SPRING/SUMMER 2010

CANADIAN POLAR COMMISSION

MERIDIAN

IN THIS ISSUE

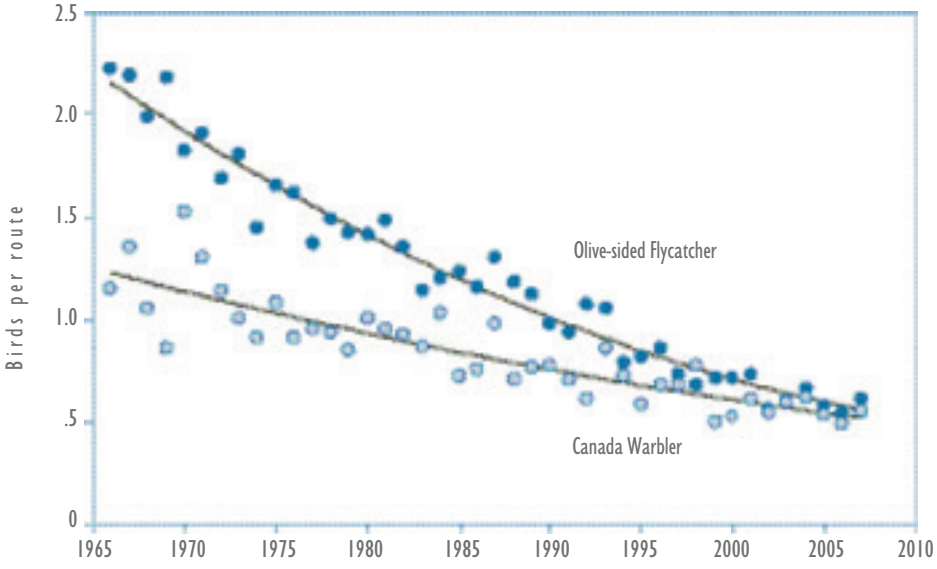
BOREAL SONGBIRD DECLINES: BREEDING AND WINTERING GROUND THREATS

Bridget Stutchbury

At 1.4 billion hectares, Canada's boreal forest represents one-quarter of the largest intact forests in the world, and is the single most important breeding ground for birds in the Americas. It is home to at least 2 billion migratory songbirds and has been dubbed North America's bird nursery, though it is better known for its role as an enormous storehouse of carbon and its potential to slow climate change. Each spring, millions of migratory birds fly thousands of kilometers from Latin America and the southern U.S. northward to Canada's vast boreal forest. This is one of the biggest animal migration movements on the planet – but migratory songbirds are also experiencing one of the most precipitous declines of any animal group on earth. Over half of the birds profiled in the National Audubon Society's "20 Common Birds in Decline" depend on Canada's boreal forest as a breeding ground.

The results from the Breeding Bird Survey (BBS) and migration monitoring at bird observatories show that many species of boreal songbirds have been diminishing in recent decades. The BBS in Canada shows that from 1966–2007 Canada Warblers dropped by 2.6% per year and Olive-sided Flycatchers by 3.7%, amounting to a cumulative and stunning loss of 50–75% in my own lifetime

Figure 1
Results from the Breeding Bird Survey showing significant declines in the Olive-sided Flycatcher (–3.7%/yr) and Canada Warbler (–2.6%/yr). Both species are now listed as threatened in Canada.



Canada

(Figure 1). Between the early 1980s and 2001–05, the Ontario Breeding Bird Atlas found a 7% decline in Olive-sided Flycatchers and a 15% decline in Canada Warbler abundance, as measured by the number of occupied atlas squares (adjusted for effort*). Both species are now listed as threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and are on the Audubon Society's Watch-List. Identifying the cause of such dramatic declines has been the focus of intensive research both on the breeding grounds and, to a lesser extent, on the wintering grounds.

Much of the boreal forest remains intact and is one of the biggest remaining wilderness areas in the world. Why, then, are so many of its bird species crashing in numbers? The answer to songbird declines may lie thousands of kilometers to the south, a possibility that even the names of the birds suggest. The tail-wagging and conspicuous rufous cap of the Palm Warbler may not make you think "snowbird" but the name comes from its winter habitat in the southern states, particularly Florida. The names of other boreal birds may also strike you as odd: Connecticut Warbler, Philadelphia Vireo, Cape May Warbler, Nashville Warbler, Tennessee Warbler, and the Magnolia Warbler, named in Mississippi after a southern tree. All were first described and named long ago during fall or spring migration by ornithologists who had little idea where these birds were coming from, or going to.

Most boreal forest songbirds are adapted to two very different worlds. The Olive-sided Flycatcher, who belts out its song "*quick, three beers!*" from the edge of a northern bog, makes the boreal forest its home for only a few months each year (Figure 2). An individual bird travels almost 20,000 km annually as it migrates back and forth to South America. The Canada Warbler, which weighs a little

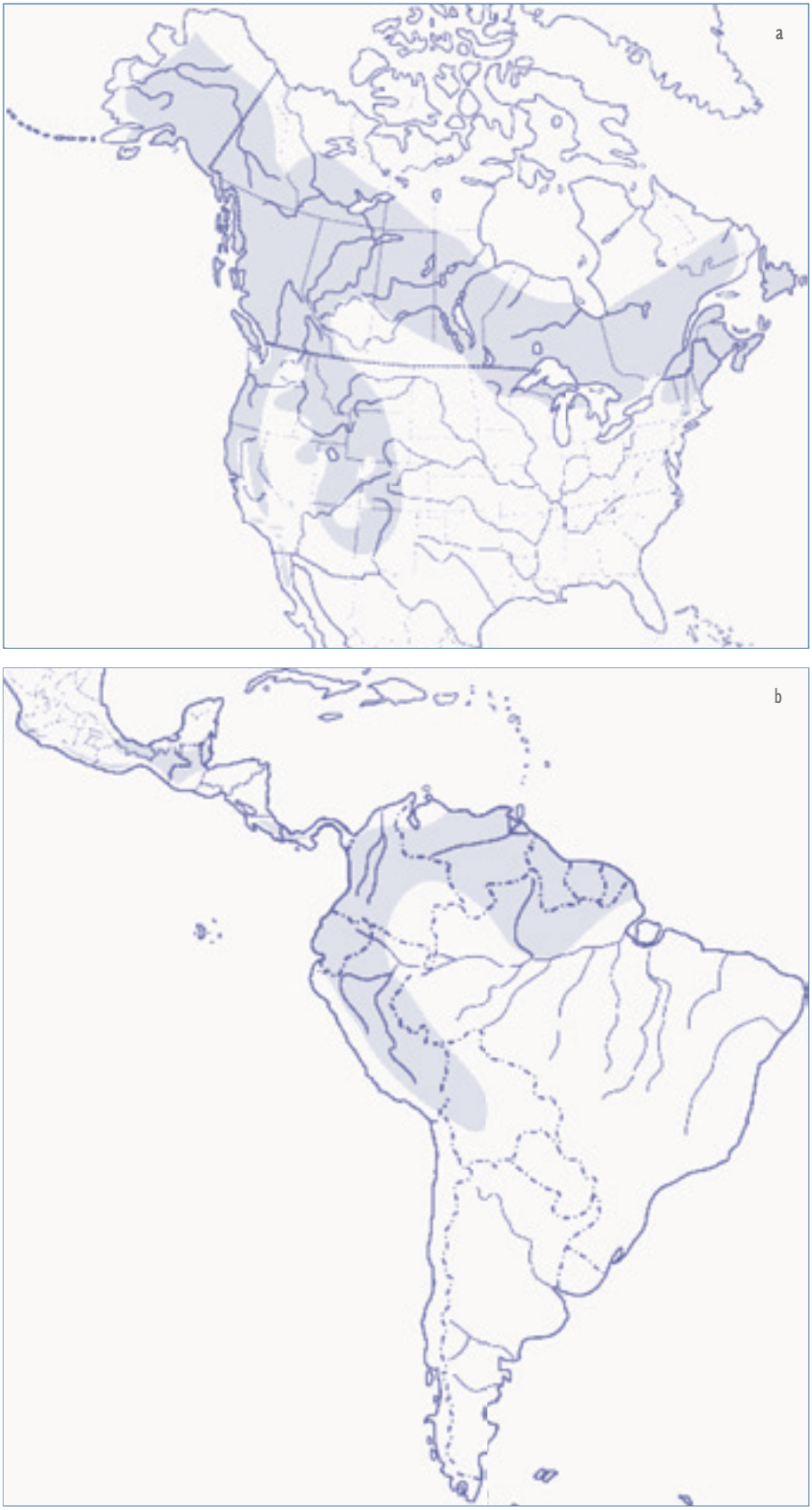


Figure 2
(a) The Olive-sided Flycatcher breeds throughout most of Canada's boreal forest but (b) over-winters in northern South America.

* The number of observers, the amount of area they covered, and the time they spent observing.

more than a loonie, is just as much at home singing boldly from a dense thicket of spruce trees as it is a few months later looking for insects in a rainforest in Colombia, alongside resident Tropical Gnatcatchers and White-winged Tanagers.

Tropical deforestation is likely driving population declines of many boreal species by lowering their chances of surviving migration. Latin American countries have been clearing about four million hectares of tropical forest per year. Research shows that songbirds that occupy dry, scrubby habitat instead of tropical forest have elevated stress levels, lower body weight, and lower survival rates. For territorial species, which usually eat insects all winter, there is fierce competition for high quality habitat, and the losers are the females and the young, inexperienced birds migrating to the tropics for the first time. For instance, American Redstarts forced into dry scrub habitat usually lost weight on their winter territory, departed northward two weeks later in spring, and also arrived one to two weeks later on their breeding territories. Redstarts from scrub winter habitat suffered lower breeding success as a result, losing one or two young per nest as a result of breeding later in spring.

Olive-sided Flycatcher. Photo: Jeff Nadler.

Figure 3

There is still extensive rainforest in some parts of the tropics, like Honduras, Nicaragua, and the Amazon basin, but the wintering grounds of many species are now a patchwork of small forest remnants and scrubby secondary growth. Deciphering whether population declines of boreal birds are a result of breeding ground or wintering ground threats requires that we know first

Canada Warbler.
Photo: Jeff Nadler.

where a given breeding population migrates to, and then the extent of deforestation and other threats in that region. We know the basic geographic distribution of species' wintering areas, but until recently it has not been possible to track the movements of individual songbirds over long distances.

My tracking studies of a forest bird, the Wood Thrush, and an aerial insectivore, the Purple Martin, have revealed a surprisingly high level of "connectivity", indicating that a single breeding population has a relatively focused wintering area. Wood Thrush can be found from southern Mexico to Panama, but individuals from a single breeding population in Pennsylvania over-winter in northern Nicaragua and Honduras. Similarly, the winter range of the Purple Martin extends from Venezuela to southern Brazil yet individuals from one breeding population spent the winter in the Amazon basin, primarily near Manaus, Brazil. What if such connectivity also occurs for long distance migratory songbirds, like boreal forest birds? If it does, then tropical deforestation in one region would not simply cause a diffuse and barely measurable drop in adult survival across the breeding range: instead, heavy deforestation in one tropical country would have a rapid and strong impact on specific breeding populations in Canada.

