



Reindeer herd in St. Paul Island, Alaska.

Photo: Johnny-Leo L. Jernsletten

## Conclusion

DON RUSSELL, *Canadian Wildlife Service, Environment Canada*

BIRGITTE ULVEVADET, *University of Tromsø*

### Introduction

The significance of reindeer and caribou to Indigenous Peoples of the rural regions of the Arctic is obvious and must not be understated. Its value as a principal subsistence resource makes reindeer and caribou a keystone species of the Arctic, and one that is closely connected to human culture and socio-economic change.

In this respect, the sustainability of family-based reindeer/caribou herding and hunting relates to resource ecology, socio-economics, human demographics, the transmission of cultural traditions from one generation to the next, political processes at the regional, national and international levels as well as the growth and development of reindeer/caribou herds.

Indigenous peoples of the Arctic have engaged in the cash economy and in some regions, established innovative legal arrangements that specify indigenous rights to reindeer/caribou harvest. In Canadian caribou hunting and Swedish and Norwegian reindeer

husbandry indigenous peoples hold special rights for these activities, whereas hunting and herding in Finland and Russia are not based on special rights for the indigenous peoples. In United States we find both, because the indigenous population does not have priority harvesting rights of access to caribou. However, participation in the reindeer husbandry in Alaska is primarily an exclusive right only for the Alaskan Natives, but today in some regions we also find non-indigenous participation.

### Development and traditional values

As a result of government policies as well as general social and technical development processes among the indigenous communities in the Arctic regions, most indigenous reindeer/caribou users of today reside in

permanent settlements and demand jobs, formal education, professional health care, infrastructure, and other social services. Despite the technical and social development, we find that traditional values still are a strong factor that affects their everyday life.

We have seen that the indigenous peoples in all the countries have developed, and still maintain an intimate relationship with reindeer/caribou and a rich knowledge of its interrelationships with the land and people. Traditional values are integrated in their everyday lives and span from local-level cultural transformations to contemporary international geopolitics. The wild reindeer/caribou migratory nature and cyclical changes in population as well as the specific knowledge needed in herding and hunting activities are traditional values that evolve together with societal development and in different ways permeate the everyday lives of reindeer/caribou using families.

## Family and community relations

### Reciprocity

The indigenous reindeer/caribou herding and hunting families of the Arctic represent a system of production for securing and maintaining the sustainability of the reindeer/caribou resource. At the centre of these production systems are family co-operation that in many cases also expand to the extended family, and in some areas to the whole community. The sharing and exchange among family members are mostly non-monetary, where reindeer/caribou resources, technical equipment and practical help are exchanged.

### Children's schooling

Children's schooling is the same all over the Arctic – mandatory primary education. The educational institutions are often located in the villages, which contributes to children's distance from the direct reindeer/caribou activities, because parents (mostly fathers) often commute between the herding and hunting areas and the permanent home. In Scandinavia and many places in North America the distances between school and home are not so far, whereas in Russia and some rural and isolated areas in Canada the distance

is very far. In general many families often feel on the one hand that formal education is important and necessary for the children, while they on the other hand experience that this situation contributes to a diminishment of children's participation in and knowledge transmission of reindeer/caribou activities.

### Female labour

We generally find that most women in reindeer herding and hunting families in Scandinavia and North America often work outside these activities in order to generate more income to the family. In North America and Scandinavia the women are often found to be the main financial contributor to the family, while also participating in herding and hunting activities on weekend and holidays as well as heading the administrative work related to the reindeer husbandry. We therefore see that women still have an important role in the maintenance of herding and hunting economies. In Russia this is a bit different. In the Yamal area we find many nomadic reindeer herder families where both spouses together with children under school age migrate with the family herd following the traditional labour division. In many other regions the wives and children often live in villages and are only able to meet their spouse and father periodically during the year. Some women manage to find work in the village, while others live on welfare.

### Co-existence

In United States (Alaska) and in Russia we have found that co-existence between domesticated and wild reindeer/caribou populations on the same or adjacent pastureland is an increasing problem among the reindeer owners/herders. Every year reindeer herders can experience thousands of domesticated reindeer being "swept up" and following the wild herds. Some groups of reindeer herders living in particularly vulnerable areas are on the verge of losing their domestic herds all together. On the other hand, hunting of wild reindeer/caribou is an important source of livelihood for many indigenous peoples living in Russia and North America, which means that the wild herds are an important and necessary resource as well. In Alaska, however, new innovative practices involving Safe Areas and radio collaring to support herders and their problems with caribou are being tested and implemented.

