



The Boreal Forest Study:

**Finding exceptional protected area sites in the boreal
ecozone that could merit World Heritage Status**

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List of Acronyms

CAD	Conservation area design
CIDA	Canadian International Development Agency
CIFOR	Centre for International Forestry Research
CIS	Confederation of Independent States (Moscow)
cm	Centimeters
COSEWIC	Committee on the Status of Endangered Species in Canada
CPAWS	Canadian Parks and Wilderness Society
ENGO	Environmental nongovernmental organizations
GFW	Global Forest Watch
ha	Hectares
IGO	Inter-governmental organization
IRMT	Integrated Resource Management Team
IUCN	World Conservation Union
km	Kilometers
LRMP	Land and Resource Management Plan
M-KMA	Muskwa-Kechika Management Area
NGO	Nongovernmental organization
PA	Protected area
SMA	Special management area
SMZ	Special management zone
TBFP	IUCN's Temperate and Boreal Forest Programme
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USA	United States of America
USSR	Union of Soviet Socialist Republics
WHS	World Heritage Site
WWF	World Wide Fund for Nature

Executive Summary

Boreal Forest Study Objective

The IUCN Boreal Forest Study identifies exceptional protected areas within the global boreal forest ecosystem. The report's findings will be used to create a list of candidate boreal forest Natural World Heritage Sites, in accordance with World Heritage Site criteria.

The IUCN report is the first phase of a broader study seeking to develop a network of boreal forest sites protected under the 1972 Convention on the Protection of the World Cultural and Natural Heritage.

Commissioned by the United Nations Educational, Scientific and Cultural Organization (UNESCO), the study is coordinated by the World Conservation Union – IUCN.

Rationale

The Centre for International Forestry Research and IUCN believe that World Heritage status is important for enhancing the conservation and management of global forest biodiversity. As anthropogenic stresses increasingly threaten the wellbeing of the world's forests, the need for protection is urgent. Boreal forests in particular provide habitat for thousands of species – many of which are rare or endangered – and help mitigate the effects of global greenhouse gas emissions by serving as carbon sinks.

A network of boreal forest World Heritage Sites would:

- Guarantee the conservation and integrity of these unique natural systems;
- Increase the prestige of the forests and of their managing institutions;
- Increase public awareness of boreal forests, as well as the development of alternative, sustainable land uses – like environmental tourism;
- Secure financial support for their conservation and protection, mainly through the World Heritage Fund.

Whereas tropical forests appear prominently on the list of Natural World Heritage Sites, boreal forests are currently underrepresented. As of 2002, only ten of the world's 144 natural sites were located within boreal ecozones.

Background Information

The **boreal forest ecosystem** forms a circumpolar ring of coniferous trees around the earth, spanning North America, Russia and Scandinavia. The ecosystem is characterized by sub-arctic and cold continental climates, uneven areas of permafrost, and needleleaf coniferous forests with some deciduous growth. Specific characteristics vary substantially throughout the region, with notable sub-regional and site-specific ecological differences.

The **Convention on the Protection of the World Cultural and Natural Heritage** was adopted in 1972 by the General Assembly of the United Nations. Now with 172 countries party to the Convention, it is considered the most representative multilateral agreement on environmental protection. The **World Heritage Committee and Fund** were established in 1976 to help implement the Convention. Today, the list of World Heritage sites contains over 700 sites and ecosystems from many regions of the world. The findings of this report will contribute to the nomination of additional boreal forest sites

Method

To identify boreal forest protected areas which may merit World Heritage status, IUCN and the World Heritage Centre jointly proposed a global thematic study on boreal forests. The study constitutes two phases:

1. Phase one, realized in the IUCN Boreal Forest Study, identifies candidate boreal forest protected areas that merit consideration for World Heritage nomination.
2. Phase two, planned for May 2003, will convene an expert workshop to discuss the proposals from the IUCN Boreal Forest Study and adopt a final list.

Phase One

To identify candidate boreal forest protected areas in each of the countries engaged, information was obtained from two primary sources: expert consultations and a database search.

Expert Consultations

Expert consultations took different forms. In **Canada, Alaska (USA) and Scandinavia**, experts from agencies responsible for management of parks and protected areas were invited to submit information on “exceptional boreal forest protected area” sites in their jurisdiction. Environmental non-governmental organizations (NGOs) working on forest issues were also asked for input. To compile relevant information on their select sites, government and NGO experts were provided with a template to facilitate the nomination of a limited number of candidate sites.

Due to the recent restructuring of the governmental agency responsible for protected areas in **Russia**, information was not readily available from federal or regional authorities. As a result, the study relied primarily on the expertise of NGOs and independent specialists, including former employees of the ministry.

In all instances, complete recommendations were accepted as “proposals.” Potential areas for which insufficient information was presented, or sufficient information was unavailable, were classified as “mentions.”

Database Search

Protected area database experts provided the second data source. Through mapping the boreal forest region, database experts were able to propose candidate

protected area sites and transboundary clusters, using the same criteria as the expert consultations.

For each of the proposed and mentioned sites, the report presents and evaluates the information obtained through expert consultations and the database search.

Phase Two

An expert workshop to evaluate 'phase one' proposals and assess their relative merit is scheduled to take place in Kostamus Zapovednik, Russia in May 2003.

List of Recommended Sites

North America

Canada – Sites from Database Search

1. Kluane – Atlin (Yukon Territory)
2. Wood Buffalo – Lake Athabasca (Alberta)
3. Prince Albert – Lac La Ronge (Saskatchewan)
4. Duck – Riding (Manitoba)
5. Churchill – Caribou (Manitoba)
6. East Side (Manitoba – Ontario)
7. Wabikimi – Nipigon (Ontario)
8. James Bay (Ontario – Québec)
9. Assinica – Albanel (Québec)

Canada – Sites from Expert Consultations

British-Columbia: Muskwa-Kechika Management Area

Alberta: Wood Buffalo National Park Satellites

Labrador (Newfoundland): Québec-Labrador cluster

Manitoba and Ontario: Atikaki-Woodland Caribou

Québec: Natashquan River Valley

Canada – "Mentions"

Saskatchewan: Amisk-Atik, Clearwater

Québec: Lacs-Guillaume-Delisle-et-a-l'Eau-Claire, Albanel-Temiscamie-Otish

Labrador (Newfoundland/): Mealy Mountains

Alaska (United States) – Sites from Database Search

1. Arctic- Yukon – Charley cluster
2. Koyukuk-Innoko-Nowitna-Denali

Russia – All Priority and Special Mention Sites

1. Panayarvi National park (Republic of Karelia)
2. Valdaisky NP and Centralno-Lesnoi (Central Forest) Biosphere Nature Reserve (Novgorod and Tver¹ provinces)
3. Pinezhsky Nature Reserve (Arkhangelsk Province)
4. Basegi Nature Reserve (Perm province), or Vishersky Nature Reserve as an extension of "Virgin Forests of Komi"
5. Malaya Sosiva Nature Reserve and Verkhne-Kondinsky Wildlife Refuge (Khanty-Mansi Autonomous Area)
6. Tsentralnosibirsky (Central Siberian) Biosphere Nature Reserve (Krasnoyarsk Province)
7. Sayano-Shushensky Biosphere Nature Reserve and Shushensky Bor NP (Krasnoyarsk Province)

8. Putoransky Nature Reserve (Taimyr Autonomous Area)
9. Tungusky Nature Reserve (Krasnoyarsk Province)
10. Verkhnebikinsky Wildlife Refuge and Traditional Landuse Area in the middle stream of river Bikin (Primorsky Province)
11. Magadansky Nature Reserve (Magadan Province)
12. Kurilsky Nature Reserve and Malye Kurily Federal Wildlife Refuge (Sakhalin Province)

Scandinavia

Laponian Area Norwegian Extension (Sweden – Norway)

Phase One Findings

Chapters one through three of the IUCN Boreal Forest Study present detailed descriptions of potential North American, Russian and Scandinavian boreal forest World Heritage Sites.