The primary cause of the deforestation of Latin America is the clearing of land for agriculture, including biofuel production. One of the most valuable export crops is coffee; North Americans drink three hundred million cups of coffee a day and import over 1.5 billion kilograms of coffee beans each year. Over the same period as the songbird declines have been documented, there has been a dramatic shift from traditional family-owned shade-grown coffee plantations to large-scale production of coffee in open rows ("sun" coffee) to facilitate rapid growth and harvesting.

A shade-coffee plantation is a mini-ecosystem with towering tropical trees that shelter the coffee plants below, fertilize the soil, and prevent soil erosion during heavy downpours. In contrast, most commercial sun-coffee farms resemble a cornfield rather than a forest, and require heavy use of chemical fertilizers and pesticides. Numerous studies have shown that shade-coffee farms have higher biodiversity, including migratory songbirds, than sun-grown farms. This is an example of how educated consumer choices – buying certified bird-friendly coffee – can promote sustainable agriculture and maintain good quality tropical habitat in areas that are already largely agricultural.

For migratory birds, protecting tropical forests alone will not necessarily prevent population declines, because nesting productivity depends on the extent and quality of breeding habitat. Less than 15% of Canada's boreal forest has been protected and nearly a third has been allocated for logging, mining, and other development. Large-scale logging in Canada is a threat to boreal songbirds because it forces species that prefer older forest to move elsewhere or attempt to breed in re-

generating forest. A study in Alberta, for instance, found that two years after the isolation of forest patches by clear-cutting there was a 15% decrease in abundance of Black-throated Green Warblers and a 50% decrease in Ovenbirds. Even songbirds that prefer edges and open areas may be threatened by logging. Olive-sided Flycatchers nest in open areas including forest edges, bogs, and burned forest, and are often attracted to regenerating logged areas. However, a study in the western U.S. found that Olive-sided Flycatchers living in selectively logged forests had 50% lower nesting success than in natural habitat.

Boreal birds are adapted to large-scale forest loss from fire and insect-outbreak disturbances that have been a natural part of the boreal forest ecosystem for thousands of years. The forestry industry is developing more sustainable harvesting methods based on the idea of approximating natural disturbances in order to have the least impact on bird and wildlife communities. For example, a study in western Canada compared bird communities in recently burned areas with logged areas, and found that a single forest harvest that left 12–34% of the trees standing and some patches untouched came closest to attaining the bird community one would find after a fire.

The effects of forest harvesting are not the same as those of a forest fire or insect outbreak. The western Canada study found that one-third of bird species differed significantly in abundance between the burned site and logged site. Bird communities in logged areas are dominated by generalists that nest on the ground or in the thickly growing shrub layer, whereas post-fire bird communities attract cavity-nesting birds in the standing snags. It takes some 60 years for post-harvest bird communities to become similar to those in burned areas. Conservation of breeding habitat for boreal songbirds will need a two-pronged approach – set aside huge areas of wilderness and, where logging is permitted, use the most sustainable practices available.

Protecting large expanses of the boreal forest, and harvesting sustainably within commercial forests, are critical for the long-term persistence of boreal forest ecosystems, including the birds who breed there and who play a critical role by preying on leaf-eating insects and dispersing fruits. In the past few years the total area of forests certified by the Forest Stewardship Council (FSC) has increased dramatically, and now stands at about 33 million hectares in Canada. Awareness of the boreal forest's importance in curbing climate change, and the need for consumers to buy FSC-certified products and recycled paper products, is also at an all-time high. Less well appreciated, and understood, is how tropical deforestation impacts Canadian ecosystems. Promotion of shade-grown coffee is an important tool for both public awareness of global environmental issues and for directly increasing the extent and quality of wintering habitat for many boreal birds.

Bridget Stutchbury holds a Canada Research Chair in Ecology and Conservation Biology at York University, Toronto, and is author of Silence of the Songbirds *(Harper Collins, 2007).*

References

Altman, B., and R. Sallabanks, 2000. Olive-sided Flycatcher (*Contopus cooperi*). *In:* The birds of North America, No 502. A. Poole and G. Gill, eds. The Birds of North America Inc., Philadelphia, PA.

Robertson, B.A., and R.L. Hutto, 2007. Is selectively harvested forest an ecological trap for olive-sided flycatchers? *Condor* 109:109–121.

Schieck, J., and S.J. Song, 2006. Changes in bird communities throughout succession following fire and harvest in boreal forests of western North America: literature review and meta-analysis. *Canadian Journal Forest Research* 26: 1299–1318.

Schmiegelow, F.K.A., C.S. Machtans and S.J. Hannon, 1997. Are boreal birds resilient to fragmentation? An experimental study of short-term community responses. *Ecology* 78:1914–1932.

Sauer, J.R., J.E. Hines and J. Fallon, 2008. The North American Breeding Bird Survey, Results and Analysis 1966–2007. Version 5.15.2008. USGS Patuxent Wildlife Research Center, Laurel, MD.

Stutchbury, B.J.M., S.A. Tarof, T. Done, E. Gow, P. Kramer, J. Tautin, J.W. Fox and V. Afanasyev, 2009. Tracking long-distance songbird migration using geolocators. *Science* 323: 896.

Van Wilgenberg and Hobson, 2008. Landscape scale disturbance and boreal forest birds: can large single pass harvest approximate fires? *Forest Management and Ecology* 256: 136–146.

Venier, L.A., and J.L. Pearce, 2007. Boreal forest landbirds in relation to forest composition, structure, and landscape: implications for forest management. *Canadian Journal of Forest Research* 37: 1214–1226.

TRANSMISSION OF ENVIRONMENTAL KNOWLEDGE AND LAND SKILLS IN ADAPTATION PLANNING FOR CLIMATE CHANGE IN THE ARCTIC

Tristan Pearce,
Roland Notaina, Harold Wright, Adam Kudlak, James Ford and Barry Smit

INTRODUCTION

Research on climate change impacts, vulnerability, and adaptation in the Arctic has shown that Inuit are exposed to climate change risks. Changes in seasonal patterns, precipitation, sea ice dynamics, and weather variability have affected the health and availability of some food species and have worsened risks associated with hunting and fishing. These changes have implications for food security and health, travel safety, and cultural activities. Climate change is expected to continue into the foreseeable future, with further effects on the social, economic, and political sectors of arctic communities (Anisimov *et al.,* 2007; Lemmen *et al.,* 2008). Inuit have a long history of coping with and adapting to the arctic ecosphere. They are already adapting to emerging climatic risks, and will need to continue to do so (Ford *et al.,* 2006a; Pearce *et al.,* 2010).

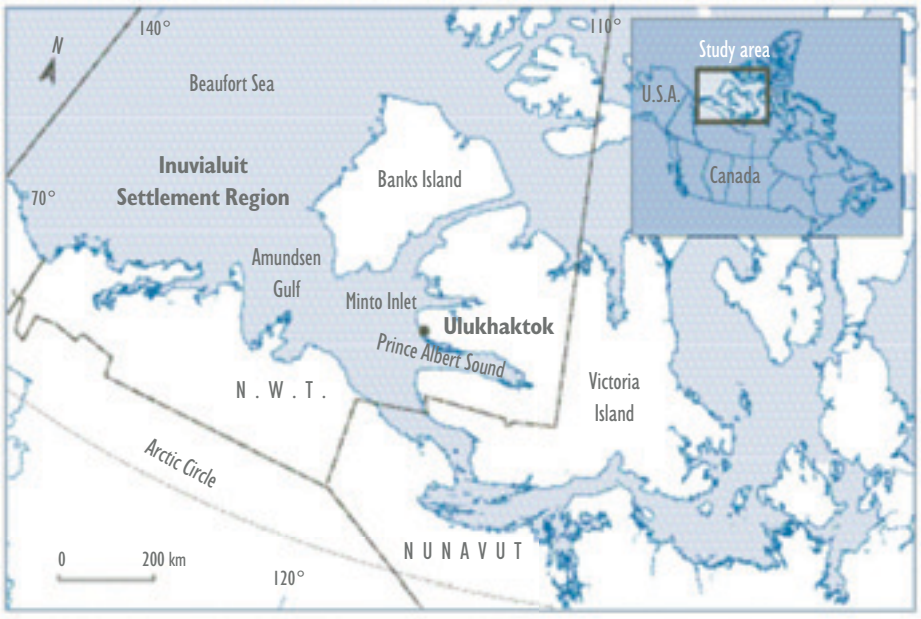
Crucial to the ability to adapt is a profound knowledge of the arctic environment, which affords Inuit dynamic and flexible use of the land and sea and their resources. Hunters manage risk by careful planning and preparation, bringing the right equipment, taking precautions, and by noting critical signs in the environment and responding appropriately. Knowledge of animal behaviour enables them to adapt to changing animal numbers and location, while knowledge of the land underpins the ability to do this. Environmental knowledge and land skills are transmitted between generations through practical engagement with the environment. However, younger Inuit are spending considerably less time in subsistence activities beyond organized land-camps and occasional hunting trips, but more time in formal education and wage employment. As a result, many younger and inexperienced hunters are not as well equipped to cope with the risks of hunting. More than a few young Inuit have encountered hazards and some have been seriously injured because of their poor understanding of dangers on the land. Changing climatic conditions are making it even more dangerous for them.

There is a need for policy that supports the teaching and transmission of environmental knowledge and land skills in order to strengthen the competence of young Inuit, and therefore Inuit capacity to adapt to climate change. To plan for adaptation decision makers need to know what skills are important for safe and successful hunting under changing conditions, to what degree they are being transmitted, and what factors facilitate or impede transmission. Few studies have formally addressed this, and broad understanding of Inuit adaptability and how policy could assist adaptation is therefore limited. Our study conceptualizes the relationships between Inuit environmental knowledge and land skills, adaptive capacity, and adaptation planning in arctic communities. We have drawn upon research that empirically documented how environmental knowledge and land skills were transmitted among Inuit men in Ulukhaktok, Northwest Territories. We use the Ohmagari and Berkes (1997) definition of transmission: the process of transferring cultural items, such as skills, among individuals, where transmission success depends on the level of mastery of a particular item.

ADAPTATION AND INUIT ENVIRONMENTAL KNOWLEDGE AND LAND SKILLS

Adaptability is a process of continual learning and readjustment. Innovation and improvi-

Study area map



sation skills, gained through personal experience in the environment, are passed down through generations. Inuit knowledge is continually evolving, updated and revised in light of observations, new experiences, and the incorporation of non-traditional knowledge alongside the traditional (Stevenson, 1996; Berkes, 1999). As a reservoir of accumulated knowledge of changing conditions and experiences of adaptation, environmental knowledge and land skills allow "response with experience" to climatic risks; this increases adaptive capacity (Ford *et al.,* 2006a). In Igloolik, Nunavut, for instance, Inuit knowledge is evolving with changing climate conditions through social learning, moderating the risks of a changing environment (Ford *et al.,* 2009).

TRANSMISSION OF ENVIRONMENTAL KNOWLEDGE AND LAND SKILLS

Traditionally, knowledge and skills among Inuit were developed and transmitted through on-the-land education, and from listening to and learning from elders and other experienced individuals. In traditional Inuit education, learning and living were the same things, and knowledge, judgment, and skill were not separated (Nunavik Educational Task Force, 1992). However, there is evidence that the traditional modes of knowledge transmission and learning are not functioning as they were in the past, particularly for younger generations (Irwin, 1989; Condon *et al.,* 1995; MacDonald, 1998; Takano, 2004).