In Finland, Norway and Greenland there are some problems of co-existence, but with a relatively low wild reindeer population the problem is much less serious than what is experienced in Russia and United States (Alaska) and subsequently fewer reindeer owners are affected. Other common problems of co-existence in all countries (except Sweden) are feeding competition on the pastures and transmission of diseases from wild to domesticated herds in Russia and Alaska.

## Distribution and abundance of wild herds

Wild *Rangifer* populations are distributed from the high arctic Islands (80° N latitude) to the boreal forests (48° N latitude). There are approximately 5,5 million wild reindeer in the circumpolar north with Canada, Russia, United States (Alaska) accounting for over 97 percent of that total. The wild populations can be classified as tundra, forest and arctic island ecotypes. The largest populations are found in the tundra/taiga transition zones of North America and Russia. These herds move from their tundra summer ranges to their taiga winter ranges. The forest ecotype often remains in the forest throughout the year or migrates to alpine areas in the summer. The forest ecotype is typically comprised of small, scattered populations, rarely exceeding 10 000 animals compared to the tundra ecotypes that can number in excess of 800 000 individuals. The arctic island ecotype generally remain on islands year round, often migrating between islands and sometimes moving on to the mainland for short portions of the year.

The individual herds are primarily counted from the air during the calving or post-calving period. In North America this activity has been significantly augmented by the deployment of radio-collars to locate the scattered aggregations of caribou. In Russia, radio-collars have yet to be used and aggregations are located by extensive aerial reconnaissance. In some parts of Canada and Russia, transects during the calving period are used. This method samples one portion of the herd (pregnant or parturient cows) and the proportions of age and sex classes in the population are needed to calculate a total count for the population.

In North America herds are defined using extensive radio-tracking information, especially during the breeding and calving seasons, and often augmented with DNA analysis. Without benefit of radio-collars

and without the systematic use of DNA analysis, the identification of herds in Russia is more confusing. This problem is particularly true for the largest herd in Russia, the Taimyr Herd, where researchers disagree over whether it is one discrete population or a number of smaller herds.

## Forces regulating the numbers of wild herds

Populations on the arctic islands are significantly impacted by severe weather conditions. In Canada, where some of the high arctic ecotype is considered endangered, icing conditions has resulted in rapid movement from affected areas and significant die-offs. Reindeer in the high arctic islands of Russia also experience severe weather conditions and their numbers are in a constant state of instability.

The forest reindeer and caribou populations in the southern portion of the *Rangifer* range are much more vulnerable to predation and human activity compared to the arctic island populations. The abundance and diversity of large mammal populations in the forest zone contributes to a high relatively stable population of the reindeer's primary predator, the wolf. Intensive forestry and mineral/hydrocarbon development tends to isolate these small populations and also provides easy access to hunters and predators. Because of this isolation and access to hunters and predators that the development provides, forest *Rangifer* populations across the circumpolar north appear to be in decline, with some populations classified as endangered.

The large tundra populations appear to cycle, at least in North America, on an approximately 40 year time scale. Populations were universally low in the mid 1970's and peaked in the mid to late 1990's. These cycles in North America are undoubtedly driven by continental weather patterns such as the Arctic Oscillation and the North Atlantic Oscillation. There is still considerable individual herd variation that probably reflects the relative growth rates of the populations. Synchronous cycles are less obvious in Russia. Accounting for the growth and decline of herds in Russia is not only complicated by the uncertainty in identifying individual herds, but also by the interaction between wild and domestic herds. A huge decline in the number of domestic reindeer has coincided with the increase in wild herds in Russia and it remains unclear whether the wild herds are on a natural popu-

lation increase or are being augmented by domestic stock.

## Management and co-management

### Management of wild herds

Management of wild *Rangifer* herds is the responsibility of Ministries or Departments of wildlife at the local, regional, or national level, depending on the country. In North America, management is the responsibility of the provinces and territories in Canada and the state in United States. The only exception in Canada is when the animals are found on federally controlled land such as National Parks. Annual population monitoring surveys are primarily conducted by the responsible government agency. Census, calf production and age and sex structure of the populations are universally documented on a periodic basis. Generally herds are counted at least every three years although some of the larger herds have not been counted in over a decade.

