

Dear Presidents of the federal granting agencies and CFI,

The past few years have seen an increase in support for northern research in Canada. This has been manifested as a result of several reports (e.g., Northern Task Force, Dialogue on Northern Research) and programs (e.g., Northern Chairs program, various CURA initiatives and Northern Supplements). This momentum has continued with significant funding from the Canadian Federal Government and NSERC, underwriting Canadian participation in the current International Polar Year (March 2007–March 2009). At the same time, heightened awareness of federal government is focusing on determining the needs and priorities as they pertain to Northern peoples and stewardship of the North (i.e., sovereignty, economic development, environmental protection).

In September 2007, NSERC, in partnership with SSHRC and CIHR, convened a small group of individuals to address the post-IPY legacy across Canada. Members of this group represented various sectors including academic and government agencies from both northern and southern institutions. They were selected for their experience in northern research and their broad perspective in Arctic science needs in Canada. After an initial teleconference it was decided that a face-to-face meeting should be organized in order to facilitate greater in depth discussions. Representatives from all three federal granting agencies were present throughout the day's meetings.

The objectives of this group were to identify how Canada's science enterprise could build on recent investments in northern research over the past years so as to be able to address critical research questions arising from current and changing social and environmental conditions throughout the north.

Concrete actions and initiatives on short, medium and long-term time frames are recommended in this subsequent report. The importance of establishing stable, long-term funding is paramount to the success of any future initiatives in the North as is the need to recognize the importance of northern participation in any endeavours. Support for research, training and knowledge applications are priorities that will assist in building a strong Northern capacity.

The report recognizes that in order to put these initiatives into effect and to resource the necessary research and improvements to social economic conditions in the North, strong partnerships between all stakeholders will be necessary. This includes organizations that fund researchers and the development of new technologies, end-users of research results as well as the private sector. We are sharing this report with you in the hope that it will be considered when determining priorities for supporting Canada's northern research needs.

If ever there was a right time to undertake these initiatives, it's now!

Sincerely,
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Post-IPY Expert Advisory Group Report

Background

Global forces are having a significant influence on the North, resulting in disruptive social and environmental change. In response to the urgency created by this change, northern research in Canada has seen a revival over the past several years with major investments related to IPY, the Amundsen research icebreaker, ArcticNet, Northern Research Chairs and other initiatives. The investments made for science and research during IPY are significantly higher than what was invested in the past. With IPY ending on March 1 2009, and dedicated IPY science and research investments continuing only 1-2 years beyond, there is a need to determine what lies in the future for northern science and research after IPY. Northern research investments are of critical importance to Canadians and the world. Measured and directed investments in northern research and science, in particular in the capacity of Northerners to study northern phenomenon, is of critical importance. An expert group of Northern researchers was convened in November 2007 by the federal granting agencies to discuss these issues and provide advice to the granting agencies and other stakeholders on the priorities for future initiatives.

Mandate

The aim of the group was to identify how Canada's science and research enterprises can collectively build on the investments made in northern research over the past several years and during IPY so that Canada can be prepared to address critical research questions in northern research. Members of this expert advisory group were selected for their experience in northern research and their broad perspective of the arctic science needs in Canada. It included academics, northerners, and government employees. The views expressed in this document does not necessarily reflect the views of the affiliated organization. The group examined the progress that has been made in northern science in Canada in recent years, and identified issues that remain to be addressed. The group recommended concrete actions and initiatives for stakeholders in northern science and research with specific advice on resource needs in the short, medium and long term to address these science and research priorities. The focus of the document is mostly aligned with academic research with the realisation that research to support some regulatory requirements and economic development is not greatly expanded upon.

Why engage in northern science and research?

Canada is a northern nation. The huge expanse of the Arctic, which makes up 50 % of our country's landmass, is an integral part of our national identity and a strategic component of our country's future. But being a northern nation carries distinct responsibilities. These include the protection of our sovereignty, the promotion of sustainable development and our participation in circumpolar initiatives, particularly in areas of northern science and social development.