North America

Canada

Of the nine provinces approached for recommendations, the governments of six – Alberta, British-Columbia (jointly with the Canadian Parks and Wilderness Society), Manitoba, Ontario, Québec, and Labrador (province of Newfoundland) – responded.

Based on government submissions and database records, **nine** sites are proposed or mentioned in the IUCN study. These include sites of the Canadian Boreal Shield, several sites traversing provincial boundaries, and sites that cluster with the four existing boreal World Heritage Sites found within Canada's borders. Several of the potential sites present prospective research partnerships between First Nations peoples and research scientists.

Alaska (USA)

Databases were heavily relied on for information on boreal forest protected areas in Alaska. The Conservation Biology Institute, which carried out the database search, provided a report on **two** site clusters proposed for this state. These include large areas of intact but unprotected boreal forest, North America's highest mountain, and transboundary areas that border the Canadian Yukon Territory.

Russia

In developing recommendations, experts in Russia made use of a list of potential World Heritage Sites compiled by Russian NGOs at the request of the Russian Federation State Committee on Environmental Protection in 1999-2000. **Twelve** protected areas were selected from a list of existing and projected national nature reserves and parks. These diverse areas include the collision site of the Tungusky Meteorite – the most powerful meteor explosion in contemporary history, habitats of rare and endangered species including the European beaver and Amur Tiger, and home to the last remaining indigenous Udege people.

Scandinavia

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For Scandinavian sites, information on protected areas was provided by experts from Norway and Sweden. No information was received from Finland. Of the two respondent countries, neither submitted official proposals. The study includes the information provided in the form of a preliminary proposal, though Sweden in particular has expressed no intention of establishing new World Heritage Site within its borders in the near future. The proposed sites would extend the current Laponian Area World Heritage Site, located in Sweden, to include areas of Norway.

Next Steps

As the first phase of a multi-phased study, the IUCN Boreal Forest Study concludes by defining future steps.

Phase two will convene a meeting of boreal forest experts to evaluate the proposals contained in the IUCN report, and use the results to submit future Boreal Forest World Heritage Site nominations to the World Heritage Committee.

Introduction

The *IUCN Boreal Forest Study* was commissioned by the United Nations Educational, Scientific and Cultural Organization (UNESCO) to identify exceptional boreal forest protected areas. The report's findings will be used to create a list of candidate boreal forest Natural World Heritage Sites, in accordance with World Heritage Site criteria. The IUCN report is the first phase of a broader study seeking to develop a network of boreal forest sites protected under the 1972 Convention on the Protection of the World Cultural and Natural Heritage.

Background

The Convention on the Protection of the World Cultural and Natural Heritage was adopted at the General Conference of the United Nations on 16 November 1972, and came into effect on 17 December 1975. Currently 172 State-Parties have signed the Convention, making it the most representative convention on environmental protection. In 1976, the World Heritage Committee and Fund were established to enhance the efficiency of the Convention. As a result, the first cultural and natural sites were inscribed in UNESCO's World Heritage List in 1978. Over the past 30 years, sites and ecosystem types from many regions of the world have been nominated. At the beginning of the year 2002, the List included 144 natural, 563 cultural and 23 natural-and-cultural sites in some 125 countries.

However, it is widely recognized that forest sites – boreal forest sites in particular – are underrepresented on the World Heritage List. Of the 144 natural sites included on the List, only ten are located in the boreal ecozone. These ten sites are located in four countries (Russia, Sweden, Canada and the USA) and cover a little over 34 million hectares (Table 1).

Table 1. Current World Heritage Sites in the Boreal Ecozone

World Heritage Sites In the Boreal Ecozone	Country	Year of Inscription	Size in hectares
1. Nahanni National Park Reserve	Canada - Northwest Territories	1978	476,560
2. Wood Buffalo National Park	Canada – Alberta	1983	4,480,000
3. Gros-Morne National Park	Canada- Newfoundland	1987	180,500
4. Kluane/Wrangell-St. Elias/Glacier Bay/Tatshenshini-Alsek	Canada / USA	1979, 1992, 1994	9,839,121
5. The Virgin Komi Forests	Russian Federation	1995	3,280,000
6. Lake Baikal	Russian Federation	1996	8,800,000
7. Volcanoes of Kamchatka	Russian Federation	1996	3,300,000

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8. golden Mountains of Altai	Russian Federation	1998	1,611,457
9. Central Sikhote-Alin	Russian Federation	2001	1,631,923
10. The Laponian Area	Sweden	1996	940,000
Total			34,539,561

Why protect boreal forests?

The green belt of the taiga (Russian term for boreal forest) extends from Russia's Pacific coast to the Barents Sea and the Atlantic Ocean, and also covers large parts of Canada and Alaska. Specific characteristics of the unique boreal forest ecosystem vary substantially throughout this vast region, with notable sub-regional and site-specific ecological differences.

Despite the large landmass covered by boreal forests, they have been extensively cut and are in need of protection. As the area and extent of old growth boreal forests rapidly diminish, many species dependent of these ecosystems are endangered. In Canada, only 12 million hectares of boreal forests are currently officially protected.²

In addition to providing habitats to thousands of species, boreal forests are carbon sinks, important for curbing the effects of CO₂ emissions on global warming.

In discussing boreal forest conservation, the differences in socio-economic, legal and institutional frameworks of countries containing boreal forests must be considered. These differences need to be carefully assessed when developing actions to promote the protection and effective management of this unique boreal forest ecosystem.

² From: "Les aires protégées en forêt boréale au Québec", Fiche d'information #1. 2002. WWF, RQFE, CPAWS, UQCN, 4 pages.

Map 1. Intact Boreal Forest Landscapes.

Role of the World Heritage Convention in the Conservation of Forests

In a joint-publication, the Centre for International Forestry Research (CIFOR), the World Conservation Union (IUCN) and the World Heritage Centre affirmed the pivotal role played by the World Heritage Convention in protecting global forest biodiversity (Box 1.)

To date, the World Heritage Convention has been effective for tropical forest conservation, with an estimated 3.3% of the world's tropical forests – more than 34 million hectares – on the list of World Heritage Sites (WHS). This number is expected to rise to between 5-10% within the next few years.

