

Beyond Opportunity to Action:

Towards a Northwest Territories Scientific Research Agenda

A Discussion Paper

**Aurora College
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Research infrastructure as well as individual knowledge and know-how needs to be strengthened. It is not sufficient to study the north from afar.
(*A Northern Vision: A Stronger North and a Better Canada*)

“It is the hope of many interviewed that the GNWT use information on current activities and future needs *to position itself in terms of its strategic interests in science.*”
(GNWT Science Interests Project March 2007).

“The Task Force found that Canadian northern research is indeed in crisis. If action is not taken, Canada will not be able to meet its international science and research obligations, or contribute to issues of global importance. Nor will we be able to meet basic national obligations to monitor, manage, and safeguard the northern environment or respond to emerging social issues in the North.”
(Task Force on Northern Research, September 2000).

“Access to excellent and sustainable infrastructure to meet current and emerging realities is one of the fundamental challenges of northern research.”
(Canadian Polar Commission, 2007)

“Our government will build a world-class arctic research station that will be on the cutting edge of arctic issues, including environmental science and resource development.”
(Throne Speech October 2007)

“The most direct challenges facing northern communities relate to the social environment.” (Northern Science and Technology in Canada.
Federal Activity Report April 1, 2004 – March 31, 2006)

“Future climate change is likely to be rapid in comparison to past changes, and its impact is predicted to be greatest in the North. Scientific knowledge is needed to understand and predict the effects of climate change on the physical and biological environment, ecosystems, and human population of the North.”
(Task Force on Northern Research, September 2000, p. 7)

Glossary of Acronyms

AAAS	American Association for the Advancement of Science
AAIR	Aboriginal Affairs and Intergovernmental Relations, Department of
AINA	Arctic Institute of North America
ARI	Aurora Research Institute
ASTIS	Arctic Science and Technology Information System
BoG	Board of Governors (Aurora College)
CAEAL	Canadian Association for Environmental Analytical Laboratories
CCI	Canadian Circumpolar Institute
CCIP	College and Community Innovation Program
CIHR	Canadian Institutes of Health Research
CPSP	Continental Polar Shelf Project
DFO	Department of Fisheries and Oceans
EC	Environment Canada
ECE	Education, Culture and Employment, Department of
ENR	Environment and Natural Resources, Department of
GNWT	Government of the Northwest Territories
GRRB	Gwich'in Renewable Resource Board
GSA	Gwich'in Settlement Area
IASC	International Arctic Science Committee
ICARP	International Conference on Arctic Research Programs
IFA	Inuvialuit Final Agreement
INAC	Indian and Northern Affairs Canada
IPY	International Polar Year
IRC	Inuvialuit Regional Council
ISR	Inuvialuit Settlement Region
ITI	Industry, Trade and Investment, Department of
JAPEX	Japanese Government Energy Exploration Agency
JOGMEC	Japan Oil, Gas and Metals National Corporation
MA	Master of Arts degree
MACA	Municipal and Community Affairs, Department of
MLA	Member of the Legislative Assembly
MSc	Master of Science degree
MVRMA	Mackenzie Valley Resource Management Act
NRCan	Natural Resources Canada
NRCP	Northern Research Chairs Program
NGO	Non-Government Organization
NRF	Northern Research Forum

NSE	Natural Sciences and Engineering
NSERC	Natural Sciences and Engineering Research Council
NU	Nunavut
PCSP	Polar Continental Shelf Project
PhD	Doctor of Philosophy degree
PWNHC	Prince of Wales Northern Heritage Centre
PW&S	Public Works and Services, Department of
PY	Person Year
RAC	Research Advisory Council
RRHI	Rural and Remote Health Initiative
RWED	Resources, Wildlife and Economic Development, former Department of
SAB	Science Advisory Board
SAI	Stefansson Arctic Institute
SCOE	Special Committee on Education
SINT	Science Institute of the Northwest Territories
SSA	Sahtu Settlement Area
SSHRC	Social Sciences and Humanities Research Council
SSRC	Social Science Research Council
S&T	Science and Technology
SWOT	Strengths/Weaknesses/Opportunities/Threats
TC	Transport Canada
TC ³	Tri-Council Coordinating Committee
TFNR	Task Force on Northern Research
THEMIS	The History of Events and Macroscale Interactions During Substorms
UA	University of the Arctic
YT	Yukon Territory

AURORA RESEARCH INSTITUTE MANDATE

The Aurora Research Institute's mandate is to improve the quality of life for NWT residents by applying scientific, technological and indigenous knowledge to solve northern problems and advance social and economic goals.

ARI is responsible for:

- licencing and coordinating research in accordance with the NWT *Scientists Act*: This covers all disciplines including the physical, social, biological sciences and traditional knowledge;
- promoting communication between researchers and the people of the communities in which they work;
- promoting public awareness of the importance of science, technology and indigenous knowledge;
- fostering a scientific community within the NWT which recognizes and uses the traditional knowledge of northern Aboriginal people;
- making scientific and indigenous knowledge available to the people of the NWT;
- supporting or conducting research and technological developments which contribute to the social, cultural and economic prosperity of the people of the NWT.

Executive Summary: Beyond Opportunity to Action

Recent steps taken by the federal government to repair Canada's faltering role in northern scientific research have, in the words of the Task Force on Northern Research, established by the three research councils, begun to move Canada *From Crisis to Opportunity*. Aurora College, acting in its role, through the Aurora Research Institute, as science advisor to the Government of the Northwest Territories, is proposing a course of action that would take the NWT *Beyond Opportunity to Action*.

The NWT is poised on the threshold of a rare opportunity. The October 2007 Speech from the Throne reaffirmed the Government of Canada's commitment to bring forward an integrated Northern Strategy focused on strengthening sovereignty, protecting the environment, promoting economic and social development, and improving and devolving governance in the North.

A Strategic Vision for ARI. From time to time the view is expressed that the Government of the Northwest Territories could do more to conduct, utilize, and promote scientific activity. The Aurora College 2006-2015 strategic plan takes up this challenge. A goal of the strategic plan is to raise the profile of the Aurora Research Institute as **a prominent research institute**. The proposed vehicle for achieving this goal is a **Northwest Territories Research Agenda**—a coordinated effort in which GNWT departments and the Aurora Research Institute would address the science interests of the GNWT and other northern partners—Aboriginal governments, the academic community, and private industry.

To achieve this goal, the strategic plan identifies four strategic objectives for the Research Institute, each with a set of strategic actions. The four objectives are to:

- Review the mandate and governance structure of ARI;
- Identify and resource ARI's capacity for research supportive of Aurora College;
- Explore avenues whereby College staff and students can participate with ARI in research activities; and
- Maximize benefits to Aurora College from research partnerships.

Key strategic actions to accomplish these objectives include the following:

- Establish an NWT Research Agenda in cooperation with key funders, stakeholders and political decision makers;
- Establish a framework for seeking partners within the scientific research community and in concert with GNWT departments and other agencies;
- Expand research partnerships with the scientific research community and endeavour to access research funding programs in concert with GNWT departments and other agencies.

GNWT Science Interests. The recent *GNWT Science Interests Project*—a status report on science activities and research/information needs within the GNWT—coincides with the Aurora College initiative to reposition ARI within the government. The report identifies the need in the GNWT for better baseline data, better monitoring, and better assessment and management tools. Two specific priorities are singled out as being of special significance to departmental programs—climate change and alternative energy. Departmental respondents also noted that science must inform policy and legislation development and GNWT strategic planning. The report concludes with a statement that echoes others made in the past: “It is the hope of many interviewed that the GNWT use information on current activities and future needs *to position itself in terms of its strategic interests in science*” (emphasis in original).

The Aurora Research Institute has many internal strengths, notably the ability as a corporate body to receive federal grants and earn revenue through fee-for-service contracts. The potential exists for ARI and GNWT departments to exploit their strengths and opportunities and create new synergy through a Northwest Territories Research Agenda.

A Program for 2008 and Beyond. An updated rationale for the Aurora Research Institute turns out in most respects to be a contemporary expression of the Inuvik Research Centre’s founding role in 1964. The logistic and other services offered by the Centre remain relevant as the basis for future activities. Inuvik remains well situated in the transition zone between subarctic and arctic regions to support research activity in emerging areas of concern: Climate change; oil and gas exploration; gas hydrates research; offshore seabed mapping; and national security. Successive community surveys have conclusively shown, however, that NWT residents place a higher priority on social science concerns—health and well-being, social issues and education.

Facilities Planning. The Inuvik Research Centre, the only purpose-built facility operated by the Aurora Research Institute, is forty-five years old and approximately ten years away from the end of its useful life. It is not too early to begin planning for its replacement.

The federal government’s commitment to rebuild Northern research capacity reinforces the incentive for ARI to do its planning within the context of the Beaufort-Delta/Arctic Region, taking into account the needs not only of ARI but of the other departments and agencies serving the region. At the conceptual planning level, Inuvik would function as the regional hub, with Tuktoyaktuk as a centre for oceans research and the communities on the islands as centres for research on the islands. A vision for the project includes: Renewal of a flexible shared-services facility with space for northern and southern scientists, facilities to support teaching, industrial research, and government regulatory needs.

Conclusions. The following conclusions stand out:

1. The Aurora Research Institute is essentially sound. Its mandate is still relevant.
2. The *Scientists Act* is still relevant as an instrument for regulating normal science fieldwork, but it should be updated to better reflect the current regulatory environment.
3. An appropriate governance model for ARI remains an open question. Changes to the governance model should be linked to decisions about the future mandate of ARI and decisions about an NWT Research Agenda and facilities planning.
4. The Aurora College 2006-2015 strategic plan creates the basis for a Northwest Territories Research Agenda.
5. The Aurora Research Institute should take steps to expand its capacity to deliver a broad range of research services across the entire Northwest Territories through regional partnerships.
6. Scientific activity is at a crossroads in Canada. In its role as science advisor, it is timely for Aurora College to engage GNWT senior management in discussions to achieve changes that meet the science interests of the Government and the NWT as a whole.

Moving Forward: Beyond Opportunity to Action. For decision-makers in the Government of the Northwest Territories, there are three critical focal points for consideration that bear on the science interests of the GNWT and the Northwest Territories as a whole.

1. To review the mandate and role of the Aurora Research Institute and to give consideration to establishing a Northwest Territories Research Agenda. This will involve determining the respective roles of the Aurora Research Institute and GNWT departments in carrying out the NWT Research Agenda, with consideration for how to involve external partners.
2. Facilities replacement planning warrants immediate attention. The GNWT should make vigorous efforts to access federal government infrastructure programs (and related program funding).
3. Action to revise legislation. Consideration should be given to updating the mandate of the Aurora Research Institute in an amended *Scientists Act* and to changing the governance model for ARI in the *Aurora College Act*.

1.0 Purpose

The value of scientific research to the Northwest Territories has been consistently recognized over the years. Yet public debate, when it occurs in the Legislative Assembly, has at times reflected a sense of missed opportunity. From time to time the view is expressed that the Government of the Northwest Territories could do more to conduct, utilize, and promote scientific activity.

The Aurora College strategic plan *Strong Foundations—New Horizons: Continuity and Change at Aurora College 2006-2015* takes up this challenge. Goal 5 of the strategic plan is to raise the profile of the Aurora Research Institute as *a prominent research institute*. The purpose of this paper is to discuss how to achieve that goal. The paper reassesses the mandate of ARI and examines ways to reposition the Research Institute for success in a changed, and changing, environment.

2.0 Background: A Changing Research Environment

The Aurora Research Institute has inherited a mandate that gives it both authority and flexibility to serve the interests of the NWT. Its core mandate for licensing scientific research can be traced back to legislation that is fifty years old. This mandate has stood the test of time, and is still relevant as far as it goes, but the assumptions on which it was based did not anticipate the current environment in which ARI operates.

The current mandate of ARI is appropriate for regulating the normal science activities of academic scientists and graduate students—fieldwork studies in the physical, biological and social sciences. But the current research environment is much different from what it was fifty years ago. The current environment involves industrial mega-projects, an experimental energy project on a scale unprecedented in the NWT; global concern about climate change, contaminants, and sustainability; and new models of Aboriginal government unlike anything in the past. The external factors that have changed the operating environment for ARI include:

- Large-scale industrial projects requiring environmental assessments that must be licensed by ARI, including environmental assessments for the Mackenzie Gas Pipeline, which continue despite uncertainties about the project;
- Operational management of the Mallik gas hydrates project by ARI in association with the Governments of Japan and Canada and the petroleum industry;
- Land claim agreements that confer law-making authority on Aboriginal governments for activities that include licensing of scientific research;
- Renewed interest in scientific research within the GNWT, federal agencies, and the larger research community, nationally and internationally, driven by global factors such as climate change, national concerns over arctic sovereignty and security, and competing international claims to offshore seabed resources.

These factors suggest that it is timely to reassess the mandate and structure of ARI to ensure that the Institute is responsive to this new environment.

3.0 The Aurora Research Institute Mandate

The critical pieces of legislation for understanding the role of the Aurora Research Institute are the *Scientists Act* (1988) and the *Public Colleges Act* (1994). Both statutes represent changes and refinements introduced over substantial periods of time. The *Aurora College Act* (2006) introduced no changes from the *Public Colleges Act*.

3.1 Licensing Scientific Research

The need to place some controls on scientific research activity in the NWT has been recognized in legislation for more than fifty years. The *Scientists and Explorers Ordinance* (1956) required researchers and explorers to be licensed, to report on their activities, and to turn over collected specimens, route maps, or other evidence of their activities at the discretion of the licensing authority. A subsequent amendment created the *Scientists Ordinance* (1974) which:

- Eliminated the licensing of exploration;
- Required the licensing authority to issue licenses within one year unless the research “would unduly interfere with the natural and social environment;” and
- Excluded archaeological research conducted under the *Northwest Territories Act* Regulations from the licensing process.

New Regulations in 1980 made explicit how the ordinance would be administered. The Regulations created a science advisor in the public service to administer the ordinance and issue research licenses. A science administration officer position was also created, subordinate to the science advisor.

The most recent amendments to the licensing function occurred after the Legislative Assembly became fully elected. The *Scientists Act* (1988) excluded wildlife research and the collection of wildlife specimens conducted under the *Wildlife Act* from the licensing requirement, as had been done earlier for archaeological work. The penalties for licensing violations remain unchanged from 1956 until now—a maximum prison term of six months, a maximum fine of \$1,000, or both.

3.2 Advice to the Legislative Assembly

Following the transfer of the Territorial administration to Yellowknife, the Territorial Council recognized the value of having a science advisory body to advise it on scientific matters. The Science Advisory Board (SAB) was created in 1975, with southern and northern representation, to provide that service. The Board was to meet at the request of Territorial Council or at the discretion of the Board.

The role of the SAB was stated in language which has been carried over unchanged through subsequent pieces of legislation. That role was to “assess the scientific, engineering and technological resources, requirements and potential of the Territories against the need for scientific, engineering and technological advice required by the Council to help solve the social and economic problems in the Territories and achieve the social and economic goals of the people of the Territories....”

The SAB was transformed into the Science Institute of the Northwest Territories (SINT) in 1984 as an arms-length corporation. As a corporation, SINT was able to augment its base funding with grants, contributions and donations from other sources, and to enter into agreements with governments, corporations, individuals or other entities. Subsequent amendments stipulated that:

- SINT was not “a territorial agency within the meaning of the *Financial Administration Act*,”
- Profits were to be used for the purpose of the Institute, not for the personal gain of its members;
- SINT was authorized to employ staff and hire consultants;
- SINT was required to appoint an auditor and submit annual reports to the Legislative Assembly; and
- SINT was authorized to appoint non-members to sit on committees.

Further amendments to the *Science Institute of the Northwest Territories Act* (1988) confirmed the advisory role carried over from the Science Advisory Board and made that role more explicit. The amendment empowered SINT to:

- Initiate investigations;
- Recommend research and development programs aimed at solving social and economic problems and achieving social and economic goals; and
- Advise the Legislative Assembly and publish the results of assessments and investigations subject to any restrictions imposed by the Legislative Assembly.

The Legislative Assembly retained the discretion to refer matters relating to science, engineering and technology to SINT for investigation and advice.

3.3 Linking Research and Postsecondary Education

While the administration of scientific research was evolving in the NWT, another line of thought was developing. The idea that scientific research belonged within an institution of higher education informed the recommendations of the Legislative Assembly’s Special Committee on Education (SCOE). The SCOE report, issued in 1982, had far-reaching influence on the future development of the Territorial education system. The report called for the activities of the Science Advisory Board and the licensing of scientific research to become responsibilities of the proposed Arctic College. Nothing was done to implement the recommendation at the time. The *Arctic College Act* (1986) made the new college responsible only for adult and postsecondary education.

That situation changed a few years later in the runup to division. SINT was split into two bodies east and west and formally amalgamated into the public colleges through the *Public Colleges Act* (1994). The Act created Aurora College to serve the western NWT and Nunavut Arctic College to serve what became Nunavut in 1999. The SINT mandate was transferred into the colleges, essentially unchanged. In the western arctic the Aurora College Board of Governors became responsible for that mandate under the powers of the Board. The only change was in the Board’s reporting relationship—now to the Minister of

Education, Culture and Employment, rather than to the Legislative Assembly.¹ The role of Aurora College, through the Aurora Research Institute, was now to:

- Assess the scientific, engineering and technological resources, requirements and potential of the Territories in relation to the need for scientific, engineering and technological advice to help solve social and economic problems in the Territories and promote the social and economic goals of the people of the Territories;
- Initiate investigations;
- Recommend research and development programs aimed at solving social and economic problems and achieving social and economic goals; and
- Advise the Minister and publish the results of assessments and investigations subject to any restrictions imposed by the Minister.

While the functions of the new Research Institute were unchanged, its structure became more complex. The *Public Colleges Act* created a Science Advisory Council, reporting to the College Board of Governors. The College Board was authorized to delegate its powers and duties to the Science Advisory Council, functioning as a Board subcommittee but with vestiges of former autonomy. The Legislative Assembly retained its previous discretion to task the College's Science Advisory Council. "The Legislative Assembly may request advice on any matter within the scope of the powers and duties of the Science Advisory Council and may specify to whom and the manner in which the advice is to be provided." The Science Advisory Council now functions under the title Aurora College Research Advisory Council (or RAC).

Aurora College fulfills its mandate for research licensing and administration through the Aurora Research Institute, with advice from the Research Advisory Council. The College president is designated as science advisor, and the Director of the Aurora Research Institute is designated as science administration officer. Staff of the Research Institute license research projects, provide logistical support to research projects, administer projects, perform investigations, and deliver programs, including educational programs, within the College, in schools, and in communities.

4.0 A Strategic Vision for ARI

To achieve the goal of raising the profile of the Aurora Research Institute, the 2006-2015 Aurora College strategic plan identifies four strategic objectives for the Institute, each with a set of strategic actions. Cooperative action is a central concept in these strategic actions. (See APPENDIX 1 for details).

The first objective is to review the mandate and governance structure of ARI. One of the key strategic actions under this objective is to *establish an NWT Research Agenda in cooperation with key funders, stakeholders and political decision makers.*

¹ In practice the reporting relationship for SINT had been delegated from the Legislative Assembly to a succession of departments over the years—Renewable Resources, the Executive, and finally Education, Culture and Employment.

The second objective is to identify and resource ARI's capacity for research supportive of Aurora College. One of the key strategic actions is to ***establish a framework for seeking partners within the scientific research community and in concert with GNWT departments and other agencies.***

The third objective is to explore avenues whereby College staff and students can participate with ARI in research activities. One of the key strategic actions is to ***explore possible relationships between northern and southern research professionals and College programs, faculty and students.***

The fourth objective is to maximize benefits to Aurora College from research partnerships. Two of the strategic actions are to ***expand research partnerships with the scientific research community*** and to ***endeavour to access research funding programs in concert with GNWT departments and other agencies.***

The College Board of Governors approved a strategic direction for ARI that involves rededication of effort within the college, cooperative action with GNWT departments, and closer relationships with the larger research community beyond the GNWT, nationally and internationally. The central element in this effort is a Northwest Territories Research Agenda. To build a strong Research Agenda will require the establishment of new working relationships among departments, with support at the Cabinet level.

The 2006-2015 strategic plan envisages:

- A revised governance structure for ARI, to be determined;
- Authority within the GNWT at the director level; and
- A reporting relationship to Cabinet.

Responsibility for the reporting relationship to Cabinet could be assigned to a department or to the Research Institute.

A mechanism will be required for getting input into the NWT Research Agenda. The main stakeholders would be GNWT departments and the Research Institute. Together, they would work in consultation with Aboriginal governments, federal government research agencies, the academic research community, and where appropriate with industry. The Agenda would require endorsement by Cabinet. With that endorsement in place, cooperative efforts would be made to access federal funding programs and other sources of funding with which to mount an expanded research effort in the NWT. A key contribution to the success of this effort would be the combined resources, human and physical, of the Northern partners, supported by the weight of their respective mandates and constitutional authority.