- Secure National Sovereignty and Security:
 The success of Canada's northern sovereignty rests on sustainable northern communities; research and science are of critical importance in this regard. At the current rate of global warming, arctic sea ice will soon disappear in the summer, allowing navigation through the Northwest Passage. As the Arctic oceans melts, other nations will increase their activity in this region. In addition, Canadian jurisdiction over the Northwest Passage is not accepted by the United States and other countries. *Conducting science in our northern lands is a peaceful way to underline our claim to sovereignty. We need a practical, sustained and relevant national presence across our North.*
- Enhance and Create Economic Development Opportunities:
 The settlement of aboriginal claims has helped paved the way for further economic development in the energy and mineral industries and there is potential for beneficial relationships between communities, industry and government. These opportunities are also being influenced by the availability of new technologies in the North, the growth in the number of small businesses, and increased tourism activity in the region. R&D activities include research on renewable energy technologies (solar, wind, biomass), the development of community energy plans, and projects to utilize distance education. Demographically, the North is different from the rest of Canada—for example in Nunavut, 56% of the population is under 25, compared with 33% of the Canadian population as a whole. At its current growth rate, Nunavut's population will double in two decades. *There is tremendous potential to increase indigenous and northern capacity for innovation, commercialization and job creation.*
- Ensure the Integrity of Northern Environments and Communities:
 Global warming, contaminants, and industrial activity pose new challenges to sustainability. A wide range of indicators shows that the northern environment and society is changing at an unprecedented rate: sea ice cover is thinning and retreating, wildlife habitat is shifting and shrinking, permafrost that supports communities and infrastructure is at risk of melting; wildlife species are changing in distribution and abundance; indigenous languages are at risk; and the health and well-being of northern people is poorer than in southern Canada. Social change is moving at a fast pace in northern communities, and research into social issues such as health, education, language, and culture is critical to their future well-being. *Our understanding of many of the stressors responsible for these changes requires ongoing and enhanced contributions from scientific and scholarly research, including research on impacts and adaptation.*
- Fulfill International Commitments and Obligations:
 Canada has made commitments to a number of international obligations, such as the Arctic Council initiatives under the Sustainable Development Working Groups, Arctic Monitoring and Assessment Programme, the United Nations Framework Convention on Climate Change, the Stockholm Convention, and the Montreal Protocol, which should be better informed by northern science. Canada

is the second largest landmass in the Circumpolar North, an area of increasing geopolitical significance. Canada is also an active participant in the activities of the Arctic Council, with responsibilities for research and monitoring in the Arctic. *We need to prioritize Canada's place as an Arctic nation and think of the position that Canada should be playing as a leader in Northern science and research.*

- Direct Efficient and Effective Use of Government Programs and Resources:
A sound public policy process requires horizontal integration with science and research. Canada can build on and coordinate what is already in place inside and outside of government, and thereby provide a focus on where the federal government has a responsibility and where it can have a real impact. *A comprehensive Northern Science and Research Strategy would provide coordination, efficiency and effectiveness to the programs that are currently delivered across many departments in an ad-hoc and piecemeal fashion.*

Current Status of Northern Science and Research

In response to concerns about the decline of Canadian research in the North, NSERC and SSHRC established a joint Task Force on Northern Research in October 1998. At that time the Task Force found that northern research was in crisis because the costs and logistics of research in the North had led to a decrease in research activity by both government departments and university researchers.

Since the release of the Task Force report in 2000 recommending that the federal government and the granting agencies increase their investment in the North, there has been a significant renewal of northern research. The 2006 Federal Report on Northern S & T found that there was an increase in the total approximate annual federal northern science and research expenditures from \$65.7M in the 2000 Federal Framework and Research Plan report to \$133M in the 2004 reporting period. This indicates, in part, a strengthening of the commitment of the federal government towards research in the North, in particular through the granting councils (NSERC and SSHRC) as well as the thirteen other federal departments and agencies involved in northern science and research.

Since the Task Force on Northern Research report, NSERC established the Northern Research Chairs program, funded the Canadian Arctic Shelf Exchange Study Network, supported the increased logistical costs of northern research through its Discovery Grants Northern Supplements, and encouraged graduate students to spend extended periods with northern partners with the Northern Internships program. SSHRC has several northern-oriented programs including the Northern Research Development grants and some CURA projects which include a northern component. The Institute for Aboriginal Peoples' Health was established by CIHR to address the special health needs of Canada's Aboriginal people. Since the creation of CIHR, nearly \$24M has been invested in health research related to the North and an additional \$17M is committed over the next three fiscal years (as part of the International Polar Year). A significant Tri-Council initiative is the interdisciplinary ArcticNet Network of Centres of Excellence using the refurbished

icebreaker Amundsen, funded by the Canadian Foundation for Innovation, as a mobile research platform.

Other initiatives have been undertaken in recent years to examine the state of various aspects of northern science and research. The 'Dialogue on Northern Research', held in Whitehorse in March 2004, was organized by the three granting agencies and several other federal departments. The meeting provided an opportunity for stakeholders to identify strengths, gaps and barriers in northern research and ideas for addressing those gaps and barriers and to identify actions to improve northern research and collaboration between natural, social, and health sciences researchers, research users and research funders.

