# The 25 Largest Unfragmented Areas in the Arctic

WWF UNEP WCMC

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WWF Arctic Programme


**Authors (maps, GIS production and descriptions):**

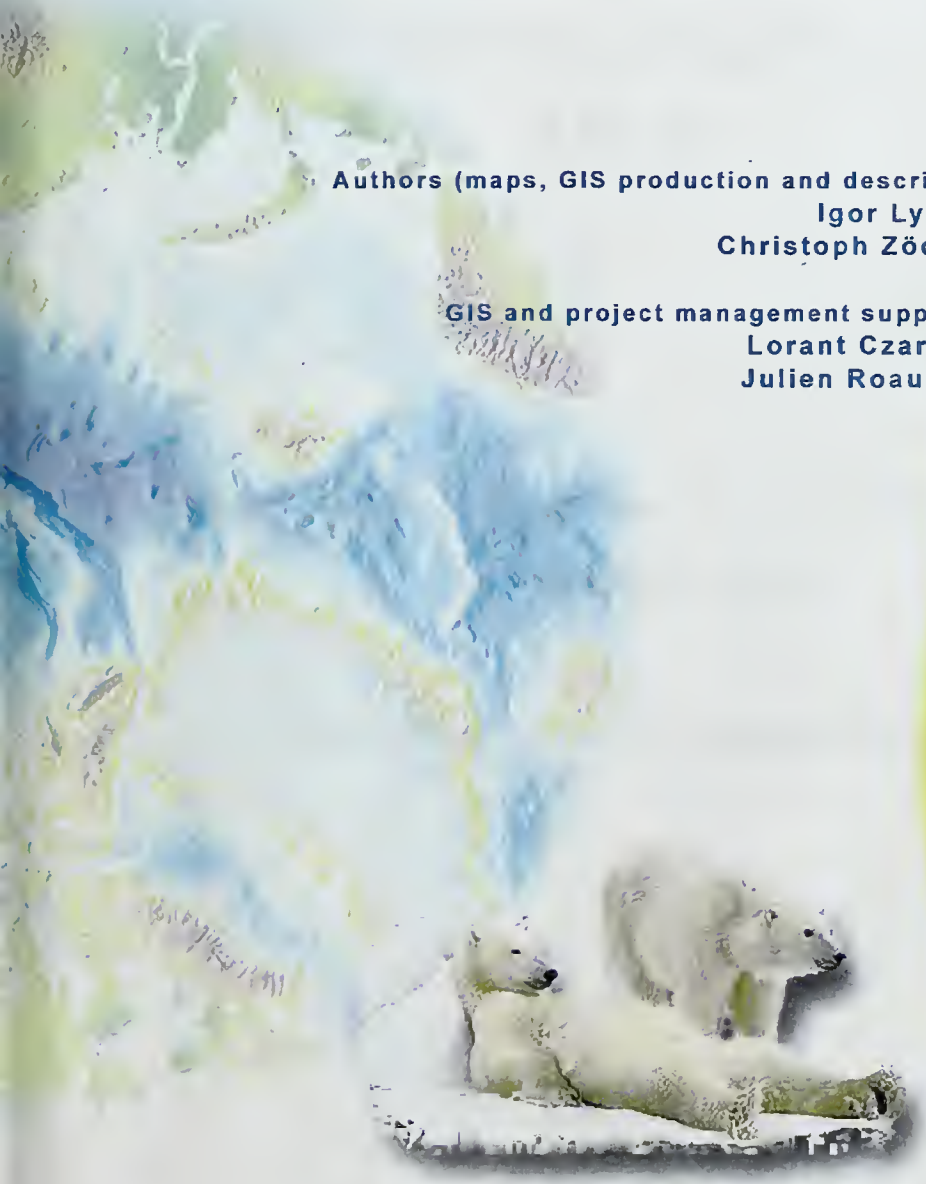
Igor Lysenko

Christoph Zöckler

**GIS and project management support:**

Lorant Czaran

Julien Roaud

# The 25 Largest Un-fragmented Wilderness Areas in the Arctic

*text by:* ***Igor Lysenko*** *(Lysenko@unep-wcmc.org)* & ***Christoph Zöckler***

*(Christoph@unep-wcmc.org)*

*also contributed: Lorant Czaran (czaran@grida.no)*

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# INTRODUCTION AND DISCLAIMER

In 2000 the World Wildlife Fund's (WWF) Arctic Programme called upon GRID-Arendal and UNEP-WCMC to produce a new report on Arctic wilderness by analysing impact of man-made infrastructure on nature and define the 25 largest wilderness areas, following the work done in 1995 on the same subject.

The scarcity of publicly available, up to date digital geographic data on infrastructure features at medium resolution proved the work more difficult than anticipated. We found ourselves obliged to use the same old Digital Chart of the World (DCW) for most of the Arctic region, given the tight schedule imposed and limited funding available.
In parallel, search for better data started, and certain areas of the Arctic are now covered by such data in our database, but mostly could not be used because of the imminent quality differences in the result.
The DCW data (roads, rail, settlements) over some areas (such as Siberia and parts of Canada) have been further improved during this project, using local expertise and review. WWF Canada staff, in light of the many changes that occurred during last years, reviewed settlement names in Canada but certain mistakes might still prevail. Readers are encouraged to contact us for any updates or corrections.

However, the result of this project, this Arctic Wilderness report should not be seen as the exact reflection of present-day wilderness status in the Arctic. While efforts have been made to improve the base data used in the analysis, as stated, the overall DCW dataset is of course outdated, but was the only public global dataset that could be used for our purposes. The results therefore reflect more the situation 10-15 years ago.. However, some recent development in the American Arctic might not been captured this way.
Practical experience showed that in order to achieve full coverage of the Arctic with newer, better, larger scale digital geographic base infrastructure data that is also publicly available would require another year or even more from now. The resources needed for this are much larger as the frame of the present project would have allowed.

Furthermore, specific areas of intense development in the Arctic such as Prudhoe Bay in Alaska or some mining areas in Siberia could not possibly be fully represented by this analysis, given the lack of access to the necessary data on those changes.

However, GRID-Arendal and UNEP-WCMC in general are committed to improve their data holdings for generating better quality products, and look forward to sharing results of any future updates with WWF and other interested organizations.
This project should be looked upon as an improvement towards the 1995 project but also as a long and ongoing process, rather than an isolated product.

**The authors, December 2001**

# DESCRIPTION OF THE PROJECT

The main purpose of this project was to explore where the last remote wilderness areas, resorts for nature, man and biodiversity can be found in the Arctic, as well as the pressures they are subjected to and their main threats. Since the Arctic Environment Protection Strategy (AEPS), the awareness of large undisturbed areas in the Arctic has grown, as well as the realisation of the threats and the speed of fragmentation.

There are two terms mentioned in the title, which require further explanation and definition.
What is **the Arctic region** and when is an area classified as a wilderness area?
The Arctic region has been defined several times and always differently, depending on the purpose and objectives. (see CAFF, AMAP and PAME). For this report we agreed with WWF on the most southern boundary of all definitions, including most of Alaska and many of the northern states in Canada, as defined by the WWF (see figure 1 and 2)..

The term **wilderness** has been interpreted differently and is not always understood in the same way by everybody. This has been discussed on various occasions and should be referred to (Fritz 1999, Nellemann et al. 2001, Kapos, Lysenko & Lesslie, 2000). In summary, we have defined wilderness areas as areas un-fragmented by any permanent physical man-made structures, such as roads, railways, power transmission lines or pipelines or settlements. Roads and settlements in the wilderness area will not exclude the very area from being classified as a wilderness area, as long as these roads are not connected to the main road network. Of course, they have to be regarded as areas of disturbance to the wilderness, and a buffer around these structures inside the wilderness areas shows the level of impact, as demonstrated in figure 1..
The impact of air transport and via rivers on boat or with heavy vehicles along the frozen rivers in winter to many of these remote places is significant, but is not part of this assessment.

Another important distinction has to be made between **winter and summer roads**. In the past there has been a lot of confusion and misinterpretation about the terms. Whereas formerly winter roads have been regarded as strong and physically permanent features in the landscape to withstand even the harsh Arctic winter conditions. But in fact summer roads require permanent physical structures to provide road access even in summer periods, when tundra soils turn into swamps. Most winter roads are therefore only accessible by vehicles in the winter months, a time also regarded as less harmful to most wildlife, often migrated into more southern latitudes. Winter roads do not require any road construction or permanent physical structures. Often, winter roads lead along a frozen river, but also across the wilderness. They not only damage the fragile tundra vegetation, but also cause disturbance to wildlife. Every effort has been made in this project to identify and differentiate "winter roads" from "summer roads" (or permanent roads) in the Arctic, with special attention to Siberia. The present wilderness analysis has been improved a lot in comparison with earlier outputs, based on DCW data only.
This report provides the first re-interpretation for the Arctic region with additional new data for Siberia (see figures 1 and 2). Although new data were already available

for some parts of the Arctic as presented above, there are still major gaps and many regions have not been interpreted using the most up-to-date base data, which would possibly tailor the wilderness areas slightly differently. This report therefore can mirror the situation only using the most accurate and complete data available publicly for analysis. When it comes to the data quality issues, a much-updated and higher resolution version of the old DCW global dataset (scale 1:1.000.000, last updated in the 1980's) is being produced by the US National Imagery and Mapping Agency (NIMA). NIMA is a military government institution and has strict rules of data distribution, being bound by official commitments to other national mapping agencies.
We started obtaining the Arctic data, but this process proved very slow and difficult because of the above reasons. Once completed however, the Arctic digital base data could exist at a scale of 1:250.000, with much fresher content checked by national mapping agencies. At the same time efforts are being made to work with national WWF groups, other NGO's, mapping agencies, the International Steering Committee on Global Map, to extract better and up-to-date base data that could be used for future work.
Such work will enable us in the longer term to possess a freely usable (and updated to near-present situation) database of infrastructure data, and would allow us to more confidently report on wilderness distribution in the Arctic.
We consider this project a good start rather than an end product in this process.

The development of infrastructure in the Arctic may impact flora and fauna directly by reducing the territory of particular habitats, and indirectly by affecting the ecological quality of surrounding territories via pollution, disturbance, increasing hunting pressure (legal and poaching), etc.
Some of the effects are very specific to the Arctic regions, like the damages to permafrost and vegetation caused by single caterpillar tracks, which might be less significant in southern zones. Particular details related to species requirements to minimum home range territory or migration areas and routes require a much more detailed investigation, which is not the object of this study.

## Methodology

After careful consideration of the best possible methods, and consultation among interested parties, it was decided to select the GLOBIO (short for **Global Methodology for Mapping Human Impacts on the Biosphere**) methodology as our approach to this new analysis.
GLOBIO relates thousands of scientific studies on environmental impacts to risk on ecosystems by the use of different buffer zones from infrastructure. By linking risk of impact to human expansions in different ecosystems and regions with satellite imagery, available resources and infrastructure, overviews of the past, the current and the possible future with continued growth in infrastructure can be derived. The impact zones are derived by a synthesis of hundreds of studies and adjusted according to geographical region, land cover, and climate. While many indices and tools, such as satellite mapping have been readily available, no simple tool has been available to effectively and visually communicate the cumulative impacts of human expansions on biodiversity and ecosystems.

While the traditional simple definition of wilderness would set a buffer of 5 kilometres around any type of man-made infrastructure and calculate the remaining areas as wilderness, there are several disadvantages for such a simplistic approach. The GLOBIO methodology was developed in response to these disadvantages, and chooses a more complex approach where buffering and distances from different types of infrastructure are scaled to defined sizes, depending on local conditions, land cover, the types of infrastructure themselves and their differentiated estimated impact on nature.
A pilot project applying the GLOBIO approach was earlier carried out by GRID-Arendal, and a Barents region wilderness analysis was produced.
As scientists and experts alike considered the approach well defined and relevant, and given the success of the Barents pilot, GLOBIO seemed like the right choice for our work.
The results of the GLOBIO work (Nellemann et al. 2001) and the correspondent pilot dataset presented by GRID-Arendal have been used as a starting point for the current analysis.
For more information on the methodology and the other studies produced, please also see http://www.globio.info on the web.

The GLOBIO set of rules therefore represents the result of applying specific criteria that allow classifying different elements of human infrastructure (settlements, roads, pipelines, etc.) into groups that have different level or no potential impact on biotic components of Arctic ecosystems. The spatial component of the GLOBIO approach considers in particular the maximum distance from infrastructure features where the potential impact on ecosystem might be identified. Further effects, related to the geographical extent and size of particular ecosystems affecting fragmentation have not been analysed at the current stage of the GLOBIO project.

The identification of the largest wilderness areas requires a threshold that we considered 20 km as a distance from man-made infrastructure features. This approach is very close to the well-based criteria developed in the GLOBIO study. This threshold has been applied to all the features, identified in the GLOBIO dataset as a source of impact, including features interpreted by the GLOBIO project as sources of potentially low impact and lower "impact distance". The reason for this was the inaccessibility of the latest data on current development in the Arctic and consideration of much higher risk of further development along existing elements of infrastructure (like power transmission lines) that have been confirmed in the GLOBIO study and applied for the existing predictive model of potential development. Therefore, applying the maximum "potential impact distance" we did try to escape the underestimation of the existing level of fragmentation of the Arctic ecosystems. For the future, a more detailed analysis of particular habitat fragmentation, a more detailed consideration could be applied, but in relation to the largest un-fragmented areas it could not make any visible difference, neither on size nor on the position of huge wilderness areas.

For a considerable part of the Russian Arctic, new up-to-date sources have been included and newly digitised, and data was used to replace the base dataset (Digital Chart of the World, or DCW) used previously for the GLOBIO project. Accordingly, it has been decided that major Arctic archipelagos like the entire Canadian archipelago, connected by pack ice during winter period, remain considered as one

wilderness area, separate from the continent and Greenland, regardless the distances. Greenland has been considered as a separate island and treated separately as a "continent". Russian islands also have been considered as separate units, such as the New Siberian Islands, and not connected to the Eurasian continent.

Any terrestrial territories connected via corridors without infrastructure features closer than 20 km have been counted as a single wilderness area. For illustrative purposes, the final dataset presents the information about "core wilderness areas", remote by more than 100 km from nearest known human infrastructure elements. It might be used as indication of good chance to not expect considerable changes in the wilderness quality in the foreseen future (Figure 1).

The minimum size threshold for the selection of "major" wilderness areas has been set at 25,000 $km^2$. Some of these areas do have considerable additional extent further to the south of the Arctic boundary. This is reflected in the description of each site and in the figures in table 1.

All 25 sites have been described in terms of general features, biodiversity and major threats possibly leading to further fragmentation. It seemed to be too big a task to describe all the features of biodiversity. In the report we focussed on globally threatened and endemic or semi-endemic species with almost their entire distribution in the actual wilderness area or only one more site. In addition we listed species and where available population status for species very much reliant on large, undisturbed territories. These include mainly large bird predators and carnivores, but also migrating species among the mammals or those living in large herds, such as reindeer, musk, ox and others, particularly vulnerable to fragmentation. Among the threats we mostly focused on the exploitation of mineral resources, but also exploitation of forest and hydropower, as well as the developments in tourism.

**Results**

Table 1 lists the 25 largest wilderness areas in the Arctic by their size in the Arctic region. Some of the areas extend further south beyond the Arctic boundary (see table 1).
The first six or seven, and most likely also the eighth are among the ten largest sites in the world.
The largest wilderness area is Northern Siberia, an area very diverse in habitats and surprisingly containing hardly any glaciers at all, and also very little barren land, compared to sites No. 3 and 4. The site map (figure 3.) also shows the pressure on such a site.
The second largest wilderness area, the Central Canadian Taiga and Tundra can in fact be regarded as the largest of all Arctic areas, when considered jointly with the Canadian archipelago (No. 4), which is only separated by the sea (and even this is mostly sea ice), and not by any human constructions, with a total size of more than 3.5 million $km^2$.

Still, this is only 25% of the size of Antarctica, the largest wilderness on earth.

In fact, all Arctic wilderness areas over 25,000 $km^2$, if summed, add up just about to the total area of Antarctica.

*The North Pole area seen from space by the Terra/MODIS sensor; © 2000 - NASA*

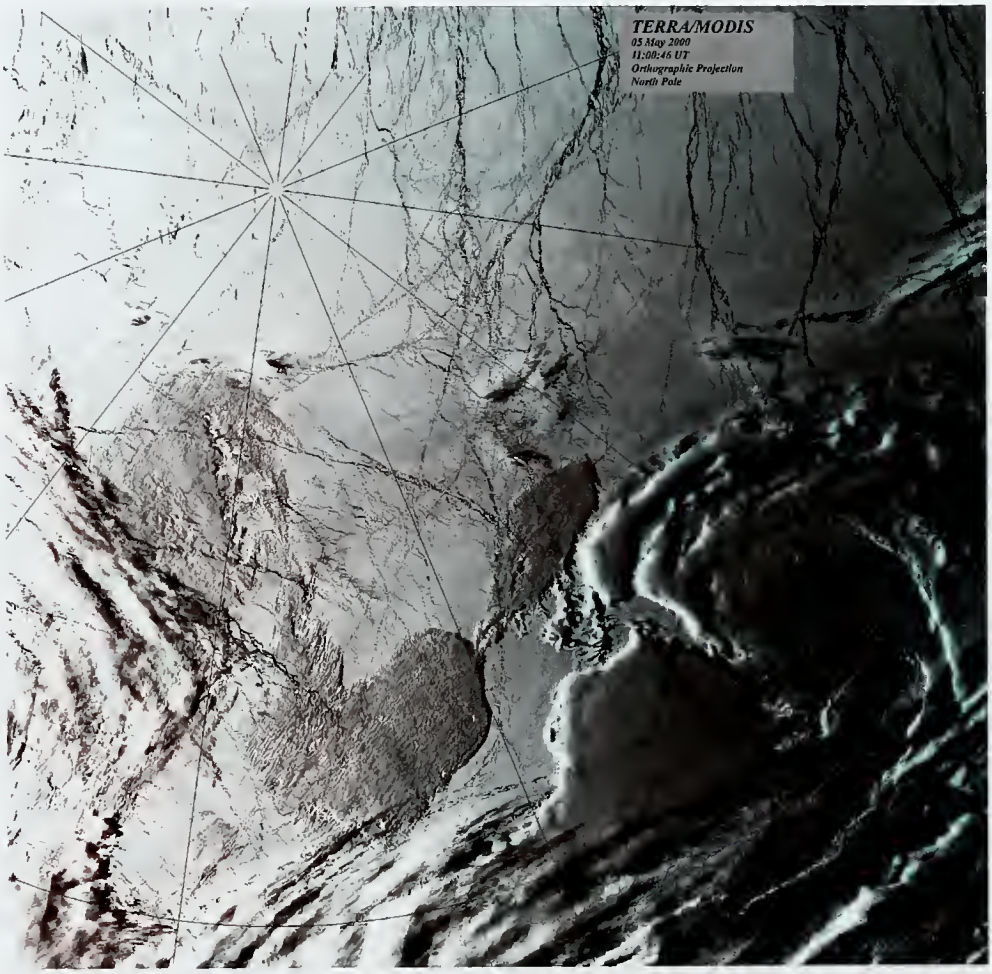


Table 1: The 25 largest un-fragmented areas in the Arctic region, as defined by WWF (see also figures 1. and 2.)

| No. | Size in km$^2$ (ARCTIC) | Total size in km$^2$ | NAME |
|---|---|---|---|
| 1 | 2310624 | 2803036 | Northern Siberia |
| 2 | 2214184 | 2479114 | Central Canadian Taiga and Tundra |
| 3 | 2120096 | 2120096 | Greenland |
| 4 | 1380725 | 1380725 | Canadian Archipelago |
| 5 | 818059 | 908086 | Eastern Canadian Shield |
| 6 | 777840 | 858407 | Chukotka-Koryak |
| 7 | 691167 | 691167 | Alaska |
| 8 | 282906 | 596249 | Southern Hudson Bay |
| 9 | 273394 | 273394 | North-Yukon |
| 10 | 205494 | 574468 | Gydan |
| 11 | 94741 | 94741 | Yamal |
| 12 | 94138 | 103072 | Bolshezemelskaya Tundra |
| 13 | 89324 | 95329 | Muskwa/Slave Lake Forests |
| 14 | 84255 | 171190 | Southern Labrador |
| 15 | 78971 | 78971 | Novaya Zemlya |
| 16 | 77136 | 99638 | St. Elias/Kluane |
| 17 | 60229 | 60229 | Svalbard |
| 18 | 55014 | 55292 | Sordoginskiy Mountains |
| 19 | 47231 | 47231 | Kola |
| 20 | 47082 | 47082 | Yukon Alpine Tundra |
| 21 | 44359 | 44359 | Markha River Valley |
| 22 | 41579 | 55968 | James Bay Lowland |
| 23 | 38135 | 38135 | New Siberian Islands |
| 24 | 35995 | 35995 | Severnaya Zemlya |
| 25 | 29424 | 89939 | Malazemelskaya Tundra |

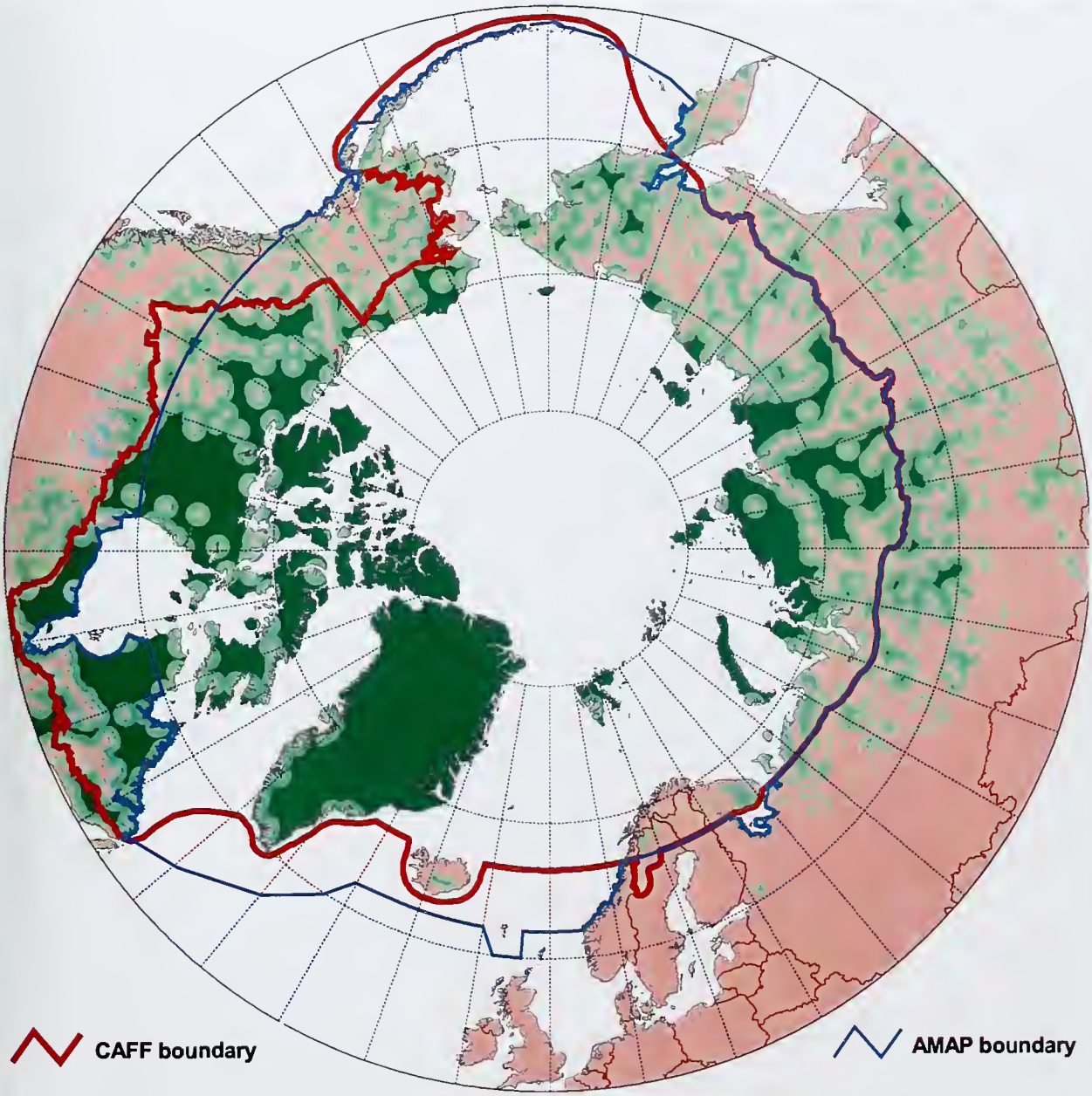
**Acknowledgements**

We would like to thank Elena Lappo for providing valuable information on infrastructure in Northern Siberia, and Sergio Martins for digitising support.
Last but not least, we would like to thank for the provision of the GLOBIO dataset, additional data support, invaluable comments and discussions we had with Lars Kullerud and Julien Rouaud from GRID-Arendal.
We also express our thanks for the support of the WWF Canada GIS group as well as the WWF Arctic office staff in Oslo, Norway.

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001.

## Figure 1: Potential Impact of Human Population and Infrastructure Features in the Arctic

WWF UNEP WCMC




Distance from settlements and major infrastructure features, km

0 20 50 100

Current Impact

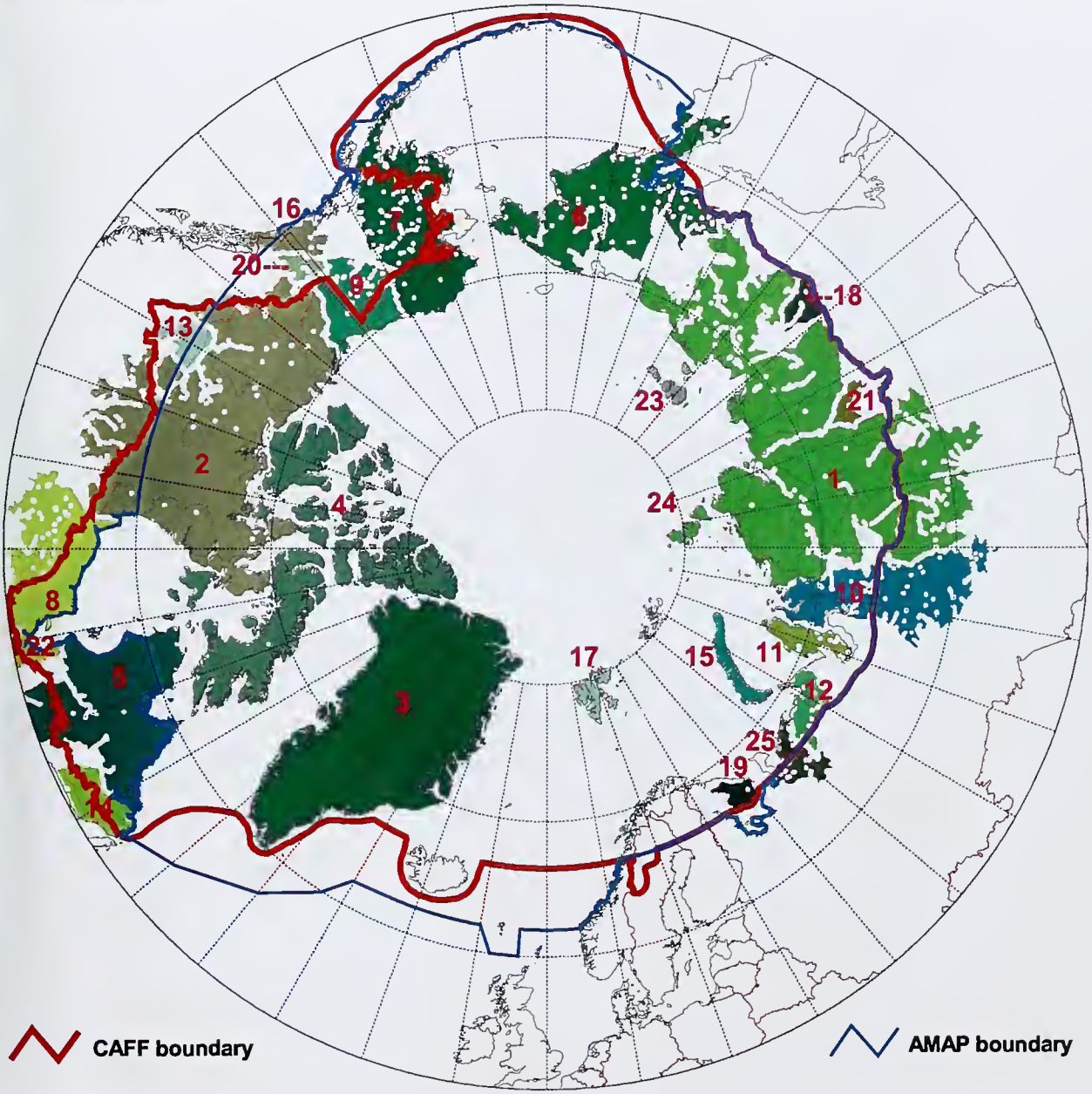
Very Low or No Current Impact

Core Unfragmented Area - Low Risk of Future Impact

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001.

