



Northern Research Report

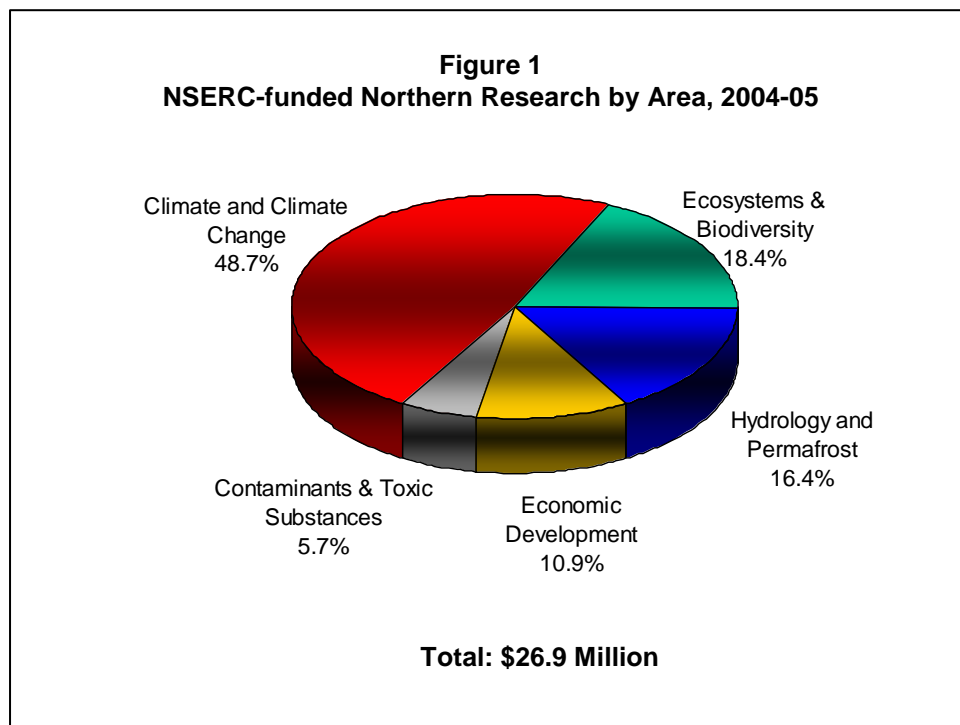
Investing in People, Discovery and Innovation

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 agency 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 twenty-first century.

In 2004-05, NSERC invested nearly \$27 million dollars in northern-related research and development (R&D) and the training of the next generation of research scientists and engineers. NSERC's annual northern research and training expenditure of \$27 million supports more than 350 professors and nearly 800 students and fellows at Canadian universities. This expenditure represents approximately 3.5 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.



A quick profile of the professors 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. Twenty of the professors conducting northern-related research are Canada Research Chair holders.