Over the last couple of decades in Canada, land claim agreements with Indigenous Peoples and governments have, resulted in the establishment of co-management arrangements. These bodies normally consist of representatives from provincial or territorial governments and the native governments. Co-management groups make recommendations regarding the management plans or regulations for the herd to the appropriate Minister. The Ministers normally are required to respond to the recommendations within a set period of time, indicating whether the recommendations are accepted and if they are not, then reasons for not accepting them are required. Where these formal groups have not been established in Alaska, informal arrangements are beginning to emerge, for example within the range of the Western Arctic Herd in Alaska.

In Russia management of wild reindeer is the responsibility of The Game Resource Department in The Ministry of Agriculture of the Russian Federation. The concept of management includes protection of the small wild reindeer herds all over the Russian North and a rational use of several of the larger populations. The main method of monitoring the herds is through aerial surveys, which are conducted by

responsible government agencies. There are important gaps in the knowledge of spatial structure and number dynamics of some wild reindeer populations and there is an obvious need to improve the monitoring system with radio-collars monitored from satellites and genetic studies.

In Russia more local control of the wild reindeer populations are beginning to be recognized, although most management decisions are still primarily state generated. A new approach to monitor wild reindeer migrations with help of observer networks is developing in Chukotka. The network includes aboriginal observers working in collaboration with scientists and aiming to prevent conflicts between wild and domesticated reindeer herds.

### Management of domesticated herds

The management of the reindeer husbandry is the responsibility of Ministries of wildlife and agriculture at the local, regional, or national level, depending on the country. In Russia the reindeer husbandry is subordinated to the Ministry of Agriculture of Russia on the federal level and to Departments of Agriculture in regional Administrations. The different reindeer herder unions in Russia are not included in any decision making bodies on the political level and there are no co-management boards.

In United States on Alaska's— Seward Peninsula, the primary location of herding, management of reindeer husbandry is subjected to the U.S. Bureau of Land Management, Alaska Department of Natural Resources, and the U.S. Department of Interior National Park Service, all of which have the responsibility of the land management. As well we find special rules of the State of Alaska. Larger private land owners such as regional corporations and village corporations also have rules, regulation and procedures that affect the reindeer husbandry (SRH pp 74-75). The Reindeer Herders' Association serves as a connecting link between the reindeer herders and governmental institutions.

The management of the Scandinavian reindeer husbandry is the responsibility of the Ministries of Agriculture. As in United States and Russia, the Ministries delegate the management to regional and local levels. Whereas in Norway The Reindeer Husbandry Agreement is negotiated every second year between The Norwegian Reindeer Herders Association and The Norwegian Ministry of Agriculture, we cannot



Herders of North America periodically use helicopters for round-ups

Photo: Tom Gray

see that such a practice exists in other Scandinavian countries.

## Hunting and herding economies

Many indigenous peoples of the Arctic hunt and/or herd reindeer/caribou. In North America and Russia we find that even those communities with a high harvest of other animal resources such as small game and marine resources take a significant number of reindeer/caribou. In all countries we find a mixed cash–subsistence economy and many family and community members help each other when needed. However, the degree of commercial and subsistence economies differs between the countries and between herding and hunting economies. As well most herding and hunting families in Fennoscandia and North America generate additional incomes from other sources than reindeer/caribou, where as most indigenous families in Russia often have difficulties finding other income sources

than *Rangifer*. The income from herding and hunting is in general one part of an entire economic system that often consists of multiple occupations.

Monitoring the total circumpolar harvest of wild *Rangifer* is highly variable in terms of techniques and accuracy. The total number of wild reindeer harvested is roughly between 250 000 to 300 000 individuals each year, which constitutes a major contribution to the regional economy throughout the circumpolar north. Commercial operations account for most of the hunting economy of wild reindeer in Russia. In North America, many indigenous peoples are against the commercial exploitation of caribou herds and harvest primarily to meet their subsistence needs. As a consequence, sharing within and between communities is a major form of meat distribution and reasonable expenses of the hunter can be reimbursed. In Alaska, state law prohibits commercial harvest of wildlife. Indigenous subsistence harvest accounts for over 80 percent of the total harvest of caribou annually taken in North America. By comparison approximately 80 percent of the total reindeer taken in Russia are taken as a commercial harvest.

There is much more infrastructure in place within the ranges of those herds that have a commercial harvest. For example in the range of the Taimyr herd the region of most intensive commercial harvest contains over 50 slaughterhouses and 20 underground ice-houses. Transportation of carcasses to markets is highly mechanized in Russia but since the downfall of the Soviet Union, the costs are subject to market forces and have escalated considerably. Whereas commercial harvesting decreased dramatically after the break-up of the Soviet system, the industry is now rebounding and harvest levels are increasing again.