## Figure 2: Location of identified areas

WWF UNEP WCMC




**LEGEND:**

1 Northern Siberia
2 Central Canadian Taiga and Tundra
3 Greenland
4 Canadian Archipelago
5 Eastern Canadian Shield
6 Chukotka-Koryak
7 Alaska
8 Southern Hudson Bay
9 North-Yukon
10 Gydan
11 Yamal
12 Bolshezemelskaya Tundra
13 Muskwa/Slave Lake Forests
14 Southern Labrador
15 Novaya Zemlya
16 St. Elias/Kluane
17 Svalbard
18 Sordoginskiy Mountains
19 Kola
20 Yukon Alpine Tundra
21 Markha River Valley
22 James Bay Lowland
23 New Siberian Islands
24 Severnaya Zemlya
25 Malozemelskaya Tundra

## No. 1. Northern Siberia

### 1.1. General description

This is the largest wilderness area in the Arctic region and the second largest in the world after Antarctica. It comprises 2,803,036 $km^2$ with 21% extending outside the Arctic, and 2,310,624 $km^2$ lie within the Arctic region as defined by WWF. It covers most of the catchments of the Yenisey, Olenyok, Khatanga, Lena, Yana, Indigirka and Kolyma rivers with an estimated total of 1,4 million cubic kilometres annual discharge! Although mountainous in parts, it does not contain any glaciers. Three major mountain ridges determine almost half of the area. Highest peak: Gora Kamen with 2037m in the Putorana mountains. The mountains contain a lot of valuable minerals and are subject to current, but also future exploitation with the threat of increasing fragmentation. It is very rich in various different biomes ranging from Polar desert to boreal forest, but due to huge mineral and organic resources the region is highly threatened by fragmentation. A huge number of roads inside the wilderness area, settlements and increasing winter roads indicate the direction of threat.

### 1.2. Biomes and major vegetation zones

The region is very rich in habitats. Eleven different biomes can be distinguished in the area, of which mountain tundra and mountain taiga prevail with 46,3 % in total, due to three major mountain ranges, the Byrranga mountains in Northern and the Putorana in Southern Taimyr and the Verkhoyansk and Cherskogo mountain complex in Eastern Yakutia. The major biomes distribute as follows:

| | |
|---|---|
| Arctic tundra | 8.6 |
| Northern subarctic tundra | 14.2 |
| Southern subarctic tundra | 3.0 |
| Mountain tundra | 23.1 |
| Forest tundra | 2.7 |
| Northern taiga | 19.9 |
| Middle taiga | 0.5 |
| Taiga wetland | 0.8 |
| Mountain taiga | 23.2 |
| Flood-plain vegetation of tundra and taiga | 1.2 |
| Lakes | 2.7 |

### 1.3. Flora and Fauna

**Flora**

The area holds the largest proportion of the largest connected forest in the world, the Siberian Boreal forest. The total number of plant species is not known. More than 72 locations of rare endemic vascular plant species of the Arctic have been recorded in North Siberia with a stronghold in Taimyr and along the Lena River.

**Fauna:**

**Mammals**

The wilderness area holds the largest wild **reindeer** population in Eurasia and the second largest in the Arctic region. The **elk** population has been estimated to reach almost 50,000 animals. The **Snow sheep** lives in the Verkhoyansk Mountains with 50,000 and more than half of the total population. The 3,500 **Putorean Snow Sheep**, endemic to the Putorana mountain range, together with the **wolverine**, are two of the globally threatened species in the wilderness area. **Polar bears** live along the coast. The population size is estimated to reach 1,200 animals. More importantly the area is most likely inhabited by the largest population of brown bears, with an estimated population size of at least 20-30,000 animals, threatened by fragmentation and increasing accessibility. Among the other large carnivores **wolf** and **wolverine** still maintain large proportion of their population in North Siberia. About 6,000, which is more than 50% of the total Russian wolf population, live in the wilderness area. Figures for the wolverine are not available, but are assumed to be of similar scale.

**Birds**

The total number of bird species is unknown; the number of breeding birds is about 260. The number of endemic bird species or those with almost their entire population (90%) breeding in the wilderness area is comparatively high with 5 species, including the **Siberian Crane** as globally threatened. The others include two sandpiper species (**Sharp-tailed Sandpiper** and **Curlew Sandpiper**), the **Little Curlew** and the **Ross's Gull**, of which only a small fraction of its 50,000 pairs breed outside east of the Kolyma River in Chukotka and irregularly a few scattered pairs in Canada and Greenland. Large proportions (> 80%) of the **Red-breasted Goose** and **Lesser White-fronted Goose**, two globally threatened species and also the majority, possibly more than 70% of the **Pintail Snipe** are breeding in North Siberia. Another globally threatened species breeding here is the **Baikal Teal** and large numbers of **White-tailed Eagles**, currently considered as not highly endangered.

Among the passerines the **Pechora pipit** and **Dusky Thrush** have by far their largest proportion breeding in the area. Other globally threatened species with considerable proportion of their breeding range include the East Atlantic flyway population of the **Red Knot**, breeding entirely in the area. Last, but not least, large proportions of the **Great Knot** and the **Grey-tailed Tattler** population breed in this and only one other wilderness area (No. 6 Chukotka–Koryak).

**White-billed Divers** breed throughout the wilderness area, with concentrations on the Taimyr Peninsula. The birds require large undisturbed territories. Although they are not threatened at present, there has been a drop in the population size in many areas with human disturbance.

**Fish**

With its large river basins it provides an enormous capacity and ecological service of freshwater fish, including **Arctic Charr** and several white fish species (***Coregonus*** spp.). No estimates are available currently, but the ecological and economical importance is enormous. Fragmentation and access appears not to threaten the freshwater fish abundance. The intactness of the river system is more important. With only six known dams the catchment area in the wilderness area is little impacted at the time.

### 1.4. Nature Conservation and Protected areas

With 208,791 $km^2$, about 9% of the area is protected by more than 25 sites (see map).

### 1.5. Threats and future developments

Among a series of identified threats to biodiversity in North Siberia, mineral extraction and oil and gas development have to be mentioned first. Due to its richness in diamonds, gold, tin and other metals, the area already has been scarred by mining sites, winter roads and also numerous summer roads. Particularly the Western part of the area, southern Taimyr and central Siberia are rich in oil and gas deposits. South of a line fom the Yenisey Delta along Western Taimyr to the southern shore of lake Taimyr, towards the East coast of Taimyr, north of Beligov island, rich oil and gas deposits of medium to high quality have been explored and most likely will be exploited in the near future. The northern half of Taimyr, north of the described line will be untouched in terms of oil and gas drilling. The eastern part will also be left largely unharmed by oil exploration, apart from a small area around and north of Yakutsk, but basically east of the Lena watershed no oil and gas deposits have been found.

Furthermore, the huge untouched boreal forest provides a vast resource of timber, which most likely is considered to be exploited with the risk of further fragmentation. Some of the roads described as summer roads have not been exactly identified with the best knowledge available. But most likely many of the shown summer roads in the wilderness are still likely to be only winter roads, such as the road following the Anabar River, in the Lower Indigirka River Delta and along the Khatanga River, to name just three examples. A further, more thorough analysis will reveal more evidence, but the size of the wilderness area will not be influenced by any reconsideration. The degree of wilderness in the area would be appreciated differently, when taking into account the less fragmented status in the south of Taimyr, Northeast Yakutia and along the Anabar River. However, the roads or tracks at those locations do indicate a potential risk of road construction and fragmentation in the future. In addition, the recognised large number of winter roads is of increasing concern as leading to more fragmentation (see map).

**Sources:**

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UNEP-WCMC Map Library

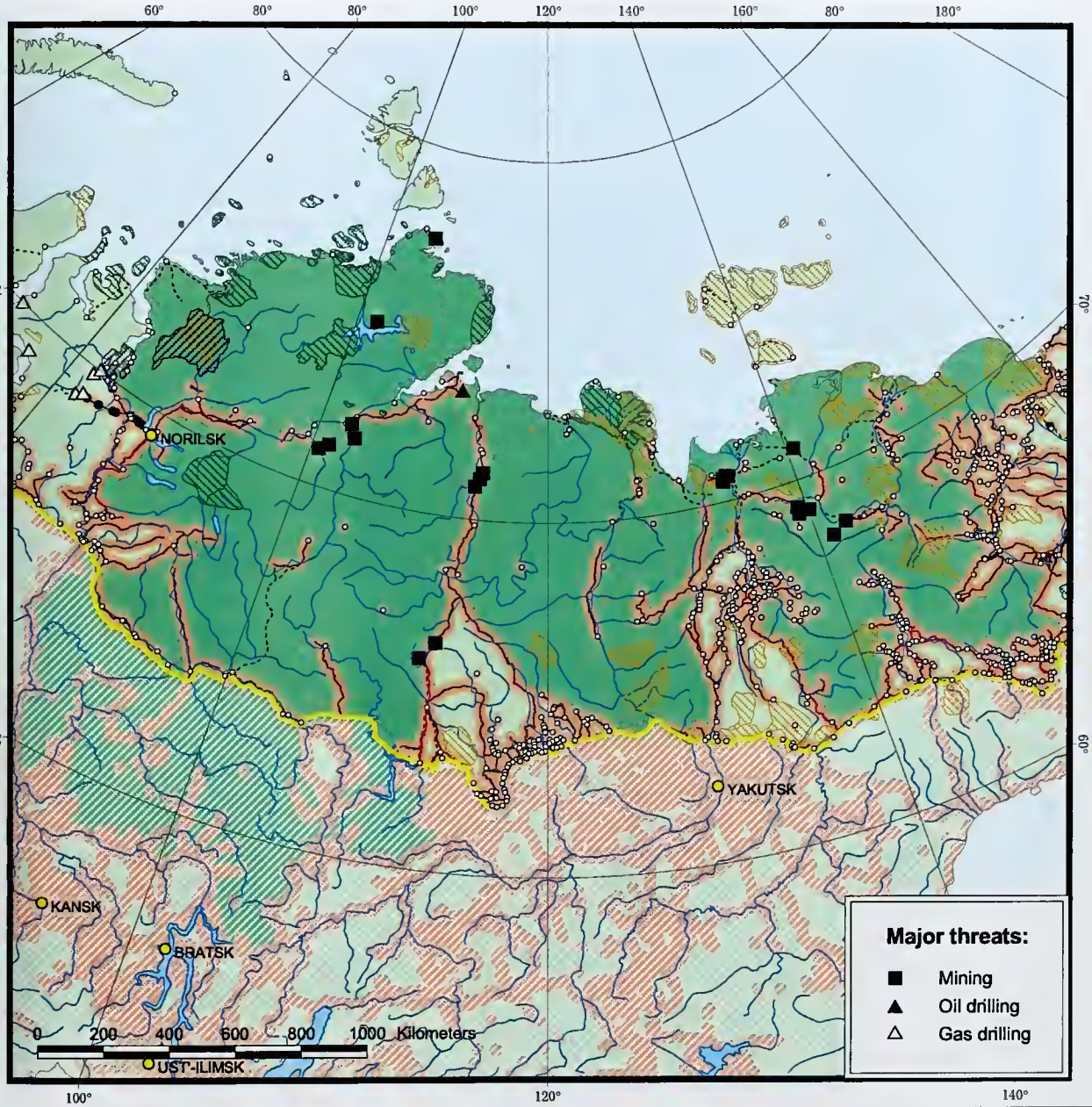
*The Lena river mouth area; fires can be seen burning in several parts of the wilderness area (see detail below), marked with red and recognisable by the smoke tails generated; Terra/MODIS sensor; © - NASA*

*Detailed view of above image; summer fires marked with red squares throughout the wilderness area; Terra/MODIS sensor; © - NASA*

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001.

## No. 1: Northern Siberia

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 1)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 2. Central Canadian Tundra and Taiga

### 2.1. General description

The second largest wilderness area in the Arctic region and the third largest in the world comprises 2,479,114 km$^2$ with 12% outside the Arctic, and 2,214,184 km$^2$ within the Arctic region as defined by WWF. It covers most of the catchment of the Mackenzie River with a total annual river discharge of appr. 450,000 to 550,000 cubic km. It does not contain any glaciers. The major mountain ridge is part of the Mackenzie Mountains. This wilderness area includes a wide variety of biomes ranging from Arctic tundra to boreal forest. Many valuable minerals can be found across this vast expanse, including copper, silver, gold, tungsten, diamonds and uranium and are subject to current, but also future exploitation with the threat of increasing fragmentation. Particularly oil and gas exploration seems to threat the wilderness area due to huge, unexploited oil and gas fields in the North of the region, raising the spectre of potential development of petroleum resources and subsequent transport along the Mackenzie Valley to markets in the United States.

### 2.2. Biomes and major vegetation zones

The region is very rich in habitats. Eleven different biomes can be distinguished in the area, of which tundra biomes prevail with 48,9% in total. Mountainous habitats are relatively uncommon with only 14,4% of the area. Comprising 257,767 km$^2$, a large proportion (11.6%) is covered by freshwater lakes. The major biomes distribute as follows:

| | |
|---|---|
| Arctic tundra | 8.1 |
| Northern subarctic tundra | 11.2 |
| Southern subarctic tundra | 24.4 |
| Mountain tundra | 5.2 |
| Forest tundra | 4.4 |
| Northern taiga | 22.5 |
| Middle taiga | 1.2 |
| Southern taiga | 2.8 |
| Taiga wetland | 0.3 |
| Mountain taiga | 8.2 |
| Lakes | 11.6 |

### 2.3. Flora and Fauna

**Flora**
Consistent with the largely intact habitats of this area, there are only six known locations of rare endemic vascular plant species of the Arctic, involving only three species (*Pucinellia poacea, Mertensia drummondii* and *Erigeron muirii*). This is comparable with the North Siberia wilderness and also indicates a less diverse flora.

**Fauna:**
**Birds**

Although the total number of bird species is unknown, the number of breeding birds is about 260. There are two endemic bird species or those with almost their entire population (90%) breeding in the wilderness area, including the **Whooping Crane** and possibly the **Eskimo Curlew,** considered to be almost extinct and whose present breeding sites are not exactly known. Another endemic bird is the **Harris' Sparrow**. Among the bird species that have the largest proportion of their population in the Central Canadian Tundra and Taiga wilderness area are the **Ross's Goose, Hudsonian Godwit** and possibly **Semi-palmated Sandpiper**. **White-billed Loons** and **Great Northern Loon** breed throughout the wilderness area. The birds require large, undisturbed habitats.

**Mammals**
The largest number of caribou in the Arctic region are found int his wilderness area and are located in eight different populations totalling more than 1,5 million animals. The area is also important for **musk ox** with an estimated population of up to 24,000 animals and increasing. Polar bears live along the coast with approximately 1,500 to 2,000 animals. The population of brown bears is estimated at over 5,000 animals. Numbering roughly 16,000, which is about 30 % of the total Canadian population, are wolf populations located north of 60° latitude . About 10,000 wolves are estimated to inhabit the wilderness area. Figures for the wolverine are estimated around 1,000.

## 2.4. Fish

With its large river basin, the MacKenzie provides an enormous resource of freshwater fish, including Arctic Char, several white fish species (*Coregonus* spp.) and the Inconnu, or sheefish (*Stenodus leucicthys nelma*) with 4,200 metric tons catch per year, but in decreasing population status.
With seven dams in the Mackenzie catchment area and another adjacent one in the wilderness area, the impact on the rivers and migrating fish has already started.

## 2.5. Nature Conservation and Protected areas

About 186,406 km, representing 8.4 % of the area is protected (see map). Significant protected areas include the Thelon Wildlife Sanctuary, Tuktut Nogait National Park, Nahanni National Park, Wood Buffalo National Park and Wager Bay National Park on the Hudon Bay coast north of Baker Lake will soon be formally established.

## 2.6. Threats and future developments

One in a series of identified threats to biodiversity in the Central Canadian Tundra and Taiga wilderness area is the oil and gas exploitation, due to known and estimated hydrocarbon reserves in the northwest part of the area. Up to five different pipeline routes are proposed to access the hydrocarbon fields and connect to those further west in Alaska (see map). Furthermore, mineral extraction will most likely be continued and expanded with additional risks of further fragmentation of the second largest wilderness area in the Arctic. In addition to the already existing two diamond-mining sites, three more sites are proposed for future exploitation in Jericho, Snap lake and Kennedy lake. Already today many kilometres of winter roads cut through the area and there is concern that some of these, in the context of the increasing exploitation of mineral resources, might be turned into all-weather roads. Due to its size and its

richness in minerals, the area is very likely to be fragmented further in the future. The effects on wildlife are largely unknown at this time.

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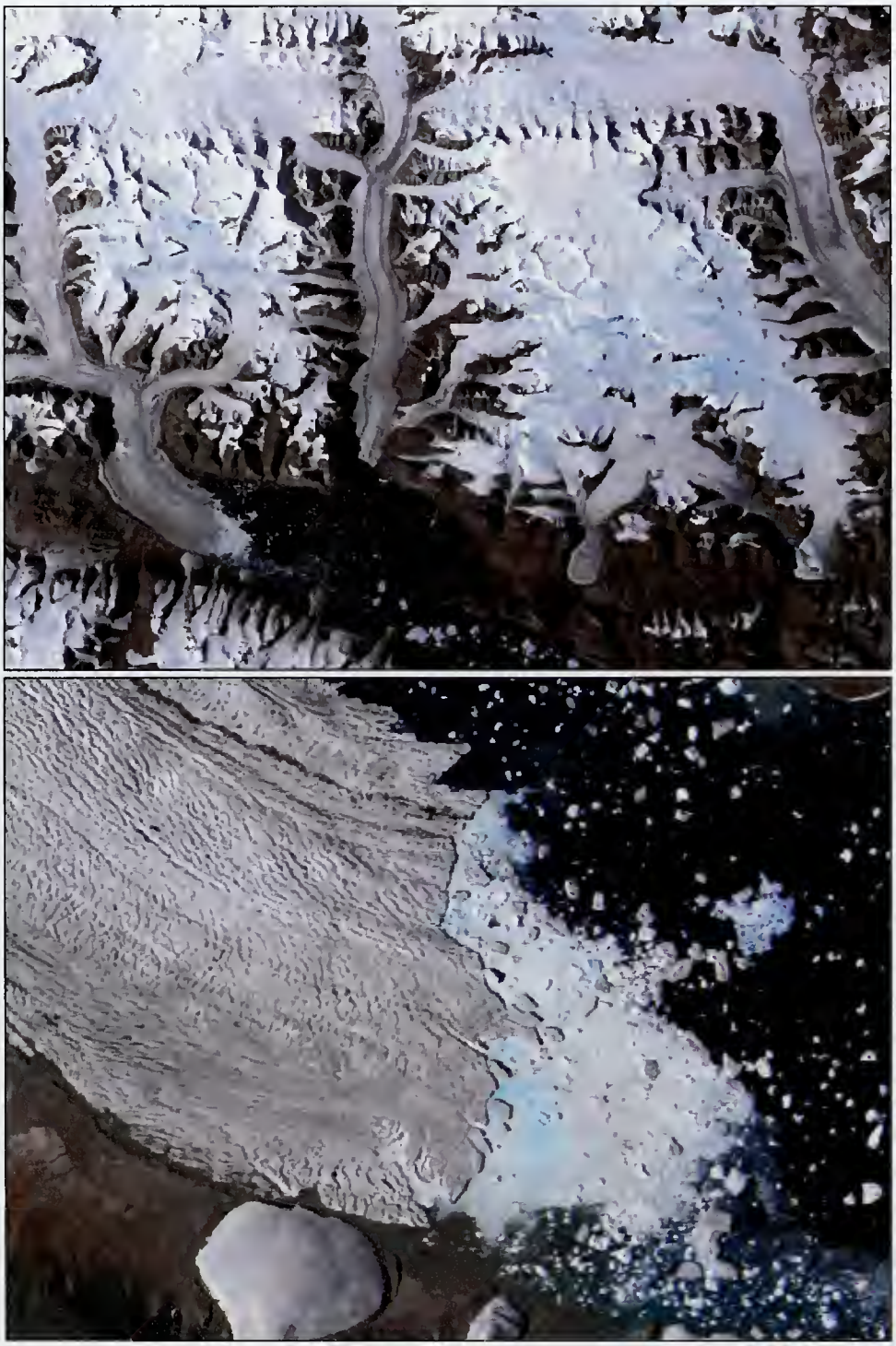

*Dobbin Bay overview and detailed satellite image, Northern Canada; Terra/ASTER sensor; © - NASA*

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 2. Central Canadian Taiga and Tundra

WWF UNEP WCMC


**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 3)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 3. Greenland

### 3.1. General description

The largest island in the world, with 2,120,096 $km^2$ almost a continent between America and Europe, it is the third largest wilderness in the Arctic region and the fourth largest in the world. It is almost entirely covered by glacial ice and hardly developed by road or railway systems at all. The Greenland Ice cover is the second largest glacier in the world, the largest in the Arctic, covering 1,800,000 $km^2$. It is 3,200 meters above sea level at its highest peak and 3,500 meters thick. It holds 9% of the world's freshwater resources. Mostly mountainous and with a rocky coast, Greenland contains large mountain ridges. Its highest peaks range from around 2,500 to almost 4,000 meters, topping the ice cover along the East coast with Gunnbjørn Fjeld (3700 m) in the Watkinsbjerge. Some of the ridges are among the oldest in the world. The Nuuk Fjord represents the oldest type on earth, with 3,8 billion years. The geology is very diverse, ranging from volcanic, through sediment, to various types of Gneiss. For this reason many, often rare minerals can be found and are exploited. As most transport has been carried out over the sea, only a few roads connect small distances around the few settlements, mainly on the West coast. Nuuk, the capital and largest settlement on the West coast has now about 13,000 inhabitants.

### 3.2. Biomes and major vegetation zones

As the majority of the land mass is covered by ice, only a very small part, about 16% of the area is vegetated and distributed by biomes as follows:

| | |
|---|---|
| Polar desert | 0.2 |
| Arctic tundra | 9.5 |
| Northern subarctic tundra | 4.8 |
| Southern subarctic tundra | 0.9 |
| Glaciers | 84.1 |
| Lakes | 0.5 |

### 3.3. Flora and Fauna

Greenland is one of the best-investigated countries in the world in terms of biodiversity, with a complete inventory. Some selected taxa are listed. In total 9,400 species have been recorded.

**Flora** (including phytoplancton, fungi and lichens): about 5,800 species recorded. Among them we can find five globally threatened vascular plant species, three of them in the low risk category:
Calamagrostis poluninii
Jamesoniella undulifolia
Puccinellia rosenkrantzii
Sisyrinchium groenlandicum
Xledodendron vanhoeffeni
three endemic species.

**Fauna:** The total number of animal species is about 3,600, including marine invertebrates.

**Mammals**: eight terrestrial species, including the partly marine **Polar bear**, the **arctic wolf** and **arctic fox**, the **Greenland reindeer** (20,000), the **musk ox** (15,000), arctic and mountain hare.

**Birds**: 231 species have been recorded, of which 58 species breed on the island. Among them the sea birds dominate with huge colonies on the West coast and water birds with four goose, seven duck and 14 wader species breeding on the tundra habitats. Among large birds of prey, **White-tailed Eagles** breed along the West Coast with 150 –170 pairs and **Gerfalcons** are widespread but sparse breeders on both coasts. One of world's largest populations of **Arctic terns** is still breeding on Greenland with about 80,000 pairs, but declining due to human disturbance.

### 3.4. Nature Conservation and Protected areas

With 868,145 $km^2$, almost 41 % of the area is protected by 11 sites, including the largest protected area in the world (see map).

### 3.5. Threats and future developments

Currently in Greenland mining of lead, silver and tin is local at the West coast. No further plans for development are known. Huge oil and gas fields off the Eastern coast of Greenland are reasons for concern though. Even if exploited offshore, it will have an impact on the land-based infrastructure on the remote east coast.

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Talbot, S. et al. (1999):

UNEP-WCMC Map Library

*View over Eastern Greenland coast;*
*Terra/MODIS sensor; © - NASA*

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 3: Greenland

WWF UNEP WCMC


**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km
- < 20
- > 20
- > 20 (Area No 3)
- Non-Arctic land

Protected Area, (boundary or point location)
- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:
- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 4. Canadian Arctic Archipelago

### 4.1. General description

The fourth largest wilderness area in the Arctic region and the fifth largest in the world comprises 1,380,725 km$^2$. It is completely within the Arctic region as defined by WWF. Wildlife migrations occur from the islands to the mainland across sea ice. Hence, the archipelago in combination with the Central Canadian Tundra and Taiga area (No. 2) would by far be the largest wilderness area in the Arctic region, comprising 3,594,909 km$^2$. The Canadian Archipelago consists of about 20 larger and medium sized islands with numerous smaller islands, all of which are connected with each other for most of the year. Glaciers can be found in the high Arctic on Ellesmere, Devon, Axel Heiberg and on Baffin island, comprising in total 11% of the wilderness area. Major mountains can also be found on these islands. The area contains a lot of valuable minerals, including copper, silver, gold, tungsten and uranium and is subject to current, but also future exploitation with the threat of increasing fragmentation.

### 4.2. Biomes and major vegetation zones

The region is dominated by high Arctic tundra and polar desert, only separated by 11% glaciers and 4.6% lakes. Mountainous habitats comprise a small proportion (<2%) of the area, but due to the high northern latitudes, tundra conditions are prevalent. The major biomes distribute as follows:

| | |
|---|---|
| Polar desert | 8.5 |
| Arctic tundra | 55.4 |
| Northern subarctic tundra | 18.6 |
| Mountain tundra | 1.9 |
| Glaciers | 11.0 |
| Lakes | 4.6 |

### 4.3. 3. Flora and Fauna

**Flora**
There are 9 records of one rare endemic vascular plant species of the Arctic (*Pucinellia poacea),* all located on Ellesmere Island .

**Fauna:**
**Mammals**
About one-third of the world;s **Polar bear** population (7,000 animals) inhabit the Canadian Archipelago. The area is also home to the largest wild population of **musk ox,** comprising up to 80% of the global population, numbering some 110,000 animals on Victoria and Banks islands. In total the islands support 140,000 caribou. In particular, the wilderness area is also home of the endangered **Peary Caribou**, the smallest and most northern caribou subspecies. The High Arctic and Banks Island populations are considered to be endangered, while the Victoria Island (Low arctic) population is listed as threatened.

