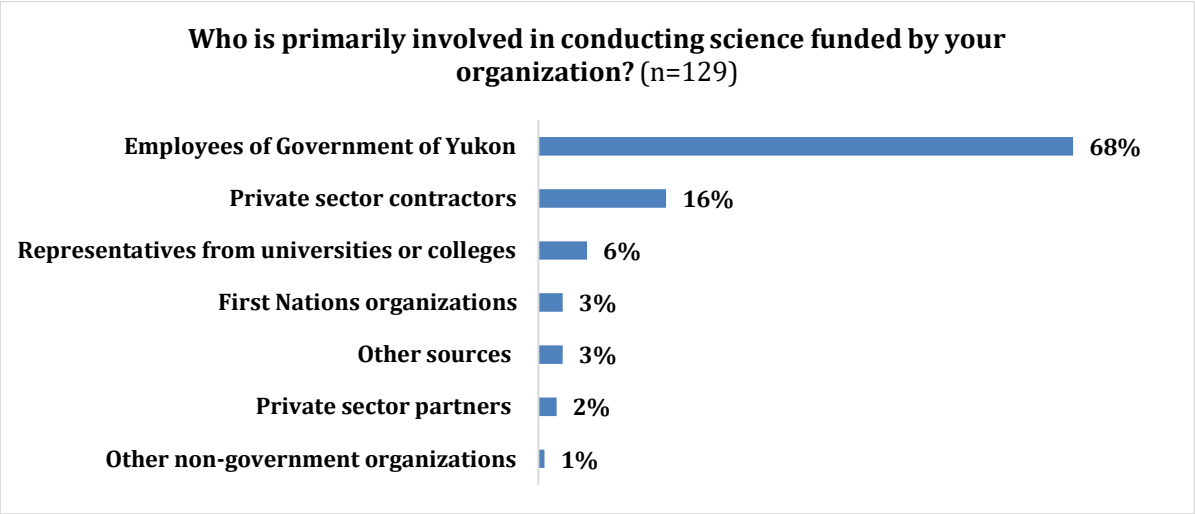
2. **Government of Yukon representatives, external stakeholders and key informants identified a wide range of science-related activities in which they have been involved as a performer, user or funder over the past year.**

   Appendix II and III list many of the science-related activity examples provided by the key informants, the stakeholders who were surveyed, and focus group participants. They described a wide array of science-related activities, often involving multiple disciplines and other departments as well as partners from outside of government. Activities focused on topics as diverse as health, transportation, environment, natural resources, and tourism. Examples of subjects on which the science-related activities focused included transportation infrastructure, electric vehicles, motor vehicle collisions, wastewater treatment, hydrology, ground water studies, water quality and air monitoring, carbon emissions, coastal erosion, procurement, technology assessment, flooding, wildlife monitoring and population assessment, wetland and plant inventories, biodiversity, climate change, permafrost geoscience, subarctic research, energy generation and energy efficiency, geology, visitor studies, liquor distribution, employee engagement survey and exit surveys, human health, FASD prevalence, heritage assessments, timber supply reviews, and documentation of traditional knowledge on issues such as land management practices, resource management, wildlife management, and heritage sites.

   The types of science-related activities ranged from the collection of baseline data, monitoring studies, policy reviews, and design, building, retrofit and feasibility studies to target group surveys, pilot projects, mapping projects, planning and technical research, wildlife counts, geological surveys, environmental reviews, community engagement and public consultation projects. The Government of Yukon has recently established an Evaluation Unit within the Department of Finance and has undertaken preliminary steps in developing government-wide evaluation policy.

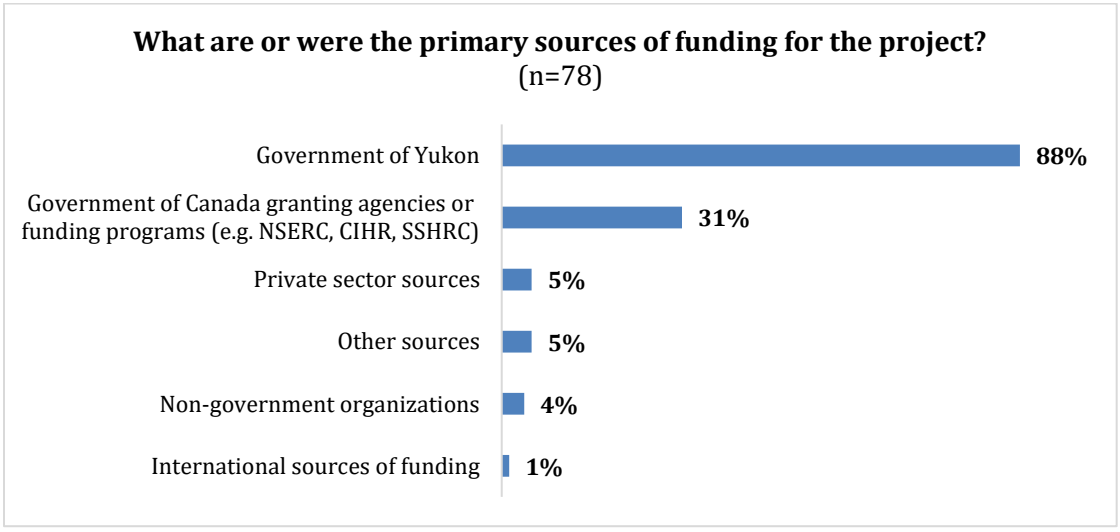
3. **Most of the science-related activities identified by the Government of Yukon representatives were both funded and conducted by the government.**

   When asked who is primarily involved in performing the science activities funded by their department, Government of Yukon representatives responded that 68% were employees of the Government of Yukon, 16% were private sector contractors, 6% were representatives from universities or colleges, and 3% were representatives of First Nations organizations.



When stakeholders who identified performers other than Government of Yukon employees were asked where those researchers are based, the results were evenly divided between Yukon and other parts of Canada.

When asked what the primary sources of funding for these projects were, 88% of Government of Yukon representatives identified Government of Yukon as a primary source and 31% mentioned Government of Canada granting agencies or funding programs (e.g. NSERC, CIHR, SSHRC). A few mentioned private sector sources (5%), non-government organizations (4%), international sources of funding (1%), and other sources (5%).



4. The external stakeholders involved in science-related activities in Yukon indicated that the Government of Canada is the primary source of funding for those activities and the projects are implemented in association with a range of other organizations.

Nearly 90% of the stakeholders indicated that the Government of Canada granting agencies or funding programs (e.g. NSERC, CIHR, SSHRC) are the primary source of funding. Other sources included the

Government of Yukon (37%), private sector sources (26%), other sources (16%), and non-government organizations (11%).

Their projects involved a broad cross-section of other organizations including First Nations organizations (identified by 84% of the external stakeholders), universities and colleges (68%), non-government organizations (32%), private sector contractors (26%) and private sector partners (11%). When asked where the researchers associated with the projects are based, 84% identified researchers who are from the Yukon, 74% identified researchers from other parts of Canada, and 21% identified researchers from outside of Canada.

3.2 Application of Science in Decision-Making

The section summarizes findings regarding the increasing emphasis on evidence-based decision-making within the Government of Yukon, provides examples where science has been applied to decision-making, and outlines some of the factors that serve as barriers to the application of science to policy development and decision-making.

1. **The Government of Yukon has been placing increased emphasis on evidence-based decision-making.**

   Government of Yukon representatives who participated in focus group discussions and interviews generally felt that, under the current government – which has been in place since early 2017 – there has been an increased focus on evidence-based decision-making. The Government of Yukon has made science and innovation and its use in evidence-based decision-making a higher priority than in the past and there has been increased interest in using and supporting science at all levels, including amongst higher-level decision-makers.

   The government representatives noted that this emphasis has been reflected in departmental mandate letters, performance plans, development of new tools and numerous public communications and policies. As an illustration:

   - Upon forming government in early 2017, Premier Sandy Silver stated:

     "This government's commitment to open and transparent decision making remains strong, and we are dedicated to allocating our resources in a responsible way while focusing on delivering results that will improve Yukoners' lives."

   - This statement was reinforced with Yukon's 2017 – 2018 Budget Address, in which the Premier called for the creation of an Evaluation Unit, housed within the Department of Finance and an "*evidence-based approach ….. guided by our priorities*."

   - Announced in 2018, the Innovation Hub represents a partnership between the Government of Yukon, Yukon College and the non-profit Yukon Makerspace Society to spur the collaboration of industry, post-secondary institutions and government on issues of innovation and entrepreneurship.

   - Launched in 2018, the Government of Yukon Performance Plan was a new process through which evidence-based decision-making and accountability were to be supported. In his introduction to the first Plan, Silver commented:

> *"For the first time in Yukon, our plan identifies territory-wide indicators. These indicators are a starting point. We know we have more work to do to make sure we are gathering the right data and we will continue to make improvements to these indicators over the next few years.*
>
> *Beginning in the next few months, we will measure our progress on achieving the commitments in this plan and update Yukoners twice a year. You will know what our government is working on and how we are making progress."*

- In the premier's most recent 2019 mandate letter (in his capacity as Minister of Finance), Silver stated that he will:

> *"Strengthen the capacity to support the effective evaluation of government programs and policies."*

2. Government representatives and external stakeholders provided numerous examples where science, research, monitoring data, Indigenous knowledge and other information has contributed to informed decisions.

Examples where research contributed to better-informed decisions and other improvements commonly related to:

- Legislation (e.g. preparing for the legalization of cannabis; conducting a review of the Liquor Act)
- Policy, planning and strategies (e.g. public health policy; policy analysis on renewable energy initiatives; planning in areas such as land-use planning, wildlife management, infrastructure design, and community resilience; development of a social inclusion strategy)
- Programs and guidelines (e.g. additions to the drug formulary; design of energy-effective retrofit packages for Yukon homes; development of guidance documents for the mining industry, such as a Water Quality Objectives Guide and an Adaptive Management Guide)
- Service delivery and operating decisions (e.g. strategies to mitigate climate change-induced impacts on highway embankments; program improvements based on the results of evaluations; development of evidence-based decision-making protocols to guide day-to-day activities)
- Target groups (e.g. Government of Yukon recently adapted a new learning management system which provides instant access to demographic information on course and workshop audiences. As a result, staff can now make better decisions in matching specific training courses to different types of audiences)
- Regulation (e.g. supporting industry regulation in areas such as the regulation of oil and gas operations)
- Human resources planning (e.g. incorporating the results of employment engagement and exit surveys)
- Systems (e.g. building of data management systems; improvements to data management processes and data sovereignty – including the First Nations principles of Ownership, Control, Access and Possession collectively referred to as OCAP)
- Performance reporting (e.g. tracking performance against established indicators)
- Targeted initiatives (e.g. improvements to First Nations health and well-being; improving cultural competency)

Evidence may be used to inform the decision-maker about the characteristics and significance of an issue, the effectiveness and efficiency of existing approaches to addressing the issue, potential alternatives, and the views of experts and key stakeholders. Representatives provided examples of both ongoing research

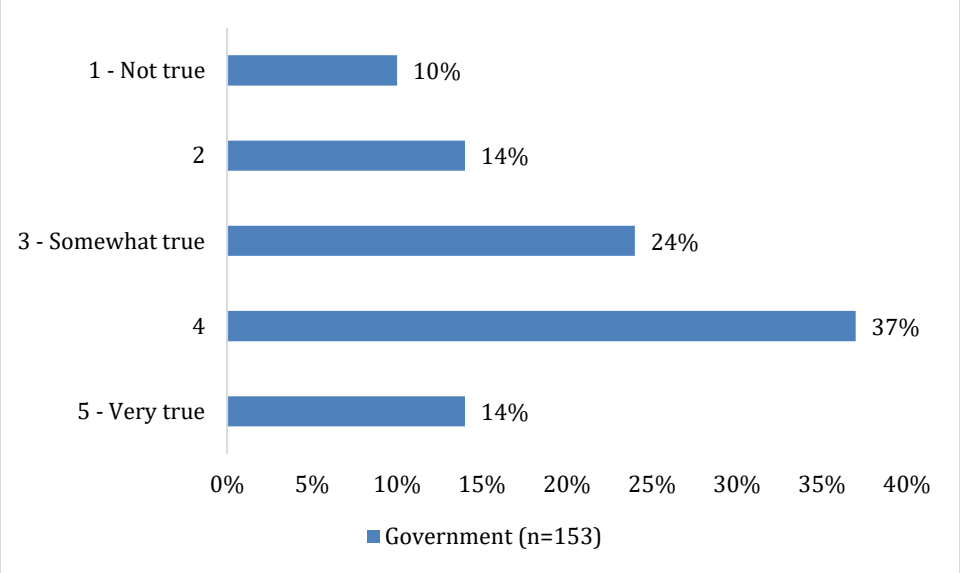
as well as targeted research that may, for example, support cabinet decision-making processes and strategic planning activities or advocate with federal science agencies and departments for further investment in Yukon and consideration of Yukon's needs and interests in federal government plans. The representatives also noted that the Government of Yukon produces data that is used not only internally but also by a range of stakeholders including academic institutions, Indigenous governments and the private sector.

3. However, the extent to which that increased emphasis on evidence-based decision making has been reflected throughout the Government of Yukon may vary widely.

In the survey, Government of Yukon representatives were asked to rate, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, the statement "*The Government of Yukon is placing a greater emphasis on evidence-based decision-making than it did five years ago.*" As indicated in the chart below, 51% rated the truthfulness of the statement as a 4 or 5. Overall, 10% rated it as not at all true. The average rating for the statement was 3.3 (i.e. somewhat true).

Statement: The Government of Yukon is placing a greater emphasis on evidence-based decision-making than it did five years ago.

Question: Reflecting your experience, we would like you to rate the statement on a scale of 1 to 5, where 1 is not true, 3 is somewhat true, and 5 is very true.



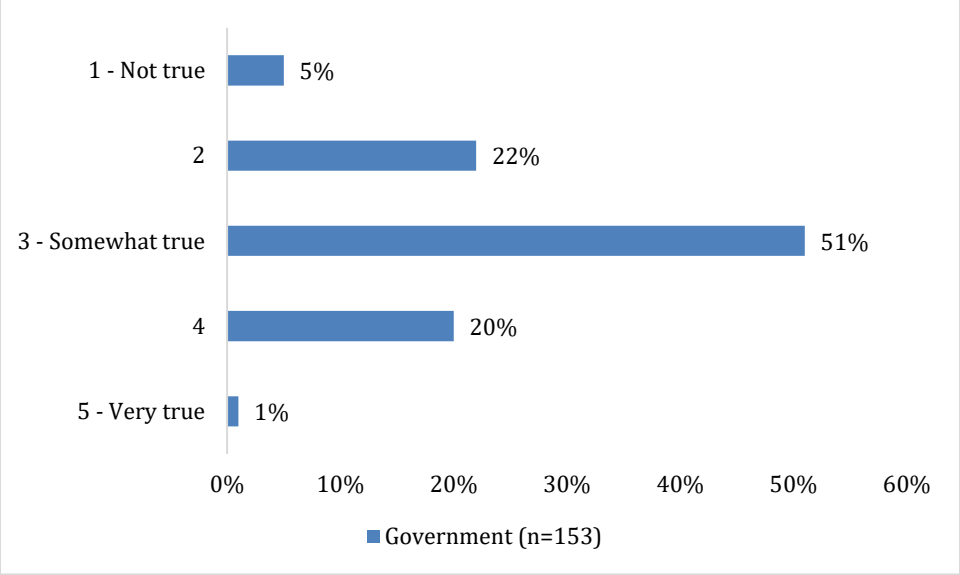
Most representatives in the focus groups agreed that there has been more discussion and recognition, within the government, of the value of evidence-based decision-making. However, some argued that putting increased emphasis on evidence-based decision-making means more than that. For example, it requires complementary investments be made in science, research, data, and Indigenous knowledge to ensure that decision-makers will have access to the information needed. In the absence of significant investment, some focus group participants characterized the increased emphasis as superficial; there is definitely more discussion about evidence-based decision-making than before, which is important, but additional work is needed to further build a culture of evidence-based decision-making and accountability and to increase access to the evidence needed to inform those decisions.

4. **The results of the surveys, interviews and focus groups suggest that further work is needed before the Government of Yukon is well-positioned to say that its policy is informed by sound science.**

In the survey, Government of Yukon representatives were asked to rate, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, the statement "*Government of Yukon policy is informed by sound science*". As indicated below, 21% provided a rating of 4 or 5 while 5% rated it as not at all true. The average rating for the statement was 2.9.

Statement: Government of Yukon policy is informed by sound science.

Question: Reflecting your experience, we would like you to rate the statement on a scale of 1 to 5, where 1 is not true, 3 is somewhat true, and 5 is very true.



This was echoed by individual interviews with key informants as well as the focus group discussions with staff. While most recognized that the Government of Yukon places a priority on evidence-based decisions, the realities of policymaking reflect the often-outsized influence of public opinion. Additionally, these same participants reflected that the speed at which policy decisions are made is often not compatible with the timelines required for rigorous research or peer-reviewed science.

5. **Stakeholders identified a range of factors that can serve as barriers to the application of science to policy development and decision-making in the Government of Yukon.**

The barriers identified by the Government of Yukon employees and external stakeholders included:

- **The nature of decision-making process.**

  Evidence is one consideration, but not necessarily the only consideration, that feeds into the decision-making process. For example, when asked about barriers to evidence-based decision-making in an open-ended question, 26% of both the Government of Yukon representatives and the external stakeholders surveyed noted that factors other than scientific evidence often are the most important consideration. These factors included:

- Pressure from interest groups, public opinion or political considerations. While all governments across Canada must balance these factors, they can be more strongly felt in a small jurisdiction like the Yukon, where elected officials and senior departmental leadership are particularly accessible to members of the public through social and community channels;

- The biases, preferences or past experiences of the decision-maker;

- Time pressures and the need for a quick decision (e.g. not enough time is available to collect and analyze data). Staff may be left triaging research requests as they come in, doing their best as they put forward policy recommendations in the absence of complete information; and

- The complexity of the decision-making process and need to satisfy multiple stakeholders (e.g. multiple stakeholders may be involved in the process along with the Government of Yukon, such as Indigenous governments, the federal government, municipal governments, and others).

While representatives noted that strong voices and opinions are often considered and can result in decisions that can be less robust than they would otherwise be, there is a trend in terms of the emphasis is shifting more and more to science. To increase the emphasis on evidence, some suggested:

- Increasing the transparency of decisions (by more frequently having decision-makers detail the rationale for decisions made); and

- Mandating or facilitating greater use of evidence-based decision-making within government (e.g. by adapting and refining decision-making templates to include science-specific components, as well as requiring sound data to be used in decision-making documents and briefing materials).

- **Some continuing resistance to evidence-based decision-making.**

  When asked about barriers to evidence-based decision-making in an open-ended question, 21% of the Government of Yukon representatives noted that, in their experience, recognition of the importance of science and evidence for decision-making remains low, at least in parts of the government. Some stakeholders noted that, in their experience, there continues to be limited use of evidence and science in the decision-making processes within government, management boards, and cabinet committees. Others, however, suggested that there have been significant improvements to briefing notes; documents going to the Minister or Cabinet for decisions now contain evidence-based analysis and propose options or approaches that are grounded in solid information.

  There were mixed opinions regarding the statement, "*There is broad recognition of the importance of science and innovation within the government.*" On a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, only 22% of the Government of Yukon representatives rated the statement as a 4 or 5. The average rating for the statement was 2.8.

- **Difficulties that decision-makers may face in interpreting and applying evidence in the decision-making process.**

  Focus group participants noted that there are few scientists at the director level or higher within Government of Yukon, and scientists are typically not directly asked to provide input into decisions. In the survey, 13% of Government of Yukon representatives noted (in an open-ended question) that a lack of understanding of the scientific process, combined with their limited experience related to scientific activities, makes it difficult for decision-makers to make informed decisions. Similarly, when asked about the barriers to evidence-based decision-making, about 8% of the Government of Yukon representatives indicated that a key factor was the lack of communication between decision-makers or policy analysts and scientists.

- **The results of some science-related activities are not considered useful or reliable by the decision-maker.**

  The surveys indicate that the results are generally useful. When asked to rate the statement "*The results of the science currently performed are useful to government decision-makers*" on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, 68% of the Government of Yukon representatives rated the statement as a 4 or 5, as did 77% of the external stakeholders. The average rating for the statement was 3.9 amongst both the Government of Yukon representatives and the external stakeholders.

  However, when asked about the barriers to evidence-based decision-making, about 8% of the Government of Yukon representatives indicated that a key factor was a lack of confidence that senior management had in the research results. Another concern identified by external stakeholders is that decision-makers sometimes have unrealistic expectations regarding how exacting or precise science can be (e.g. not understanding how much uncertainty or variabilities there must be when assessing nature or human-systems), and a perceived general lack of scientific experience or literacy among Government decision-makers.

- **The science-related activities may not align well with government's policy needs.**

  In the survey, Government of Yukon representatives were asked to rate, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, the statement "*Scientific priorities within Government of Yukon are informed by its policy needs."* The average rating was 3.1, with 28% rating the statement as a 4 or 5. Four percent rated it as not at all true. Factors identified by focus group members and those surveyed that can contribute to a lack of alignment include:

  - In the absence of direct research, the evidence may have to come from secondary sources (which may hold some relevance, but were not commissioned for this specific purpose);

  - The science-related activities may serve multiple purposes and stakeholders, whose various interests have to be reflected in the design. For example, several key informants noted that the research agenda of their department was driven more by the needs of industry than by the needs of government decision-makers;

  - There may be a lack of direct communication and coordination between the decision-makers and the researchers who carry out the day-to-day science activities.

- **There may be a lack of evidence or important gaps in the data available to inform decision-making.**

  When asked about barriers to evidence-based decision-making in an open-ended question, 25% of Government of Yukon representatives noted their departments often do not have sufficient access to the data or evidence needed to inform decisions. Representatives noted that, in some cases, the needed data has simply not been collected or compiled (e.g. long-term monitoring data for water stations, fish and wildlife data, demographic data in smaller communities). In other cases, the data has been collected but there are data issues or quality issues that preclude its use; alternatively the data may have been collected for other purposes or in other regions and is not relevant or reliable for Yukon (which, for example, may need cold climate data). The stakeholders noted data often needs to be appropriately contextualized so that it can provide information that is useful to the decision-maker.

  In other cases, the data exists as needed but there is an access issue. For example, the representative may not have access to the databases (internal to government or external databases) containing the data or they may not have access to needed scientific journals and other research. Yukon's small population also means that health, social and demographic data from traditional sources like the federal census and health status surveys are often suppressed to maintain confidentiality. Some representatives also noted that a lack of communication and coordination across departments and organizations can make it difficult for representatives to first become aware of and then access data collected by another departments and agencies.

6. **The results of the two case studies illustrate some of the ways in which the results of science-related activities inform decision-making as well as some of the collaborative work that has been carried out to support and build science capacity in the Territory.**

   The case studies are provided in Appendix III and summarized in brief below.