Swedish, Finnish and Norwegian reindeer husbandry is primarily focussed on meat production. Strict rules on hygiene and waste handling of meat make a subsistence economy difficult. In Russia reindeer husbandry has a significant subsistence economy due to lack of transportation and because families are living far away from the market. Families exchange and sell meat in the local community. However, there are several large reindeer enterprises with commercial reindeer meat production. Presently in Alaska the reindeer herding industry supplies primarily meat for subsistence consumption due to the rapid decrease of domesticated herds.

In Sweden and Norway all reindeer meat are produced from the Saami, where as in Finland and Alaska the reindeer meat is produced from both indigenous and non-indigenous reindeer owners. In all cases the income from meat production, handicraft and tourism are for most families not enough to live of and additional income is therefore necessary. In Russia we find some families that receive income from outside the reindeer husbandry, but very few family members are able to find additional work since the reindeer are located far away from the settlements and villages.

## Industrial development

In North America and the western part of the Russian North there is an ever increasing interest in northern development within the ranges of large herds. In North America the most intensive industrial development is the oil fields surrounding the Prudhoe Bay area in Alaska. Proposed oil and gas development on the calving grounds of the Porcupine herd in the Arctic National Wildlife Refuge is one of the most high profile and controversial environmental issues of North America. While a number of studies have documented

the impacts of the development, the herd that inhabits the development zone of Prudhoe Bay has increased over the last four decades. In western Siberia pipelines, roads and resource extraction still have major impacts on the migration routes, hunting access and the reindeer husbandry. After the collapse of the Soviet Union many economically marginal operations have been shut down in North-East part of Russia, while the deteriorating infrastructure remains. As reflected in the SRH report, the reindeer husbandry in Norway, Sweden and Finland is increasingly being affected by industrial developments as well.

Strict environmental assessment procedures for the review of proposed industrial development are legislated in North America, unlike Russia, and government, industry and indigenous peoples' organisations are finding innovative ways to cooperatively research and assess the potential impacts. A good example is the West Kitikmeot Slave Study Society formed to help direct the development of diamond mines in the Northwest Territories.

## Climate change

The rapid increase in greenhouse gas emissions is the basis for Global Climate Model projections of significant changes to northern climate in this century. In North America, these projections have resulted in a number of studies and monitoring programs designed to assess the present trends and projected impacts of climate change on caribou populations. In Russia, the disruption of the Soviet system, the lack of adequate baseline data and monitoring programs and the complication of domestic reindeer declines has reduced manager's ability and thus, priority, to monitor and prepare for climate change impacts. In general climate change creates difficulties for herds due to late timing of snowfalls, freeze-ups and earlier break-ups that often results in problems for the herds' natural movement.

## Overall

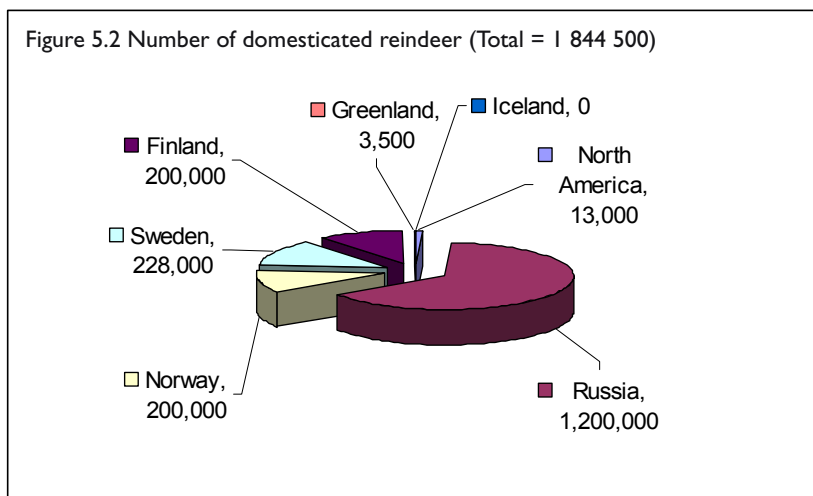
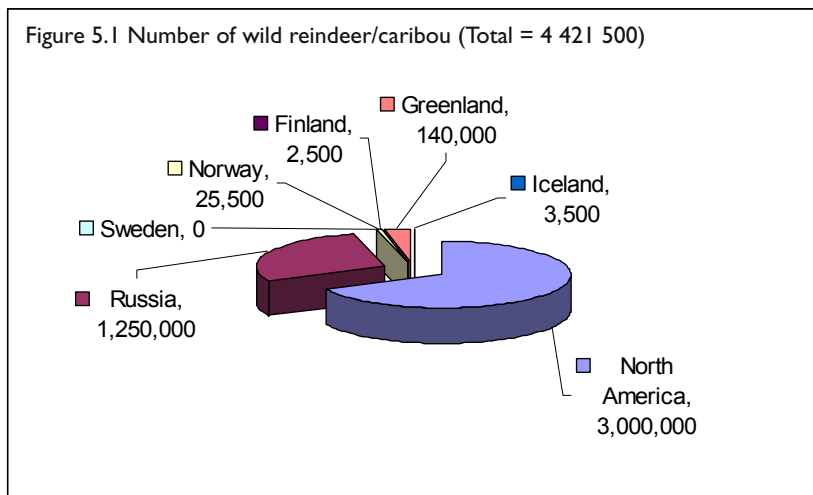
Wild and domesticated *Rangifer* populations across the Circumpolar North are an extremely valuable component of the cultural identity of many northern peoples. As well, the subsistence and commercial value of the species supplements an often limited northern