This "deskilling" results from a gradual disengagement of younger generations from the land and subsistence activities, beginning with the settlement of Inuit in communities in the 1960s and accelerating since. Disengagement has been linked to several factors: requirements of formal schooling, increased dependence on wage employment, alternative activities (*e.g.* sports, television, video games), increasing separation between younger and older generations, new technologies, a decline in the prestige of being a hunter, and the desire among youth to follow "western" rather than "traditional" social norms (Condon *et al.,* 1995; Ohmagari and Berkes, 1997; Ford *et al.,* 2006b).

The name Ulukhaktok means "a place where material for making ulus (crescent shaped knives used by women) is found". This refers to the the copper and slate found in th area. Photo: T. Pearce.

KNOWLEDGE AND SKILLS TRANSMISSION IN ULUKHAKTOK

We studied the transmission of environmental knowledge and land skills among Inuit men in Ulukhaktok using an approach described by Ohmagari and Berkes (1997) and following recommendations for community engagement outlined by Pearce *et al.* (2009). Ulukhaktok, on the west coast of Victoria Island in the Inuvialuit Settlement Region (ISR), has a population of about 400, of whom 99% are Inuit. This research responded to community concerns about the erosion of environmental knowledge and land skills, and the consequent disengagement of some youth in subsistence and increased risk of accident among young people.

First, the study used semi-structured interviews and free lists, with active harvesters recognized by the community as experts and with elders, to generate a comprehensive list of necessary land skills and related environmental knowledge. For practical reasons we condensed this to 83 items, including traditional skills like meat and skin preparation, and others such as setting up and operating a VHF radio, and using a naptha stove. We then conducted structured interviews with 39 Inuit men: 28 between 18 and 34 years old, and 11 between 35–49 years old, representing 51% of the available male population in these age groups.

Each interviewee was asked three questions on each item on the list: (1) Did you learn this skill? (2) If yes, who was your main teacher? (3) How old were you when you learned the skill? Following the framework described by Ruddle and Chesterfield (1977) to analyze the learning sequences for traditional skills, we asked respondents whether, if

they learned a skill, they learned it by hands-on experience or by observation only (Figure 1). We used more detailed questions to gauge respondents' level of knowledge about a particular skill. For example, if an interviewee said he knew how to hunt caribou, he was then asked if he knew where to hunt it and if so, why was that a good place? Semi-structured interviews were conducted with eight elders (50 years or older) for comparative purposes.

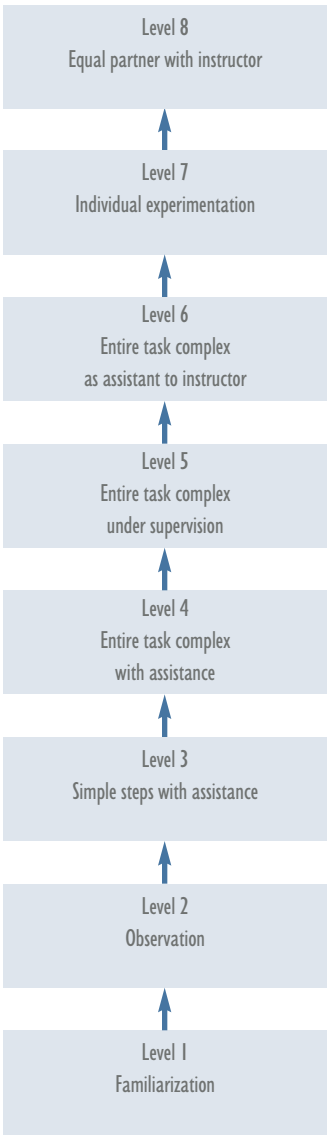
RESULTS

The transmission status of environmental knowledge and land skills by group of knowledge/skills is shown in Table I. Among respondents 18–34 years of age, 56% of 83 items were learned by the respondents by hands-on experience and another 17% were learned by observation only. Among respondents 35–49 years of age, 87% were learned by hands-on experience and another 6% by observation only. Twenty-seven percent of the 83 items were not learned by 18–34-year-old respondents, and seven percent were not learned among 35–49 year olds.

General hunting, travelling and camp-related skills, and skills related to fishing (all seasons), caribou hunting, musk-ox hunting and duck-hunting were transmitted well among respondents 18–34 years of age, and completely among 35–49-year-old respondents. Skills including using a rifle and shotgun, pulling an *aalliak* (sled) behind a snowmobile, setting up a frame tent, starting and tending a naptha stove or fire, and getting ice for drinking water were transmitted 100% among respondents in both age groups.

In the context of changing climatic conditions it is significant that some traditional navigation, way-finding, and weather forecasting skills were, on average, poorly transmitted among 18–34-year-old respondents. Ninety-three percent of respondents 18–34 years of age could navigate by remembering landforms but few could navigate using snowdrifts (29%) or the stars (21%) – skills which are important for navigating in poor visibility or unfamiliar areas. Furthermore, only 57% knew the different types of sea ice (including what is safe and unsafe to travel over). Even fewer knew how to forecast weather from cloud type (18%) or wind patterns (21%) but 96% could read a weather report. Interviews revealed that most 18–34-year-old respondents chose to travel when weather conditions were optimal and consulted weather reports before travelling. Respondents 34–49 years of age were more likely to consult elders before travelling and relied on traditional weather forecasting skills. Inuit in Ulukhaktok, and in other arctic communities, have said that weather patterns are changing (Nickels *et al.,* 2006). Consequently, some traditional ways of navigation and

Figure I
Learning Sequence for Environmental Knowledge and Land Skills



After Ruddle and Chesterfield (1977) and Ohmagari and Berkes (1997).

Young hunters Roland Notaina and Joseph Kuptana hunting musk-ox near Uryoktoak, Ulukhaktok, NWT. Photo: T. Pearce.

weather prediction are less accurate and applicable than in the past (Ford *et al.,* 2009). However, older respondents stressed that traditional navigation and weather prediction skills, adapted as necessary to accommodate new conditions, remain important.

A respondent's level of knowledge about a particular skill became more evident when asked if he knew where to hunt a species and why. It is one thing to be able to approach, shoot, and butcher a caribou, and another to know where to find the animals and understand why. This knowledge is particularly important in light of climate change which is affecting ecosystems and wildlife patterns, requiring hunters to adapt and sometimes hunt in less familiar locations. Although they had good duck hunting skills, respondents 18–34 years of age most often did not know where to hunt caribou, musk-ox, wolf, or polar bear, or where to set fox traps; nor did they know why they went to the hunting areas they used. For example, only 14% of respondents 18–34 years old knew where to hunt caribou and why, and for polar bear hunting the figure was a mere 11%. This is because for the most part, these respondents still hunt with their teachers (older family members) and skills have yet to be fully transmitted.

It is important to note that some respondents within each age group had acquired more knowledge and skills than others (*e.g.* 96% of 83 skills were learned by hands-on experience by some respondents) and to higher learning levels. It appears that some respondents were better positioned to acquire environmental knowledge and land skills than others. Factors which may influence learning include birth order, family structure, education history, and access to equipment. This and other trends will be explained in detail in future publications.

LEARNING AGE

Table II shows the mean age of skill acquisition, transmission of selected environmental knowledge and land skills (hands-on learning), and the level of learning achieved. Most general hunting and camp-related skills were acquired by both age groups by the age of 13 or 14. Skills for travelling on the sea ice were on average acquired later at age 15–17 among respondents in both age groups. These ages are consistent with the accounts of older respondents (50 years and over) who had learned and mastered general hunting and camp-related skills by the age of 13 or 14 and more advanced skills such as navigation on the sea ice by 15–16. However, although the age at which skills were learned "hands-on" by respondents is similar among age groups, the level of skill mastery differed. For example, 18–34-year-old respondents on average had learned caribou hunting skills to level 5 (entire task complex under supervision) whereas 34–49 year olds acquired the same skills to level 8. Similarly, competence in travelling on the sea ice in winter was acquired to level 4 by 18–34-year-olds (entire task complex with assistance) whereas 34–49-year-olds had mastered the skill by 16 years of age. This difference is found with most of the skills tested with the exception of basic hunting, travelling, and camp-related skills. Younger respondents are learning at similar ages to older respondents but their level of acquisition is lower, which suggests that they will not master them until a later age.

Table I
Transmission of Environmental Knowledge and Land Skills, Mean Scores by Groups of Skills, by Percentage

	18–34 years (x=28)			35–49 years (x=11)		
Knowledge and Skills	HO	O	N	HO	O	N
General hunting and traveling skills (n=5)	95%	4%	1%	100%	0%	0%
Re-load bullets (n=1)	18	43	39	64	27	9
Dog team skills (n=2)	39	19	42	73	27	0
Camp-related skills (n=8)	87	8	5	100	0	0
Light and tend a *qulliq** (n=1)	11	64	25	27	18	55
Fishing skills (n=3)	94	1	5	100	0	0
Caribou hunting skills (n=4)	84	6	10	100	0	0
Musk-ox hunting skills (n=4)	74	14	12	100	0	0
Seal hunting skills (n=7)	43	29	28	79	9	12
Duck hunting skills (n=3)	100	0	0	100	0	0
Polar bear hunting skills (n=3)	23	12	65	91	6	3
Wolf hunting skills (n=3)	26	14	60	85	0	15
Trapping skills (n=3)	50	11	39	88	0	12
Fur preparation skills (n=6)	25	46	29	79	16	5
Navigation and way-finding skills (n=7)	45	14	41	94	0	6
Travel on the sea-ice (n=3)	54	8	38	97	3	0
Weather forecasting (n=5)	39	25	36	64	7	29
Equipment making and repair (n=15)	51	17	31	82	10	8
Total (n = 83)	56%	17%	27%	87%	6%	7%

HO Learned by hands-on experience
O Learned by observation only
N Not learned
n Number of skill items
x Number of respondents
* Inuit stone lamp

CONCLUSIONS

The results of this research support policy initiatives that promote the teaching and transmission of environmental knowledge and land

Table II
Age of Skill Acquisition, Transmission of Selected Environmental Knowledge and Land Skills (Hands-on Learning), and Level Achieved on the Learning Sequence

	18–34 years (x=28)			35–49 years (x=11)		
Skills	Mean age	Transmission (HO)	Level	Mean age	Transmission (HO)	Level
Use a rifle	8	100%	8	9	100%	8
Use a shotgun	10	100%	8	10	100%	8
Pack an *aalliak** for travelling	14	96%	7	14	100%	8
Set-up a frame tent	13	100%	7	11	100%	8
Set fish nets in the summer	14	100%	6	11	100%	8
Set fish nets in the fall (under the ice)	14	82%	5	12	100%	8
Hunt caribou	11	86%	5	11	100%	8
Hunt ducks	10	100%	7	11	100%	8
Navigate using snowdrifts	14	29%	5	18	100%	7
Weather forecast using clouds	14	18%	5	17	73%	7
Travel on the sea ice in winter	15	57%	5	16	100%	7
Travel on the sea ice in spring	16	82%	6	17	100%	7

HO Learned by hands-on experience
x Number of respondents
* Inuit sled

skills in arctic communities. Societal changes have altered traditional methods of knowledge and skill transmission in the Arctic, requiring policy intervention. Detailed understanding of the transmission process can help northern decision makers and educators make informed decisions regarding the development and implementation of skills-training programs and educational curricula. Consistent with the learning ideology of, for example, the Piqqusilirivvik cultural school in Clyde River, Nunavut, this research shows that hands-on learning is important for the complete transmission (level 7 or 8 in the learning sequence) of environmental knowledge and land-based skills – including the detailed knowledge and experience that allows harvesters to adapt to changing climatic conditions. Initiatives to support the teaching and transmission of environmental knowledge and land skills, while not directed at climate change adaptation specifically, will also enhance the adaptive capacity of communities to deal with current and future climate change risks.