   YESAB / Coffee Gold Mine

   The Yukon Environmental and Socio-economic Assessment Board (YESAB) provides independent recommendations on specific projects, under the *YESA Act.* The assessment process for the Coffee Gold Mine project has to date been underway for several years and illustrates the inter-relation between Government of Yukon data, original science expected to be carried out by the proponent and their consultants, as well as the importance of traditional and local knowledge from Yukon communities and First Nations.

   The case study highlights both relative strengths and challenges identified elsewhere in this baseline assessment. Given the scope and scale of the proposed gold mine, diverse scientific evidence pertaining to surrounding wildlife corridors, water, plant life, socio-cultural considerations and heritage must all be taken into account – in addition to the geological and operational characteristics of the mine itself.

   Specifically, the importance and availability of government-generated data is critical for the proponent – yet there are significant gaps. The proponent then turns to external consulting firms to collect original data or seeks to discover whether local First Nations have collected similar data in the past. A general lack of coordination or centralization of data from these disparate parties then leads to duplication and inefficiencies. For example, one interviewee described carrying out water sampling at the proposed mine

site and discovering that Government of Yukon staff were conducting nearby water sampling for another project.

While inefficiencies and data duplication were not described as ultimately affecting the decision-making process, all Coffee Gold case study interviewees acknowledged that public perceptions and local connections to the decision-making process often override the objective or empirical basis for decisions. This was considered partially unavoidable; however, it was felt that Yukon's small territorial population with close personal connections to decision-makers makes this issue more challenging than it would be in other jurisdictions.

Canadian Mountain Network (CMN)

Yukon's involvement in the national CMN and role in securing $18.3M of federal Network of Centres of Excellence (NCE) funding for 2019-2024 demonstrates both the importance of Government of Yukon staff and material support to science throughout the Territory, as well as the need to leverage outside relationships and networks to reach any science-related objectives for the Territory. Through a leading role played by the Government of Yukon's Science Advisor, an extensive and collaborative Yukon Initiating Group helped shape the successful NCE proposal. This work ensured a Yukon focus that is positioned to address not only financial gaps, but also explore new ways of conducting partnership-based research and leveraging training programs to bring increased science opportunities to Yukon First Nations youth.

Unfortunately, long-term funding remains a concern even after the successful CMN application. Federal budget 2018 included the announcement that the NCE program will be sunsetted in 2024, with relevant investments transitioning towards the newly-established New Frontiers in Research program. Interviewees described this new program as reflecting a shift toward more traditional investigator-driven science projects, and away from the collaborative, network and partnership-based research that is a better fit for Yukon and the current focus of the CMN.

As the CMN project implementation moves forward, there may be opportunities to more formally connect the Science Strategy to the project – both to provide a framework for bringing lessons learned from the CMN to bear in bolstering science capacity within the Government of Yukon, as well as in positioning government to potentially be able to play a larger role in addressing some of the gaps the CMN project addresses once the NCE funding period is over.

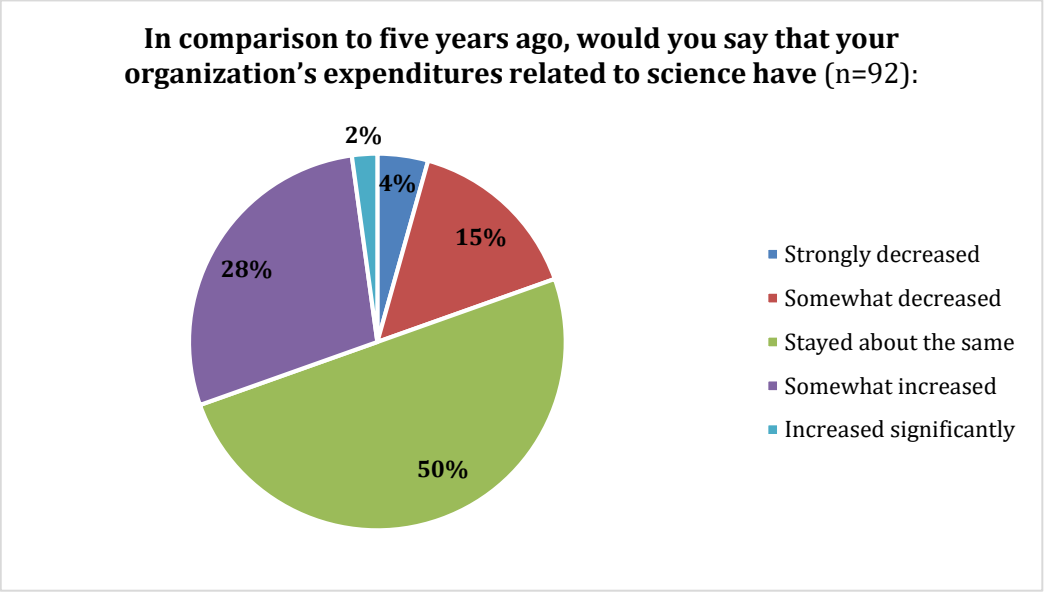
3.3 Key Issues and Opportunities for Improvement

This section first summarizes findings regarding investment in science-related activities. It then outlines key issues and opportunities for improvement related to science capacity, the incorporation of traditional and local knowledge into science and decision-making, and the level of communication, coordination and information sharing across departments and organizations.

1. **Government of Yukon expenditures related to science may have increased over the past five years – due to an increased focus on evidence-based decision-making - but likely not significantly. An increase in the science-related expenditures of external organizations was reported and attributed largely to an increase in federal government grant funding.**

   Government of Yukon expenditures related to science do not appear to have changed significantly over the past five years, with most stakeholders who are able to respond indicating that their department's

expenditures have remained the same (50%), increased slightly (28%) or decreased slightly (15%). Only 2% reported a significant increase while 4% reported a significant decrease.



Those who reported at least somewhat of an increase in expenditures attributed it to undertaking additional research tied to departmental priorities and new initiatives, the department's increased focus on evidence-based decision-making, and opportunities to leverage funding from other sources (e.g. funding from the federal government). Those who reported a decrease in expenditures attributed that to budgetary pressures, difficulties in leveraging funding from other sources, and competing priorities. For example, a key informant mentioned that investing in health, public services, or infrastructure tends to be a higher priority than investing in research, science or evaluation.

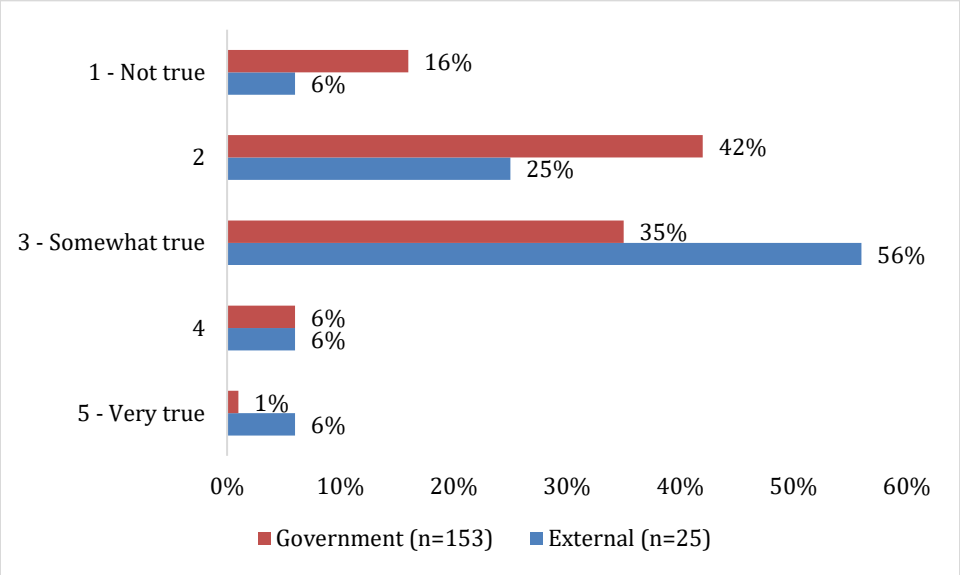
In comparison, the representatives of the external organizations indicated that the science expenditures of their organizations have increased, primarily as a result of increased access to research grants. When compared to five years ago, 24% of the external stakeholders responded that expenditures have increased significantly, 53% responded that expenditures have increased somewhat, and 24% responded that expenditures have stayed about the same. None experienced a decrease. The most common reasons included increased access to research grants (particularly federal government grants), increased capacity to conduct research (e.g. increased access to highly qualified researchers), and increased interest in specific research topics on which they focus (e.g. climate change).

2. **The broad consensus among the Government of Yukon representatives and external stakeholders is that making further progress towards evidence-based decision-making will require additional funding to be invested in science and research.**

In the survey, Government of Yukon representatives and external stakeholders were asked to rate, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, the statement "*The level of investment in science and research by Government of Yukon is appropriate given its needs.*" As indicated below, only 7% of government representatives provided a rating of 4 or 5 while 16% rated it as not at all true. Twelve percent of external stakeholders provided a rating of 4 or 5 while 6% rated it as not at all true. The average rating for the statement was 2.3 among Government of Yukon representatives and 2.8 among external stakeholders.

Statement: The level of investment in science and research by Government of Yukon is appropriate given its needs.

Question: Reflecting your experience, we would like you to rate the statement on a scale of 1 to 5, where 1 is not true, 3 is somewhat true, and 5 is very true.



Similarly, in an open-ended question, 17% of Government of Yukon representatives and 21% of external stakeholders identified funding constraints and lack of investment in science activities when asked about the major barrier to evidence-based decision-making. More investment in both science activities and human resources will be required to increase access to the science needed to support evidence-based decision-making. Key informants noted examples where departments have identified particular areas as a priority for action, but corresponding investments have not made in areas that would provide the data needed to make effective decisions related to those priorities.

Focus group participants and key informants provided a range of comments on the relative shortage of funding for science-related activities in Yukon:

- The level of funding provided by the Government of Yukon is low compared not only to provinces but also to other territories across the north. It was suggested, for example, that the NWT invests considerably more in research areas such as health and monitoring.

- Because of its under-developed capacity to perform science, research and development, the region faces greater difficulties in accessing federal government funding from sources such as the Tri-Council granting agencies.

- The Government of Yukon should expand funding for science-related activities performed internally and also work with the new university and partner with universities outside of the region when government lacks the capacity to carry out such science projects.

- By increasing its investment in science-related activities and targeting more of that funding locally, the Government of Yukon could play an important role in promoting the development of a healthy local private research sector. Growth in the local research sector will better enable local

contractors to access funding from other sources. By helping to build local capacity, the Government of Yukon would be better able to access a range of science- and research-related services that can be tailored specifically to their needs.

- Access of Yukon's private sector to federal government science funding is constrained by the design of federal programs. For example, many of the small or early-stage companies in Yukon are not incorporated, which means that they are not able to access funding under the Industrial Research Assistance Program (IRAP). Similarly, the nature of the R&D undertaken by these early-stage companies is not eligible for credits under the Scientific Research & Experimental Development (SRED) program. Funding provided to entrepreneurs through the Yukon Innovation Centre is not recognized for the purposes of federal matching programs.

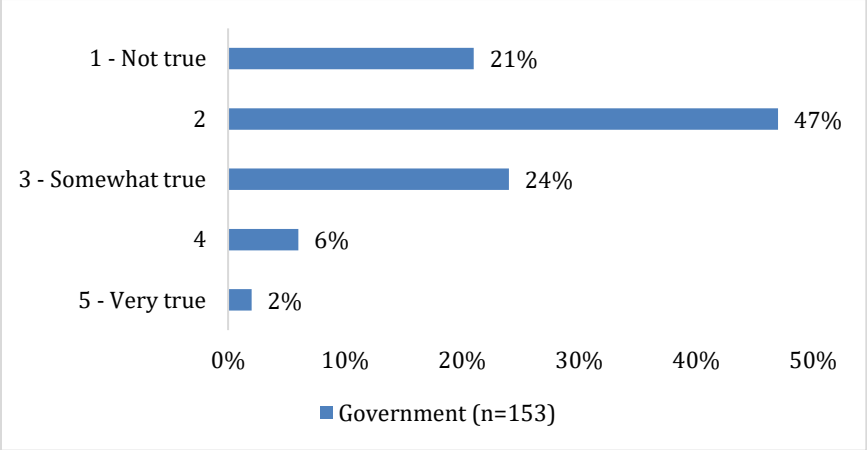
3. In association with that increased investment, there is a need to expand the Government of Yukon's capacity to effectively manage and perform science.

Progress has been made in increasing scientific capacity within Yukon. Key informants noted progress in areas such as Yukon College (particular its transition to a university, which will expand its capabilities and help to build the local knowledge sector), development of science activities within First Nations communities, and development of the Canadian Mountain Network and Permafrost Net. Advancements have been made not only in terms of skills and resources but also in terms of methodologies; for example, a new, more sophisticated way to assess moose populations has been developed. Several key informants also highlighted the increased capacity of the government to incorporate traditional knowledge in decision-making. Some departments reported an increase in their investment in training for staff and researchers and are committed to conducting more robust reviews and evaluations.

However, most government representatives felt that further work is needed. In the survey, Government of Yukon representatives were asked to rate, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, the statement "*The capacity of Government of Yukon to manage and perform science is sufficient given its needs.*" As indicated below, only 8% of government representatives provided a rating of 4 or 5 while 21% rated it as not at all true. The average rating for the statement was 2.2.

Statement: The capacity of Government of Yukon to manage and perform science is sufficient given its needs.

Question: Reflecting your experience, we would like you to rate the statement on a scale of 1 to 5, where 1 is not true, 3 is somewhat true, and 5 is very true.



Key informants noted that most managers within government tend to have relatively little experience in managing science and research projects and few have a science background. The potential solutions that emerged from the group discussions with both staff and decision-makers focused primarily on providing some form of preferably government-wide science orientation and training programs, which could be delivered through a variety of means including classroom training, online, workshops, or lunch and learns. The focus would be on both improving the science literacy of decision-makers and leaders as well as increasing their understanding of the purpose and process involved in evidence-based decision-making. Some suggested that the training should focus mostly on decision-makers, while others suggested it should also be targeted at staff and politicians as well. A few focus group participants suggested all senior level managers and directors who oversee science and technology departments should have a relevant training, experience and background in those fields.

In terms of performance, some key informants noted that the Government of Yukon tends to have more experience in data collection activities but relatively less experience in conducting research and experimental projects. It was suggested that the ultimate responsibility for building science capacity lies within each Government of Yukon department.

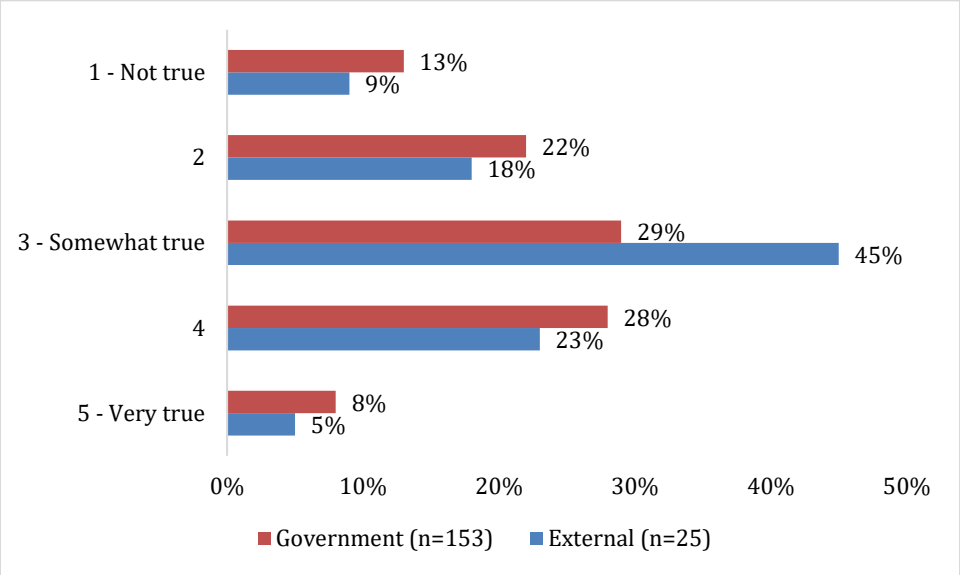
Some noted that science-related capacity also entails infrastructure, including facilities to protect and store data, studies, artifacts and other materials. Lack of adequate storage was identified as a pressing need ("artifacts up to 9,500 years old are being stored in leased storage units. If science was taken seriously, we would invest in protecting and storing these artifacts properly in a good facility."). Towards that end, it was suggested that the Government of Yukon pass legislation and establish a regulatory regime that allows for the protection of scientific artifacts and evidence.

4. **An important component of building science capacity involves having a strong talent base of science practitioners and professionals in place.**

In the survey, Government of Yukon representatives and external stakeholders were asked to rate, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, the statement "*It is difficult for the Yukon to attract and retain science practitioners and professionals*." Opinions were somewhat mixed as indicated below; 36% of government representatives provided a rating of 4 or 5 while 28% of external stakeholders provided a rating of 4 or 5. The average rating for the statement was 2.9 among Government of Yukon representatives and 3.0 among external stakeholders.

Statement: It is difficult for the Yukon to attract and retain science practitioners and professionals.

Question: Reflecting your experience, we would like you to rate the statement on a scale of 1 to 5, where 1 is not true, 3 is somewhat true, and 5 is very true.



It was also noted that, by giving Yukon College the mandate to transition to a university, the Government of Yukon will be significantly increasing the size of Yukon's knowledge sector. Key informants and focus group participants provided several suggestions regarding the attraction and retention of science practitioners and professionals, including:

- More investment by the Government of Yukon in human resources will be required to support evidence-based decision-making.
- At least part of this additional investment can be targeted to building local capacity. For example, key informants noted that there has been a shortage of archaeologists; the Government of Yukon could help to build local capacity by using its funding to hire Yukon-based researchers and experts rather than bringing in people from outside the province.
- Further work is needed to engage K-12 students in schools and encourage them to see science as a viable and relevant career option. More generally, there is a need to improve science education and literacy at all levels from elementary through post-secondary, as well as in the general public.
- Human resources branches within the departments should review their recruitment strategies to ensure that staff and researchers are brought into positions where their skills and talents are being utilized efficiently. Key informants mentioned that human resources departments can increase staff capacity by hiring recent graduates or students and provide an opportunity for them to pursue their career goals across a broad range of disciplines most appropriate to the individual branch or department.
- Government should build on partnerships with other organizations. For example, the Government of Yukon can build on its partnerships with the Centre for Northern Innovation &

Mining to help the private sector in meeting worker shortages and provide funding for research activities.

- The Government of Yukon could make greater use of partnerships with universities outside of the region when government lacks the capacity to carry out such science projects.

5. **While progress has been made in incorporating traditional and local knowledge into science and the decision-making progress, more work is required.**

In the survey, Government of Yukon representatives and external stakeholders were asked to rate, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, the statement "*Incorporation of traditional and local knowledge in science is increasing*." As indicated below, 51% of government representatives and 50% of external stakeholders provided a rating of 4 or 5. The average rating was 3.5 among Government of Yukon representatives and 3.4 among external stakeholders.

The Government of Yukon has made progress in working with First Nations governments and organizations on a variety of science-related activities and initiatives. Examples of some of these initiatives include the Indigenous Observation Network Program, the Canadian Permafrost Network, the Northwest Boreal Landscape Conservation Cooperative, the Canadian Mountain Network, and the Kwanlin Dün First Nation land use planning documentation, final agreement, and resulting processes.

However, much more progress needs to be made in working with Indigenous communities in identifying priorities, designing projects, and implementing research as well as incorporating traditional knowledge into policy development and decision-making in areas ranging from wildlife management to health. Two barriers to doing so, as identified by key informants, include biases built into the historical western academic way of conducting research and science as well as challenges in engaging Indigenous communities given competing priorities and capacity limitations.

The OSA has been tasked with further developing an effective approach for respecting and reflecting Indigenous ways of knowing and doing. To facilitate further progress, focus group participants and key informants suggested that the Government of Yukon should:

- Provide training on Indigenous data ownership, control, access and possession (OCAP) principles and other relevant individual First Nation protocols to Government of Yukon employees involved in funding, performing or using the results of science-related activities to ensure they understand the history of data and science in First Nations communities.
- Provide support to better enable communities to expand their capacity to participate in science research processes (e.g. in areas such as land use planning).
- Revise the process associated with Yukon Scientist and Explorer Licenses to require more meaningful consultation with First Nations on research permit applications.
- Maintain communication with Indigenous governments regarding the identification of priorities and planning, implementation and results of science-related activities.

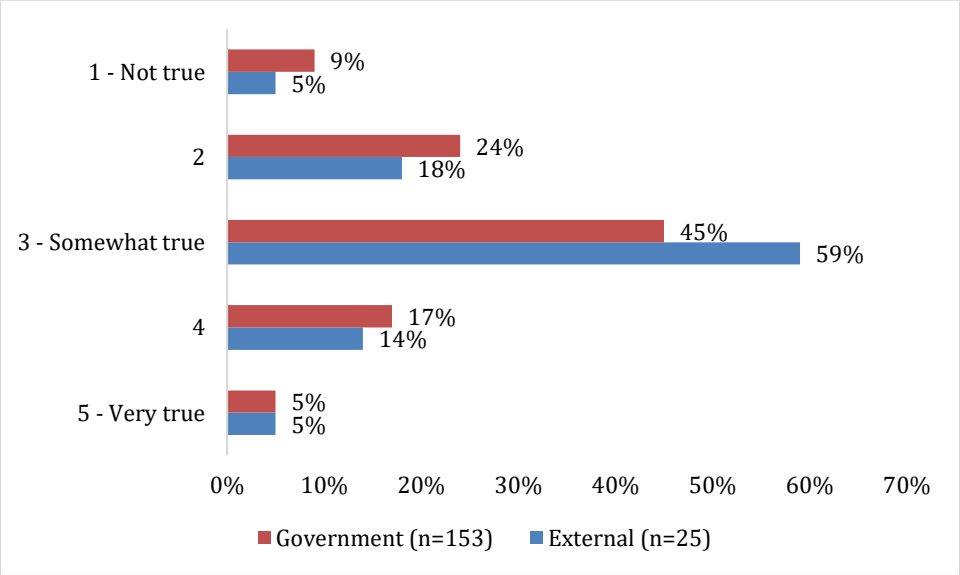
Key informants also stressed the importance of respecting First Nations protocols.

6. **Government of Yukon representatives and external stakeholders highlighted the benefits of improving the level of communication, coordination and information sharing across departments and organizations, as well as improving data standards and scientific information management systems.**

In the survey, Government of Yukon representatives were asked to rate, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, the statement "*There is a culture of information sharing that facilitates the sharing and distribution of scientific information generated in Yukon*." As indicated below, only 22% of government representatives provided a rating of 4 or 5 while 9% rated it as not at all true. 19% of external stakeholders provided a rating of 4 or 5 while 5% rated it as not at all true. The average rating for the statement was 2.8 amongst government representatives and 3.0 among external stakeholders.

Statement: There is a culture of information sharing that facilitates the sharing and distribution of scientific information generated in Yukon.