Internally within the College, ARI would strive to build closer relationships with scientific professionals for curriculum development, instruction, and fieldwork involving College students. One intended outcome of this enhanced level of activity would be to build the capacity of Northerners to participate in or conduct scientific research projects.

A recent initiative within the GNWT, the *GNWT Science Interests Project*—a status report on science activities and research/information needs within the GNWT—coincides with the Aurora College initiative to reposition ARI within the government. It is now timely to consider ways to link the activities of the Research Institute more closely first with the research interests of GNWT departments, and secondly with research agencies beyond the NWT.

5.0 Science Activities in GNWT Departments

The *GNWT Science Interests Project* (March 2007) identifies the direct and indirect involvement of departments in research—as producers and users of research and as participants in research partnerships and special initiatives like the International Polar Year. The survey also identifies the short- and long-term research interests of departments; the research methodologies they use; and departmental, interdepartmental, intergovernmental, and academic linkages. Two specific priorities are singled out for discussion—climate change and alternative energy. The report concludes with a statement that echoes others made in the past: ‘It is the hope of many interviewed that the GNWT use information on current activities and future needs “*to position itself in terms of its strategic interests in science*” ’ (emphasis in original).

The project report is an inventory of science-related activity within departments. The report defines science activities to include “research, baseline studies, effects monitoring, assessment of program effectiveness, traditional knowledge studies, community-based monitoring and design engineering.” The departmental writeups cover the full spectrum of scientific activity including the physical, biological and health sciences, social sciences, and engineering, supported by a wide range of data collection and statistical analysis.

Examination of departmental mandates reveals parallel or converging activities and interests and perhaps some overlapping jurisdictions around issues such as air and water quality, permafrost and climate-related issues, and energy sources. Many areas of research interest are not containable within the mandate of a single department or even one level of government. The research environment around these issues is a network of complementary activity that crosses the boundaries of departmental mandates and branches of science. Their converging interests have encouraged cooperative action between divisions within departments and joint efforts in the form of interdepartmental committees and projects. (See TABLE 1 for selected examples and APPENDIX 2 for a more detailed summary of departmental mandates and research activities and interests).

TABLE 5.1
Selected Parallel Science Mandates and Research Interests of GNWT Departments

Research Interest	ENR	ITI	MACA	PW&S	Transportation
Dust	Impacts on food intake by animals, plants & humans		Dust control for community roads	Mitigative measures	Dust control treatments & management
Energy sources	Pipeline dev't Unconventional energy sources	Pipeline dev't Unconventional energy sources	Community energy planning	Energy efficiency Conservation design standards Unconventional energy sources	
Land	Land use planning Ecological classif. Protected areas Soil classification	Land use planning Protected areas Soil classification	Land use planning Soil classification		
Permafrost	Impacts on pipelines	Impacts on pipeline		Impacts on building stability	Embankment temperatures Effects of road construction materials
Water	Water quality Acid rain Source water Safe drinking water strategy	Water quality Agricultural water	Water quality Drinking water testing Water treatment facilities & options Safe drinking water strategy	Water sampling & testing Water treatment options Safe drinking water strategy	Water quality sampling—salt levels H&SS Safe drinking water
Wildlife	Impacts of development Country food safety Sustainable harvesting	Food safety & quality Sustainable harvesting			Country food safety Wildlife diseases with human health implications

Source: Derived from GNWT Science Interests Project (March 2007).

Of significance to this discussion paper, departmental representatives surveyed for the GNWT Science Interests Project indicated three areas where improvements would be beneficial. Their suggestions included:

1. Better baseline data

- Air & water quality
- Land & soils classification
- Mineral deposits & sedimentary basin analysis
- Maps and surveys
- Traditional knowledge
- Environmental inventories
- Health-related environmental issues
- Food sources, safety & quality
- Industry, community & infrastructure profiles
- Health status & indicators
- Seasonal change effects
- Etc.

2. Better monitoring

- Baseline & emerging contaminants
- Cumulative effects
- Drinking water
- Sanitation
- Wastewater effluent
- Energy efficiency
- Traditional knowledge
- Etc.

3. Better assessment & management tools

- Management strategies
- Contingency planning
- Spill response
- Site remediation
- Recovery strategies
- Modelling tools
- Scenario projections
- Cost/benefit analyses
- Use of new technologies
- Alternative project delivery models
- Policy & legislation research
- Etc.

Two areas of interest identified by departments with major implications for scientific research are climate change and alternative energy. Research and information needs related to **climate change** include:

- Air & water quality
- Solid waste management
- Influence on northern treatment systems
- Human health
- Food sources & nutrition
- Landscape changes
 - Predict
 - Monitor
 - Assess
 - Mitigate
- Species at risk
- Invasive species
- Extreme weather
- Natural hazards assessment
 - Flooding
 - River crossings
 - Landslides
 - Roads
 - Bridge safety
- Effects of permafrost changes on:
 - Roads
 - Foundations
 - Pipelines
 - Community infrastructure
 - Building infrastructure
 - Infrastructure stabilization
 - Seasonal change effects
- Models for managing change.

Research and information needs related to **alternative energy** include:

- Gas hydrates
- Shale gas
- Fuel cells
- Wind energy
- Solar energy
- Solar gain
- Passive hydro
- Wood pellets
- Thermoscan heat loss identification.

The respondents to the GNWT Science Interests Project identified steps they take to improve current activity, and others that could be taken. Some respondents described how they use real-time data sources rather than wait for national or Territorial databases to be made public. Several respondents suggested that one portal for licensing and permitting research would be beneficial, and might improve communication among researchers and dissemination of data and findings to a broader audience. It was thought that researchers might find it easier to understand and follow the regulatory process if a one-stop process was in place.

Respondents also demonstrated awareness that research should be an end to larger objectives than the immediate scientific ones. Developing the capacity of staff to understand and use information sources effectively for planning purposes was understood to be vitally important. Respondents suggested that if the prevailing case-by-case approach to conducting reviews and assessments were replaced by a sectoral or holistic approach, better collaboration between those with similar information and science needs, and better outcomes, would be possible.

This more holistic approach would drive policy and legislation development and strategic planning across the GNWT. **“A recurring theme related to how science must inform policy and legislation development. Information gaps need to be identified so that best science is used to drive the rules we live by and the decisions we make. Science should be “meshed” with management objectives, policy and legislation, and the overall GNWT strategic planning.”**

Respondents argued that a common northern science agenda would drive ongoing research and generate research funding, and give the Northwest Territories its own voice in northern research. “There is a need to assert what our northern priorities are or funders will simply continue with the existing academic model that was described by many as ‘*an agenda being driven by Universities*’.”

6.0 Regional Research Needs and Interests

The geography, resources and climate vary from each region of the Northwest Territories south to north and east to west. The NWT encompasses discontinuous and continuous permafrost zones, boreal forest, small areas of arable land, mountains, barrenlands and arctic tundra, with extensive lakes and river systems. Each region has distinctive species of wildlife and renewable and nonrenewable resources. Each region therefore has specific scientific research needs and interests. As well, the regions share common interests related to global environmental issues and social, health, and cultural issues.

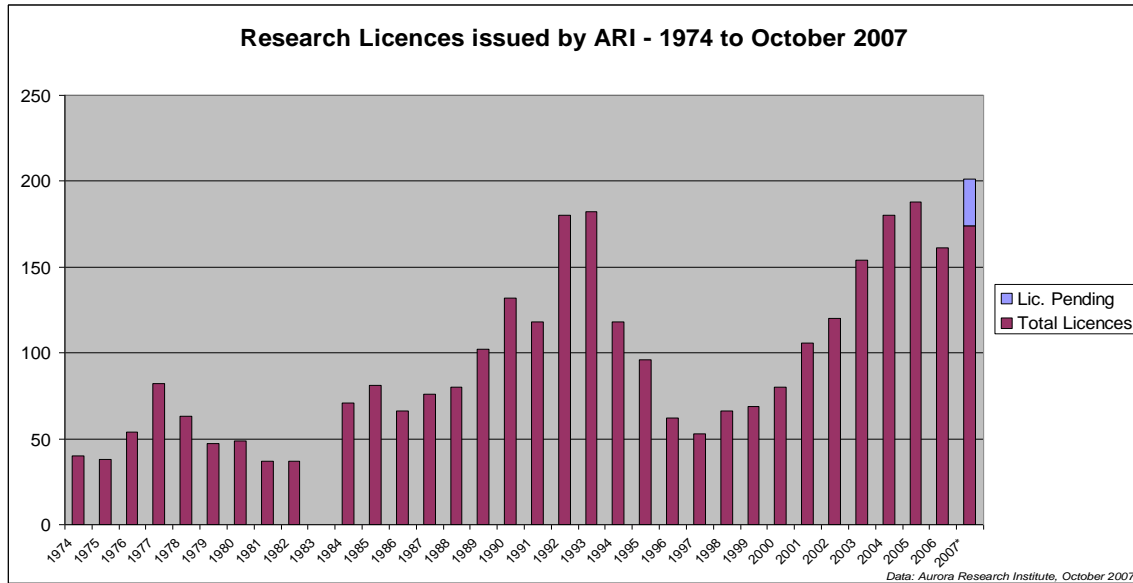
Development of an NWT Research Agenda depends on sound understanding of these regional needs and interests and of the capacity of GNWT departments and the Aurora Research Institute to respond to them. Increasingly, regional research priorities are being identified by Aboriginal governments, which have their own role to play in regulating research. It is also important that the efforts of ARI and GNWT departments be congruent

with national priorities, as federal agencies with their extensive resources represent significant partnership opportunities and sources of research funding.

6.1 Research Licencing in the NWT 1974 – October 2007

The Aurora Research Institute has data on scientific research licencing in the Northwest Territories dating back to 1974. Summary data for this thirty-four year period illustrate how the volume of research activity has risen and fallen over the course of a general rising trend, culminating in two peaks of activity in the early 1990s and again over the past several years. (See TABLE 6.1 and APPENDIX 3 for details).

TABLE 6.1
Research Licences Issued 1974 – October 2007



For data reporting purposes, the types of research projects licensed are compiled into nine categories, shown in TABLE 6.2. Over the twenty-three year period 1985-2007, the biological and physical sciences outpaced other areas of research interest by a substantial margin.² The social sciences and geology each accounted for approximately 14 percent of research activity, followed by traditional knowledge studies at 9.3 percent. Health studies received relatively little attention, a perhaps surprising outcome, given the prevalence of serious health issues among the Aboriginal population. Engineering also received relatively little attention, despite the potential benefits to be derived from renewable energy technology, better construction systems and the like in a northern climate. There has not been any licenced research into renewable energy in the NWT since 1996, except that done by ARI itself. Contaminants research as well received very little attention, in spite of frequently expressed concerns about the effects of contaminants on the northern environment, wildlife, and human health. Contaminants research has only been tracked since 1996. (See APPENDIX 3 for details).

² NOTE: A change in classification beginning in 2005 incorporated Geology and Fossils into Physical Science. A complete recalculation would make Physical Science the largest research category.

TABLE 6.2
Scientific Research Licences Issued by Category Average 1985 – October 2007*

CATEGORY	Average 1985-2007
Biology	28.3%
Contaminants	1.4%
Engineering	4.5%
Health	3.8%
Social Sciences	14.5%
Physical Science	24.1%
Traditional Knowledge	9.3%
Fossils	0.6%
Geology	13.5%

Source: Aurora Research Institute October 30, 2007.

There has been a gradual rising trend in research activity across the regions since 1974. Each region has experienced substantial change from the lowest to the highest level of activity in a given year. The highest level of activity, measured by the number of research licenses issued, has occurred over the most recent period beginning in 2001 (2000 in South Slave). Five of the six regions experienced the highest level of activity ever in just the first ten months of 2007. (See TABLE 6.3 for details).

TABLE 6.3
Scientific Research Licences Issued by Region 1974 – October 2007*

Lowest and Highest Number of Research Licences Issued by Region by Year 1974 - October 2007													
	Sahtu		Year		Gwich'in		Year		Inuvialuit		Year		
Low	7		1978		8		1985		17		1975		
High	36		2007		52		2007		80		1992		
	North Slave				Deh Cho				South Slave				
Low	1				5				3				1979
High	55				35				30				2007
Research Licences Issued by Region, Total Number and Percent of Total													
	Sahtu		Gwich'in		Inuvialuit		North Slave		Deh Cho		South Slave		Total
1974-2007	466	11.7	709	17.8	1305	32.8	631	15.9	482	12.1	380	9.6	3973
2001-2007	192	13.5	253	17.8	408	28.6	273	19.2	177	12.4	122	8.6	1425
Jan-Oct 2007	36	13.4	52	19.4	68	25.4	55	20.5	27	10.1	30	11.2	268

Source: Derived from Aurora Research Institute database. Data for 2007 updated on October 30, 2007.

***Note:** Projects commonly happen in more than one region, thus the sum of the regions will usually be higher than the actual total number of licences issued.
 Percentages may not add to 100% due to rounding.

Historically, research activity has been highest in the Inuvialuit Settlement Region (ISR). The lowest number of licences issued in the ISR is close to double the lowest number issued in the Gwich'in Settlement Area (GSA), in second place, and several times higher than in most of the other regions. The ISR has also seen the highest level of research activity in a given year—80 licences issued in 1992, well ahead of the 55 licences issued in the North Slave region in 2007. In total, the number of research licences issued in the ISR over the period 1974-2007 has been almost double the number issued in the GSA, with other regions well behind. The total number of licences issued in the ISR has exceeded every region every year since 1974. (See APPENDIX 3 for details).

A similar pattern holds for the recent period 2001-2007. The number of research licences issued in the ISR still leads the other regions, although at a somewhat reduced level. The most noticeable change has been the increased level of activity in the North Slave region, which displaced the GSA by a small margin for second place.

Activity for the first ten months of 2007 shows a continued decline in licences issued in the ISR as a percentage of the total. The Gwich'in and North Slave regions continued to show small gains behind the ISR. The largest percentage gain occurred in the South Slave, the region which historically has experienced the lowest research activity.

The researchers carrying out licenced research projects, as identified by the principal investigator, originate in northern Canada, southern Canada, and other countries. Over the twelve-year period 1996-October 2007, the number of research licences tripled. Researchers from southern Canada have dominated research activity every year, from years of relatively low activity to the recent years of high activity. Southern Canadian researchers in most of those years have accounted for at least two-thirds and in some years nearly three-quarters of the principal investigators. Most years, northern Canadian researchers have been outnumbered by southern Canadian researchers by a ratio of about three to one.³ Researchers from other countries have followed the same pattern of increase, doubling in numbers over the period, but their numbers are very low and their percentage of the total has declined substantially—from an average of about ten percent of the total from 1996-2000 down to about six percent from 2001-2007. (See TABLE 6.4 for details).

³ Wildlife research carried out by the Department of the Environment and Natural Resources and archaeological research carried out by the Prince of Wales Northern Heritage Centre is not included in the count of northern researchers—unless it includes other types of research activity such as interviews.

TABLE 6.4
Scientific Research Licences Issued by Origin of Researcher 1996 – October 2007*

Year	Northern	% Northern	Southern Canadian	% Southern Canadian	Foreign National	% Total	Total
1996	11	17.7	46	74.2	5	8.1	62
1997	11	20.8	36	68.0	6	11.3	53
1998	18	27.3	42	63.6	6	9.1	66
1999	16	23.2	46	66.6	7	10.1	69
2000	19	23.8	52	65.0	9	11.3	80
2001	26	24.5	73	68.9	7	6.6	106
2002	28	23.3	88	73.3	4	3.3	120
2003	43	27.9	103	66.9	8	5.2	154
2004	38	21.1	131	72.8	11	6.1	180
2005	44	23.4	132	70.2	12	6.4	188
2006	38	23.6	109	67.8	14	8.7	161
2007*	43	24.7	120	69.0	11	6.3	174

Source: Derived from the Aurora Research Institute database.

***Note:** Data for 2007 updated on October 30, 2007.

Percentages may not add to 100% due to rounding.

Researchers affiliated with governments, universities, and industry have been the major recipients of research licences in recent years. Each group has followed a distinctive trend pattern. Government research has followed a steady upward trend, reaching its highest point in 2007. University research has tended to fluctuate, sometimes quite noticeably, except for a high peak in growth between 2003 and 2005. University-affiliated research accounted for the highest number of licences issued in five of the past seven years. Industry research followed a bell curve. Industry held the highest number of licences issued in 2002 and 2003, but by 2007 the number had fallen back to the 2001 level.

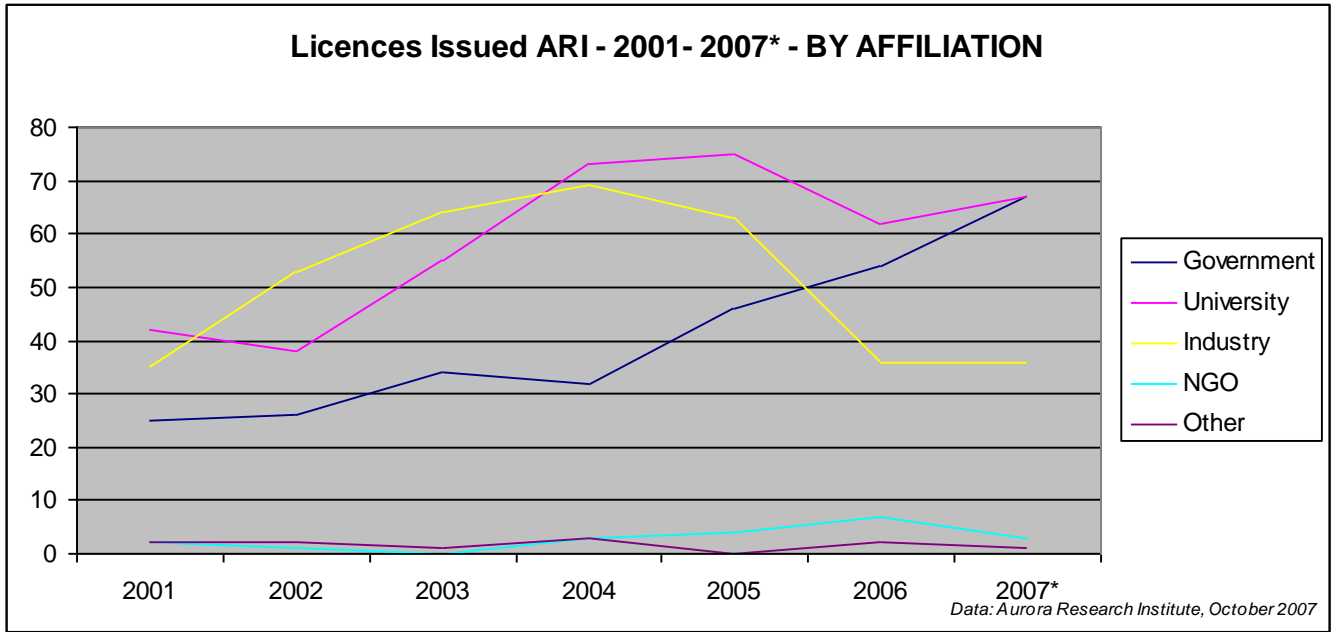
TABLE 6.5 Scientific Research Licences Issued by Affiliation 2001-October 2007

Affiliation	2001	2002	2003	2004	2005	2006	2007*	Total
Government	25	26	34	32	46	54	67	284
University	42	38	55	73	75	62	67	412
Industry	35	53	64	69	63	36	36	356
NGO	2	1	0	3	4	7	3	20
Other	2	2	1	3	0	2	1	11

Source: * 2007 data updated on October 30 2007

Notes:

- Government affiliated: federal, territorial, municipal, Aboriginal, co-management, foreign and consultants hired by any of these agencies.
- University affiliated: national or foreign, independent of funding source.
- Industry: industry or consultants hired by industry.
- NGO: only when obviously NGO. Some organizations are semi-independent, but are government organizations.
- Others: private individuals, private institutions or foundations, museums, non-identifiable sources.



7.0 The Role of Aboriginal Governments in Regional Research

Aboriginal governments represent a new level of authority in the Northwest Territories with a role to play in scientific research. The federal legislation that establishes them, and the Territorial legislation that recognizes them, convey authority over land, wildlife and other resources that must be respected when research projects are being licenced. The Inuvialuit, the Gwich'in Dene and Metis, the Sahtu Dene and Metis, and the Tlicho regions exercise co-management authority over land and wildlife in their settlement areas, and responsibility for social and economic matters. A powerful source of their authority is derived from the fact that where conflict or inconsistencies with GNWT statutes may occur, their respective land claim agreements prevail.