Tristan Pearce is a Ph.D. candidate in Geography at the University of Guelph. He was awarded the Canadian Polar Commission Scholarship in 2008. Roland Notaina, Harold Wright and Adam Kolouhok Kudlak are hunters and researchers in Ulukhaktok. James Ford is Assistant Professor of Geography at McGill University. Barry Smit is a Canada Research Chair and Professor of Geography at the University of Guelph.

Acknowledgments

The generosity, friendships, and knowledge shared by the residents of Ulukhaktok and specifically the interview respondents are gratefully acknowledged. Thank you to Robert Kuptana, Mel Pretty, Ross Napayok Klengenberg, Jack Simon Kataoyak, Jerry Sr. Akoakhion, Morris Nigiyok, Justin Memogana and Zane Kuneyuna for intellectual input and assistance in the field. The contributions of Dr. Ben Bradshaw, Dr. Chris Furgal, Frank Duerden, Dr. Peter Collings, Mark Andrachuk and Laura Fleming are also acknowledged.

This research was made possible through support from ArcticNet, International Polar Year CAVIAR project, SSHRC Vanier Doctoral Scholarship, ACUNS Canadian Polar Commission Scholarship, and University of Guelph graduate scholarships.

The research was undertaken as part of the Global Environmental Change Group at the University of Guelph, and was conducted under Aurora Research Institute scientific research license No. 14440.

References

Anisimov, O., D. Vaughan, T. Callaghan, C. Furgal, H. Marchant, T. Prowse, H. Vilhjalmsson and J. Walsh, 2007. Chapter 15: polar regions (Arctic and Antarctic). *In:* M. Parry, J. Palutikof, P. van der Linden and C. Hanson. Climate change 2007: impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, U.K. 653–685.

Berkes, F., 1999. Sacred Ecology: Traditional Ecological Knowledge and Resource Management. Taylor and Francis, London, U.K.

Berkes, F., J. Colding and C. Folke, 2003. Navigating Social-Ecological Systems: Building Resilience for Complexity and Change. Cambridge University Press, Cambridge, U.K.

Ford, J., B. Gough, G. Laidler, J. MacDonald, K. Qrunnut, and C. Irngaut, 2009. Sea ice, climate change, and community vulnerability in northern Foxe Basin, Canada. *Climate Research* 37:138–154.

Ford, J., B. Smit and J. Wandel, 2006b. Vulnerability to climate change in the Arctic: A case study from Arctic Bay, Canada. *Global Environmental Change* 16(2):145–160.

Irwin, C., 1989. Lords of the Arctic: wards of the state. The growing Inuit population, Arctic resettlement and their effects on social and economic change – a summary report. Canadian Arctic Resource Committee, Ottawa. *Northern Perspectives* 17(1).

Lemmen, D., F. Warren, J. Lacroix and E. Bush, 2008. From impacts to adaptation: Canada in a changing climate 2007. Government of Canada, Ottawa. 448.

MacDonald, J., 1998. The Arctic Sky: Inuit Astronomy, Star Lore, and Legend, Nunavut Research Institute, Iqaluit, and the Royal Ontario Museum, Toronto.

Nickels, S., C. Furgal, M. Buell and H. Moquin, eds., 2006. Unikkaaqatigiit – Putting the human face on climate change: perspectives from Inuit in Canada. Joint Publication of Inuit Tapiriit Kanatami, Nasivvik Centre for Inuit Health and Changing Environments at Université Laval and the Ajunnginiq Centre at the Nataional Aboriginal Health Organization, Ottawa.

Nunavik Educational Task Force, 1992. Silatunirmut: the pathway to wisdom. Final report of the Nunavik Educational Task Force. Makivik Corporation, Laval, Quebec.

Ohmagari, K., and F. Berkes, 1997. Transmission of Indigenous Knowledge and bush skills among the western James Bay Cree women of subarctic Canada. *Human Ecology* 25(2):197–222.

Pearce, T., B. Smit, D. Duerden, J. Ford, A. Goose and F. Kataoyak, 2010. Inuit vulnerability and adaptive capacity to climate change in Ulukhaktok, Northwest Territories, Canada. *Polar Record* 46 :157–177.

Pearce, T., J. Ford, G. Laidler, B. Smit, D. Duerden, M.Allarut, M. Andrachuk, S. Baryluk, A. Dialla, P. Elee, A. Goose, T. Ikummaq, E. Joamie, F. Kataoyak, E. Loring, S. Meakin, S. Nickels, K. Shappa, J. Shirley and J. Wandel, 2009. Community collaboration and environmental change research in the Canadian Arctic. *Polar Research* 28(1):10–27.

Stevenson, M.G., 1996. Indigenous Knowledge in Environmental Assessment. *Arctic* 49(3):278–291.

Takano, T., 2004. Connections with the land: land skills courses in Igloolik, Nunavut. *Ethnography* 6(4): 463–486.

For a full list of references, please contact Tristan Pearce: tpearce@uoguelph.ca.

MINERAL EXPLORATION AND MINING HISTORY OF LABRADOR

Derek Wilton

Mining has had a long history in Labrador, and mineral discoveries have had – and continue to have – profound effects on the shaping of cultures there. The nature of rock and mineral exploitation in Labador has been dictated by the economic conditions and technological needs of the times. Rules and regulations governing exploration and exploitation have continually changed, but since historic times there has been a progression towards greater local control.

ROCK AND MINERAL USE IN ANCIENT LABRADOR

The earliest known "mining" operation in Labrador is in the Hilda Creek area of the Torngat Mountains National Park Reserve. These remote workings in a glacial bowl approximately 285 km north of Nain were originally used by people of the Maritime Archaic Tradition. The first known inhabitants of

Geologist, surveyor and explorer A.P. Low (at left in Labrador in 1895, with assistant surveyor David Eaton) mapped over 300,000 square kilometres during his epic journeys through what is now Northern Quebec and Labrador. He was the first to realize the importance of the Labrador iron ranges. Source: Library and Archives Canada (PA-038321).

Newfoundland and Labrador, they lived from about 5000 to 2500 years ago, after which they disappeared from the archeological record. They used an exceptional variety of silicious rock now known as Ramah chert. Aside from its innate workability this chert can be very translucent – almost transparent – and apparently was of more than just a utilitarian interest.

It seems to have had some spiritual significance as well. In some Maritime Archaic caches, exquisite bifaces over 20 cm long have been found which are thought to have had ceremonial use (Stephen Loring, pers. com. 2006). Artifacts of the material have been recovered from sites as far south as Maine, indicating that chert was an important trade item thousands of years ago. All subsequent groups, including the Thule Inuit 600–700 years ago, used it. Near Hopedale the Thule also quarried soapstone and carved it into oil lamps (Meyer and Montague, 1994). Tuttle (1885) describes garnets, which he called latrobite, from Amitok Island which Inuit from Killiniq, at the north tip of Labrador, used as jewelry.

MINERALS, MISSIONARIES, AND THE GEOLOGICAL SURVEY OF CANADA

European interest in the rocks and minerals of Labrador began with Moravian missionaries who arrived on the northern Labrador shores in the 1770's. One, a Mr. Wolfe, noticed an interesting mineral with a blue iridescence on Paul Island, near Nain. He brought some back to Europe where it was named Labrador stone (Labradorstein). This mineral, with gemstone qualities, is now known as Labradorite. The Moravians even contemplated mining as means of funding their Labrador missions (Hans Rollmann, pers. com. 2010).

The Geological Survey of Canada provided the first written technical descriptions of Labrador rocks. Robert Bell (1884) stopped at Nain en route to Hudson Bay and describes the use of slate from Ramah Bay in house construction. In his epic expedition through the Labrador Peninsula in 1893–94, A.P. Low (1895) first documented and described the vast iron ranges of western Labrador. There is some evidence that a Catholic priest, Louis Babel, may have actually been the first to note iron in the region while travelling to minister to the Innu of the interior, but Low was defi-

nitely the first to realize the economic significance of the deposits and to bring out samples proving their significant iron contents.

Newfoundland interest and association with Labrador into the early 20th Century focused on the marine fishery and coastal resources. The first historical mine was at Rowsell's Harbour in the Ramah Bay area, where pyrite was recovered in 1902 from a singular sedimentary horizon that stratigraphically lies directly below the same chert horizon that crops out at Hilda Creek, some 6 km to the east. Newfoundland mining law at the time provided for staking of "fee-simple" claims that granted ownership of the mineral claim in perpetuity, once fees had been paid (Martin, 1973). Interestingly, the fee-simple licence to the Rowsell's Harbour "mine-site" remains in effect today, even though the rest of the region constitutes the Torngat Mountains National Park Reserve.

In 1927, the Privy Council in London defined the Labrador border (the so-called "coast of Labrador") as extending to the headwaters of rivers flowing to the Atlantic. The headwaters of the largest of these, the Churchill River (then known as the Hamilton River), included a large portion of the iron ranges described by Low. In 1929 the New Quebec Company received mineral land concessions from the Quebec Government for land above the Hamilton River headwaters. They undertook field work using aircraft support, the first time for this technology in the region. According to Geren and McCullogh (1990), they discovered iron deposits near Knob Lake (Schefferville, QC) and the Wabush area,and also recognized that portions of the concession area were actually in the Hamilton River basin, and hence in Labrador. The New Quebec Company also found that other iron deposits straddled the continental divide, in other words were in both Quebec and Labrador.

One of the bright spots in the Depression years for Newfoundland seemed to be the 1932 discovery of gold in western Labrador near Wabush. An expedition led by a Captain Bondurant (associated with the New Quebec Company) and financed from St. Louis, Missouri, reported the discovery of high-grade gold veins. As part of the hype surrounding this "discovery", the Newfoundland government established a post office in the region and in 1933 even issued a 75-cent airmail stamp labelled "Labrador The Land of Gold". Subsequent work in the summer 1933 revealed the discovery to be a hoax and presumably that the rich samples had been salted.

MODERN MINERAL EXPLORATION AND MINING

The real start of modern mineral exploration in Labrador began in 1936 when the (Newfoundland) Commission of Government granted a 55,000 square mile concession in western Labrador to the Weaver Coal Company, later renamed the Labrador Mining and Exploration Co. Ltd. (LME). Exploration in 1936 by Dr. J. Retty sought a range of possible commodities, but iron wasn't one of them (Geren and McCullogh, 1990). In 1937, however, Retty discovered a massive, high-grade iron deposit at Sawyer Lake: more correctly, he was led to the deposit by Innu trapper Mathieu André, who received $7000 as a finder's fee (*op cit.*). One key result of the mapping conducted for the exploration work was documentation that the Hamilton River basin was larger than previously believed. The areal extent of Labrador continued to increase with the field work (*op cit.*). LME obtained mineral land concessions for the area north of the Hamilton watershed, including the Knob Lake area, from the Quebec government in 1939.