Question: Reflecting your experience, we would like you to rate the statement on a scale of 1 to 5, where 1 is not true, 3 is somewhat true, and 5 is very true.



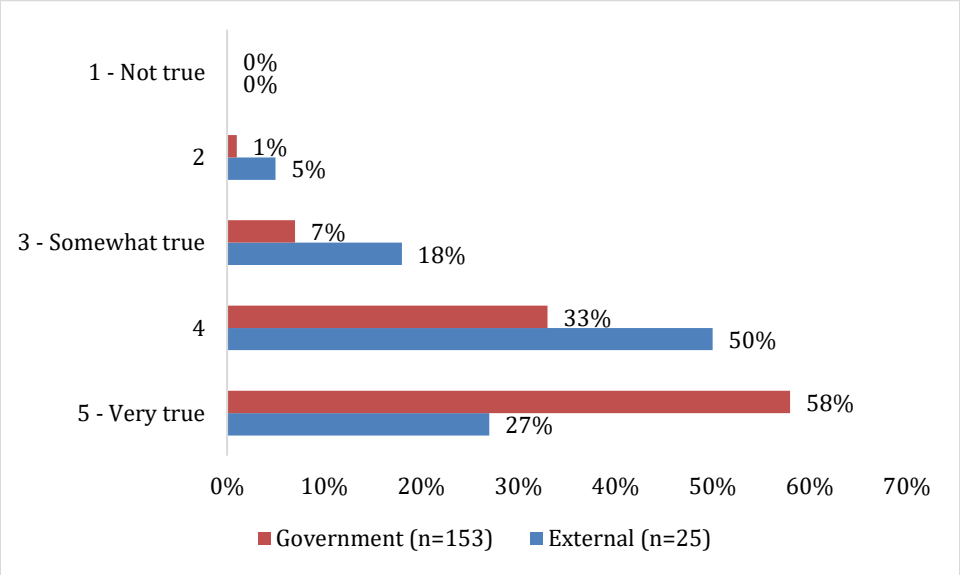
It was noted that some progress has been made through inter-departmental communications and mechanisms such as SCOPe and the Compendium of Current Research and Monitoring. In addition, some boards and committees were praised for sharing research results and making the rationale for their decisions available publicly. However, focus group participants and key informants indicated that further work is needed to promote better communication, coordination and sharing of research information between groups within the Government of Yukon as well as with the federal governments, non-government organizations, Indigenous governments and organizations, universities, resource companies, and others.

Internal focus group members talked at length about the need to break down the information silos that exist between departments and between the Government of Yukon and others. For example, it was noted that Yukon Wildland Fire Management, Yukon Environment, and Yukon College each have their own monitoring programs and data and there is little sharing of information. Similarly, key informants noted that the results of much of the research undertaken by the private sector in Yukon would be useful to government, but the results are currently not shared.

The representatives also stressed the need to improve data standards and scientific information management systems so data can be more easily retrieved, transferred, shared and used. In the survey, Government of Yukon representatives and external stakeholders were asked to rate, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, the statement "*There is a need to improve data standards and scientific information management systems so data can be more easily retrieved, transferred, shared and used*." As indicated below, 91% of government representatives provided a rating of 4 or 5 while 77% of external stakeholders provided a rating of 4 or 5. The average rating for the statement was 4.5 among Government of Yukon representatives and 4.0 among external stakeholders.

Statement: There is a need to improve data standards and scientific information management systems so data can be more easily retrieved, transferred, shared and used.

Question: Reflecting your experience, we would like you to rate the statement on a scale of 1 to 5, where 1 is not true, 3 is somewhat true, and 5 is very true.



When speaking about data in the focus groups, interviews and surveys, participants tended to focus primarily on information management systems. Improved systems including central repositories of science, research and traditional knowledge will facilitate greater access to and sharing of information on science-related activities and results. A few key informants also noted the need to:

- Establish clear policies regarding the use and accessibility of data;
- Improve data standards through providing training and other support to those involved in implementing and overseeing science-related activities;
- Implement new systems, processes and standards related to the collection, reporting and storage of data; and
- Establish a research ethics board for Yukon.

Improved communication, coordination, data management and information sharing will:

- Improve planning and implementation (e.g. involving multiple parties in the design and oversight of science activities often results in a project that is more relevant and effective);

- Reduce the potential for duplication in research efforts. It was suggested that, as a result of turnover within a department, it is not unusual for virtually the same research project to be conducted multiple times. The YESAB/Coffee Gold Mine case study illustrates how duplication can occur when parties are not fully aware of the extent of current science – whether government-generated or traditional knowledge from local First Nations – for a specific project;

- Increase the value of the final product by being able to incorporate and build on various data sources and methodologies; and

- Improve the cost-effectiveness of science-related activities by enabling a broader range of groups to access and benefit from the results.

To improve the level of communication, coordination and information sharing, focus group participants, key informants and those surveyed suggested:

- Better coordinating research, plans and strategies over time and across departments in order to leverage research activities and reduce the potential for duplication.

- Fostering development of a culture in which departmental representatives recognize a responsibility to let others know what they were working on, the methodology they used, the results they had, and the value of that work. Several key informants noted a reluctance to share information between departments.

- Considering the broader policy needs of the Government of Yukon, rather than only the more narrow interests of individual researchers and branches, when designing projects so that the results will be more broadly beneficial to the government and others. This approach may also help to leverage additional resources.

- Expanding use of existing mechanisms such as SCOPe and the Compendium of Current Research and Monitoring to facilitate information sharing.

- Creating new mechanisms that will facilitate greater communication between scientists, policy staff, decision-makers and the general public. One suggestion was to stage an annual "Science in Government" conference to facilitate communication between policy staff, decision-makers, scientists and others. Another suggestion was to encourage decision-makers to engage scientists more directly in their decision-making processes; scientists could assist both in interpreting evidence and advising on the application of that evidence to the specific issue at hand.

- Increasing access to peer-reviewed journal articles so that those designing and implementing research projects are in a better position to build on the existing knowledge base.

- Ensuring that the results of science-related activities are, wherever feasible, made available publicly and communicated in terms and in a manner than is understandable for the general public (e.g. translate scientific results into common language).

- Researchers should work closely with communities to determine their needs and find out about the research they would like to be conducted. One suggestion was to promote development of

distributed, citizen-based science as a means to overcome the research constraints associated with the widely distributed, low-population geographic area in the territory.

- Continue to build the Open Data Portal. Launched in 2019, the portal is intended to be a one-stop, accessible portal to host scientific, statistical and other data. Increasing access to data offers the potential to better leverage existing data, reduce duplication, conserve resources and improve decisions. One key informant noted that "best thing we can do to advance science is to make data sets more open and available."

  Several factors were identified as constraining the posting of data to the portal, including competing priorities ("departments have competing priorities, so open data is not at the top of the list"), the slow pace of digitization ("many departments still have data on paper in boxes") and concerns about privacy. It was noted that not all data is suitable to broad sharing and distribution (e.g. some health data). However, some noted that much more data could be shared than presently is (e.g. "the Government of Yukon tends to default to not sharing data because of the fear of potential damage to people's feelings rather than any actual damage to privacy").

- Invest in robust collections management software which will help in managing house artifacts and collections.

- Provide for better tracking and sharing of information on research licensed through the *Scientists and Explorers Act* (e.g. by establishing a central database), which had been a prior commitment of the Government, but was sidelined due to competing priorities. Other suggestions concerning the Act are that it should be revised and updated to encourage external researchers to develop partnerships in Yukon through their work; and it should be used to ensure that researchers have the proper credentials to conduct specific research activities. The Act currently applies only to those researchers coming into the territory from outside. A remnant of the territory's early mineral exploration and extraction history, this means activities carried out by Yukon-based researchers are not licensed, reported or monitored under the Act – which represents a major limitation to the awareness and utilization of science carried out in the Territory.

3.4 Feedback on the Yukon Science Strategy

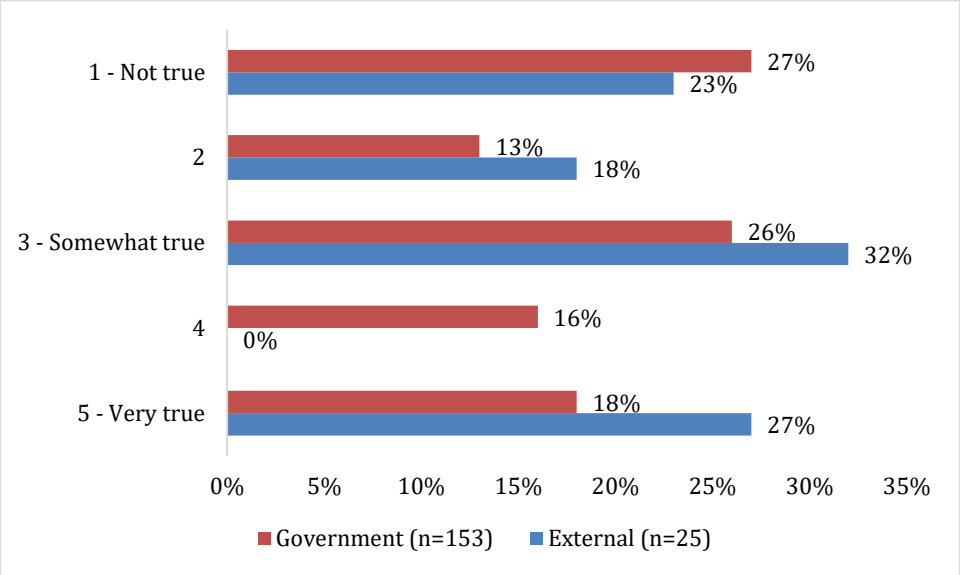
This section summarizes findings regarding familiarity with the Yukon Science Strategy among government employees and other stakeholders, perceived need for the Strategy and its alignment with the issues identified, engagement in various activities related to the strategy, and opportunities for improvement.

1. **Familiarity with the Science Strategy varies widely across the government representatives and external stakeholders who were surveyed.**

   In the survey, Government of Yukon representatives were asked to rate, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, the statement "*Prior to being contacted for this survey, you were familiar with the Yukon Science Strategy.*" As indicated below, 34% of government representatives provided a rating of 4 or 5 while 27% rated it as not at all true. Twenty-seven percent of external stakeholders provided a rating of 4 or 5 while 23% rated it as not at all true. The average rating for the statement was 2.9 among both government representatives and stakeholders.

Statement: Prior to being contacted for this survey, you were familiar with the Yukon Science Strategy.

Question: Reflecting your experience, we would like you to rate the statement on a scale of 1 to 5, where 1 is not true, 3 is somewhat true, and 5 is very true.



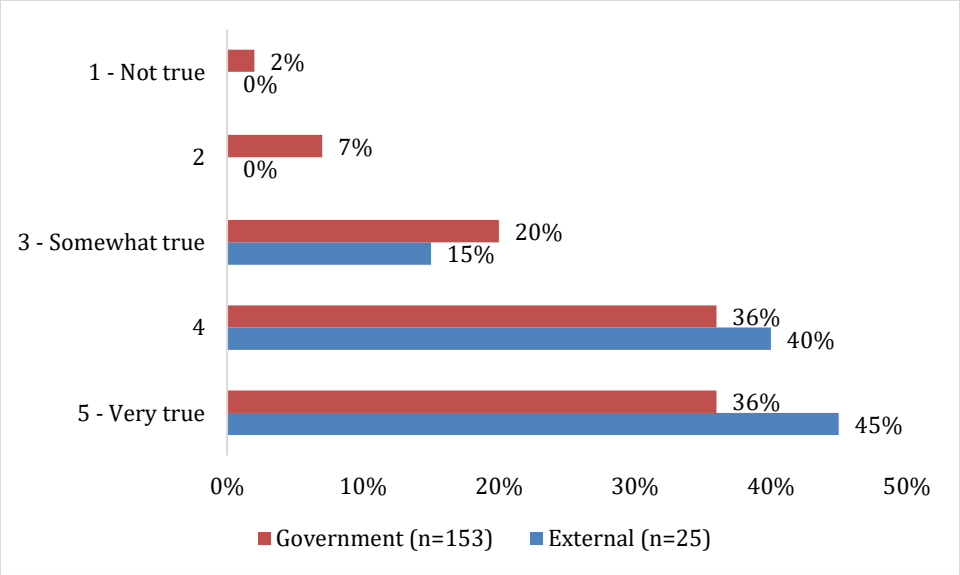
2. **Most Government of Yukon representatives and external stakeholders, even those who are not familiar with the Yukon Science Strategy, believe that there is a need for such a strategy which works to enhance the efficiency and effectiveness of science activities in order to support evidence-based decision-making.**

   The preamble to the surveys included a short description of the Yukon Science Strategy (i.e. it was released in 2016 to provide a strategic framework for integrating and enhancing the efficiency and effectiveness of science activities carried out within Government, in order to support evidence-based decision-making).

   In the survey, Government of Yukon representatives and external stakeholders were asked to rate, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, the statement "*There is a need for the Yukon Science Strategy.*" As indicated below, 74% of government representatives and 85% of external stakeholders provided a rating of 4 or 5. Only 2% percent of the Government of Yukon representatives and none of the external stakeholders indicated that there is not a need. The average rating was 4.0 among both government representatives and 4.3 amongst external stakeholders.

Statement: There is a need for the Yukon Science Strategy.

Question: Reflecting your experience, we would like you to rate the statement on a scale of 1 to 5, where 1 is not true, 3 is somewhat true, and 5 is very true.



The key informants felt the goals of the Yukon Science Strategy align well with the key issues and priorities for improvement that they identified. As identified by the key informants, key benefits that would be realized from achieving the goals of the Science Strategy include:

- Researchers will work more collaboratively with governments and communities in identifying priority needs.
- Improving the design and implementation of science-related projects will increase the quality of research as well as the confidence in research results, better align research with information needs, increase participation in the conduct and use of science, and strengthen partnerships and relationships within government and with other stakeholders including universities and colleges.
- As access to relevant and reliable data increases, the Government of Yukon will be better positioned to develop more effective policies, make more effective and transparent decisions, and explain the rationale for its decisions. As a result, government programs and services will operate with greater effectiveness and efficiency. Increased access to relevant and reliable data will also improve accountability and facilitate more effective evaluations of programs and services.
- The Government of Yukon will be better positioned to assist Indigenous governments, communities, NGOs, and other organizations in meeting their information needs, which will contribute to further improvements in programming and services.
- A strengthened science ecosystem will increase access to scientific professionals and help to attract public and private sector investment in research, innovation and commercialization.

The major concern expressed about the Science Strategy itself, particularly in the focus group discussions, is that the Strategy is perhaps too broad or ambitious, especially in light of current

resourcing. It was suggested that, in the absence of additional funding, the Strategy may be more effective if it concentrates on two or three of the six goals.

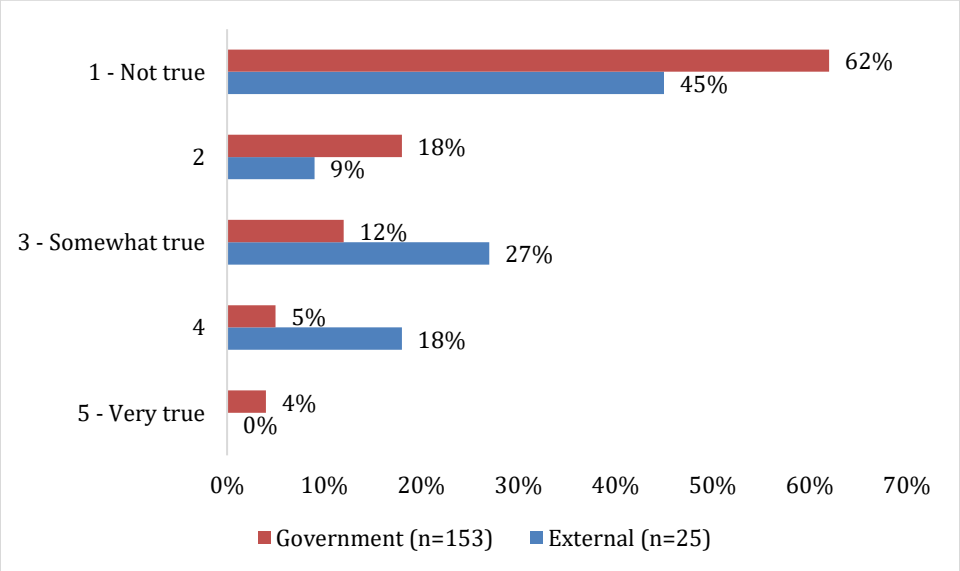
3. **Use of the Compendium of Current Research and Monitoring and participation in SCOPe and ISC is relatively limited. However, those key informants and stakeholders who used these resources provided recommendations to increase participation levels and enhance the benefits associated with the Compendium, SCOPe and the ISC.**

Of the 20 key informants, four indicated that they have used the Compendium of Current Research and Monitoring, 10 have participated in one or more SCOPe (SCOPe) sessions, and three have been involved as appointed members of the Interdepartmental Science Committee (ISC). Overall, eight of the 20 key informants had not been involved in any of the three activities (Compendium, SCOPe, or ISC). Of those surveyed, 9% of Government of Yukon employees and 18% of external stakeholders indicated that they more than somewhat agreed (i.e. rated the truthfulness of the statement as a 4 or 5), with an average rating of 1.7).

In the survey, Government of Yukon representatives and external stakeholders were asked to rate, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true, the statement "*You have made use of the Government of Yukon's online Compendium of Current Research and Monitoring to access information on research and monitoring activities currently underway at Yukon government and/or supported by Yukon government.*" As indicated below, 9% of government representatives and 18% of external stakeholders provided a rating of 4 or 5 (62% of government representatives and 45% of external stakeholders provided a rating of 1). The average rating for the statement was 1.7 among government representatives and 2.2 amongst external stakeholders.

Statement: You have made use of the Government of Yukon's online Compendium of Current Research and Monitoring to access information on research and monitoring activities currently underway at Yukon government and/or supported by Yukon government.

Question: Reflecting your experience, we would like you to rate the statement on a scale of 1 to 5, where 1 is not true, 3 is somewhat true, and 5 is very true.



Few of the participants in the focus groups were familiar with the SCOPe series or the Compendium of Research and Monitoring.

Those who indicated that they have used the Compendium of Current Research and Monitoring generally supported the concept of compiling information and making it public. However, most felt that the information contained in the Compendium was of limited use to them; the subject matter may be not relevant to their needs and the database was perceived as out of date (e.g. environment data and information have not been updated since 2016) and incomplete (e.g. missing some research and monitoring activities). The technology (ArcGIS story maps) was considered cumbersome to work with.

Website visit data provided by OSA confirms the low level of use of the compendium. The main compendium page averaged just 3.2 views per day (totaling 1,156 visits in the most recent 2019-2020 year). The 2016-2017 launch year generated the most visits to the site (5.5 main page views per day), with traffic dropping off to a low of 1.7 daily page views the following year. This likely reflects the level of early activity and engagement as project listings were solicited from individual departments in order to populate and launch the compendium.

Perceptions of the SCOPe were much more favourable. Participants characterized the sessions as featuring "fantastic discussions and presentations." SCOPe has been effective in facilitating knowledge sharing; for example, it has increased the willingness and capacity of departments to share their projects, including the methodology that was used as well as the outcomes and conclusions. The sessions were praised for being interdisciplinary, interesting for both presenters and participants, and open to the public, and for having made significant efforts to invite First Nations representatives whenever the topic is relevant. Participants reported learning about the OSA, Arctic Net, Permafrost Net, the Canadian Mountain Network and other topics. It was noted that SCOPe has tended to focus more on natural sciences and less on social science topics to date.

In terms of challenges, several key informants noted that participation levels in SCOPe have been lower than they should be given the usefulness of the sessions. The sessions would benefit from increasing awareness of SCOPe within government and in the broader community as well as by including more presenters from outside government. Facebook groups, including the current SCOPe Facebook page, were identified as one effective way to engage people. While a 2015 survey conducted by OSA originally determined that lunch times were preferable, some participants noted that it can be difficult to attend luncheon sessions (one participant recommended setting "a time during the workday").

Those who indicated that they have participated in the Interdepartmental Science Committee (ISC) noted that:

- The ISC has played an important role in particular initiatives, such as developing the Canadian Mountain Network and the leading the ongoing evaluation of the Science Strategy.

- Commitment to the ISC varies widely by department, which is reflected in varying levels of attendance and frequent turnover in representatives. Low levels of participation were attributed to a mixture of departments not recognizing science as a priority and a failure to define a clear role for the ISC that was important enough that involvement becomes a higher priority for the departments.

- The varying levels of participation means that some voices and perspectives are not being heard while others may be favored.

When asked for recommendations as to how to better engage stakeholders in all of these activities, key informants suggested:

- Creating a champion with direct responsibility for engaging existing and potential partners. A wide variety of levers are available, including direct communication, websites, social media, annual forums and ongoing events such as science fairs.

- Explore different ways to engage First Nations communities, recognizing that these communities commonly face time and capacity limitations.

- Broadening the target groups beyond scientists to include all government employees, particularly those without a science background.

- Building a strong network involving external organizations, such as professional associations like the Association of Professional Engineers of Yukon.

- Strategically rebranding and marketing the Science Strategy. Focus group participants noted that the term "science" could be limiting the potential reach and impact of the Strategy, as it may be seen as excluding activities such as surveys, operational research, evaluation, performance measurement and community and traditional knowledge. 'Science' also carries a stigma for First Nations partners who understandably have ongoing negative impressions of 'research' carried out by non-Indigenous researchers.

4. **The ECO (Executive Council Office), and more specifically OSA, appears to be best positioned to oversee the Strategy, given the focus on science and the horizontal nature of the strategy (i.e. its application across all departments).**

The key informants were asked whether the governance structure for the Science Strategy has been effective. Most key informants and focus group participants felt that they were not in a position to provide an informed opinion. Awareness of the Strategy remains relatively low overall and most key informants have only a limited knowledge as to how it has been governed. Amongst those who provided comments, the major themes were:

- The ECO (Executive Council Office), and more specifically OSA, is best positioned to oversee the Strategy, given the focus on science and the horizontal nature of the strategy (i.e. its application across all departments). This positioning was support by both key informants and participants in the focus groups. It was also suggested by some key informants that administration of the *Scientists and Explorers Act* should be transferred to the OSA.

- There is a need to increase the level of engagement of individual departments with the Science Strategy, clearly assign responsibilities, and find ways to hold departments more accountable for the results. Key informants from some departments indicated that science and evidence-based decision-making remains a low priority at the senior management level within their department.

- Whether through strengthening the core group within the Strategy or other measures, there is a need to expand capabilities to facilitate greater sharing of information across departments, better coordinate science activities, and reduce the potential for duplication.

- Achievement of the goals of the Science Strategy will require increasing both the financial and human resources available to the OSA.

Some key informants recommended establishing a Science Management Board, which would have oversight responsibilities, support implementation of the Strategy, and track the progress made overall and by department.

When asked about tools, resources and other support that will be needed for the Science Strategy to be effective, key informants and focus group participants noted a need to:

- Increase the commitment of senior management to incorporating science into management board and cabinet submissions.