The four settled claims are not identical, but each claim conveys ownership of land and water and subsurface mineral rights. The land claims establish a formal relationship between the claimant groups and the federal and Territorial government departments responsible for scientific research. Social and economic concerns are also institutionalized in the legislation, with recognition for the role of traditional knowledge.

7.1 Research Needs and Interests of the Gwich'in Dene and Metis

The Gwich'in Renewable Resource Board (GRRB) is the co-management board established under the Gwich'in Comprehensive Land Claim Agreement. The Board manages renewable resources in the Gwich'in Settlement Area by involving beneficiaries, Gwich'in organizations, government agencies, universities, and other research management organizations. The GRRB funds organizations to conduct projects that will assist with renewable resource management in the GSA. The GRRB may also provide in-kind support (e.g. office space, office support, vehicles). In this respect, the GRRB mirrors the logistical support services provided by the Aurora Research Institute.

The GRRB relies on local and traditional knowledge, community input and participation, and research project results to make informed decisions about wildlife conservation. The board collaborates with Gwich'in communities, governments and other related interests to develop research and management plans.

Researchers interested in doing wildlife research in the Gwich'in Settlement Area are required to consult with the appropriate Renewable Resource Councils in the communities and get a Scientific Research Licence from ARI, a Wildlife Research Permit from ENR, and any federal permits required. Projects involving ecological traditional knowledge must consult with the Gwich'in Social and Cultural Institute.

The GRRB has been involved in numerous wildlife projects. Most of the research is related to management issues or monitoring of wildlife in the GSA. GRRB staff are trained to conduct research, and the GRRB collaborates with partner agencies and organizations—ENR; Yukon Government; Parks Canada; Ducks Unlimited and other organizations, or university researchers.⁴

⁴ Details of these research projects are well described on the Gwich'in Renewable Resource Board website under *GRRB Wildlife Projects*, reproduced as **APPENDIX 4**.

The GRRB:

- has completed research projects on more than a dozen species of wildlife found in the GSA, and has ongoing projects to monitor several species;
- is developing a forest management plan in cooperation with ENR;
- has a partnership with the University of Alberta to collect information on historic and current forest use, funded by the Sustainable Forest Management Network and the GRRB;
- participates in a Biodiversity Monitoring Plot with the Smithsonian Institution (Man and the Biosphere Biodiversity Program); and
- has a second project with the University of Alberta on driftwood use in the GSA.

The Gwich'in Land Use Plan took six years of planning that involved consultation with the Gwich'in communities and organizations, federal and territorial government departments, industry groups and environmental non-governmental organizations. The plan incorporates traditional and scientific knowledge about the region. The GNWT (RWED) and INAC ministers approved the plan in 1999.

The Gwich'in have a voice in international policy-making. The Gwich'in Council International is one of six Permanent Participants representing Aboriginal peoples on the Arctic Council.

7.2 Research Needs and Interests of the Sahtu Dene and Metis

The Sahtu Dene Metis Comprehensive Land Claim Agreement was approved by the Sahtu Dene and Metis in 1993 and subsequently by the Governments of Canada and the GNWT in September 1993. The Agreement confirms hunting and fishing rights of the Dene and Metis in the Sahtu Settlement Area (SSA), establishes their exclusive trapping rights in the SSA, and guarantees the Sahtu Dene and Metis participation in institutions of public government for renewable resource management, land use planning, land and water use in the SSA, and participation in environmental impact assessment and review in the Mackenzie Valley.

The structure of the Sahtu Agreement identifies an extensive list of matters with immediate or potential implications for scientific research activity, most of which are addressed in the other northern land claims as well:

- Wildlife harvesting and management and management of migratory species;
- Forestry and plants;
- National Parks;
- Protected areas;
- Lands;
- Water rights and management;
- Subsurface resources;
- Land and water regulation; and
- Heritage resources.

7.3 Research Needs and Interests of the Tlicho

The *Tlicho Land Claims and Self-Government Act* (Bill C-14) received assent on February 15, 2005, thereby becoming the most recent and the most comprehensive settlement in the Northwest Territories. The legislation brought into force the first combined comprehensive land claim and self-government agreement in the NWT and the second such agreement in Canada, after the Nisga'a treaty. The Tlicho, the GNWT and the Government of Canada are signatories. The Act also makes consequential amendments to other Acts, primarily the *Mackenzie Valley Resource Management Act*.

The Tlicho Government gained ownership over approximately 39,000 square kilometres of land, including the subsurface resources. It exercises a defined range of law-making powers on Tlicho lands and over Tlicho citizens off Tlicho lands. Tlicho laws will apply concurrently with federal or territorial laws. In the case of conflict with a federal law, the federal law will prevail, to the extent of the conflict. In most instances, a Tlicho law will prevail over a territorial law, to the extent of the conflict.

The Wekeezhii Renewable Resources Board manages wildlife and the Wekeezhii Land and Water Board regulates land use and water use in the Wekeezhii management area. The Land and Water Board is a regional panel of the Mackenzie Valley Land and Water Board. At least one member of the Mackenzie Valley Environmental Impact Review Board established under the Mackenzie Valley Resource Management Act (MVRMA) will be a nominee of the Tlicho Government. Excluding the chairperson, government will appoint half the members of the two boards and the Tlicho Government will appoint half.

The Tlicho Government is the custodian of heritage resources on Tlicho lands, empowered to name geographic features and locations on these lands in consultation with government. Where a geographic feature is partially or wholly outside Tlicho lands, the Tlicho Government will try to reach an agreement with government on the official name. All archaeological permits relating to Tlicho heritage resources require consultation with the affected Tlicho community or communities.

Mining activities that require a land use permit or a water licence in Wekeezhii will also require consultation with the Tlicho Government on a range of issues. The intent is to reach agreement on the impacts of the project on the environment and on wildlife harvesting, Tlicho employment opportunities, safety, health and hygiene.

7.4 Research Needs and Interests of the Inuvialuit

The Inuvialuit Final Agreement (IFA) is the oldest land claim agreement in the NWT, negotiated at a time when federal government policy was to achieve the extinguishment of native claims in exchange for land title. The *Western Arctic (Inuvialuit) Claims Settlement Act*, which became law in 1984, established a series of corporations to administer the Agreement. The IFA established the principle that the Inuvialuit should be integrated into all bodies, functions and decisions pertaining to wildlife management and land management in the Inuvialuit Settlement Region.

The IFA also established the principle that where there is an inconsistency or conflict between the Act or the Agreement and the provision of any other law applying to the

Territory, the Act or the Agreement prevails to the extent of the inconsistency or conflict. The IFA includes territory in the Yukon as well as the NWT. The GNWT and Yukon Government continue to have jurisdiction over game management “and may continue to pass legislation with respect to game management that is not inconsistent with this agreement and the Settlement Legislation.”

Unique among the land claim agreements in the NWT, the Inuvialuit Final Agreement explicitly identifies scientific research as an important activity. The Agreement provides for the application of special protective measures “to lands determined to be important from the standpoint of wildlife research or harvesting,” and requires the appropriate ministers to consult with the Inuvialuit Game Council on the application of such legislation. Like subsequent agreements, the IFA established a place for traditional knowledge in research activity. “The relevant knowledge and experience of both the Inuvialuit and the scientific communities should be employed in order to achieve conservation” (IFA sec. 14.5).

Canada retained the right to conduct fisheries research and management-related activities on Inuvialuit land; erect small scale temporary camps and installations in consultation with the Inuvialuit; and establish and operate new meteorological stations and climatological stations on Inuvialuit land subject to conditions, including compensation.

The Inuvialuit gained the right to set environmental standards higher than the standards required in other legislation, and some limited rights to veto oil and gas leases approved by the federal government.

The Inuvialuit Game Council appoints members to joint wildlife bodies and international delegations and advises government on “any proposed Canadian position for international purposes that affects wildlife in the Inuvialuit Settlement Region.”

One subsection of the Agreement established a Research Advisory Council. “Comprehensive and continuous research and scientific investigation are required in the Inuvialuit Settlement Region to provide information on which decisions affecting wildlife and the environment can be based. Whenever possible, studies should be undertaken by existing public and private institutions” (IFA sec. 14[80]).⁵

The Research Advisory Council is a central coordinating agency with membership open to all persons conducting research in the ISR who choose to participate. The structure of the executive committee of the Research Advisory Council is broadly inclusive: one member each from the federal departments of Fisheries and Oceans, Environment, and Indian and Northern Affairs; the GNWT; Yukon Government; private industry; the Association of Canadian Universities for Northern Studies (ACUNS); and two members representing the Inuvialuit.

The role of the Research Advisory Council is to: collect and collate existing data; identify information gaps and recommend research projects; commission studies on request from

⁵ See **APPENDIX 5** for the complete text which establishes the Research Advisory Council.

government, industry or native groups on a cost-recovery basis; and serve as a repository of information. The GNWT is responsible for the Research Advisory Council budget.

8.0 Federal Government Research Needs and Interests

The network of research activity across GNWT departments is more than matched by the federal government, which is also engaged in northern scientific research through government departments, agencies and research councils responsible for the major branches of science. The scope of federal responsibility creates a dense network of overlapping legislated powers, activity and investment. Notwithstanding the relative magnitude of the federal presence, Canada is only now beginning to emerge from a decade or more in which Canadian investment in scientific research declined precipitously, creating a state of crisis for the research community.

8.1 Federal Government Departmental Mandates

The Government of Canada website lists 173 departments, agencies, and Crown corporations. A partial list of those most directly involved in northern research, or current or potential research with northern applications, includes:

- Canadian Coast Guard
- Canadian Environmental Assessment Agency
- Canadian Institutes of Health Research
- Canadian Museum of Civilization
- Canadian Museum of Nature
- Canadian Polar Commission
- Commissioner of the Environment and Sustainable Development
- Environment Canada
 - Canadian Ice Service
 - Canadian Wildlife Service
 - Climate Change
 - Freshwater
 - Meteorological Service of Canada
 - National Pollutant Release Inventory
- Environmental Protection Review Canada
- Fisheries and Oceans Canada
 - Aquaculture
 - Canadian Hydrographic Service
 - Canadian Science Advisory Secretariat
 - Integrated Science Data Management
 - Marine Navigation Services
 - Oceans and Fish Habitat
- Foreign Affairs and International Trade
- Hazardous Materials Information Review Commission
- Health Canada
 - Pest Management Regulatory Agency
- Indian and Northern Affairs Canada
 - Northern Affairs Program

- Industry Canada
 - Broadband for Rural and Northern Development
 - Communications Research Centre Canada
 - Industrial Technologies Office
 - Information and Communications Technologies
- Infrastructure Canada
- National Defence
- National Energy Board
- National Research Council Canada (Industry Canada)
 - Biotechnology Research Institute
 - Canada Institute for Scientific and Technical Information
 - Canadian Technology Network
 - Herzberg Institute of Astrophysics
 - Industrial Materials Institute
 - Industrial Research Assistance Program
 - Institute for Biological Sciences
 - Institute for Fuel Cell Innovation
 - Institute for Marine Biosciences
 - Institute for Ocean Technology
 - Institute for Research in Construction
- Natural Resources Canada
 - Canadian Forest Service
 - Earth Sciences Sector
 - Geological Survey of Canada
 - Geomatics Canada
 - Polar Continental Shelf Project
 - Energy, Minerals and Management Information Centre
 - Energy in Canada
 - Minerals and Metals Sector
 - Office of Energy Efficiency
- Natural Sciences and Engineering Research Council of Canada
- Networks of Centres of Excellence
- Parks Canada
- Public Health Agency of Canada
 - Canadian Health Network
 - Centre for Chronic Disease Prevention and Control
 - Centre for Infectious Disease Prevention and Control
 - Public Health Agency of Canada—Alberta and NWT Region
- Social Sciences and Humanities Research Council of Canada
 - Canada Research Chairs
- Species at Risk Act Public Registry
- Statistics Canada
- Transport Canada

8.2 The Crisis in Canadian Scientific Research

The decade of the 1990s witnessed severe reductions in scientific research investment in Canada, as the federal government moved to halt deficit spending. Retrenchment hit northern research activities hard. In the Northwest Territories, Natural Resources Canada closed the Polar Continental Shelf Project (PCSP) research station at Tuktoyaktuk in 1998, and moves to full cost-recovery curtailed university research projects. The result was that Canada ceased to be a leader in areas of research where it had been prominent, and a gap appeared in the production of a new generation of northern science specialists. This period of growing crisis coincided in the NWT with new mining development, renewed oil and gas exploration, and growing awareness that climate change might soon create international challenges to Canada's sovereignty in the arctic.

The crisis persuaded the National Science and Engineering Research Council (NSERC) and the Social Science and Humanities Research Council (SSHRC) to strike a Task Force on Northern Research in 1998. The task force members were specialists in the natural sciences and engineering and social sciences from the university, government, and northern research communities. The task force submitted its report in 2000, following consultations with university researchers, federal government departments, and northern and Aboriginal communities and organizations.

The Task Force report confirmed that Canadian northern research was in crisis. It warned that if action was not taken, Canada would not be able to meet its international science and research obligations, or contribute to issues of global importance. Nor would Canada be able to meet basic national obligations to monitor, manage, and safeguard the northern environment or respond to emerging social issues in the North.

The Task Force urged NSERC and SSHRC, and the federal government in general, to rejuvenate northern research through a program with five elements:

Northern Research Chairs – 24 chairs (12 senior, 12 junior) for outstanding researchers proposed by the universities to a NSERC/SSHRC peer review process;

Northern graduate scholarships and postdoctoral fellowships – 40 MA/MSc/PhD and 40 postdoctoral, to include a research supplement to offset northern costs of research;

Research projects on the North – basic and applied research of social, industrial or environmental relevance (approximately 70 projects each year);

Community-University Research Alliances—North – to build partnerships between community groups and university researchers by defining a research and training agenda of mutual interest (approximately nine projects at full program strength); and

Equipment, infrastructure, and logistical support – to place new equipment in northern locations and to make the northern research institutes eligible recipients.

The program was costed at \$9.2 m in Year 1, \$17.5 m in Year 2 and \$23.5 m in Year 3.

The federal government has responded to the crisis with renewed funding and promises of more. The Throne Speech delivered on February 2, 2004 promised to develop a Northern Strategy to support sustainable development, the advancement of knowledge, socio-economic objectives and improved quality of life.

The most recent Speech from the Throne, delivered on October 16, 2007, revealed more details, which have significant potential for the NWT. The federal government renewed the commitment to bring forward an integrated northern strategy focused on strengthening sovereignty, protecting the environment, promoting economic and social development, and improving and devolving governance in the North.

The details included:

- Construction in the arctic of “a world-class arctic research station that will be on the cutting edge of arctic issues, including environmental science and resource development;” and, as measures to assert national sovereignty:
- Comprehensive mapping of Canada’s arctic seabed;
- Deployment of new arctic patrol ships and expanded aerial surveillance over the Far North and the Northwest Passage; and
- Expansion of the size and capabilities of the Arctic Rangers.

8.3 Federal Expenditures on Northern Science and Technology

The Task Force on Northern Research, sponsored by NSERC and SSHRC, was instrumental in encouraging the development of the framework for rejuvenating northern science and technology – the *Northern Science and Technology in Canada: Federal Framework and Research Plan: April 1, 2000-March 31, 2002*. The Federal Framework and Research Plan report for 2000 identified *approximately* \$65.7 million in northern S&T expenditures, while the 2004 report identified an *apparent* increase to \$133 million.

TABLE 8.1
Approximate Federal Northern Science and Technology Expenditures 2003 – 2004⁶

Federal Department or Agency	2003-04 Expenditures (\$ millions)
Canadian Museum of Civilization	\$1.2
Canadian Museum of Nature	0.5
Canadian Polar Commission	1.0
Environment Canada	28.6
Fisheries and Oceans Canada	11.0
Foreign Affairs Canada	0.4
Health Canada	6.4
Indian and Northern Affairs Canada	6.9
Industry Canada	10.7

⁶ The amounts shown are approximate. They are difficult to differentiate accurately from S&T investments in other parts of Canada because these expenditures are generally not classified by region. In addition, many activities are sub-components of national programs. The apparent increase in expenditures from 2000 to 2003-04 is largely the result of substantial changes in how expenditures specific to the North are recorded and presented by departments.

Department of National Defence	0.2
Natural Resources Canada	47.4
Natural Sciences and Engineering Research Council	10.6
Parks Canada Agency	5.0
Social Sciences and Humanities Research Council	2.6
Transport Canada	0.5
TOTAL	133

Source: Northern Science and Technology in Canada. Federal Activity Report
April 1, 2004 – March 31, 2006.

It is clear that TABLE 8.1, and the report from which it is taken, excludes areas of federal government activity that could have been included. To cite just two examples noted above—the Canadian Institutes of Health Research, representing the federal government’s commitment to health research; and Statistics Canada, which provides services to the Northwest Territories in conjunction with the NWT Bureau of Statistics.

Not all of the funding indicated in TABLE 8.1 is expended by the departments. The universities receive substantial amounts each year for research projects, some of which are conducted in the NWT. The academic research community, like the federal government, is an important partner in current activity and will continue to be an important partner in an NWT Research Agenda.

9.0 Academic Research Needs and Interests

University academics have traditionally dominated “normal science” research activity in the Northwest Territories, often supported by federal research dollars. Notwithstanding the curtailment of activity in recent years, university researchers—tenured professors, graduate students and post-graduate students—drawing on the resources of their respective institutions, are and will remain leaders in northern research for the foreseeable future. The Task Force on Northern Research found that university research priorities are congruent with northern interests, including the interests of Aboriginal communities and governments. The report also declared that university researchers working in the North have a role to play in informing northern communities, training northern fieldwork assistants, and providing community outreach in schools and public forums.

9.1 GNWT Academic Partnerships and Professional Linkages

The GNWT Science Interests Project report lists research partnerships of GNWT departments with universities. These initiatives offer insight into an area of activity that would be a prominent component in a Territorial Research Agenda.

The Aurora Research Institute, several departments, and the Prince of Wales Northern Heritage Centre reported their involvement in research partnerships with universities. Often these partnerships had linkages with other research organizations, professional bodies, and inter-jurisdictional committees, indicating how extensive and complex research networks are.

TABLE 9.1 summarizes these academic partnerships and professional linkages. The Department of Energy and Natural Resources has active university partnerships related to wildlife issues and extensive professional linkages concerned with forestry issues. Industry, Tourism and Investment has limited academic partnerships but extensive professional linkages. The Prince of Wales Northern Heritage Centre has relationships with several universities pertaining to archaeology and museum-related issues. The various divisions within Health and Social Services have partnerships related to their respective areas of responsibility. Public Works and Services, like ENR, has extensive working relationships with specialized professional bodies. Not surprisingly, the partnerships are often with universities in western Canada which have shared interests with the NWT; but where the interests are more widespread, so are the linkages. The Aurora Research Institute provides logistical support to about 20 universities each year.