economy in many communities. Still, many families struggle to meet their basic needs and it is difficult to live on reindeer/caribou resources alone, the consequence being multiple occupations.

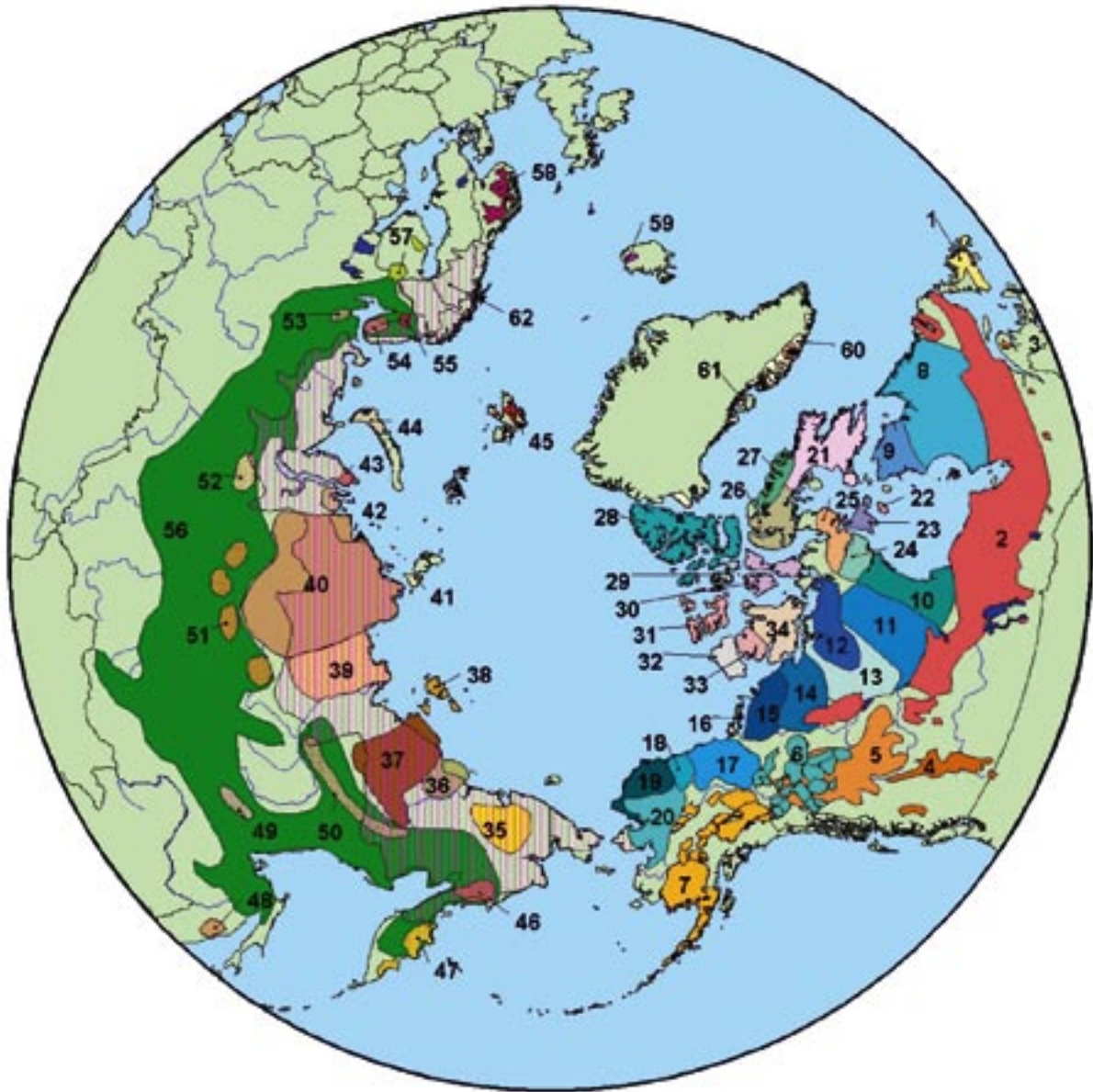
As a generalization, in North America the management of the species is based on a clear definition of herds, an adequate research base and monitoring program, and, increasingly, local control of decision making. The wild populations are managed primarily for subsistence hunting, while domesticated populations in Alaska form the basis of both a subsistence and commercial meat- and antler sales economy. Caribou and Reindeer of North America are managed under strict environmental protection policies and relatively limited, controlled industrial development.