- Raise the importance placed on the Science Strategy by incorporating its goals and/or a direct reference to the Science Strategy into departmental mandate letters as well as in individual employee performance plans.

- Build greater trust and partnerships between Government of Yukon and First Nations, and work to better incorporate science and traditional knowledge into decision-making processes.

- Create venues, such as annual conferences, to bring scientists and decision-makers together to share information, facilitate communication and discuss implementation of the Strategy.

- Create avenues (e.g. regional events) to facilitate greater networking and communication between internal and external researchers, including with institutions such as Yukon College, key associations, professional engineers and others.

- Make greater use of tools to facilitate knowledge transfer (e.g. computer programs that create GIS maps, database tools, open data, and infographics).

- Demonstrate the value of science to decision-making. Suggestions included more case studies, promotional materials, training and visioning that would enable people to imagine what the future would look like if the Strategy was fully implemented.

- Promote additional investment in science-related activities and further development of the capacity for scientific research.

- Raise awareness of the Science Strategy within government and the broader community.

Participants in the external focus group also suggested establishing an external advisory panel for the Science Strategy, consisting of academic, industry and First Nations experts. The panel could provide strategic advice and help to ensure that any potential revisions to the strategy and its goal areas is well-linked to industry and community science needs. It could also provide a mechanism to leverage partnerships, facilitate information sharing, and support implementation going forward.

4. Conclusions and Opportunities for Improvement

This chapter summarizes the major conclusions of the baseline review regarding the science-related activities of the Government of Yukon and the existing and potential roles of the Yukon Science Strategy.

4.1 Science-related Activities of the Government of Yukon

Our conclusions regarding the science-related activities of the Government of Yukon are as follows:

1. **Government of Yukon researchers, policy analysts and decision-makers are involved, as performers, users and funders, in a wide array of science-related activities. These activities produce results that are useful in development of policy and making of decisions.**

   Government representatives reported involvement in science-related activities in areas as diverse as health, transportation, environment, natural resources, human resources and tourism, often involving multiple disciplines, multiple departments and partners from outside of government. Many representatives are involved in multiple ways in conducting, funding, and using science to inform policy development and decision-making.

2. **The Government of Yukon has placed increased emphasis on evidence-based decision-making, although the extent to which that emphasis has translated into practice varies somewhat across government departments.**

   Since the 2003 devolution process, the Government of Yukon's focus on evidence-based decision-making has been increasing. This was further reinforced when the current government formed in early 2017. Departmental mandate letters which mention evidence-based decisions, the development of government-wide performance plans, the establishment of an evaluation unit, and the adoption of the Strategy itself all speak to a commitment to accountability and transparency around decisions.

   Most representatives agree that there is more discussion and recognition of the value of evidence-based decision-making. However, to translate into practice across all departments, more work is needed to ingrain a culture of evidence-based decision-making and accountability, and complementary investments in science, research, data, and Indigenous knowledge are needed to ensure that decision-makers have access to the information needed.

3. **At times, factors such as competing priorities, combined with difficulties in accessing the evidence needed as well as interpreting and applying that evidence, serve as barriers to the application of science in policy development and decision-making within the Government of Yukon.**

   Evidence is one consideration, but not the only consideration, that feeds into the decision-making process. The need for a quick decision, pressure from interest groups and political realities also influence decisions.

   Access to evidence can also be a major constraint. In some cases, needed data has simply not been collected and compiled. In other cases, data has been collected but there may be data or quality issues,

it may have been collected for other purposes and not be relevant for Yukon, or the data exists as needed but there is an access issue. Lack of communication and coordination across departments and organizations can make it difficult for Government of Yukon representatives to first become aware of, and then access, data collected by other departments and agencies.

There can also be challenges faced in applying the evidence. Government representatives noted that there are not many scientists at the director level or higher and, at times, there can be a lack of understanding of the scientific process, combined with limited experience in interpreting results, which can make it difficult for decision-makers to make fully-informed decisions.

4. **Evidence-based decision-making within the Government of Yukon would benefit from increased investment in science-related activities, further developing internal capacity to perform and apply science, incorporating traditional and local knowledge, and improving communication, coordination, information sharing and data management.**

The broad consensus among the Government of Yukon representatives and external stakeholders is that making further progress towards evidence-based decision-making will require additional investments in science and research. Government of Yukon expenditures related to science have likely increased over the past five years, but not significantly. Factors that may constrain expenditures include budget pressures, difficulties in leveraging funding from other sources, and competing priorities.

In association with that increased investment, there is a need to expand the Government of Yukon's capacity to effectively manage, perform and apply science. An important component of building science capacity involves having a strong talent base of science practitioners and professionals in place.

Government of Yukon representatives and external stakeholders highlighted the benefits of improving the level of communication, coordination and information sharing across departments and organizations, as well as improving data standards and scientific information management systems. A key part of that is strengthening relationships with Indigenous governments and communities. While progress has been made in incorporating traditional and local knowledge into science and the decision-making progress, more work is required.

4.2 Role of the Science Strategy

Our conclusions regarding the Government of Yukon Science Strategy are as follows:

1. **There is a strong need for the Yukon Science Strategy.**

Most Government of Yukon representatives and external stakeholders, even those who are not familiar with the Yukon Science Strategy, recognize the need for such a strategy which works to enhance the efficiency and effectiveness of science activities in order to support evidence-based decision-making. The goals of the Yukon Science Strategy align well with the key issues constraining evidence-based decision-making and the priorities for improvement identified by government representatives and stakeholders.

2. **The Yukon Science Strategy can play a significant role in promoting and supporting evidence-based decision making in Government of Yukon. However, fulfilling that role may require**

additional funding and some changes to how it is implemented.

The ECO (Executive Council Office), and more specifically OSA, is well-positioned to oversee the Strategy, given the focus on science and the horizontal nature of the strategy (i.e. its application across all departments). Potential actions that could be taken by the OSA and others to increase the impact of the Yukon Science Strategy in promoting and supporting evidence-based decision making include:

- ***Raise awareness of the Strategy***. Familiarity with the Science Strategy varies widely across government representatives and external stakeholders. Consideration should be given to rebranding the name ("science" carries a certain connotation both within government and important First Nations partners) and creating a champion responsible for engagement and network development.

- ***Establish priorities***. Rather than pursuing the full, ambitious set of six goals, the OSA and ISC should establish clear priorities regarding its plans on a year-by-year basis.

- ***Strengthen the governance structure*.** While the ISC has played an important role in development of key initiatives, the level of commitment varies widely by department as reflected in varying levels of attendance and turnover. The governance structure could benefit from increasing the resources and impact associated with the Strategy and defining a more meaningful role for ISC. Consideration could also be given to establishing an external advisory panel of academic, industry and First Nations experts to support the Strategy as well as establishment of a research ethics board for Yukon.

- ***Facilitate greater information sharing***. One option is to expand use of SCOPe and the Compendium of Current Research and Monitoring. SCOPe is well received and could be more aggressively promoted to a range of target groups. Use of the Compendium appears low and increasing usage would likely require finding options to increase the utility of information provided. Other options include supporting the development of new mechanisms that will facilitate greater communication such as an annual "Science in Government" conference, promoting further use of the Open Data Portal, ensuring research results are, wherever feasible, made available publicly and communicated in a manner than is understandable for the general public, and finding other avenues to break down information silos that exist within government and across organizations.

- ***Facilitate incorporation of traditional knowledge*.** The OSA has been tasked with further developing an effective approach for respecting and reflecting Indigenous ways of knowing and doing. This could be supported by providing training on OCAP principles to government employees and assisting communities to expand their capacity to participate in research processes.

- ***Improve the* Scientists and Explorers Act *and associated licensing***. Suggestions include transferring responsibility to the OSA, expanding the mandate to include Yukon-based researchers, revising the process to require more meaningful consultation with First Nations where relevant, and using license data to establish a central database on research permit applications.

- ***Further ingrain the principle of evidence-based decision-making into government***

processes. Participants recommended that integrating the principle into memoranda to cabinet and the Cabinet Committee on Priorities and Planning (C2P2), decision-templates, mandate letters, and employee performance plans and increasing the transparency of decisions. The principle could be further supported through case studies, promotional materials, training and other support focused on improving science literacy and understanding of the purposes and processes involved in evidence-based decision-making.

- ***Invest in the supporting infrastructure and data standards***, including systems, processes, standards and tools related to collection, storage, protection, and reporting and data, artifacts and other materials.

- ***Increasing access to peer-reviewed journal articles*** so that those designing and implementing research projects are in a better position to build on the existing knowledge base.

Appendix I: Evaluation Matrix

Evaluation Matrix of the Government of Yukon Science Strategy

Issues and Evaluation Questions		Indicators	Timing[5]	Data Sources
Relevance				
1	Is there a continued need for the Yukon Science strategy?	▪ Recognition of the importance of science and innovation within the Government of Yukon	BL, SE	▪ Key informant interviews ▪ Survey of Researchers, Decision-Makers and Policy Analysts
		▪ Perceptions regarding the use of science in evidence-based decision-making	BL, SE	▪ Key informant interviews
		▪ Primary barriers to use of science in decision-making by Government of Yukon	BL, SE	▪ Key informant interviews ▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science ▪ Literature Review
		▪ Perceived need for the Yukon Science Strategy	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science ▪ Focus groups ▪ Key informant interviews
2	Is the Yukon Science Strategy responsive to the needs identified?	▪ Familiarity with the Yukon Science Strategy	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science
		▪ Key priorities for improvement with respect to the conduct of science and its role in informing decision-making/key issues that need to be addressed	BL, SE	▪ Key informant interviews ▪ Focus Groups
		▪ Alignment of the goals and activities of the Strategy with the key needs identified/priorities for improvement	BL, SE	▪ Key informant interviews ▪ Focus groups
		▪ Recommendations to improve use of science in decision-making by Government of Yukon	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts

[5] Some data on all indicators will be collected during the Summative Evaluation (SE) while data on some indicators will be collected as part of the baseline (BL) research.

Issues and Evaluation Questions		Indicators	Timing[5]	Data Sources
				▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science ▪ Key informant interviews
3	Is the Science Strategy aligned with priorities and policies of the Government of Yukon?	▪ Related Government of Yukon priorities and policies identified by key informants	+SE	▪ Key informant interviews ▪ Program documentation / data
		▪ Documented priorities and policies related to science and decision-making	SE	▪ Program documentation / data
Outcomes				
4	What progress has been made to date in implementing the Science Strategy and more specifically the Science Strategy Action Plan?	▪ Overview of science, research and monitoring initiatives supported by the Government of Yukon	SE	▪ Program documentation / data (via ISC members at B, data warehouse at S)
		▪ Comparison to actions outlined in the Science Strategy Action Plan	SE	▪ Review of program documentation
		▪ Involvement of key informants in Science Strategy-related activities/perceptions of effectiveness	BL, SE	▪ Key informant interviews
5	In what manner and to what extent has progress been made towards achieving the intended outcomes of the Yukon Science Strategy: ▪ Increased evidence-based decision-making	▪ How needs for the initiatives were identified	BL, SE	▪ Case studies
		▪ Perceptions regarding the extent to which policy is informed by sound science, scientific priorities are informed by its policy needs, and the results of science that is performed in Yukon are useful to government decision-makers.	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science ▪ Key informants ▪ Case studies
		▪ Perceptions that government is placing greater emphasis on evidence-based decision-making than five years ago	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts
		▪ Perceptions regarding increasing use of science and research to support evidence-based decision-making	SE	▪ Key informant interviews
		▪ Examples cited by survey respondents of science activities made a significant contribution to evidence-based decision-making	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Case studies
	▪ Increased science capacity	▪ Government of Yukon investment in science activities / factors contributing to the change in investment	BE, SE	▪ Available departmental data on science activities ▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Literature review
		▪ Perceptions regarding the appropriateness of level of investment in science and research by Government of Yukon	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts
		▪ Perceptions regarding whether the capacity of Government of Yukon to manage and perform science is sufficient given its needs	SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Key informant interviews

Issues and Evaluation Questions		Indicators	Timing[5]	Data Sources
		▪ Performers of science funded by the Government of Yukon	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts
		▪ Number of Government of Yukon staff with science-related job titles	BL, SE	▪ Data on research activities (PSC)
		▪ Number of Government of Yukon staff with science-related professional designations	BL, SE	▪ Data on research activities (PSC)
		▪ Delivery of science-related education in Yukon (programs and enrollment)	SE	▪ Data on research activities (via Yukon College, dept of Ed.)
		▪ Opinions regarding the ability of Yukon to attract and retain science practitioners and professionals	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science
		▪ Impact of Yukon's SCOPe (SCOPe) ▪ Number of people participating ▪ Involvement in/perceived effectiveness of amongst participants	BL, SE	▪ Program documentation ▪ Interviews with key informants
		▪ Evidence of scientific partnerships/percentage of science, research and monitoring initiatives that involve partnerships with other organizations	BL, SE	▪ Data on research activities ▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science
		▪ Partnerships reported by Yukon Private Sector, NGOs, and other organizations		▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science
		▪ Perceptions of key informants regarding the increase in science capacity	SE	▪ Key informant interviews
	▪ Improved data collection and management	▪ Reported improvement in data collection and management – number of departments reporting: ▪ Development of research data management strategies ▪ Implementation of projects involving on-going collection of data ▪ Adoption of standardized data collection protocols ▪ Development of data 'warehouses' ▪ Preservation of data sets ▪ Sharing of data with the public/establishment of publicly accessible data portals ▪ Increased data collaboration at local, regional, national and international levels	SE	▪ Document review ▪ Follow-up with departments and agencies
		▪ Perceptions regarding improving data standards and scientific information management systems so that data can be more easily retrieved, transferred, shared and used.	SE	▪ Key informant interviews
		▪ Perceptions regarding the need to improve data standards and scientific information management systems	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts

Issues and Evaluation Questions		Indicators	Timing[5]	Data Sources
				▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science
	▪ Increased private and civil sector science	▪ Change in the number of Yukon businesses and employment in NAICS codes related to professional, scientific & technical fields	BL, SE	▪ Data on research activities (Yukon Bureau of Stats)
		▪ Change in the number of people employed in professional, scientific & technical fields in the Yukon	BL, SE	▪ Data on research activities (Yukon Bureau of Stats)
		▪ Evidence of federally funded (or internationally funded), private sector and NGO-led research projects taking place in Yukon	BL, SE	▪ Data on research activities
		▪ Evidence of partnerships and collaboration with academic institutions, NGOs, and the private sector	BL ,SE	▪ Data on research activities ▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science
		▪ Perceptions regarding whether private sector expenditures on science and research in Yukon have been increasing	BL, SE	▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science ▪ Key informant interviews
		▪ Increases / decreases over the past five years in science expenditures made by private and civil sector organizations surveyed / contributing factors	BL, SE	▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science
		▪ Primary sources of funding for science expenditures made by private and civil sector organizations surveyed	BL, SE	▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science
	▪ Improved culture of information sharing	▪ Sharing of information through the Compendium ▪ Listing of active and completed projects/activities ▪ Monthly website hits and other website analytics	BL, SE	▪ Data on research activities (compendium)
		▪ Use of the Government of Yukon's online Compendium of Current Research and Monitoring to access information on research and monitoring activities currently underway at Government of Yukon and/or supported by Government of Yukon	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science ▪ Key informant interviews
		▪ Sharing of information through SCOPe	BL, SE	▪ Key informant interviews ▪ Data on research activities (compendium)
		▪ Perceptions regarding building a culture of information sharing that facilitates the sharing and distribution of scientific information generated in Yukon	SE	▪ Key informant interviews
		▪ Perceptions that there is a culture of information sharing that facilitates the sharing and distribution of scientific information generated in Yukon.	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science

Issues and Evaluation Questions		Indicators	Timing[5]	Data Sources
	▪ Enhanced science conduct	▪ Steps taken to better manage the design and implementation of science	SE	▪ Key informant interviews
		▪ Number and nature of projects brought to ISC for advice	SE	▪ Data on research activities (ISC)
		▪ Extent to which ISC members report improvement made in the conduct of science conduct within their Departments	SE	▪ Key informant interviews
		▪ Extent to which the incorporation of traditional and local knowledge in science has increased	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science
6	To what extent is this progress influenced by or attributable to the Science Strategy? What other factors have contributed to or constrained the progress made to date?	▪ Participation of stakeholders and organizations in various activities associated with the Strategy	SE	▪ Key informant interviews
		▪ Views of key informants regarding the extent to which changes are influenced by or attributable to the Science Strategy	SE	▪ Key informant interviews ▪ Focus groups
		▪ Evidence from case studies illustrating the linkages between the Strategy and progress made	SE	▪ Case studies
		▪ Evidence of other internal and external factors contributing and constraining the progress made	SE	▪ Key informant interviews ▪ Focus groups
7	Are there any unintended outcomes, positive or negative, that can be attributed to the Science Strategy?	▪ Unintended positive and negative outcomes reported by key informants	SE	▪ Key informant interviews
		▪ Other outcomes revealed from document review	SE	▪ Program documentation
		▪ Other outcomes observed by the evaluator	SE	▪ Evaluator's assessment
Design				
8	In what manner and to what extent has the Science Strategy been successful in engaging key stakeholder groups?	▪ A review of key activities associated with the Strategy targeted at different stakeholder groups	BL, SE	▪ Program documentation
		▪ Awareness of the Science Strategy	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science
		▪ Use of the Government of Yukon's online Compendium of Current Research and Monitoring	BL, SE	▪ Survey of Researchers, Decision-Makers and Policy Analysts ▪ Survey of Yukon Private Sector, NGOs, and Other Organizations Involved in Science
		▪ Participation in SCOPe and other activities	BL	▪ Key informant interviews
		▪ Departmental involvement in the ISC and other Science Strategy activities and initiatives/statistics on membership and participation	SE	▪ Program documentation

Issues and Evaluation Questions		Indicators	Timing[5]	Data Sources
		▪ Perceptions regarding the effectiveness in engaging stakeholder groups	BL	▪ Key informant interviews
		▪ Perceived value of being engaged amongst those who have been involved	SE	▪ Key informant interviews ▪ Focus groups
		▪ Barriers to engagement	SE	▪ Key informant interviews ▪ Focus groups
9	Has the governance structure and design of the Science Strategy been effective? Are there alternative governance structures and/or approaches that would be more effective or efficient?	▪ Overview of the existing governance structure and approaches	SE	▪ Program documentation
		▪ Perception of stakeholders regarding the effectiveness of the governance structure and design/strengths and weaknesses	BL, SE	▪ Key informant interviews
		▪ Priority issues that need to be addressed/potential alternatives	SE	▪ Key informant interviews
		▪ Alternative approaches, lessons learned, and best practices employed by similar strategies in other jurisdictions	SE	▪ Literature review
		▪ Recommendations provided by key informants and arising from the case studies regarding potential improvements to design and delivery	SE	▪ Key informant interviews
10	Is the Science Strategy supported by the tools, resources and other support needed for it to be effective?	▪ Overview of existing resources (activities, tools, budgeted and actual expenditures, FTEs)	SE	▪ Data on research activities
		▪ Views of key informants regarding the adequacy of existing tools, resources and other support	BL, SE	▪ Key informant interviews
		▪ Opportunities for improvement	SE	▪ Key informant interviews ▪ Evaluator's assessment
11	How effective are existing performance metrics in reporting on the progress made? What improvements should be made?	▪ Assessment of the existing performance metrics (e.g. in terms of validity, attribution, relevance, ease of communication, reliability, frequency, availability, timeliness, implementation, and cost)	SE	▪ Key informant interviews
		▪ Performance measures and reporting systems employed in other jurisdictions	SE	▪ Literature review
		▪ Recommendations from the key informants	SE	▪ Key informant interviews
		▪ Opinion of the evaluator	SE	▪ Evaluator's assessment

Appendix II: Summary of the Key Informant Interviews

II.1 Methodology

A target list of 64 representatives was developed in association with the OSA and the ISC. In total, twenty telephone interviews were conducted with key informants (representing a response rate of 31%) drawn from inside and outside of government.[6] Of the 20 interviews, 10 interviews were conducted with Government of Yukon representatives (including OSA and ISC staff); six interviews were conducted with external researchers from University of Guelph, University of Saskatchewan, Yukon College, Morrison Hershfield, and YESAB; and four interviews were conducted with First Nations representatives.

Type of Organizations	Key Informants	Percentage
Internal Yukon Representatives	10	50%
External Researchers	6	30%
First Nations Representatives	4	20%
Total	**20**	**100%**

II.2 Examples of Science Activities

To illustrate the wide range of science activities undertaken by the Government of Yukon and other stakeholder organizations, the key informants were asked to provide one or more examples of major science activities undertaken by their department or organization. This was not intended to establish a comprehensive listing of science activities – which can be better understood via resources including but not limited to, the Compendium of Current Research and Monitoring, the Yukon Research Centre website and the Arctic Science and Technology Information System (ASTIS) database - but rather to gain an understanding of the range of experiences and perspectives of the key informants. Results are summarized below.

Department or Agency	Examples of Major Science Activities
Energy, Mines, and Resources	▪ Regulate oil and gas operations to make sure licenses comply with their application under Oil and Gas Act ▪ Support geological surveys and other related research activities
Environment	▪ Compile and manage databases to maintain a Yukon inventory of wetlands as well as a herbarium of Yukon plants
Executive Council Office	▪ Conduct targeted research to support cabinet decision-making processes, strategic planning activities, and monitor performance against established indicators ▪ Provide corporate leadership regarding the use of science via partnering with universities and research agencies ▪ Support building of data management systems ▪ Advocate with Federal science agencies and departments for investment in Yukon and consideration of Yukon's needs and interests in Federal Government plans ▪ Oversee the Canadian Mountain Network project ▪ Launch a peer-to-peer Government of Yukon-based research and monitoring discussion forum under the Science Strategy

6 Some interviews involved more than one representative (23 people were interviewed in total). For those interviews where more than one person participated, the responses were counted as one key informant).

Department or Agency	Examples of Major Science Activities
First Nation Organizations	▪ Undertake traditional activities such as harvesting and wildlife counts ▪ Administer Indigenous water projects (e.g. conducting water quality tests and building water monitoring system) ▪ Streamline data collection and management process (e.g. streamline data that goes from the field up to decision-makers within First Nations communities/bands) ▪ Document traditional knowledge around land management practices, resource management, and wildlife management ▪ Document and manage heritage sites (e.g. intersection of physical science with traditional knowledge, and connection to heritage and local knowledge) ▪ Knowledge sharing with the community
Highways and Public Works	▪ Conduct research on highways, roads, airports, business initiatives, and procurement
Public Service Commission	▪ Support and provide science-related training to staff ▪ Provide training courses and spaces to support evidence-based decision-making ▪ Support the incorporation of traditional knowledge
Tourism and Culture	▪ Undertake research activities related to archeology and paleontology ▪ Manage licensing under the *Scientists and Explorers Act* and regulations ▪ Manage licensing of non-Yukon scientists who want to do non-commercial research
Others	▪ Conduct research activities related to land use planning, and public consultation ▪ Work with a Yukon First Nation on First Nations health and well-being, cultural competency, data management, and data sovereignty ▪ Partner with First Nations on community adaptation ▪ Land-use planning for a Yukon First Nation ▪ Teach science-related courses and other programs through partnering with other universities ▪ Undertake research activities related to climate change, northern energy, mining, ecosystems, biodiversity and human-ecosystem interactions ▪ Conduct research activities related to hydrology and permafrost geoscience ▪ Conduct research related to stream flow, water quality, and ground water studies

II.3 Recognition of the Importance of Science

Of the 20 key informants, nine highlighted the progress that has been made within the Government of Yukon in recognizing the importance of science, noting situations where policy has been informed by sound science and the scientific priorities within Government of Yukon have been informed by the policy needs. Of the remainder, eight felt that much further work needed to be done to incorporate science into decision-making and three were not sure or non-committal.