TABLE 9.1
GNWT Academic Research Partnerships and Professional Linkages

Department	Research Partner(s)	Research Initiative	Professional Linkages
Aurora Research Institute	Bartol Research Institute	Cosmic Ray Monitoring Project	NWT Environmental Contaminants Committee
	THEMIS project (NASA)	Monitor extreme upper air disturbances	Polar Shelf Advisory Committee
	JOGMEC, JAPEX, & NRCAN	Gas hydrates project	National Research Action Committee
	Geological Service of Canada	Oceanography project	Association of Canadian Universities and Colleges
	Average 20 universities/year	Provides support services to researchers	Arctic Council Advisory Group
		NWT node for IPY projects	Simon Fraser University
			University of Alberta
			University of Saskatchewan
			University of Manitoba
			Carleton University
Energy & Natural Resources	University of Calgary	Parasite loads in caribou	Canadian Forest Service
	University of Northern BC	Factors affecting caribou foraging	Northern Forest Research Centre
	University of Alberta	Grizzly bear habitat in Mackenzie Valley	Virtual Centre of Excellence—National Forest Inventory Project
		Grizzly bear population dynamics	Forest as a Carbon Sink Project
		Boreal caribou habitat modeling	Alberta Research Council—land use impacts and management processes
		Changes in wildlife use patterns	National & international agencies & committees—e.g. climatology effects on treeline, permafrost, moisture regimes etc.
	University of BC	Community fuel treatment evaluation experiments	Canadian Interagency Firefighting Centre
	University of Alberta		Northern Research Working Group
	University of Saskatchewan		Mackenzie River Basin Board
	Forest Engineering Research Institute of Canada		Alberta Cooperative Conservation Research Unit
	University of Alberta	Western Boreal Growth and Yield Cooperative—forest stand dynamic regrowth study (10 th year)	5 IPY projects
Would like to establish closer links w/Environment Canada & INAC			

Department	Research Partner(s)	Research Initiative	Professional Linkages
Industry, Tourism & Investment	University of Saskatchewan Olds College Red Deer College Aurora Research Institute Southern universities using Daring Lake Research Camp	Veterinary science Berry harvesting Growing forage Geomatics—Responds to information requests from researchers	Western Canada Sedimentary Basin Committee National Geological Survey committees Committees of provincial geologists Geological Survey of Canada National Energy Board Canadian Geological Mapping Strategy Canadian geosciences Knowledge Network F/PT Agricultural Policy Framework Group Geoscience departments in universities across Canada & in the United States & Australia
Prince of Wales Northern Heritage Centre	University of Calgary University of Calgary Science disciplines & Tulita elders	Baseline Contaminant Levels in Pre- Industrial Food Web Study of Space in Inuvialuit Dwellings Science Camp (Alpine studies, archaeology, Traditional Knowledge etc)	Smithsonian Institute University of Alaska National Museum of American Indians National Museum of Scotland University of Dundee Archaeological & anthropological institutes in circumpolar region
Health & Social Services	Alberta Research Foundation Calgary Health Authority University of Alberta U of A Hospital University of Toronto University of Manitoba	h.pylori and relation to stomach infections & cancers in Aklavik Inter-jurisdictional study Averting Emerging Chronic Diseases in Northern Populations	Capital Health Authority (Alberta) Statistics Canada (Canadian Community Health Survey) Canadian Public Health Association Canadian Cochrane Network International Polar Year—Arctic Health Research Network University of Ottawa University of Calgary University of Toronto University of Victoria University of Northern BC

Department	Research Partner(s)	Research Initiative	Professional Linkages
Transportation	University of Alberta	Mackenzie River ice crossing studies	Transportation Association of Canada
Public Works & Services Recognizes that more formal linkages could be established with ARI	University of Alberta University of Alaska Yukon Government	Cold Climate Utilities Monograph	Canadian Council of Engineers National Research Council Institute for Research in Construction Public Infrastructure Engineering Vulnerability Committee Canadian Commission on Building & Fire Codes Canadian Institute of Quantity Surveyors Building Energy Code Collaborative Committee Commission on Building & Fire Codes Canadian Building Technology Transfer Forum

Source: GNWT Science Interests Project (March 2007).

10.0 Research Institutes as Models for the Northwest Territories

It is clear from the foregoing sections that universities are significant research partners with government departments and Aboriginal governments in the Northwest Territories. Given the scale of their human, physical and financial resources, at the national level universities are the leading sources of much research activity in the physical and health sciences, and for practical purposes almost the only source of research in the social sciences. Universities will have a place in an NWT Research Agenda, but it goes beyond the scope of this discussion paper to describe their role in detail. Sufficient to say here, there are parallel and overlapping programs and departmental structures within large universities and collaborative networks based on common interests among universities that are at least as extensive as any in government. It is important to note, as well, that many universities house departments or institutes devoted to northern or circumpolar research.

Often international research bodies are focused on high-level policy-making. The participants are likely to be senior government representatives, drawing upon the work of senior scientists. All of these organizations have features that merit consideration as models for the Aurora Research Institute.

TABLE 10.1
Academic Research Institutes and International Forums

Research Body	Institutional Base	Role
Arctic Institute of North America	University of Calgary	<p>Created by an Act of Parliament in 1945, AINA is a non-profit membership organization and multi-disciplinary research institute. The institute's mandate is to advance the study of the North American and circumpolar Arctic through the natural and social sciences, the arts and humanities and to acquire, preserve and disseminate information on physical, environmental and social conditions in the North.</p> <p>Fellows Program—Elected in recognition of significant contributions to the knowledge of polar and/or sub-polar regions—currently 149 Canadian Fellows, 124 American Fellows and 26 Fellows from other countries.</p> <p>Arctic Science and Technology Information System (ASTIS) database.</p>
Canadian Circumpolar Institute	University of Alberta	<p>Promotes, facilitates and conducts research throughout the circumpolar world. Community-based programs, strategic partnering, cooperative efforts, adaptive management, and sustainable development are central themes for research into the environment, resources, politics, health, land use, economics, social policy, and people of the North.</p> <p>Grant and contract-funded research Supports investigator-driven research or applied programs of associates, faculty, graduate and senior undergraduates Seed funding for inter-disciplinary and multi-year initiatives Grants, awards and scholarships Extension and outreach Library Archives CCI Press—monographs, occasional papers, research reports etc.</p>
Scott Polar Research Institute	Cambridge University	<p>Research into both polar regions in both the environmental sciences and social sciences.</p>

		<p>Research groups Masters and Doctoral programs Library, archives, and on-line resources Hosts Secretariats of the International Glaciological Society and the Scientific Committee on Antarctic Research Museum</p>
Thule Institute	University of Oulu, Finland	<p>The Institute was founded by the University of Oulu in 1995 to promote research and teaching cooperation related to Northern and environmental issues conducted by the University's faculties and departments. Research programs are implemented jointly with different units of Oulu University, other universities, research institutes and the business sector.</p> <p>Plans and promotes basic and post-graduate studies Coordinates multi-disciplinary environmental Master's program Participates in national and international research strategy work Arranges seminars and courses Provides information on northern and environmental issues.</p> <p>Research program—Global change in the North, Northern land use and land cover, Circumpolar Health and well-being etc. ENVIRU project—Virtual teaching of environmental issues NorTech Oulu project—Researchers and business sector. Development and continuing education projects Lecture series Conferences Research station Environmental research network Integrated Ocean Drilling Program—processes & impacts of global change Archive—annual reports, research publications etc. EnviroMap</p>
University of the Arctic	Decentralized international governance. Administrative & support services distributed at member institutions	<p>A cooperative network of universities, colleges, and other organizations committed to higher education and research in the North. Recognizes the integral role of indigenous peoples in northern education, and seeks to engage their perspectives in all of its activities.</p> <p>Bachelor of Circumpolar Studies Graduate Studies Open Learning Student exchange Internships Field school Go North student mobility program 3 PhD networks</p>
American Association for the Advancement of Science (AAAS)	Washington, DC	<p>International non-profit organization dedicated to advancing science around the world by serving as an educator, leader, spokesperson and professional association.</p> <p>Goals: Enhance communication among scientists, engineers, and the public Promote and defend the integrity of science and its use Strengthen support for the science and technology enterprise Provide a voice for science on societal issues Promote the responsible use of science in public policy Strengthen and diversify the science and technology workforce Foster education in science and technology for everyone Increase public engagement with science and technology Advance international cooperation in science.</p>

American Association of Arctic Sciences	University of Alaska, Fairbanks	<p>The Arctic Division of AAAS is open and accessible to all scientific scholars who are working on Arctic, Alaskan, Canadian, northern or Antarctic issues. Promotes science activities and communication among researchers, graduate students, wildlife managers, business leaders, rural residents, Alaska natives, high school teachers, students and others.</p> <p>Annual conferences—Topics have included climate, environmental change, natural resources, telecommunications, northern people and cultures. High school teachers and educators are involved.</p> <p>Promotes interdisciplinary activities Publications Workshops and symposia</p>
Arctic Council	<p>Tromso, Norway (Chair and Secretariat 2006-2008)</p> <p>Denmark and Sweden will share the chair and rotating secretariat after 2008</p>	<p>The Arctic Council is a high-level forum for cooperation, coordination and interaction between Arctic states, indigenous communities and other Arctic residents. The Member States are Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden and the United States of America.</p> <p>The Council is a unique forum for co-operation between national governments and indigenous peoples. Six international organizations representing many Arctic indigenous communities have the status of Permanent Participants of the Arctic Council and are involved in the work of the Council in full consultation with governments. The indigenous populations in the Arctic are represented by:</p> <p>Aleut International Association Arctic Athabaskan Council Gwich'in Council International Inuit Circumpolar Conference Russian Association of Indigenous Peoples of the North Saami Council.</p> <p>Environmental monitoring and assessment Working groups Reports—influenced by traditional knowledge of indigenous peoples Database—circumpolar statistics</p>
International Arctic Science Committee	Secretariat based in Stockholm, Sweden	<p>IASC was established in 1990, began operations in 1991 and today comprises 18 member countries. Members are national science organizations covering all fields of Arctic research. IASC is an associate of the International Council for Science and an observer in the Arctic Council.</p> <p>Identifies scientific priorities and working group members Assessments and science planning Long-term programs Research projects Workshops Presentations Seed money Early Career Scientist Support Funding guide Publications</p>
International Conference on Arctic Research Programs	Copenhagen, Denmark	<p>The goal of ICARP is to prepare Arctic research plans to guide international cooperation over the next 10-15 years. ICARP brings 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.</p>

		<p>Twelve draft science plans—over 140 scientists involved</p> <p>Working groups Working group reports International conferences Arctic research plans Travel reimbursement Scholarships Open forums Government and foundation sponsorship</p>
Northern Research Forum	Akureyri, Iceland (Secretariat shared between Stefansson Arctic Institute and University of Akureyri)	<p>Provides a platform for policy-relevant discussion and sharing of research on northern issues. A wide variety of scientists, policy makers and other stakeholders participate in the biennial meetings. The first NRF was held in Akureyri in 2000.</p> <p>The purpose of the NRF is to promote intensive dialogue to address the critical issues, problems and opportunities facing the circumpolar peoples in the context of social and environmental changes and economic globalization. The Forum provides an open meeting for policy-relevant discussion on the role of research in addressing issues of sustainable development, community viability, peace and security, social and environmental policy, and the impacts of global change. Developing the capacity to address these issues is central to the mandate of the University of the Arctic which has incorporated the Forum as one of its key programmatic activities.</p> <p>Open forums—biennial, rotated among northern countries to address sub-regional and local concerns as well as region-wide issues Government and foundation partnerships Publications—NRF proceedings Workshops Travelling symposia Reports Calendar of events</p> <p>Northern Dimension Foreign Policy North-South Relations Northern Economies</p>
Stefansson Arctic Institute	Akureyri, Finland	<p>The Stefansson Arctic Institute (SAI), established in 1998, operates under the auspices of the Icelandic Ministry for the Environment. The staff includes scientists with broad interdisciplinary research background and experience. SAI welcomes visiting scholars.</p> <p>Role of SAI: Forum for co-operation with regards to multi-disciplinary research Promote sustainable development in northern areas Icelandic participation in international endeavours Facilitate and co-ordinate Arctic research in Iceland Gather and disseminate information regarding northern issues Advise the Government and co-operate with others internationally Provide facilities for scholars.</p> <p>Member of Interim Council of University of the Arctic. Chairs team developing UA's Bachelor of Circumpolar Studies program Library—Emphasis on communities and sustainable development Visiting scholars Conferences, workshops, seminars and lectures Annual Stefansson Memorial Lecture (since 1998) Reports and publications</p>

Source: Websites of each organization. See the Reference section for home page addresses.

TABLE 10.1 gives an indication of the scope of scientific activity being conducted within and among universities and in international forums, both academic and inter-governmental. Observations of interest to the Northwest Territories, and to the Aurora Research Institute, can be made from scrutinizing the table.

1. It is clear that while some of the more famous research institutes, like the Arctic Institute of North America and the Scott Polar Institute, have relatively long histories, there are also a number of recent bodies, like the Arctic Council, which have been created in response to contemporary concerns for the environment and the well-being of circumpolar societies.
2. The Northwest Territories has been an active participant in some of this international activity. Yellowknife hosted the third Northern Research Forum in September 2004. Membership in the Arctic Council, arguably the most influential of the international bodies concerned with the circumpolar world, includes the Gwich'in Council International as a Permanent Participant.
3. Of specific interest to the Aurora Research Institute, TABLE 10.1 illustrates the features typically found in a research institute. It is clear that, structurally and functionally, ARI incorporates many of these common features, albeit on a much smaller scale.

11.0 Industry's Northern Research Needs and Interests

While little attention will be given to it here, private industry has research needs and interests, which are often related to environmental assessment and mitigation of the impacts of industrial projects. Oil and gas exploration in the Mackenzie Valley has been a major driver of research licencing by the Aurora Research Institute in recent years. Diamond mining on Tlicho lands has been a major driver of the growing level of research activity in the North Slave region. Industry must now satisfy three levels of government in the Northwest Territories when it seeks to bring new projects on stream.

The rise in concern over environmental issues generally, and specifically with respect to the Northern and polar regions, make it incumbent upon industry to accept standards of environmental responsibility not demanded of it in earlier decades. In this new working environment, corporations may find it advantageous as good corporate citizens to become sponsors of northern research. One example will suffice. Besides the Government of Canada and the Government of Alberta, a large number of major oil and gas producers and the pipeline, exploration and transportation companies on which they rely, are sponsors and partners of the Arctic Institute of North America at the University of Calgary.

12.0 SWOT Analysis—Aurora Research Institute

The Aurora Research Institute has many internal strengths and some offsetting weaknesses that limit its capacity to play a more prominent role in northern scientific research—and will continue to do so if they are not removed. ARI's strengths match well with emerging opportunities, so long as real and potential threats are overcome. The GNWT plays an important role in these strengths and weaknesses, and in the opportunities and threats that exist. TABLE 12.1 represents a SWOT analysis of ARI's current situation and potential future. The potential exists for ARI and GNWT departments to exploit their strengths and opportunities and create new synergy through a Northwest Territories Research Agenda.

TABLE 12.1
SWOT Analysis—Aurora Research Institute

Mandate and Resources	
Strengths	Weaknesses
ARI has a mandate enshrined in legislation with the authority to enforce the <i>Scientists Act</i> .	The <i>Scientists Act</i> was last amended in 1988. Penalties remain unchanged since 1956.
ARI's mandate is still relevant as far as it goes—regulation of fieldwork studies.	The assumptions on which ARI's mandate is based did not anticipate the current operating environment—industrial mega-projects, climate change, Aboriginal governance models etc.
ARI has 11 PYs in Inuvik to manage research licencing, scientific services, and technical development, coordinate special projects like IPY, perform administrative and financial functions, provide technical services, and direct the Institute.	The South Slave Research Centre in Fort Smith has only 2 PYs and few other resources. Previous cutbacks eliminated the one PY ARI used to have in Yellowknife. Deh Cho, Tlicho and Sahtu are unstaffed.
ARI has two qualified technicians with northern outdoor skills able to support ongoing projects and visiting scientists who may have limited fieldcraft skills.	One technician position is project funded, and susceptible to funding cuts. Workload varies directly with major research programs such as IPY, therefore capacity shortages are possible unless outside funding is available.
The Inuvik Research Centre has five laboratories, conference room, offices, workshop, storage and warehouse facilities available to visiting scientists and for use by ARI staff.	The facility has been operating since 1964 and is about ten years away from the end of its useful life.
ARI has equipment for use by visiting scientists at reasonable rental rates—boats, outboard motors, snow machines, vehicles, computers, lab equipment etc. recently purchased and in good condition.	No base budget exists to fund required logistic support infrastructure. User fees will not fund ongoing update of this equipment if they are being expended on staff expenses.
ARI has a research library. The collection includes some rare and archival items. It is staffed and the collection can be searched on-line.	An on-line journal search feature would enhance the library's capabilities.
ARI has four housing units in Inuvik with bed space for 24 visiting scientists. The pilings under these units have been replaced by steel girders, extending their useful life.	During busy periods (summer for fieldwork, winter/spring for the Mallik gas hydrates project) the housing stock is fully occupied, limiting the number of projects ARI can support.

As a unit of an arms-length corporation, ARI is able to generate funding by providing contract services to clients and to receive grants, contributions and donations.	Chasing contracts can lead to loss of research focus. Much of staff workload becomes dedicated to raising funds via grants and contracts, reducing the capacity of the Institute to conduct independent programs.
ARI is the project manager for the gas hydrates project, an alternative energy source that is one of two major areas of interest identified by GNWT departments (climate change the other).	Very large programs require dedicated staff time. This can detract from program development outside the “mega project”.
ARI has developed a one-portal system for licensing and permitting.	Many technical and operational barriers need to be overcome. This has resulted in delays in deployment of the online system upgrades.
Structurally and functionally, ARI incorporates most of the features of national and international research institutes.	At current resource levels, ARI’s capabilities and accomplishments are not widely appreciated.
Aurora College has a strategic vision for ARI as outlined in its 2006-2015 strategic plan.	The ability to achieve the college’s vision for ARI is only partly within the college’s control. Full implementation requires the support of GNWT senior management and Cabinet.
Broadly based governance structure allows for both regional and sectoral input at the RAC	The structure of RAC as a subcommittee of the Aurora College Board of Governors currently does not include GNWT or outside science advisors.
The Northern Research Environment	
Opportunities	Threats
MLAs over the years have acknowledged the value of scientific research.	Debate about scientific research seldom occurs in the Legislative Assembly, but when it does, it often reflects a sense of missed opportunity.
The federal government is promising to revitalize Canada’s northern research capacity.	The research environment is changing and ARI has a fixed capacity with which to respond.
The federal promise includes a commitment to build new research infrastructure in the Canadian arctic and pursue other research-related objectives in the north.	Federal government plans to locate the new arctic research centre in the high arctic may have significant negative impacts on research in the NWT, unless the NWT can make a persuasive case for accessing other federal programs.
The Canadian Polar Commission is undertaking a study to determine what is needed to revitalize northern research infrastructure and capacity.	Aggressive partisanship may distort the identification of needs and allocation of resources.
The Task Force on Northern Research (TFNR) identified a program to revitalize northern research.	The TFNR has warned that unless action is taken to address the research crisis, Canada will be unable to meet its international and national obligations or train the next generation of northern scientists.

The NWT could benefit from at least three elements in the TFNR's northern research program—graduate scholarships and fellowships, northern research projects, and equipment, infrastructure and logistical support.	ARI may not be able to support an increased level of research activity given its current housing stock in Inuvik and limited resources in Fort Smith. Opportunities for maximizing partnerships across the NWT will be lost without additional resources.
Federal agencies represent significant partnership opportunities and sources of research funding.	In spite of the rules, the national research councils have generally been reluctant to fund colleges. However this is slowly changing.
The GNWT has recognized that it has science interests and is investigating how to respond to those interests.	GNWT departments for the most part do not appear to have much awareness of ARI and the possibility of partnership arrangements with ARI.
GNWT departments have networks of cooperation with one another and with academic institutions and professional associations that provide a basis for an NWT Research Agenda.	Many partnerships appear to be overlapping, however benefits arising from partnerships do not always result in direct benefits for territorial agencies.
GNWT departments have identified their short- and long-term research interests.	GNWT goals may not coincide with current research activity or capacity.
GNWT departments recognize that science must inform policy and legislation development and overall strategic planning.	Capacity of GNWT or other northern science professionals does not exist to provide required information. Government funds continue to be spent on southern based scientists with limited northern experience, providing advice of questionable utility.
GNWT departments recognize that a common northern science agenda would drive ongoing research, generate research funding and give the NWT its own voice in northern research.	There is a need to assert northern priorities or funders will continue to support the existing academic model driven by universities.
An NWT Research Agenda could focus cooperative efforts within the GNWT and with external partners.	The NWT Research Agenda would require management at the director level (or higher).
The Aboriginal governments have active research programs involving government, university, NGO and private sector partners, and play a role in national policy making and international forums.	
The Aboriginal governments recognize the role played by ARI in licencing research.	
Private industry increasingly sponsors research and research institutes.	The research agenda becomes driven by industry needs, detracting from needs expressed by other non-paying stakeholders.

PART TWO

Planning Options for the Aurora Research Institute

13.0 Governance

The governance model for the Aurora Research Institute has evolved since the days of the Science Advisory Board. The model then was one of balancing southern scientific expertise with Northern regional knowledge. That model was carried over into the Science Institute of the Northwest Territories in the 1980s. The current model, with the Research Advisory Council functioning as a subcommittee of the Board of Governors, provides for scientific expertise on the RAC, but in practice it has been difficult to attract researchers to sit on the RAC as a subcommittee of the Board, which tends to be preoccupied with instructional matters. The current operating environment, which includes the Aboriginal governments, industrial activity onshore and possibly offshore again in the near future, and concerns for national sovereignty, all suggest that it is timely to revisit the governance structure of ARI. Listed below are options for the College to discuss with the GNWT.

13.1 Options for a Governance Model for ARI

Four models of governance for the Aurora Research Institute have been identified.

Option 1. Status Quo (Regional Model).

In spite of some shortcomings, the status quo has merit and is always an option.

Option 2. Expanded Representation Model

Option 2 would increase the number of members on the Research Advisory Council and would specify that the additional members bring research expertise or related experience to the RAC that would complement the current regional representation. Option 2 would partially recreate the structure of the Science Advisory Board of the 1970s—a balance of scientific expertise (which could now be northern expertise) and northern knowledge.