"Labrador, The Land of Gold" stamp from 1933. Source: Library and Archives Canada.

The Hollinger North Shore Exploration Co. Ltd. acquired LME in 1941, and continued exploring. In 1947 they decided to develop the Knob Lake iron deposits as a mine with first production and shipment planned for 1952. The Knob Lake formations were direct shipping ore, meaning it could simply be dug out of the ground and transported to market with minimal secondary processing. The ores from this area had been softened through atmospheric exposure and weathering during the Cretaceous period (*ca.* 100 million years ago). In contrast, the relatively rich ore near Sawyer Lake and the somewhat lower grade ore near present-day Wabush are much harder and require more processing.

The end of the Second World War brought new factors into play, with significant impacts on the mineral industry. Confederation with Canada on April 1, 1949 led to the development of a modern regulatory system for exploration rights and mineral development. Confederation also negated potential international problems with shipping ore by rail from Knob Lake, Quebec, across western Labrador to Sept-Iles, Quebec. Advances in air transportation coupled with the new Goose Bay air base allowed greater access to the Labrador interior and the deployment of new airborne techniques. In 1948 a group from Norancon Exploration Ltd. discovered copper near Seal Lake in the Central Mineral Belt (CMB) of central Labrador. Mineral land concessions in central Labrador were granted to Frobisher Ltd. in 1950. Their field crews found extensive copper deposits near Seal Lake that summer (Evans, 1950), setting off an exploration boom in the CMB over the next decade, when significant resources of copper, uranium, molybdenum, lead, and zinc were discovered.

The Labrador Inuit Association's Labradorite quarry at Ten Mile Bay. Blocks weighing from 10 to 30 tonnes are shipped to Italy where they are sold to customers from around the world. Source: Labrador Inuit Development Corporation.

With the decision to proceed to production at Knob Lake, the Iron Ore Company of Canada (IOC) was incorporated in 1949 and construction of the Quebec North Shore and Labrador railway began in 1951. Exploration work was also conducted on the specularite-rich iron deposits near Wabush Lake from 1949–52. In 1951, along with drilling of the deposits, airborne magnetic surveys over the IOC (originally LME) concessions in the region were completed. This survey also covered parts of the original LME concession that had been dropped in 1939 (Geren and McCollogh, 1990) and indicated potential magnetic iron deposits on these lapsed portions as well. In 1951, the Newfoundland government created the Newfoundland and Labrador Corporation (NALCO), a crown corporation, and vested in it mineral concession areas in Labrador outside of those belonging to LME and Frobisher Ltd. The British Newfoundland Corporation (BRINCO) was incorporated in 1953 and most NALCO Labrador concessions were transferred to its mineral exploration division, British Newfoundland Exploration Ltd. (BRINEX). IOC reported all results for its 1951 airborne magnetic survey to the Government of Newfoundland, which then ceded mining rights of the ground not held by LME to NALCO.

In 1954, BRINEX geologists, working in the eastern portions of the CMB, discovered uranium near the coastal community of Makkovik, setting off an almost thirty-year period of uranium exploration. Frobisher Ltd. geologists discovered uranium in the western CMB in 1955 and BRINEX personnel discovered the Kitts Deposit in 1956. Numerous other discoveries followed, including the Michelin Deposit, found in 1967 during ground follow-up to an airborne geophysical (radiometric) survey. The BRINEX operations were run from Northwest River and employed a number of local residents as prospectors.

The Quebec North Shore and Labrador (QSNL) railway was finished in February, 1954, and the first shipment of iron ore left Schefferville for Sept-Iles that July. With the opening of the St. Lawrence Seaway in 1955, ships could transport ore directly from Sept-Iles to customers throughout the Great Lakes.

Kennco Explorations (Canada) Ltd. optioned the Frobisher Ltd. concession in 1956 and conducted a reconnaissance geochemical survey of the Seal Lake region of the CMB. This was a pioneering study using then state-of-the-art of techniques, including an analytical laboratory in a bush camp, which led to the discovery of further copper mineralization along with beryllium and rare earth element mineralization (Brummer, 1960).

Great technological changes both in the mining of iron and in steel production occurred in the early 1950s. The chief result was that iron mining became geared towards pellet production, which brought production efficiencies and reduced transportation costs. Most of the steel-making operations that comprised IOC ownership embraced these new techniques. Ores from Wabush were well suited to pellet production; Schefferville ores were not. Consequently, it was decided in 1957 to develop the Wabush ores, and the Carol Project was sanctioned. The plan called for first production in 1962. It also involved the creation of a whole new township, to be called Labrador City – along with open pit mines, a pelletizing plant, a hydro-electrical generating plant at Twin Falls (on a tributary to Churchill [Hamilton] River system), and a railway spur to the QSNL main line. All of these tasks were accomplished, and first pellets poured out of the plant in 1963. Wabush Mines Ltd. built the community of Wabush (less than 5 km from Labrador City) and opened the Scully open pit mine in 1965 on the original (1951) NALCO property. As was the normal practice at the time, all of these operations were established without any examination of environmental impacts and without any input from the aboriginal inhabitants.

The IOC and Wabush operations essentially represented mining in Labrador for almost 40 years; *ca.* 2003, Labrador West accounted for 63% of Canadian iron ore production and 2% of world production (Wardle,

2004). The industry went through difficult times during the 1980-82 recession, with some retrenchment. The Schefferville operations ceased production in 1982.

MINING AND LAND CLAIMS

BRINEX continued exploration and development work on its CMB uranium properties through the 1970s and decided to bring both the Kitts and Michelin deposits into production. Kitts is a high-grade, but low tonnage deposit, whereas Michelin is low-grade with high tonnage; production would have involved mixing the ore from both operations. The development included bulk sampling of both deposits from underground adits. The development plans – which included a road from Northwest River north to Postville – were ultimately shelved when uranium prices dropped drastically in 1980. There were also, however, strong objections from Postville and Makkovik residents, chiefly relating to their exclusion from planning, and environmental concerns. In 1979, the Government of Newfoundland requested that the proponent complete an environmental impact study; but, as the covering legislation was still being developed, this was not a formal legal request (Sweetnam, 1980). Public meetings associated with the study galvanized the fledging Labrador Inuit Association, established in 1973, which had started land claims negotiations with both levels of government in 1977. For the first time, local opinions were heard when a mining operation was proposed.

During the 1970s the Government of Newfoundland grew disenchanted with the granting of mineral land tenure through the concession system. In 1978 the Minerals Holdings Impost Act was proclaimed, which required holders of large concessions to pay an ever-increasing impost tax on lands not being developed or explored; small fee-simple grants were exempted. The act quickly had its desired effect and by 1981, 87% of crown lands were available for staking (Wardle, 2004). This act allowed the provincial government greater control over mineral resources and their development.

In 1992, the Torngait Ujaganniavingit Corporation (TUC) opened a labradorite quarry at Ten Mile Bay, near Nain. The material is processed as dimension stone in Hopedale and in Italy. TUC is owned by the Labrador Inuit Development Corporation, the business and economic development corporation of the Labrador Inuit Association. The opening of this quarry marked the first time, since their involvement with Europeans began, that Labrador aboriginal people were mining, at least partly, on their own terms.

VOISEY'S BAY

The 1990–91 recession hit Canadian mineral exploration and mining companies particularly hard. The only bright spot was the 1991 discovery of diamonds in the Northwest Territories (NWT) which triggered extensive mineral exploration there. In 1993, two Newfoundland prospectors, Albert Chislett and Christopher Verbiski, persuaded Diamond Fields International (DFI) that the rocks in northern Labrador were worth investigating because they tectonically resembled diamond-bearing rocks in the NWT. DFI then funded a diamond exploration program for the summer of 1993 by Chislett and Verbiski's company, Archean Resources, in the region north of Nain. Towards the end of the field season while still in the area, the prospectors decided to investigate a rusty (gossanous) hill 35 km southwest of Nain, near Voisey's Bay: they found nickel and copper-bearing sulphides in the rocks. During the summer and fall of 1994, DFI funded Archean to conduct surface and geophysical surveys in the vicinity, and by January they had discovered a very significant ore body (the Ovoid) which set in motion – for the first time in Newfoundland and Labrador – a frenzy of mineral exploration, staking, and speculation which would profoundly change the status quo. By 1996 INCO had acquired the Voisey's Bay venture for $3.2 billion in stock and cash. Chislett and Verbiski maintained a 3% Net Smelter Return (NSR) on the development which gave them a 3% royalty on all Voisey's Bay ore.

By the end of 1995, over 100 exploration companies had staked more than 250,000 mineral land claims (250 square metres each) in Labrador because of the Voisey's Bay discovery. The LIA and Innu Nation became concerned as some of these claims covered areas included in their land claims. More critically, these claims alarmed people living in coastal communities as they encroached on town limits. To allay these fears the provincial government established a series of Exempt Mineral Land (EML) zones around current communities and historic abandoned communities, where exploration and staking was prohibited.

To further address the concerns of Labradorians, the provincial government also abruptly changed staking regulations in 1995. Previously, the methods for mineral claim staking were different in Newfoundland from those in Labrador. In Labrador, because of the remote nature of much of the terrain, claims could be map-staked, whereas on the island claims had to be ground-staked, meaning that posts had to be erected on the ground. The new rules made map-staking the method for the whole province. Even toponymy was changed. The original National Topographic System mapsheet listed the inlet near the deposit as Voisey Bay: upon strenuous local objections the deposits were subsequently referred to as Voisey's Bay.

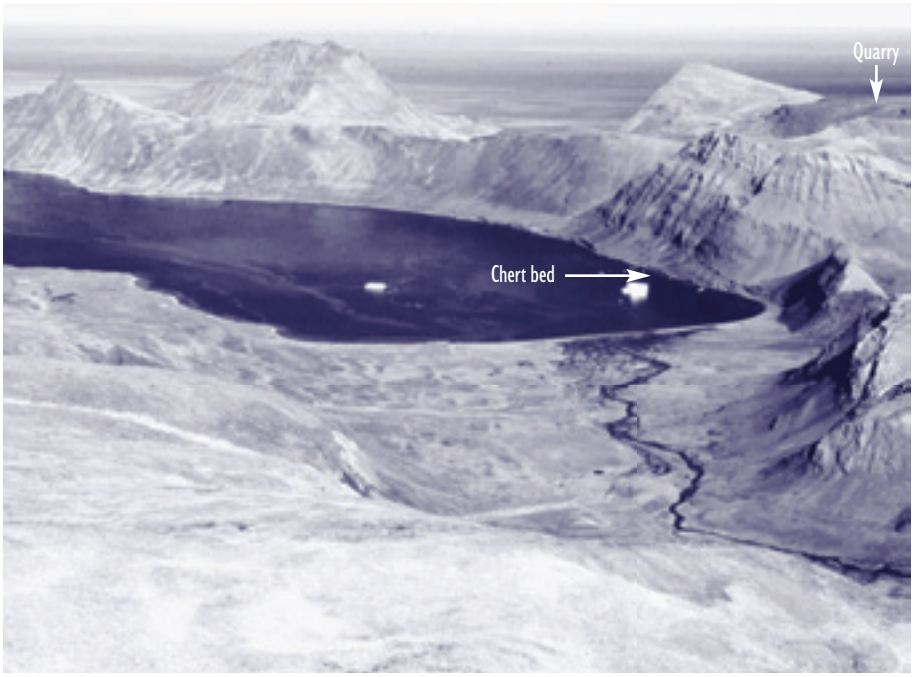
It was also apparent that before any development at Voisey's Bay a large-scale environmental impact study would be required, and Impact and Benefit Agreements (IBA) would have to be negotiated with affected aboriginal groups. The Innu staged a protest

at the deposit site in February 1995, and in August 1997 both the Innu Nation and LIA protested at the site. Development plans for the Voisey's Bay discovery added impetus to successful resolution of LIA land claims.