The key informants who highlighted progress that has been made noted that:

- The Government of Yukon has made science and innovation and its use in evidence-based decision-making a priority. There has been increased interest in using and supporting science at all levels including amongst higher-level decision-makers.

- The Government of Yukon has taken steps to better align science activities with the information needs of individual departments. For example, research related to environmental monitoring and mining has contributed to more informed decisions.

- The importance of evidence-based decision-making is more highly recognized in Government of Yukon, although access to reliable data can continue to be an issue.

- Science has been used to inform specific operational decisions. Some of the examples which were cited related to land use, development of a social inclusion strategy, employee engagement, and Yukon Bureau of Statistics.

- Progress has been made in increasing scientific capacity within Yukon. Key informants noted progress in areas such as Yukon College (particularly transition to a university), science activities within First Nations communities, and development of the Canadian Mountain Network and Permafrost Net.

- Advancements have been made not only in terms of investment but also capabilities; for example, a new, more sophisticated way to assess moose populations has been developed. Several key informants noted increased use of traditional knowledge in decision-making.

Those who responded more negatively or had mixed options noted that:

- While access to scientific knowledge has increased, science is only one of several factors that may impact on a decision. Examples of other factors include public interest, sentiment and time constraints under which staff are operating. Science is only a part of the decision-making process. However, it was noted that while loud voices and opinions are still given much consideration, more and more of the emphasis is shifting to science.

- While there is a strong desire to move toward evidence-based decision-making, scientific capacity is still a limiting factor. More investment in both science activities and human resources will be required to increase access to the science needed to support evidence-based decision-making. One suggestion was for the Government of Yukon to focus more heavily on partnering with universities outside of the region when government lacks the capacity to carry out such science projects.

- There are ongoing information gaps in key areas (e.g. long-term monitoring of water stations, fish and wildlife)

- More progress needs to be made in incorporating First Nations traditional knowledge, in areas ranging from wildlife management to health. The OSA has been tasked with further developing an effective approach for reflecting Indigenous ways of knowing and doing.

- There is a need to promote better sharing of research information (e.g. between government, NGOs, Indigenous communities, resource companies, and others). It was noted that the government lacks a facility to protect and store data, studies, and artifacts. “Artifacts up to 9,500 years old are being stored in leased storage units. If science was taken seriously, we would invest in protecting and storing these artifacts properly in a good facility.”

- There is a need to increase access to secondary resources such as journals and other reports.

- There are areas where there continues to be a lack of understanding about science and the purpose of evidence-based decision-making.

II.4 Improving the Use of Science in Decision-Making

Of the 20 key informants, eight indicated that their department or agency has identified the use of science and evidence-base decision-making as a priority area for improvement (as reflected in any formal plans, strategies, budgets or documents), nine indicated that it has not, and three offered no or mixed opinions.

Those who indicated that the use of science has been identified as a priority for improvement noted that their department or agency has or is:

- Increasing its investment in training for staff and researchers and is committed to conducting more robust reviews and evaluations.
- Implementing new reporting procedures and systems in order to get more accurate data, including the results of qualitative research and mixed methods.
- Placing increased emphasis on evaluation projects, public engagements, and the use of surveys and other methods to support public engagement.
- Taking more of an evidence-based approach to development of strategies including human resources strategies.
- Developing an evidence-based decision-making protocol to guide day-to-day activities within the branch or department.
- Improving its briefing notes. For example. a key informant noted that any of their briefing notes in now expect to contain evidence-based analysis and propose options or approaches that are grounded in evidence.
- Working more closely with First Nations organizations in science-related activities. Improvements were reflected under programs such as Indigenous Observation Network Program, the Canadian Permafrost Network (newly formed in 2020), the Northwest Boreal Landscape Conservation Program, Canadian Mountain Network and the KDFN land use planning documentation, final agreement, and resulting processes.

Those who indicated that the use of science has not been identified as a priority for improvement noted that:

- Science and evidence-based decision-making is still not supported by sufficient investment. For example, some departments have identified particular areas as a priority for action but have not made corresponding investments in areas that would provide data which would be useful in making decisions related to those priorities.
- While scientific knowledge underpins decision-making, there are no formalized plans for improvement.
- There is a need for the department to work more closely with First Nations to identify key areas of research which would better support the use of science in evidence-based decision making.

When asked for recommendations as to how the use of science in decision-making by Government of Yukon could be improved, key informants highlighted the need to:

- Work more closely with First Nations and incorporate greater use of traditional knowledge. The Government of Yukon should provide support that will enable First Nations to improve their capacity to participate in science research processes (e.g. in areas such as land use planning). The Science Strategy would benefit from a more collaborative approach involving First Nations.

- Ensure that the data is appropriately contextualized so that it provides useful information that leads to better decisions.

- Ensure the Government of Yukon takes a more comprehensive and consistent corporate approach to evidence-based decision making.

- Improve access to data and journal articles.

- Further increase understanding of the importance of science in decision-making within government.

- Be able to communicate scientific knowledge to the public and communities in "plain language."

- Engage scientists directly in decision-making. There are few scientists at the director level or higher within government, and scientists are typically not asked directly to provide input into decisions. Where possible, decision-makers should be encouraged to get direct input from those with scientific knowledge and experience.

- Pass legislation and establish a regulatory regime that allows for the protection of scientific artifacts and evidence.

- Provide for better tracking and sharing of information through the *Scientists and Explorers Act* (e.g. by establishing a central database).

- Improve communication and sharing of information within and between departments regarding science activities and results. A lack of communication can lead to information silos (e.g. Yukon Wildland Fire Management, Yukon Environment, and Yukon College each have their own monitoring programs and data).

- Continue to invest in science internally and, in association with the Yukon College, with other universities and other organizations.

II.5 Alignment of Science Strategy Goals with Identified Issues

When asked whether the goals and activities associated with the Science Strategy are aligned with the issues and priorities related to the use of science in decision-making, key informants provided comments illustrating some of the benefits of achieving each of the goals as well as some key challenges and barriers.

Goal 1: Developing scientific knowledge and science-based solutions to support Government of Yukon decision-making.

Key informants anticipated that further development of scientific knowledge and science-based solutions will:

- Enable government programs and services to operate with greater effectiveness and efficiency.
- Encourage researchers to work more collaboratively with government and communities to identify and address priority information needs.
- Provide the opportunity for government to point to evidence when making decisions. For example, decision documents could include a section containing the supporting evidence.
- Guide Government of Yukon in terms of expanding evidence requirements for future decisions and working to fill in any existing gaps.
- Help to attract further investment. For example, an increased focus on scientific knowledge in Yukon would encourage the federal government to increase its investment in Yukon, particularly in health and social science. It could also attract more external investors to develop resources and other aspects of the Yukon economy.
- Increase access to scientific professionals.

Key informants also identified some key challenges and barriers to achieving this goal including:

- The need for Government of Yukon to take ownership over creating a more cohesive research ecosystem in the territory around coordination and collaboration.
- A lack of communication between Government of Yukon departments (for example, between Environment and EMR).
- Lack of understanding of the importance of the use of science in decision-making. For example, there is a lack of training and education around science knowledge at all levels from the senior level to staff.
- Difficulties in engaging First Nations communities due to the relatively small Indigenous population in Yukon and the historical western academic way of conducting research and science, which is a barrier to engagement.
- Competing priorities of the Government of Yukon. For example, a key informant mentioned that investing in public services or infrastructure is generally considered a higher priority than investing in research and science.
- Limited use of evidence and science in the decision-making processes of management boards and cabinet.
- A tendency to consider public opinion more than science in decision-making. For example, a mixture of time constraints and lobbying pressure can result in decision-makers making quick decisions even in the absence of analysis or evidence to support the decision.
- Limited consideration of traditional knowledge in evidence-based decision-making.
- A lack of transparency related to decision-making.

Goal 2: Building Science capacity – enhancing our ability to access, apply and develop scientific knowledge.

Key informants anticipated that, by building science capacity, the Science Strategy will contribute to:

- An improved decision-making process within the Government of Yukon, since more reliable data would be available.
- Improved services to NGOs, First Nations communities, and other organizations (Government of Yukon would be better positioned to assist them in meeting their information needs or improving access to scientific evidence).
- Increasing investment in the long term.
- Better connections between Government of Yukon and Indigenous communities and improved accountability through more regular progress reporting.
- Greater sharing of data and information internally and externally.

Key informants have identified some key challenges and barriers to achieving this goal, including:

- Lack of staff and researchers. There is a need for human resources departments to revise their recruitment strategies to ensure that staff and researchers are brought into positions where their skills and talents are being utilized efficiently. Key informants mentioned that human resources departments can increase staff capacity by hiring recent grads or students and provide an opportunity for them to pursue their career goals (e.g. in archeology or paleontology).
- Lack of access to data and information such as published academic journals. There is a need for a universal database to access academic journals which would help translating information to staff and others who need the information.
- A need for additional education and workshops delivered to public and internal staff.
- A need to improve community engagement. For example, it is important to keep communities in the loop around updates, mentorship, training, and education.
- Responsibility and guidance should be held within each Government of Yukon department when it comes to building science capacity.
- There is a need to stabilize funding for long-term monitoring and collection studies.

Goal 3: Improving science data collection and management.

Key informants anticipated that, by improving science data collection and management, the Science Strategy will:

- Help Government of Yukon better meet the data collection needs of internal and external researchers. For example, Government of Yukon recently adopted a new learning management system which provides instant access to demographic information on course and workshop audiences. As a result,

staff can now make better decisions in matching specific training courses to different types of audiences.

- Help Government of Yukon in identifying program data needs at the start of a project and implementing a data system that supports not only the program's service needs, but also evaluation needs.

Key informants have identified some key challenges and barriers to achieving this goal including:

- The need for a new data management system that allows for improved sharing and accessibility of information. Key informants noted that, within Government of Yukon departments, there are competing priorities (that is, increasing the accessibility of data and information is "not at the top of the list). As a result, departments often operate with "data on paper in boxes stuck in a corner somewhere." It was noted that, "whichever department you talk to, you will find a lack of data and information that is needed to support decisions."

- The need for a better relationship and partnership with First Nations communities. Key informants noted a need for increased access to training programs within Government of Yukon on OCAP principles, which would help staff to understand the history of data and science in First Nations communities.

- Privacy is a constraint for open data systems. Key informants noted that "Government of Yukon tends to default to not sharing data with the public because of the fear of potential damage to people's feelings rather than any actual damage to privacy."

- Terms of references regarding the use and accessibility of data needed to be clarified.

Goal 4: Stimulating private and civil sector science is another goal of the Government of Yukon science strategy. Through stimulation of private sector research, innovation and commercialization activities, the government aims to support the growth and development of Yukon's knowledge sector.

Key informants anticipated that, by stimulating private and civil sector science, the Science Strategy will help to:

- Increase private sector investment in research, innovation and commercialization. For example, key informants noted that the Government of Yukon Department of Economic Development has been effective in stimulating private sector investment through funding an Innovation and Entrepreneurship Hub which supports market research and social innovation.

- Increase access to science professionals. Key informants noted that there has been a shortage of archaeologists; the Government of Yukon could help to address this shortage by building local capacity (i.e. using its funding to hire Yukon-based researchers and experts rather than bringing in people from outside the province). It was also noted that, by giving Yukon College the mandate to transition to a university, the Government of Yukon is significantly increasing the size of Yukon's knowledge sector.

- Build partnerships with other organizations. For example, the Government of Yukon can build on its partnerships with the Centre for Northern Innovation & Mining to help the private sector in meeting worker shortages and provide funding for research activities.

- Ensure that researchers have the proper credentials to conduct specific research activities. Under the *Scientists and Explorers Act*, the government controls the licensing of researchers who conduct research activities within Yukon.

Key informants have identified some key challenges and barriers to achieving this goal including:

- The need for the Government of Yukon to build stronger partnerships with the private sector. Key informants noted, for example, that the results of much of the research undertaken by the private sector in the Yukon would be useful to the government. However, the results are currently not shared with government. Hence, the Government of Yukon should seek partnerships with private companies to access that and other research.

- It is challenging for organizations to conduct research in Yukon. Key informants noted that there is a need for regulatory change. For example, "unlike in other jurisdictions, organizations that would like to conduct research in Yukon have to go through a complex regulatory process." This can serve as a disincentive to undertaking research in the territory.

- Private sector research activities often focus on resource development. There is a perception, among some key informants, that there is a resistance to resource development within the Government of Yukon, which can also act as a disincentive to undertaking research in the territory.

Goal 5: Promoting scientific information sharing in its Science Strategy, in order to both build and enhance science literacy, and to raise awareness of our government's science expertise, activities, facilities, interests and needs.

Key informants anticipated that by increasing information sharing, the Science Strategy will help to increase awareness and transparency. Key informants noted that research activities should be more transparent with a greater emphasis placed on making information as accessible as possible. Suggestions to promote information sharing include:

- Expanding participation in SCOPe to include many people outside of Government of Yukon.

- Working to improve communication between internal and external researchers and First Nations communities.

- Providing professional staff and researchers with full access to academic articles and data.

- Promoting increased science literacy in the territory by providing better training and mentorship (particularly for youth).

Key informants have identified some key challenges and barriers to achieving this goal including:

- A need to communicate science in a way that others without a science background can understand. Key informants noted that Government of Yukon has a good reputation as being science and evidence based; however, communicating science in a way that is understandable to the general public is challenging.

- Sensitivity to criticism and a reluctance to share work. Key informants noted that, within the Government of Yukon, some researchers "feel nervous about peers seeing their work and are overly concerned about being criticized."

- Limited ability to share data and information due to lack of investment in infrastructure. Some of the gaps that were identified included facilities for data storage and lack of a robust collection management software.

- A need to engage students in schools and encourage them to see science as a viable and relevant career option.

- Lack of capacity to conduct research and experiments. Key informants noted that the Government of Yukon has some data collection capacity but only limited research and experimental capacity. Government of Yukon should partner with colleges and universities to allow for better experimentation.

- A need to produce stronger scientific information and evidence that will support decisions, rather than simply reflect views or opinions.

Goal 6: Managing and enhancing science conduct. Government of Yukon aims to address policy needs that will enable coordinated scientific activity, with effective oversight. Activities under this goal are also intended to facilitate and promote scientific excellence.

Key informants anticipated that enhancing and better managing the conduct of science will increase the quality of research and confidence in research results, better align research with information needs, increase both participation in and the use of science, and strengthen partnerships and relationships within government and with other stakeholders including universities and colleges.

Key informants have identified some key challenges and barriers to achieving this goal, including:

- The need for closer relationships and better engagement with First Nations communities. Key informants stressed the importance of respecting First Nations protocols.

- The need for more robust and rigorous guidelines and tools related to the conduct of science in the territory (e.g. development of a scientific integrity policy).

- The need to revise and update the *Scientists and Explorers Act* to encourage researchers to develop partnerships in Yukon through their work.

II.6 Science Strategy Governance Structure and Tools

The key informants were asked whether the governance structure for the Science Strategy has been effective. Most key informants felt that they were not in a position to provide an informed opinion. Awareness of the Strategy remains relatively low overall and most key informants have only a limited knowledge as to how it has been governed. Amongst those who provided comments, the major themes were:

- The ECO (Executive Council Office), and more specifically OSA, is best positioned to oversee the Strategy, given the focus on science and the horizontal nature of the strategy (i.e. its application

across all departments). It was also suggested by some key informants that administration of the *Scientists and Explorers Act* should be transferred to the OSA.

- There is a need to increase the level of engagement of individual departments with the Science Strategy, clearly assign responsibilities, and find ways to hold departments more accountable for the results. Key informants from some departments indicated that science and evidence-based decision-making remains a low priority at the senior management level within their department.

- Whether through strengthening the core group within the Strategy or other measures, there is a need to expand capabilities to facilitate greater sharing of information across departments, better coordinate science activities, and reduce the potential for duplication.

- Achievement of the goals of the Science Strategy will require increasing both the financial and human resources available to the OSA.

Some key informants recommended establishing a Science Management Board, which would have oversight responsibilities, support implementation of the Strategy, and track the progress made overall and by department.

When asked about tools, resources and other support that will be needed for the Science Strategy to be effective, key informants noted a need to:

- Increase the commitment of senior management to incorporating science into management board and cabinet submissions.

- Build greater trust and partnerships between the Government of Yukon and First Nations, and work to better incorporate science and traditional knowledge into decision-making processes.

- Create venues, such as annual conferences, to bring scientists and decision-makers together to share information, facilitate communication and discuss implementation of the Strategy.

- Create avenues (e.g. regional events) to facilitate greater networking and communication between internal and external researchers, including with institutions such as Yukon College, key associations, professional engineers and others.

- Make greater use of tools to facilitate knowledge transfer (e.g. computer programs that create GIS maps, database tools, open data, and infographics).

- Demonstrate the value of science to decision-making. Suggestions included more case studies, promotional materials, training and visioning that would enable people to imagine what the future would look like if the Strategy was fully implemented.

- Promote additional investment in science-related activities and further development of the capacity for scientific research.

- Raise awareness of the science strategy within government and the broader community.

II.7 Participation in Science Strategy Activities

Of the 20 key informants, four indicated that they have used the Compendium of Current Research and Monitoring, 10 have participated in one or more SCOPe sessions, and three have been involved in the Interdepartmental Science Committee (ISC). Overall, eight of the 20 key informants had not been involved in any of the three activities (Compendium, SCOPe, or ISC).

Those who indicated that they have used the Compendium of Current Research and Monitoring generally supported the concept of compiling information and making it public. However, most felt that the information contained in the Compendium was of limited use to them; the subject matter may be not relevant to their needs and the database was perceived as out of date (e.g. environment data and information have not been updated since 2016) and incomplete (e.g. missing some research and monitoring activities). The technology (ArcGIS story maps) was considered cumbersome to work with.

Perceptions of the SCOPe were much more favourable. Participants characterized the sessions as featuring "fantastic discussions and presentations." SCOPe has been effective in facilitating knowledge sharing; for example, it has increased the willingness and capacity of departments to share their projects including the methodology that was used, and the outcomes and conclusions. The sessions were praised for being interdisciplinary, interesting for both presenters and participants, and open to the public, and for having made significant efforts to invite First Nations representatives whenever the topic is relevant. Participants reported learning about the OSA, Arctic Net, Permafrost Net, the Canadian Mountain Network and other topics. It was noted that SCOPe has tended to focus more on natural science and less on social science topics to date.

In terms of challenges, several key informants noted that participation levels in SCOPe have been lower than they should be, given the usefulness of the sessions. The sessions would benefit from increasing awareness of SCOPe within government and in the broader community as well as by including more presenters from outside government. A Facebook group was identified as one effective way to engage people. It was noted that it can be difficult for some to attend luncheon sessions (one participant recommended setting "a time during the workday").

Those who indicated that they have participated in the Interdepartmental Science Committee (ISC) noted that:

- The ISC has played an important in particular initiatives, such as developing the Canadian Mountain Network and the leading the on-going evaluation of the Science Strategy.

- Commitment to the ISC varies widely by department, which is reflected in varying levels of attendance and frequent turnover in representatives. Low levels of participation were attributed to a mixture of departments not recognizing science as a priority and a failure to define a role for the ISC that was important enough that involvement becomes a higher priority for the departments.

- The varying levels of participation means that some voices and perspectives are not being heard while others are favored.

When asked for recommendations as to how to better engage stakeholders in all of these activities, key informants suggested:

- Creating a champion with direct responsibility for engaging existing and potential partners. A wide variety of levers are available from direct communication, websites, and social media to annual forums and ongoing events such as science fairs.

- Explore different ways to engage First Nations communities, recognizing that these communities commonly face time and capacity limitations.

- Broadening the target groups beyond scientists to include all government employees, particularly those without a science background.

- Building a strong network involving external organizations, such as professional associations such as the Yukon Association of Engineers.

- Strategically branding and marketing the Science Strategy.

Appendix III: Summary of the Survey Results

This appendix provides a summary of the survey results. The first section focuses on the survey of internal stakeholders (i.e. Government of Yukon representatives) while the second section focuses on the survey of external stakeholders.

III.1 Government of Yukon Representatives

III.1.1 Methodology

We first worked with the OSA in developing a list of 377 prospective respondents including Government of Yukon researchers, policy analysts and decision-makers. The survey was administered online, beginning with an initial invitation letter with a link to the survey which was distributed on November 28th, 2019. Following our reminder protocol, three reminders were sent out over the following weeks (December 3, December 11 and December 19).

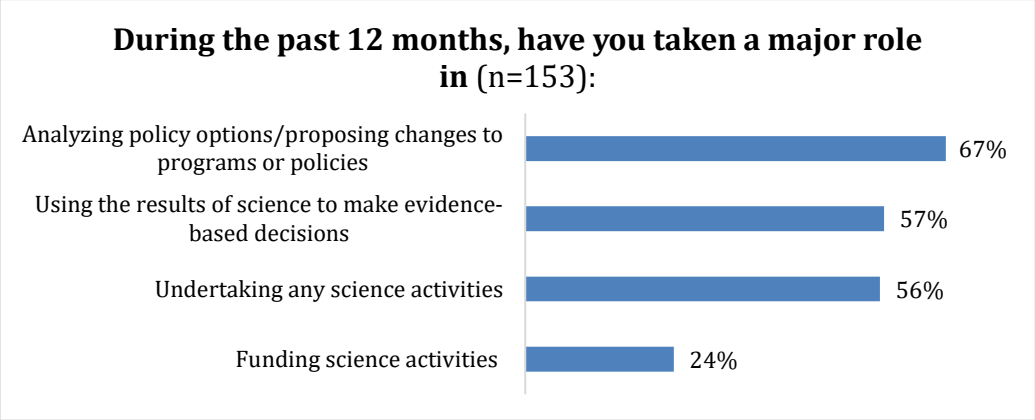
In total, 153 government representatives responded (representing a response rate of 41%). The respondents were drawn from a wide range of departments within the Government of Yukon, of which Energy, Mines and Resources (18%); Department of Environment (16%); Executive Council Office (14%); and Health and Social Services (12%) were most common.