**Birds**

The total number of bird species is unknown, the number of breeding birds is about 120. There are about four endemic bird species or those with almost their entire population (>90%) breeding in the wilderness area, among them the **White-rumped Sandpiper**, **Buff-Breasted Sandpiper** and **Thayers Gull**. Among the bird species with a large proportion of the population in the Canadian Archipelago wilderness area are the entire American population of the **Purple sandpiper** and the entire American population of the **Ivory Gull** with an estimated population size of almost 4,000, which is about a quarter of the global population. Southampton Island in the southern part of the Archipelago in the Northern Hudson Bay contains nine sandpiper species, an unexpectedly high diversity. **White-billed Divers** breed throughout the wilderness area. The birds require large undisturbed territories. Although they are not threatened at present, there has been a drop in the population size in many areas with human disturbance.

### 4.4. Nature Conservation and Protected areas

With 186,406 km, about 8.4 % of the area is protected by several sites (see map). Most protected areas are national parks located on Baffin Island and Banks Island. Polar Bear Pass National Wildlife Area, located on North Bathurst Island, has been withdrawn from any resource extraction and, as a result, is afforded the same level of protection as national parks. Discussions for a national park adjoining Polar Bear Pass to the north are underway and the candidate has been given interim protection.

### 4.5. Threats and future developments

Among a series of identified threats to biodiversity in the Canadian Archipelago wilderness area is oil and gas exploitation, due to a huge field in the Sverdrup Basin in the north. Particularly oil and gas exploration seems to threat the wilderness area due to huge unexploited oil and gas fields in the north in the Sverdrup basin and east of the region, on Baffin Island. Additionally, mining activities on lead, silver and tin might continue and expand with additional risks of further fragmentation.

**Sources:**

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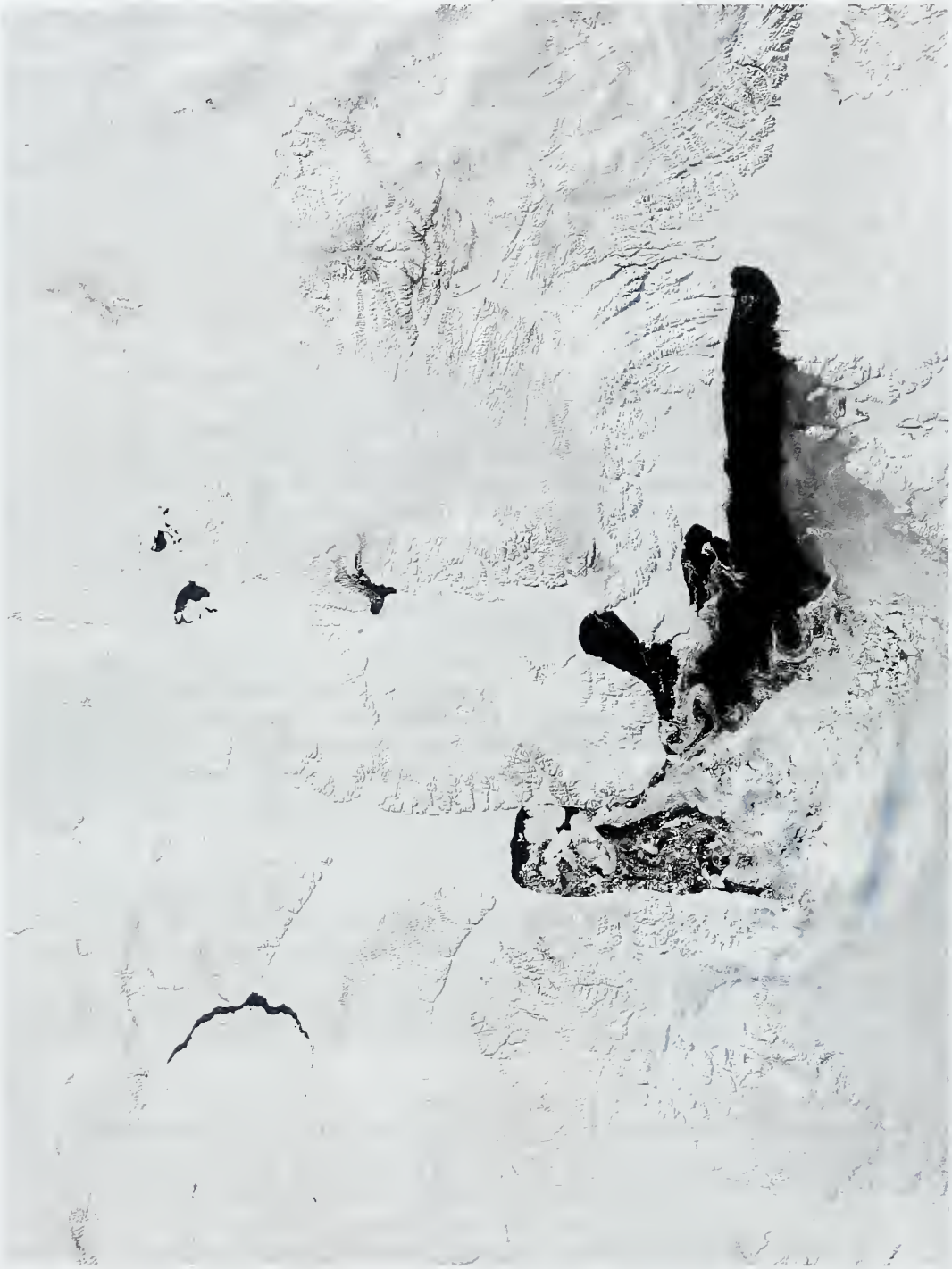
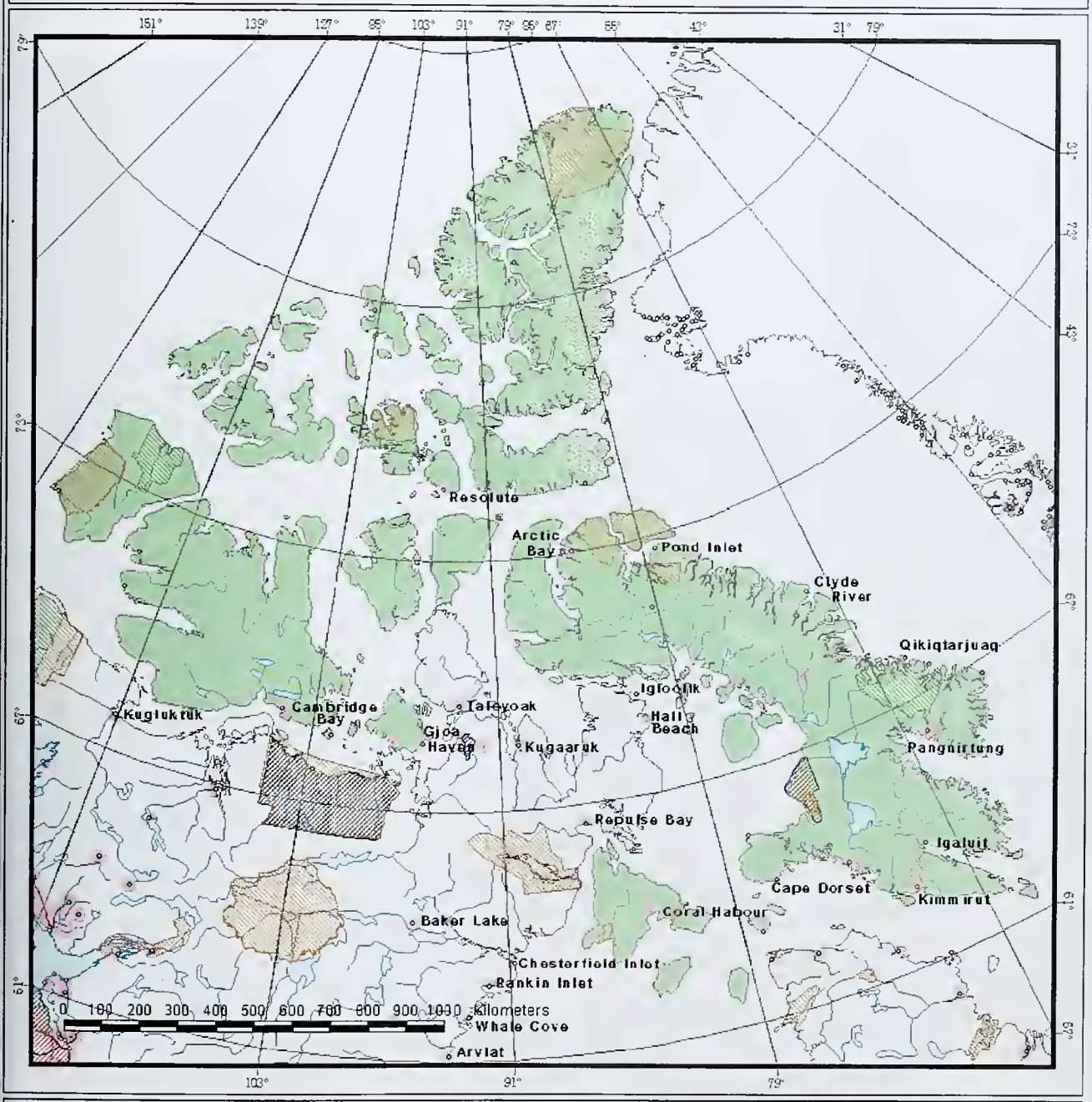
*Typical winter view of the Canadian Arctic Archipelago wilderness area; Terra/MODIS sensor; © -NASA*



# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 4. Canadian Archipelago

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 3)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 5. Eastern Canadian Shield (Canada)

### 5.1. General description

The fifth largest wilderness area in the Arctic region comprises 908,086 km$^2$ with 11% of the area extending south outside the Arctic region as defined by WWF. It is possibly the sixth largest wilderness area in the world, but definitely among the top 10 global sites. A global analysis on wilderness areas might reveal more detailed information. Mountainous terrain occurs only in the northeast portion of the area in northern Labrador and has been protected in the Torngats Mountain National Park. Iron and tin mining is known to take place at present, diamond exploration is occurring and discussions are ongoing to develop the Voisey's Bay nickel deposit in central Labrador. Many freshwater lakes and rivers are characteristic to the area, and serve as critical habitat for many wildlife species, but 14 dams indicate the development pressure on these resources.

### 5.2. Biomes and major vegetation zones

The dominant features of the region are southern sub-arctic tundra and forest tundra, as well as a very large proportion of freshwater lakes, covering 11.2% of the region. Mountainous habitats are relatively small and give only 2% of the area. Tundra habitats prevail due to the high northern latitudes. The major biomes are distributed as follows:

| | |
|---|---|
| Arctic tundra | 2.0 |
| Northern subarctic tundra | 6.5 |
| Southern subarctic tundra | 27.8 |
| Forest tundra | 35.7 |
| Northern taiga | 16.5 |
| Taiga wetland | 0.2 |
| Lakes | 11.2 |

### 5.3. 3. Flora and Fauna

**Flora**
No rare endemic vascular plant species of the Arctic have been recorded in the wilderness area.

**Fauna:**
**Mammals**
With 780,000 individuals, the George River population is the largest caribou population in the world and the total wilderness area hosts more than 1,000,000 caribous. With an estimated 2,500 to 3,000 **polar bears**, the coast along the region is also very important for the species in a circumpolar context.

**Birds**
The total number of breeding bird species of 109 is relatively low compared to the size of the region. They include such northern species as the **Snowy Owl**, but also southern species, such as the **Caspian Tern** and the **Common Nighthawk**. The latter

species is characteristic for boreal forest located in the southern part of the region. There are no endemic bird species or species with almost their entire population (>90%) breeding in the wilderness area. There are only two sandpiper species, **Semi-palmated** and **Least Sandpiper** breeding in the area.

### 5.4. Nature Conservation and Protected areas

With 45,991 km, only 5.6% of the area is protected in 17 medium-sized sites (see map). Many of the protected areas in northern Quebec are legally withdrawn from resource extraction, but have not been designated through a formal process.

### 5.5. Threats and future developments

Apart of iron and tin mining in the north, and the Voicey's Bay nickel deposit in central Labrador, no further developments are known in the area. Potential hydro development is a continual issue. Oil and gas fields are not known and no major threats appear to be coming from these sources.

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# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 5: Eastern Canadian Shield

WWF UNEP WCMC


**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 3)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

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## No. 6. Chukotka-Koryak (Russia)

### 6.1. General description

The Chukotka-Koryak wilderness area comprises 858,407 km$^2$, 777,840 km$^2$ of which is in the Arctic region and 11% of it is extending south outside the Arctic region as defined by WWF, into Kamchatka and the Magadan district. Its remote situation in northeastern Siberia near Alaska has been responsible for comparatively little development and its un-fragmented status by today. It is one of the most diverse regions in the Arctic. Recent finds of huge oil and gas fields and the richness in mineral resources though describes this wilderness site as one of the sites most vulnerable to fragmentation in the entire Arctic, already indicated by ongoing road constructions (see map). The site is close to Alaska, only separated from it by the Bering Strait, but up to now it suffered only little impact from North America.
Most of the area, more than 75% is covered by mountains habitat, but without any glaciers.
Highest peak: (1454 m)

### 6.2. Biomes and major vegetation zones

The majority of the area is covered by mountainous habitats; some of them are little vegetated and barren (up to 25%). The prevailing vegetation is the mountain taiga and mountain tundra, but also coastal tundra with moss-sedge tundra components and very little bush vegetation. Lakes only constitute a small fraction with less than 1% of the area. The biomes divide as follows:

| | |
|---|---|
| Arctic tundra | 2.2 |
| Northern subarctic tundra | 5.3 |
| Southern subarctic tundra | 14.0 |
| Mountain tundra | 35.5 |
| Northern taiga | 1.8 |
| Mountain taiga | 40.4 |
| Lakes | 0.9 |

### 6.3. Flora and Fauna

**Flora**

The number of plant species is not known, but it is very diverse and high compared with other regions in the Arctic. The number of rare endemic plant species is comparatively high with more than 20 locations concentrating in Northern Chukotka. They involve 29 species of which the following 19 are listed as globally threatened:
Androsace semiperennis
Artemisia flava
Artemisia senjavinensis
Cardamine sphenophylla
Claytoniella vassilievii vassilievii
Hedinia czukotica
Oxytropis beringensis
Oxytropis deflexa dezhnevii

Oxytropis wrangelii
Papaver atrovirens
Potentilla tschaunensis
Pucciphippsia czukczorum
Ranunculus punctatus
Roegneria nepliana
Rumex krausei
Taraxacum czaunense
Taraxacum jurtzevii
Taraxacum petrovskyi petrovskyi
Taraxacum senjavinense

**Fauna:**

**Mammals**: The area is also rich in mammal species, including large predators, such as Polar bear, Brown bear, the arctic and red fox, the wolf and wolverine.
**Polar bear**: 2,000 to 5,000 (Chukchi Sea, shared with Alaska)
**Brown bear**: 4,000
**Wolf**: 2,000
**Wolverine**: no estimates
---
**Reindeer**: 35,000
**Elk**: 10,000
**Snow sheep**: common and wide-spread all over the mountains in the area, estimates around 6,000 to 7,000 animals

Additionally, colonies of sea lions, walruses and many other seals do have resorts along the wilderness area's coast.

**Birds**: With about 200 bird species breeding, the area is very diverse compared to many other regions. The region is also rich in endemic and globally threatened species. Foremost nine globally threatened species, including the **Spoon-billed Sandpiper** as a species also endemic to the region is entirely breeding inside the Chukotka Koryak wilderness area. Currently the population is estimated not to exceed 1,000 pairs. Other globally threatened species include **Nordmann's Greenshank** and **Steller's Sea-Eagle** endemic to the Russian Far East. The small breeding range of the first just extends into the southern end of the wilderness area. **Steller's Sea-Eagle** is breeding almost exclusively in the wilderness area. As a large predator bird, the species is very much relying on large un-fragmented areas. With currently only 7,500 birds and the majority breeding in Kamtchatka, the wilderness area is very likely responsible for hosting more than half of the breeding population in the south of its area.
Other globally threatened species include:

- Baikal Teal
- Lesser White-fronted Goose
- Marbled Murrelet

The latter species has been included into the latest Red data book, due to a major decline of more than 35 % in the last ten years. As it is also breeding inland away from the coast in old-growth forests, it is vulnerable to development and fragmentation. Additionally, the area hosts a large number of breeding **White-tailed**

**Eagles**, and a small population of **Far-eastern Curlews**, both listed at low risk in the global Red Data book. **White-billed Divers** breed throughout the wilderness area, with the highest concentration in Chukotka. The wilderness area probably contains the largest population. The birds require large undisturbed territories. Although they are not threatened at present, there has been a drop in the population size in many areas with human disturbance.
Other bird species include a large variety of waders. With almost 50 wader species breeding in the area, including 16 of the total of 24 sandpiper species, the Chukotka-Koryak wilderness area is the most diverse in this respect, as well. Last, but not least, large populations of **Great Knot** and **Grey-tailed Tattler** breed in this and only one other wilderness area (No. 1: North Siberia). The **Emperor Goose** is another endemic species to the Bering Sea, and the breeding range and population in the Chukotka-Koryak wilderness area is only shared with Alaska, and both areas are important for the well-being of the species, which spends almost its entire lifecycle in these two wilderness sites or nearby.

### 6.4. Nature Conservation and Protected areas

Only 30,027 $km^2$, representing 3.9% of the wilderness area is protected by 11 sites only south of the Anadyr Bay. The north is completely unprotected (see map); this most diverse area with six globally threatened bird species is insufficiently protected.

### 6.5. Threats and future developments

The threats to the area are as multiple and diverse as the region itself, due to its richness in minerals. Recently discovered large resources of gold and other minerals are target for exploitation in the near future. A large proportion of the Russian gold resources can be found in the area. Some of it has already been subject to current exploitation, but some areas with gold reserves along the North coast and in the North of the Chukchi Peninsula might be connected by roads soon, and the wilderness is endangered of the immediate threat of further fragmentation (see map). A threat by coal mines in the central and southern part of the area is not so immediate, as the mines do not contain the highest quality coal. Of the seven sites rich in gold, only two have been exploited so far. Particularly threatening are the sites along the coast above the Anadyr bay and near Kolyunshinskaya Guba. Also very threatening seem to be the large oil fields in the southern Anadyr Bay and along the Bering Sea coast in the south, as well as another field in the sea off the north coast of Chukotka. In addition, several sites of high pressure from human activity have been recognised in the wilderness area. The majority are located around Cape Schmidt along the North coast, opposite Wrangel Island. Other areas are further inland on the Anadyr and Velikaya rivers, as well as near Beringovski at the Bering Sea coast. A large network of roads already exists in the area or is leaping into the wilderness area. In several places, the wilderness area is in immediate danger of being closed (see map). A current road construction between Pevek at the Chaunskaya Bay and mining sites near Anguema River in the northern part is going to split the wilderness and will cut off the entire North coast, including the Chukchi Peninsula. The new area is additionally in danger to be split further soon by connecting the existing road with a gold mine near the Kolyunshinskaya Bay. The size of the Chukotka Koryak wilderness will be most likely reduced by about 20%. This road is already under construction, but they are plenty of other tracks that can easily be turned into proper summer roads and continue

to split the sixth largest wilderness site with major implications on the most diverse wilderness area in the Arctic.

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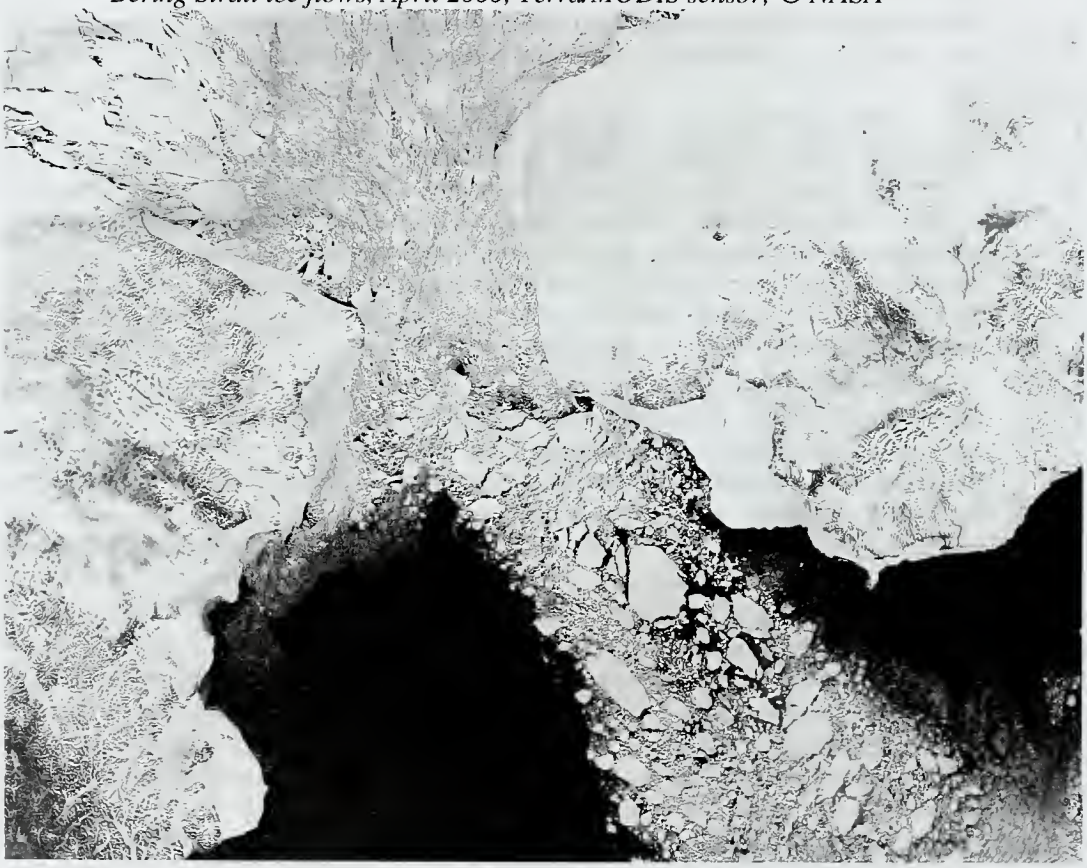
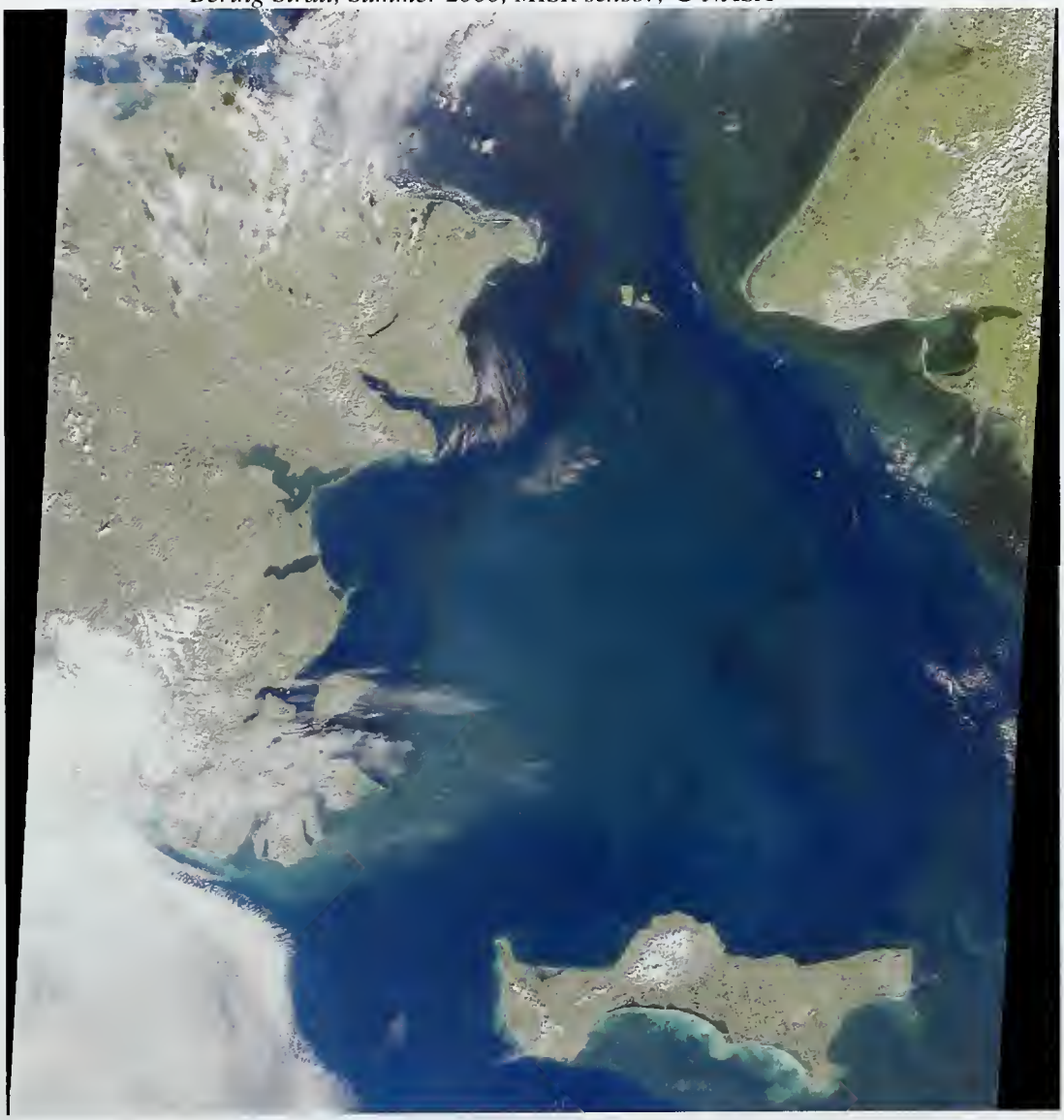
UNEP-WCMC Map Library

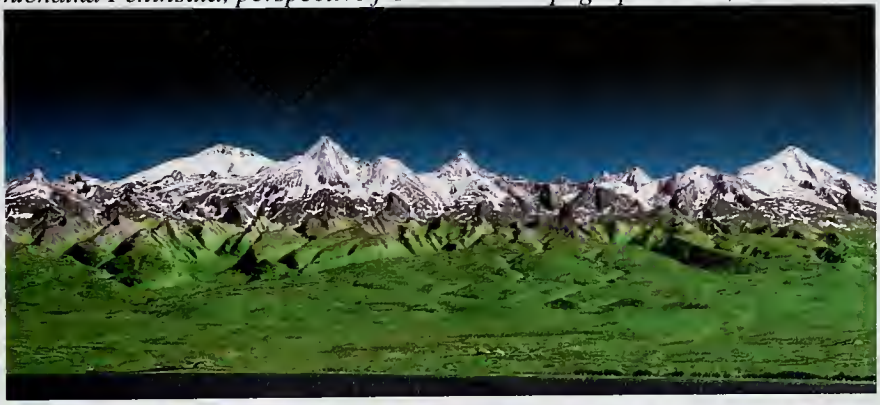
*Bering Strait ice flows, April 2000, Terra/MODIS sensor; © NASA*