To parallel the effective application of the World Heritage Convention to protecting tropical forests, the number of boreal and temperate forests awarded World Heritage status should be increased. To illustrate, currently in Canada, only two ecozones have WHS status: the Boreal Plains (Wood Buffalo site) and Taiga Plains (Nahanni site) (Map 3, p. 41). There are no WHS within the boreal forest of the Hudson Plains ecozone, a vast area of intact forest in northern Manitoba, Ontario and Québec. One additional and relatively small site exists in the Boreal Shield ecozone (Gros Morne National Park.) In Russia, there are no WHS within the large central intact taiga, and those existing in other ecozones are quite small (Map 5, p. 113). While these small-scale protected areas are significant, larger tracts of forest, including clusters of sites, must be set aside for adequate protection of ecosystem processes, viable animal populations, and the diversity typical of boreal forests.

Box 2. Advantages of World Heritage Status for Protecting Global Forest Ecosystems³

1. Secures additional guaranties of conservation and integrity of unique natural systems;
2. Enhances the prestige of the areas and of their managing institutions;
3. Popularizes the sites included on the List, as well as the development of alternative land uses (for example, environmental tourism);
4. Secures priority of financial support for World Cultural and Natural Heritage Sites, mainly on behalf of the World Heritage Fund;
5. Facilitates the planning, monitoring and evaluation of the status of natural sites.

³ Source: "World Heritage Forests: The World Heritage Convention as a Mechanism for Conserving Tropical Forest Biodiversity," CIFOR, Government of Indonesia and UNESCO, 1999.

Increasing the number of boreal forest areas on the World Heritage List, and linking these to the existing World Heritage network, would be a significant step toward boreal forest protection. It would also help build the required human and institutional capacity for their effective management. In order to lay the foundations for a representative system of boreal forest World Heritage Sites, a systematic review of the ecosystem is needed.

To identify boreal forest protected areas which may merit World Heritage status, IUCN and the World Heritage Centre have jointly proposed a global thematic study on boreal forests.

The goal of the study is to promote the development of a network of boreal forest World Heritage sites as a mechanism to enhance their conservation and management. To achieve this goal the following activities were proposed:

- 1- Prepare a report identifying boreal forest protected areas that may merit consideration for World Heritage nomination (realized in this report).
- 2- Organise an expert workshop to discuss proposals from the IUCN Boreal Forest Study and adopt a final list.

Structure of the report

This report corresponds to 'step one' of the two-step proposal described above. The first section of the report describes the process used to identify exceptional boreal forest protected areas as contenders for World Heritage status. It also includes some general results.

The second section presents detailed descriptions of those sites proposed in Canada, Alaska (United States), and Russia, including country maps of current and proposed World Heritage Sites. Relevant information on Scandinavia is also included. Each site is categorized according to IUCN Management Categories (See box below).

The third and final section presents preliminary lessons-learned while conducting this study, and prescribes steps necessary to develop a final list of recommendations for the boreal forests World Heritage Site list. It concludes by anticipating the major challenges to be encountered on the way to making the recommended list a reality.

Box 3: IUCN WCPA Protected Areas Management Categories

IUCN categorises protected areas by management objective, and has identified the following six distinct categories of protected areas:

- I. Strict Nature Reserve/Wilderness Area: protected area managed mainly for science of wilderness protection
- II. National Park: protected area managed mainly for ecosystem protection and recreation
- III. Natural Monument: protected area managed mainly for conservation of specific natural features
- IV. Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
- V. Protected Landscape/Seascape: protected area managed mainly for landscape/seascape protection and recreation.
- VI. Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems.

These are described in detail in the publication **Guidelines for Protected Area Management Categories**, available at:

<http://www.iucn.org/themes/wcpa/pubs/publications.html>

Methods

Data for this study was derived from two main sources.

1. Expert Consultation

Canada, Alaska and Scandinavia

In Canada, the United States (State of Alaska) and Scandinavia, more than 30 experts from governmental agencies responsible for the management of parks and protected areas were consulted, and invited to submit information on “exceptional boreal forest protected area” sites in their jurisdiction. As the individuals best informed and able to provide this information, these governmental experts were contacted either by phone (North America) or by email and phone (Scandinavia). In addition, environmental nongovernmental organisations (NGOs) working on boreal forests and protected areas were also contacted for input. In each instance, the goals, objectives and criteria used for the study were clearly explained (see Annex 1 for detailed criteria).

Experts were asked to propose a maximum of two sites per province for Canada, per State for the United States or per country for Scandinavia. The objective in limiting the number of proposed sites was to produce a manageable number of sites to evaluate in phase two of this project – the Spring 2003 workshop – and to produce a list of sites suitable for boreal forest World Heritage Site nomination.

Governmental experts were provided with a template to compile information on their select sites. The format used came from UNESCO’s existing World Heritage Site Description, with an additional question relating to how the proposed site would fill the gap in the country’s current boreal forest WHS.

Russia

In the past two years, the governmental agency responsible for protected areas (PAs) in Russia has been restructured, and up-to-date government information on protected areas is frequently nonexistent or inaccessible. As a result, this study relied primarily on the expertise of nongovernmental organizations (NGOs) and independent specialists, including former employees of the ministry. Experts from the following organisations were involved: Worldwide Fund for Nature-Regional Programme Office, Greenpeace-Russia, the Conservation of Natural Heritage of Russia Foundation, Biodiversity Conservation Centre, Commission on Protected Areas of the Russian Academy of Sciences, All-Russian Research Institute on Nature Protection, the former officials of the Federal Forest Service, and the Ministry of Natural Resources. Experts were contacted by e-mail or in person.

It was learned that Russian regional and local protected areas are often characterized as “paper parks”, i.e. their management does not meet the level of protection required for World Heritage Site standards. For this reason, experts agreed that only federal protected areas be proposed. These

include nature reserves, national parks and nature refuges, and also regional PAs that are under the jurisdiction of nature reserves and national parks.

To gauge the current state of proposed sites, we consulted directors of protected areas and regional experts from conservation NGOs and regional environmental departments. This information was compared with data obtained from a 2002 project which evaluated the management effectiveness of federal protected areas. This latter study was conducted within the framework of a joint IUCN-WWF project supported by the Canadian International Development Agency (CIDA).

2. Database search

Protected area database experts provided the second data source. Through mapping the boreal forest region, database experts were able to propose candidate protected area sites and transboundary clusters, using the same criteria as the expert consultations. This mapping and assessment was carried out by the Global Forest Watch (GFW) and their affiliates: GFW-Canada, GFW-Russia and the Conservation Biology Institute (USA). Their research was based on their most current map of intact boreal forest, "Remaining Woodlands in the northern Forests" (unedited draft).

GFW defines "intact boreal forest landscapes" as "Large natural wildlands (at least 50,000 hectares) unaffected by modern, industrial-scale land uses. There are no signs of roads, recent settlements, agricultural fields, clear-cuts, mines, pipelines or oil wells."⁴ Within the intact landscapes, the map shows forest and naturally treeless areas, as well as areas where large fires have occurred during the last 50-60 years. Using this definition as a point of departure for this study, it was agreed that "intact forest landscapes offer exceptional conservation opportunities. They serve as reference points to assess change in managed landscapes, while providing the natural range of ecosystem goods and services."⁵

3. Selection Criteria

In identifying potential boreal forest World Heritage Sites, this study used four criteria:

1. Protected Area (PA) is located in the boreal ecozone (Boreal Forest)
2. PA satisfies World Heritage criteria
3. Clusters of PA or very large single PA
4. Preference for transboundary clusters

⁴ This definition comes from the poster map entitled: "Remaining wildlands in the Northern forests", produced by Global Forest Watch-Canada, the Finnish Nature League, Biodiversity Conservation Center (Russia), Greenpeace (Russia), International Socio-ecological Union (Russia), Swedish University of Agricultural Sciences, Conservation Biology Institute (USA) and the World Resources Institute (USA).