Option 3. Expert Model

Option 3 would replace Board of Governors representation on the RAC with members drawn from the northern (and possibly southern) research communities. Regional representation would be sacrificed for professional knowledge and experience.

Option 4. Annual Meeting and Conference Model

Option 4 would introduce a model that is quite widely used by many organizations—a combination of business meeting and conference. The meeting is often an annual general meeting and the conference serves as professional development for the members and may be partly or entirely open to the public.

TABLE 13.1
Four Options for a Governance Model for ARI

Governance Model	Strengths	Weaknesses
Option 1. Status Quo (Regional Model)	College & ECE are familiar with it.	GNWT departments not represented.
	Requires no amendments to legislation.	Federal departments not represented.
	Requires no changes to College policies.	Scientists not represented.
	Requires no additional resources.	Regional governments not represented.
	College & regions are represented.	Industry not represented.
Option 2. Expanded Representation Model	Stakeholder representation (GNWT).	Cabinet approval required.
	Expert representation (feds, scientists).	Legislative amendment required.
	Regional government representation.	Good selection criteria required.
	Other representation—Industry, NGOs.	Selections might become politicized.
	More & better advice for ARI & BoG.	Might be hard to get suitable members.
	Higher profile with Cabinet & MLAs.	More members = higher cost of RAC
Option 3. Expert Model	Would give ARI expert guidance.	Cabinet approval required.
	Might help ARI access research funding.	Legislative amendment required.
	Might help ARI focus activities more.	Good selection criteria required.
		BoG voice would be lost.
		Might create conflict with BoG.
		Might be hard to get suitable members.
	Might be expensive to implement.	
Option 4. Annual Meeting and Conference Model	Requires no change to RAC structure.	Would require additional organization.
	Provides guidance to ARI & BoG.	Annual format might not provide enough guidance for ARI throughout the year.
	Conference portion would be public.	Presenters might have to be paid.
	Minister, MLAs etc. would be invited.	
	Expert presentations = public outreach.	
	Would raise the profile of ARI.	

14.0 Towards a Northwest Territories Research Agenda

The Aurora Research Institute and GNWT departments together represent one segment of a Northern scientific research effort that is vast and loosely networked at every level—within and among all levels of government, within and among the universities, and with other partners nationally and internationally. To be meaningful, an NWT Research Agenda has to give the Government a measure of control within this larger research environment. The NWT must also be able to accommodate the research priorities of other parties and take advantage of partnership opportunities within the larger networks. The role of the national research councils is critical in this regard, as they are the most likely source of additional funding for an expanded NWT research agenda.

14.1 Tri-Council Northern Initiatives

The three national granting agencies, now working collectively as the Tri-Council,⁷ share a common goal—to position Canada on the cutting edge of the global economy as a leader in all fields of research.⁸ Each of the granting agencies funds northern research.⁹

14.1.1 Natural Sciences and Engineering Research Council (NSERC)

NSERC has made increasing investments in northern research since 2001 in response to the concerns raised by the Task Force on Northern Research about inadequate research capacity in the North. Currently this funding amounts to about \$27 million a year. NSERC's northern programs include: Northern Research Internships, Discovery Grants, International Polar Year projects, and the Northern Research Chairs Program (NRCP). The NRCP is designed to rebuild Canadian research expertise in northern research and train future northern researchers. Nearly half of the budget (48.7%) is directed to projects on climate and climate change.¹⁰ Ecosystems and biodiversity (18.4%), hydrology and permafrost (16.4%), economic development (10.9% in response to diamond mining and oil and gas exploration), and contaminants and toxic substances (5.7%) consume the remainder.¹¹

The \$27 million investment in northern-related R&D (representing approximately 3.5 percent of NSERC's \$900 million budget), funds more than 350 professors and nearly 800 students and fellows at Canadian universities. NSERC's direct investment in International Polar Year (IPY) consists of \$6 million in the research activities of eleven groups of Canadian researchers. NSERC also administers more than \$30 million of the federal government's \$98 million investment in IPY research.¹²

The Task Force on Northern Research also called for new partnerships between universities and northern communities and the direct involvement of Northerners in research and training. In response, NSERC created the College and Community Innovation Pilot Program (CCIP). CCIP is designed to enhance innovation and the economic revitalization of small and medium-sized enterprises in their communities. This program received a positive evaluation in 2006/07 and is now base funded.¹³ CCIP represents an opportunity for Aboriginal governments and the GNWT. The

⁷ The presidents of the granting agencies meet regularly as the Tri-Council Coordinating Committee, dubbed "TC³." Their purpose is to find ways to "work in synergy in order to maximize the contributions of research in all disciplines to Canadian life." (See the *SSHRC Annual Report 2006-2007 Framing Our Direction* for details).

⁸ The oldest granting agency, the National Research Council, established in 1916, is involved primarily in specialized scientific research leading to commercialization of advanced technologies. Its activities are not considered germane to this discussion paper.

⁹ See APPENDIX 6 for details on the activities of NSERC, SSHRC, and CIHR.

¹⁰ See APPENDIX 7 for a list of research projects carried out in the Northwest Territories through the Climate Impacts and Adaptation Research Program (ICARP).

¹¹ See NSERC *Northern Research Report 2004. Investing in People, Discovery and Innovation* at http://www.nserc.gc.ca/northern_research/NorthernResearchReport_3.pdf

¹² See NSERC *About Northern Research* at http://www.nserc.gc.ca/northern_research/About_e.asp and APPENDIX 8 for a listing of the IPY projects being carried out in the Northwest Territories.

¹³ See NSERC *Fostering Applied Research in Colleges* at http://www.nserc.gc.ca/colleges/about_e.asp

Aurora Research Institute has prepared the documentation required to become eligible for CCIP funding.

14.1.2 Social Sciences and Humanities Research Council (SSHRC)

SSHRC supports research in more than 30 disciplines. Its vision is “to engage Canadians in building knowledge through research and in using that knowledge to create a just, free, prosperous and culturally vibrant world.”¹⁴

SSHRC programs broadly cover the social sciences and humanities, with funded research falling into eight research themes. Two in particular address northern concerns. Investments in *Immigration, Multiculturalism, and Indigenous Peoples* reached \$27.9 million, or 9.5 percent of SSHRC’s \$305.3 budget in 2006-2007, while investments in the *Environment and Natural Resources* totaled \$21 million, or 7.2 percent of the total.¹⁵ SSHRC also administers the Canada Research Chairs Program (CRCP) on behalf of the Tri-Council—a five-year \$900 million program. The CRCP is designed to create 2,000 research professorships for “established and up-and-coming researchers” at Canadian universities by 2008.¹⁶

Three programs explicitly address northern issues. Aboriginal Research Development Grants help teams of Aboriginal community organizations and university-based researchers develop research partnerships and research proposals. Having done so, they can then apply for an Aboriginal Research Grant to conduct the project. The Northern Research Development Program (NRDP) is designed to support research in and about the Canadian North, again with emphasis on involving local stakeholders.

One other program listed as a Strategic Joint Initiative is of northern interest as well. *Homelessness and Diversity Issues in Canada* provides strategic research grants, public outreach grants, and conference grants.¹⁷

Canadian postsecondary educational institutions with active degree-granting status in social sciences and humanities disciplines may establish their eligibility to receive SSHRC funding.

14.1.3 Canadian Institutes of Health Research (CIHR)

CIHR integrates research through a unique interdisciplinary structure made up of thirteen “virtual” institutes—networks of researchers pursuing common goals. “Unconstrained by bricks and mortar, the Institute’s virtual structure encourages partnership and collaboration across sectors, disciplines and regions.”¹⁸ Two of the

¹⁴ See *SSHRC Strategic Plan 2006-2011* at

http://www.sshrc-crsh.gc.ca/web/about/publications/strategic_plan_e.asp

¹⁵ See *SSHRC Annual Report 2006-2007*. at

http://www.sshrc-crsh.gc.ca/web/about/publications_sshrc_annual_report_2006_e.pdf

¹⁶ See *SSHRC Annual Report 2006-2007* and *About SSHRC* at

http://www.sshrc-crsh.gc.ca/web/about/about_e.asp

¹⁷ SSHRC. *Complete List of SSHRC Programs* at

http://www.sshrc-crsh.gc.ca/web/apply/program_index_e.asp

¹⁸ See *CIHR Institutes* at <http://www.cihr.ca/e/9466/html>

institutes are of particular interest in the North—the *Institute of Aboriginal Peoples' Health* and the *Institute of Nutrition, Metabolism and Diabetes*.

CIHR takes a problem-based and multidisciplinary approach to research in four areas:

- Biomedical;
- Clinical;
- Health systems and services; and
- Population and public health (the social, cultural and environmental factors that affect the health of populations).¹⁹

CIHR funding increased from \$289 million in 1999-2000 to \$700 million in 2005-2006. CIHR currently supports the work of more than 11,000 researchers and trainees in universities, teaching hospitals and research institutes in Canada. Seventy percent of CIHR research funding is investigator-driven through peer-reviewed open competition, while 30 percent is reserved for strategic initiatives targeted at major health challenges.²⁰

Nearly all of CIHR's Major Strategic Initiatives involve collaboration between two or more of CIHR's institutes and partnerships with other organizations—federal and provincial government departments and agencies, national and provincial funding organizations, territorial health departments, health charities, non-governmental organizations, and industry.²¹

Joint initiatives of interest in the North are:

- *Reducing Health Disparities and Promoting the Health of Vulnerable Populations*; and
- *Rural and Remote Health (RRH) Initiative*. Strengthening rural research capacity and networks and promoting community-based health research are key elements.

14.2 Research Priorities Identified by Government Departments

The Aurora College strategic plan 2006-2015 and the GNWT Science Interests Project lay the groundwork for the development of a Northwest Territories Research Agenda. The three territorial governments have already recognized the value of working together to strengthen northern research infrastructure and establish Northern research priorities that are responsive to the fragile and rapidly changing Northern environment.²²

¹⁹ See CIHR *Who We Are* at <http://www.cihr.ca/e/7263/html>

²⁰ See *An Overview of CIHR* on the CIHR home page at <http://www.cihr-irsc.gc.ca/e/30240.html>

²¹ See *CIHR's Major Strategic Initiatives* at <http://www.cihr.ca/e/12679.html>

²² Premier's Offices (May 2007). *A Northern Vision: A Stronger North and a Better Canada*.

What an NWT Research Agenda would look like remains a matter for discussion with GNWT senior management and, through the Minister of Education, Culture and Employment, at the political level. The GNWT Science Interests Project identifies three areas of activity by departments where improvements would be beneficial across a range of departmental mandates:

- Better baseline data;
- Better monitoring; and
- Better assessment and management tools.

Two areas of scientific research activity are singled out as being of special significance to departmental programs:

- Climate change; and
- Alternative energy.

There is a broad consensus around these issues. Clearly they should be incorporated into an NWT Research Agenda. Departmental respondents also recognized that:

- Research activity should help develop the capacity of staff to understand and use information sources effectively.
- Taking a sectoral or holistic approach to reviews and assessments could result in better collaborations and better outcomes.
- Science must inform policy and legislation development.
- A common northern science agenda would drive ongoing research and generate research funding, and give the NWT its own voice in northern research—distinct from the prevailing academic agenda driven by the universities.

14.3 Research Priorities Identified by NWT Communities

The natural sciences dominate research activity and funding in the Northwest Territories, but community respondents, when surveyed, consistently identify social concerns as their highest research priorities. The Aurora Research Institute found very little change in the opinions of community members when surveyed in 1995 and 2001. *The NWT Research Agenda Survey 2001* found that community residents (non-researchers) had different priorities from the research scientists doing research in the NWT. The survey also found differences in the priorities selected by northern-based and southern-based researchers. Further, the survey found differences between the highest priorities and the research projects being conducted.

Wildlife and the environment are matters of daily concern in the NWT, but community residents in the 2001 survey selected *Health and Well-Being*, *Social Issues* and *Education* as their top three research priorities. In the 1995 survey, Social Issues ranked first, Health and Well-Being second and Education again third. There were insignificant differences in the percentage scores each time.

The top research priorities for researchers were *Land Resources*, *Wildlife Management*, and *Health and Well-Being*. The northern-based researchers and the southern-based researchers both selected *Land Resources* as their first priority, and both had *Wildlife Management* in their top three. Both groups also ranked *Health and Well-being* in their top three. When the rankings of community respondents and both groups of researchers were combined, *Health and Well-being* ranked first, *Land Resources* second, and *Social Issues* third.

TABLE 14.1
2001 Survey Respondents' Top Three Research Priorities
Ranking and Percentage of Total Responses

Research Priority	Overall		Non-Researchers		Researchers North		Researchers South	
	Ranking	Percent	Ranking	Percent	Ranking	Percent	Ranking	Percent
Health & Well-being	1	15	1	18	3/4	10	2	14
Land Resources	2	14	4	8	1	18	1	17
Social Issues	3	12	2	17	5/6	9	4/5	8
Wildlife Management	4	10	7	7	2	15	3	10
Education	5	9	3	3	8	4	8	5
Culture & Heritage	6	8	5	5	3/4	10	4/5	8
Economy	7	7	6	6	7	8	9	4
Fisheries & Marine	8	7	8	8	5/6	9	7	7
Northern Engineering	9	4	10	10	9	2	6	8
Communication Technology	10	2	9	9	10	0	10	0
Other	--	14	--	--	--	15	--	--

Source: NWT Research Agenda Survey 2001, Table 2.

Note: 'Other' responses not included in Rankings.

14.4 Options for a Northwest Territories Research Agenda

The form a Northwest Territories Research Agenda may take will ultimately be determined politically. It remains to be seen whether the Government of the Northwest Territories will see merit in raising the profile of scientific research as a solution to northern issues and as a driver of northern policy and legislation. A number of models can be suggested as the basis for discussion. They are not mutually exclusive.

Option 1. Departmental Collaboration Model

Option 1 would build on the current intra- and inter-departmental committee approach to dealing with parallel or overlapping departmental priorities within the GNWT. A research agenda based on this model would be relatively informal, low-keyed and incremental.

Option 2. Government-Wide Strategy Model

Option 2 would require a political decision directing GNWT departments to collaborate on an NWT Research Strategy, similar in structure to the NWT Literacy Strategy or the NWT Arts Strategy. This approach could involve public input to identify goals and outcomes. An action plan with performance indicators and annual progress report would be required.

Option 3. Regional Partnership Model

Option 3 would involve collaboration between the GNWT and the Aboriginal governments to identify common priorities for action. Projects would rely on existing resources and/or potentially on external funding.

Option 4. Inter-Territorial Model

Option 4 would involve collaboration between the GNWT (and possibly the regional governments) and one or both of the Yukon and Nunavut Governments. Option 4 would require the territories to agree at the political level to work together on a common research agenda within the framework of the Northern Strategy.

Option 5. National Partnership Model

Option 5 would involve efforts to extend the partnership approach beyond the NWT to include federal government departments and funding agencies, the universities and research institutes, and, where appropriate, the private sector.

Option 6. Funding Search Model

Option 6 would focus GNWT efforts entirely on generating new sources of research funding from the Tri-Council and other funding sources such as the Canada Foundation for Innovation. Responsibility for writing proposals would have to be assigned.

Option 7. Aurora College/ARI (Status Quo) Model

As a fallback position failing interest in a more ambitious research agenda, Aurora College would act alone to pursue the 2006-2015 strategic plan for ARI, relying on current resources and future funding proposals to secure new grants or contracts.

TABLE 14.2
Seven Options for a Northwest Territories Research Agenda

Strategic Model	Strengths	Weaknesses
Option 1. Departmental Collaboration Model	Departments are working together now.	Incentive to do more may be absent.
	Responds to identified needs.	Lacks strong strategic focus.
	Requires few organizational changes.	New synergies may be overlooked.
	May not require additional funding.	Funding agencies may show no interest.
Option 2. Government-Wide Strategy Model	Authorized at highest level in GNWT.	May be perceived as imposed.
	Departments familiar w/this approach.	Workload falls heavily on a few.
	Requires inter-departmental effort.	Departmental commitments are unequal.
	Action plan requires accountability.	May interfere with existing work plans.
	May receive new funding.	May require new funding to succeed.
High profile is achievable.	New initiatives not guaranteed to work.	

Option 3. Regional Partnership Model	Builds on existing relationships (co-management boards etc).	Relationships can't be taken for granted. Collaborations require time & effort.
	Common goals promote collaboration.	Goals may differ, resulting in conflict or unsatisfactory compromises.
	Resources are shared (HR, \$ etc).	Room for misunderstanding exists. Commitments must be clearly defined.
	Outcomes benefit each partner.	Failure of one partner may compromise outcomes for all.
	Potential for future synergies.	Potential for future acrimony.
Option 4. Inter-Territorial Model	Premiers agreed to a Northern Strategy that includes scientific research.	Each territory has its own priorities. Finding common ground requires time.
	Territorial Governments recognize urgency of environmental issues.	Collective effort requires time, effort and resources to implement.
	Should strengthen the Territorial voice politically & with federal departments.	Competitive interests also exist (e.g. re research infrastructure).
	May influence Tri-Council and other funding decisions.	Project management structure acceptable to funding agencies would be required.
Option 5. National Partnership Model	Federal departments exercise authority & command extensive resources.	Seeking partnerships requires time, effort and dedicated human resources.
	Universities have large research programs.	Universities may regard the GNWT as a competitor for research funding.
	Industry has Northern research interests.	Care is required to match industry with GNWT priorities.
	GNWT departments have national (and international) relationships.	Potential for expansion of existing partnerships may be limited.
		Effort might be better spent w/in NWT.
Option 6. Funding Search Model	Easy to implement (groundwork done by GNWT Science Interests Project).	Would succeed only if funding proposals are approved.
	Able to serve departmental or inter-departmental objectives.	
	Not overly onerous of staff time.	
	Success = win/win for departments.	
	GNWT as a whole stands to benefit.	
	Non-competitive (no incentive for departments to protect turf).	
Option 7. Aurora College/ARI (Status Quo) Model	Strategic framework for action exists.	Would eliminate many opportunities.
	College & ARI can make it work.	
	Requires no organizational changes.	
	Staff understand their roles.	
	Places no additional workload on staff.	

15.0 Planning Infrastructure Requirements for the Aurora Research Institute

A sound rationale is required to substantiate investment in scientific research infrastructure. Records suggest that the rationale for the establishment of the Inuvik Research Laboratory, as it was originally called, is still relevant today. Only the specific circumstances have changed.

15.1 Rationale for the Inuvik Research Laboratory

The Inuvik Research Laboratory, operated by the Northern Coordination and Research Centre of the Department of Indian Affairs and Northern Development, was officially opened on April 1, 1964, following several months of setup. It was designed as a service facility to support research and technical programs in the Western Arctic. The Laboratory's purpose was "to stimulate Arctic research among universities, government, and industry by providing well-equipped facilities for intensive study and serving as a base from which extensive field studies can be undertaken."²³ Its five laboratories were designed for general-purpose use by investigators from all scientific disciplines. Logistical assistance, working space, technical support, and equipment were made available to researchers at that time free of charge. "The government supports its operation with the expectation of improving conditions and resource utilization in Canada's Northern lands through enriched knowledge obtained by more sophisticated research."²⁴

The Laboratory was to be used by both resident and visiting scientists working on solutions to problems of regional and local importance. Ancillary benefits were to include employment opportunities for local residents and community information and outreach. The purchase of goods and services by visiting scientists was expected to benefit the regional economy.

The rationale for the Laboratory was borne out by the utilization rate, which began strong and tended to increase from year to year, in spite of limited accommodation for visiting scientists.²⁵

Underlying the scientific rationale for the new facility were deeper national concerns. Canada had lagged behind the Soviet Union and the United States in occupying, studying, and developing its northern, and particularly its Arctic, regions. Only a smattering of scientific field stations existed in Canada before 1959. These included, in the Northwest Territories, a Canadian Wildlife Service station at Aklavik beginning in 1946, the Dominion Experimental Farm at Fort Simpson, also beginning in 1946, and the

²³ Inuvik Research Laboratory. *Report of Operations 1965/1966*. R.M. Hill, July 7, 1966. (Inuvik: Aurora Research Institute files).

²⁴ All information in this section except where otherwise cited is from a draft history by Iris Warner on file at the Aurora Research Institute in Inuvik entitled *The Inuvik Research Laboratory* (commissioned by the Department of Indian Affairs and Northern Development in 1975).

²⁵ Initial plans to build a residence for up to 16 visiting scientists were eliminated. A variety of housing arrangements had to be used instead that were not always satisfactory (Annual reports Inuvik Research Laboratory). The planned accommodation building was deferred due to the cost of the Laboratory and never built. (Department of Indian Affairs and Northern Development: *Report on the Inuvik Research Laboratory 1976*).