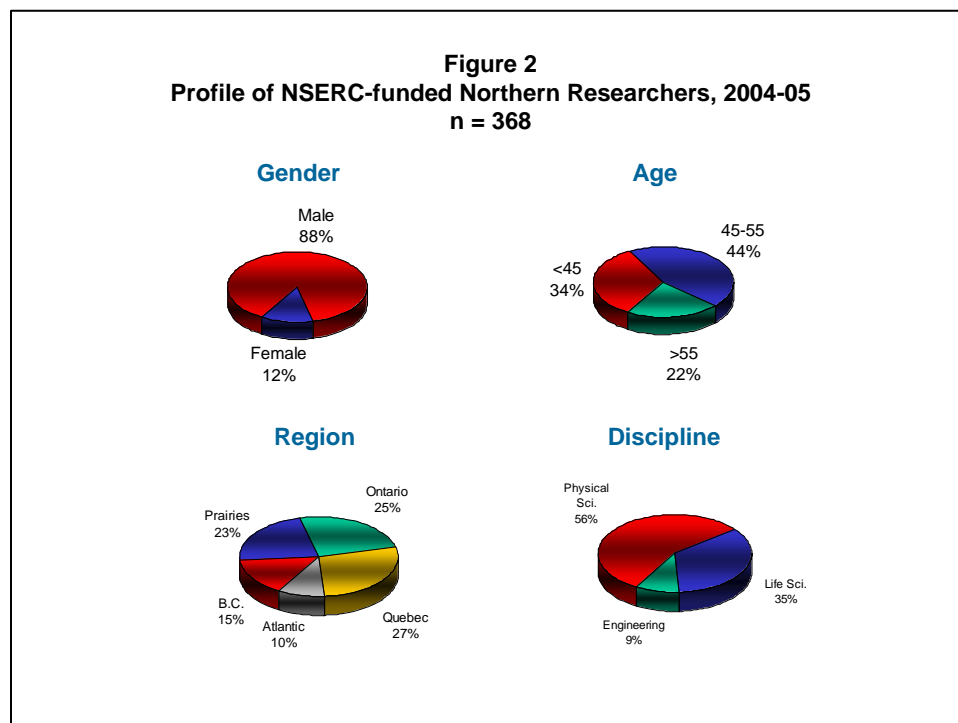


Table 1 presents NSERC northern funding by program, while Table 2 highlights northern grants funding by university. NSERC's Discovery Grants program provides the most NSERC support for northern R&D, while Université Laval is the largest funding recipient by virtue of managing two large awards (ArcticNet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

Examples of Pollutants and Wildlife in the North Being Studied by NSERC-funded Professors	
<p><u>Pollutants</u></p> <ul style="list-style-type: none"> • mercury, methylmercury • organochlorides • hexachlorocyclohexane • hexachlorobenzene • PCB's • trichloroethane • dichlorodiphenyl dichloroethylene 	<p><u>Wildlife</u></p> <ul style="list-style-type: none"> • polar bears • arctic fox • arctic char • caribou • wolverines • walrus and seals • king eiders, sandpipers, murre, alpine birds



Table 1
NSERC Northern Funding, 2004-05
(millions of dollars)

Activity Level	(\$)	(%)
Strategic Outcome		
1.0 People	8.3	30.8
2.0 Discovery	10.6	39.5
3.0 Innovation	8.0	29.7
Total	26.9	100.0
Program Activity		
1.1 Promote Science and Engineering	0.1	0.3
1.2 Support Students and Fellows	3.1	11.6
1.3 Attract and Retain Faculty	5.1	18.9
2.1 Fund Basic Research	10.4	38.6
2.2 Fund Research in Strategic Areas	0.2	0.8
3.1 Fund University-Industry-Gov't Partnerships	8.0	29.7
3.2 Support Commercialization	0.0	0.0
Total	26.9	100.0
Program Sub-Activity		
1.1.1 Promote Science and Engineering	0.1	0.3
1.2.1 Undergraduate Student Research Awards	0.5	2.0
1.2.2 NSERC Postgraduate Scholarships	1.6	6.0
1.2.3 Canada Graduate Scholarships	0.4	1.6
1.2.4 Postdoctoral Fellowships	0.4	1.6
1.2.5 Industrial Research Fellowships	0.1	0.4
1.3.1 Canada Research Chairs	2.9	10.8
1.3.2 Industrial and Other Research Chairs	2.1	8.0
1.3.3 Prizes	0.0	0.1
2.1.1 Discovery Grants	8.5	31.6
2.1.2 Special Research Opportunity Grants	0.4	1.4
2.1.3 Perimeter Institute	0.0	0.0
2.1.4 Small University Capacity Development	0.0	0.0
2.1.5 Research Tools and Instruments	0.9	3.5
2.1.6 Major Facilities Access Grants	0.5	2.0
2.1.7 General Support	0.0	0.0
2.2.1 Strategic Project Grants	0.2	0.8
2.2.2 Collaborative Health Research Project	0.0	0.0
3.1.1 Collaborative Research and Development Grants	0.9	3.2
3.1.2 Research Partnership Agreements	0.0	0.0
3.1.3 Networks of Centres of Excellence	2.0	7.5
3.1.4 Research Networks	5.1	19.0
3.2.1 Intellectual Property Management	0.0	0.0
3.2.2 Idea to Innovation Program	0.0	0.0
3.2.3 College and Community Innovation Pilot Program	0.0	0.0