⁵ Citation from the poster map: "Remaining wildlands in the Northern forests"

Definitions of Criteria

1. Taiga or Boreal Forest

Introduction. The taiga or boreal forest exists as a nearly continuous belt of coniferous trees across North America and Eurasia. Overlying formerly glaciated areas and areas of patchy permafrost on both continents, the forest is mosaic of successional and subclimax plant communities sensitive to varying environmental conditions. Taiga is the Russian name for this forest which covers so much of that country. However, the term is used in North America as well.

Climate: The taiga corresponds with regions of sub-arctic and cold continental climate (Koeppen's Dfc, Dfd, and Dwd climate types). Long, severe winters (up to six months with mean temperatures below freezing and short summers (50 to 100 frost-free days) are characteristic, as is a wide range of temperatures between the lows of winter and highs of summer. For example, Verkhoyansk, Russia, has recorded extremes of *minus* 90 ° F and *plus* 90 ° F. Mean annual precipitation is 15 to 20 inches, but low evaporation rates make this a humid climate.

Vegetation: Needleleaf, coniferous (gymnosperm) trees are the dominant plants of the taiga biome. A very few species in four main genera are found: the evergreen **spruce** (*Picea*), **fir** (*Abies*), and **pine** (*Pinus*), and the deciduous **larch** or **tamarack** (*Larix*). In North America, one or two species of fir and one or two species of spruce are dominant. Across Scandinavia and western Russia the Scots pine is a common component of the taiga.

Broadleaf deciduous trees and shrubs are members of early successional stages of both primary and secondary succession. Most common are alder (*Alnus*), birch (*Betula*), and aspen (*Populus*).

Subclimaxes: Edaphic conditions result in sometimes extensive, persistent patches of vegetation other than spruce and fir:

1. **Bogs (muskeg)** occur in poorly drained, glacial depressions. Sphagnum moss forms a spongy mat over ponded water. Growing on this mat are species of the tundra such as cottongrass and shrubs of the heath family. black spruce and larch ring the edge.
2. **Pine forests**, in North America dominated by the jack pine (*Pinus banksiana*), occur on sandy outwash plains and former dune areas. These are low nutrient, droughty substrates not tolerated by spruce and fir.
3. **Larch forests** claim the thin, waterlogged substrate in level areas underlain with permafrost. These forests are open with understories of shrubs, mosses and lichens. In Alaska stands of *Larix laricina* are localized phenomena, but in Siberia east of the Yenesei River the extreme continentality and nearly continuous permafrost give rise to vast areas dominated by *Larix dihurica*.

Fauna: Fur-bearing predators like the lynx (*Felis lynx*) and various members of the weasel family (e.g., wolverine, fisher, pine martin, mink, ermine, and sable) are perhaps most characteristic of the boreal forest proper. The mammalian herbivores on which they feed include the snowshoe or varying hare, red squirrel, lemmings, and voles.

Large herbivores are more closely associated with successional stages where there is more nutritious browse available and include elk or wapiti (*Cervus elaphus*, known as red deer in Europe) and moose (*Alces alces*, known as elk in Europe). The beaver (*Castor canadensis*), on which the early North American fur trade was based, is also a

creature of early successional communities, indeed its dams along streams create such habitats.

Among birds, insect-eaters like the wood warblers are migratory and leave after the breeding season. Seed-eaters (e.g., finches and sparrows) and omnivores (e.g., ravens) tend to be year-round residents. During poor cone years, normal residents like the evening grosbeak, pine siskin, and red crossbill leave the taiga in winter and may be seen at bird feeders here in Virginia.

Distribution patterns within the boreal forest: The boreal forest is restricted to the northern hemisphere. It is circumpolar in distribution, as are many of the species which comprise it and even more of the genera. In general, plants have different species represented on North America and Eurasia; the mammals of both continents tend to be conspecific.

There are latitudinal zones within the forest. Running north to south, one finds

- * the tundra/taiga ecotone
- * an open coniferous forest (the section most properly called taiga)
- * the characteristic closed-canopy needleleaf evergreen boreal forest; and
- * a mixed needleleaf evergreen-broadleaf deciduous forest, the ecotone with the Temperate Broadleaf Deciduous Forest. In the US, this southern ecotone is dominated by white pine (*Pinus strobus*), sugar maple (*Acer saccharum*), and American beech (*Fagus americanus*).

Alpine expressions of the biome: In Merriam's Life Zones, the Hudsonian and the Canadian zones correspond with the Boreal Forest

In North America, several variants of the boreal forest occur in the mountains of the West.

- * In the Pacific Northwest, what amounts to a temperate rainforest is dominated by needleleaf species such as Douglas fir, western hemlock, and other giants. This forest type is the center of a major controversy regarding timber operations in old growth forests.
- * On the windward (western) slopes of the Sierra Nevada at elevations between 4,000 and 8,000 feet, the tall western conifers are joined by the magnificent giant sequoia (*Sequoia gigantea*). The specimen named General Sherman is some 3,800 years old, 272 feet tall, and has a diameter of 37 feet. The congener of this sequoia, the redwood (*S. sempervirens*) grows along the northern California coast. Their closest relative is the Dawn Redwood, a deciduous conifer of the genus *Metasequoia* from China.
- * In the Rocky Mountains, where fire is an important part of the environment, lodgepole pines (*Pinus contorta*) form nearly pure, single-aged stands. The great fire of Yellowstone National Park demonstrated once again the association of this species and its ecosystem with repeated burns.
- * Along the Appalachian Mountains in eastern North America the boreal forest of eastern Canada, dominated by red spruce (*Picea rubens*) and balsam fir (*Abies balsamea*), extends southward with little change in species composition until Virginia. The southern limit of balsam fir occurs in Shenandoah National Park; southward to the Great Smokies, on isolated mountain tops, is found Fraser fir (*A. fraseri*)

2. Criteria for the Inclusion of Properties in the World Heritage List

Natural criteria:

In accordance with Article 2 of the Convention, the following is considered as "natural heritage":

- "natural features consisting of physical and biological formations or groups of such formations, which are of outstanding universal value from the aesthetic or scientific point of view;
- geological and physiographical formations and precisely delineated areas which constitute the habitat of threatened species of animals and plants of outstanding universal value from the point of view of science or conservation;
- natural sites or precisely delineated natural areas of outstanding universal value from the point of view of science, conservation or natural beauty."

A natural heritage property - as defined above - which is submitted for inclusion in the World Heritage List will be considered to be of outstanding universal value for the purposes of the Convention when the Committee finds that it meets one or more of the following criteria specified by Operational Guidelines and fulfilling the conditions of integrity set out below. Sites nominated should:

- i. be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features; or
- ii. be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals; or
- iii. contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance; or
- iv. contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation;

3. Clusters of Protected Areas or very large single PA

Several protected areas make up a world heritage site such as the Lake Baikal WHS in Siberia, Russia made up of 2 National parks, 3 Strict nature reserves (zapovednik) and several other regional parks.