Northern Research Station of the National Research Council in Norman Wells, doing permafrost and soils research beginning in 1950.

A link was made between scientific development, northern development, and Arctic sovereignty. Part of the mandate of the Department of Northern Affairs and National Resources, established in 1953, was, through scientific investigation and technology, to foster knowledge of the Canadian North and its further development. “Canadian Arctic sovereignty, in particular, would be enhanced by the encouragement of university and private research agencies, whose study and development programs could also be expected to offer local employment opportunities.” Prime Minister John Diefenbaker regarded the development of Inuvik as ““completing the pattern of Confederation by the development of a self-governing north.”” Senior Ottawa scientists had a more pragmatic rationale for the proposed laboratory—to avoid duplication and under-utilization of facilities.²⁶

Construction of Inuvik began in 1955, at the same time that the Distant Early Warning sites were being constructed across the Arctic. Located in the transition zone, Inuvik was deemed suitable as a centre for research activity and as a base for field parties. Inuvik offered the advantage of proximity to freshwater lakes and rivers, the Arctic coast, mountain ranges to the west and south, and tundra, with its experimental reindeer herd, to the east. The wisdom of the planning effort has been borne out over the years by the programs carried out from Inuvik (and from the Polar Continental Shelf Project field station at Tuktoyaktuk, no longer operational).

15.2 Rationale for the Aurora Research Institute 2008 and Beyond

From today’s vantage point, after nearly fifty years of economic, social, and constitutional development, the contributions of the Inuvik Research Laboratory can be regarded as a pioneering effort. Yet an updated rationale for the Aurora Research Institute, which includes the Inuvik Research Centre, as the Laboratory is now called, turns out in most respects to be a contemporary expression of the Laboratory’s founding role, adapted to current circumstances. In addition to its scientific responsibilities, ARI has also been assigned a regulatory role as the administrator of the *Scientists Act*, a role for which its predecessor was not responsible.

The role of ARI is consistent with the current northern policy objectives of the federal government: to strengthen sovereignty, protect the environment, promote economic and social development, and improve and devolve governance to the North.

²⁶ The *Report on the Inuvik Research Laboratory* reiterates this point and goes on to discuss the need for clear lines of authority to forestall interagency politics, which soon arose at the Laboratory, and administrative confusion.

A rationale for the Aurora Research Institute for 2008 and beyond involves continuing to:

- Function as a support service facility for scientific laboratory and fieldwork serving a wide range of users and disciplines;
- Contribute to scientific knowledge and the solution of scientific problems of regional, national, and international significance by facilitating and/or conducting scientific research;
- Contribute to northern development in response to ongoing and emerging issues;
- Address emerging issues of national sovereignty by maintaining a presence for scientific activity in the North; and
- License scientific research and serve as the science advisor to the GNWT by performing investigations and reporting and publishing findings;
- Assist the GNWT to develop legislation and policy that support its strategic interests in science.

ARI documents and website emphasize the Research Institute's role in facilitating communications, public awareness, and building a unique scientific community that integrates western scientific and indigenous knowledge in a research program addressing northern issues:

The Aurora Research Institute's mandate is to improve the quality of life for NWT residents by applying scientific, technological and indigenous knowledge to solve northern problems and advance social and economic goals.

ARI is responsible for:

- *licencing and coordinating research in accordance with the NWT Scientists Act: This covers all disciplines including the physical, social, biological sciences and traditional knowledge;*
- *promoting communication between researchers and the people of the communities in which they work;*
- *promoting public awareness of the importance of science, technology and indigenous knowledge;*
- *fostering a scientific community within the NWT which recognizes and uses the traditional knowledge of northern Aboriginal people;*
- *making scientific and indigenous knowledge available to the people of the NWT;*
- *supporting or conducting research and technological developments which contribute to the social, cultural and economic prosperity of the people of the NWT.*

15.3 Emerging Research Issues

Inuvik remains well situated to support research activity in emerging areas of concern: environmental sustainability, industrial activity, and national sovereignty and security. The Inuvialuit and Gwich'in settlement areas give access to bird sanctuaries, caribou breeding grounds, the marine environment and archaeological sites. They are also active centres of research into contemporary scientific issues:

- Climate change is impacting the Arctic more quickly than in many parts of the world, with implications for coastal shorelines (as around Tuktoyaktuk), potential ship traffic through the Northwest Passage, and national claims to sovereignty over the offshore.
- Oil and gas exploration is centred in the region, there is potential for renewed offshore exploration in the Beaufort Sea, and proven reserves of natural gas appear to be sufficient to justify construction of the Mackenzie Valley Pipeline, which will require a continuation of environmental assessment and monitoring and where necessary mitigative measures.
- An international project involving the governments of Japan and Canada, with ARI involvement, is undertaking leading edge research to determine the recoverability of gas hydrate deposits in the region near Tuktoyaktuk.
- A program of offshore seabed mapping is under way as Canada participates in an international program to determine boundaries and possession of offshore resources.
- The region is well placed to support measures to protect national security.

15.4 A Program for ARI 2008 and Beyond

It follows from the foregoing discussion that the programs and services offered by the Aurora Research Institute remain relevant as the basis for future activities.

Facility/Service	Description	Remarks
Laboratories	Five general purpose laboratories equipped to serve the physical sciences.	Aging lab equipment has been largely replaced.
Workshop	Equipped for making or repairing equipment.	
Cold rooms	Refrigerated areas for working in or for storage.	Investigators are encouraged to use freezers for short term storage only, as these units are not suitable for low temperature (-86 degree) storage.
Logistic support	Boats, outboard motors, canoes, snowmobiles, trailers, camping gear, arctic clothing, and field equipment, generators, rifles and shotguns etc. available to investigators.	The ARI website includes the current fee schedule for all facilities, equipment and services.
Technical support	Two technicians with on-the-land skills.	Charged out at a day rate.
Communications	Satellite radios and GPS and call-out services available for field parties.	Included in fee schedule.
Library	Technical reference library and reading area with large collection of Western Arctic material, on-line search capacity to the NWT Public Library Services and the NWT Legislative Library, Internet connection and printer.	An upgrade to the on-line search capacity to include on-line access to journals has been identified as desirable. Database subscription rates exceed the current budget.
Conference room	Large conference room equipped with tables and comfortable seating, speaker telephone, videotape and projector equipment.	Suitable for meetings, lectures, and instruction.
Office services	Clerical and financial staff, photocopying, fax.	
Office space	Offices equipped with Internet connections, computers etc. for investigator use.	
Accommodations	Four rowhouse units provide accommodation for up to 24 individual investigators and teams. Fee schedule includes lower rates for students.	Includes fully-equipped kitchens, towels and bedding, clothes washers and dryers, cable television and telephone connections.
Heated storage	Available.	Chemical storage not available.
Warehouse storage	Three unheated warehouses on main grounds.	
Loading dock	Provides access to labs, storage area and freezers.	
Cosmic ray monitor	Neutron monitor collects data 24 hours a day.	Operated continuously since 1964.
Licensing	ARI website provides licensing information, Research Guide, list of current research projects, and search feature to the Research Compendia.	One-portal licensing system is ready for full deployment.
Research Compendia	Published for all licenced research projects. Available in hard copy or on-line.	ARI website includes on-line search feature.

Related Services		
Airline connections	Daily flights to Inuvik from Edmonton, regional service to communities including connections to Vancouver and Alaska through Dawson City, Yukon	Firstair and Canadian North mainline service.
Aircraft charters	Not supplied by ARI.	Helicopter and fixed-wing aircraft available from operators in Inuvik.
Road access	Dempster Highway to Inuvik.	Seasonal disruptions spring and fall.

The Inuvik Research Centre is typically under-utilized during the winter months and typically fully utilized or beyond capacity at other times of the year. Accommodation continues to restrict the number of investigators and projects ARI is able to support, as does access to laboratory space during the busy months.

15.5 Resource Requirements for a Northwest Territories Research Agenda

As noted above, research, especially research involving fieldwork, depends on a variety of resources for its success—skilled support personnel, equipment, transportation services and facilities, including laboratories, workshops, meeting rooms and offices, a professional library, staging for fieldwork and storage facilities. Infrastructure anchors research activity, making it possible and to a considerable extent determining where it will take place.

15.6 Infrastructure Requirements for Research in the NWT

The Inuvik Research Centre, the only purpose-built facility operated by the Aurora Research Institute, is forty-five years old and approximately ten years away from the end of its useful life. It is not too early to begin planning for its replacement. While the rationale for the Research Centre remains sound, that does not mean that a replacement facility should just replicate the existing one. The new facility should be responsive to current and anticipated research priorities and to the needs of all users—especially potential partners in a shared-use facility. It should also be designed to complement other research capacity in the region (hub and node model).

Besides the Inuvik Research Centre, other government departments and agencies have research-related facilities in Inuvik. A recent exercise by the Aurora Research Institute sought to determine what research infrastructure and capability exists in the region, and what the various players believe their needs are. Similar regional analyses are needed for each of the other regions of the NWT.

15.7 Science and Research Capacity in Inuvik

There are several agencies doing research in the Beaufort-Delta area, some with basic laboratory capacity and lab space. The recent exercise led by ARI brought representatives from the federal and territorial government departments and Aboriginal organizations together to:

1. Review the existing capacity in each organization;
2. State what capacity each organization would like to have locally; and
3. Brainstorm how to achieve that capacity.

TABLE 15.7
Agency Research Capacity and Desired Capacity—Inuvik

Organization	Role	Local Research Capacity	Desired Capacity	Research Sent South
Golder	Applied research, Monitoring and remediation (contracts)	Soil moisture vegetation ID Benthos ID	Hydrocarbon analysis, metals analysis	Soil and water analysis, Hazardous materials analysis
Inuvialuit Regional Corporation	Liaison	N.A.	N.A.	N.A.
Joint Secretariat	Liaison	N.A.	N.A.	N.A.
Fisheries Joint Management Committee	Liaison, screening, logistics, regulatory	N.A.	Flow meters, data loggers	N.A.
Gwich'in Regional Resource Board (GRRB)	Liaison, research, research collaboration	Nothing in-house, use DFO	Fish aging, fecundity, simple genetic analyses, sample prep, storage, extraction, contaminant analyses	Presently all sent south. Genetic analyses always will be sent south
Stanton Territorial Health	Monitoring and enforcement	Water analysis, sample collection: blood samples, bacterial	Hydrocarbon analysis, soil testing, bacterial analysis: food, sewage/fecal coliform	Blood work, chemical and water analyses, food analyses (Rabies will always be sent out)
Department of Environment & Natural Resources		Equipment locally: Fume hood, autoclave, oven, waterbath, centrifuge for blood samples, water distillation, freezer, microscopes. Some local determination of parasites and diseases. On-line library.	Possibly fish aging Storage capacity Liquid nitrogen storage Freeze dryer	All analyses More complex parasites and diseases Diet analyses Blood analyses Rabies analysis Genetic analyses Water analyses Contaminant analysis

Organization	Role	Local Research Capacity	Desired Capacity	Research Sent South
Department of Fisheries & Oceans		Basic lab space for visiting scientists Short term storage and freezers Water quality and turbidity Water meter On line library	Flow meters Data records	All analyses
GNWT Regional Director's Office	Policy, strategic planning	N.A.	N.A.	N.A.
Aurora Research Institute	Manager	Equipment locally: lab space, fume hood, spectrophotometer, oven, ice machine, centrifuge, scales, water distillation, freezers, microscopes, water meter, growth chamber, some portable equipment, pH probes, turbidity testing, rapid assay kits, boats, skidoos	Cold temp. Storage.	Analyses as required
ARI library	Librarian	Journals, books, maps, research files, theses	Comprehensive online journal access	Interlibrary loans of journal articles and books
Department of Indian & Northern Affairs			Sewage analysis (E. Coli)	
Environment Canada		Storage (under construction)		Analysis in CAEAL authorized labs

Source: Laboratory Capacity Meeting Minutes 12-Sept-07.

N.A. = Not applicable

A list of desired capacity was created from the above discussion:

- Low temperature storage
- Soil analyses
- Bacterial/sewage/fecal coliform analysis
- Water quality
- Food analysis
- Possibly DNA extraction and PCR analysis
- Fish aging
- Hydrocarbon analysis
- Sample preparation
- Microscopes

- On-line access to professional journals.

When the Continental Polar Shelf Project closed its staging facility in Tuktoyaktuk, Inuvik took over from Polar Shelf as the research hub for the Beaufort Delta region. The federal government's commitment to rebuild Northern research capacity reinforces the incentive for ARI to do its planning within the context of the Beaufort-Delta/Arctic Region, taking into account the needs not only of ARI but of the other departments and agencies serving the region. At the conceptual planning level, Inuvik would function as the regional hub, with Tuktoyaktuk as a centre for oceans research and the communities on the islands as centres for research on the islands.

15.8 Infrastructure Requirements for the Beaufort-Delta/Arctic Region

Purpose of Project: The project will enhance existing research support infrastructure and research capacity in the Arctic and specifically the Beaufort-Delta area.

Partnerships: Partnerships are a key element: Federal government, GNWT, Joint Secretariat, industry, university researchers, other research centres and institutes. Aurora College is a key partner, as one of the foundation elements is capacity development (Tri-Council, Canada Foundation for Innovation etc).

Vision for Project: Renewal of a flexible shared-services facility with space for northern and southern scientists, facilities to support teaching, industrial research, government (regulatory) needs. Shared operating costs reduce risk and provide a critical mass of activity sufficient to justify specialized support functions (e.g., librarian, information technology staff etc).

Requirements: Facility, equipment, staging space (large industrial lot near the Mackenzie River).

Strategic Location: What makes Inuvik and the Beaufort Delta a strategic location for research support and increased capacity:

- Road access by the Dempster Highway;
- Barge and boat access by the Mackenzie River;
- Airport with daily scheduled air service from Edmonton (Canadian North and Firstair);
- Regular scheduled flight services to communities;
- Helicopter and fixed wing charter services to remote locations;
- Network of research field stations (Green Cabin, Sheep Creek, Tuktoyaktuk, Polar Bear Cabin, Mould Bay);
- Proximity to the Beaufort Sea and to oil and gas exploration and research.

Concept: Hub and node concept for supporting research from the Inuvik Research Centre with nodes in communities.

Relationship: Between new facility and existing facility, yard and garages.

Key Research Issues: Climate change, sovereignty, sustainable resource development, alternate energy research, oil and gas exploration and development research, cold weather engineering, arctic fauna and flora.

Rationale: The need to enhance existing facilities across the Arctic and not start from nothing—long history of research support infrastructure in the north.

Facility Concept Drawing or Image: Perhaps how it would fit on the college site.

15.9 Infrastructure Requirements for the South Slave and Deh Cho Regions

The South Slave Research Centre based at the Thebacha Campus in Fort Smith currently provides the following services:

- Logistic support in the South Slave and Deh Cho regions;
- Information technology research programs;
- Geomatics research and training programs;
- Community monitoring programs;
- Thebacha Campus instructional services;
- Youth training;
- Regional education outreach/science and technology extension services.

Facilities requirements for SSRC are modest given the current type of programs and services offered. However, the absence of the kind of infrastructure present in Inuvik severely limits the types of research SSRC is able to support and constrains its potential for development.

15.10 Infrastructure Requirements for Yellowknife/North Slave Region

ARI is currently structured for maximum efficiency and not for widest delivery of programs and services. With the relatively small resources available, a two-region model headquartered in Inuvik with additional presence in Fort Smith has allowed ARI to meet its mandated requirements without a presence in Yellowknife. This lack of representation in Yellowknife has an impact on the Institute, reducing its relevance to territorial and federal decision-makers, a continuing inability to deliver programs in the North Slave Region and lack of interaction with Yellowknife Campus. The current structure has also led to a situation where with most staff in Inuvik, ARI is widely considered to be an agency concerned with only the Inuvik and Gwich'in Regions, and not as an institute with a pan-territorial mandate.

Options for the Yellowknife/North Slave (and other) Regions include:

Regional Staff Deployment—A possible course of action could be the elimination of the central staff location in Inuvik and reassignment of a manager to each NWT region. There are five main programs at ARI and five main regions in the NWT. This option would involve relocating staff and finding accommodations for them at other College locations. Although this would allow better representation, particularly in the Deh Cho, North Slave and Sahtu, it would result in very high travel costs and loss of accountability, with each regional staff member responsible for all individual aspects of ARI services with little central coordination. Licensing in particular may be very difficult to maintain as a cohesive program. This totally decentralized model also loses the “critical mass” required by most research organizations to act as something larger than the simple sum of its individual parts.

Transfer of Some Staff to Yellowknife—Licensing activity, the Director’s Office and regional logistic support would be all that would be left in Inuvik in this model. Both the Research Programs and Technology Development could move to Yellowknife. The Inuvik Research Centre Manager’s position would be eliminated and resulting savings used to fully fund a library assistant/receptionist, upgrade administrative support in Inuvik to a finance officer, and provide for administrative support in Yellowknife. This would increase access of ARI to activity in the North Slave. Both managers with pan-territorial responsibilities would be located more efficiently and provide a presence in the North Slave Region.

ARI services in the Inuvik region would be greatly decreased, and the workload of several staff members would be greatly increased, particularly the director and senior technician. The current administrative support position would need to be upgraded to reflect the increased financial accountability issues surrounding the operation of three independent ARI offices.

PART THREE

Conclusions and Next Steps

16.0 Conclusions

It is timely to review the Aurora Research Institute—its mandate, model of governance, structure and function, capacity and resources and potential future role. Given the current level of interest in science shown by the Government of the Northwest Territories, and the declared intention of the federal government to restore Canada’s role in northern science, the opportunity exists to reposition ARI within Aurora College and within the GNWT through a Northwest Territories Research Agenda. The GNWT needs to consider what its priorities are in science and how it wants to achieve them.

The following conclusions stand out:

7. The Aurora Research Institute is essentially sound. Its mandate is still relevant, as far as it goes. In structure and function ARI is typical of major research institutes and differs from them only in the scale of its resources. ARI should continue to administer the *Scientists Act* and perform its related duties.
8. The *Scientists Act* is still relevant as an instrument for regulating normal science fieldwork. But the Act was last amended in 1988; the penalties for violations remain unchanged since 1956 and should be updated. The Act should be reviewed and brought up to date in view of the current regulatory environment:
 - Industrial mega-projects requiring extensive environmental assessments;
 - Global concerns over climate change;
 - National concerns over sovereignty issues in the Far North;
 - The current and future role of Aboriginal governments as important players with jurisdiction over scientific activity; and
 - Additional provisions added for enforcement of the updated penalties.
9. An appropriate governance model for ARI remains an open question. There has always been an awkward fit between the Research Advisory Council concept, carried over from SINT, and the College Board of Governors. Changes to the governance model should be linked to:
 - Decisions about the future mandate, role, and resources of ARI;
 - Decisions about the relationship between ARI and GNWT departments in an NWT Research Agenda;
 - Consultations with the Aboriginal governments to address how ARI can best serve regional needs; and
 - An assessment of how the NWT can benefit from federal programs to enhance northern research activity, logistics, and facilities.

10. Facilities planning needs to be addressed in the short term in view of:
 - The aging Inuvik Research Centre facility;
 - The limited resources of the South Slave Research Centre;
 - Plans to re-establish a presence in Yellowknife/North Slave;
 - The needs of Aboriginal governments in the regions;
 - Federal government plans for research infrastructure renewal; and
 - Overall current GNWT facilities and anticipated future needs.

11. The Aurora College 2006-2015 strategic plan creates the basis for a Northwest Territories Research Agenda and a role for ARI in that research agenda. The strategic plan creates a framework within which to:
 - Strengthen ARI's relationship with GNWT departments and political decision-makers;
 - Establish a framework for seeking partners between GNWT departments, the scientific research community, and other agencies;
 - Strengthen the relationship of ARI with scientific researchers and their relationship to the College's instructional programs, faculty and students;
 - Expand research partnerships with the scientific research community; and
 - Work with GNWT departments and other agencies in efforts to access research funding programs.

12. The Aurora Research Institute should take steps to expand its capacity to deliver a broad range of research services across the entire Northwest Territories.
 - Additional expertise should be added through revision and subsequent expansion of the Research Associates program.
 - Full eligibility of ARI/Aurora College to secure Tri-council agency funding should be secured.
 - Regional partnerships with Aboriginal, GNWT, Federal, and other research-oriented agencies should be considered as pathways to develop regional research capacity.