The Voisey's Bay discovery had several other, mainly economic, effects. A number of junior exploration companies were established in the province, some based in Labrador. Joint-venture companies were also set up between aboriginal organizations and/or individual aboriginals and outside companies for a range of mineral exploration support activities ranging from camp management, through provision of geological and geophysical surveys, to environmental monitoring.

Negotiations between INCO and the provincial government over Voisey's Bay stalled in 1998 because the government wanted greater say over the rates of development and resource depletion, along with spin-off effects – in particular, they wanted the ore processed in the province. The Joint Environmental Assessment Panel released its report on the impact of project in April, 1999. The provincial government and INCO reached a final agreement in June, 2002; it required that a hydro-smelter be built on the island to process the ores. INCO, LIA, and the Innu Nation agreed in principle on Impact and Benefit Agreements in June, 2002, and the Voisey's Bay mine shipped its first concentrate on November 16, 2005.

The LIA and both levels of government signed an agreement in principle on the land claim in June, 2001, and signed the final agreement in August, 2003. It provided a land settlement of 72,520 km^2 to the LIA beneficiaries. This was split into two classes: 15,799 km^2 as Labrador Inuit Lands (LIL) and the remaining 56,721 km^2 as the Labrador Inuit Settlement Area (LISA). On LIL, the Inuit government could enact laws and would receive 25% of provincial revenues from mining. On LISA, the Inuit would receive 50% of the first $2 million of provincial revenues from mining and 5% thereafter. The provincial government would continue to regulate existing mineral claims in LIL, but future exploration permits would need approval from both governments. The 9,600 km^2 Torngat Mountains National Park was also to be created within LISA lands. Labrador Inuit Lands include the coastal communities and also the Exempt Mineral Lands from 1995.



Rowsell's Harbour. Ramah chert from the ancient quarry at Hilda Creek, in the Torngat Mountains National Park, has been found in archaeological sites as far away as Maine. Photo: D. Wilton.

The recession of the early 2000's again slowed mineral exploration in Canada. One of the few deposit types that attracted interest at the time was Iron Oxide-Copper-Gold (IOCG) deposits, which also contain uranium. In 2003, a number of junior exploration companies staked claims throughout the Central Mineral Belt of Labrador because they assumed that the uranium-rich nature of the rocks indicated potential IOCG mineralization. One group, a joint venture between Fronteer Development Group, (FRG), of Vancouver, and Altius Resources Inc. (ALS), of St. John's, staked the Michelin deposit. In late 2003, the price of uranium started to rise from around $10 US per pound to a high of almost $140 per pound in mid 2007; In February 2010 it was trading at around $45. The Mining Weekly journal headlined it as "U-turn Uranium" in its Feb. 18, 2005 issue. The reason for this increase was twofold: (1) secondary uranium supply from dismantled nuclear weapons was declining and (2) nuclear power generation was growing in popularity as an alternative to greenhouse gas-emitting sources. Consequently, the Labrador IOCG projects became uranium projects and another claim staking boom started in the CMB. The FRG-ALS joint venture spun off their CMB claims to a new company, Aurora Energy Corp, and their exploration and evaluation work revealed a resource of 83.8 million pounds of uranium (measured and indicated) and a further inferred 53.0 million pounds, chiefly at the Michelin Deposit which has a measured and indicated resource of 67.1 million pounds, making it one of Canada's largest untapped uranium resources (www.fronteergroup.com/sites/files/LabradorResourceTable.pdf). In September 2009, Aurora released an independent Economic Impact Assessment report which suggested that development of the uranium mineralization in the CMB would generate a

potential 31,200 person years of employment, $2.9 billion in business and individual income, and $1.8 billion in tax revenues over a 17-year lifespan. Included in the development plan would be open pit and underground mines, a road from Northwest River to Postville, a power-line to the mine-site, and a port facility at Postville. Other companies also reported uranium resources from their properties in the CMB.

LOCAL CONTROL: THE NUNATSIAVUT GOVERNMENT

In June 2004, the LIA beneficiaries approved the Inuit land claims agreement. By June 2005, the agreement had likewise been approved by the provincial legislature and the Parliament of Canada, and on December 1, 2005, the Nunatsiavut Government came into being. The Torngat National Park Reserve was officially established on the same day, and mineral exploration and any future exploitation ceased in this region which hosts the prehistoric Ramah quarry.

Many of the uranium occurrences in the CMB, and much of the proposed Aurora project including the Michelin Deposit, lie within LIL. With the uranium staking rush and proposed development plans, local residents, along with the Nunatsiavut Government once more became concerned about the pace of mining development. In April 2008 the Nunatsiavut Government enacted a three-year moratorium on uranium mining and mine development on LIL; exploration, however, could continue. The chief rationale was that the new government needed some time to develop a land-use plan along with a lands administration system and an environmental assessment process.

In January 2010, the Regional Planning Authority for the Labrador Inuit Settlement Area produced a Draft Regional Land Use Plan for LISA (www.lisaplan.ca/documents/). The proposed ten-year plan would run from 2011–21. The draft suggests that mining developments may take place as long as they have minimal adverse effects on the environment and communities, are subject to provincial statute, and that IBAs and other relevant agreements can be reached between the proponents and the Nunatsiavut Government. The proposed plan also acknowledges that mining could have considerable positive economic impacts. Mineral exploration would be restricted to "lands designated as General Use or Resource Development, unless the mineral right was established prior to this Plan being approved". For an exploration project to proceed to mine development, application would have to be made for the land in question to be re-designated from General Use to Resource Development, which would require provision of an acceptable environmental impact and other studies. The Michelin deposit and Aurora project are within what the plan maps as General Use land.

Mineral exploration and mining will continue to be major economic features of Labrador. Most residents, cultural and economic groups of Labrador, all aboriginal and local government organizations, along with the provincial government view mining as a legitimate and necessary component of Labrador's economic framework – but only as long as the rate of development can be controlled, local benefits can be maximized, and the environment is protected.

The underlying historical theme of mining in Labrador has been the progression to greater local control. In a way, mineral exploration has lead to the development of land-use policy.

Derek Wilton is a Professor in the Department of Earth Sciences at Memorial University.

References

Bell, R., 1884. Observations on the geology, mineralogy, zoology and botany of the Labrador coast, Hudson's Strait and Bay. Geological Survey of Canada Report of Progress for the years 1882–1884. 1-62DD.

Brummer, J.J., 1960. A reconnaissance geochemical survey in the Seal Lake area, Labrador. *Canadian Mining and Metallurgical Bulletin*, v. 63, pp. 260–267.

Evans, E.L., 1950. Exploration in the Seal Lake area, Labrador. Unpublished Report Frobisher Limited, 18p.

Geren, R., and B. McCullogh, 1990. Cain's Legacy: The building of Iron Ore Company of Canada. Iron Ore Company of Canada, Sept-Îles, QC, 352p.

Low, A.P., 1895. Report on Exploration in the Labrador Peninsula Along the East Main, Koksoak, Hamilton, Manicuagan and Portions of Other Rivers in 1892–93–94–95. Montreal, Dawson Brothers, 1895. Geological Survey of Canada Annual Report 1895.

Martin, W., 1973. Once upon a mine; story of pre-Confederation mines on the island of Newfoundland, Canadian Institute of Mining and Metallurgy, Special Volume 26, 102p.

Meyer, J., and E. Montague, 1994. Soapstone in the Hopedale area, Labrador. in Current research, Government of Newfoundland and Labrador, Department of Mines and Energy, Geological Survey Branch, Report 94-01, pp. 273–278.

Sweetnam, L., 1980. A Summary Report of the BRINEX Uranium Mine Proposal for the North Coast of Labrador. Unpublished report, Labrador Unit Association, 6p.

Tuttle, C.R., 1885. Our North Land: Being a full account of the Canadian North-west and Hudson's Bay Route, together with a narrative of the experiences of the Hudson's Bay Expedition of 1884. C. Blackett Robinson, Toronto.

Wardle, R.J., 2004. The minerals industry in Newfoundland and Labrador: its development and contributions. Government of Newfoundland and Labrador, Department of Natural Resources, Open File NFLD 2889, 96p.

THE ARCTIC POLICY OF THE RUSSIAN FEDERATION: A BLUEPRINT FOR NORTHERN ACTION

Ron Macnab

On September 18, 2008 the Russian Security Council approved a new state policy for that country's arctic region. Titled *Fundamentals of the State Policy of Russia in the Arctic in the Period until 2020 and Beyond* and signed by Russian President Dmitry Medvedev, the document was formally promulgated by the official newspaper *Rossiyskaya Gazeta* on March 30, 2009[1].

Drafted as an update to a declaration issued in 2001, the new arctic policy can be viewed as a codicil to the *National Security Strategy of Russia until 2020*[2] of 2009. Expanding on northern issues that are not specifically mentioned within the broader framework of the security strategy, it addresses priorities and concerns that will resonate in Canada: security, regional governance, resource extraction, environmental protection, health and education, and infrastructure upgrades.

By outlining Russia's intentions and objectives in these areas, the policy will make it easier for the country's international partners to find common ground and identify potential areas of cooperation. Moreover, it will facilitate a clearer understanding of the motivations that inspire Russian statements and actions in the North. Canada and other arctic states would be well advised to become familiar with its contents. The Policy is divided into six main sections.

1. The Policy is available in Russian at www.rg.ru/2009/03/30/arktika-osnovy-dok.html. As far as can be determined, the document has not been released in an official English translation, although informal translations have been produced by several parties. Titles and texts vary somewhat between these unofficial versions. While every effort has been made in this article to present the contents of the Policy with the utmost fidelity, readers who are concerned with authenticity are advised to refer to the Russian version.
2. Posted in Russian at www.scrf.gov.ru/documents/99.html.

1. GENERAL PROVISIONS

This section articulates the overriding goal of the Arctic policy, which is to ensure that provisions of the country's national security strategy are fully realized throughout Russia's Arctic zone. It outlines the Arctic zone's territorial and maritime extents, and describes the area's environmental, social, and economic characteristics, recognizing that they must be taken into account during the implementation of the policy.