In general, Russian wild herds are managed, primarily through state control, for commercial harvest based on adequate population data, a sometimes, unclear delineation between herds and within an environment with few legislated safeguards to protect habitat and control poaching. With the exception of seven regions domesticated herds are not managed through any law concerning reindeer husbandry specifically, but through several by-laws. In contrast to wild herds, the reindeer husbandry is mostly based on a subsistence economy. Scandinavian reindeer husbandry is managed and regulated by special laws regarding only reindeer husbandry with local control of decision making. The economy is both commercial and subsistence based, however, the income is generally low.

Below are the estimated numbers of wild and domesticated herds in the Circumpolar region, figure 5.1 and 5.2. Each number reflects the median of the highest and lowest official estimate made in the respective countries.



Map 5.1 Distribution of Wild and Domesticated Herds



- |                        |                                     |                                  |
|------------------------|-------------------------------------|----------------------------------|
| 1 Newfoundland         | 22 Coats Island                     | 43 Belyi                         |
| 2 Boreal               | 23 Southampton Island               | 44 Novaya Zemlia                 |
| 3 Atlantic             | 24 Lorillard                        | 45 Svalbard                      |
| 4 Southern Mountain    | 25 Wager Bay                        | 46 Parapolskii                   |
| 5 Northern Mountain    | 26 North Baffin Island              | 47 Kamchatka                     |
| 6 Yukon                | 27 Northeast Baffin Island          | 48 Amur                          |
| 7 Alaska               | 28 Eastern Queen Elizabeth Islands  | 49 Okhotsk                       |
| 8 George River         | 29 Bathurst Island                  | 50 Yakutsk                       |
| 9 Leaf River           | 30 Prince of Wales-Somerset-Boothia | 51 Evenkiya                      |
| 10 Qamanirjuaq         | 31 Western Queen Elizabeth Islands  | 52 Nadym-Pur (Yamal Okrug)       |
| 11 Beverly             | 32 Banks Island                     | 53 Arkhangelsk Oblast            |
| 12 Ahiak               | 33 Northwest Victoria Island        | 54 Terskii Bereg (Kola)          |
| 13 Bathurst            | 34 Dolphin-Union                    | 55 Laplandskii Zapovednik (Kola) |
| 14 Bluenose East       | 35 Chukotka                         | 56 Range of Forester Reindeer    |
| 15 Bluenose West       | 36 Sudrinskaya                      | 57 Finland                       |
| 16 Cape Bathurst       | 37 Yana-Indigirka                   | 58 Norway                        |
| 17 Porcupine           | 38 Novosibirskii Ostrava            | 59 Iceland                       |
| 18 Central Arctic      | 39 Lena-Olenek                      | 60 Greenland                     |
| 19 Teshekpuk           | 40 Taimyr                           | 61 Greenland Feral Reindeer      |
| 20 Western Arctic      | 41 Severnaya Zemlia                 | 62 Range of Domestic Reindeer    |
| 21 South Baffin Island | 42 Gydan                            |                                  |