Departments/Branch	Internal Stakeholders	Percentage
Energy, Mines and Resources	28	18%
Department of Environment	25	16%
Executive Council Office	21	14%
Health and Social Services	18	12%
Department of Community Services	11	7%
Department of Tourism and Culture	10	7%
Highways and Public Works	9	6%
Department of Education	7	5%
Department of Finance	5	3%
Yukon Housing Corporation	3	2%
Department of Justice	3	2%
Public Service Commission	3	2%
Yukon Workers' Compensation Health and Safety Board	2	1%
Women's Directorate	2	1%
Economic Development	1	1%
Yukon Liquor Corporation	1	1%
N/A	4	3%
Total	**153**	**100%**

III.1.2 Involvement in Science

- **A majority of internal stakeholders reported being involved in analyzing policy options and proposing changes to programs or polices; using the results of science to make decisions; and undertaking science activities over the past year. They were less likely to be directly involved in funding science activities.**

During the past 12 months, 67% of the 153 stakeholders have taken a major role in analyzing policy options and/or proposing changes to Government of Yukon programs or policies based on the results of science; 57% were involved in using the results of science to make evidence-based decisions; and 56% were involve in undertaking science activities. Only 24% played a role in funding science activities.



- **Most internal stakeholders have been involved in multiple roles related to science.**

  The relationship matrix of science involvement is shown in the below table. A breakdown of interpretations is summarized below.

  - Of the 86 internal stakeholders who were involved in undertaking any science activities, 67% were also involved in analyzing policy options and/or proposing changes to Government of Yukon programs or policies based on the results of science; 70% were also involved in using the results of science to make evidence-based decisions with Government of Yukon; while 31% were involved in funding science activities.

  - Of the 102 internal stakeholders who were involved in analyzing policy options and/or proposing changes to Government of Yukon programs or policies based on the results of science, 67% were also involved in using the results of science to make evidence-based decisions with Government of Yukon; 57% were actively undertaking science activities; while 26% were also involved in funding science activities.

  - Of the 87 internal stakeholders who were involved in using the results of science to make evidence-based decisions with Government of Yukon, 78% were also involved in analyzing policy options and/or proposing changes to Government of Yukon programs or policies based on the results of science; 69% were actively undertaking science activities; while 30% were involved in funding science activities.

  - Finally, of the 36 internal stakeholders who were involved in funding science activities, 75% were also involved in undertaking science-related activities; 75% were involved in analyzing policy options and/or proposing changes to Government of Yukon programs or policies based on the results of science; and 72% were involved in using the results of science to make evidence-based decisions with Government of Yukon.

Relationship Matrix of Science Involvement

Own Relationship Matrix	Undertaking any science activities		Analyzing policy options/proposing changes to programs or policies		Using the results of science to make evidence-based decisions		Funding science activities	
	#	%	#	%	#	%	#	%
Undertaking any science activities	**86**	**100%**	58	57%	60	69%	27	75%
Analyzing policy options/proposing changes to programs or policies	58	67%	**102**	**100%**	68	78%	27	75%
Using the results of science to make evidence-based decisions	60	70%	68	67%	**87**	**100%**	26	72%
Funding science activities	27	31%	27	26%	26	30%	**36**	**100%**

- **Internal stakeholders were also involved in other science-related activities such as providing leadership and oversight, delivering education and training, and community engagement.**

  The most commonly identified other science-related activities include:

  - *Providing leadership and oversight activities* such as supervising a group of scientists and coordinating Yukon-based science activities with federal agencies and universities.
  - *Conducting education- and training-related activities* such as teaching and educating staff on science-related topics. Examples included presenting talks and conference papers and holding workshops on science-related topics internal and external to government. Another example included the implementation a new science curriculum of studies for use in Yukon schools.
  - *Participating in community engagement.* Working with First Nations to incorporate traditional ecological knowledge into decision-making process.

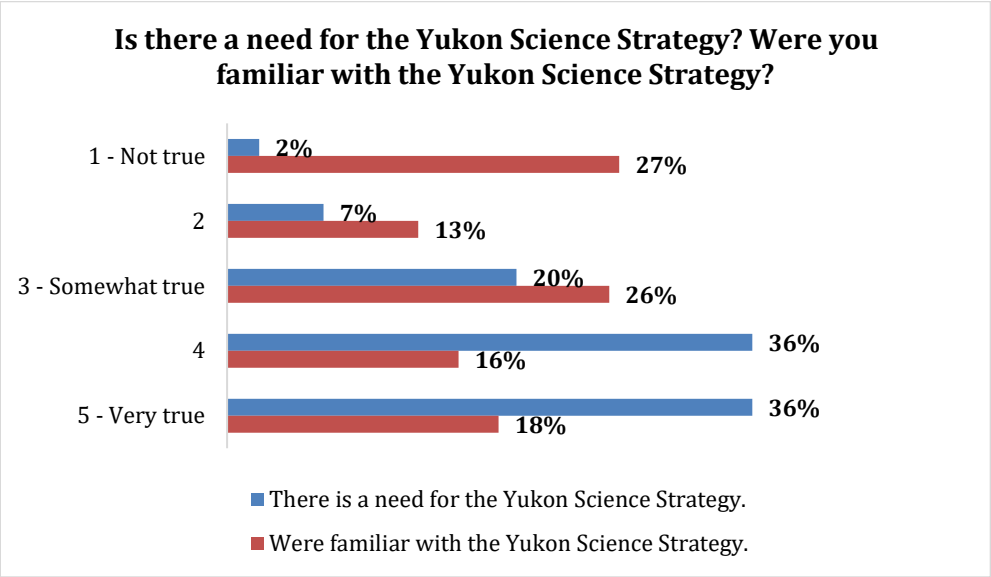
III.1.3 Status of Science and Research in Yukon

- **Familiarity with the Science Strategy varied widely across the internal stakeholders. Over one-quarter of internal stakeholders were not familiar with the Science Strategy.**

  Of the 146 internal stakeholders who answered the question regarding their familiarity with the Yukon Science Strategy, 60% reported that it was at least somewhat true that they are familiar of the Strategy (18% indicated that it was very true). Twenty-seven percent indicated that they were not familiar with the Strategy. The average rating regarding whether they are familiar with the Science Strategy on the scale of 1 to 5, where 1 is not at all true and 5 is very true, was 2.9.

- **Most internal stakeholders agreed that there is a need for the Yukon Science Strategy.**

  The preamble to the questionnaires included a short description of the Yukon Science Strategy (i.e. it was released in 2016 to provide a strategic framework for integrating and enhancing the efficiency and effectiveness of science activities carried out within Government, in order to support evidence-based decision-making). The internal stakeholders were asked whether there is a need for the Strategy. Of the 137 internal stakeholders who responded, 92% reported that it was at least somewhat true that there is a need for the Strategy (36% indicated that it was very true.). On 2% percent indicated that there is not a need.



The average rating regarding whether there is a need for the Science Strategy on the scale of 1 to 5, where 1 is not at all true and 5 is very true, was 4.0. The rating did not vary widely depending upon the respondent's familiarity with the strategy (ranging between 3.9 and 4.2)

- **While some progress is being made, internal stakeholders indicated that significant further progress is needed to ensure that the Government of Yukon has the data and systems in place to support evidence-based decision-making.**

  Internal stakeholders were given a list of statements regarding science and the Government of Yukon and asked to rate the truthfulness of those statements, on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true. The results indicate that a majority of internal stakeholders agree that:

  - The results of the science currently performed are useful to government decision-makers (68% rated the truthfulness of the statement as a 4 or 5, with an average rating of 3.9);
  - Some progress has been made in incorporating traditional and local knowledge into science (51% rated the truthfulness of the statement as a 4 or 5, with an average rating of 3.5);
  - Government has made some progress in terms of placing a greater emphasis on evidence-based decision-making (51% rated the truthfulness of the statement as a 4 or 5, with an average rating of 3.3).

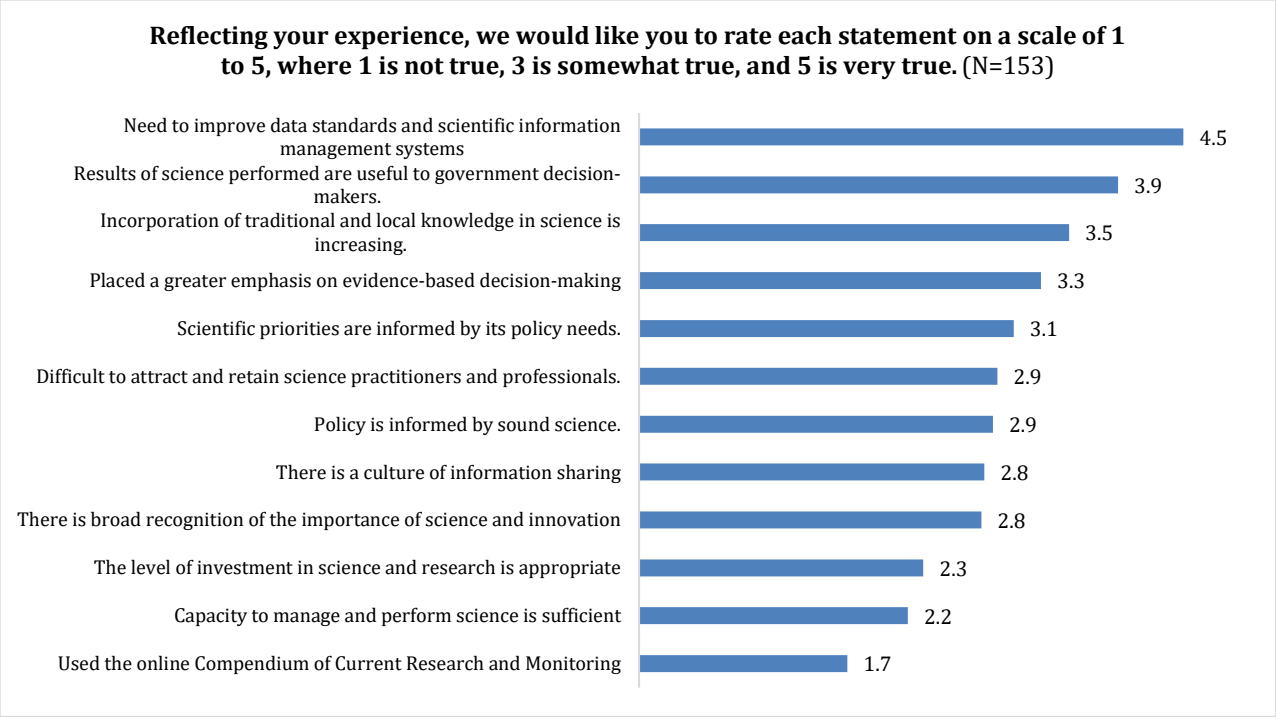
  However, only 28% of internal stakeholders more than somewhat agreed (i.e. rated the truthfulness of the statement as a 4 or 5, with an average rating of 3.1) that scientific priorities are informed by the government's policy needs and only 21% of internal stakeholders more than somewhat agreed (with an average rating of 2.9) that policy is informed by sound science.

  Potential areas for improvement included:

  - *Investment*: Only 7% more than somewhat agreed that the level of investment in science and research is appropriate (average rating of 2.3)

- *Science capacity*: Only 8% more than somewhat agreed that the capacity to manage and perform science is sufficient (average rating of 2.2)
- *Data standards and management systems*: 91% more than somewhat agreed that there is a need to improve data standards and scientific information management systems (average rating of 4.5)
- *Recognition of importance*: only 2% of stakeholders more than somewhat agreed that there is broad recognition of the importance of science and innovation (average rating of 2.8)
- *Information sharing:* 22% more than somewhat agreed that there is a culture of information sharing (average rating of 2.8)
- *Talent*: 36% more than somewhat agreed that it is difficult to attract and retain science practitioners and professionals (average rating of 2.9)

The ratings are summarized below.



When asked to rate whether they had used the online Compendium of Current Research and Monitoring, only 9% more than somewhat agreed (i.e. rated the truthfulness of the statement as a 4 or 5, with an average rating of 1.7).

III.1.4 Use of Science in Decision-Making

- **When asked to identify any recent or ongoing science activities which have been particularly useful in supporting evidence-based decisions in the Government of Yukon, internal stakeholders identified a wide range of science activities.**

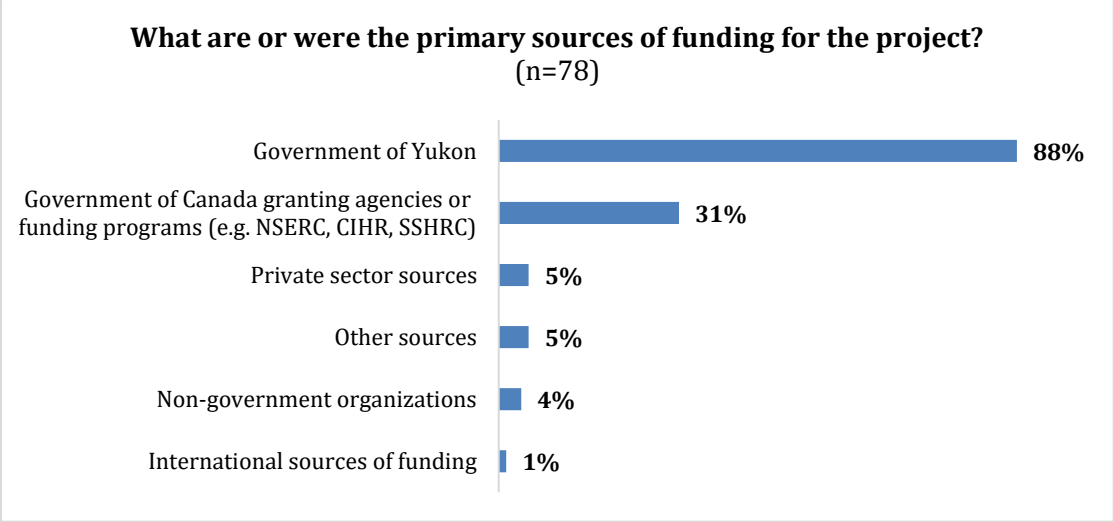
  Seventy-eight of the internal stakeholders identified one or more examples of recent or on-going science activities which have been particularly useful in supporting evidence-based decisions. Some of these examples are listed below:

  - Generation of baseline data and in-depth information on topics such as highways, roads, bridges, airports, climate change strategy, green procurement, First Nations procurement policy, and electric vehicles
  - Conducted passive treatment pilot studies and provided insight into mining technologies
  - Prepared flood maps for 14 communities to supports land-use planning, infrastructure design, and community resilience planning
  - Developed science-based guidelines for management of northern mountain caribou in Yukon which uses empirical evidence from Yukon caribou herds to make management decisions
  - Used information from CADTH to inform policy and drug formulary additions for Yukon drug and medical benefits
  - Developed a public health report on motor vehicle collisions in Yukon (Office of the CMOH), providing a very useful, qualitative summary of the causative factors involved in collisions in Yukon
  - Permafrost research to determine the best route for the proposed Dempster Highway fibre optic cable which minimizes disturbance of the permafrost and potential impact on the highway structure
  - Conducted the Residential Thermal Envelope Retrofit Study to determine the most cost effective and most energy-effective retrofit package for a typical Yukon home
  - Conducted research on climate change adaptation for highways (funding was secured to research different adaptive measures to mitigate climate change-induced impacts on and near highway embankments)
  - Setting up an Evaluation Unit within Finance to provide evaluation information & facilitation support for departments, build a cross-government policy on evaluation, build information resources and, in general, work towards a culture of evaluative thinking and doing
  - Used and researched geological data to assess mineral potential, including areas of interest for mineral exploration activities that may conflict with traditional use activities
  - Development of guidance documents for the mining industry (a Water Quality Objectives Guide and an Adaptive Management Guide). The former is based on data and experience in managing water quality data in mining projects in the territory. The guides should help to shorten water licensing and environmental assessment processes.
  - Conducted the 2019 Yukon Resident Perceptions of Tourism Survey intended to measure one of the main goals of the Yukon Tourism Development Strategy (i.e. "ensure at least 80% of Yukoners have a positive attitude about tourism")
  - Research and air monitoring in Yukon communities
  - Conducting the Canadian Alcohol Policy Evaluation (CAPE) which is used to inform a review of the Liquor Act
  - Conducting research on climate change and carbon emissions
  - Conducting coastal erosion studies
  - Conducting analysis and assessment of fisheries populations

- Creation of the draft Wildlife Conservation Management Plan for the Yukon North Slope
- Development of an online repository for meteorological data to facilitate distribution
- Conducted an Employee Engagement Survey and Corporate Exit Survey
- Conducted a FASD prevalence study
- Conducted heritage assessments of YESAB project proposals and land dispositions
- A review focused on the legalization of cannabis
- Monitoring of moose populations across Yukon and assessment of areas where harvest is not sustainable
- Results of Yukon Geological Survey Research have been used to support policy analysis on renewable energy initiatives in Yukon
- The Lewes Marsh Caribou Lichen Research and Monitoring Project
- The November 2019 Chief Medical Officer of Health Report
- A Timber Supply Review
- Water Resources Branch (WRB) and partners conducted an audit of the City of Whitehorse's municipal wastewater treatment facilities
- Wildlife population data collection

- **The Government of Yukon has been the most common primary source of funding for these science-related projects, followed by the Government of Canada.**

  When the 78 stakeholders who cited examples were asked about what the primary sources of funding for these projects were, 88% mentioned the Government of Yukon as a primary source of funding for their project and 31% mentioned Government of Canada granting agencies or funding programs (e.g. NSERC, CIHR, SSHRC). A few mentioned private sector sources (5%), non-government organizations (4%), international sources of funding (1%), and other sources (5%).



- **Various factors such as a bias towards interest-based decision-making, data access and availability issues, limited recognition of the importance of evidence-based decision making, and limited levels of investment in science and research capacity were the barriers to the use of science in decision-making most commonly identified by the internal stakeholders.**

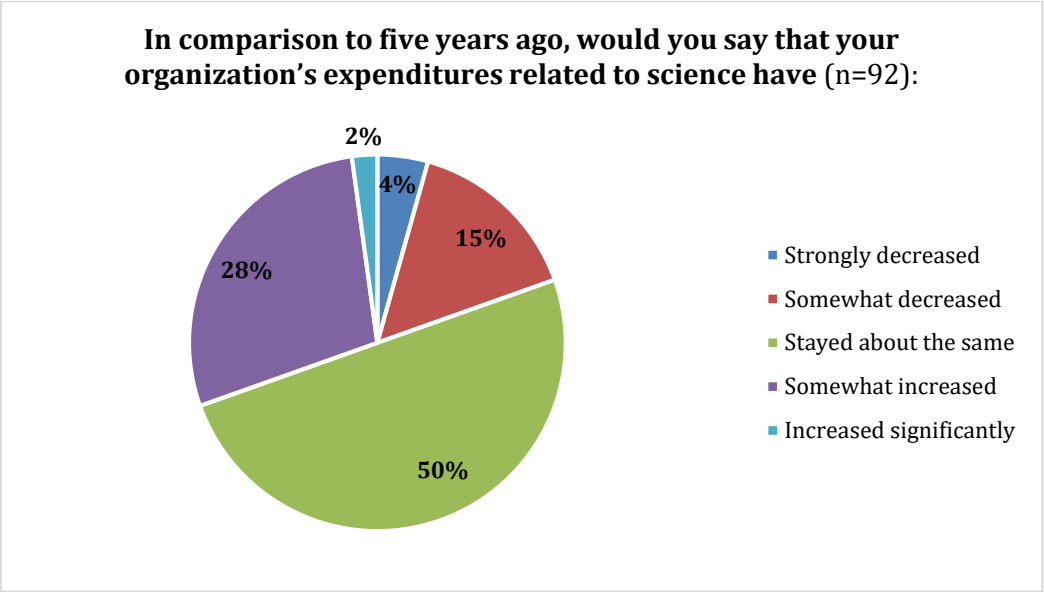
Primary Barriers to the Use of Science in Decision-making by Government of Yukon

Primary Barriers	#	%
Number of Stakeholders Identifying Barriers	**126**	**100%**
While scientific evidence is a consideration, other factors are commonly more important factors (e.g. such as the perceptions of senior management, political considerations and the need for quick action)	33	26%
Government often does not have ready access to the data or evidence needed to inform the decision (e.g. lack of data available, limited accessibility to internal and external databases, journals and research, lack of communication and coordination across departments, data issues/lack of quality data, lack of data on traditional knowledge)	32	25%
Recognition of the importance of science and evidence for decision-making remains low (lack of emphasis on evidence-based decision-making)	26	21%
A lack of investment in science activities and the development of capacity for science	21	17%
Lack of understanding of the scientific process/lack of experience of some government employees related to scientific activities	17	13%
Time constraints	11	9%
Lack of communication between decision-makers, policy analysts, and science practitioners.	11	9%
Limited confidence of senior management in the research results	10	8%

III.1.5 Trend in Scientific Expenditures

- **Government of Yukon expenditures related to science do not appear to have changed significantly over the past five years, with most stakeholders who are able to respond indicating that their department's expenditures have remained the same, increased slightly or decreased slightly.**

  When asked about whether there has been a change (compared to five years ago) in the organization's expenditures related to science, 50% of the 92 internal stakeholders who were in a position to respond indicated that expenditures have stayed about the same and 28% responded expenditures have somewhat increased, while 15% noted that expenditures have somewhat decreased. Only 2% reported a significant increase while 4% reported a significant decrease.



Those who reported at least somewhat of an increase in expenditures related to science noted:

- An increase in the scope of public engagements and collection of information through that process.
- The development of new initiatives and projects that required scientific research (e.g. the Yukon Tourism Development Strategy).
- Staff are placing greater emphasis on evidence-based decision-making, which increases the demand for science and research.
- Increased funding from the federal government. For example, additional funding was obtained to support and expand the activities of the newly NCE funded Canadian Mountain Network.
- Opportunities to leverage external funding have increased the return on investment.
- Staff have been able to link the need for additional investment to identified government priorities.

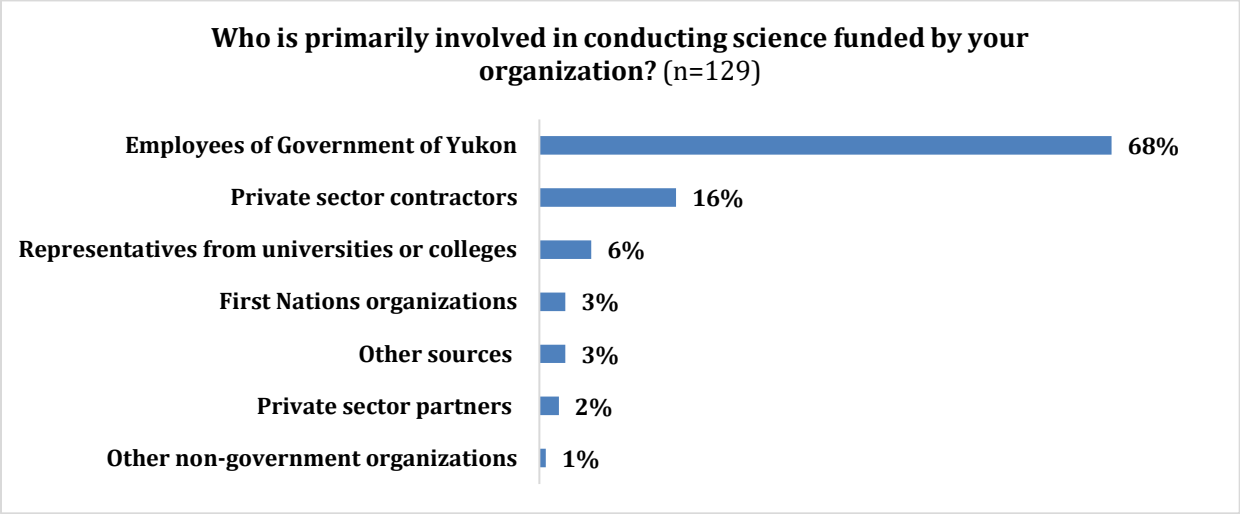
Those who reported at least somewhat of a decrease in expenditures related to science attributed that to:

- Budgetary pressures within the department. While the costs of doing research has been increasing, funding levels have remained stagnant for the past 10 to 15 years.
- Difficulties in leveraging funding from other departments. For example, when stakeholders reached out to program areas in other departments, with the exception of the Bureau of Statistics, their resources are already being used to provide direct services to the public or other administrative matters.