2. NATIONAL INTERESTS OF THE RUSSIAN FEDERATION IN THE ARCTIC ZONE

This section underscores Russia's most important interests in the Arctic zone, in light of its potential as a strategic resource base that can help resolve the country's socio-economic problems. Russia intends: (a) to safeguard the Arctic as a zone of peace and cooperation through adherence to national legal frameworks and to international treaties; (b) to preserve the region's unique ecology by proceeding in an environmentally sound manner; and (c) to promote greater use of the Northern Sea Route as a primary transportation artery.

3. BASIC OBJECTIVES AND STRATEGIC PRIORITIES OF THE RUSSIAN FEDERATION'S NATIONAL POLICIES

The Policy lists six basic objectives:

- Resource development (hydrocarbons, fisheries, and strategic raw materials);
- Military security and border defense;
- Conservation and environmental protection;
- Enhanced communications and information technology;
- Promotion of scientific research and technological development;
- International cooperation through bilateral and multilateral agreements.

Strategies for achieving these encompass numerous activities. At the domestic level, they include government leadership for enabling socio-economic development and for improving the quality of life of indigenous populations. The creation of a better business climate is a priority, as is the application of advanced technology for developing the north's resources. The modernization of transportation systems and fishery infrastructure is identified as a key facilitator for advancement.

At the international level, these strategies call for increased interaction and cooperation between Russia and other states with regard to the delineation of maritime space, the organization and effective use of polar air and sea routes, coordinated measures for regional search and rescue operations, and disaster prevention and mitigation. Healthy bilateral

relations are considered essential to constructive participation in economic, scientific and technical, and cultural affairs. Russia will continue its support for international fora on arctic problems, and will maintain its presence in Svalbard.

4. TASKS AND MEASURES FOR IMPLEMENTING THE ARCTIC POLICY

This is the longest and most significant section. It defines a series of domestic goals specific to four spheres of northern governance, and outlines actions for their implementation within a national framework.

Social and Economic Development

Russia will assess its natural resources on land and offshore, and improve the technology and operational infrastructure for northern fisheries. The development and use of alternative and renewable energy sources will be encouraged. Cargo capacity on the Northern Sea Route will be increased with appropriate measures for ensuring the safety and efficiency of shipping. An integrated security system is proposed for countering natural and man-made threats.

These goals are to be achieved under state leadership and financing. The social infrastructure will be modernized through improvements in housing, health, and education services for northern residents, particularly the indigenous population. Rational schemes for wildlife management and ecotourism will be developed while preserving the cultural heritage of indigenous peoples.

Military Security, Defense, Border Protection

The Russian Federation proposes to secure its Arctic zone against potential threats and challenges through the deployment of appropriate military resources and border agencies, complemented by a surveillance and control system for monitoring and managing situations in border zones and in maritime zones such as the Northern Sea Route.

Russia will improve its coast guard services and seek more efficient interactions with counterparts in adjacent states in order to address high seas terrorism, illicit activities, and fisheries protection.

Environmental Security

Russia intends to protect the diversity of its living resources through an expanded network of land and marine protected areas. This is consistent with the need to promote economic development and will take into account the long-term impacts of global climate change. The policy also recognizes the need to recycle nuclear-powered vessels.

These goals will require special measures for wildlife management and environmental protection. Related activities will include natural landscape restoration, toxic waste recycling, and the imposition of limits on the release of harmful substances, particularly in zones of high population density.

Information and Technology

The Arctic zone requires modern means for information transmission, at different levels and for different purposes: radio broadcasts, maritime and aerial navigation, remote sensing, and weather and ice monitoring. A reliable system is required to facilitate the surveillance and control of economic, military, and environmental activity in the Arctic, and to respond to emergency situations.

A network of regional links across the region using state-of-the-art technologies will be deployed to achieve these goals.

Science and Technology

New technologies are required for remediating polluted lands and waters, and for developing materials suited to the arctic environment. New research vessels are required to upgrade the scientific fleet, along with improved technology for polar science.

These goals will require comprehensive long-range arctic research plans. Techniques for forecasting natural hazards and the longer-term effects of global climate change need refinement. A series of studies will improve understanding of the socio-economic and juridical factors that influence Arctic activities. The impact of environmental factors on human health needs investigation, so that policies can be developed that ensure the well-being of northern residents.

5. GENERAL MECHANISMS FOR IMPLEMENTING THE ARCTIC POLICY

The policy will be implemented through a series of measures that coordinate the activities of government and other organizations according to their mandates and within existing frameworks for international cooperation. This will entail adjustments to legislation regulating arctic policies, initiatives, and activities, followed by the definition of target programs and funding sources. Northern residents will participate in the formulation of planning and development strategies, while the mass media will be encouraged to highlight issues and advances. Progress will be monitored and analyzed to ensure that implementation objectives are achieved.

6. TIMELINES FOR THE IMPLEMENTATION OF THE ARCTIC POLICY

Russia proposes to realize the policy in three stages:

2008–2010

- Data gathering and analysis to establish the external borders of the Russian Federation's Arctic Zones;
- Assessment of options for international cooperation in the development of natural resources;
- Formulation of a development program featuring concentrations of industrial facilities and special economic zones;
- Implementation of public-private investment projects for strategic development .

2011–2015

- Confirmation of the external borders of Russia's Arctic zone and the realization of the country's competitive advantages with regard to the exploitation and transportation of energy resources;
- Restructuring of the northern economy to promote resource development;
- Improved infrastructure for managing traffic along the North Sea Route and for promoting Eurasian transit;
- Creation of a coordinated system for information and communication throughout the Arctic zone.

2016–2020

- Full development of the Arctic zone as a strategic resource base;
- Confirmation of Russia's role as a leading Arctic power;
- Utilization of Russia's competitive advantages to maintain peace and stability in the Arctic region, and to consolidate international security.

CONCLUSIONS

In tone and content, Russia's new arctic policy reads as a lucid, realistic, and constructive appraisal of the country's priorities and objectives in its northern reaches, complemented by a long-term plan to address problems and issues that are comparable to those facing Canada's arctic citizens. The document's main focus is internal: in addition to emphasizing the sound development of natural resources in the Russian Arctic, the policy calls for action to preserve the northern environment and promote the well-being of its residents: these goals ought to resonate with all Canadians concerned over the state of Canada's Arctic.

The policy is also concerned with maintaining the Arctic as a zone of peace and cooperation, and makes several references to Russia's intentions of adhering to international agreements while collaborating with neighbour states in the pursuit of mutual security interests. Militarization is mentioned in one section of the policy, citing the need for coordinated measures to defend Russia's northern borders against external threats, again in collaboration with neighbour states. Notably, the policy contains no overt expression of any intention to project military power beyond Russia's Arctic zone – although there is a clear and understandable desire to maintain Russia's position of influence within the region.

Many if not most of the issues addressed by Russia's new arctic policy were discussed in a brief speech that was delivered on September 17, 2008 by President Medvedev at the beginning of the Security Council meeting which approved the policy[3]. This talk articulated the President's priorities and concerns in plain language: it was a refreshingly frank acknowledgement of the challenges that re-

3. Posted in English at http://eng.kremlin.ru/text/speeches/2008/09/17/1945_type82912type82913_206564.shtml.

main to be addressed in his country's northern territories, but without the stilted and self-serving phraseologies that so often characterize government declarations of this sort – regardless of their country of origin.

Offering candid overviews of conditions in Russia's Arctic zone along with prescriptions for corrective actions, certain components of President Medvedev's address could apply equally to the situation in Canada's north. Concerned Canadians and their authorities would be well advised to read this speech, and to contemplate how similarities between the two countries could motivate them to consider collaboration in the resolution of common problems in their northern territories.

Ron Macnab is a geophysicist (Geological Survey of Canada, retired) based in Dartmouth, Nova Scotia.

Acknowledgements

The author is grateful to associates who helped him obtain several unofficial English translations of the Arctic Policy of the Russian Federation. Readers are advised that the views expressed in this article are derived from a reading of these unofficial translations, and that minor discrepancies may exist between English texts and the official Russian document. The author also expresses his thanks to reviewers who offered constructive comments after reading an early draft of this article. Opinions expressed as well as errors of fact or understanding, however, are the author's own.

BOOK REVIEW

Fred Weihs

Finding Dahshaa – Self-Government, Social Suffering, and Aboriginal Policy in Canada, by Stephanie Irlbacher-Fox, UBC Press 2009. 216 pp. $32.95 paper. ISBN: 978-0-7748-1625.

In the late 1980s, as a negotiator for the Inuit Tungavik Federation of Nunavut, I participated in negotiations on the economic provisions of the Nunavut land claim agreement. As part of the final settlement, the Government of Canada would transfer funds to Inuit as compensation for ceding Aboriginal rights to lands and waters in exchange for the specific rights and benefits provided within the agreement. As these funds represented a contractual transfer of capital, they would logically not be subject to tax. Both Inuit and Canada agreed that it would be beneficial to negotiate taxation provisions within the claim to ensure that these transfers were not subject to unexpected, adverse rulings of the tax department.

When it came to negotiating the tax provisions however, government negotiators tabled a set of provisions that tied agreement on tax protection for claim organizations to a regime of permanent oversight by the government of the funds held by Inuit and of the specific types of expenditures allowed. Any activity outside the narrow specifications of government-mandated expenditures would result in disallowance and severe financial penalties. Inuit protested that as this money was being paid in compensation for surrender of interests in lands and resources, it belonged to Inuit to use as they saw fit for their economic, social and cultural betterment. However, the government had tabled similar provisions at other land claim negotiations tables and declared that comparability with other claim settlements was essential; therefore this first offer represented their bottom line. On receiving advice that agreement to these provisions would give Inuit land claim implementation organizations a tax status worse than that enjoyed by any Canadian under the laws of general application, Inuit refused to negotiate taxation as part of their claim.

In *Finding Dahshaa: Self Government, Social Suffering and Aboriginal Policy in Canada,* Stephanie Irlbacher-Fox provides a systematic analysis of how this type of government paternalism continues, still today, to permeate Canada's Aboriginal policies. She elucidates the attitudes and assumptions underlying Canadian Aboriginal policy through a detailed examination of the dynamics of self-government negotiations between Aboriginal communities and government, an area with which Dr. Irlbacher-Fox is very familiar. While a number of authors have addressed Aboriginal land claim settlements from an ethnographic point of view, she is the first to apply this perspective to the area of Aboriginal self-government.

This is Irlbacher-Fox's first book, which she began as a doctoral student in polar studies at Cambridge University, and it is both thoughtful and thought-provoking. For the past decade, she has worked on self-government and related areas for Aboriginal communities in the Northwest Territories. This allows the more theoretical elements of the analysis to be complemented by evidence from first-hand, practical experience, presented by means of three case studies in the Northwest Territories – Dehcho self-government negotiations on Resource Revenue Sharing, Délînê self-government negotiations on Child and Family Services, and Inuvialuit/Gwich'in self-government negotiations on Language and Culture.