4. Preference for transboundary clusters

Several transboundary clusters were identified, for example, between Russia and Finland, Canada and USA or for large countries such as Russia and Canada, between provinces or regional divisions such as Québec and Labrador.

Overview of Results

1. Expert Consultations

Canada

Canada's provincial and territorial governments expressed great interest in participating in this study. Seeing this exercise as an opportunity to bring some of their exceptional protected area sites to the attention of the world, six of the nine provincial and territorial governments approached provided information on exceptional boreal forest protected area within their territory. These were the provincial governments of Alberta, British-Columbia (jointly with the Canadian Parks and Wilderness Society), Manitoba, Ontario, Québec, and Labrador (province of Newfoundland). These respondent provinces span the entire country (See Map 1 of Canada's ecoregion, p.9).

Some of the provinces identified potential areas, but provided no detail on their outstanding elements. These submissions were considered "mentions" rather than "proposals". Sites usually fell into the so-called "mentions" category when their management status was unresolved or the area had not yet been fully constituted. Québec, Saskatchewan, and Labrador each submitted "mentions." Between the six respondent provinces, nine sites were proposed or mentioned.

Highlights of Canadian proposals include (from West to East):

10. In British-Columbia, a new framework for the management area that combines core protected areas, special management zones, and reclamation practices. This was strongly supported by the Canadian Parks and Wilderness Society (CPAWS);
11. In Alberta, a cluster of satellite sites of the existing Wood Buffalo WHS;
12. In Ontario and Manitoba, a transboundary site cluster proposed jointly by the provincial agencies and five First Nations;
13. In Labrador, a transboundary site with Québec, with great potential according to CPAWS, but comprised of sites not fully constituted as protected areas.

Alaska (United States)

The US government response to the request for protected area nominations was less enthusiastic. To obtain information, the States Party to the World Heritage Convention suggested databases be searched, and information from their websites be used. Furthermore, the Conservation Biology Institute, which carried out the search, provided a report on the two site clusters they proposed.

Russia

Twelve protected areas were selected from a list of existing and projected nature reserves and national parks. Using the criteria set out for this study, the twelve areas were chosen as those with the most representative forest communities. Experts also used the list of potential World Heritage Sites compiled by Russian NGOs at the request of the Russian Federation State Committee on Environmental Protection in 1999-2000.

Scandinavia

For Scandinavian sites, information on protected areas was provided by experts from Norway and Sweden. However, as no official proposals were submitted from either country, the authors of this report prepared proposals based on information obtained from these experts, as well as information sent by the Swedish government on their network of protected areas. A summary of this information is provided in the next section. No material nor information was obtained from Finland.

To better evaluate the proposals from each geographical region, four tables of the key features of the proposed and mentioned sites (Tables 2-5), and of the ten existing boreal forest World Heritage Sites (Tables 6 p.35).

2. Database search

Canada

Global Forest Watch (GFW) Canada proposed nine site clusters spanning from the Yukon territory to the province of Québec. All are located within intact boreal forest landscapes. Some of the clusters include existing boreal forest WHS, such as Kluane-Atlin and Wood Buffalo National Park, and could therefore be considered as "extensions" or "satellites" of existing WHS. Current boreal forest WHS have also been included on the GFW map for reference (Chapter 1.)

Four of the sites proposed independently by GFW-Canada correspond to sites proposed by the governmental agencies: the Wood Buffalo – Lake Athabasca, East Side, James Bay, and the Assinica – Albanel clusters.

Alaska

The Conservation Biology Institute proposed two clusters in Alaska.

Russia

Global Forest Watch Russia considered the location of the proposed sites within the large (more than 50,000 ha) tracts of intact forests. Their analysis helped prioritise twelve candidate areas. Of these, we selected eight first-priority sites based on their location within intact natural landscapes, and on their qualification according to the criteria laid out in the World Heritage Convention (Table 4, p.27). The remaining four sites were ranked as second-priority because they are located within landscapes that are:

1) affected by human activity, resulting in loss of natural features. These areas, however, remain exceptional and are successfully managed

anthropogenic pressures (Valday, Sayan-Shushensky Nature Reserve, Table 4, p.27) or;

2) more typical than exceptional, but have a history of non-destructive use by local communities (Forests of Pinega River, Central Siberian Biosphere Nature Reserve).

Sweden

No database search was done for Scandinavia, however, Sweden provided a map of their protected areas system. While further analysis of the potential of these sites remains to be done, Sweden has indicated no intention of establishing new WHS on its territory in the near future.

Table 2. Summary of Proposed and Mentioned Sites in Canada

Boreal Forest Study - Process, Methods and Results

Boreal Forest Study - Process, Methods and Results

Boreal Forest Study - Process, Methods and Results

Table 3. Summary of Proposed Sites in Alaska

Table 2. Summary of Proposed and Mentioned Sites in Russia

Boreal Forest Study - Process, Methods and Results

Boreal Forest Study - Process, Methods and Results

Boreal Forest Study - Process, Methods and Results

Boreal Forest Study - Process, Methods and Results

Boreal Forest Study - Process, Methods and Results

Table 5. Summary of Proposed Site in Norway

Table 6. Current Boreal Forest World Heritage Sites

Boreal Forest Study - Process, Methods and Results

Boreal Forest Study - Process, Methods and Results

Chapter 1: North America

Canada

Clusters from database search:

(From West to East)

14. Kluane - Atlin
15. Wood Buffalo – Lake Athabasca
16. Prince Albert – Lac La Ronge
17. Duck - Riding
18. Churchill – caribou
19. East Side
20. Wabikimi – Nipigon
21. James Bay
22. Assinica - Albanel

Clusters and sites from expert consultation (detailed proposals):

British-Columbia: Muskwa-Kechika Management Area

Alberta: Wood Buffalo National Park Satellites

Labrador (Newfoundland): Québec-Labrador cluster

Manitoba and Ontario: Atikaki-woodland caribou

Québec: Natashquan River Valley

Special mentions:

Saskatchewan: Amisk-Atik, Clearwater

Québec: Lacs-Guillaume-Delisle-et-a-l'Eau-Claire, Albanel-Temiscamie-Otish

Labrador (Newfoundland/): Mealy Mountains

Alaska (United States)

Clusters from database search:

3. Arctic- Yukon – Charley cluster
4. Koyukuk-Innoko-Nowitna-Denali

Map 2. Ecoregions of Canada

Map 1. Protected Areas on Intact Boreal Forests in Canada

Canada

Clusters from database search:

(From West to East of the Country)

*Sites also proposed by governmental agency experts are noted in italics.