Canadian scholars contributed to several international assessments, including the 2004 *Arctic Human Development Report* (AHDR), an assessment requested by the Arctic Council to initiate the process of developing "a comprehensive knowledge base for the Arctic Council's Sustainable Development Programme" and the Arctic Climate Impact Assessment (ACIA) report entitled *Impacts of a Warming Arctic* which evaluated and synthesized knowledge on climate variability, climate change, and increased ultraviolet radiation and their consequences. In addition, the Second International Conference on Arctic Research Planning (ICARP II) in November 2005 had the goal of preparing Arctic research plans to guide international cooperation for the next 10-15 years. ICARP brought together senior and young scholars, policy experts, Arctic indigenous and other residents, science and land managers as well as funding agencies to discuss and extend the draft science plans taking special note of the problems, priorities and concerns of those who live in or near the Arctic.

The Canadian Polar Commission (CPC) has a process underway to assess the infrastructure and logistics in place to support northern research in Canada. The goal of this initiative is to produce a report that will contain recommendations to enhance our long term support of and capacity for northern research. This work will also support the Sustained Arctic Observing Networks (SAON) initiative, supported by Canada as host of the second planning workshop in Edmonton in April 2008.

The three territorial governments are all engaged in developing their own research strategies. The process in all three territories involves consultations with the northern colleges, research institutions, communities, aboriginal groups, federal departments, industry and southern institutions. These interests were also summarized in the May 2007 Northern Vision document released by the Premiers of Yukon, NWT and Nunavut.

Canada has made one of the largest contributions of all the nations involved in the International Polar Year. With a \$6 million program at NSERC and \$150 million invested through the Government of Canada's program for IPY, Canada is at the forefront of this international effort in polar research.

The October 2007 Speech from the Throne highlighted the government's continuing commitment to the North, and proposed a world-class international research station for the Canadian Arctic as part of an integrated northern strategy: "the station that will be on the cutting edge of arctic issues, including environmental science and resource development. This station will be built by Canadians, in Canada's Arctic, and it will be there to serve the world."

Northern science and research issues to address

The Government of Canada's science program for IPY described two broad research areas of national importance: climate change impacts and adaptation; and, health and well-being of Northern Peoples' and communities. These will remain relevant post-IPY. The science priorities for the environment included marine, terrestrial and freshwater ecosystems (ice and snow, carbon and land), the dynamics of the atmosphere, and interactions with people, societies and the world. A research effort focused on the terrestrial system is needed to complement the coastal efforts undertaken by the highly successful ArcticNet program.

The ICARP II process resulted in 12 Science Plans and some emerging issues that were identified for the entire Arctic region. These are closely linked to the areas of concerns highlighted here by the Expert Advisory Group. The most pressing needs for northern indigenous communities could be found in ICARP II Science Plan 2: Indigenous Peoples and Change in the Arctic: Adaptation, Adjustment and Empowerment.

Future research in the health sciences should focus on the Human Dimension of an Arctic Strategy. This domain would include several foci including: Aboriginal health and well being; gender and health; health services and policy; public health; life stage specific research from prenatal, maternal, infant child, youth, adult and healthy aging; health promotion; prevention; rehabilitation and palliative care issues. More details are required on the need for translational research knowledge into strategic policy action to reduce health disparity and vulnerability of at risk populations.

Long-term observation, modeling and analysis, and process studies will be required to address these research questions. There is a need for capital and infrastructure investment, as well as ongoing and stable resources for the operation of a number of core facilities located across the Arctic and logistical support. Although the Speech from the Throne highlights a new Arctic Research Station, it is felt that one station is not enough to represent the entire Arctic and the research needs within the northern populations. Enhanced support for the Polar Continental Shelf Project (PCSP) with an expanded geographical coverage to provide support throughout the North would address the high cost of northern logistical support.

The largest cost for ongoing research programs in the North is for the training and support of highly-qualified personnel: students, technicians, field guides and assistants and data monitors. To develop capacity for research in the north by northerners will require enhanced education and science promotion opportunities, as well as improved

research management and governance structures. Modern northern research cannot be conducted without the input of traditional knowledge and research on the land. The sustainable development of the North's natural resources must be carried out in concert with the private sector, involving collaborations between industry, northern communities and researchers, to ensure the translation of the knowledge gained to tangible benefits.

Options for Implementation

- The over-riding recommendation from this group was that a common national vision of northern science and research priorities is required and needs to be informed through a consultation process of northern governments (territorial and Aboriginal) with the federal government. Stable, long-term funding for projects and programs of research is essential to help build the knowledge base necessary to develop and provide solutions for the many problems facing the north and those who reside there. The federal science-based government department and the federal granting agencies are increasingly working together to meet these objectives, and doing so at various levels using the Science and Technology Strategy as a framework. The S&T Strategy focuses on: environmental science and technologies; natural resources and energy; health and related life sciences and technologies; and information and communication technologies.