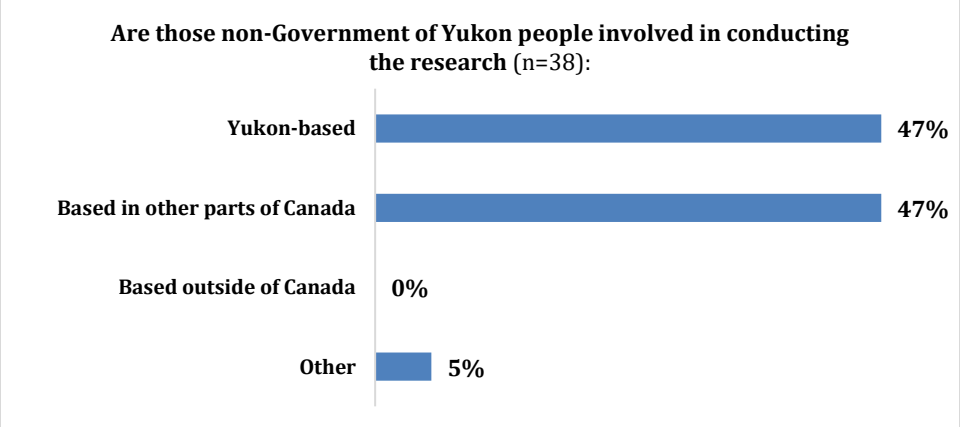
- **Most of the science-related projects have been performed by employees of the Government of Yukon.**

When asked who is primarily involved in performing the science activities funded by their organization, 129 internal stakeholders responded that 68% were employees of the Government of Yukon, 16% were

private sector contractors, 6% were representatives from universities or colleges, and First Nations organizations accounted for 3%.



When those stakeholders who mentioned non-Yukon government employees were asked where those researchers are based, the results were evenly divided between Yukon (47%) and other parts of Canada (47%).



III.1.6 Recommendations for Improvement

- **When asked for recommendations to improve the use of science in decision-making by Government of Yukon, internal stakeholders identified a wide variety of areas.**

The most common responses are provided in the table below.

Recommendations to Improve the Use of Science in Decision-Making by Government of Yukon

Most Commonly Identified Recommendations	#	%
Number of Stakeholders Providing Recommendations	**119**	**100%**
Mandate/facilitate greater use of evidence-based decision-making within government (e.g. adapt and refine decision-making templates to include science-specific components; ensure sound data is required in decision-making documents and briefing materials; increase transparency by more frequently detailing the rationale for decisions made)	36	30%
Improve data management and storage (e.g. adapt modern database systems and leading-edge technology; develop facilities)	25	21%
Increase investment in scientific research, better leverage resources available from other sources, and further develop (invest in) needed scientific capacity (e.g. increase funding, address factors that hamper collaboration with national and international research partners, and hire more researchers or senior managers who understand and have a background in science)	22	18%
Implement government-wide science orientation and training programs (e.g. train decision-makers on the benefits of using science in decision-making at all levels including senior leadership; provide more education and engagement)	20	17%
Facilitate greater communication between scientists, policy staff, decision-makers and the general public (e.g. establish venues and mechanisms to facilitate communication between policy staff and scientists; translate scientific results into common language)	17	14%
Promote greater use of scientific evidence rather than public opinion in decision-making	17	14%
Facilitate greater coordination and data sharing between departments (facilitate sharing of data and research results; increase communication and coordination; work to reduce areas of duplication or overlap)	16	13%
Increase use of traditional knowledge in decision-making	9	8%

Internal stakeholders also suggested that there is a need to:

- Establish a research ethics board in Yukon.
- Develop a talent retention strategy to ensure that highly qualified staff and researchers stay in Yukon.
- Increase funding for, and more aggressively promote, the Science Strategy.
- Increase access to management training programs. All senior level managers and directors who oversee science and technology departments should have relevant training, experience and background in those fields.
- Better coordinate research, plans and strategies over time and across departments in order to reduce the potential for duplication. For example, it was suggested that, as a result of turnover within a department, it is not unusual for virtually the same research project to be conducted multiple times.

III.2 External Stakeholders

III.2.1 Methodology

We first worked with the OSA in developing a list of 41 prospective respondents from outside of the Government of Yukon. The survey was administered online, beginning with an initial invitation letter with a link to the survey which was distributed on November 28th, 2019. Following our reminder protocol, three reminders were sent out over the following weeks (December 3, December 11 and December 19).

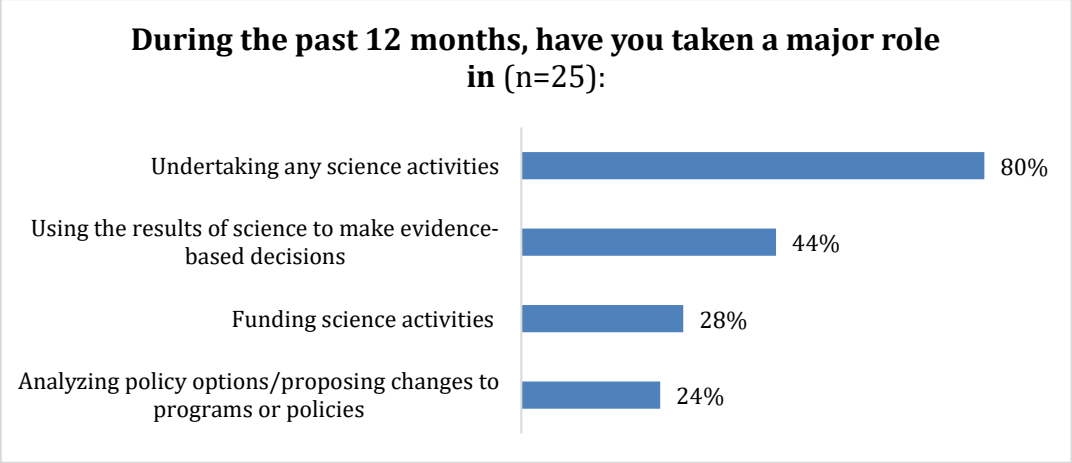
In total, 25 representatives responded (a response rate of 61%). A summary of the response by type of organization is provided in the table below.

Type of Organizations	External Stakeholders	Percentage
Universities & Colleges	12	48%
Yukon Environmental and Socio-economic Assessment Board	3	12%
Research Centre & Institutions	3	12%
Businesses and Investment Corporations	3	12%
Associations in Yukon	2	8%
Government of Canada (INAC)	1	4%
Consultant	1	4%
Total	**25**	**100%**

III.2.2 Involvement in Science

- **The external stakeholders most commonly are involved in undertaking science-related activities.**

  During the past 12 months, of the 25 surveyed external stakeholders, 80% played a major role in undertaking any science activities; 44% were involved in using the results of science to make evidence-based decisions in associated with the Government of Yukon; 28% played a role in funding science activities; and 24% have taken a major role in analyzing policy options and/or proposing changes to programs or policies.



- **Most external stakeholders have been involved in multiple roles in activities related to science.**

  The own relationship matrix of science involvement is shown in the below table. A breakdown of interpretations is summarized below.

- Of the 20 external stakeholders who were involved in undertaking any science activities, 30% were also involved in analyzing policy options and/or proposing changes to Government of Yukon programs or policies based on the results of science; 45% were also involved in using the results of science to make evidence-based decisions; while 30% were involved in funding science activities.
- Of the 6 external stakeholders who were involved in analyzing policy options and/or proposing changes to Government of Yukon programs or policies based on the results of science, all were also actively undertaking science activities; 50% involved in using the results of science to make evidence-based decisions; while 33% were also involved in funding science activities.
- Of the 11 external stakeholders who were involved in using the results of science to make evidence-based decisions, 82% were actively undertaking science activities; 27% were also involved in analyzing policy options and/or proposing changes to Government of Yukon programs or policies based on the results of science; while 27% were involved in funding science activities.
- Finally, of the 7 external stakeholders who were involved in funding science activities, 86% were also involved in undertaking science related activities; 29% were involved in analyzing policy options and/or proposing changes to Government of Yukon programs or policies based on the results of science; and 43% were involved in using the results of science to make evidence-based decisions.

Own Relationship Matrix	Undertaking any science activities		Analyzing policy options/proposing changes to programs or policies		Using the results of science to make evidence-based decisions		Funding science activities	
	#	%	#	%	#	%	#	%
Undertaking any science activities	**20**	**100%**	6	100%	9	82%	6	86%
Analyzing policy options/proposing changes to programs or policies	6	30%	**6**	**100%**	3	27%	2	29%
Using the results of science to make evidence-based decisions	9	45%	3	50%	**11**	**100%**	3	43%
Funding science activities	6	30%	2	33%	3	27%	**7**	**100%**

- **External stakeholders were also involved in other science-related activities related to working with communities and education.**

  The other types of science-related activities most commonly identified include:

  - *Working with communities* in communicating research results, supporting community-based projects, working with Indigenous groups in merging research and traditional knowledge, and working with youth, First Nations, and others on science projects.

  - *Education-related activities* such as teaching undergraduate and graduate science courses, as well as holding workshops for First Nations communities.

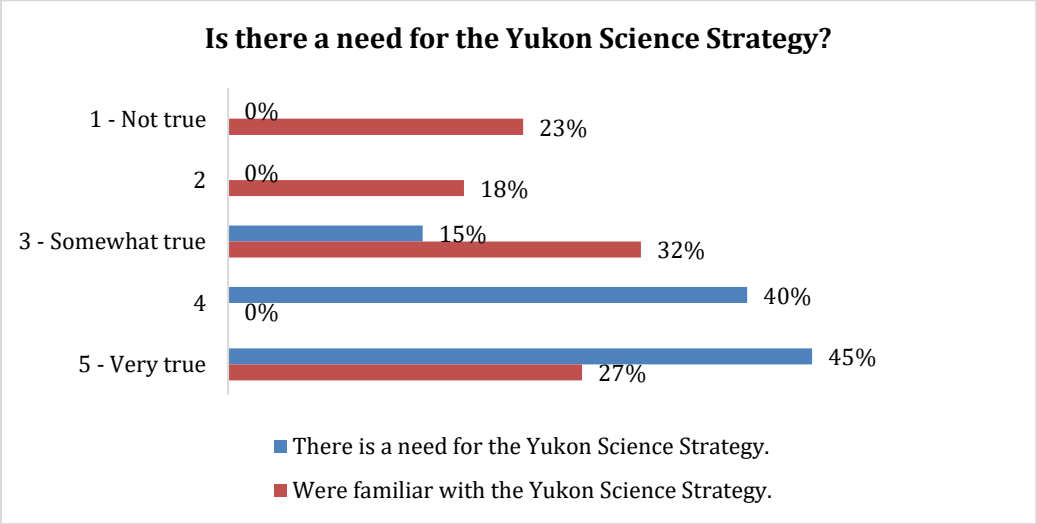
III.2.3 Status of Science and Research in Yukon

- **Familiarity with the Science Strategy varied across the external stakeholders. Nearly one-quarter of internal stakeholders were not familiar with the Science Strategy.**

Of the external stakeholders, 59% reported that it was at least somewhat true that they are familiar with the Strategy (27% indicated that it was very true). Twenty-three percent indicated that they were not familiar with the Strategy. The average rating regarding whether they are familiar with the Science Strategy on the scale of 1 to 5, where 1 is not at all true and 5 is very true, was 2.9.

- **Most external stakeholders agreed that there is a need for the Yukon Science Strategy.**

  The preamble to the questionnaires included a short description of the Yukon Science Strategy (i.e. it was released in 2016 to provide a strategic framework for integrating and enhancing the efficiency and effectiveness of science activities carried out within Government in order to support evidence-based decision-making). The internal stakeholders were asked whether there is a need for the Strategy. Of the 20 external stakeholders who responded, all reported that it was at least somewhat true that there is a need for the Strategy (45% indicated that it was very true).



- **While progress is being made, external stakeholders indicated that further progress will be needed to ensure that the Government of Yukon has the data and systems in place to support evidence-based decision-making.**

  External stakeholders were given a list of statements regarding science and the Government of Yukon and asked to rate the truthfulness of those statements on a scale of 1 to 5, where 1 is not at all true, 3 is somewhat true and 5 is very true. The results indicate that a majority of external stakeholders agree that:

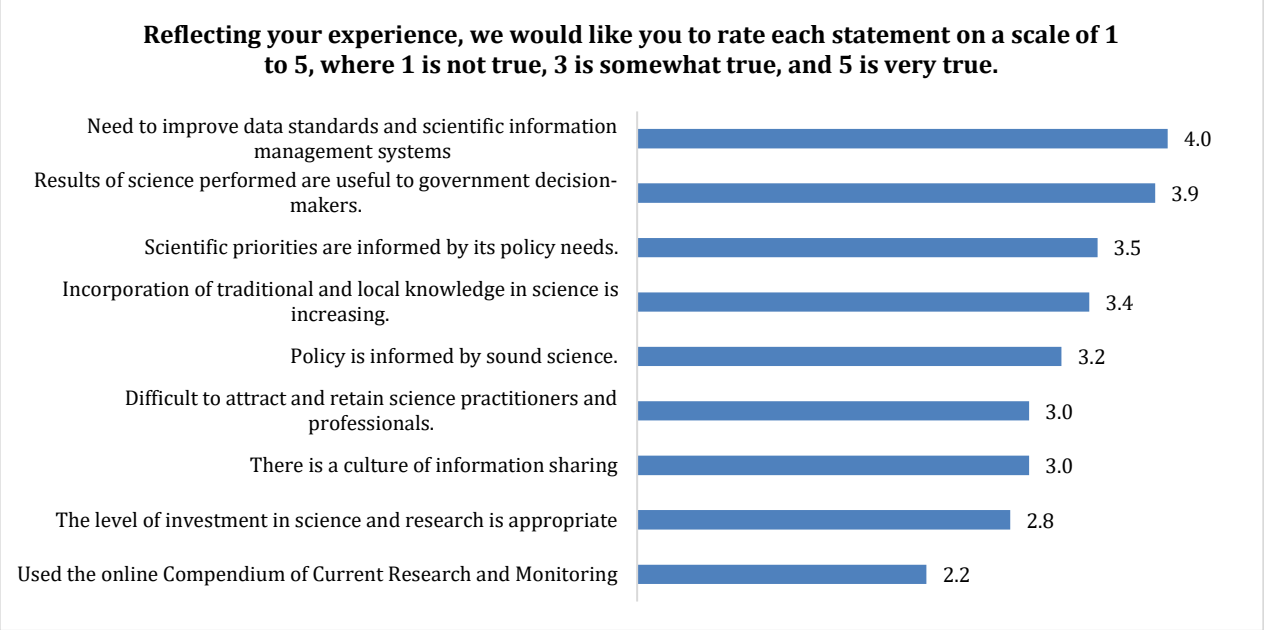
  - The results of the science currently performed are useful to government decision-makers (77% rated the truthfulness of the statement as a 4 or 5, with an average rating of 3.9);
  - Scientific priorities are informed by the government's policy needs (78% of external stakeholders rated the truthfulness of the statement as a 4 or 5, with an average rating of 3.5); and
  - Some progress has been made in incorporating traditional and local knowledge into science (50% rated the truthfulness of the statement as a 4 or 5, with an average rating of 3.4).

Only 25% of external stakeholders more than somewhat agreed (with an average rating of 3.2) that policy is informed by sound science.

Potential areas for improvement included:

- *Investment*: Only 12% more than somewhat agreed that the level of investment in science and research is appropriate (average rating of 2.8)
- *Information sharing: 19*% more than somewhat agreed that there is a culture of information sharing (average rating of 3.0)
- *Data standards and management systems*: 77% more than somewhat agreed that there is a need to improve data standards and scientific information management systems (average rating of 4.0)
- *Talent*: 28% more than somewhat agreed that it is difficult to attract and retain science practitioners and professionals (average rating of 3.0)

The ratings are summarized below.

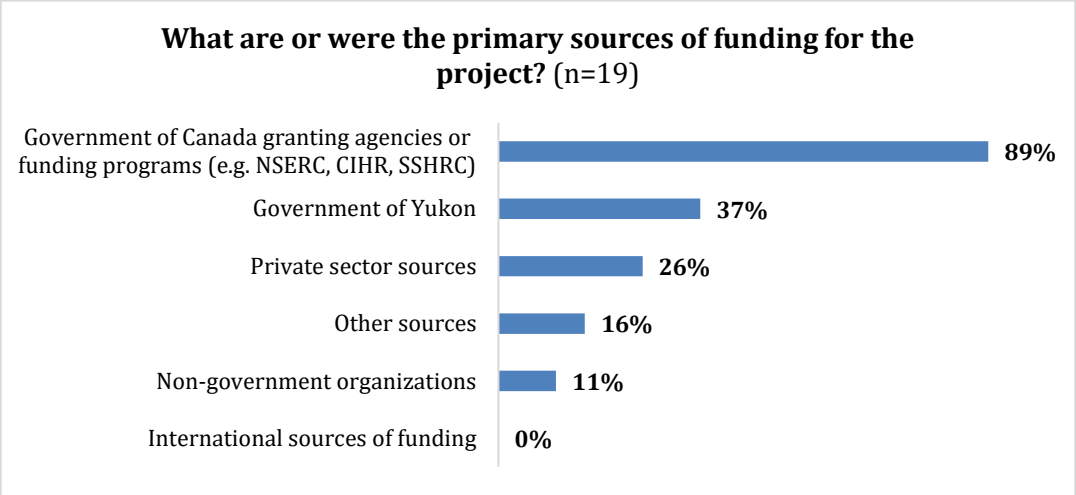


When asked to rate whether they had used the online Compendium of Current Research and Monitoring, only 9% more than somewhat agreed (i.e. rated the truthfulness of the statement as a 4 or 5, with an average rating of 2.2).

III.2.4 Use of Science in Decision-Making

- **The Government of Canada granting agencies and funding programs are the primary sources of funding for the science-related projects undertaken by these organizations.**

When asked about the primary sources of funding for their project, 89% of the 19 survey participants who responded to the question identified Government of Canada granting agencies or funding programs (e.g. NSERC, CIHR, SSHRC) as the primary source of funding. Other sources mentioned included the Government of Yukon (37%), private sector sources (26%), other sources (16%), and non-government organizations (11%).



- **External stakeholders identified several barriers to the use of science in decision-making by the Government of Yukon, of which the most common was access to the data and evidence needed to inform decisions.**

The results are summarized below.

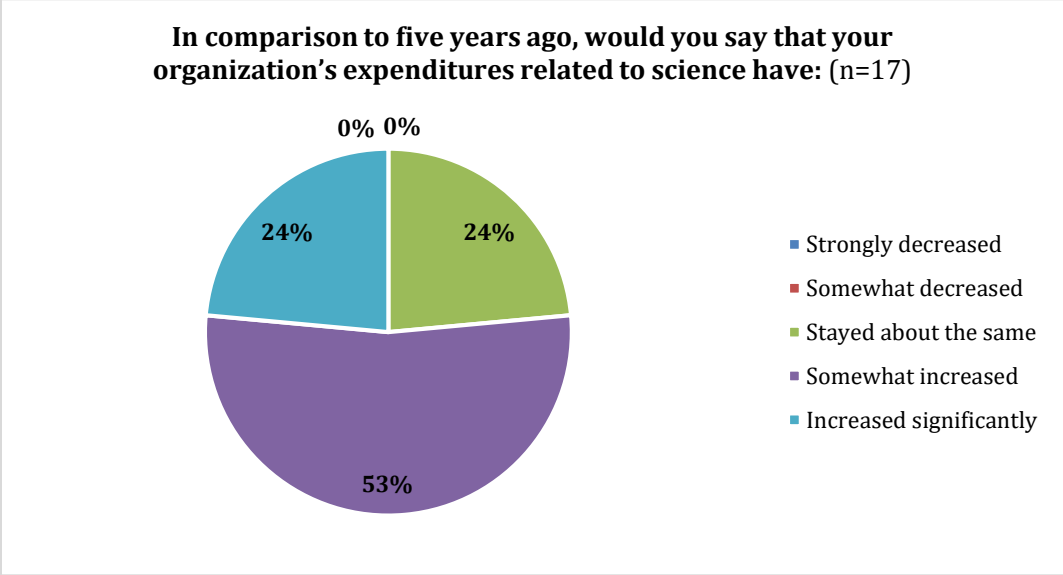
Primary Barriers to the Use of Science in Decision-making by the Government of Yukon

Primary Barriers	#	%
External stakeholders identified barriers	**19**	**100%**
The data, science-based evidence and traditional knowledge needed for decision-making is not always available (e.g. limited access to research, secondary data sources, traditional knowledge, and data specific to the Yukon such as cold climate data)	9	47%
Public pressure/impact of interest groups on decisions (government may be pressured to make decisions that aren't science-based or aren't as robust as they could be)	5	26%
Funding constraints/lack of investment in science activities	4	21%
The number of stakeholders involved in science, policy and decision-making and the need for compromise (e.g. interplay between municipal, territorial, and federal jurisdiction, scientists and funding priorities)	2	11%
Unrealistic expectations regarding how science can be accessed and applied (e.g. magnitude of scientific uncertainty regarding many issues such as natural and human-system responses to climate change)	2	11%

III.2.5 Funding and Implementation of Science

- **The representatives of most of these external organizations indicated that the science expenditures of their organizations have increased over the past five years, primarily as a result of increased access to research grants.**

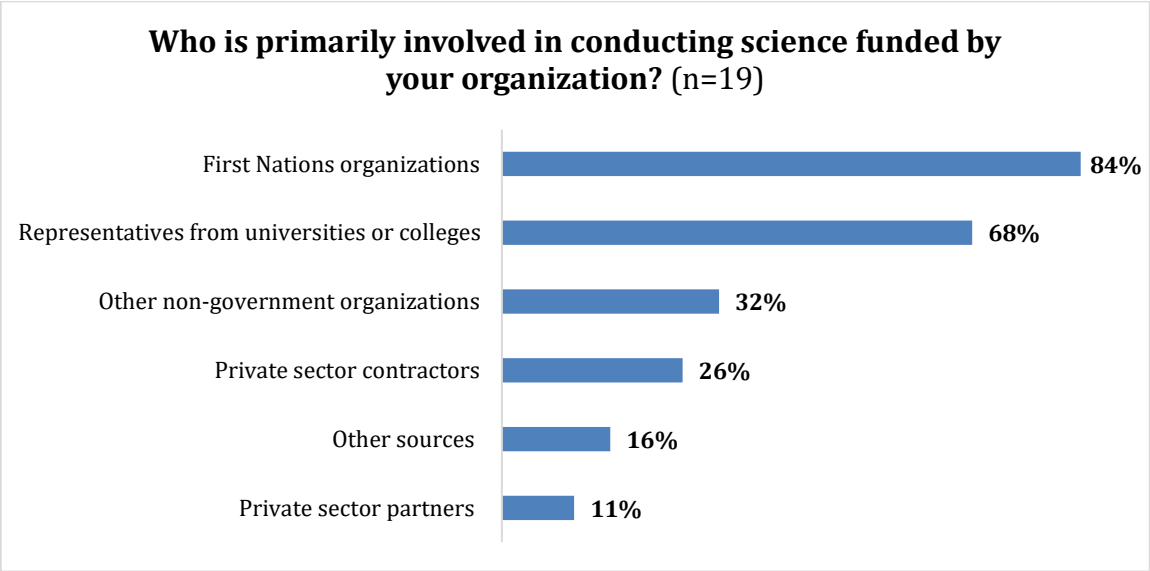
  When asked about whether there is a change (compared to five years ago) in the organization's expenditures related to science, 53% of the external stakeholders responded that expenditures have increased somewhat, 24% responded that expenditures have increased significantly, and 24% responded that expenditures have stayed about the same. None experienced a decrease.