1. Kluane – Atlin (Yukon Territory)

- Kluane Wildlife Sanctuary
- Kluane National Park - National
- Atlin Provincial Park Class A
- Takshenshini-Alsek Wilderness
- MacArthur Game Sanctuary
- Chilkoot Trail National Historic Park

2. Wood Buffalo – Lake Athabasca (Province of Alberta)

- Wood Buffalo National Park
- *Colin Lake Wildland Park*
- *Fidler Point Wildland Park*
- *caribou Mountains Wildland Park*
- *Athabasca Sand Dunes Wilderness Park*
- *La Butte Wildland Park*
- *Birch Hills Wildland Park*
- *Marguerite Lake Wildland Park*

3. Prince Albert – Lac La Ronge (Province of Saskatchewan)

- Prince Albert National Park
- Steepbank Lake Provincial Recreation Site
- Candle Lake Park – Provincial
- Narrow Hills Natural Environment Provincial Park
- Lac La Ronge Natural Environment Provincial Park

4. Duck – Riding (Province of Manitoba)

- Grass River Provincial Park
- Cormorant Provincial Forest
- Saskeram Wildlife Management Area
- Tom Lamb Wildlife Management Area
- Clearwater Lake Provincial Park
- Porcupine Provincial Forest
- Swan Pelican Provincial Forest

- Duck Mountain Provincial Park
- Duck Mountain Provincial Forest
- Duck Mountain Natural Environment Park
- Riding Mountain National Park
- McCreary Provincial Forest Reserve
- Alonsa Wildlife Management Area
- Westlake Wildlife Management Area
- Weiden Wildlife Management Area
- Dauphane-Ethelbert Provincial Forest Reserve
- Pansy Provincial Forest Reserve
- Point River Wildlife Management Area
- Proven Lake Wildlife Management Area
- Asessippi Provincial Park
- Steeprock Wildlife Management Area
- Lenswood Provincial Forest Reserve
- + many small protected areas / special management areas

5. Churchill – caribou (Province of Manitoba)

- caribou River Provincial Park
- Baralzon Lake Nature Reserve
- Sand Lake Provincial Park
- Numaykoos Provincial Park
- Wapusk National Park
- Cape Churchill Wildlife Management Area
- Cape Tatnum Wildlife Management Area

6. East Side (Provinces of Manitoba and Ontario)

- Opasquia Provincial Park
- *Atakaki Provincial Park*
- *woodland caribou Waterway Park*
- Nopiming Provincial Park

7. Wabikimi – Nipigon (Province of Ontario)

- Wabikimi Waterway Park
- Windago Bay Nature Reserve
- Albany River Wilderness Park
- Kopka River Wilderness Park
- West Bay Nature Reserve
- Pantagrueel Creek Nature Reserve
- Kaiashke Nature Reserve

- Livingstone Point Nature Reserve
- Brightsand River Wilderness Park

8. James Bay (Provinces of Ontario and Québec)

- Polar bear Waterway Park
- Akamiski Island Migratory Bird Sanctuary
- Lac Burtin Riviere Roggan et La Pointe Louis XIV Provincial Park Reserve
- Peninsula Ministikawatin Provincial Park Reserve
- Baie Botswain Migratory Bird Sanctuary
- Kesgami Waterway Park
- Tidewater Natural Environment Provincial Park
- *Lacs Guillaume-Delisle-et-a-L'Eau-Claire*

9. Assinica – Albanel (Province of Québec)

- *Monts Otish Provincial Park Reserve*
- *Lacs Albanel-Mistassini-Et-Waconiche Wildlife Management Area*
- Assinica Wildlife Management Area
- Aschuapmushuan Wildlife Management Area

Canada

Clusters and sites from expert consultation (detailed proposals):

(From West to East)

British-Columbia: Muskwa-Kechika Management Area

Alberta: Wood Buffalo National Park Satellites

Labrador (Newfoundland): Québec-Labrador cluster

Manitoba and Ontario: Atikaki-woodland caribou

Québec: Natashquan River Valley

Muskwa-Kechika Management Area

Name of Cluster

Muskwa-Kechika Management Area (M-KMA)

Area of Cluster

6.3 million hectares (approx. the size of Ireland)

Country - Province

Canada-British Columbia

Proposed by

Canadian Parks and Wilderness Society⁶

Name of Protected Areas

About one-quarter of the lands are located in 16 parks and protected areas (1.64 million ha).

1. Dall River: 640 ha
2. Denetiah: 97,600 ha
3. Graham-Laurier: 100,780 ha
4. Horneline Creek: 300 ha
5. Liard River Corridor: 90,450 ha
6. northern Rocky Mountains: 645,000 ha
7. Prophet River Hot Springs: 180 ha
8. Redfern-Keily: 80,800 ha
9. Scatter River Old Growth: 1,140 ha
10. Toad River Hot Springs: 400 ha
11. Wokkpash (recreation area upgrade): 37,300 ha
12. Tetsa River: 103 ha
 - Muncho Lake: 86,079 ha
 - Stone Mountain: 25,179 ha
 - Sikanni River Ecological Reserve: 2091 ha
13. Kwadacha Park: 130,488 ha
14. Kwadacha Recreation Area: 32,551 ha
15. Finlay-Russell Park: 122,795 ha
16. Dune Ze Keyih: 347,789 ha
 - Dall R. Oldgrowth: 644 ha

⁶ The Muskwa-Kechika Management Area Information Office kindly provided background material to prepare this proposal. The information was found primarily in a draft report prepared for the Conservation of Natural Heritage Task Force of the National Round Table on the Environment and the Economy. The report is titled "Nature Conservation Case Studies," dated June 2002.

Denetiah: 97,908 ha⁷

The surrounding special management areas, or SMAs (3.63 million ha), maintain wilderness and wildlife habitats, while allowing for some ecologically sensitive logging, mining, and oil and gas operations. In addition, special wildland zones (0.92 million ha) have been created, where timber harvesting is not permitted. This is a significant result, as it provides a more comprehensive approach to conservation design – one that allows for connectivity and buffers between protected areas, two key principles of conservation biology.

Geographical Location

One of the largest un-roaded and scenic mountain wilderness landscapes in North America south of the 60th parallel.

1. Outstanding Features of the Site

Physical Features

The M-KMA features mature and old-growth forests; spectacular geological formations; lakes, rivers, and streams; waterfalls and hot springs; sub-alpine and alpine areas and major wetlands.

Incredibly rich in oil and gas deposits, metallic and non-metallic resource potential and huge boreal forests are also found.

The northern Rockies Mountain Provincial Park area has spectacularly exposed geological structures, including huge folds, thrust faults, rugged castellated peaks, glacially sculpted U-shaped valleys, cirques and hanging valleys.

The terrain in the mountainous area is characterized by rocky steep-sided slopes separated by high and wide valleys. Spectacular geological formations, escarpments and chevron folds exist in the layers of Sleeping Chief Mountain, Mount Sylvia (2942 metres) and Mount Mary Henry (2614 metres).

Soil development is poor to non-existent in the more elevated alpine areas, while valley bottoms frequently have well-developed and well-drained soils.

Climate

The biogeoclimatic zones found in the Fort St. John Land and Resource Management Plan (LRMP) Area of the M-KMA are as follows:

- Alpine Tundra (AT);
- Engelmann Spruce-Sub-alpine Fir (ESSF);
- Boreal white and black Spruce (BWBS); and,
- Spruce-Willow-Birch (SWB);

⁷ Note that the Dune Ze Keyih, Dall R Oldgrowth and Denetiah are proposed as one new park.

Figure 1. Map and pictures from Muskwa-Kechika Management Area

The biogeoclimatic zones present in the Fort Nelson LRMP area of the M-KMA are:

- Boreal white and black Spruce (BWBS);
- Spruce-Willow-Birch (SWB);
- Alpine Tundra (AT).

