Northern Research Report

Investing in People, Discovery and Innovation

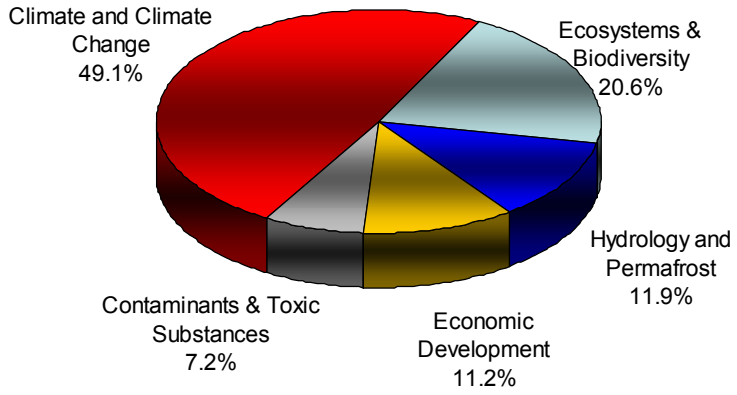
The Natural Sciences and Engineering Research Council (NSERC) invests in people, discovery and innovation to build a strong Canadian economy and to improve the quality of life of all Canadians. It supports research in universities and colleges, research training of scientists and engineers, and research-based innovation.

The Council promotes excellence in intellectual creativity in both the generation and use of new knowledge, and it works to provide the largest possible number of Canadians with leading-edge knowledge and skills to help Canada flourish in the 21st century.

In 2006-07, NSERC invested nearly $25 million dollars in northern-related R&D and the training of the next generation of research scientists and engineers. NSERC's annual northern research and training expenditure of $25 million supports more than 300 professors and more than 700 students and fellows at Canadian universities. This expenditure represents approximately 2.9 per cent of NSERC's annual budget. Nationally, NSERC is the third most important government department or agency in supporting northern R&D, behind only Natural Resources Canada and Environment Canada.

NSERC's northern funding is more diverse than that of most government departments or agencies. NSERC funds most of the major areas of northern research, as shown in Figure 1. The largest proportion of NSERC funding is used to understand the northern climate and climate change in the North. Buoyed by diamond discoveries and strong commodity and oil and gas prices, research related to economic development in the North has increased.

Figure 1
NSERC-Funded Northern Research by Area, 2006-07



Total: $24.9 Million

A quick profile of the professors (principal investigators) conducting northern-related research supported by NSERC is shown in Figure 2. The typical professor is a middle-aged male, from an

eastern university in a physical sciences department. Overall, there is a good regional distribution of professors conducting northern-related research, while female representation is slightly below the NSERC average.

Figure 2
Profile of NSERC-Funded Northern Researchers, 2006-07
n = 234

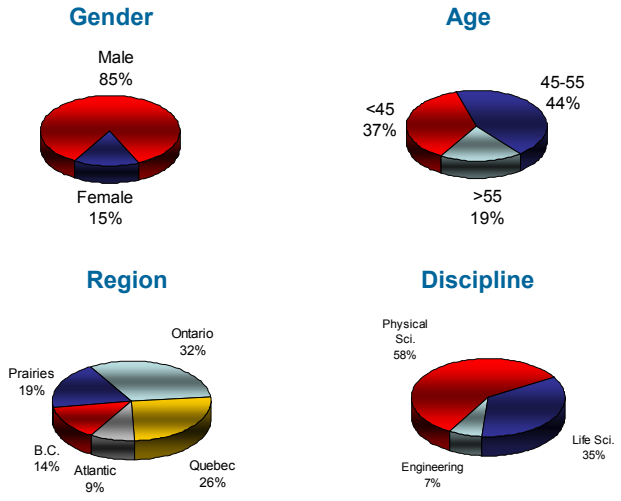


Table 1 presents NSERC northern funding by program, while Table 2 highlights northern grants funding by university. NSERC's Discovery Grants program provides the most NSERC support for northern R&D, while the Université Laval is the largest funding recipient by virtue of managing two large awards (ArcticNet and CASES).

Examples of Pollutants and Wildlife in the North Being Studied by NSERC-Funded Professors

Pollutants
- mercury, methylmercury
- organochlorides
- hexachlorocyclohexane
- hexachlorobenzene
- PCBs
- trichloroethane
- dichlorodiphenyl dichloroethylene

Wildlife
- polar bears
- arctic fox
- arctic char
- caribou
- wolverines
- walruses and seals
- king ciders, sandpipers, murres, alpine birds

Table 1
NSERC Northern Funding, 2006-07
(millions of dollars)