*Bering Strait, Summer 2000, MISR sensor; © NASA*



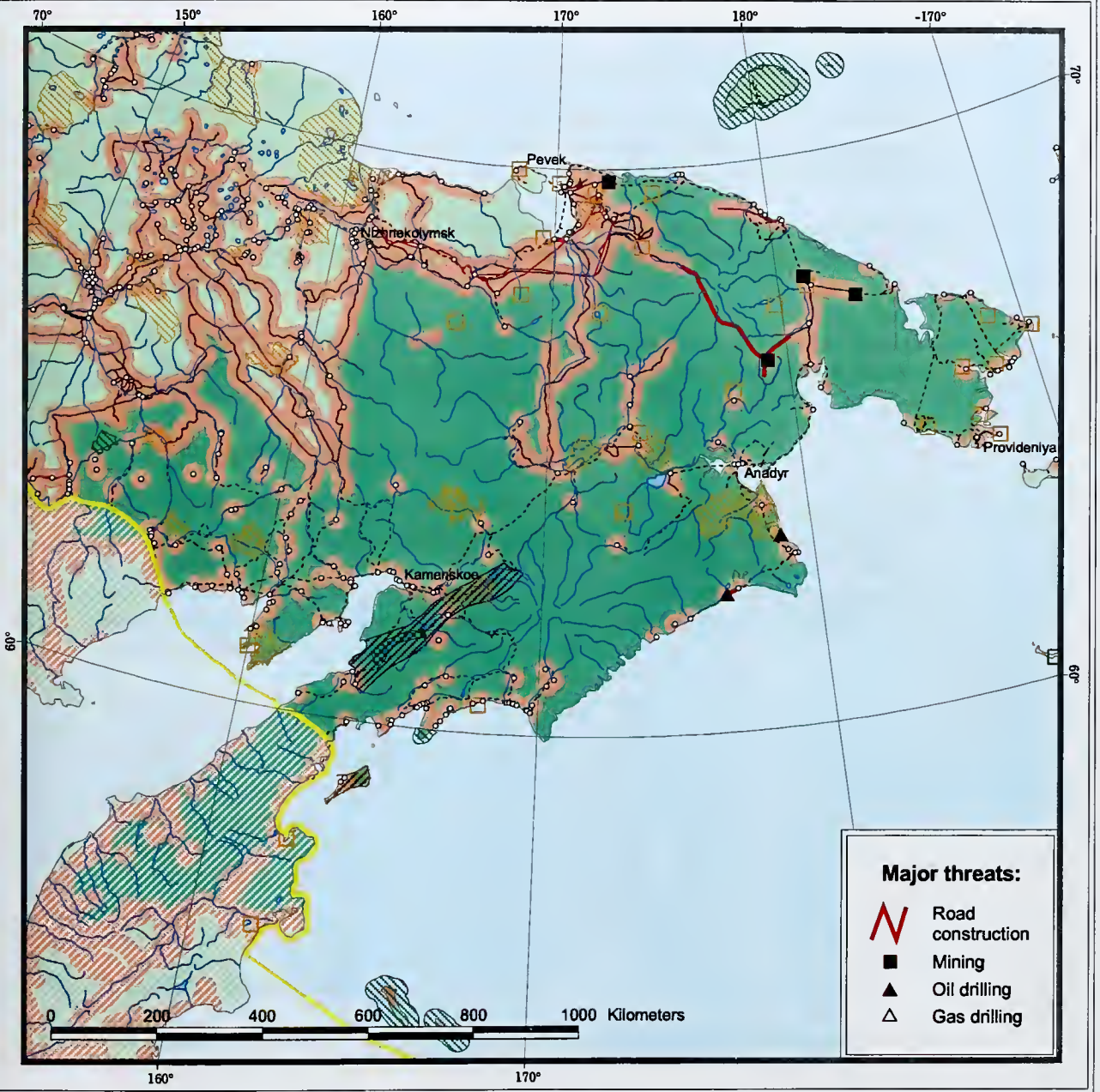
*Kamtchatka Peninsula, perspective from Shuttle Topographic data; © 2001 NASA*



# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 6: Chukotka-Koryak

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 6)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 7. Alaska (USA)

### 7.1. General Description

The Alaska wilderness area covers 691,167 km$^2$, all inside the Arctic region as defined by WWF.
The site is close to Chukotka in Russia (wilderness area No. 6), only separated by the Bering Strait, but up to now there is very little exchange between the sites, which underlines the remoteness of both sites. In general there is quite a lot of similarity in biomes and species with the Chukotka-Koryak wilderness, reflecting the connection of both areas in pre-historic era. Mountains and coastal tundra habitats dominate the area.
The area is well populated with Inuit and Americans from the mainland in increasing numbers, putting additional pressure on the wilderness by expanding the already existing road network.

Most of the area, 38.7%, is covered by mountain habitat, but with only a few glaciers. Highest peak: McKinley (6,194 m) in the Alaska Range, just on the southeastern edge of the wilderness is the highest mountain in North America.

### 7.2. Biomes and major vegetation zones

With nine different biomes, the Alaska wilderness area is very diverse in habitats. The prevailing vegetation is the mountain taiga and mountain tundra, but also coastal tundra with moss-sedge tundra components and very little bush vegetation. Lakes only cover a small fraction with less than 3.4% of the area. The few glaciers can be found in the mountain ridges and cover 1.7% of the area. The area is divided in biomes as follows:

| | |
|---|---|
| Arctic tundra | 2.0 |
| Northern subarctic tundra | 5.4 |
| Southern subarctic tundra | 16.5 |
| Mountain tundra | 23.0 |
| Coastal tundra | 14.4 |
| Northern taiga | 7.9 |
| Mountain taiga | 25.7 |
| Glaciers | 1.7 |
| Lakes | 3.4 |

### 7.3. Flora and Fauna

**Flora**

The number of plant species is not known, but very diverse and high compared with other regions in the Arctic. The number of rare endemic Arctic plant species is comparatively high with more than 20 locations concentrating in Northern Alaska and on the Seward Peninsula. They involve 12 species, 11 of which are considered as globally threatened:
Artemisia globularia
Beckwithia glacialis alaskensis
Douglasia beringensis
Erigeron muirii

Mertensia drummondii
Oxytropis sordida barnebyana
Poa hartzii alaskana
Potentilla murrayi
Pucciphippsia czukczorum
Rumex krausei

**Fauna:**
**Mammals**: The area is also rich in mammal species, including large predators, such as Polar bear, Brown bear, the arctic and red fox, the wolf and wolverine. Polar bear: 2,000 to 5,000 (Chukchi Sea, shared with Chukotka) and many marine mammals. **The Brown bear** is estimated at about 20,000 of a total of 31,700 estimated for all of Alaska, and the wilderness area contains most likely the largest bear density in the whole Arctic region.
**Wolverine**: 4,500 (for all of Alaska)
**Wolf**: 7,500 (for all of Alaska)
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**Musk ox**: 3,300
**Caribou**: 450,000 +
**Moose**: 10,000
**Dall sheep**: more than 20,000

In addition, colonies of **sea lions**, **walruses** and many other seals do have resorts along the wilderness area's coast.

**Birds**: With about 200 bird species breeding, Alaska is very diverse compared to many other regions and as rich in species as the Chukotka-Koryak wilderness area. The region is also rich in endemic and globally threatened species. Foremost the globally threatened species, including the vulnerable **Bristle–thighed Curlew** endemic to the region is entirely breeding inside the Alaska wilderness area. Another globally threatened species is the **Marbled Murrelet**, endemic to the Bering Sea region and also breeding in the Chukotka–Koryak and St.Elias/Kluane wilderness area. The species has been included only recently into the Red data list, due to a major decline of more than 35% in the last ten years. Other endemic species or those, which have the large majority of their population in the wilderness area, include the **Black Turnstone,** possibly the **Wandering Tattler** and the **Surfbird**. Even though the **Western Sandpiper** does breed in Chukotka, by far the large majority of the most common sandpiper, with 2.5 to 3 million birds, is breeding in Alaska, and here almost entirely in the wilderness area. The **Emperor Goose** is another endemic species to the Bering Sea region and the breeding population is only shared between Alaska and Chukotka, and both areas are important for the well-being of the species, which spends its lifecycle almost entirely in the two wilderness sites or nearby. **White-billed Divers** breed throughout the wilderness area. The birds require large undisturbed territories. Although they are not threatened at present, there has been a drop in the population size in many areas with human disturbance.

Other bird species include a large variety of waders. With 44 wader species breeding in the area, including 14 of the 24 sandpiper species, the Alaska wilderness area is also very diverse in this respect. The southernmost spit along the Bering Sea hosts a

variety of large sea bird colonies, including a large number of endemic sea birds, such as **Red-legged Kittiwake** and **Cassin's Auklet**.

### 7.4. Nature Conservation and Protected areas

38.7% of the area, stretching over 267,168 $km^2$, is well protected through about 14 sites (see map); this most diverse area with five globally threatened bird species is clearly not well protected at all.

### 7.5. Threats and future developments

The threats to the area are as multiple and diverse as the region itself, due to its richness in minerals and oil reserves. Recently discovered large resources of oil, gas and gold among many of the minerals have been already targeted for exploitation. Most threatening though seem to be the large oil and gas fields along the northern coast. A large network of roads already exists in the area or is leaping into the wilderness area. In several places, the wilderness area is in immediate danger of being closed by additional pipelines linking to those already existing. Together with Chukotkaya-Koryak the Alaska wilderness area is most threatened by oil and gas development and mining activity. Additionally, another threat is deriving from the planned testing site for the National Missile Defence system, which recently allocated planned sites in the Alaskan wilderness. The exact locations are not known.

**Sources:**

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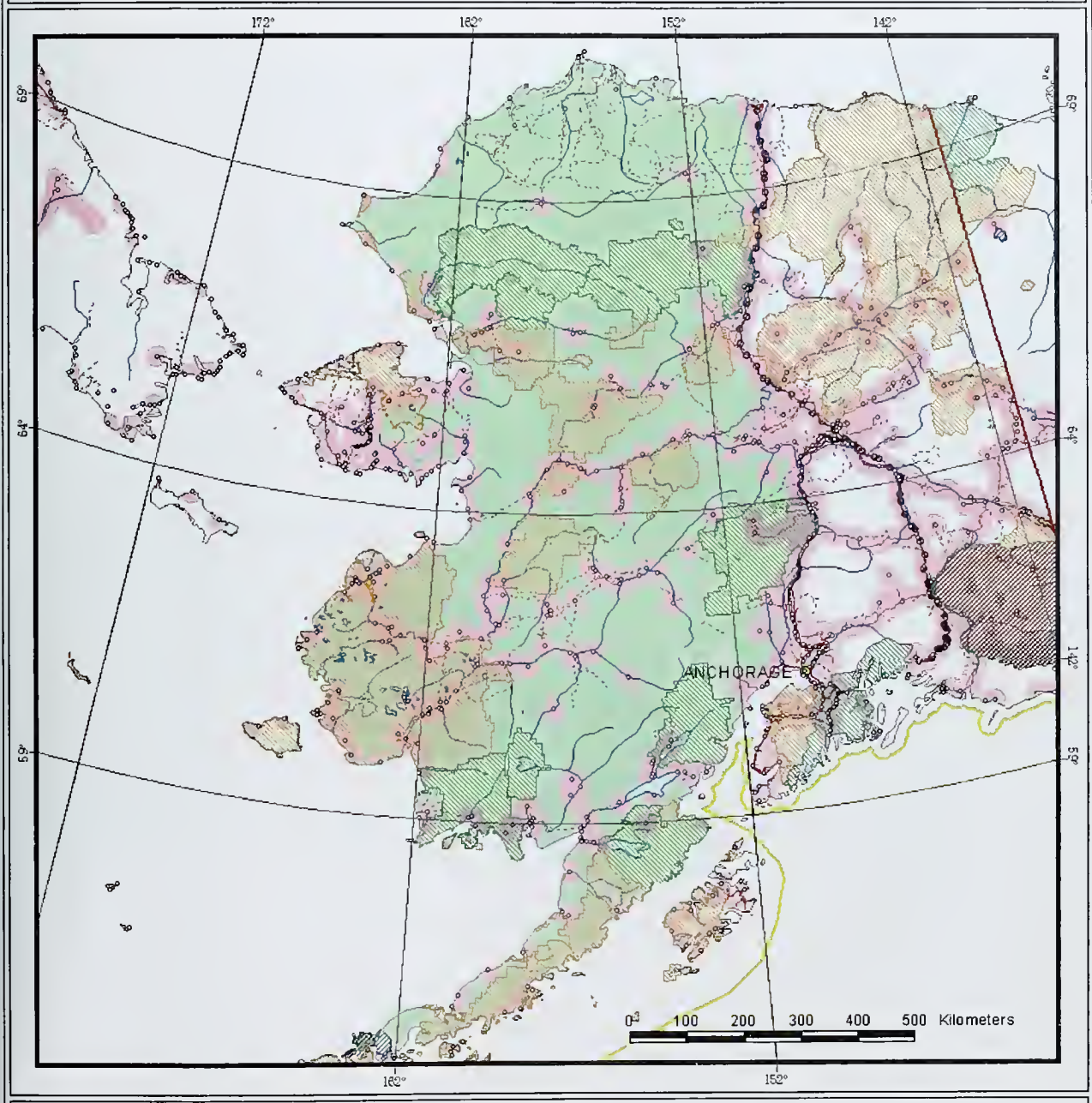
*Anchorage, Alaska; Terra/ASTER sensor - © NASA*

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 7: Alaska

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km
- < 20
- > 20
- > 20 (Area No 7)
- Non-Arctic land

Protected Area, (boundary or point location)
- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:
- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 8. Southern Hudson Bay (Canada)

### 8.1. General Description

The wilderness area comprises 596,249 $km^2$, of which only less than half, 282,906 $km^2$ are inside the Arctic region as defined by WWF.
The site is delimited in the north by the Hudson Bay and dominated mostly by boreal forest.
The area is well populated with Inuit and Americans from the mainland in increasing numbers, putting additional pressure on the wilderness expanding the already existing road network.

### 8.2. Biomes and major vegetation zones

The wilderness area is characterised by not many different biomes. The prevailing vegetation is the taiga with almost 80%, and is mostly moist, with interspersed bogs and other wetlands. Only 17% are tundra vegetation. Lakes only cover a small fraction with less than 2.2% of the area.

| | |
|---|---|
| Southern subarctic tundra | 17.0 |
| Forest tundra | 1.0 |
| Middle taiga | 5.5 |
| Taiga wetland | 74.3 |
| Lakes | 2.2 |

### 8.3. Flora and Fauna

**Flora**
The number of plant species is not known, but the number of rare endemic plant species is comparatively high, with eight locations along the Hudson Bay shore. They involve 2 species, both considered as globally threatened:
Linum lewisii lepagei (LR)
Salicornia borealis

**Fauna:**
**Mammals**: With approximately 1,000 polar bears, the area is quite densely populated with this top predator and highly sensitive to further fragmentation.
**Brown bear**: widespread, but no numbers available
**Wolverine**: numbers?
**Wolf**: numbers most likely around 1,000 to 2,000 animals
---
**Caribou**: woodland caribou, no numbers available
**Moose**: no numbers available

**Birds**: The number of birds breeding in the wilderness area is not known, but likely to be higher than the average of Arctic sites, due to its southern, more forest-covered components. The area is rich in species ranging from southern boreal forest species, such as seven woodpecker species to high Arctic ducks such as **King Eider** and, locally, **Ross's Gull** near Churchill, and extremely large **Snow Goose** colonies. The **Hudsonian Godwit** does have one of its major strongholds in this wilderness area, in the tundra along the Hudson Bay coast. Among the large predator birds, the **Golden**

**Eagle** is still widespread. There are no globally threatened or endemic species known to breed in the wilderness area.

### 8.4. Nature Conservation and Protected areas

With 41,416 $km^2$, 14.6 % of the Arctic part of this area is protected by 3 large sites (see map).

### 8.5. Threats and future developments

There are no threats known to the area, though the tourist development near Churchill has expanded and might reach out to neighbouring sites along the Hudson Bay coast.

**Sources:**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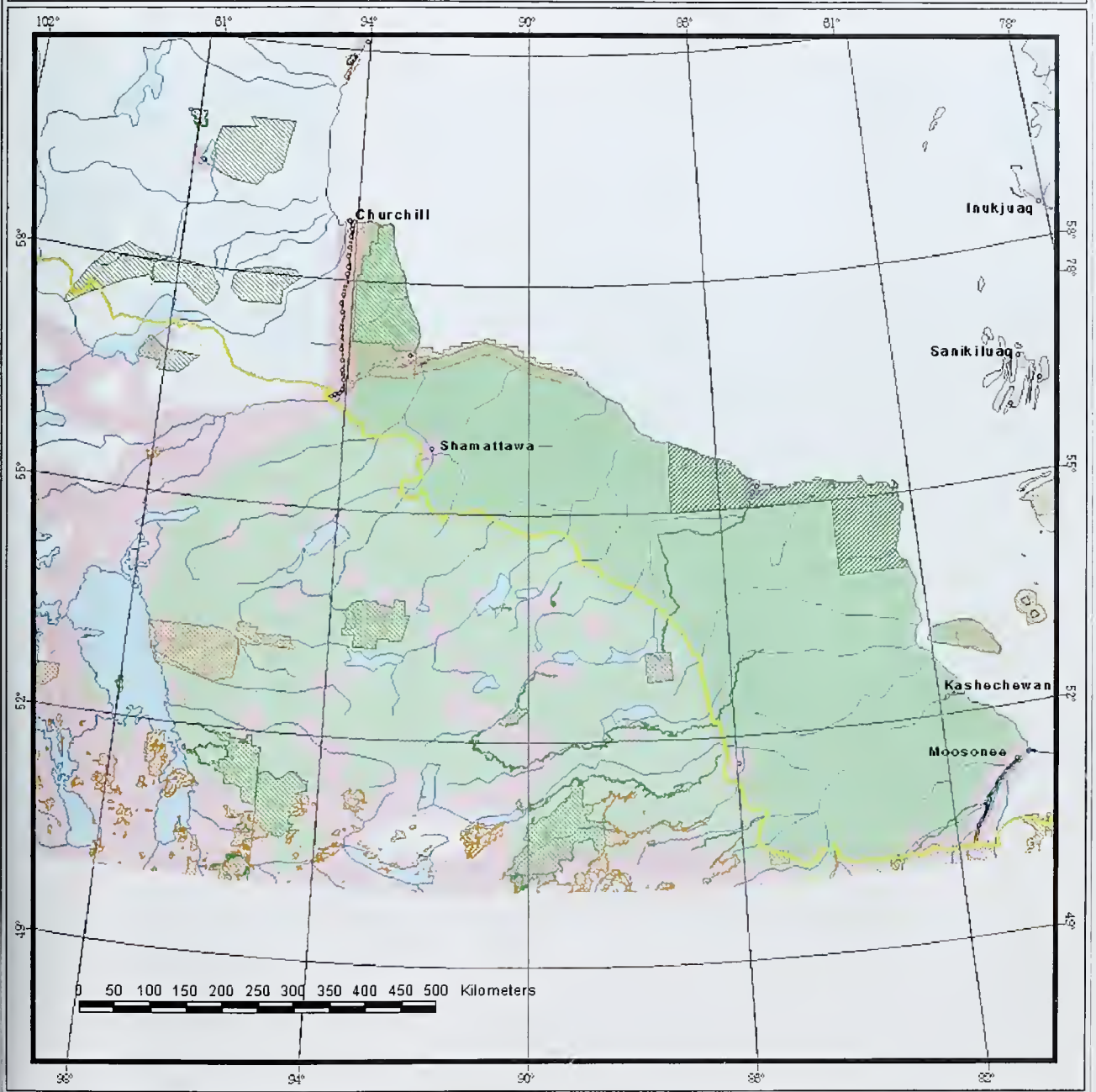
# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 8: Southern Hudson Bay

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km
- < 20
- > 20
- > 20 (Area No 3)
- Non-Arctic land

Protected Area, (boundary or point location)
- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:
- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 9. North Yukon (Alaska/Canada)

### 9.1. General Description

The wilderness area covers 273,394 km$^2$, all entirely inside the Arctic region, as defined by WWF, and bisected by the Canada/U.S. border between Alaska and Yukon. It is smaller than the Gydan wilderness, but its Arctic proportion is larger. The area is characterised by mountainous terrain, but lowland coastal habitats and river valleys are also prevalent, particularly the Yukon river and parts of the Western Mackenzie River Delta. Most of the area, more than 74%, is covered by mountain habitat, but with only a few glaciers.
Highest peak: Mt. Chamberlin in the Brooks range with 2,977 m.

### 9.2. Biomes and major vegetation zones

Although the wilderness area is characterised by few broad habitat types, there is a diversity of community types along environmental gradients from coastal tundra to alpine to taiga. The prevailing vegetation is the mountain tundra with almost 40% and other lowland tundra types with 14.4%. The taiga vegetation types cover over 44% and the mountain types prevail with 34%. Altogether, mountains dominate about 75% of the area. The highest peak is Mt. Chamberlin in the Brooks Range with 2,977 m. A few small glaciers cover 0.2% of the area. Lakes only cover a small fraction with 1.4% of the area.

| | |
|---|---|
| Northern subarctic tundra | 0.3 |
| Southern subarctic tundra | 14.1 |
| Mountain tundra | 39.8 |
| Northern taiga | 10.3 |
| Mountain taiga | 33.9 |
| Glaciers | 0.2 |
| Lakes | 1.4 |

### 9.3. Flora and Fauna

**Flora**
The number of plant species is not known, but the number of rare endemic plant species is comparatively high, with eight locations in the northern part and at the Beaufort Sea shore. They involve three species, two of which are considered as globally threatened with category low risk:
Erigeron muirii
Poa hartzii alaskana
Potentilla brooksensis

**Fauna:**

**Mammals**:
**Polar bear**: about 1,200
**Brown bear**: 6,300
**Wolverine**: 1,000

**Wolf:** numbers most likely around 1,000 to 2,000 animals

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**Musk ox**: only a few discrete populations along the Beaufort Sea coastal tundra range
**Caribou**: 129,000 (porcupine herd) increasing!
**Moose**: no numbers available
**Dall sheep**: about 30,000

**Birds**: The number of birds breeding in the wilderness area is not known, but likely to be around 150, due to its diverse habitats. The eastern part of the wilderness area may include the possible breeding range of the globally critically endangered **Eskimo Curlew**, whose exact breeding location is not known. There are no other globally threatened or endemic species known to breed in the wilderness area. The **Hudsonian Godwit** is known to breed in the wilderness area. As do the **Surfbird, the Buff-breasted Sandpiper** and the **Wandering Tattler,** all of which have a significant proportion of their population in the wilderness area. Among the large predator birds, the **Golden Eagle** and the **Gyrfalcon** are still widespread.

### 9.4. Nature Conservation and Protected areas

With 134,233km$^2$ an extremely high proportion (49.1%) of the area is protected in 4 sites, one of which is very large (see map).

### 9.5. Threats and future developments

Despite the overall level of protection of the area, with almost 50% of the entire wilderness in some form of conservation designation, it is not at all free from threats of resource extraction. Due to the neighbouring oil drilling sites at Prudhoe and large still untouched oil and gas reserves along the Beaufort Sea, the general area and even the existing protected sites, namely the Alaskan Arctic National Wildlife Refuge, are threatened by oil and gas development with further road and pipeline constructions. Several pipelines are already planned. Two of them cutting the area, one along the Beaufort Sea to link with the existing sites in Prudhoe, the other linking exploration sites further West in Alaska with the Central Canadian pipeline in the Northwest Territories. There is ongoing mineral exploration in the area. Hence, the prospect of further oil and gas development is a considerable threat to the wilderness area.

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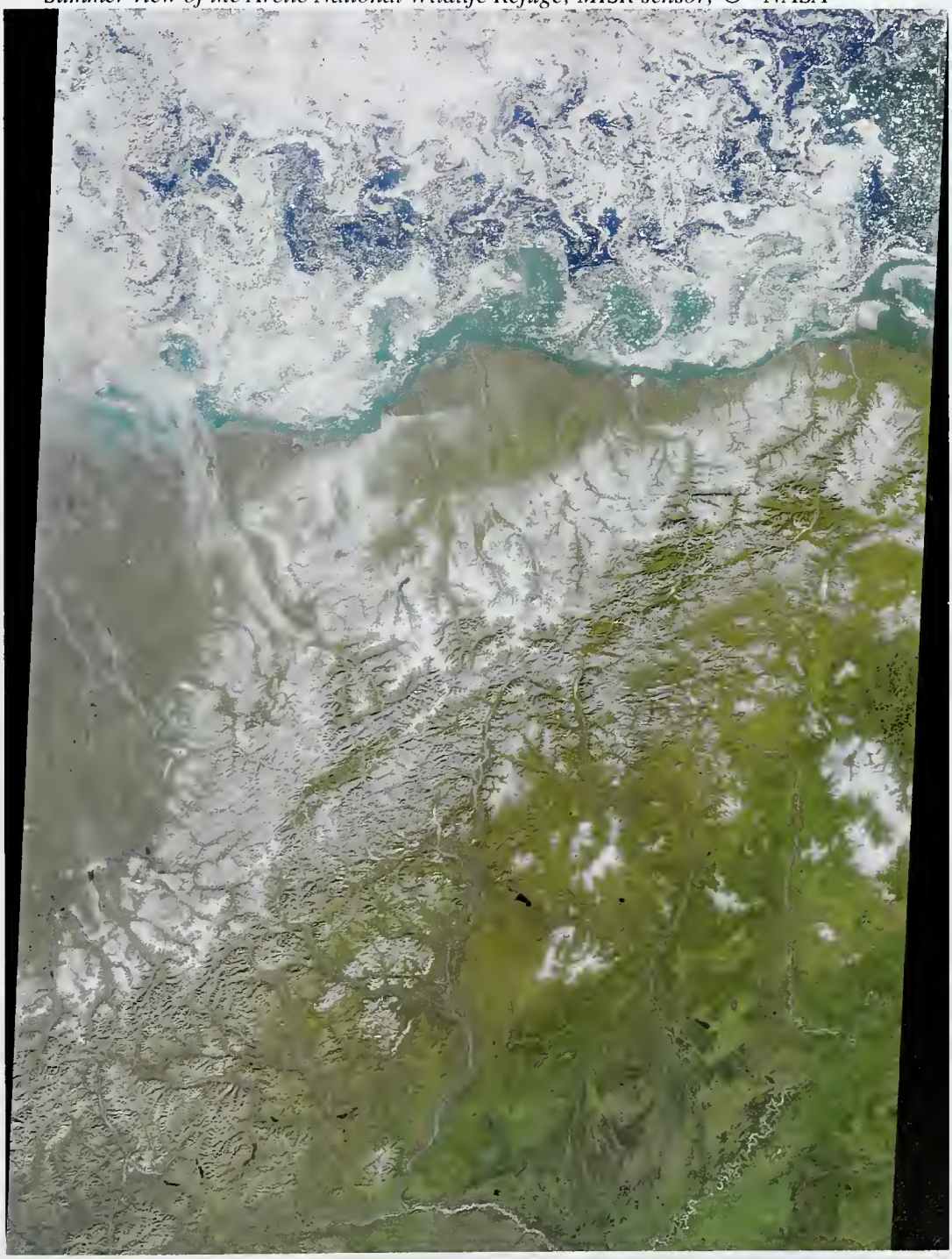
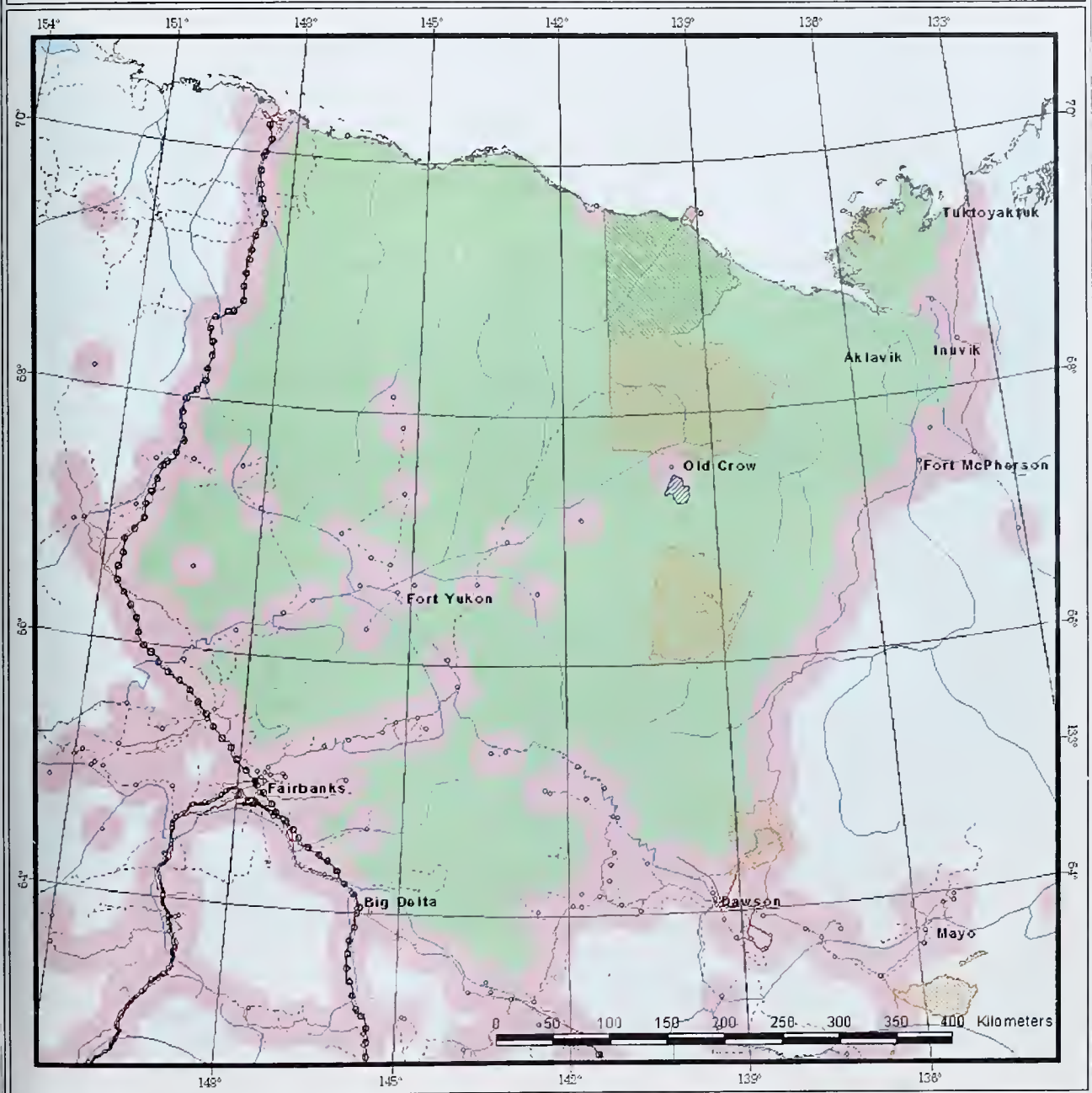
*Summer view of the Arctic National Wildlife Refuge; MISR sensor; © - NASA*



# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 9. North-Yukon

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 3)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 10. Gydan (Russia)

### 10.1. General description

Although the Gydan wilderness area stretches over 574,468 $km^2$, almost 2/3 of its area is outside the Arctic region as defined by WWF. It is very flat with no mountains, and the prevailing vegetation is determined by sub-arctic tundra. For many years the region has been subject to oil and gas exploitation. Recent discoveries describe the entire Arctic part of the wilderness area as rich in oil and gas fields. More than half of the region is doomed by oil of high quality and with the likelihood of further exploitation in the near future. Already today oil exploitation scarred the wilderness area by roads and pipelines. Further constructions (see map) are likely and already planned.