Table 2
NSERC-Funded Northern Research Grants¹ by University

University	Award (\$)	(%)
Laval ²	7,515,729	36.4
Alberta	1,378,283	6.7
McGill	1,255,885	6.1
McMaster	1,079,220	5.2
British Columbia	780,380	3.8
Toronto	753,875	3.6
Queen's	714,120	3.5
Victoria	689,545	3.3
Saskatchewan	521,224	2.5
Manitoba	445,610	2.2
Waterloo	439,160	2.1
Guelph	435,210	2.1
Dalhousie	418,257	2.0
Simon Fraser	389,751	1.9
Ottawa	338,458	1.6
Carleton	326,095	1.6
Québec à Montréal	322,046	1.6
Institut national de recherche scientifique	296,666	1.4
Québec à Rimouski	288,583	1.4
New Brunswick	285,677	1.4
Calgary	244,102	1.2
Memorial Univ. of Nfld	230,398	1.1
Western Ontario	211,820	1.0
Montréal	143,860	0.7
Wilfrid Laurier	140,000	0.7
Trent	101,460	0.5
Northern British Columbia	89,179	0.4
Sherbrooke	85,400	0.4
York	79,840	0.4
Winnipeg	77,000	0.4
Windsor	71,700	0.3
Québec à Trois-Rivières	63,000	0.3
Acadia	61,400	0.3
Laurentian	57,058	0.3
Lethbridge	53,520	0.3
Lakehead	51,000	0.2
Québec à Chicoutimi	42,750	0.2
Brock	42,000	0.2
Okanagan University College	38,000	0.2
Ryerson University	35,176	0.2
Saint Mary's	28,000	0.1
École de technologie supérieure	27,450	0.1
Royal Military College of Canada	18,573	0.1
Total	20,666,460	100.0

1. Excludes scholarships and fellowships.

2. Includes Canadian Arctic Shelf Exchange Study (CASES) and ArcticNet.



NSERC-FUNDED NORTHERN RESEARCH IN THE NEWS



High-speed bacteria

University of Saskatchewan researcher Steven Siciliano has found that with the help of some unique bacteria, northern soil transforms pollutants such as mercury, arsenic and pesticides more quickly than soil found in the rest of Canada.

This process can make the pollutants less harmful, an important contribution to a region where pollutants carried up from the south are a problem. These findings also translate to parts of southern Canada, where, in conditions that are cold enough, Siciliano hopes the process could be mimicked.

There is no current theory about what regulates the activity of bacterial communities towards pollutants at low temperatures in soil. Siciliano is trying to understand how environmental factors such as temperature and moisture interact with biological factors like microbial diversity to control bacterial transformations of contaminants.

Through his research, he will determine which groups of bacteria are faster at transforming pollutants in the North and what role nutrients and temperature play. Once clarified, he says, this knowledge could be used in the North to help ensure there is no contamination of food such as fish and in the south to ensure clean drinking water.



Out of energy

Quebec's energy reserves are diminishing because of the lack of precipitation in northeastern Canada during the last few years – the opposite of what experts were predicting!

Experts predicted that global warming should have created more heat and humidity. During the twentieth century, these predictions were right, with an almost 40 per cent rise in precipitation. In the last few years, however, the water level has been dropping. Yves Bégin is trying to discover if such variations in precipitation have occurred in the last 300 years.

The Université Laval researcher will spend the summer in northern Quebec, east of Hudson's Bay, in order to go back in time and space with the help of tree ring analysis. The trees will be used as indicators of the natural abundance of water throughout the centuries in order to complement data gathered with scientific instruments.

Bégin's team's work will aid in understanding the reach of hydrological predictions and predicting the state of energy reserves for years to come.



Diamonds are an earth scientist's best friend

During the last 10 years, Canada has become a major focus of exploration for diamonds, as well as one of the world's top producers. But ongoing research into the origin and occurrence of diamonds is needed to assure the future development of what is fast becoming one of our major natural resources.

As Chair in Diamonds at the University of Alberta, Thomas Stachel is drawing on his well-established expertise to study diamonds and their syngenetic inclusions. Syngenetic inclusions are minerals contained within diamonds that are formed at the same time, and by the same processes as the host diamonds. Studying these inclusions will provide valuable qualitative and quantitative data, which the diamond industry can employ to locate diamond deposits and predict their quality.