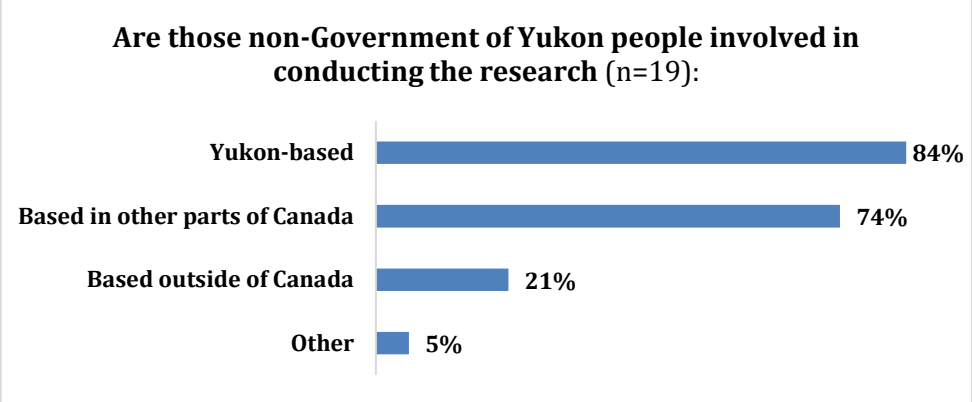
  Among those who reported at least somewhat of an increase in expenditures related to science, the most common reasons include:

  - There is increased access to research grants, particularly federal government grants.
  - Their capacity to conduct research has increased (i.e. increased access to highly qualified researchers).
  - Senior management within their organization has placed increased emphasis on science and using science in decision-making.
  - There is increased interest in specific research topics on which they focus (particularly climate change).

- **Their research projects have involved a broad cross-section of organizations including First Nations organizations (identified by 84% of the stakeholders), universities and colleges (68%), non-government organizations (32%), private sector contractors (26%) and private sector partners (11%).**



Participating organizations included a broad cross-section of researchers from the Yukon (identified by 84% of the external stakeholders), other parts of Canada (74%), and outside of Canada (21%).



III.2.6 Recommendations for Improvement

- **In terms of opportunities for improvement, external stakeholders identified the need for more collaboration among researchers, First Nations and decision-makers within and outside of Yukon, and a need for greater funding and support.**

  When asked about recommendations to improve the use of science in decision-making by Government of Yukon, external stakeholders most commonly identified the need for more collaboration (43%) and more funding and support (29%) as well as the need to better incorporate traditional knowledge (21%) and engage further with communities (21%).

Recommendations to Improve the Use of Science in Decision-making by the Government of Yukon

Most commonly identified recommendations	#	%
Number of external stakeholders providing recommendations	**14**	**100%**
There is a need for greater collaboration among researchers, First Nations and decision makers within the Yukon and outside of Yukon	6	43%
There is a need for more funding and support for Yukon research	4	29%
There is a need to further incorporate traditional knowledge into decision-making as well as in the design and conduct of research	3	21%
Researchers should engage further with the communities (there is a need to listen to community needs and find out about the research they would like to be conducted)	3	21%
There is a need to improve science education and literacy at all levels from elementary through post-secondary, as well as in the general public	2	14%
There is a need to improve data collection and accessibility to quality data	2	14%
The Yukon Scientists and Explorers License process should be revised to create more meaningful consultation with First Nations and other governments on research permit applications	1	7%

Appendix IV: Summary of the Case Studies

IV.1 YESAB / Coffee Gold Mine Case Study

YESAB

Chapter 12 of the *Umbrella Final Agreement* (UFA) and Yukon First Nation final agreements establish the foundation for a legislated development assessment process applicable to all lands in Yukon. The *Yukon Environmental and Socio-economic Assessment Act* (YESAA) was enacted by the Parliament of Canada and received Royal Assent on May 13, 2003 and came fully into force November 2005.

The Yukon Environmental and Socio-Economic Assessment Board (YESAB) is an independent arms-length body responsible for the assessment responsibilities of the YESAA legislation and regulations. It aims to balance priorities of protecting the environmental and social integrity of Yukon while fostering responsible development in the territory that reflects the values of Yukoners and respects the contributions of First Nations.

As of their 2018-2019 annual report, YESAB had 194 projects submitted for assessment, of which 180 were either assessed or active – with 14 withdrawn. These projects pertain to a wide range of activities in the Territory, with the largest contingent being placer mining (n=56 or 28.9% of all projects), quartz mining (n=36; 18.6%), recreation and tourism (n=20; 10.3%) and residential, commercial and industrial land development (n=19; 9.8%).

Projects are also geographically dispersed throughout the Territory, frequently involving the traditional lands of more than one local First Nation. YESAB maintains a project file map that is accessible at https://www.yesab.ca/project-map/, and a detailed registry of projects and associated documentation at https://yesabregistry.ca.

Assessment Process

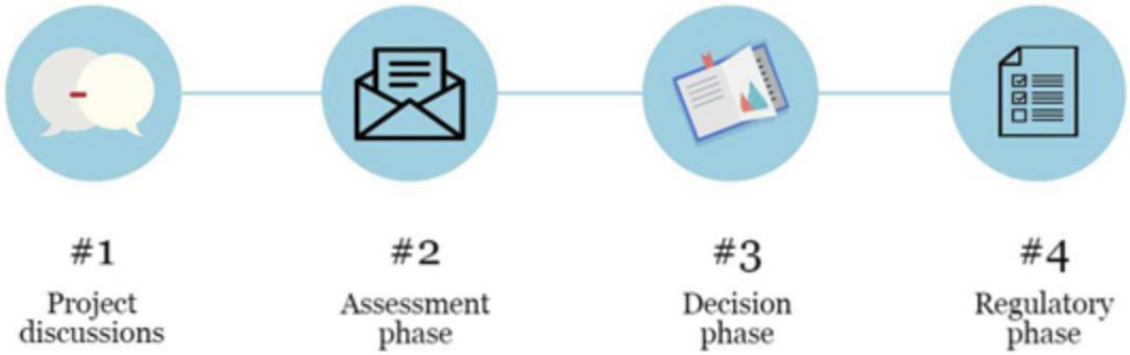
The Act mandates assessors to look at the potential environmental and socio-economic effects of proposed projects and to recommend whether projects should proceed as proposed, proceed with terms and conditions, or should not proceed.

YESAB has a broad range of responsibilities when conducting environmental and socio-economic assessments and providing recommendations to Decision Bodies. The organization notifies interested parties, First Nations and the public of current project assessments, ensures proponents submit the appropriate information, conducts research related to project activities, and collects and considers public comments before submitting reports and recommendations to Decision Bodies.

When YESAB completes an assessment, a recommendation is sent to the relevant Decision Body(s), who review and either accept the recommendation or send the recommendation back to YESAB's Executive Committee with comment if they do not agree with the recommendation. When a final decision has been reached, this is then issued via a Decision Document.

YESAB does not issue permits, authorizations or approve projects. Regulatory bodies within governments are responsible for issuing permits and authorizations, and when permits are issued, the terms and conditions of those permits are not enforced by YESAB, but by governments.

The overall development assessment process can be broken into the following stages:



1. **Project discussions**
    1. Proponent meets with Regulator
    2. Determine authorizations required and project location
    3. Proponent works with Assessor to finalize proposal
2. **Assessment phase**
    1. Proponent submits project to YESAB
    2. Proponent responds to requests from Assessor
    3. Public, NGOs and governments provide expert knowledge for Assessor
    4. Assessor produces Evaluation Report including recommendation
3. **Decision phase**
    1. Decision Bodies such as Government of Yukon give full and fair consideration to recommendation
    2. If project is in non-settled First Nation Territory, Decision Body consults
    3. Develops and issues Decision Document
4. **Regulatory phase**
    1. Regulators issue authorizations where applicable
    2. Authorizations conform to the wording of the Decision Document

Coffee Gold Project

Newmont Goldcorp Corporation (proponent) is proposing the construction, operation, decommissioning and closure of an open-pit gold mine in the White Gold District of west-central Yukon. The proposed mine, named the Coffee Gold Mine will extract ore at a rate of up to nine million tonnes per year and is expected to be in operation for 10 years.

The Coffee Gold Mine site is located approximately 130 km south of the City of Dawson and 330 km northwest of Whitehorse on the northern access route (a 214 km all-weather access road with barge crossings across the Stewart and Yukon rivers between Dawson and the mine site).

Mining activities require open pits, sodium cyanide heap leaching technology, a water treatment plant and waste rock storage facilities. Access to the mine site will be by air, ground and river crossings. Construction includes approximately 37 km of new road and barge landings and ice crossings at the Stewart River and Yukon River crossings.

Among other licenses, the proponent must secure type A and type B water licenses, as administered by the Yukon Water Board, and a quartz mining license as administered by the Yukon Department of Energy, Mines and Resources. These are the relevant decision bodies for the YESAB review of this project.

Given the scope and scale of the proposed gold mine, diverse scientific evidence pertaining to surrounding wildlife corridors, water, plant life, socio-cultural considerations and heritage must all be taken into account – in addition to the geological and operational characteristics of the mine itself.

What We Heard

Science, in its broad definition as embraced by the Strategy, is crucial to all stages of the YESAB assessment process. However, challenges arise when multiple pieces of evidence conflict – either with each other, or with public perceptions around the project.

While inefficiencies and data duplication were not described as ultimately affecting the decision-making process, all Coffee Gold case study interviewees (3) acknowledged that public perceptions and local connections to the decision-making process often override the objective or empirical basis for decisions. This was considered partially unavoidable; however it was felt that Yukon's small territorial population with close personal connections to decision-makers makes this issue more challenging than it would be in other jurisdictions.

The importance and availability of government-generated data is critical – yet there are significant gaps. When the proponent is faced with a gap in Government of Yukon data, they turn to external consulting firms to collect original data or seek to discover whether local First Nations have similar data available. A general lack of coordination or centralization of data from these disparate parties then leads to duplication and inefficiencies. One interviewee described carrying out sampling to detect uranium in water at the proposed mine site and discovering that Government of Yukon staff were conducting similar water sampling for another project nearby. Given the type of testing being done, it would have been sufficient and cost-effective to rely on the Government of Yukon testing.

Another issue from the perspective of the proponent is that some data requests seem to go beyond the scope of the project. There is a perception that "nice to have" data becomes "must have" when the proponent is already out in the field or collecting data about a certain habitat, watershed or species. The Government of Yukon and local First Nations understandably want to fill many of the data gaps, but it is not always clear whether the onus is on the proponent or government to collect that data – or whether it's absolutely essential to the review process.

One YG biologist who has contributed research for the assessment process described being frustrated by the lack of an underlying risk management or risk tolerance framework in the YESAB process. Science can answer many of the technical questions that arise during the assessment process, but not the value judgments or what level of risk is socially acceptable.

The impact of development activities on wildlife are largely cumulative in nature. The risks and hazards of a single project are challenging to tie to specific outcomes on a species or herd, yet the limited scope of each individual YESAB assessment precludes any examination of larger issues that might transcend the spatial or temporal limits of a single project. Each project is considered only on its own, but not in concert with nearby existing or other proposed projects.

YESA has an implementation fund tied to it that allows for funding of some research that could address these cumulative effect issues, yet the funding is limited to $150,000/year. It was felt that a more secure and

reliable source of Government of Yukon funds to deal with longer-term research questions would be a significant improvement.

Interviewees contacted for this case study were not closely familiar with the Science Strategy yet felt that the Strategy represents an opportunity to improve several aspects of science and decision-making in the territory. There is an appetite for the Strategy to provide stronger direction on research priorities that stretch beyond a single YESAB assessment, especially on topics such as cumulative effects on species, demographic data, and traditional knowledge. Likewise, the Strategy could assist with making evidence available to decision-makers and those tasked with collecting information throughout an assessment process. This could significantly reduce duplication and save time and resources for all parties involved.

What We Learned

While the Coffee Gold assessment process has not yet reached the decision phase, the independent and arms-length nature of YESAB and the wide range of projects and associated stakeholders provided an opportunity to examine how science is collected and contributes to a relatively complex decision-making process in the territory. Given the historical and ongoing relevance of mining activity to the Territory's overall GDP and employment, there are considerable economic consequences of the recommendations put forward by YESAB and ultimate decisions made by regulatory bodies within the Government of Yukon.

The process for the Coffee Gold project has been underway for several years – starting in 2014, with the formal assessment stage being underway for 3 years now – and illustrates the inter-relation between Government of Yukon staff and data, original science carried out by the proponent and their consultants, and the importance of traditional and local knowledge from Yukon communities and First Nations.

There is a general lack of baseline data for many areas of concern for the Coffee Gold project and many YESAB assessment processes. This includes not only data on climate, wildlife, and hydrology in remote locations, but also demographic and socio-cultural data in Yukon's smaller communities.

The requirement for the proponent to consult with local First Nations is central to the YESAA, yet as currently implemented, offer little guarantees about whether or how traditional or local knowledge will ultimately be incorporated into the emerging recommendations or decisions of regulators. Proponents will engage in First Nations consultation in different ways, with some only ensuring that the First Nations in question have been informed of the project and offered an opportunity to comment.

Overall, the assessment process for the Coffee Gold project demonstrates the inter-relation between Government of Yukon data and externally conducted science. The success or shortcomings of the data collected and decisions made ultimately depend on the strength of those relationships. Clear communications about what data is available and robust dialogue about the various priorities of the proponent, stakeholders and governments are essential.

IV.2 Canadian Mountain Network

First established in 2016, the Canadian Mountain Network (CMN) is an alliance of partners from universities, governments, Indigenous and non-Indigenous communities, not-for-profits, and businesses dedicated to the sustainability of mountain environments and communities across the country and around the world. While the CMN and its administrative centre are hosted at the University of Alberta in the Faculty of Science, Yukon has played a pivotal role as one of four initiating groups – along with BC, Alberta and the Northwest

Territories – that advised on local priorities and opportunities as well as inform CMN's overall management structure.

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; and
- Meets the needs of diverse mountain communities and their Indigenous peoples

More specifically, CMN has established the following three goal areas:

NCE

In mid-2017, CMN sought to secure long-term funding and coordinated a formal submission to the federal Networks of Centres of Excellence (NCE) program, which involved the input of all initiating groups (IGs). The Yukon IG was chaired by Aynslie Ogden, Science Advisor for the Government of Yukon, and included other members from within the Government of Yukon, Yukon College, other post-secondary institutions across Canada and non-governmental organizations.

The NCE is a federal government initiative which funds partnerships between universities, industry, government and not-for-profit organizations to create large-scale research networks. The CMN submission was ultimately approved for $18.3 million over a five-year period from 2019-2024.

Yukon Priorities & Activities Within CMN

Following the successful NCE application, a Yukon CMN Coordinating Committee was initially struck and included representatives of the main partners involved in delivering the Project, with invitations extended to all CMN staff and contractors active in Yukon; CMN governance committee members from Yukon-based organizations; active members of the previous Yukon CMN Initiating Group; a Council of Yukon First Nations (CYFN) representative and the Principal Investigators of Yukon-based projects. Its role was to support networking among Yukon-based CMN activities and to ensure organizations across the territory were able to influence the development and take advantage of CMN's research, monitoring, training and knowledge mobilization program opportunities and to ensure the cohesive delivery of CMN activities in Yukon. In fall

2019, the decision was made to host the training coordinator position in Alberta and to shift its role to that of a Programs and knowledge mobilization coordinator. A contractor, who will help define the training program, the Co-Research Director, and a CMN Research Chair will still be located in Yukon. With these changes, the Yukon Coordinating Committee was dissolved, although collaboration and conversations among Yukon-based stakeholders continue. In addition, an Advisory Committee is planned to inform the work of the Research Chair, when they are in place.

In addition to CMN-tied funds coming into the territory, as part of a 5-year (2019-2024), $1-million investment in supporting the work of the CMN, the Government of Yukon has identified the following year one priorities for funding. Note dollar values are Government of Yukon contribution only, not total costs tied to each activity:

- Training Program Development ($35,000)
- Yukon-based Co-Research Director ($63,000)
- Indigenous Outreach and Engagement Assistant ($14,800)
- Yukon Monitoring Inventory ($15,000)
- ALCES Online Landscape and Land-Use Online Tool ($10,000)
- Haines Junction Mountain Festival ($5,000)

In addition to YG CMN program activities identified above, of the eleven total projects identified to receive early CMN funding, three are led or co-led by Yukon First Nations, and two others have activities in and relevance to the territory. These activities are marked for approximately $1.7 million in NCE funding

What We Heard

The success of the CMN NCE application is seen as an important victory in securing funding to support Yukon-based research priorities, as well as in connecting to and leveraging external networks and expertise. While there are links to all 6 goal areas of the Science Strategy, #2 – Build Science Capacity and #5 – Promote Information Sharing are seen as the most directly relevant.

Interviewees were quick to point out that a major theme for Yukon in the CMN has been to explore and develop *how* research is done more so than *what* research is done. As a means to advance reconciliation across different modes of research, CMN is being leveraged to fund Indigenous, collaborative, partnership-based and investigator-driven research.

Through its training program, CMN is providing opportunities for Yukon First Nations and Indigenous youth. Interviewees provided examples such as Kluane First Nation and Taku River Tlingit working on original research about sheep harvesting and horn growth. These sorts of activities are seen as part of a broader effort to focus on First Nations and establish research and community links within the territory. The funding brought in through the NCE program has been further leveraged to secure federal MITACS funding through scholarships that will benefit Yukon students.

While there have been early successes, interviewees echoed that there are ongoing funding challenges both for the CMN and more broadly for supporting science in the territory. Most federal funding that is directed toward the north is seen as going to the high arctic and eastern arctic regions, with little left for Yukon. The development of Yukon College becoming Yukon University in 2020 has been as a positive and should help address some of those funding issues, yet it will be some time before the new university can rival the capacity as other academic institutions outside of the territory.

Further, while there are benefits of leveraging a larger network, the geographically dispersed nature of CMN presents some challenges for Yukon too. The establishment of the Yukon-based co-research director is a positive, but most leadership positions in the CMN remain based in Alberta and elsewhere outside the north. This has meant some initial growing pains for the project are unavoidable as long-distance communication, travel and meetings are more challenging.

What We Learned

Yukon's involvement in the CMN and role in securing the NCE funding for 2019-2024 demonstrates both the importance of Government of Yukon staff and material support to science, as well as the need to leverage outside relationships and networks to reach any science-related objectives for the territory.

Unfortunately, long-term funding remains a concern even after the successful CMN application. Federal budget 2018 resulted in NCE being sunsetted, with current commitments being honoured under the newly established New Frontiers in Research program. Interviewees described this new program as reflecting a shift toward more traditional investigator-driven science projects, and away from the collaborative, network and partnership-based research that is a better fit for Yukon and the current focus of the CMN.

As the CMN project implementation moves forward, there may be opportunities to more formally connect the Science Strategy to the project – both to provide a framework for bringing lessons learned from the CMN to bear in bolstering science capacity within the Government of Yukon, as well as in positioning the Government of Yukon to potentially be able to play a larger role in addressing some of the gaps the CMN project addresses once the NCE funding period is over.

Appendix V: Summary of the Focus Groups

Three separate focus group sessions were held, with a total of 13 participants. The focus groups were Internal Staff, Internal Decision-Makers and External key informants. Given the limited number of participants, a detailed summary of the sessions was not prepared in order to protect confidentiality. Relevant findings are incorporated throughout the report where appropriate, with the following high-level descriptions of each session further illustrating the nature and tone of the overall sessions:

- The internal staff focus group included four participants from four different Government of Yukon departments. The conversation was guided to explore the role of science in supporting government decision-making (Strategy Goal #1), and the role of the strategy in supporting that process. All staff participated in the conversation, providing input from both departmental and personal perspectives. In general, discussion focused around how building a culture of evidence-based decision-making remains a work in progress across the Government of Yukon. The process of building that culture is felt to be hampered by departmental silos, and while the Strategy is seen as a positive, staff recognized that the OSA is small and under-resourced in comparison to the scope of the Strategy. Participants used the session to share experiences with each other, and the suggestion of incorporating more Strategy-related goals into HR tools like the Personal Performance Plan (PPP) for staff and Professional Development Plans (PDP) for management.

- The internal decision-makers focus group involved three participants from three departments. This session was also facilitated to explore the role of science in supporting government decision-making (Strategy Goal #1), and the role of the Strategy in supporting that process. While the number of participants was low, the group described a diverse and multi-faceted relationship with science through their respective departmental operations. This included roles as manager of science activity within Yukon, regulator of activities carried out within the Territory, as well as managing collaborative science activities across departments on more complex projects. The group felt that decisions are well-supported by science at present, yet noted that the overall scientific literacy among both senior decision-makers and politicians within the Territory remains low and presents a challenge. Participants offered up the idea of having more clear documentation of evidence through Management Board submissions, as well as embedding the goals of the Strategy in Cabinet Committee on Policy and Planning (C2P2) templates to bring increased profile to the goals.

- The external focus group involved six participants with a range of academic, private sector and NGO representation, and was intended to be more focused on exploring issues related to Strategy Goal #4 – Stimulating Private and Civil Sector Science. The group had a dynamic conversation, reflecting and building off of each other's comments. The discussion did spend some time on the relative lack of funding within territory to support science, especially in comparison to other northern jurisdictions, and a significant portion of time was spent discussing gaps and opportunities in engaging with First Nations around science through the Strategy, and building up an inclusive approach to respecting and valuing traditional knowledge. The group felt there was also an opportunity to expand the Strategy beyond the Government, perhaps by establishing an external advisory group.