To address these themes and the other issues raised above, the Expert Advisory Group has recommended a series of measures, from the short to long-term. These would build on the renewal of research infrastructure in the proposed High Arctic Research Station, as well as the other infrastructure needs to be identified through the Canadian Polar Commission's ongoing consultations, and other international efforts such as the Sustained Arctic Observing Networks (SAON) initiative.

Immediate term:

To continue with the progress and momentum created by the federal government's investment in IPY, the following are recommended for implementation within the next 1-3 years. These proposals are modeled on programs in place at the federal granting agencies.

- Strategic Networks focused on the North (6 @ \$2m/yr = \$12M/yr)
Networks of researchers addressing strategic questions in the areas of environment, energy, information and communication technologies, and health as highlighted by the S&T Strategy.
- Terrestrial Arctic Network of Centres of Excellence (\$6m/yr)
A terrestrial NCE modeled after ArcticNet addressing interdisciplinary research in non-coastal areas and communities. One goal would be to establish a network of North-South and East-West terrestrial stations operated in partnership with Natural Resources Canada (Polar Continental Shelf Project) on the model of the partnership with Department of Fisheries and Oceans for the Amundsen

icebreaker. The CFI-funded North-South line of stations developed by Centre d'Étude Nordique would be the basis for this network of stations.

- Northern Community-University Research Alliances/community based research (10 @ \$300K/yr = \$3M/yr)
Partnership projects that requires involvement of northern communities as highlighted in the Task Force on Northern Research report.
- Strategic training initiative in northern research (5@\$300K/yr = \$1.5M/yr)
Dedicated funding for the support of training modeled after granting agency programs such as the CIHR Training Grant.
- Enhanced ship-time (ST)/ new air-time (AT) allocation program for the North (ST \$3M/yr, AT \$5m/year = \$8M/yr)
Support the logistics requirement of conducting research in the North using ships and aircrafts, complementing the current support provided through PCSP.
- Major resource support program for northern infrastructure (\$4M/yr)
Support for the ongoing operation and maintenance of research stations and infrastructure in the North.
- New Northern Research Chairs (24 @ \$250k/year = \$6M/yr)
Including Chairs at the northern colleges, health sciences Chairs, social sciences Chairs, additional natural sciences Chairs, in partnerships between academia, industry, government and NGO. Targeting Chairs could be in northern engineering, northern wildlife, community health and well-being, linguistics and culture.
- Data management and collections (\$3M/yr)
Support for long-term archiving and access to IPY data and northern research data to ensure data collected can have long term benefits.
- Northern Promoscience (\$1M/yr)
Promoting science to youth to encourage future generations of northern researchers.
- Establish a longitudinal health cohort study on populations in the north to track the interaction of biological and environmental factors linked to optimal health and well being particularly for children and youth and health aging (\$3M/yr)
- University of the Arctic (\$2.5M/yr)
Stable multi-year funding to allow the establishment of strong degree-granting Canadian component of this pan-Arctic institution
- Enhanced funding to individual researchers (\$3M/yr)

Funding provided to ongoing research programs has been seriously eroded by sharply increased costs of conducting Northern research

Mid to long term

The initiatives proposed below would require involvement of multiple partners and significantly larger investment of resources. The timeframe for delivery on these recommendations would be five to ten years.

- **Renewing research ice breaker fleet:** Two Polar-class icebreakers are needed to: buttress Canada's sovereignty claims; enhance national and environmental security; support the sea-lift; escort traffic; constitute the central platform for an efficient Inuit Health system; and support ocean sciences, terrestrial ecology, health sciences and social sciences in the Canadian coastal Arctic. A national project with time horizon of 6-8 years would be required.
- **Universities in the North:** There are currently no university in the North which limits the ability of Northerners to obtain research funds from federal granting agencies and address research questions of importance to the North.
- **Support for or contribution to an international fund to support Arctic research:** build a larger funding base for international programs such as ICARP II and allow for more exchange opportunities

Partnerships and Delivery

Supporting research and science in the North will require strong partnerships between all stakeholders, from funders to researchers through to the end-users of research results. To deliver benefits to all Canadians, the private sector needs to be involved as a provider of services (e.g. internet provider) and in the development of new technologies. Moreover, international partnerships are required to address broad research questions. Private sector and international involvement in projects bring their own benefits and should be encouraged through active partnerships in all initiatives.

In terms of the delivery of research support, new ways of accessing funds and leveraging partnerships opportunities will be required. This could involve using cross-cutting initiatives where all sectors (government, academia, private sector, NGO) could access funds to deliver research results. Involvement of northerners in the design and/or delivery of programs and projects would be critical for success.