Most of the area with more than 75% is covered by mountains habitat, but without any glaciers.
Highest peak: (1454 m)

### 10.2. Biomes and major vegetation zones

The large majority, more than 80% of the Arctic part of the wilderness area is covered by tundra and 9% by forest tundra habitats. The prevailing vegetation is treeless sub-arctic tundra with shrubs. Lakes only comprise a small fraction with less than 1.6 % of the area. The biomes divide as follows:

| | |
|---|---|
| Arctic tundra | 12.7 |
| Northern subarctic tundra | 49.0 |
| Southern subarctic tundra | 20.9 |
| Forest tundra | 8.8 |
| Northern taiga | 6.5 |
| Taiga wetland | 0.5 |
| Lakes | 1.6 |

### 10.3. Flora and Fauna

**Flora**

The number of plant species is not known, but very diverse and high compared with other regions in the Arctic. The number of rare endemic plant species is not high with 3 locations along the Yenisey River mouth, involving only one species: *Artemisia samojedorum.*

**Fauna:**

**Mammals**: The area is rich in large predators:
**Polar bear** (> 100)
**Brown bear** 300 - 400
**Wolf** 150 - 200
**Wolverine** (no figures available)
**Arctic** and **red fox** (no figures available)
**Reindeer:** no figures available
**Elk**: 1,000-1,500

**Birds**: The total number of bird species breeding in the area is not known, but comparatively slightly lower than on Taimyr and further east in Siberia. The wilderness area has no endemic birds, but three globally threatened species. Some of the **Red-breasted Goose** population, endemic to Central Siberia, breeds on the Gydan Peninsula. Further south in the forest tundra area **Lesser White-fronted Geese** can be found. Other globally threatened species include the **White-tailed Eagle**, considered at low risk, with still high numbers breeding in the area. A few pairs of **White-billed Divers** breed throughout the wilderness area in low numbers. The birds require large undisturbed territories. Although they are not threatened at present, there has been a drop in the population size in many areas due to human disturbance.

### 10.4. Nature Conservation and Protected areas

With only 10,277 $km^2$ of the area, which is only 5% of the Arctic part of wilderness area protected in 3 sites (see map), the wilderness area is not sufficiently protected at all.

### 10.5. Threats and future developments

The threats to the area are deriving solely from oil and gas exploitation. A large proportion of the Russian oil and gas resources, including those of highest quality, is found in the area. Huge amounts have already been subject to current exploitation, but huge areas along the Yenisey and further north have not yet been exploited. There are currently eight gas drilling sites and a pipeline connected to Norilsk on Taimyr on the edge of the largest wilderness (North Siberia). Most of these sites are only connected by air and no roads have been built so far. The wilderness is very much exposed to further fragmentation (see map). A large network of roads already exists in the south of the area or is leaping into the wilderness area. Another new pipeline is planned to connect gas fields further north or even offshore (see map). The Gydan wilderness area will probably be split into two or three different areas in its northern Arctic part.

**Sources:**

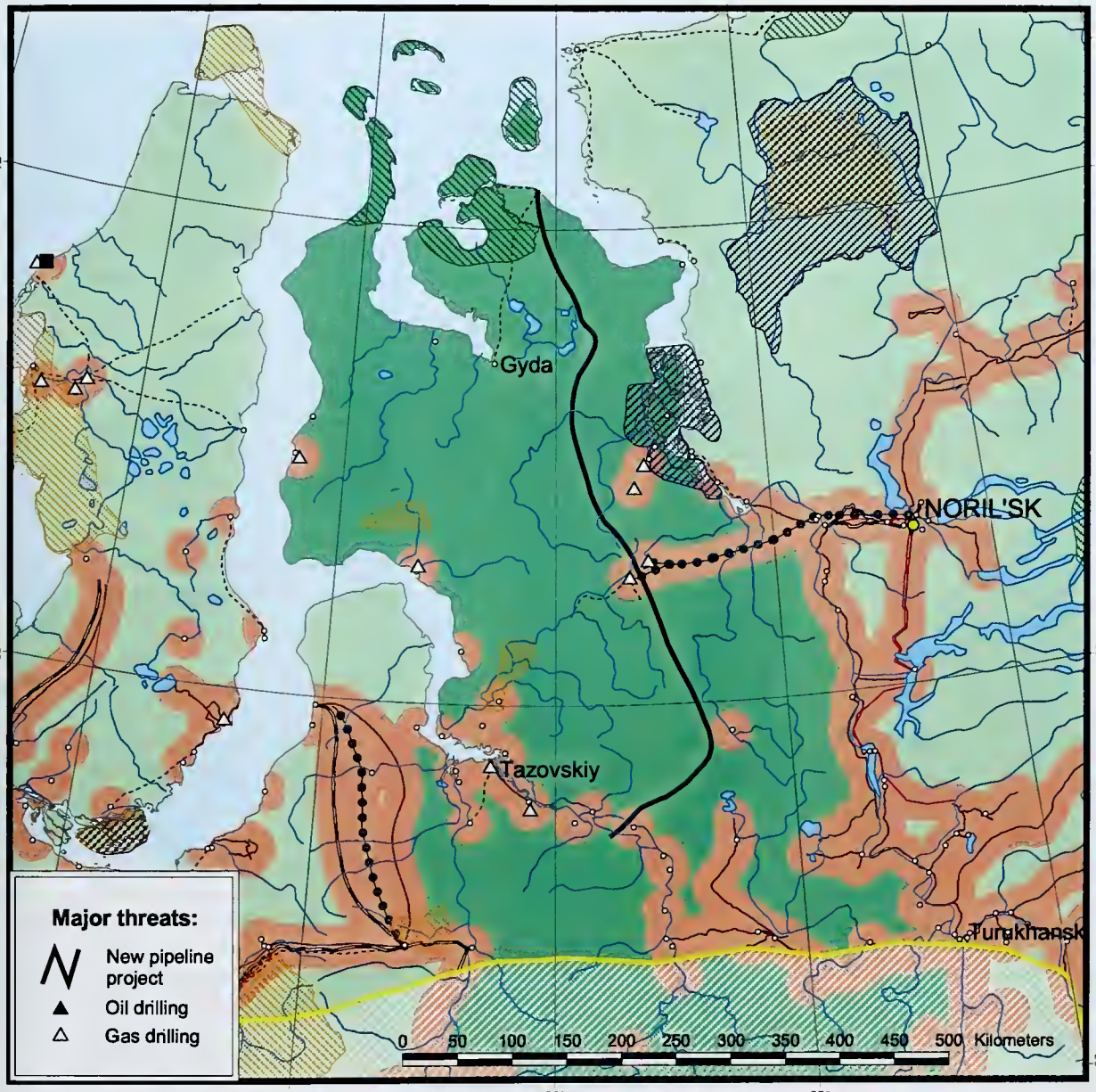
IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
Talbot, S. (1997): Atlas of Rare Plants in the Arctic. Draft Map. Anchorage, Cambridge
UNEP-WCMC Map Library

*The Yenisey river mouth and parts of the Gydan and Northern Siberia wilderness areas, in spring time; Terra/MODIS sensor; © - NASA*

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 10: Gydan

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 10)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 11. Yamal (Russia)

### 11.1. General description

The Yamal wilderness, with its area of 94,741 $km^2$, is entirely within the Arctic region as defined by WWF. It is very flat, with no mountains, and the prevailing vegetation is determined by sub-arctic tundra. Oil and gas drilling are currently ongoing. Recent discoveries describe the southern parts of the wilderness area as rich in oil and gas fields. More than half of the region holds oil resources of highest quality and with a strong possibility of further exploitation in the near future. Until today there has been oil and gas exploitation at two locations in the south of the wilderness area.
The area is almost entirely structured by treeless tundra with more than 90% of it covered by lowland tundra habitats, a few lakes and a lot of wetlands, mostly tundra bogs.

### 11.2. Biomes and major vegetation zones

The large majority, more than 95% of the Arctic part of the wilderness area is covered by tundra habitats. The prevailing vegetation is treeless sub-arctic tundra with few bushes in its southern type. Lakes only cover a small fraction, with less than 3.4% of the area. The biomes divide as follows:

| | |
|---|---|
| Arctic tundra | 26.3 |
| Northern subarctic tundra | 50.3 |
| Southern subarctic tundra | 20.0 |
| Lakes | 3.4 |

### 11.3. Flora and Fauna

**Flora**
The number of plant species is not known. Rare endemic plant species are only found just outside the wilderness in already disturbed and largely fragmented areas.

**Fauna:**
**Mammals**: The area is rich in large predators:
**Polar bear (> 100)**
**Brown bear** 300 - 400
**Wolf** 150 - 200
**Wolverine** (no figures available)
**Arctic** and **red fox** (no figures available)
**Reindeer:** no figures available
**Elk**: 1,000-1,500

**Birds**: The total number of bird species breeding in the area is not known, but slightly lower than in Taimyr and further East in Siberia. The area is inhabited by no endemic, but two globally threatened species, a few **Lesser White-fronted Geese** breeding in the southern tundra. Also a few pairs of the **Red-breasted Goose** are breeding in the area. The most recent estimate was about 50 pairs in 1995. Other globally threatened species include the **White-tailed Eagle**, considered at low risk, with still a few

breeding pairs in the area. A few pairs of **White-billed Divers** have bred in the wilderness area. The birds require large undisturbed territories. Although they are not threatened at present, there has been a drop in the population size in many areas with human disturbance.
Large birds have been documented to leave first heavily disturbed areas near oil and gas exploration, including swans and geese, falcons, divers, skuas, owls and certain waders.

### 11.4. Nature Conservation and Protected areas

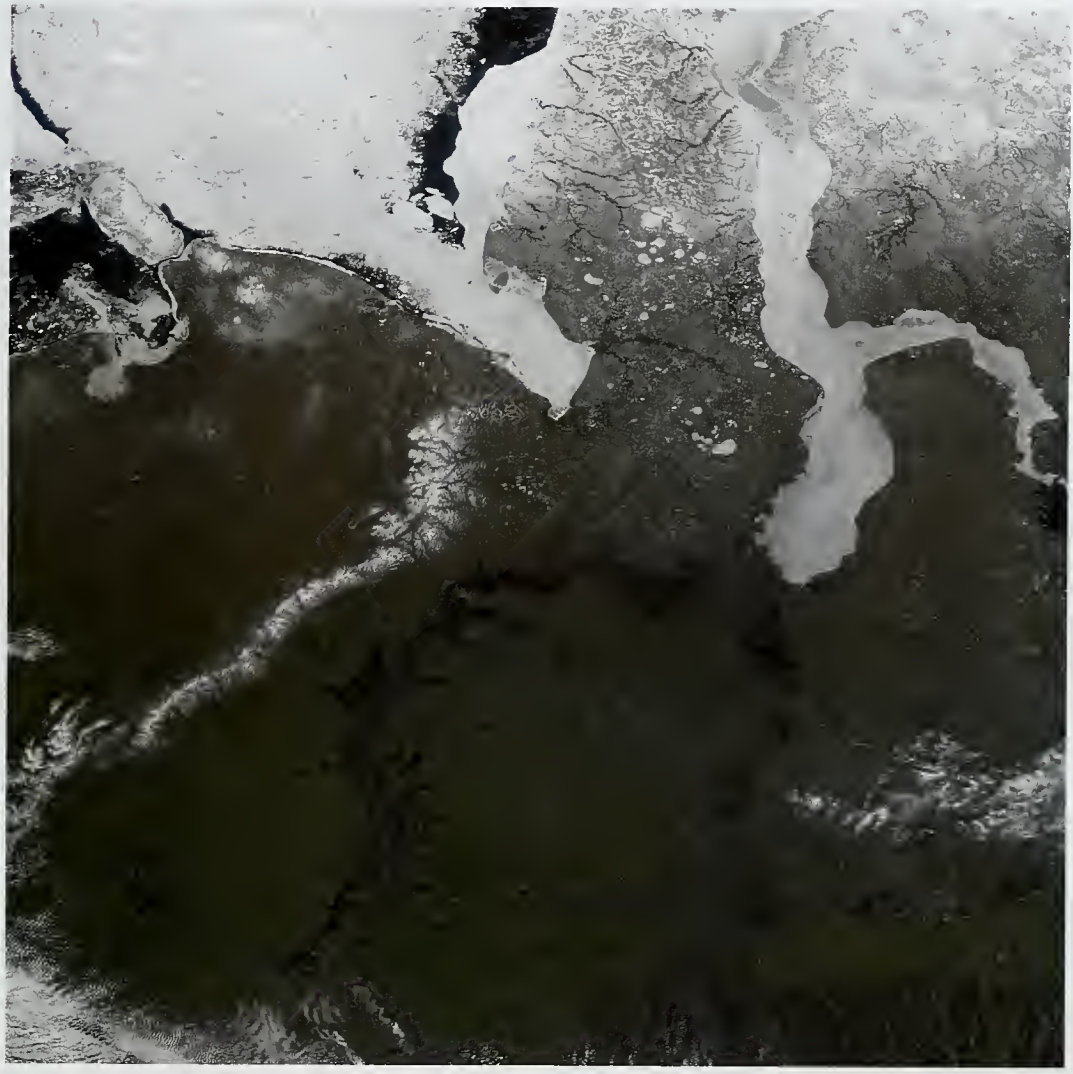
With only 12,761 $km^2$, which is only 13.5% of the wilderness area protected in 3 sites (see map), the area is fairly well protected in size. But as already two of the five gas drilling sites are situated inside the protected area, the overall protection of the wilderness might not be sufficient to face the likely prospect of further oil and gas development.

### 11.5. Threats and future developments

The threats to the Yamal wilderness area are dominated by oil and gas exploitation. A large proportion of the Russian oil and gas resources, including those of the highest quality, is deposited in more than half of the wilderness area. Large amounts have already been subject to current exploitation; huge areas in the North and East seem to be almost untouched, although according to other sources, there also is gas exploration near Drovanaya in the north and near Sabetta on the East coast. There are currently at least five, if not eleven gas drilling sites and a few gravel quarries. Vehicles crossing over the tundra have destroyed large parts of the area, and some areas were destroyed completely. After 1988, road construction and gravel tracks accompanied by off-road restrictions to vehicle use only in the winter allowed some of the tundra vegetation to recover. A recently constructed 250 km railway connecting Vorkuta with Ust Yuribey on the western edge (see map) cut off some of the formerly larger wilderness already. A road accompanies this railway with additional access facilities for hunters and poachers into the area. The wilderness is very much threatened by further fragmentation, due to further oil and gas development (see map). A network of roads exists in the south of the area, but the north of the wilderness area seems to be still reasonably untouched. But as rich resources in oil and gas have been found here as well, this part is also in danger of further fragmentation. Some gas drilling already took place, first tracks appeared and the subsequent steps will inevitably lead to further road construction and fragmentation.

**Sources:**

IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
Paskhalny, S.P (2000): Economic Development of the Yamal Peninsula and Issues of Bird Conservation. in Ebbinge, B.S. (eds). Heritage of the Russian Arctic: Research, Conservation and International Cooperation. Moscow. Ecopros Publ. 394-402pp.
Paskhalny, S.P., Sosin, V.F. & V.G. Shtro (1995): Red-breasted Goose on Yamal: Distribution, Numbers, Reproduction of the Population. Carsca 1: 103-109
Talbot, S. (1997): Atlas of Rare Plants in the Arctic. Draft Map. Anchorage, Cambridge, UNEP-WCMC Map Library



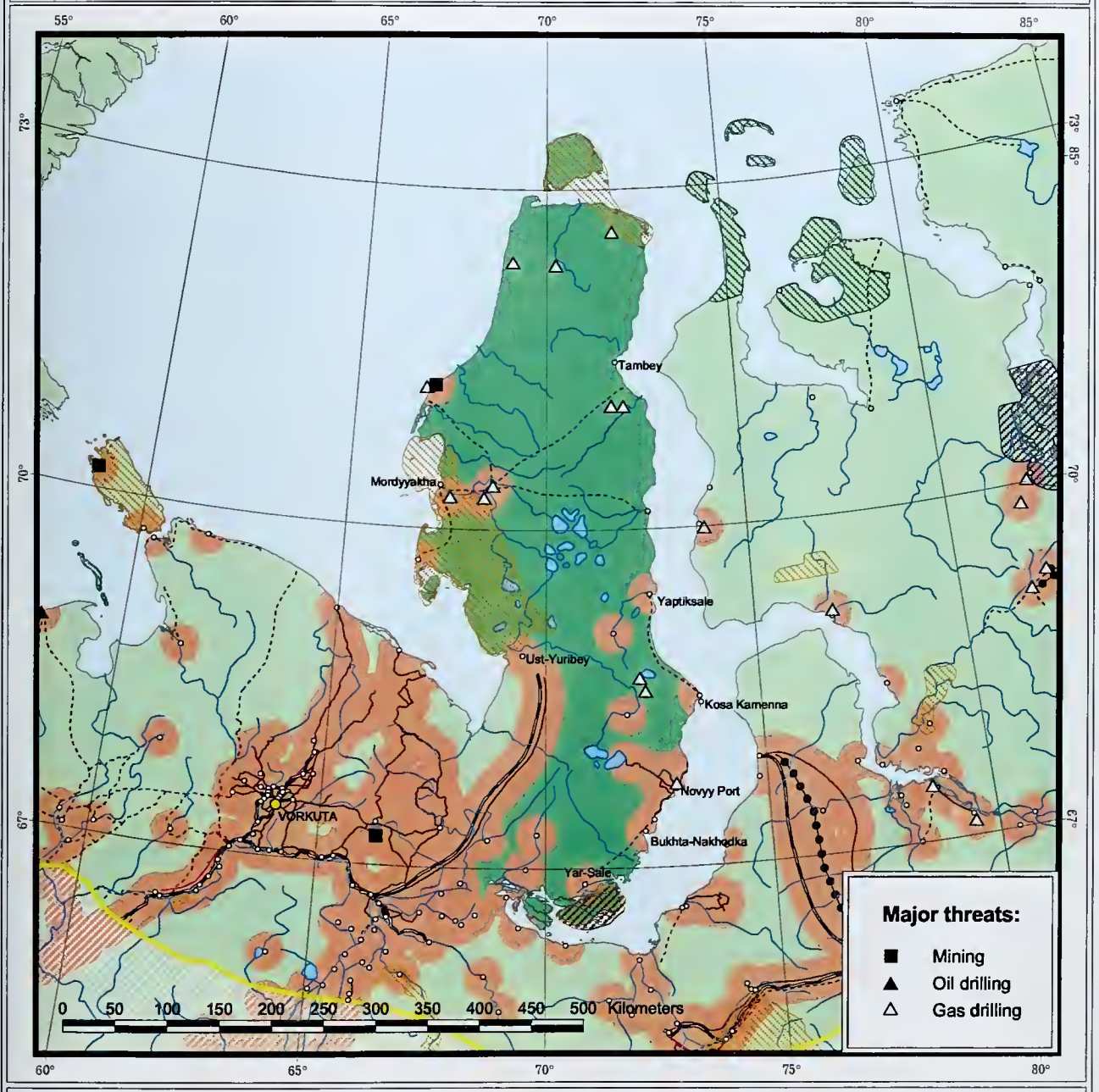
*The mouth of the Obi river in Siberia, with parts of the Yamal peninsula and Bolshezemelskaya Tundra (to the west) wilderness areas; Terra/MODIS sensor; © - NASA*

*Detail spring view of the Obi river in Northern Siberia, with southern part of the Yamal peninsula wilderness area; Terra/MODIS sensor; © - NASA*

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 11: Yamal

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 11)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 12. Bolshezemelskaya Tundra (Russia)

### 12.1. General description

Most of the Bolshemelskaya wilderness, with 94,138 km$^2$ of the area, is part of the Arctic region as defined by WWF. Almost 10% of its area is outside the Arctic region. With a total of 103,072 km$^2$, the wilderness area is the largest in Europe. It is very flat, with hardly any mountains. The prevailing vegetation is determined by sub-arctic tundra. Exploration drills are currently ongoing. Recent discoveries describe the southern parts of the wilderness area as rich in oil and gas fields and coal mines. More than half of the region holds oil resources of medium quality and with a slight likelihood of further exploitation in the future. Until today there has been oil and gas exploitation at two locations in the south in the wilderness area.
The area is almost entirely structured by treeless tundra, with more than 80% of it covered by lowland tundra habitats, a few lakes and a lot of wetlands, mostly tundra bogs.

### 12.2. Biomes and major vegetation zones

The large majority, more than 80% of the Arctic part of the wilderness area is covered by tundra, and 7% by forest tundra habitats. The prevailing vegetation is treeless sub-arctic tundra with few shrubs. A few mountains leap from the Ural Mountains into the area, but they do not cover more than 2.2% of the area. Lakes only cover a small fraction, with less than 1% of the area. The biomes divide as follows:

| | |
|---|---|
| Arctic tundra | 2.0 |
| Northern subarctic tundra | 19.8 |
| Southern subarctic tundra | 67.7 |
| Mountain tundra | 2.2 |
| Forest tundra | 7.2 |
| Lakes | 0.9 |

### 12.3. Flora and Fauna

**Flora**
The number of plant species is not known. Rare endemic plant species are only found just outside the wilderness in already disturbed and largely fragmented areas.

**Fauna:**
**Mammals**: The area is rich in large predators:
**Polar bear (> 100)**
**Brown bear** 2,000 –2,500
**Wolf** 300 – 600 (increasing)
**Wolverine** (no figures available)
**Arctic** and **red fox** (no figures available)
**Reindeer:** 3,500
**Elk**: estimated at 10,000 -15,000

**Birds**: The total number of bird species breeding in the area is not known, but comparatively slightly lower than on Taimyr and further east in Siberia. The area has

no endemic, but one globally threatened species, breeding in the forest tundra area: the **Lesser White-fronted Goose**. The wilderness area holds one of the largest groups of the western population and the largest in Europe. Other globally threatened species include the **White-tailed Eagle**, considered at low risk, with still high numbers breeding in the area. With the Vaygakh Island, the wilderness also hosts a large proportion of the Russian **Barnacle Goose** population. **White-billed Divers** breed throughout the wilderness area in a few pairs. The birds require large undisturbed territories. Although they are not threatened at present, there has been a drop in the population size in many areas with human disturbance.