Vegetation

The northern Boreal Mountains ecoprovince of the M-KMA consists mainly of mountains, foothills and wide valleys. The climate is relatively dry. (See biogeoclimatic zones above.)

The natural flora of the park remain unthreatened from foreign invaders, and strong efforts are being made to avoid introduction of alien flora. Increased awareness by park users is aimed at mitigating the introduction of weed species, and park management must limit the interference in ecological processes. Active management may be needed to maintain or restore significant natural features or processes, and to eliminate threats caused by weeds and other foreign species.

Fauna

There are approximately 316 vertebrate wildlife species that occur in the M-KMA, including:

- Mammals (approximately 42 species);
- Birds (approximately 230 species);
- Reptiles (2 known species);
- Amphibians (5 known species); and,
- Fish (approximately 37 species).

The region's wildlife population is unparalleled in British Columbia. An estimated 4,000 caribou, 13,000 elk, 18,000 moose, and 5,000 Stone's sheep (constituting 75% of the world population) roam the area. It is also home to the only plains bison population in the province. The wood bison of M-KMA are the largest disease-free herd in the world. They are also red-listed in B.C., and considered 'threatened' by the Committee on the Status of Endangered Species in Canada (COSEWIC). The territory, with its 2000 black and 2000 grizzly bears, as well as coyotes, wolves, wolverines, cougars and such fur-bearers as squirrel, mink, fisher, weasel, marten, lynx, and beaver, supports one of the largest, intact predator-prey systems on the continent.

Upland game birds include the sharp-tailed, ruffled, and blue grouse, as well as several species of ptarmigan. Wetlands provide habitat for the Canada and snow goose, the trumpeter swan and a variety of ducks including mallards, blue-winged teals and buffleheads. Predator species including the gyrfalcon, bald eagle, boreal owl and broad-winged hawk live alongside such songbirds as the European starling, yellow-headed blackbird and several species of waxwings. Endangered bird species include the Connecticut warbler, the sharp-tailed sparrow and the upland sandpiper.

Cultural Heritage

The M-KMA is rich in cultural and heritage. Traditionally, the land was used by First Nations for hunting, gathering, and fishing. As such, the M-KMA overlaps with a number of First Nation traditional territories, including that of Treaty 8 First Nations, the Kaska Dene Council, and the Carrier Sekani Tribal Council. The Kaska Dene call the area Dene Kéyih (pronounced den-ah key-ah), which means "people's land" in their traditional language.

The area accommodates a number of archaeological sites, a historic fur-trading route with related trapper cabin sites, the remains of a Hudson's Bay Trading Post, a historic commercial fishery site, a native village abandoned after World War II, native pack trails, and an old wagon trail.

Traditional vocations and activities such as trapping, guide outfitting, aviation, packing, hunting and others are recognized in the M-KMA.

2. Management Status

IUCN Management Category

Date and History of Establishment

Historically, the M-KMA was managed as Crown land, with each government agency separately managing its own jurisdictional interest (e.g., forestry, environmental quality, etc.). The remoteness of the area has restricted development of natural resources, just as it has preserved wilderness. One of the intentions of the 1998 legislation which established the M-KMA, was to bring about a greater multidisciplinary and coordinated government approach to land management.

The M-KMA was first identified as "ecologically significant" by government biologists who had undertaken extensive research work in the area. Then in 1992, a loose coalition of conservationists, recreationists, trappers, First Nations, and tourist operators began a campaign to conserve the northern Rockies. These groups shared a vision of working toward a permanent, sustainable wildlife and wilderness arrangement for Canada's northern Rockies and surrounding areas. This arrangement was to be negotiated by all stakeholders including miners, loggers, hunters, trappers, and conservationists. The provincial government's imposition of a two-year restriction on new vehicle access (i.e., no new roads or trails) in the area, combined with the establishment of comprehensive land use planning in the area set the stage for this unique management agreement.

The management objective for the M-KMA is to ensure the maintenance of wilderness characteristics, wildlife and habitat over time, while allowing for resource development and use via recreation, timber harvesting, mineral exploration and mining, and oil and gas exploration and development. Central to this intent is the integration of management-related activities, especially the planning, development, and management of road access within the M-KMA. The long-term objective is to return the lands, as often as possible, to their natural state after completion of development activities.

Land Tenure

The area is managed by the Provincial Minister of Sustainable Resource Management, with assistance from the M-KMA Advisory Board (a volunteer group appointed by the Premier) which includes representatives of the following interests:

- Conservation/Environment
- First Nations
- Mining
- Oil and Gas
- Forestry
- Guiding and Outfitting
- Labour
- Local/Regional/Provincial Government
- Recreational Use
- Trapping
- Wilderness Tourism

The M-KMA is not a park, but rather a 'Management Area'. Protected areas/parks afford the highest level of protection. By contrast, Special Management Zones (SMZs) + Wildland Zones permit innovated and environmentally responsible development. A general formula might be proposed: Parks + SMZs = the M-K Management Area. This is a possible model for future conservation strategies.

The intent of the M-KMA is to achieve a balance between economic development and conservation. The overall goal is to maintain in perpetuity the wilderness quality, and the diversity and abundance of wildlife and the ecosystems on which it depends, while allowing resource development in 75% of the area.

Conservation Value

The M-KMA is unique in that it has used a number of innovative tools to manage the area:

1- Legislation

First, the area was established by legislation. This means that all planning and management of Crown land and natural resources in the area must be conducted in accordance with legislation. The *M-K Management Area Act* (Bill 37, 1998 and the 2002 Amendment Act) sets out the core objectives for the territory (as outlined above). It also provides for an advisory board and trust fund (see below) and details the requirements for local strategic plans (e.g., the oil and gas pre-tenure plan; forestry landscape unit objective, recreation management plan; park management plan; wildlife management plan). These local strategic plans are a prerequisite to development activity in the M-KMA. Other legislation (*Parks Act, Environment and Land Use Act, Wildlife Act*) is used for other aspects of the plan.

2- Advisory Board

Second, the Muskwa-Kechika Advisory Board was established to provide input on natural resource management in the area, and to make recommendations to the trustee (Minister of Sustainable Resource Management) on Trust Fund expenditures. Representatives are appointed by the premier for up to three years, at which point their terms can be extended. The objective of the Advisory Board is to:

- Maintain and enhance the M-KMA in order to safeguard environmental values, while allowing for integrated resource management in the special resource management areas;
- Work to ensure that future generations will experience the current high levels of wilderness values found in the M-KMA;
- Identify, maintain, and enhance the M-KMA's unique wildlife, eco-tourism, and native cultural values; and
- Sustain funding for the management of the Muskwa Kechika Management Area through regional, national, and worldwide promotion.

3- Trust Fund

Third, and probably most importantly, a special trust fund was created for the M-KMA. The provincial government contributes up to \$1 million annually to the trust fund, while private sector donations are encouraged and matched by the government (up to \$1 million). Since 1998, the Trust Fund has received over \$800,000 in private and public donations. The Advisory Board continues to actively seek new contributions and partnerships to ensure that the Trust Fund continues to grow, and that it is maintained beyond the expiration of the current legislation in the fiscal year 2005. The M-K Advisory Board also reviews proposed expenditures from the Fund before recommending them to government for approval.