Presented in tandem with the description and analysis of self-government negotiations are records of the author's experience working with Dene women to learn the skills of moosehide tanning, including finding *Dahshaa*, the rotted spruce wood essential to

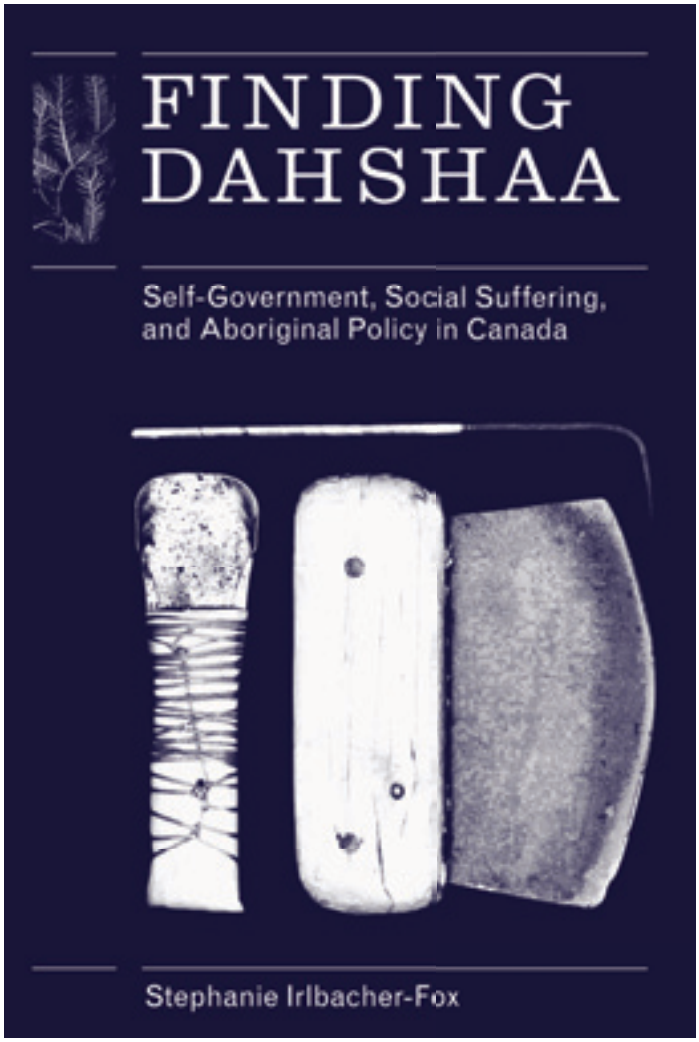
traditional tanning methods that provides the title for the book. These descriptions are intended as a "cultural referent", to help readers in understanding the cultural base that underpins Indigenous visions for self-government as a tool for cultural, social and political self-determination.

Self-government negotiations in Canada are the result of legal obligations under land claim agreements and of the1995 Inherent Right Policy, which recognizes the right of self-government as an existing Aboriginal right under the Constitution. Despite the intentions of the policy to "restore dignity" to Aboriginal people, a key theme of this book is that, as Bill Erasmus, Dene National Chief, states in his *Foreword*, "... colonial attitudes are entrenched in policies under which Canada negotiates today."

At the core of Irlbacher-Fox's analysis is an assessment of the extent to which self-government negotiations are able to address the ongoing injustice and resulting social suffering experienced by Aboriginal people in Canada. For Aboriginal people:

> *Social suffering can generally be understood as the various social pathologies afflicting Indigenous communities in Canada, a complex of disease and unwellness, poverty, and social issues often referred to as 'Third World conditions' common in Indigenous communities ... [The] argument advanced throughout this book is that these Third World conditions are actually the expected outcomes of colonization and injustice that is ongoing....*

Based on the three case studies, Irlbacher-Fox describes the divergence between Aboriginal and government views of the nature of this social suffering, and her analysis underscores the gulf in Aboriginal and government perspectives on self-government. For the Aboriginal groups profiled in the *Finding Dahshaa,* self-government is a tool for attaining increased control over vital governmental programs to address ongoing social suffering. This suffering results both from past injustices



as well as from existing institutional arrangements and policies that continue to impose a colonial relationship on Aboriginal people. Motivated by a profound lack of trust in government, Aboriginal participation in self-government negotiations is about self-determination – having the flexibility to establish governmental arrangements that accommodate Aboriginal rights for management of their lands and resources and that foster Aboriginal culture and identity.

Irlbacher-Fox argues that the key belief underlying government policies is that the current shameful conditions and dysfunction in Aboriginal communities are the result of past injustice, but are unrelated to current arrangements arising from federal policies. The current dysfunction in Aboriginal communities is seen to be caused by cultural differences, poor lifestyle choices and lack of capacity on the part of Aboriginal people. Whereas for Aboriginal people, self-government negotiations are an attempt to secure protection from future government interventions, the government's view of the causes of current social suffering provides a rationale for increased intervention and control over the lives of Indigenous people. The author notes that, with access to financial resources "far outstripping those of Indigenous negotiators" and able to establish "bottom lines" "consistent with their various internal policies, jurisdictional and legal frameworks, and political interests", the government's view of the purpose and nature of self-government negotiations prevails. These assumptions, which underlie current Canadian Aboriginal policies and government negotiating mandates, have resulted in self-government negotiations and

arrangements that have failed the expectations on the part of Aboriginal communities for increased self-determination.

Irlbacher-Fox uses the example of the community of Délînê's negotiations on Child and Family Services to demonstrate how government authorities resulting from self-government negotiations are bounded by conditions that operate at the discretion of other governments. For Délînê, this self-government initiative was seen as a response to impairment of the community from previous policies of assimilation, including residential schools, and from the ongoing consequences of externally administered child and family service programs. Authority in the area of child and family services was seen as essential to preservation of their identity and culture. However the offer presented by the Government of the Northwest Territories, which had jurisdiction in this area, provided for Délînê taking over jurisdiction only upon successfully operating a Child and Family Services agency under GNWT law for 10 years. Even at that point the final decision on Délînê laws and programs would remain with the GNWT Director of Child and Family Services. If the Director determined that they were not meeting or surpassing the GNWT's standards, responsibility would revert to the GNWT. This position was presented by the government as their bottom line, which Délînê felt compelled to accept in order to secure some measure of control over these programs.

Throughout *Finding Dahshaa,* Irlbacher-Fox advances her analysis through this type of practical evidence from the positions and discourse that characterize specific self-government negotiations. She is less concerned with speculating on the intentions underlying Canadian Aboriginal policy than on the need to find a way out of the "misdirected" policies that have further imbedded colonial relationships and attitudes. One part of the answer, she suggests, lies with the Indigenous resurgence movement, which promotes greater self-determination for Aboriginal people through personal and collective regeneration of culture. The other essential element is a renewal of government policies and negotiating mandates to provide for self-government arrangements that provide Aboriginal people with more direct control over the laws, programs and services that bear directly on their lives. In the words of Bill Erasmus, governments need to allow the "social and political space for Indigenous people to exist as Indigenous people". This is the essential lesson that comes through *Finding Dahshaa.*

Fred Weihs works with Aboriginal groups in Nunavut, Northwest Territories and other areas of northern Canada on land claims and economic development. In the 1980s he worked as a negotiator with the Tungavik Federation of Nunavut on the Nunavut land claim agreement and with the Metis Association of the Northwest Territories.

NEW BOOKS

Arctic Scientist, Gulag Survivor: The Biography of Mikhail Mikhailovich Ermolaev, 1905–1991, by Aleksei Mikhailovich Ermolaev and V.D. Dibner. Edited and translated by William Barr. University of Calgary Press, 2009. $44.95. ISBN: 978-1-552382-56-1.

One of the most prominent Soviet Arctic scientists of the 1920s and 1930s, Mikhail Mikhailovich Ermolaev was a geologist, physicist, and oceanographer. After working in the Arctic for some 13 years, he was arrested by the NKVD, convicted on a trumped-up charge of "sabotage", and sent to the Gulag for 10 years. After barely surviving a year of correctional hard labour in a lumber camp, Ermolaev was appointed to a sharashka, or professional team, which was charged with extending the railroad to the coal mines of Vorkuta in the farthest reaches of northeast Russia. Still later, he and his family were exiled to Syktyvkar and Arkhangel'sk. Remarkably, Ermolaev was eventually able to resume his academic career, ultimately establishing a new Department of the Geography of the Oceans at Kaliningrad State University.

Translated from the original Russian and edited by William Barr, this biography is a fascinating personal account typical of the experiences of so many Soviet citizens who were unjustly banished to the infamous Gulag. (University of Calgary Press)

The Language of the Inuit: Syntax, Semantics, and Society in the Arctic, by Louis-Jacques Dorais. McGill-Queens University Press. $45.00 hard cover. (0773536469) 9780773536463.

The Language of the Inuit is the most comprehensive study to date of the language and the forces that have affected its development. The culmination of 40 years of research, *The Language of the Inuit* maps the geographical distribution and linguistic differences between the Eskaleut and Inuit languages and dialects. It shows the effects of bilingualism, literacy, and formal education on Inuit language and considers its present status and future. (McGill-Queens University Press)

The Canadian Forces and Arctic Sovereignty: Debating Roles, Interests, and Requirements, 1968–1974, by P. Whitney Lackenbauer and Peter Kikkert. Wilfrid Laurier University Press. $34.95 paper. ISBN: 13: 978-1-92680-400-2.

This book introduces the debate about the Canadian Forces' role, mission, and contributions to Arctic sovereignty during these pivotal years. Policy analysts grappled with many of the same issues facing decision makers today, and recently declassified documents (published in this volume for the first time) yield insights into what Canadians should reasonably expect from their military as the country develops and implements an Arctic strategy in the 21st century. (Wilfrid Laurier University Press)

Inuit Shamanism and Christianity: Transitions and Transformations in the Twentieth Century, by Frédéric B. Laugrand and Jarich G. Oosten. McGill-Queens University Press. $32.95 paper. (077353590X) 9780773535909.

Using archival material and oral testimony collected during workshops in Nunavut between 1996 and 2008, the authors provide a nuanced look at Inuit religion, offering a strong counter narrative to the idea that traditional Inuit culture declined post-contact. They show that setting up a dichotomy between a past identified with traditional culture and a present involving Christianity obscures the continuity and dynamics of Inuit society, which has long borrowed and adapted "outside" elements. They argue that both Shamanism and Christianity are continually changing in the Arctic and ideas of transformation and transition are necessary to understand both how the ideology of a hunting society shaped Inuit Christian cosmology and how Christianity changed Inuit shamanic traditions. (McGill-Queens University Press)

HORIZON

GeoCanada 2010:
Working with the Earth
Calgary
10–14 May 2010
www.geocanada2010.ca

International Polar Year
Oslo Science Conference
Oslo, Norway
8–12 June 2010
www.ipy-osc.no/

Scientific Committee
on Antarctic Research
Open Science Conference 2010
Buenos Aires, Argentina
2–6 August 2010
www.scar.org/conferences/BuenosAires/SCAR31_OSC_1st_Circular.pdf

Meridian is printed on paper certified by the Forestry Stewardship Council.

MERIDIAN
is published by the Canadian Polar Commission.

ISSN 1492-6245

Editor: John Bennett
Translation: Suzanne Rebetez, John Bennett
Design: Eiko Emori Inc.

Canadian Polar Commission
Suite 1710, Constitution Square
360 Albert Street
Ottawa, Ontario
K1R 7X7

Tel.: (613) 943-8605
Toll-free: 1-888-765-2701
Fax: (613) 943-8607
E-mail: mail@polarcom.gc.ca
www.polarcom.gc.ca

To receive printed copies of *Meridian* please contact the editor. There is no subscription charge.