### 12.4. Nature Conservation and Protected areas

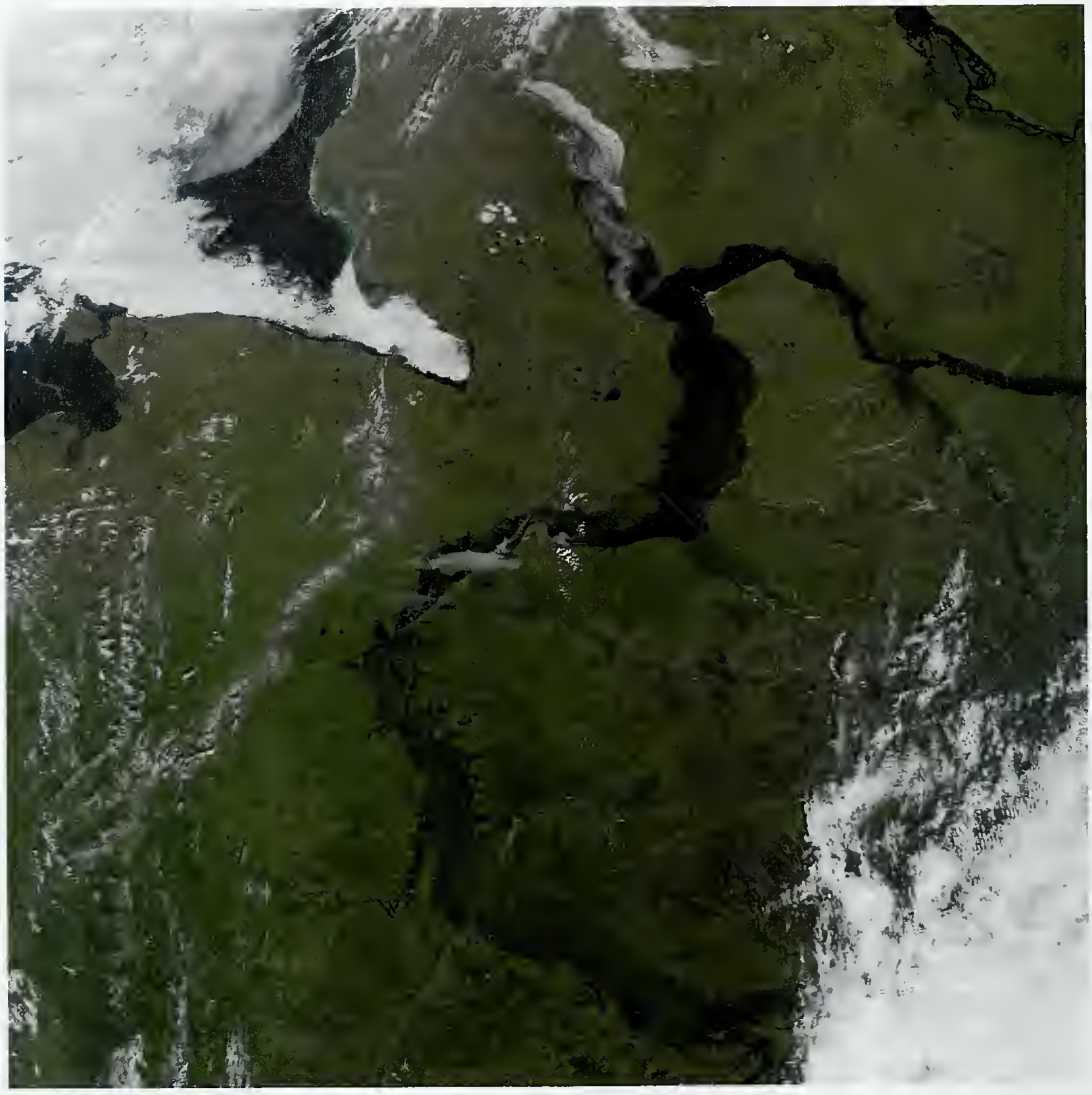
With only 2,105 $km^2$, which is only 2.2% of the wilderness area protected by only 1 site (see map), the area is hardly protected at all and very likely facing further fragmentation.

### 12.5. Threats and future developments

The threats to the area are deriving from oil and gas exploitation, but in this area the threat of coal mining is more important. Oil resources of medium quality are found in more than half of the region. There are two drill locations at present and there is a slight likelihood of further exploitation in the future. The wilderness is very much endangered by further fragmentation (see map). A large network of winter roads already exists in the the Bolshemelskaya wilderness area. Some of the roads, such as between Naryan mar and Vorkuta, might be built into summer roads and will quite likely split the area into two, cutting off the southern part.

**Sources:**

IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
Talbot, S. (1997): Atlas of Rare Plants in the Arctic. Draft Map. Anchorage, Cambridge
UNEP-WCMC Map Library

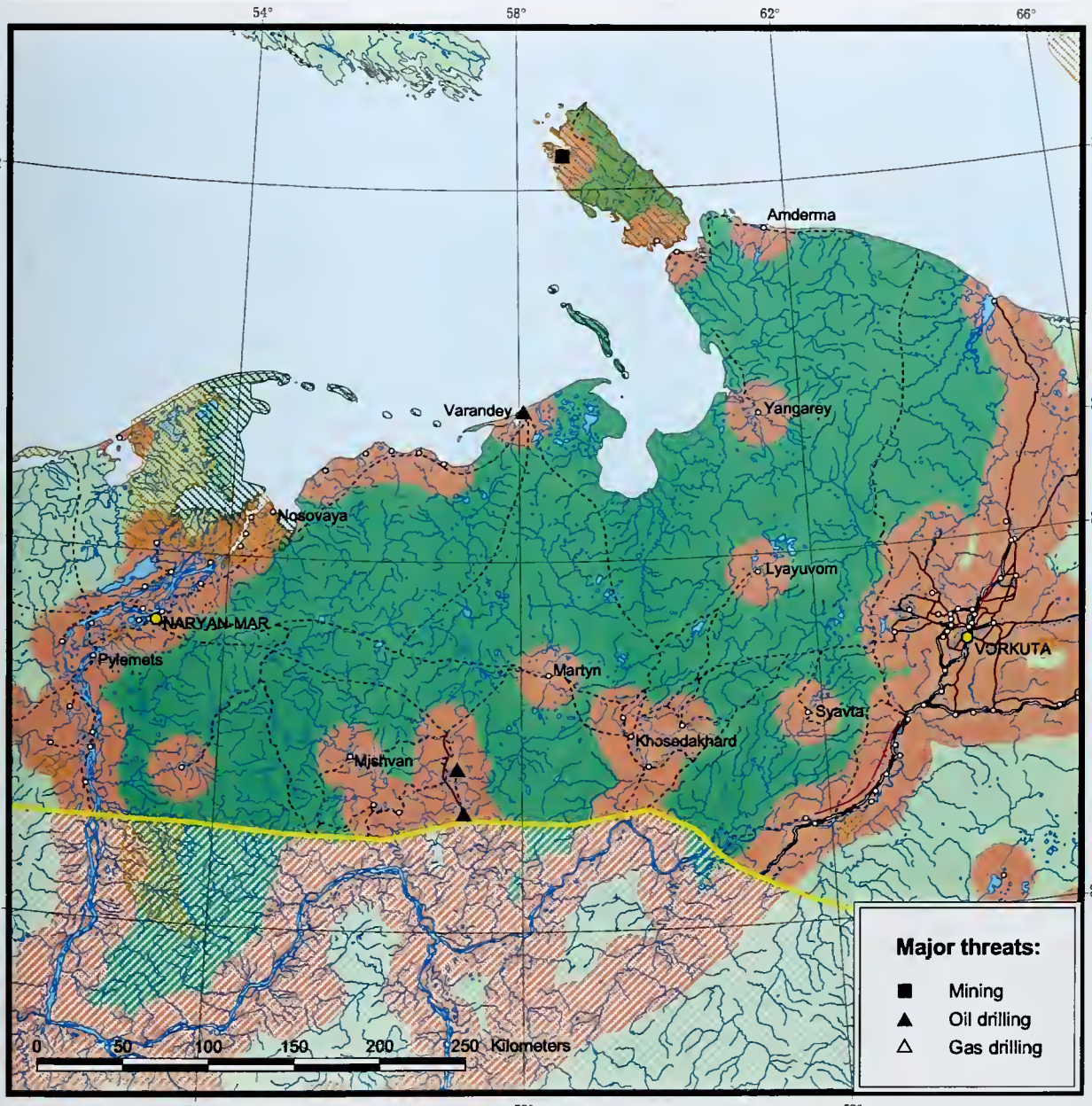


*The Obi river, with Bolshezemelskaya Tundra and Yamal peninsula wilderness areas in the summer; The Ural Mountains are also visible; Terra/MODIS sensor; © 2000 - NASA*

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 12: Bolshezemelskaya Tundra

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 12)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

## No. 13. Muskwa/Slave Lake Forests (Canada)

### 13.1. General Description

The wilderness area covers 95,329 $km^2$ in total, slightly less of which, namely 89,324 $km^2$ lies inside the Arctic region as defined by WWF.
The site is very close to the large Central Canadian Taiga and Tundra wilderness area, and is only separated by a road that parallels the Mackenzie River flowing west from Great Slave Lake.

### 13.2. Biomes and major vegetation zones

The wilderness area is largely characterised by taiga and mostly by its southern type. The prevailing vegetation is boreal forest with interspersed bogs, lakes and other wetlands. Lakes only cover a small fraction with 2.8% of the area.

| | |
|---|---|
| Northern taiga | 5.5 |
| Middle taiga | 0.1 |
| Southern taiga | 91.6 |
| Lakes | 2.8 |

### 13.3. Flora and Fauna

**Flora**
The number of plant species and the number of rare endemic species are not known.

**Fauna:**
**Mammals**:
**Brown bear**: no numbers available
**Wolverine**: no numbers available
**Wolf**: no numbers available
---
**Moose**: no numbers available

**Birds**: The number of birds breeding in the wilderness area is not known, but likely to be higher than the average Arctic site, due to its southern, more forested components. The site is very close to the famous Wood Buffalo National Park, where the last remaining wild pairs of the critically endangered **Whooping Cranes** are breeding. An expansion of the population into the adjacent wilderness area is quite likely and should not be hampered by further fragmentation. Among the large predator birds the **Golden Eagle** is known in the area. There are no globally threatened or endemic species known to breed in the wilderness area.

### 13.4. Nature Conservation and Protected areas
Only a small fraction of 18 $km^2$, which is only 0.02% of the area is protected by 1 site (see map).

### 13.5. Threats and future developments
The area is currently experiencing significant hydrocarbon exploration, including drilling and timber removal as a result of seismic activity. Although commercial

forestry is limited to a few permits and leases, the threat of logging expansion exists for the Muskwa forests as elsewhere in the northern boreal. The unprotected status might encourage development plans in the area for exploiting natural resources such as timber or to provide access for tourism. One road leaping into the area from the south and eight winter roads or tracks might be converted into permanent road structures.

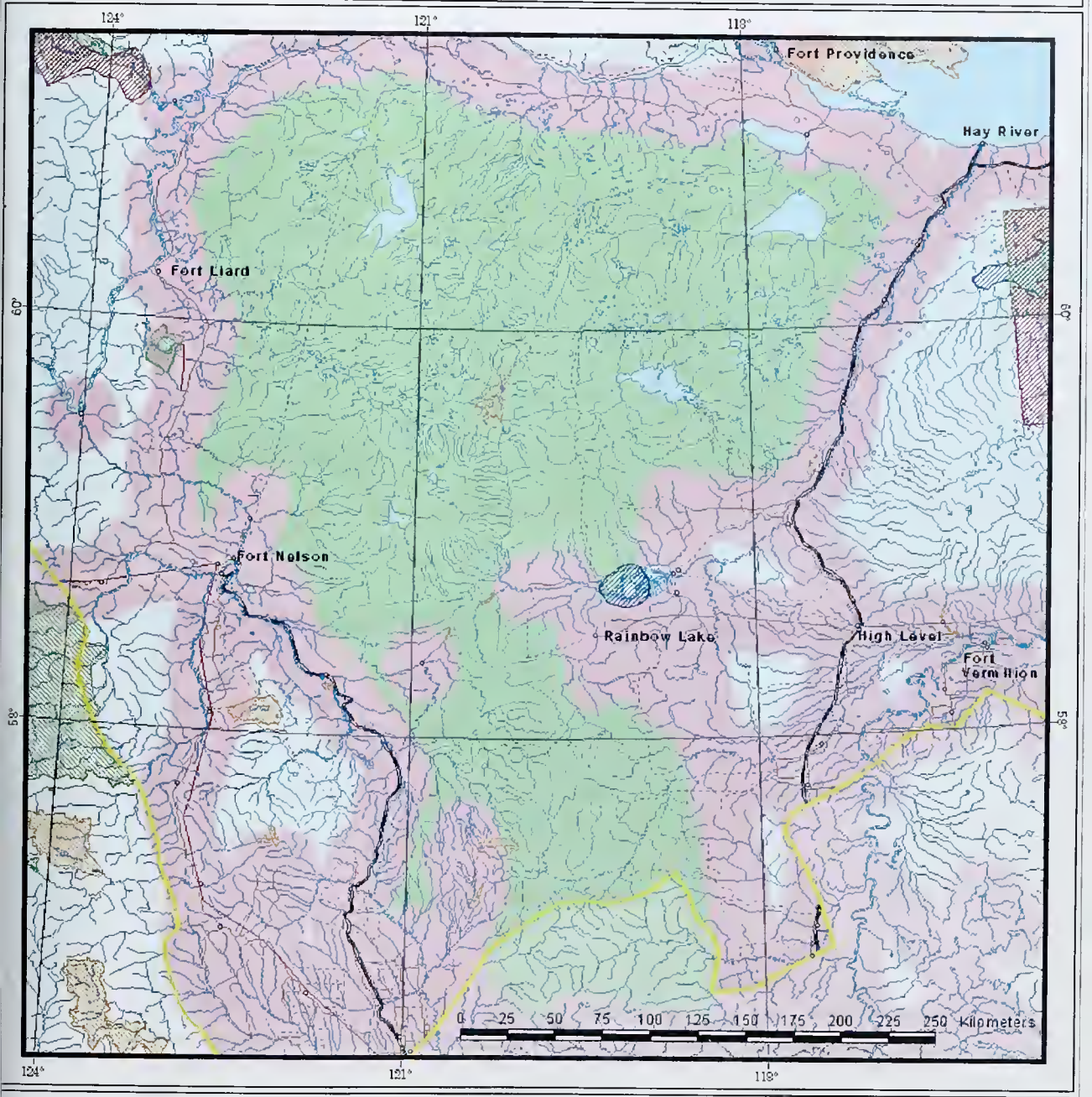
**Sources:**

Cluff, H.D. Wolves in *CAFF* Arctic Flora and Fauna. in Helsinki page: 234-235.
Gau, R. (2001): Brown Bear in *CAFF* Arctic Flora and Fauna. in Helsinki page: 238.
Gau, R. & R. Mulders (2001): Wolverine in Arctic Flora and Fauna in *CAFF* Helsinki p: 236-237.
IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
Godfrey, W.E. (1986): The Birds of Canada (2. rev. Edition). Ottawa. 595 p.
Talbot, S. (1997): Atlas of Rare Plants in the Arctic. Draft Map. Anchorage, Cambridge
UNEP-WCMC Map Library

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No.13: Muskwa/Slave Lake Forests

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km
- < 20
- > 20
- > 20 (Area No 3)
- Non-Arctic land

Protected Area, (boundary or point location)
- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites
- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 14. Southern Labrador (Canada)

### 14.1. General Description

The wilderness area comprises 171,190 $km^2$, of which less than half (84,255 $km^2$) lies within the Arctic region as defined by WWF.
The site is delimited to the south by the St. Lawrence River and dominated mostly by boreal forest.

### 14.2. Biomes and major vegetation zones

The wilderness area is characterised by taiga biomes in almost 70%. The prevailing vegetation is the middle taiga with more than 37%. Lakes comprise 5.6% of the area.

| | |
|---|---|
| Southern subarctic tundra | 6.0 |
| Forest tundra | 20.5 |
| Northern taiga | 30.7 |
| Middle taiga | 37.2 |
| Lakes | 5.6 |

### 14.3. Flora and Fauna

**Flora**
The number of plant species is not known, and no rare endemic Arctic plant species are known in the area.

**Fauna:**
**Mammals**: Black bears have migrated north into the tundra habitats in the absence of polar bears.
**Brown bear**: no figures available
**Wolverine**: no figures available
**Wolf**: numbers most likely around 1,000 to 2,000 animals
---
**Caribou**: woodland caribou (Red Wine and Mealy Mountain herds), no numbers available
**Moose**: no numbers available

**Birds**: The number of birds breeding in the wilderness area is not known, but likely to be higher than the average Arctic site, due to the large proportion of taiga components. The area is rich in species ranging from southern boreal forest species, such as seven woodpecker species, to high Arctic ducks. In the south, outside the Arctic region the wilderness touches upon the breeding range of the **Piping Plover**, a species considered vulnerable among the globally threatened birds. Among the large predator birds, the **Golden Eagle** is still widespread. There are no globally threatened or endemic species known to breed in the wilderness area.

### 14.4. Nature Conservation and Protected areas

There are no protected areas in the Arctic part of the wilderness at all!

### 14.5. Threats and future developments

Expansion of hydropower development in the western part of the wilderness threatens remaining caribou herds already impacted by the existing hydro development along the Churchill River. There are no other threats known to the area.

**Sources:**

Cluff, H.D. Wolves in *CAFF* Arctic Flora and Fauna. in Helsinki page: 234-235.
Gau, R. (2001): Brown Bear in *CAFF* Arctic Flora and Fauna. in Helsinki page: 238.
Gau, R. & R. Mulders (2001): Wolverine in Arctic Flora and Fauna in CAFF Helsinki p: 236-237.
Godfrey, W.E. (1986): The Birds of Canada (2. rev. Edition). Ottawa. 595 p.
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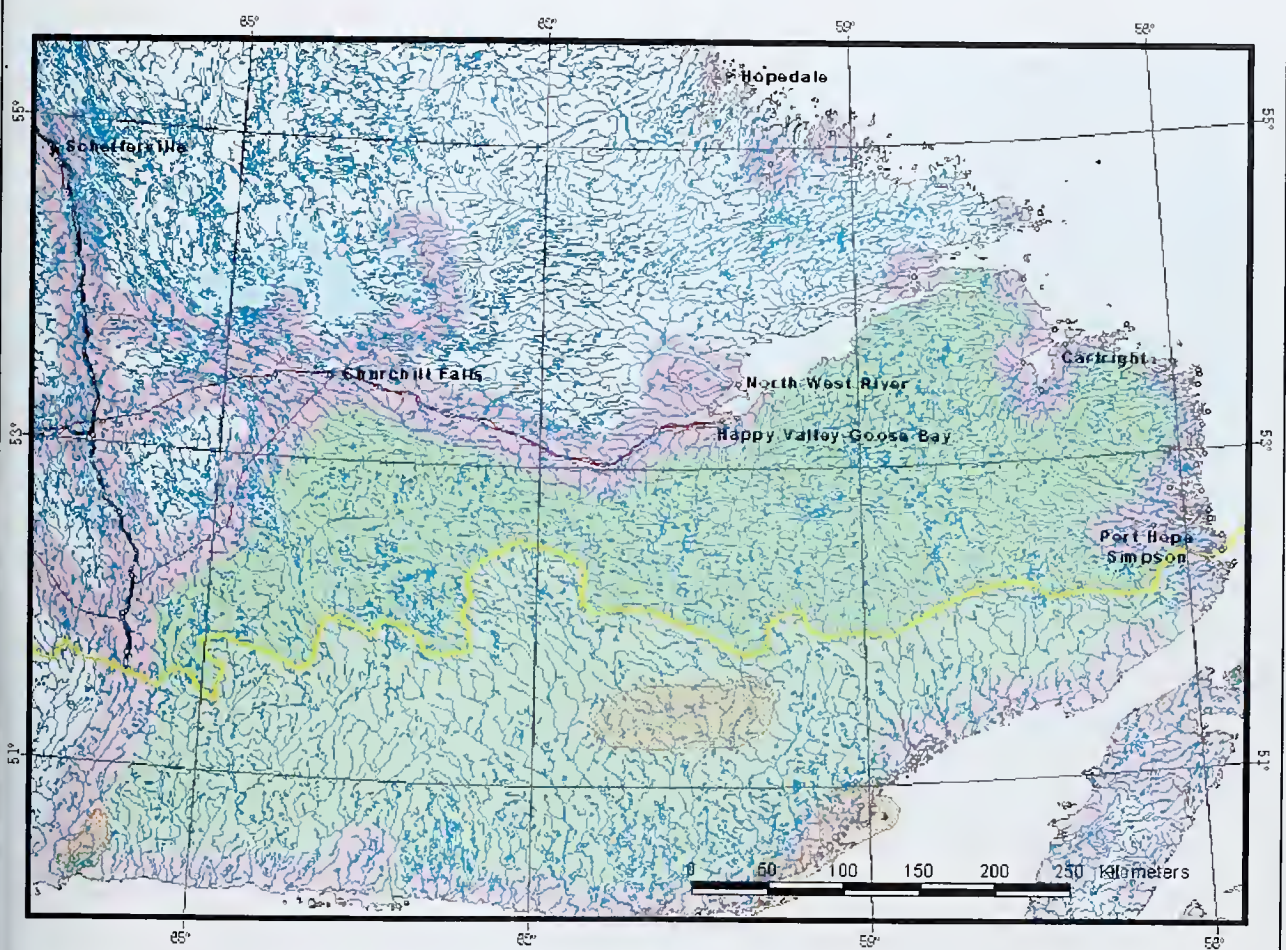
IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
Talbot, S. (1997): Atlas of Rare Plants in the Arctic. Draft Map. Anchorage, Cambridge
UNEP-WCMC Map Library

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 14: Southern Labrador

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 14)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites

- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 15. Novaya Zemlya (Russia)

### 15.1. General description

The area consists of two large islands covering 78,971 $km^2$ in total. It is the third largest wilderness area in Europe. As high Arctic islands, a large proportion of the area is covered by ice.

Highest peak: 1342 m (Stolbovoy)

### 15.2. Biomes and major vegetation zones

As a large proportion of the land mass is covered by ice, only a very small part of the area is vegetated. The area is divided in biomes as follows ( %):

| | |
|---|---|
| Polar desert | 12.2 |
| Arctic tundra | 11.3 |
| Mountain tundra | 40.0 |
| Glaciers | 35.9 |
| Lakes | 0.6 |

### 15.3. Flora and Fauna

**Flora:** The total number of plant species is not known. None of the globally threatened or rare endemic vascular plant species of the Arctic have been recorded on Novaya Zemlya.

**Fauna:** Novaya Zemlya is in the high Arctic and hence not very rich in biodiversity. Some selected taxa are listed. The total number of species is unknown; the number of breeding birds is about 36.

**Mammals**: Only **arctic wolf** and **fox**, **reindeer**, **arctic hare** and **polar bear** are among the major mammals on the islands.
**Polar bear** The area around Novaya Zemlya is holding one of the largest populations of polar bears, with 2,500 to 3,500 animals.
**Wolf:** no figures available
**Wolverine** (no figures available)
**Arctic fox** (no figures available)
**Reindeer:** 3,500

**Birds**: Most famous are the sea bird colonies. The most common bird is the Brunnich's Guillemot. With 850,000 breeding pairs, Novaya Zemlya hosts about 6% of the global population. Other important sea bird colonies include the Little Auk with 30,000 to 50,000 pairs in one colony. The large majority of the Russian **Barnacle Goose** population estimated to be 260,000 pairs is located on the South Island of Novaya Zemlya. There are no globally threatened or rare endemic species in the wilderness area.

A few **White-billed Divers** breed on the South Island. The birds require large undisturbed territories. Although they are not threatened at present, there has been a drop in the population size in many areas with human disturbance.

### 15.4. Nature Conservation and Protected areas

There is no protected area on Novaya Zemlya today.

### 15.5. Threats and future developments

Among a series of identified threats to biodiversity on Novaya Zemlya, such as fisheries, oil, other pollutants, disturbance, and area encroachment have been described with a rather high index as a current threat and even higher for a potential threat compared to other mentioned threat types. The index though is still lower than in adjacent areas, even smaller than on Svalbard.

Big oil fields have been discovered around the islands offshore east and west. West of the islands they are of high and partly even of highest quality and very likely to be exploited at some stage. The offshore drilling will imply further encroachment along the shore with additional risk of fragmentation.

**Sources:**

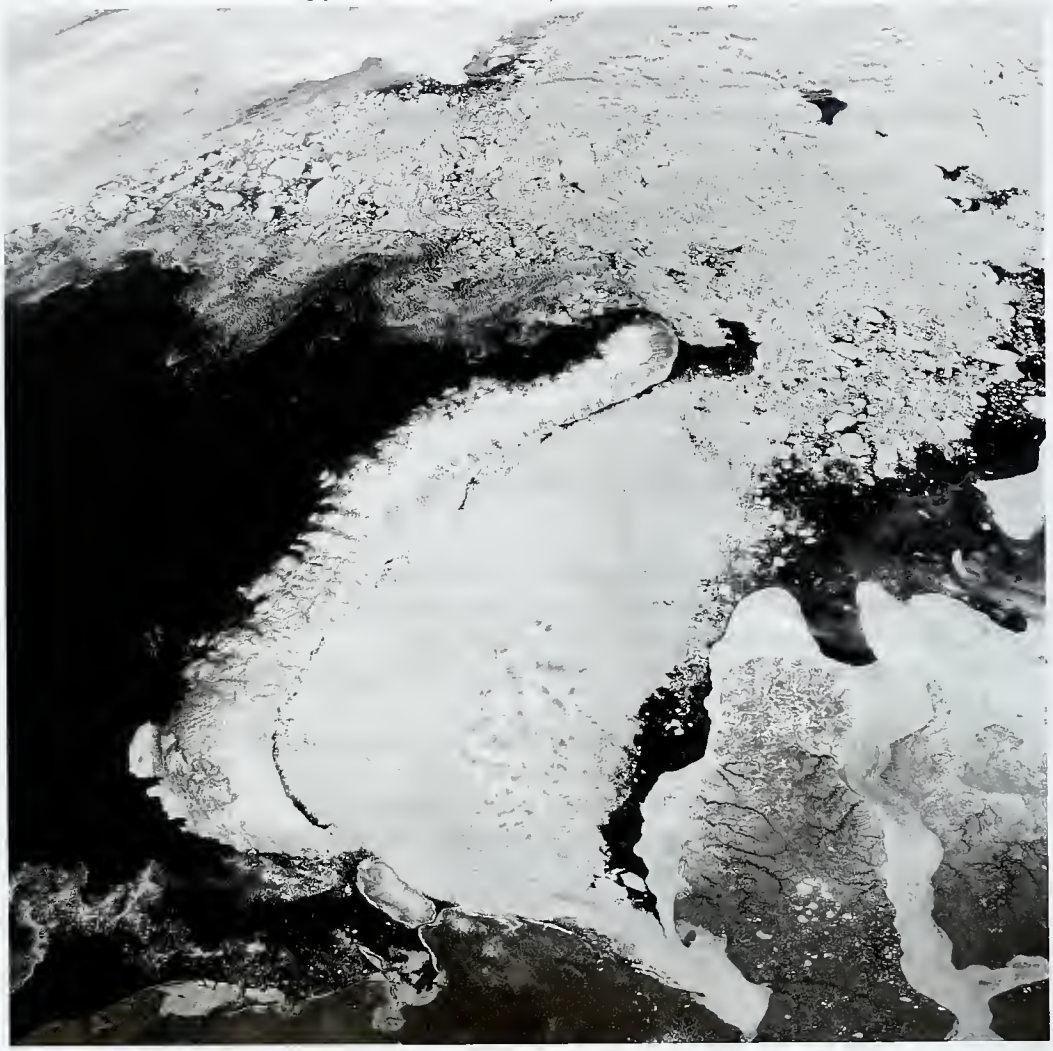
Anker – Nilssen, T., Bakken, V., Strøm, H., Golovkin, A.N., Bianki, V.V. & I.P. Tatarinkova 2000: The Status of Marine Birds Breeding in the Barents Sea Region. Norsk Polarinstitutt Rapport Nr. 113. Tromsø. 213p

Hagemeijer & Blair (1997): The EBCC Atlas of European Breeding Bird. Poyser London.

IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.

WCMC Map Library

*Novaya Zemlya wilderness area as seen from space;*
*Terra/MODIS sensor; © - NASA*



# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 15: Novaya Zemlya

WWF UNEP WCMC


**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 15)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 16. St. Elias (Alaska/Canada)

### 16.1. General Description

The wilderness area comprises 99,638 $km^2$ in total, of which only 70% with 77,136 $km^2$ lie inside the Arctic region as defined by WWF.
The site is on the southeastern edge of Alaska on the pacific coast, shared by two countries, Alaska and Canada almost to equal halves with slightly larger parts in Alaska. The area is very mountainous and includes Canada's highest mountain, Mount Logan (5,950m), and one of the world's largest non-polar ice field systems (Bagley ice field).