Activity Level	($M)	(%)
Strategic Outcome		
1.0 People	7.8	31.2
2.0 Discovery	12.0	48.1
3.0 Innovation	5.2	20.7
Total	**24.9**	**100.0**
Program Activity		
1.1 Promote Science and Engineering	0.1	0.5
1.2 Support Students and Fellows	2.9	11.7
1.3 Attract and Retain Faculty	4.7	19.0
2.1 Fund Basic Research	10.4	41.9
2.2 Support for Research Equipment and Major Resources	1.6	6.3
3.1 Fund Research in Strategic Areas	1.0	4.0
3.2 Fund University-Industry-Gov't Partnerships	4.1	16.6
3.3 Support Commercialization	0.0	0.0
Total	**24.9**	**100.0**
Program Sub-Activity		
1.1.1 PromoScience	0.1	0.3
1.1.2 Centres for Research in Youth, Science Teaching and Learning	0.0	0.0
1.1.3 Prizes	0.0	0.2
1.2.1 Undergraduate Student Research Awards	0.5	1.9
1.2.2 NSERC Postgraduate Scholarships	1.3	5.2
1.2.3 Canada Graduate Scholarships	0.8	3.1
1.2.4 Postdoctoral Fellowships	0.4	1.5
1.2.5 Industrial Research and Development Fellowships	0.0	0.0
1.3.1 Canada Research Chairs	2.8	11.1
1.3.2 Industrial Research Chairs	0.8	3.1
1.3.2 Chairs in Targeted Areas of Research	1.2	4.9
1.3.4 University Faculty Awards	0.0	0.0
2.1.1 Discovery Grants	8.2	32.7
2.1.2 Special Research Opportunity Grants	2.3	9.0
2.1.3 General Support	0.0	0.1
2.2.1 Research Tools and Instruments	0.5	2.1
2.2.2 Major Resources Support Grants	1.0	4.2
2.2.3 Research Capacity Development in Small Universities	0.0	0.0
3.1.1 Strategic Partnerships	1.0	4.0
3.1.2 Collaborative Health Research Projects	0.0	0.0
3.2.1 Collaborative Research and Development Grants	0.4	1.7
3.2.2 Research Partnership Agreements	0.0	0.1
3.2.3 Networks of Centres of Excellence	3.7	14.8
3.3.1 Intellectual Property Mobilization	0.0	0.0
3.3.2 Idea to Innovation Program	0.0	0.0
3.3.3 College and Community Innovation Pilot Program	0.0	0.0
Total	**24.9**	**100.0**

Table 2
NSERC-Funded Northern Research Grants[1] by University

University	Award ($)	(%)
Laval[2]	7,189,620	37.9
Alberta	1,688,625	8.9
Toronto	995,470	5.2
McGill	805,060	4.2
British Columbia	729,709	3.8
Queen's	720,320	3.8
Québec à Rimouski	676,740	3.6
Manitoba	632,400	3.3
Guelph	498,767	2.6
Ottawa	426,192	2.2
Calgary	399,067	2.1
Carleton	391,460	2.1
Victoria	389,340	2.1
Dalhousie	363,440	1.9
Québec à Montréal	328,000	1.7
Saskatchewan	318,383	1.7
Simon Fraser	230,300	1.2
Western Ontario	204,070	1.1
Trent	183,144	1.0
Laurentian	172,004	0.9
Wilfrid Laurier	170,990	0.9
Waterloo	153,910	0.8
New Brunswick	130,390	0.7
Inst natl de la recherche scientifique	129,190	0.7
Northern British Columbia	123,575	0.7
Memorial Univ. of Nfld	122,820	0.6
McMaster	120,320	0.6
Montréal	103,860	0.5
Winnipeg	79,980	0.4
York	75,490	0.4
Acadia	63,900	0.3
Lethbridge	55,200	0.3
Lakehead	51,000	0.3
Brock	42,000	0.2
École de technologie supérieure	36,000	0.2
Ryerson	35,176	0.2
Sherbrooke	27,400	0.1
Québec à Chicoutimi	25,750	0.1
Windsor	25,300	0.1
Royal Military College of Canada	18,573	0.1
Québec à Trois-Rivières	17,600	0.1
Moncton	12,000	0.1
Total	18,962,535	100.0

1. Excludes scholarships and fellowships.
2. Includes Canadian Arctic Shelf Exchange Study (CASES) and ArcticNet.

NSERC-FUNDED NORTHERN RESEARCH IN THE NEWS

Source of chemicals detected

Nearly all humans and other animals on the planet are contaminated with a suspected carcinogen known as perfluorooctanoic acid, or PFOA. The compound has been found in alarmingly high levels in Arctic animals.

Scott Mabury at the University of Toronto believes his group has found an explanation for where that chemical originated. Mabury's research team shows stain-repellents, widely used on fabrics, carpets and paper products, are a significant source of the chemical.

This research influenced Environment Canada's policy in the area of fluorinated polymers and the U.S. Environmental Protection Agency, which recommended industry reduce emissions of volatile PFOA precursors.

Keeping an eye on the tree line

Climate change could affect the face of the tundra. A warmer climate would mean trees and shrubs move further north. The increased shade could kill off lichens – an important food source for caribou. This in turn would affect the northern communities that depend on the caribou herds.

Recent changes in tree and shrub distributions at the tundra border already suggest environmental changes are taking place. In some areas in southwestern Yukon, tree lines have already advanced considerably – as much as 85 metres elevation on warm, south-facing slopes.

That's why Karen Harper of Dalhousie University is setting up a network of long-term monitoring sites to track these and any future changes to the vegetation at the forest limit in the Canadian Arctic. Harper's team will monitor the changes and try to determine their impacts on northern communities.

Impacts of climate change on landscape and water systems

Scott Lamoureux is spending some time in Nunavut. The Queen's University researcher is investigating how climate change affects Arctic rivers, soils and vegetation.

His team is trying to understand the hydrological and ecosystem processes that are sensitive to climate change. They also hope to get a handle on what might lie ahead in terms of climate change effects in the future.

The group's goals encompass more than straight research. They will also train young adults in environmental science methods and educate them about the research project. Working with community leaders, they will develop a science learning program for elementary students in northern communities.