13. Scientific activity is at a crossroads in Canada. In its role as science advisor to the Legislative Assembly, it is timely for Aurora College to engage GNWT senior management in discussions to achieve:
 - a. Revisions to the *Scientists Act*;
 - b. Revisions to the governance model for ARI (Research Advisory Council) in the *Aurora College Act*;
 - c. Capital planning objectives;
 - d. Service level objectives; and
 - e. Support for a Northwest Territories Research Agenda.

17.0 Moving Forward: Beyond Opportunity to Action

Recent steps taken by the federal government to repair Canada's faltering role in northern scientific research have, in the words of the Task Force on Northern Research, established by the three research councils, begun to move Canada *From Crisis to Opportunity*. Aurora College, acting in its role, through the Aurora Research Institute, as science advisor to the Government of the Northwest Territories, is proposing a course of action that would take the NWT *Beyond Opportunity to Action*.

The NWT is poised on the threshold of a rare opportunity. The October 2007 Speech from the Throne reaffirmed the Government of Canada's commitment to bring forward an integrated Northern Strategy focused on strengthening sovereignty, protecting the environment, promoting economic and social development, and improving and devolving governance in the North.

For decision-makers in the Government of the Northwest Territories, there are three critical focal points for consideration that bear on the science interests of the GNWT and the Northwest Territories as a whole.

4. To review the mandate and role of the Aurora Research Institute and to give consideration to establishing a Northwest Territories Research Agenda. This will involve determining the respective roles of the Aurora Research Institute and GNWT departments in carrying out the NWT Research Agenda, with consideration for how to involve external partners.
5. Facilities replacement planning warrants immediate attention. The GNWT should make vigorous efforts to access federal government infrastructure programs (and related program funding).
6. Action to revise legislation. Consideration should be given to updating the mandate of the Aurora Research Institute in an amended *Scientists Act* and to changing the governance model for ARI in the *Aurora College Act*.

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APPENDIX 1.

Strategic Objectives for the Aurora Research Institute 2006-2015

Objective 5.1

Review the mandate and governance structure of the Aurora Research Institute.

- Prepare a discussion paper outlining a contemporary vision for ARI for consideration by the GNWT.
- **Establish an NWT Research Agenda in cooperation with key funders, stakeholders and political decision makers.**
- Conduct a comprehensive review of the research licensing function to ensure that the licensing process is effective.
- Ensure that ARI continues to act as the central point of information on research in the NWT.

Objective 5.2

Identify and resource ARI's capacity for research supportive of Aurora College.

- Establish a framework for seeking partners within the scientific research community and in concert with GNWT departments and other agencies.
- Resume the delivery of educational programs in schools and communities.
- Encourage government agencies and educational institutions to conduct traditional knowledge research through ARI.

Objective 5.3

Explore avenues whereby College staff and students can participate with ARI in research activities.

- Explore possible relationships between northern and southern research professionals and College programs, faculty and students.
- Continue support for community-based research projects.
- Do more to promote the role of ARI.
- Do more to promote ARI scholarships and bursaries in the North.
- Do more to introduce ARI publications into College programs.
- Ensure that national funding programs are well communicated to Northern students who qualify.

Objective 5.4

Maximize benefits to Aurora College from research partnerships.

- Expand research partnerships with the scientific research community.
- **Endeavour to access research funding programs in concert with GNWT departments and other agencies.**
- Continue publication of the Compendium of Northern Research.
- Continue to participate in Northern research forums.

**APPENDIX 2.
Research-Related Mandates and Interests of GNWT Departments**

ENR	ITI	ECE	H&SS	MACA	Transport	AAIR	Executive	PW&S
Wildlife research & management	Economic planning & analysis	Early childhood & school programs K-12	Population health	Land administration	Plan, design, construct or reconstruct, acquire, operate & maintain public transportation infrastructure	Land claims & self-government negotiations	Strategic Planning Strategic advice on matters with govt-wide implications	Plan, design, construct, operate & maintain public buildings, fuel storage & distribution, water/sanitation infrastructure & waste disposal facilities
Environmental protection	Traditional economy	Adult & post-secondary education	Health promotion	Safety	Regulate & license individuals & vehicles	Inter-governmental relations	Coordinate development & implementation of GNWT strategic plan	Energy conservation
Environmental assessment & monitoring	Agriculture	Career development & employment	Health protection	Emergency services	Community governance support & advice		Coordinate socio-economic research	Water sampling & testing
Forestry management	Fisheries	Apprenticeship & occupational certification	Disease registries	Consumer affairs	Public infrastructure		Bureau of Statistics Produce statistical information	Electrical & mechanical safety
Policy, legislation & communications	Geoscience Office	Culture, heritage & language		Sport, recreation, youth & volunteerism			Conduct surveys for departments	Etc.
Administers <i>Wildlife Act</i>		Aurora College (ARI) administers <i>Scientists Act</i>						
		PWNHC administers <i>Archaeological Regulations</i>						
Major Research Interests by Department								
Air quality	Agricultural development	Program reviews & evaluations	Data collection	Infrastructure assessments	Embankment temperatures	Literature searches	Strategic Planning	Building science
Land use	Land classification	Program development	Data analysis	Design standards	Ground temperatures	Statistical data	GNWT strategic planning	Building & systems design
Land reclamation	Land use planning	Program strategies	Reportable diseases	Water sampling	Permafrost	Baseline data	Socio-economic research	Operational reviews

ENR	ITI	ECE	H&SS	MACA	Transport	AAIR	Executive	PW&S
Protected areas	Protected areas	Special initiatives	Disease registries	Community energy plans	Drainage channels	Program costs	NWT Statistics Bureau	Green building standards
Ecological classification	Soils classification	Educational indicators	Health surveillance	Energy efficiency	Road salt management	Best practices:	Produce statistical data	Evaluation of construction materials, systems & components
Water quality	Water usage for agriculture	Data collection: Education Labour market Population ETC.	Food safety, quality, & inspection	Energy conservation	Water quality (test for salt)	Health	Analyze socio-economic data	Water sampling & testing
Source water	Food safety & quality	Language preservation & revitalization	Nutrition surveys	Alternative energy sources	Effects of culverts on fish habitat	Education	Community surveys	Energy efficiency
Wildlife harvesting	Hydrocarbon development & transmission	Record & report traditional knowledge	Addiction surveys	Prepare for resource dev't	Ice crossings	Labour market analysis	Housing needs	Energy conservation
Country food safety	Alternative energy sources	Monitor socio-economic agreements	Tobacco use surveys	Mitigate resource project impacts	Spray ice technology & management	Etc.	Country food consumption surveys	Alternative energy sources:
Energy sources	Environmental impacts on agriculture	Resource project impacts	Community health survey		Road construction & mgt techniques	Education surveys	Aboriginal language use	Geothermal heating
Environmental impacts	Contaminants impacts on agriculture	Business survey	Community health profiles		Effects of climate change on stability of transportation network		Smoking habits	Residual diesel heat capture
Landscape changes	Roads (tourism)	Historic site designation	Youth obesity				Crime rates	Biomass heating
Wildlife harvesting	Ice conditions	Impacts on heritage sites					Harvesting surveys	Technical performance surveys
Timber harvesting	Invasive species	Cultural names					Labour data	Pile foundations

ENR	ITI	ECE	H&SS	MACA	Transport	AAIR	Executive	PW&S
Species at risk	Forestry harvesting	Archives & PWNHC collections					Quarterly price surveys	Snow load/roof configuration
Invasive species		Arts & culture promotion					Quarterly demographic surveys	Building physics engineering tools
Contaminants		Archaeological projects:					Vital statistics estimates & modeling	Operating & control systems
Hazardous substances & waste management		Ice patch study					Input/output modeling	Fire resistant materials
Solid waste management		Pre-industrial contaminants						Permafrost change impacts on building stability
Municipal effluent								Seasonal change effects Etc.

Source: Derived from GNWT Science Interests Project (DK Consulting, March 2007).

Note: The Department of Justice is not included in the GNWT Science Interests Project survey. Service departments are also excluded.

APPENDIX 3.
Scientific Research Licences Issued
By the Aurora Research Institute 1974 – October 2007

Total Licences Issued 1974-October 2007

YEAR	Total Licences	Lic. Pending
1974	40	0
1975	38	0
1976	54	0
1977	82	0
1978	63	0
1979	47	0
1980	49	0
1981	37	0
1982	37	0
1983		
1984	71	0
1985	81	0
1986	66	0
1987	76	0
1988	80	0
1989	102	0
1990	132	0
1991	118	0
1992	180	0
1993	182	0
1994	118	0
1995	96	0
1996	62	0
1997	53	0
1998	66	0
1999	69	0
2000	80	0
2001	106	0
2002	120	0
2003	154	0
2004	180	0
2005	188	0
2006	161	0
2007*	174	27

* 2007 data updated on Oct 30 2007

Aurora Research Institute database

** In 2008, and old licences awaiting other documents (for example Ethics Review)

NOTES FROM ORIGINAL AUTHOR:

Maybe 1984 includes 1983?

APPENDIX 3. 1985-2007 Data by Category
Scientific Research Licences Issued by the Aurora Research Institute
by Category and by Percentage of Total 1985 – October 2007

CATEGORY	1985	1986	1987	1988	1989	1990	1991	1992
Biology	24%	28%	27%	23%	26%	24%	23%	25%
Contaminants	--	--	--	--	--	--	--	--
Engineering	8%	5%	4%	4%	6%	7%	5%	7%
Health	6%	2%	5%	5%	3%	5%	4%	3%
Social Sciences	6%	9%	11%	10%	13%	12%	14%	11%
Physical Science	21%	23%	16%	19%	18%	19%	20%	20%
Traditional Knowledge	13%	13%	15%	16%	16%	11%	15%	13%
Fossils	--	--	--	--	--	--	--	--
Geology	23%	22%	23%	22%	18%	22%	19%	21%

CATEGORY	1993	1994	1995	1996	1997	1998	1999	2000
Biology	27%	25%	27%	16%	19%	30%	30%	41%
Contaminants				2%	2%	3%	1%	1%
Engineering	7%	6%	5%	0%	0%	0%	0%	0%
Health	3%	5%	5%	3%	4%	3%	3%	4%
Social Sciences	11%	12%	13%	37%	28%	15%	22%	13%
Physical Science	22%	19%	23%	24%	26%	38%	30%	25%
Traditional Knowledge	12%	15%	10%	3%	6%	6%	1%	5%
Fossils	--	--	--	3%	4%	3%	0%	0%
Geology	16%	18%	17%	11%	11%	2%	12%	11%

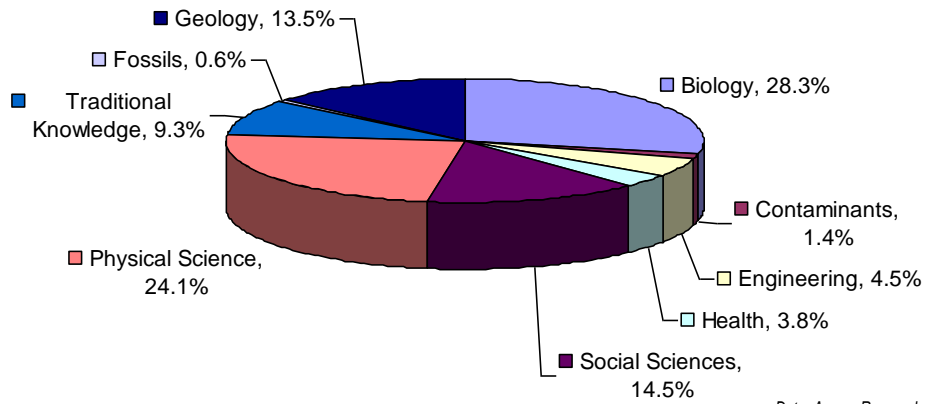
CATEGORY	2001	2002	2003	2004	2005	200600%	2007**
Biology	46%	43%	34%	31%	28%	32%	23%
Contaminants	0%	0%	3%	1%	7%	8%	6%
Engineering	1%	1%	5%	13%	12%	4%	5%
Health	4%	3%	2%	3%	4%	4%	6%
Social Sciences	8%	18%	14%	12%	12%	13%	19%
Physical Science	24%	23%	23%	24%	28%	32%	35%
Traditional Knowledge	3%	2%	8%	8%	9%	8%	6%
Fossils*	0%	2%	1%	1%			
Geology*	15%	10%	11%	8%			

Note: Decrease in '06 and '07 Engineering research probably due to difference in how manager classifies the projects.

* From 2005 on, research categories were simplified: Physical Sciences now includes Fossils and Geology.

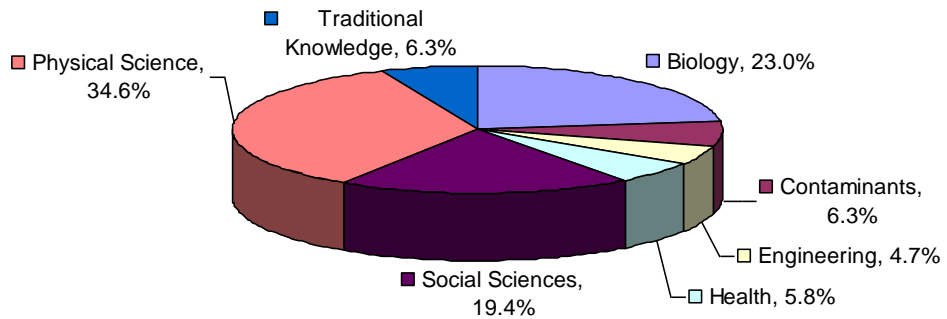
** 2007 data updated on Oct 30 2007.

**Research Licences issued by ARI
Research Categories Average 1985-Oct.2007**



Data: Aurora Research Institute, October

**Research Licences issued by ARI
Research Categories Jan-Oct 2007**



Data: Aurora Research Institute, October 2007

APPENDIX 3**Scientific Research Licences Issued by the Aurora Research Institute
By Region By Year 1974 – October 2007**

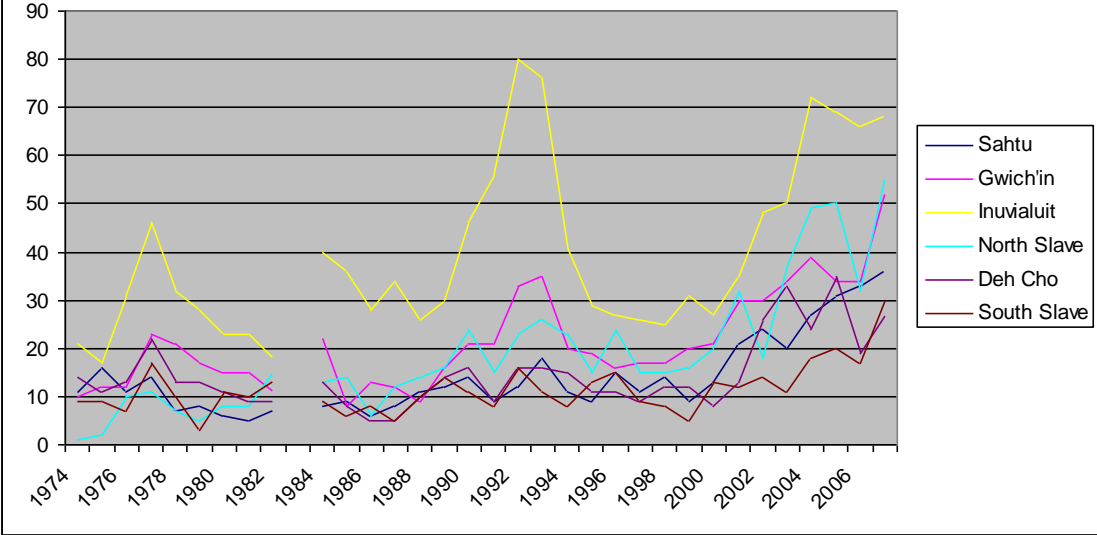
Year	Sahtu	Gwich'in	Inuvialuit	North Slave	Deh Cho	South Slave
1974	11	10	21	1	14	9
1975	16	12	17	2	11	9
1976	11	12	31	10	13	7
1977	14	23	46	11	22	17
1978	7	21	32	7	13	10
1979	8	17	28	5	13	3
1980	6	15	23	8	11	11
1981	5	15	23	8	9	10
1982	7	11	18	15	9	13
1983						
1984	8	22	40	13	13	9
1985	9	8	36	14	8	6
1986	6	13	28	6	5	8
1987	8	12	34	12	5	5
1988	11	9	26	14	10	10
1989	12	16	30	16	14	14
1990	14	21	46	24	16	11
1991	9	21	56	15	9	8
1992	12	33	80	23	16	16
1993	18	35	76	26	16	11
1994	11	20	41	23	15	8
1995	9	19	29	15	11	13
1996	15	16	27	24	11	15
1997	11	17	26	15	9	9
1998	14	17	25	15	12	8
1999	9	20	31	16	12	5
2000	13	21	27	20	8	13
2001	21	30	35	32	13	12
2002	24	30	48	18	26	14
2003	20	34	50	37	33	11
2004	27	39	72	49	24	18
2005	31	34	69	50	35	20
2006	33	34	66	32	19	17
2007**	36	52	68	55	27	30

* Projects commonly happen in more than one region, thus the sum of the regions will be usually higher than the actual total licences issued in a given year.

**2007 data updated on Oct. 30, 2007.
Aurora Research Institute database.

Research Licences issued by ARI - 1974 - Oct 2007
RESEARCH per REGION*

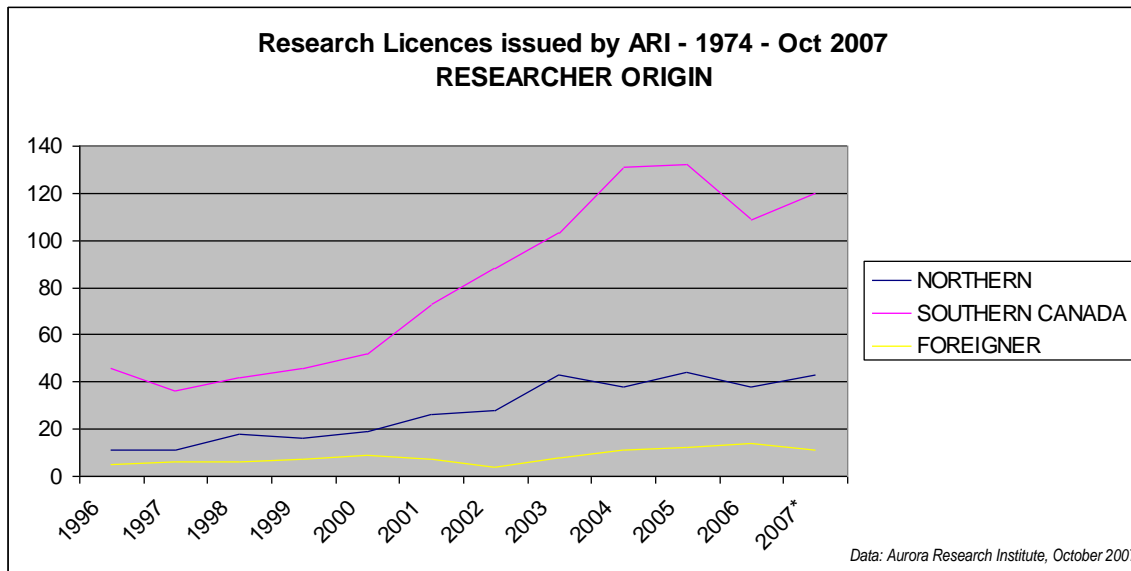
* Note: projects commonly happen in more than one region, thus sum of the regions will usually be higher than the actual total.



APPENDIX 3
Scientific Research Licences Issues by the Aurora Research Institute
By Origin of Researcher (Principal Investigator)
By Year 1974 – October 2007

Year	Northerner	Southern Canada	Foreign National	Total
1996	11	46	5	62
1997	11	36	6	53
1998	18	42	6	66
1999	16	46	7	69
2000	19	52	9	80
2001	26	73	7	106
2002	28	88	4	120
2003	43	103	8	154
2004	38	131	11	180
2005	44	132	12	188
2006	38	109	14	161
2007*	43	120	11	174

* 2007 data updated on Oct 30 2007.
 Aurora Research Institute database.



APPENDIX 4

Research Activity by the Gwich'in Renewable Resource Board



GWICH'IN RENEWABLE RESOURCE BOARD

HOME

ABOUT US

SETTLEMENT AREA

WILDLIFE STUDIES FUND

WILDLIFE

HUNTING & TRAPPING

SPECIES

PLANNING RESEARCH?