### 16.2. Biomes and major vegetation zones

The wilderness area is almost entirely characterised by mountains and mostly by mountain tundra with little vegetation, barren ground or glaciers. The prevailing vegetation is mountain boreal forest with interspersed bogs, lakes and other wetlands. The amount of glaciers is fairly large, with almost 10%. Lakes only cover a small fraction of 0.8% of the area.

| | |
|---|---|
| Southern subarctic tundra | 0.1 |
| Mountain tundra | 70.1 |
| Northern taiga | 1.1 |
| Mountain taiga | 18.5 |
| Glaciers | 9.4 |
| Lakes | 0.8 |

### 16.3. Flora and Fauna

**Flora**
The number of plant species and the number of rare endemic Arctic species is not known. Unique plants include *Aster yukonensis*, a *Picea/Hypnum* community, *Artemisia fuscala* and *Artemisia rupestris-Oxytropis viscida*

**Fauna:**
**Mammals**: Although the vegetation may seem sparse, especially in the interior, the wilderness area contains a large variety of wildlife, also partly due to its southern location and its diverse structure. 29 mammals have been recorded in the wilderness area. Carnivores include **coyote** *Canis latrans,* **wolf** *Canis lupus* (V), **red fox** *Vulpes fulva*, the globally threatened **wolverine** *Gulo gulo*, **river otter** *Lutra canadensis*, **lynx** *Lynx canadensis* and the more easily visible **brown bear** *Ursus arctos* (apparently the largest protected population in the world, of 600 individuals) and **black bear** *U. americanus*. A rare bluish colour phase of the black bear known locally as the glacier bear, is centred in the vicinity of Yakutat in the south of the wilderness area, just outside the Arctic boundary. Other mammals include **pika** *Ochotona collaris* and **snowshoe hare** *Lepus americanus*, **arctic ground squirrel** *Citellus parryi* and **beaver** *Castor canadensis*. Rodents include the **hoary marmot** *Marmota calligata*. **Moose** *Alces alces* and **caribou** *Rangifer arcticus* range in lower elevations

and **mountain goat** *Oreamnos americana* and **Dall sheep** *Ovis dalli* (> 200) occupy high mountainous areas. **Bison** *Bison bison* was introduced in 1950 and again in 1962. **Black-tailed deer** *Odocoileus hemionus* may occur along coastal fringes.

**Birds**: The number of birds recorded in the wilderness area is relatively high with more than 210. The species include the globally threatened **marbled murrelet** *Brachyramphus marmoratus*.
There are also **Brewer's sparrow** *Spizella breweri*, **Smith's longspur** *Calcarius pictus*, **golden eagle** *Aquila chrysaetos*, **trumpeter swan** *Cygnus buccinatus*, **peregrine falcon** *Falco peregrinus*, **bald eagle** *Haliaeetus leucocephalus*, **gyr falcon** *Falco rusticolus*, and a large variety of owls, but also more southern species such as the bluebird are nesting in the area. Among the breeding wader species the almost-endemic species, such as **Surfbird**, **Wandering Tattler** and **Black Turnstone** are breeding here in considerable numbers.
The Copper River drainage and the Malaspina forelands are major flyways for migratory birds and include prime nesting sites for trumpeter swans.

**Fish**
All five species of Alaskan Pacific salmon including **red salmon** *Oncorhynchus nerka*, **chum** *O. keta*, **silver salmon** *O. kisutch*, **pink salmon** *O. gorbuscha* and **king salmon** *O. shawytscha* spawn in park or preserve waters. Freshwater fish species include **Dolly** Varden *Salvelinus malma*, lake trout *S. namaycush*, **steelhead** *Salmo gairdneri*, **cutthroat trout** *S. clarki*, **arctic grayling** *Thymallus arcticus*, **burbot** *Lota lota*, **round whitefish** *Prosopium cylindraceum* and **humpback whitefish** *Coregonus pidschian*

### 16.4. Nature Conservation and Protected areas
The major part of the wilderness area is protected by one large site, which is also a World Heritage site, covering 65,562 km$^2$, which is 85% and the highest value among all the wilderness areas in the Arctic (see map). The world heritage site consists of four protected areas: The Kluane National Park: 2,201,568 ha, the Wrangell-St. Elias National Park: 3,382,014 ha, the Wrangell-St. Elias Reserve: 1,962,115 ha and the Tatshenshini-Alsek Wilderness: 958,000 ha.
The wilderness area also covers parts of the Glacier Bay National Park with 1,312,424 ha.

### 16.5. Threats and future developments
There are no threats known to the area. The highly protected status of the reserve seems to ensure protection from further development. Tourism is the major source of income and the only track visible in the area between Chitima and McCarthy is heavily used but not likely to be converted into a proper road.

**Sources:**

Douglas Ecological Consultants Ltd. (1980): *Biophysical Inventory Studies of Kluane National Park.*
IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
Godfrey, W.E. (1986): The Birds of Canada (2. rev. Edition). Ottawa. 595 p.
Parks Canada (1980): Kluane National Park Management Plan.

Shakelton, D.M. and the IUCN Species Survival Commission Caprinae Specialist Group (1997): Wild Sheep and Goats and Their Relatives. Status Survey and Conservation Action Plan for Caprinae. IUCN, Gland, Switzerland, Cambridge, U.K. 390 + vii pp.
Talbot, S. (1997): Atlas of Rare Plants in the Arctic. Draft Map. Anchorage, Cambridge

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 16: St. Elias/Kluane

WWF UNEP WCMC


**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 16)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 17. Svalbard (Norway)

### 17.1. General description

The Svalbard wilderness area is about 60,229 $km^2$, the largest wilderness area in Western Europe. It consist of two major islands, several medium sized and numerous smaller islands. A very long coastline and a strong marine influence characterises most of the life of the wilderness area.

The majority of about 60% of the land consists of ice and glaciers covering a mountainous landscape.
The highest peaks on Svalbard are Newtontoppen and Perriertoppen. Both are 1717 meters above sea level.

### 17.2. Biomes and major vegetation zones

As the majority (over 56%) of the land mass is covered by ice and more than 20% of it is polar desert, only a very small part of the area is vegetated. The prevailing vegetation is lowland and mountain tundra with moss-sedge tundra components and very little bush vegetation, such as the stunted Arctic willow and dwarf birch.
Proportion of biomes:

| | |
|---|---|
| Polar desert | 20.3 |
| Mountain tundra | 23.3 |
| Glaciers | 56.1 |
| Lakes | 0.2 |

### 17.3. Flora and Fauna

**Flora**: There are about 165 species recorded and 3 locations known of rare endemic vascular plant species of the Arctic, all of them on the main island, involving tow species:
*Pucinellia svalbardensis*
*Ranunculus vilanderi.*

**Fauna**:
**Mammals**: eight terrestrial species, including the partly marine
**Polar bear:** 5,000-6,000
**Arctic fox:** no figures available
**Svalbard reindeer**: 8,000
Additionally musk ox, arctic and mountain hare have been introduced, but did not establish populations. Other mammals include sibling vole Microtus epiroticus and possibly M. arvalis.

**Birds**: 164 species have been recorded, of which 30 species breed on the archipelago. Apart of the large seabird colonies defined to coastal areas, the area hosts several

goose, duck and wader populations. The Pink-footed Goose has increased its population by today to 37,000 and the Barnacle Goose to almost 24,000 birds.

### 17.4. Nature Conservation and Protected areas

With 36,768 $km^2$, more than 68% of the wilderness area is protected in 25 protected sites, including 5 Ramsar sites (see map). It is the third best-protected wilderness area in the Arctic.

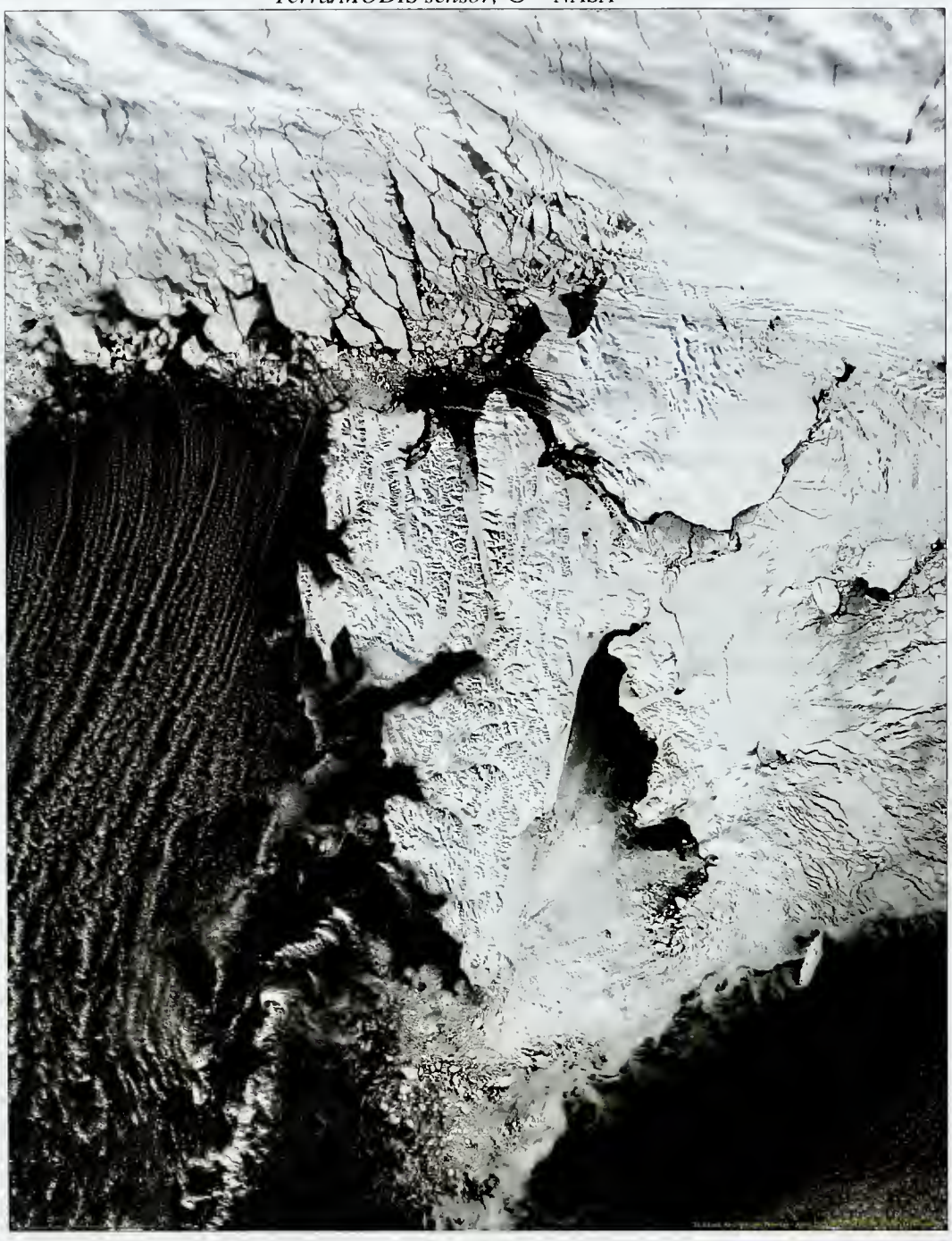
### 17.5. Threats and future developments

Among a series of identified threats to biodiversity on Svalbard, such as fisheries, oil, other pollutants, disturbance and area encroachment, oil pollution being currently the major threat. Fragmentation and oil pollution might be an even higher potential threat in comparison with other mentioned threat types. Also disturbance, mainly through tourism has been recognised with an increasing tendency. The most immediate threat in terms of fragmentation are the planned roads between Longyearbyen and Sveagruva and another one between Barentsburg and Coles Bay, along the southern coast of Isfjorden.

**Sources:**

Anker – Nilssen, T., Bakken, V., Strøm, H., Golovkin, A.N., Bianki, V.V. & I.P. Tatarinkova 2000: The Status of Marine Birds Breeding in the Barents Sea Region. Norsk Polarinstitutt Rapport Nr. 113. Tromsø. 213p
Mehlum (1990): Birds and Mammals of Svalbard
Hagemeijer & Blair (1997) : The EBCC Atlas of European Breeding Bird.
UNEP-WCMC Map Library

*The Svalbard archipelago wilderness, April 20th 2000;*
*Terra/MODIS sensor; © - NASA*



# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 17: Svalbard

WWF UNEP WCMC


**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km
- < 20
- > 20
- > 20 (Area No 17)
- Non-Arctic land

Protected Area, (boundary or point location)
- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:
- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 18. Sordoginskiy Mountains (Russia)

### 18.1. General description

The Sodorginskiy Mountains wilderness, with 55,292 $km^2$, is almost entirely within the Arctic region as defined by WWF, located north of the Lower Aldan River, before its joining the Lena River. It is very flat, with no mountains, and the prevailing vegetation is determined by sub-arctic tundra. Oil and gas drilling is currently ongoing. Recent discoveries describe the southern parts of the wilderness area as rich in oil and gas fields. More than half of the region is deposited by oil resources of highest quality and with a strong possibility of further exploitation in the near future. Until today there has been oil and gas exploitation at two locations in the south of the wilderness area.
The area is almost entirely structured by treeless tundra with more than 90% covered by lowland tundra habitats, a few lakes and a lot of wetlands, mostly as tundra bogs.

### 18.2. Biomes and major vegetation zones

The large majority, more than 90% of the wilderness area is mountainous. The prevailing vegetation is mountain taiga. Floodplain vegetation can be found along the Aldan River. Lakes only cover a very small fraction with 0.4% of the area. The biomes divide as follows:

| | |
|---|---|
| Mountain tundra | 35.3 |
| Middle taiga | 5.2 |
| Mountain taiga | 58.0 |
| Flood-plain vegetation of taiga | 1.1 |
| Lakes | 0.4 |

### 18.3. Flora and Fauna

**Flora**
The number of plant species is not known, but could be quite high, owing to the high diversity of mixed mountain and floodplain habitats. Rare endemic plant species are not known in the area.

**Fauna:**

**Mammals**:
**Brown bear:** no numbers known, possibly 300 - 400
**Wolf:** no figures available
**Wolverine:** no figures available
**Red fox:** (no figures available)
**Elk**: no figures available, most likely more than 5,000 animals

**Birds**: The total number of bird species breeding in the area is not known, but comparatively slightly higher than in the average Arctic sites due to its southern location in Siberia. The area is little surveyed and most likely is not inhabited by any known endemic species. Among the globally threatened species, the **Baikal Teal** is

breeding in the lowland area. Other globally threatened species include the **White-tailed Eagle**, considered at low risk with still a few breeding pairs in the area. **Golden Eagle** and **Peregrine Falcon**, predator birds, which require large undisturbed areas, are also breeding in the area.

### 18.4. Nature Conservation and Protected areas

With 21,487 $km^2$, which is 39.1% of the wilderness area, the site is well protected in 6 sites (see map).

### 18.5. Threats and future developments

Some oil and gas resources have been discovered in the very southern part of the area. In addition, large deposits of coal have been discovered in the southern part near the Aldan River. All of this is not being exploited today, but roads from the south have connected some of the settlements in the centre of the wilderness. It is to hope that these roads will not be expanded to reach more southerly settlements. Two large protected areas (Tukulan and Prialdansky Zakasnik) do currently prevent any further road construction. No information on other minerals is available, but gold has been found directly adjacent to the southeastern part of the area.

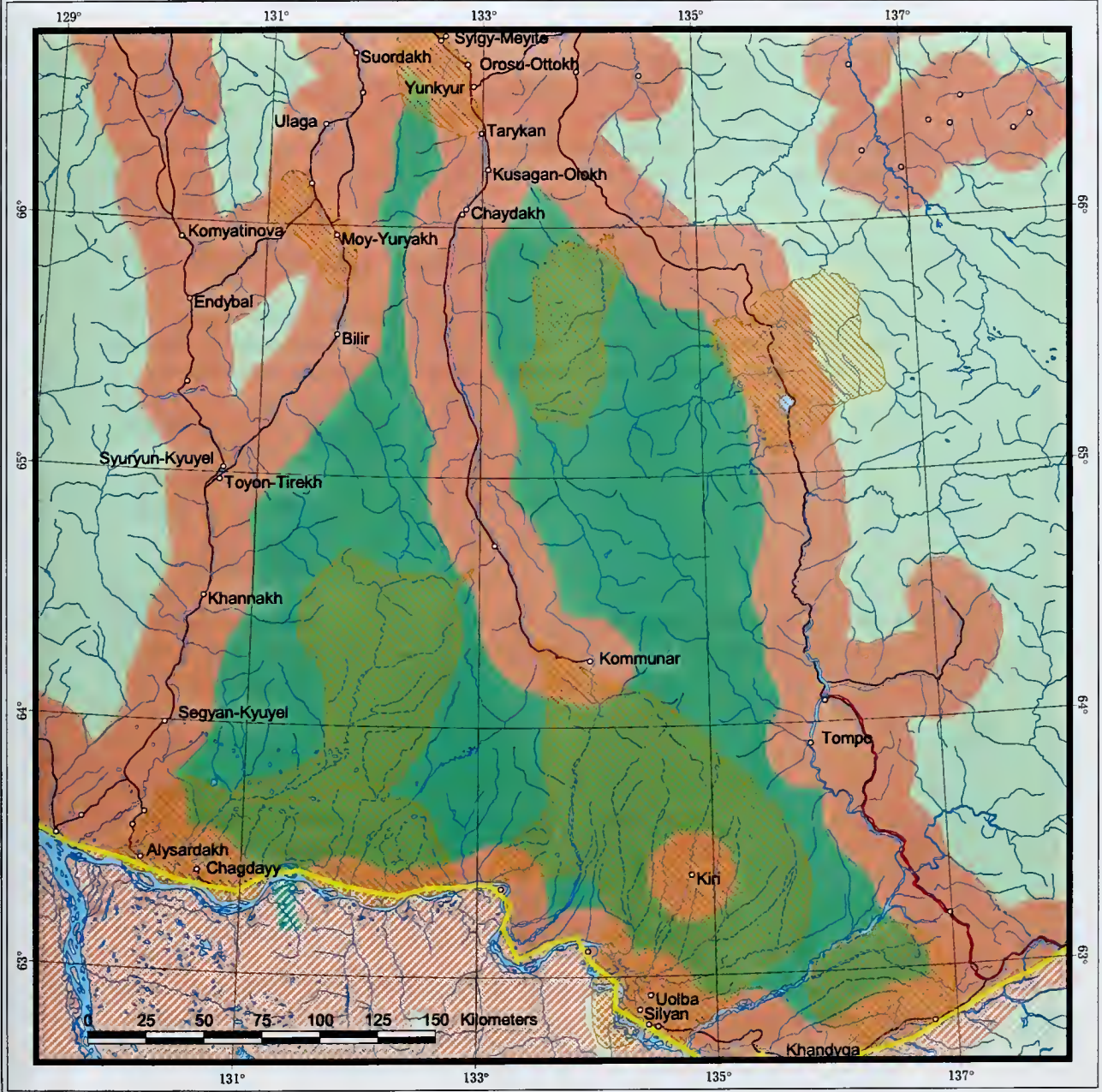
**Sources:**

IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
Talbot, S. (1997): Atlas of Rare Plants in the Arctic. Draft Map. Anchorage, Cambridge
UNEP-WCMC Map Library

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 18: Sordoginskiy Mountains

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 18)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

## No. 19. Kola Peninsula (Russia)

### 19.1. General description

The Kola Peninsula wilderness, with 47,231 $km^2$, is entirely within the Arctic region as defined by WWF. It is gently hilly, but with no mountains, and the prevailing vegetation is determined by sub-arctic tundra. Oil and gas drilling are currently ongoing. Recent discoveries describe the southern parts of the wilderness area as rich in oil and gas fields. More than half of the region holds by oil resources of highest quality and with a strong possibility of further exploitation in the near future. Until today there has been oil and gas exploitation at two locations in the south of the wilderness area.

### 19.2. Biomes and major vegetation zones

The large majority, more than 60% of the wilderness area is mountainous. The prevailing vegetation is tundra with a large proportion, 30% taiga. Lakes only cover 2.7% of the area. The area is divided in biomes as follows:

| | |
|---|---|
| Southern subarctic tundra | 38.0 |
| Coastal tundra | 27.9 |
| Northern taiga | 31.3 |
| Lakes | 2.7 |

### 19.3. Flora and Fauna

**Flora**

The number of plant species is not known, but could be quite high owing to the high diversity of mixed mountain and floodplain habitats. Rare endemic Arctic plant species are not known from the area.

**Fauna:**

**Mammals**:
**Brown bear:** no numbers known, possibly 300 - 400
**Wolf:** no figures available
**Wolverine:** common, but no figures available
**Arctic** and **Red fox:** (no figures available)
**Elk**: no figures available, most likely more than 2,000 animals

**Birds**: The total number of bird species breeding in the area is not known, but comparatively slightly higher than the average Arctic site, due to its southern location in Siberia. The area is little surveyed and most likely is not inhabited by any known endemic species. The **White-tailed Eagle** is the only globally threatened species breeding in the area., considered at low risk with still a few breeding pairs in the area, but no numbers are available. **Golden eagle**, **Peregrine Falcon** and **Gyrfalcon**, predator birds, which require large undisturbed areas, are also breeding in the area. The latter is known to have a stronghold particularly in the northern half of the Kola Peninsula.

### 19.4. Nature Conservation and Protected areas

With 5,415 $km^2$, which is 11.5% of the wilderness area, the site is moderately protected by 2 sites only (see map).

### 19.5. Threats and future developments

The Kola Peninsula has been heavily affected by Nickel smelters, Nuclear Power and waste plants. Other mineral extractions involve copper, cadmium, tin among others, but it seems that the eastern part of the Peninsula will continue to be unaffected. As far as we know, there is no oil or gas and no further coal deposits known to be exploited. The are also few winter roads in the area, although one surrounding the entire area along the coast is reason for concern.

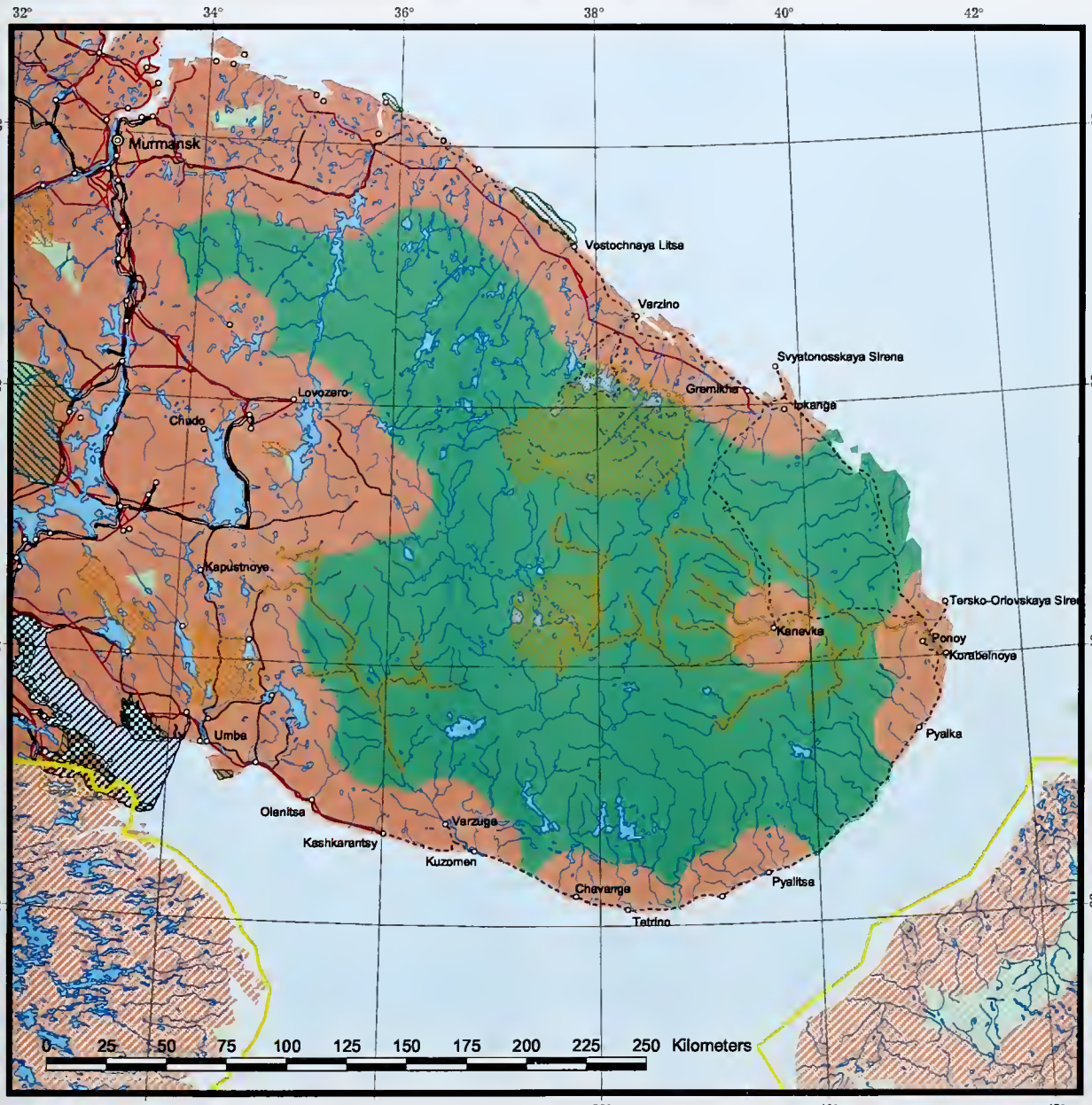
**Sources:**

IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
Talbot, S. (1997): Atlas of Rare Plants in the Arctic. Draft Map. Anchorage, Cambridge
UNEP-WCMC Map Library

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No 19: Kola

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 19)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

Compiled by Dr I. Lysenko, ©UNEP-WCMC, 2001

## No. 20. Yukon Alpine Tundra (Alaska/Canada)

### 20.1. General Description

The wilderness area comprises 47,082 km$^2$. The entire wilderness is inside the Arctic region as defined by WWF and is situated just north of the St. Elias wilderness. Two countries, Alaska and Canada share the site with the larger part being located in Canada.

### 20.2. Biomes and major vegetation zones

The wilderness area is almost entirely characterised by mountains and mostly by mountain taiga with sparse vegetation and a little sub-arctic tundra. The prevailing vegetation is mountain boreal forest with interspersed bogs, lakes and other wetlands. Lakes only cover a small fraction, a few percents of the area.

| | |
|---|---|
| Southern subarctic tundra | 4.7 |
| Mountain tundra | 16.3 |
| Mountain taiga | 77.9 |
| Lakes | 1.1 |

### 20.3. Flora and Fauna

The flora and fauna is not described or documented, but due to its closeness, it should be very similar to the one in St. Elias, which has been described in detail. Located slightly further to the north, the site might have a little less diverse flora and fauna, also due to the lack of the pacific coast appearance. The information on biodiversity is sparse because the area is more boreal and the researchers would need to extend the research scope.

**Flora**
The number of plant species and the number of rare endemic Arctic species is not known. Unique plants are also unknown, but the flora seems to be similar to the one in St. Elias.

**Fauna:**

Very little is known about this wilderness area, but the size and mountainous topography suggest a similar fauna of large predators including **brown bear** *Ursus arctos*, **coyote** *Canis latrans*, **wolf** *Canis lupus* (V), **red fox** *Vulpes fulva*, the globally threatened **wolverine** *Gulo gulo*. It is also assumed that most likely **Moose** *Alces alces* and **caribou** *Rangifer arcticus* range in lower elevations. **Dall sheep** *Ovis dalli* (more than 10,000) occupy high mountainous areas.

**Birds**: The number of birds recorded in the wilderness area is not known, but assumed to be slightly lower than in the neighbouring St. Elias wilderness.
There are **golden eagle** *Aquila chrysaetos*, **bald eagle** *Haliaeetus leucocephalus*, **gyr falcon** *Falco rusticolus* and **peregrine falcon** *Falco peregrinus*, and a variety of owls.

Among the breeding wader species, the almost-endemic species, such as **Surfbird** and **Wandering Tattler** are breeding here in fairly large numbers.

### 20.4. Nature Conservation and Protected areas

Only 0.03% of the area is protected by one site, covering 122 $km^2$ (see map).

### 20.5. Threats and future developments

Primary threats in the area are fragmentation as a result of settlements and road development. There is an active mineral industry with an extensive history in the area of hard rock and placer mining in many locations.

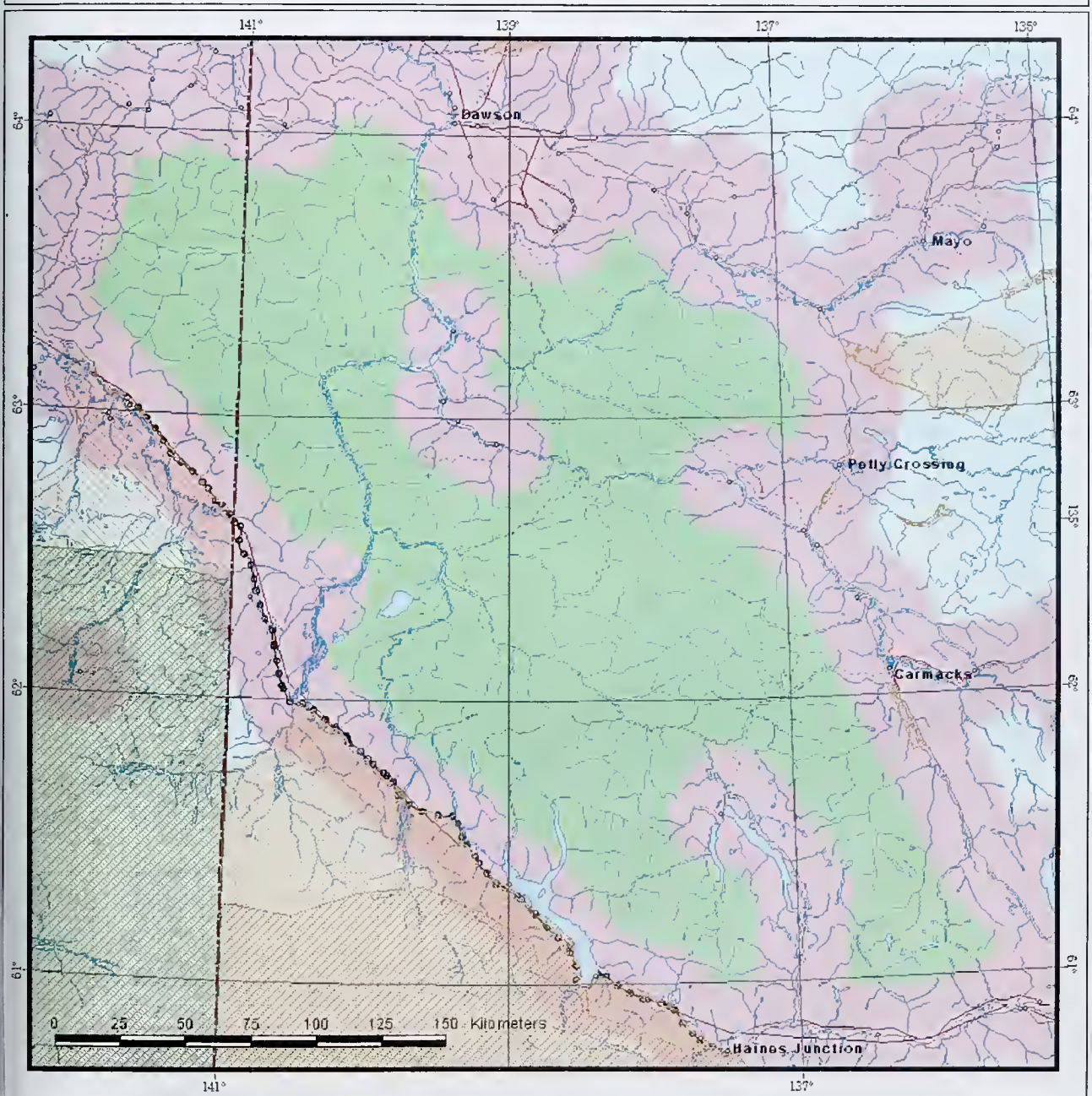
**Sources:**

Godfrey, W.E. (1986): The Birds of Canada (2. rev. Edition). Ottawa. 595 p.
Shakelton, D.M. and the IUCN Species Survival Commission Caprinae Specialist Group (1997): Wild Sheep and Goats and Their Relatives. Status Survey and Conservation Action Plan for Caprinae. IUCN, Gland, Switzerland, Cambridge, U.K. 390 + vii pp.
Talbot, S. (1997): Atlas of Rare Plants in the Arctic. Draft Map. Anchorage, Cambridge

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 20: Yukon Alpine Tundra

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km
- < 20
- > 20
- > 20 (Area No 20)
- Non-Arctic land

Protected Area, (boundary or point location)
- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:
- Ramsar (Wetlands) site
- World Heritage Site

## No. 21. Markha River Valley (Russia)

### 21.1. General description

The Markha River Valley wilderness of 44,359 $km^2$ is entirely within the Arctic region as defined by WWF, located in Western Yakutia, south of the Large North Siberian wilderness and possibly part of it, due to unclear road definition on its eastern boundary. Two gold mines on the western boundary have been connected with roads, but the status of the roads extending north is not quite clear. It is very flat, with no mountains and the prevailing vegetation is determined by sub-arctic tundra. Recent discoveries describe the southern parts of the wilderness area as rich in oil and gas fields. More than half of the region holds oil resources of highest quality and with a strong possibility of further exploitation in the near future. Until today there have been mining activities at two locations in the west of the wilderness area.
The area is almost entirely dominated by taiga, mostly by lowland taiga. Only a few lakes cover not more than 0.5% of the area.

### 21.2. Biomes and major vegetation zones

The large majority, more than 90% of the wilderness area is taiga forest, most of it in its northern form. Only 8% is mountain taiga. Lakes only cover a very small fraction, only 0.5% of the area. The biomes divide as follows:

| | |
|---|---|
| Northern taiga | 73.7 |
| Middle taiga | 17.7 |
| Mountain taiga | 8.1 |
| Lakes | 0.5 |

### 21.3. Flora and Fauna

**Flora**
The number of plant species is not known, but could be relatively large owing to the southern latitude. Rare endemic Arctic plant species are not known from the area.

**Fauna:**

**Mammals**:
**Brown bear:** no numbers known, possibly 300 - 400
**Wolf:** no estimates
**Wolverine:** no estimates
**Elk**: no figures available, most likely more than 3,000 - 4,000 animals

**Birds**: The total number of bird species breeding in the area is not known, but comparatively slightly higher than the average Arctic site due to its southern location in Siberia. The area is little surveyed and most likely is not inhabited by any known endemic species. Among the globally threatened species, the **Baikal Teal** is breeding in the lowland area. Other globally threatened species include the **White-tailed Eagle**, considered at low risk with still a few breeding pairs in the area. **Golden Eagle**

and **Peregrine Falcon**, predator birds, which require large undisturbed areas, are also breeding in the area.

### 21.4. Nature Conservation and Protected areas

There are no protected areas.

### 21.5. Threats and future developments

There are two mining sites known on the western edge of the area. In addition, large deposits of oil and gas have been discovered in the area. It is of medium quality and no plans of exploitation are known yet.

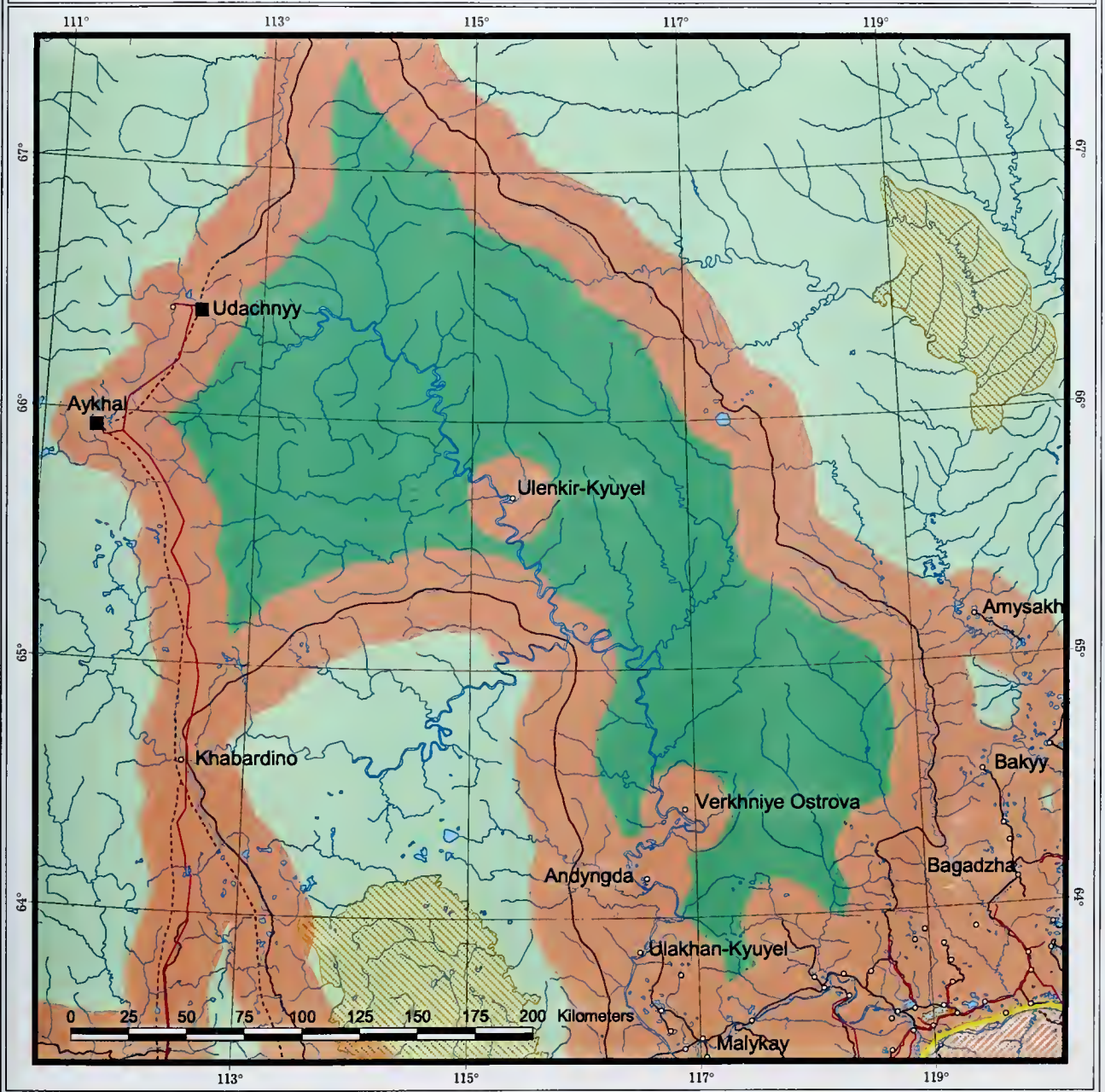
**Sources:**

IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
Talbot, S. (1997): Atlas of Rare Plants in the Arctic. Draft Map. Anchorage, Cambridge
UNEP-WCMC Map Library

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 21: Markha River Valley

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 21)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

## No. 22. James Bay Lowland (Canada)

### 22.1. General Description

The James Bay Lowland wilderness area comprises 55,968 $km^2$, of which only 41,579 $km^2$ are situated within the Arctic region as defined by WWF.
The site is delimited in the west by the Hudson Bay. Almost 30% of it reaches beyond the Arctic boundary into the south. Mostly lowland wetlands and taiga dominate the wilderness site.

### 22.2. Biomes and major vegetation zones

The wilderness area is quite unique compared to the other Arctic sites, since lowland taiga wetlands dominate. This broad habitat type has not been noted elsewhere in the Arctic and reflects the effect of Hudson Bay in pushing the Arctic boundary far to the south in this part of North America. Primarily within the Hudson Bay lowlands, the wilderness area is characterised by wetland vegetation in the taiga region. Only 5.2% has been classified as tundra. Larger lakes cover 2.4% of the area, but numerous small lakes characterise the wilderness area. The amount of actual boreal forest is unknown.

| | |
|---|---|
| Southern subarctic tundra | 5.2 |
| Northern taiga | 0.2 |
| Middle taiga | 0.2 |
| Taiga wetland | 91.9 |
| Lakes | 2.4 |

### 22.3. Flora and Fauna

**Flora**

The number of plant species and the number of rare endemic Arctic plant species is not known in the area.

**Fauna:**

**Mammals**: A few **polar bears** might still reach the area in winter, but no figures are available.
**Brown bear**: no estimates
**Wolverine**: no estimates
**Wolf**: numbers most likely around 1,000 to 2,000 animals
---
**Caribou**: woodland caribou, no numbers available
**Moose**: no numbers available

**Birds**: The number of birds breeding in the wilderness area is not known, but likely to be higher than the average Arctic site, due to the large proportion of southern species. The area is rich in wetland species ranging from southern species, such as American Bittern to high Arctic ducks like **Greater Scaup, Oldsquaw, Surf Scoter, Common Eider** and possibly even **King Eider**. In the south, outside the Arctic region, the wilderness touches upon the breeding range of the **Piping Plover**, a species considered vulnerable among the globally threatened birds. Among the large predator birds the **Golden Eagle, Osprey** and **Peregrine** are still widespread. Other than the

Piping Plover mentioned above, there are no globally threatened or endemic species known to breed in the wilderness area.

### 22.4. Nature Conservation and Protected areas

There are seven protected areas in the Arctic part of the wilderness, covering 798 $km^2$, which is only 2% of the Arctic part.

### 22.5. Threats and future developments

There are hardly any winter roads leading into the area and there are no further threats known to the area, deriving from mineral or natural resource exploitation. Plans of hydro power development in the area might lead to a major interference, flooding and possibly also fragmentation by tracks, even roads and encroachment activities. Further detailed information on these potential threats is required.

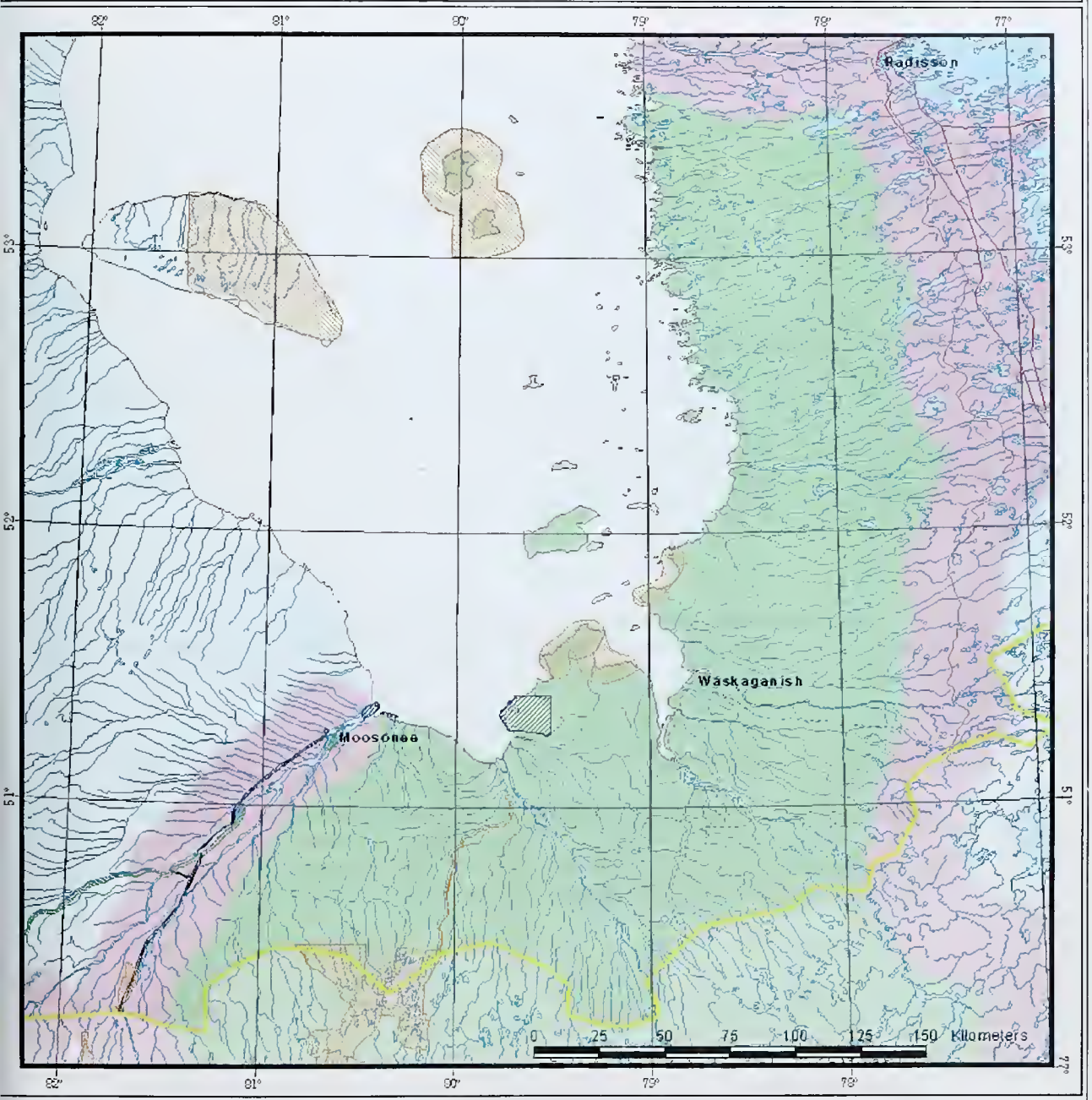
**Sources:**

Gau, R. (2001): Brown Bear in *CAFF* Arctic Flora and Fauna. in Helsinki page: 238.
Godfrey, W.E. (1986): The Birds of Canada (2. rev. Edition). Ottawa. 595 p.
IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
Talbot, S. (1997): Atlas of Rare Plants in the Arctic. Draft Map. Anchorage, Cambridge
UNEP-WCMC Map Library

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 22: James Bay Lowland

WWF UNEP WCMC




**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 22)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

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## No. 23. New Siberian Islands (Russia)

### 23.1. General description

The area consists of an archipelago of three large islands and several small islands comprising 38,135 $km^2$ in total and is situated entirely in the Arctic region. They are partly composed of ice cores covered with a thin layer of soil, with no mountains at all. Some islands preserve the skeletons of giant mammals from prehistoric times in their ice-cores, including the largest mammoth cemetery of the world. The islands are situated in the Laptev Sea near the start of the transpolar pack ice drift, an important current for the world climate. As high Arctic islands, the wilderness remained a very remote place for a long time and has hardly been settled at all. Even today only few settlers mostly stay here for the summer only. Six small settlements are dispersed over two of the three main islands. The most eastern island is not permanently settled at all.

### 23.2. Biomes and major vegetation zones

The area is simply classified as covered almost entirely by Arctic tundra. One large and a few smaller lakes cover only 3.6% of the area. Due to its low elevation, no permanent ice remained and no glaciers have been left. :

| | |
|---|---|
| Arctic tundra | 96.4 |
| Lakes | 3.6 |

### 23.3. Flora and Fauna

**Flora:** The total number of plant species is not known. None of the globally threatened or rare endemic vascular plant species of the Arctic have been recorded on the New Siberian Islands.

**Fauna:** New Siberian Islands is in the high Arctic and hence not very rich in biodiversity. Some selected taxa are listed. The total number of species is unknown; the number of breeding birds is about 36.
**Mammals**: Only arctic wolf and arctic fox, reindeer, arctic hare and polar bear are among the major mammals on the islands.
**Polar bear:** The area around the New Siberian Islands in the Laptev Sea is estimated to hold about 800 – 1,200 polar bears, which frequently stray on the islands in the summer months as well.
**Wolf :** no figures available
**Arctic fox**: no figures available
**Reindeer:** rare, but no estimates

**Birds**: The number of breeding birds is about 29. With six species of Calidrid sandpipers, this group is well represented. But only one goose, the **Brent Goose** is breeding there. Other birds include the **Snowy owl**, which requires large undisturbed territories. No figures are available.

### 23.4. Nature Conservation and Protected areas

The total area, including the sea surrounding the islands is protected as a Zapovednik, a strict nature reserve. This wilderness area is the best-protected site in the whole Arctic region.

### 23.5. Threats and future developments

Threats of fragmentation are not expected for the nature reserve.
Large oil fields have been discovered around the islands offshore, mainly north and east, and also underneath the easternmost island, but it seems to be of only medium quality and unlikely to be exploited in the near future.

**Sources:**

IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
UNEP-WCMC Map Library
WWF (1998): Lena Delta and New Siberian Islands, Nature Reserve. Oslo 34 pp.

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 23: New Siberian Islands

WWF UNEP WCMC


**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 23)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

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## No. 24. Severnaya Zemlya (Russia)

### 24.1. General description

The Severnaya Zemlya wilderness area consists of an archipelago of three large islands and several small islands comprising 35,995 $km^2$ in total, and is situated entirely in the Arctic region. The islands are situated between the Laptev and Kara Sea, north of the Taimyr Peninsula. They are very mountainous, with highest peaks up to 800 meters. As high Arctic islands, the wilderness remains a very remote place and even today the islands are not settled permanently at all.

### 24.2. Biomes and major vegetation zones

The area is clearly dominated by glaciers and polar desert, about half each. Only 0.6% is covered by one large and a few smaller lakes. Due to its higher elevation, about seven different glaciers cover almost half of the area.

| | |
|---|---|
| Polar desert | 52.2 |
| Glaciers | 47.1 |
| Lakes | 0.6 |

### 24.3. Flora and Fauna

**Flora:** The total number of plant species is not known. None of the globally threatened or rare endemic vascular plant species of the Arctic have been recorded on Severnaya Zemlya.

**Fauna:** Severnaya Zemlya is in the high Arctic and hence not very rich in biodiversity. The total number of species is unknown. The number of breeding birds is about 17.

**Mammals**: Only **arctic wolf** and **arctic fox, reindeer, arctic hare** and **polar bear** are among the major mammals on the islands.
**Polar bear:** The number of polar bears is not known, but the area east in the Laptev Sea is estimated to hold about 800 – 1,200 polar bears and west in the Kara and Barents Sea is about 2,500 – 3,500. Animals from both populations frequently visit the islands.
**Wolf :** no figures available
**Arctic fox:** rare, but no figures available
**Reindeer:** very few only, no estimates

**Birds**: The number of breeding birds is limited to only 17. With only two species of Calidrid sandpipers, this group is also poorly represented. Only one goose, the **Brent Goose** is breeding there. Other birds include the **Snowy owl**, which requires large undisturbed territories. Most famous and very important for the species is the large colony of 1,000 – 2,000 **Ivory Gulls**.

### 24.4. Nature Conservation and Protected areas

The protected area is only 3,081 $km^2$, which is only 8.6% of the wilderness area, divided in three larger and one very small reserve, protecting the largest ivory gull colony.

### 24.5. Threats and future developments

Threats of fragmentation are not expected for the nature reserve.
Large oil fields have been discovered around the northern two islands and offshore mainly north and west, but it seems to be of only medium quality and unlikely to be exploited in the near future.

**Sources:**

De Korte, J., Volkov, A.E. & M.V. Gavrilo (1996): Bird Observations on Severnaya Zemya, Siberia. Arctic 48:222-234.
IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
UNEP-WCMC Map Library

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 24: Severnaya Zemlya

WWF UNEP WCMC


**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 24)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

## No. 25. Malazemelskaya Tundra (Russia)

### 25.1. General description

The Malazemelskaya wilderness, with its area of 29,424 km$^2$, is the smallest of the 25 Arctic wilderness areas. As more than 2/3 of its total size is located outside of the Arctic region as defined by WWF, it is still rather large with a total of 89,939 km$^2$ and it is the second largest wilderness in Europe. The prevailing vegetation is determined by sub-arctic tundra. There is oil and gas exploration drilling currently in process. Recent discoveries describe most parts of the wilderness area as rich in oil and gas of high quality and there is strong evidence for planning further oil and gas exploitation in the future.

### 25.2. Biomes and major vegetation zones

The large majority, with more than 80% of the Arctic part of the wilderness area is covered by tundra, followed by 16.7% Forest tundra habitats. The prevailing vegetation is treeless sub-arctic tundra with few shrubs. Lakes only cover a small fraction of 1.8% of the area. The biomes divide as follows:

| | |
|---|---|
| Northern subarctic tundra | 3.9 |
| Southern subarctic tundra | 76.6 |
| Forest tundra | 16.7 |
| Flood-plain vegetation of tundra and taiga | 1.0 |
| Lakes | 1.8 |

### 25.3. Flora and Fauna

**Flora**

The number of plant species is not known. Rare endemic plant species are only found just outside the wilderness in already disturbed and largely fragmented areas.

**Fauna:**

**Mammals**: The area is rich in large predators:
**Brown bear** estimated at about 2,000
**Wolf:** 300 – 600 (increasing)
**Wolverine** (no figures available)
**Arctic** and **red fox** (no figures available)
**Reindeer:** 3,500
**Elk**: estimated at 10,000 -15,000

**Birds**: The total number of bird species breeding in the area is not known, but comparatively slightly lower than on Taimyr and further east in Siberia. The area has no endemic but one globally threatened species, rarely breeding in the forest tundra area is the **Lesser White-fronted Geese**. In the wilderness area it holds one of the largest populations of the western population and the largest in Europe. Other globally threatened species include the **White-tailed Eagle**, considered at low risk with still

high numbers breeding in the area. In the north and in particular on the northern most spit, the Russkiy Zavorot Peninsula, the wilderness hosts a high density of the **Bewick's swan**, probably the majority of the European population with 25,000 to 36,000 birds.

### 25.4. Nature Conservation and Protected areas

With only 3,628 $km^2$, a fairly large proportion of 12.3% of the wilderness area is protected in 2 sites (see map).

### 25.5. Threats and future developments

The threats to the area are deriving from oil and gas exploitation. Almost the entire region is rich in oil resources of high to medium quality. There are several drilling sites at present (not shown on the map) and there is a slight likelihood of further exploitation in the future. The wilderness is very much endangered by further fragmentation. A fairly large network of winter roads already exists in the Malazemelskaya wilderness area and it might be extended.

**Sources:**

IUCN Species Survival Commission (1998) Polar Bears. Occasional paper of the IUCN Species Survival Commission No.19: 159p.
Mineyev, Yu. N. (1991): Distribution and Numbers of Bewicks Swans in the European Northeast of the USSR. Wildfowl Suppl 1: 62- 67pp.
Talbot, S. (1997): Atlas of Rare Plants in the Arctic. Draft Map. Anchorage, Cambridge
UNEP-WCMC Map Library

# The 25 Largest Unfragmented Areas in the Arctic, Year 2001

## No. 25: Malozemelskaya Tundra

WWF UNEP WCMC


**Legend**

- Major cities
- Populated place
- Railroad
- Primary & secondary roads
- Tracks / trails / winter roads
- Power transmission line
- Pipeline
- Arctic boundary
- River
- Lake
- Snowfield / Glacier

Distance from major infrastructure features, km

- < 20
- > 20
- > 20 (Area No 25)
- Non-Arctic land

Protected Area, (boundary or point location)

- IUCN category Ia, Ib, II
- other protected areas

Internationally designated sites:

- Ramsar (Wetlands) site
- World Heritage Site

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