GRRB WILDLIFE PROJECTS

MANAGEMENT

FORESTY

FISHERIES

TRADITIONAL KNOWLEDGE

EDUCATION

SCHOLARSHIPS

APPLICATIONS & FORMS

PUBLICATIONS

NEWSLETTERS

LINKS

CONTACT US

GRRB Wildlife Projects

Since the beginning of the GRRB, we have been involved in various wildlife projects within the GSA. Most of the research we conduct is related to management issues or monitoring of wildlife in the GSA. Our staff is trained to conduct research projects, and we also actively collaborate with partner agencies and organizations (Department of Environment and Natural Resources, Government of the Northwest Territories; Yukon Government; Parks Canada; Ducks Unlimited; etc.), or university researchers.

Ongoing Projects

- Dall Sheep, Grizzly Bear and Wolf Project
- Furbearer Community-Based Monitoring
- Small Mammal Transects
- Hare Pellet Count Monitoring
- Wolverine and Wolf Carcass Collection

Completed Projects (by species)

- Barren-Ground Caribou
- Woodland Caribou
- Moose
- Dall Sheep
- Muskox
- Grizzly Bear
- Black Bear
- Wolf
- Wolverine
- Furbearers
- Small mammal (vole species, mice, etc.)
- Snow-Shoe Hare
- Waterfowl

Barren-Ground Caribou

Moose Aerial Survey

Who: Catherine Lambert (GRRB), Jozef Carnogursky (GRRB), Marsha Branigan (ENR, GNWT)
Observers from each community (names to be determined soon)

When: Workshops to be completed in February 2006; Survey in March 2006.

Where: Northern half of the GSA, including areas of high use by the communities, and corridor of the proposed Mackenzie Gas Project Pipeline.



Summary: The Gwich'in Renewable Resource Board (GRRB), in collaboration with the Department of Environment and Natural Resource (ENR), will conduct an aerial moose survey in the Gwich'in Settlement Area (GSA). This survey is part of a standard monitoring program, and will serve to update our estimates of moose density, composition (bull:cow and cow:calf ratios), and recruitment rate in different regions of the GSA. The survey will cover areas previously surveyed as well as the proposed pipeline corridor of the Mackenzie Gas Project. Workshops are being conducted in each community to identify areas of high and low moose densities, and then stratify the survey area into high and low density cells. Approximately 10% of those cells will be randomly selected for the survey. Flights will be conducted between March 13 and March 20, on board of a Cessna 207 aircraft. One community observer per community will be hired to assist us in spotting and counting the moose. After the survey completion, a report and a poster will be distributed to the Ehditait, Gwichya, Nihtat and Tetlit Renewable Resource Councils, and will be available for download on our website.

from helicopter, 2001 GRRB survey

Moose

Dall's Sheep, Grizzly Bear and Wolf Project

Who: Catherine Lambert (GRRB, University of Alberta)
 Dr. Andrew Derocher, University of Alberta
 Marsha Branigan, ENR GNWT
 Ehditait, Gwichya, Nihtat and Tetlit RRC

Note: This multidisciplinary project benefits from the collaboration between many partners and involves several components. Look up

the [Dall Sheep, Grizzly and Wolf Project](#) *Page for more details!*

When: Start in spring 2006 – End in 2009
Where: Richardson Mountains

Summary: The Richardson Mountains are home to a variety of wildlife species and possess a high cultural, conservation and hunting value for the Gwich'in people. Dall's sheep (*Ovis dalli dalli*) in the Richardson Mountains have been declining steadily since 1997, and several hypotheses have been postulated to explain this decline; from climate change to diseases, predation, competition with other ungulates, habitat loss, and human disturbances. This project will investigate the causes of the decline, with an emphasis on the impact of grizzly bears (Shih, *Ursus arctos*), and wolves (Zhoh, *Canis lupus*), two common predators in the Richardson Mountains. By monitoring the three species simultaneously in the study area, we will (1) acquire baseline information on Dall's sheep, grizzly bear, and wolf populations; (2) increase our understanding of sheep predation by grizzlies and wolves; (3) evaluate the impact of climate change and habitat characteristics on the interactions between the three species; and (4) determine the impact of other ungulate species abundance and distribution on Dall's sheep predation. Additionally, this study will document the Gwich'in Traditional Knowledge about the interactions between Divii, Shih and Zhoh, and will result in the publication of a comprehensive document on the subject. This project will be achieved by equipping individuals of the three species with GPS collars, by analyzing fatty acids composition and isotopes of body tissues collected at capture and by Gwich'in hunters, and by interviewing harvesters and elders on their knowledge about Divii, Shih and Zhoh interactions. This project will start in April 2006 and is expected to last until 2009.



Dall's Sheep Aerial Survey

Who: Catherine Lambert (GRRB), Marsha Branigan (ENR GNWT), and Dorothy Cooley (Yukon Government)
When: August 2006
Where: Northern Richardson Mountains

Summary: An interjurisdictional management plan for Dall's sheep (*Ovis dalli*) in the Richardson Mountains is currently being drafted, and the knowledge of this population status is necessary to the adoption of relevant management strategies. Past aerial surveys were conducted in June of 1984, 1985, 1986, and 2001; and in August of 1991, 1997, and 2003. The latest estimates revealed that this population is currently declining, and suffer from low recruitment rates, as evidenced by a low lamb:ewe ratio, a low lamb survival rate, and a very old age structure. To verify the current abundance, structure, and recruitment rate of the Dall's sheep population in the Richardson Mountains, we propose to fly over the survey area and complete an aerial census of this population. The survey would be completed in August, in approximately 35 hours of helicopter. The



resulting information will allow us to determine the current status of the population and make appropriate management recommendations for the benefit of this population, as well as of all users.

Furbearers Community-Based Monitoring

Who: Ehdiiat, Gwichya, Nihtat and Tetlit RRC
Catherine Lambert (GRRB)

When: Fall and Winter 2006-2007

Where: Traditional and used hunting and trapping areas in the GSA, as determined by selected users.

Summary: It has recently been suggested in some communities that beavers may interfere with muskrat populations by deteriorating muskrat habitat quality. As there is currently no monitoring system in place to estimate furbearer abundance and distribution in the Gwich'in Settlement Area (GSA), this assumption is difficult to assess. Moreover, since the end of the Gwich'in Harvest Study, very little information has been collected for other furbearer species, such as martens, fishers, otters, wolverines, wolves, foxes, and lynxes. To verify the interactions between beavers and muskrat, and to gain baseline information on the other furbearer species of the GSA, we propose to launch a community-based monitoring program. We will allocate four GPS in each community, which will be distributed to active land users (hunters or trappers). Those land users will record their observations of beavers and lodges, muskrats, martens, fishers, otters, wolverines, wolves, foxes, and lynxes, as they travel on the land and perform their usual hunting and trapping activities. This project will result in the creation of a multi-species database on distribution and abundance of furbearers in the GSA, and will provide some insights related to the interactions between beavers and muskrats.

Swimming muskrat



Small mammal and Hare Research

Who: Staff from GRRB and the Department of Environment and Natural Resources, GNWT

When: Almost every year since 1990

Where: Within the Inuvik municipal boundaries

Summary: We have been collecting population trend information, based on pellet count along transects, on snowshoe hares around the Inuvik area. This is part of a Northwest Territories-wide study on snowshoe hare population changes. We also monitor small mammal density by conducting trap transect. In 2005, the most abundant species

collected in the small mammal survey was the northern red-backed vole, distinguished by its bright red hair along its back (see photo). In the NWT, small mammal and hare surveys have been conducted each year at specific sites since 1990, with hares generally surveyed in late-spring, early-June, and small mammal surveys in August. Small mammals and hare play key roles in both arctic and boreal ecosystems. Their rise and fall reflect similar patterns in their predators and ecosystems.

[View NTW small mammal & hare survey research](#)

APPENDIX 5.**Inuvialuit Final Agreement Section 14(80)–14(85):
Research Advisory Council**

Research Advisory Council

14. (80) Comprehensive and continuous research and scientific investigation are required in the Inuvialuit Settlement Region to provide information on which decisions affecting wildlife and the environment can be based.

Whenever possible, studies should be undertaken by existing public and private institutions.

14. (81) There shall be a central coordinating agency known as the the Research Advisory Council comprising all persons conducting research in the Inuvialuit Settlement Region who wish to participate.

14. (82) The Executive Committee of the Council shall have one (1) member from the Department of Fisheries and Oceans, one (1) from the Department of Environment, one (1) from the Department of Indian Affairs and Northern Development, one (1) from the Government of the Northwest Territories, one (1) from the Government of the Yukon Territory, one (1) from private industry, one (1) from the Association of Canadian Universities for Northern Studies and two (2) members designated by the Inuvialuit

14. (83) The Executive Committee of the Council shall determine its own duties and functions and make its own by-laws and rules of procedure.

14. (84) The Research Advisory Council may:

(a) collect and collate existing research data, identify gaps therein and make recommendations on any research required, including research to complete the data base;

(b) at the request of government, industry, native groups or others, commission special studies, on a cost recovery basis, to fill particular needs;

(c) serve as a repository for research studies and other relevant information; and

(d) consider any other pertinent matter referred to it by the Executive Committee of the Council.

14. (85) The budget for the operation and maintenance of the staff and facilities of the Research Advisory Council shall be provided by the Government of the Northwest Territories.

14. (86) Travel and accommodation costs incurred by the members of the Research Advisory Council in carrying out their duties and functions shall be borne by the governments or bodies from which the Council members are drawn.

14. (87) Subject to any agreement between the Inuvialuit and the Dene/Metis and subject to subsection 11(8), it is agreed that the Dene/Metis traditional harvesters shall have the right to appoint one (1) voting member as an additional member on all regional Councils, Committees or Boards referred to in sections 11, 12 and this section. That member shall have a vote only on matters concerning species and the harvesting and habitat of species traditionally harvested by the Dene/Metis in the Inuvialuit Settlement Region. These rights shall be accorded to the Dene/Metis on condition that they accord the same rights to the Inuvialuit. Where an additional member is appointed pursuant to this subsection, Canada shall have the right to designate or appoint its own additional member in order to attain representation equivalent to that of the natives.

APPENDIX 6**Tri-Council Features—NSERC, SSHRC and CIHR**

Feature	NSERC	SSHRC	CIHR
Focus of Strategic Activity	People Discovery Innovation	Key Ambitions: Quality Connection Impact	Problem-based Multi-disciplinary 4 Areas: Biomedical Clinical Health systems & health services Population & public health
Strategic Outcomes	<ul style="list-style-type: none"> Highly skilled science & engineering research professionals in Canada High quality Canadian-based competitive research in NSE Productive use of new knowledge in NSE 	<ul style="list-style-type: none"> Enhance the quality of & support for research Facilitate research connections Increase the impact of research activities 	<ul style="list-style-type: none"> Outstanding research Outstanding researchers in innovative environments Transforming health research into action Achieved Through: Effective partnerships & public engagement; & Organizational excellence
Strategic Directions	<ul style="list-style-type: none"> Promote science & engineering Support students & fellows Attract & retain faculty Fund basic research Fund research in strategic areas Fund university-industry-government partnerships Support commercialization 	<ul style="list-style-type: none"> Art, literature, music, history, theatre, recreation Canadian families, health, aging Technology, management, economic development Globalization, politics, international development & trade Education, literacy, lifelong learning Immigration, multiculturalism, indigenous peoples Law, justice, ethics, poverty Environment, natural resources 	<ul style="list-style-type: none"> Strengthen Canada's health research communities. Address emerging health challenges & develop national research platforms & initiatives Develop & support a balanced research agenda that includes research on disease mechanisms, disease prevention & cure, & health promotion Harness research to improve the health status of vulnerable populations (Includes northern & rural Canada & Aboriginal peoples) Support health innovations that contribute to a more productive health system & prosperous economy
Eligibility for Grants	Universities and colleges	Postsecondary institutions offering degree programs	Universities, teaching hospitals & research institutes

Clients	Invest in people: Support 22,000 university students and postdoctoral fellows each year Promote discovery: Fund 10,000 professors each year Support innovation: 1,200 university/industry research & training collaborations each year	Clients 19,000 full-time faculty 40,000 graduate students in 90+ universities 3,615 grants, fellowships & scholarships awarded in 2006-2007 8,233 projects	11,000 researchers & trainees
Budget	\$900 million 2007-2008	\$305.3 million 2006-2007 + \$300 million CRCP	\$700 million 2005-2006
Funding Programs	Grants Programs Partnerships Programs Chairs & Faculty Support Programs Research Tools & Instruments & Infrastructure Programs International Programs	Core Grants & Scholarships Program Canada Graduate Scholarships Program Canada Research Chairs Program Initiative on the New Economy Networks of Centres of Excellence Program Indirect Costs Program	Catalyst Grant Chair Clinician-Scientist Award Clinician-Scientist Training Award Doctoral Research Award Emerging Team Grant Fellowship Master's Award Operating Grant Other Partnerships for Health System Improvement Prize Randomized Controlled Trials Team Grant Undergraduate
Peer Review of Projects	Yes	Yes—includes international experts	Yes
Canada Research Chairs Program		To create 2,000 research professorships at Canadian universities by 2008	
Researchers Holding Canada Research Chairs	780 of 1,755 in 2006-2007	398 of 1,755 in 2006-2007	577 of 1,755 in 2006-2007
Northern Research by Area	Climate & climate change 48.7% Ecosystems & biodiversity 18.4% Hydrology & permafrost 16.4% Economic development 10.9% Contaminants & toxic substances 5.7%	Aboriginal Research: Development Grants Aboriginal Research: Research Grants Northern Research Development Grants	Reducing Health Disparities & Promoting the Health of Vulnerable Populations Rural & Remote Health Initiative
Northern funding	\$27 million 2004-2005	None explicitly identified	None explicitly identified
Northern Clients	350+ professors & nearly 800 university students & fellows	None explicitly identified	Includes territorial health departments

Sources: NRSERC, SSHRC and CIHR home pages referenced in footnotes and Reference section.

APPENDIX 7**Research Projects in the Northwest Territories Funded Through Climate Change Impacts and Adaptation Program (CCIAP)**

Principal Investigator	Partner(s)	Project Classification	Location
Carleton University	Carleton University	Agriculture	National study
Agriculture Canada	Statistics Canada	Agriculture	National study
Agriculture Canada		Agriculture	National study
University of Guelph	Brandon U, SFU	Agriculture	National study
University of Alberta	NRCan—Forestry Svc	Agriculture & Forestry	National study
NRCan	Fisheries & Oceans Aurora College etc.	Coastal Zones	Western arctic coast
Memorial University	Includes Aurora College & Nunavut Research Ins NRCan, universities	Coastal Zones	NWT, NU
St. Lawrence University	NRCan, GNWT, Town of Norman Wells etc.	Communities	Norman Wells & Tuktoyaktuk
Federation of Canadian Municipalities	NRCan, U of Ottawa, Global Change Strategies	Communities	National study
Carleton University	Multiple	Communities	National study
Canadian Forest Service	Multiple/international	Communities	National study
Wilfred Laurier U	Deninu Kue 1 st Nation	Communities	Fort Resolution
University of BC	Cam Bay, Pond Inlet, Baker Lake	Communities	NWT
NRCan	GNWT PW&S, MACA	Communities	NWT
NRCan	EC, Aurora College etc	Climate change workshop	NWT
U of New Brunswick	Environment Canada	Ecosystems	National study
McGill University		Ecosystems	Victoria Island
Environment Canada	U of A, UBC	Ecosystems	NWT, YT
NRCan	ARI, Inuvik, Tuk etc.	Ecosystems	Western arctic coast
St. Lawrence University	NRCan	Ecosystems	NWT
Environment Canada	EC, U of Alaska etc.	Ecosystems	NWT, YT, NU
U of Saskatchewan	GNWT, YT, EC, Sahu RRB, USDA	Ecosystems	NWT, YT
University of BC	Multiple	Food Supply	AB, SA, NWT, YT
Arctic Institute of NA	University of Calgary	Fisheries	Beaufort Sea
NRCan	Environment Canada	Forestry	Western Canada
Environment Canada	Multiple	Forestry	2 provinces, NWT, YT
NRCan	Multiple	Forestry	National study
NRCan	EC, GO, U of T	Forestry	National study
NRCan	EC, USDA, universities	Forestry	National study
McGill University	Includes Dene Nation	Health	Includes Ft. Providence
Health Canada	EC, CIHI, ETC	Health	National study
Carleton University		Landscape Hazards	National study
Fisheries & Oceans		Landscape Hazards	NWT, YT, NU
University of Waterloo	EC, Ouranos	Tourism	National study
Environment Canada	DFO, universities, CARC	Transportation	NWT Yukon Nunavut
NRCan	Academic/US Govt etc.	Transportation	National study
NRCan	GNWT/Carleton U	Transportation	Mackenzie Valley
Transport Canada	Environment Canada	Transportation	National study

GNWT	NRCan/EC/TC	Transportation	NWT
University of Waterloo	McMaster/St. Mary's U	Transportation	National study
National Research Council	TC, Enfotec	Transportation	NWT, YT, NU
Consultant	Environment Canada	Water Resources	National study
University of Calgary	University of Calgary	Water Resources	National study
Consultant	Academic/other	Water Resources	National study

Source: Natural Sciences and Engineering Research Council.

APPENDIX 8

International Polar Year Projects in the NWT

Project	Dates	Led By	Communities Impacted
Biochemistry of Lakes in the Mackenzie Delta	May-Aug 2007	Simon Fraser University	Inuvik Tuktoyaktuk
Study of Canadian Arctic River-delta Fluxes	May 2007-April 2008	Simon Fraser University	Aklavik Inuvik Tuktoyaktuk
Investigation of the Water Cycle and Hydro-logical Processes of the Subarctic Canadian Shield	Feb-Dec 2007	Environment Canada	Fort Resolution Behchoko Yellowknife
Stream Flow Generation in Wetland-dominated Zones of Discontinuous Permafrost	Mar-Sept 2007	Wilfred Laurier University	Fort Simpson
Sensitivities of High-Latitude Lakes to Climatic and Development Disturbances	March-Oct 2007	Water and Climate Impacts Research Centre, University of Victoria	Aklavik Inuvik Tuktoyaktuk
Alaska-Canada Barren Lands Traverse	April 2007	Cold Regions Research and Engineering Laboratory, Fairbanks, Alaska	Behchoko Deline Fort Good Hope Fort McPherson Fort Resolution Inuvik Lutsel K'e Tsiigetichic Tulita Yellowknife
Building Adaptive Capacity in an Inuvialuit Community: Learning to Deal with Environmental Change	June-Sept 2007	Department of Geography, University of Guelph	Inuvik Tuktoyaktuk
Circumpolar Flaw Lead (CFL) System Study—Part 1 (Ship Based Research)	Oct 2007-Aug 2008	University of Manitoba	Inuvik Paulatuk Sachs Harbour Tuktoyaktuk Ulukhaktok
Recent Changes in Carbon-Sink Relationships and Greenhouse Gas Emissions in Forestland Ecosystems Along the Mackenzie Valley Region of Canada	June 2007-Aug 2010	NRCan—Canadian Forest Service	Fort Good Hope Fort Simpson Inuvik Jean-Marie River Norman Wells Tulita
Permafrost Investigations and Climate Change, Western Arctic Canada	Aug-Nov 2007	Department of Geography, Carleton University	Aklavik Inuvik Paulatuk Tuktoyaktuk
Housing Security, Homelessness and Resource Development in the NWT	Jan 2008-Aug 2009	Department of Geography, McGill University	Fort McPherson Fort Resolution Fort Smith Inuvik Paulatuk Yellowknife

Climate Change Impacts on Canadian Arctic Tundra Ecosystems—Metis Traditional Knowledge Study	Aug-Oct 2007	North Slave Metis Alliance, Yellowknife	Behchoko Fort Resolution Lutsel K'e Yellowknife
Mass Balance of Arctic Glaciers	April 2007	Terrain Sciences Division, Glaciology Section, NRCan	Inuvik Sachs Harbour Tuktoyaktuk Ulukhaktok
NWT Ice Patch Study—Geophysical Project	August 2007	Department of Geography, University of Calgary	Deline Norman Wells Tulita
Climate Change Impacts on Canadian Arctic Tundra Ecosystems—Interdisciplinary and Multi-Scale Assessments: Spatial and Temporal Variation	June-Sept 2007	University of Saskatchewan	Behchoko Yellowknife
A Renewed North: Resources, Corporations and First Nations	Oct-Dec 2007	Department of Political Science, York University	Fort McPherson Inuvik Tuktoyaktuk
AWAITING ETHICS APPROVAL			
Human Papilloma Virus and Cervical Dysplasia in the NWT	No licence issued	Public Health Agency of Canada	ISR GSA Deh Cho Area South Slave Area
Molecular Evolution of the Hepatitis B Virus and Clinical Impact of Occult HBV Over 20-25 Years	No licence issued	John Buhler Research Centre, University of Manitoba	ISR GSA Deh Cho Area North Slave Area South Slave Area

Source: Aurora Research Institute (December 13, 2007)