The Trust Fund supports planning initiatives and special projects in the area. These include enhancing wildlife populations and habitat; conducting research into wildlife biology and ecology; supporting wildlife, recreational, and cultural inventories and mapping; supporting planning initiatives for resource development activities, wildlife, recreation, and parks; developing and producing public education materials and programs about the M-KMA and its management; and supporting programs aimed at involving and training youth from local communities in resource-related career opportunities.

4- Technical Studies and Local Knowledge

Fourth, in terms of research tools, scientific studies, traditional and local knowledge were used in defining the M-KMA. The previous provincial Protected Areas Strategy, put together with technical expertise (including geologists, biologists, foresters and anthropologists among others), served as a foundation document. However, given the lack of inventory data and previous studies in the region, local knowledge of the critical areas was also tapped. Therefore, knowledge derived from both the public and from LRMP members was significant in the process. In general, governments offered support and provided information as requested.

As many interests had to be balanced, the decisions reached were not always in agreement with the technical recommendations of documents such as the *Protected Areas Strategy*. The lack of a thorough socio-economic analysis of the area prior to its designation meant that the full economic consequences of the plan were not anticipated. The most obvious oversight in undermining the potential buy-in to the plan by the mining sector.

5- Reclamation

Lastly, an innovative process is now in place to reclaim, over time, the full wilderness value of the M-KMA. For example, roads will be reclaimed in special management areas after their use; and development plans must provide, as much as possible, for the eventual return of the area to its natural state.

It is the intention of the Canadian Parks and Wilderness Society to replicate this concept in two other Canadian provinces: in North-East Alberta, near Wood Buffalo National Park and in northern Saskatchewan, East of Lake Winnipeg.

Conservation and Management Constraints

The LRMP planning process in the M-K took a number of years to complete. The Advisory Board has been in existence since 1998. Such an extended period of engagement in the process created a major challenge for stakeholders, especially considering that their time was volunteered. It also required a significant contribution of time and effort by government to shepherd the process. While there was some turnover in representatives, many were committed to the process and continued to participate. Getting the right people to the table – those with fundamental interests – also facilitated continued involvement. When sector representatives felt that decisions had been imposed on them, they simply walked out of the process.

Certain communications barriers played a role as well. When the initial M-KMA was announced by the government, it was “mis-advertised” as parkland, thereby creating a major initial barrier to industrial and local buy-ins and to investor confidence in the area. This emphasis on promoting so-called conservation aspects led some sectors to speculate that the whole process had a predetermined agenda. In their constant battle to overcome this perception barrier, the new government and the M-KMA Advisory Board Office now use the more accurate term “management area” to describe the region.

Staff

The M-K Advisory Board maintains one full-time coordinator and a sub-contractor for part-time assistance. In addition, the Ministry of Sustainable Resource Management has one full-time Program Manager, who is an ex-officio, non-voting member of the M-K Advisory Board.

3. Potential Threats

Sustainable resource development in the SMAs is permitted. Some sectors believe that the M-KMA designation makes it easier for business to do its job. A climate of certainty and protection for the environment is fostered, facilitating the approval of industrial development. However, not all sectors share this view. Indeed, if local investment is not made in the area, community support for the project may wane. Planning and development over the next several years will reveal the true M-KMA economic results.

4. Local Populations Living on the Site

Local Human Population

Less than 20 people actually 'live' in the M-KMA full-time. These full-time residents maintain traplines or act as caretakers for guide outfitters. One First Nations family of historical significance have lived in one area of the M-KMA for decades. Known as the Macdonald family, they lived off the land, having no desire to live in 'urban' communities or towns outside of the M-KMA. One of the Trust Fund projects was to assist the Kaska Dena Council in documenting this family on video.

5. Tourism Potential

Visitors and Visitor Facilities

There is a well-developed guide outfitter and tourism business in the area. Approximately 25 guide outfitters operate in the M-KMA, and diversification into eco-tourism has recently begun.

6. Scientific Research Potential

The aforementioned annual Trust Fund was provided until 2005 to support government spending on planning initiatives and special projects in the M-KMA, such as conducting research or enhancing wildlife populations.

Scientific Research and Facilities

One of the program areas under the Trust Fund is Advancing Applied Science. Through this program, the Board has funded numerous projects including:

1- An Assessment of Habitat Suitability Models for Managing Predator-Prey Ecosystems. This project undertook a problem analysis and ultimately a proposal to evaluate the accuracy, reliability, and sensitivity of current wildlife habitat suitability models used to predict the potential impacts of human and industrial activities on individual species.

2- An Evaluation of Animal Conditions and Predator/Prey Interactions Indirectly. This project enabled the undertaking of a problem analysis of the benefits and limitations of using indirect measures to monitor animal condition and to quantify linkages between species (predator-prey relationships). From these findings, a proposal will be developed to assess the impacts of resource extraction on wildlife species in a localised area using appropriate indirect techniques.

3- caribou Habitat Use. This project enabled an additional year of taking inventory of radio-collared caribou on a biweekly basis. This provided a habitat use analysis for integrated management planning, and completion of a habitat model for this species for development of the M-KMA Management Plan.

4- A Sub-alpine and Alpine Ecosystem Classification. This enabled the development of a classification and description of site-level ecosystem units for the Spruce-Willow-Birch and Alpine Tundra zones of the M-KMA. The project involves the collection of field data for the study area that is accessible from the Alaska Highway and extends from Stone Mountain Park to Muncho Lake Park. A single report that is

web-based with a hyper-linked structure will be produced to permit the report to be viewed at varying levels of complexity and detail.

5- A northern M-K caribou Study. This five year study enabled the establishment of baseline ecological information on one of the main caribou herds of northern M-KMA, to support future wildlife management and conservation objectives for the predator-prey systems in the northern part of the M-KMA.

6- A Traditional grizzly Inventory. An inventory of grizzly bears was taken employing radio collaring.

7- The Board is currently producing a conservation area design (CAD) for the M-KMA. This long-term project will provide a key conservation biology toolkit to assist in on-going planning and management issues. The purpose of CAD is to delineate and describe a network of core areas and ecological corridors within the M-KMA ecosystem that could enhance the long-term viability of key resident species and major ecosystem processes. A CAD will contribute to on-going local strategic planning initiatives, developing landscape unit objectives, operational development planning and regulatory decision making in the M-KMA.

7. Gaps Filled in the Canadian Boreal World Heritage System

The Muskwa-Kechika Management Area is located in north-eastern British Columbia, where the extensive boreal plains and muskeg of the east meet the mountains to the west. Containing over 50 roadless watersheds, each of which spans over 5,000 hectares, this area remains one of North America's largest intact wilderness territories south of the 60th parallel.

Rich in untouched beauty, natural resources, and animal life, the M-KMA is an ecological region of international significance. At the same time, it represents an innovative model for nature conservation, one that reflects new approaches to both conservation planning and local involvement.

As the first legislated example of conservation biology in action, the M-KMA offers a valuable new model for conservation planning and design. The combination of core protected areas, special management zones, and reclamation practices provides an important test case for the principles of conservation biology for both northern Canada and the world.

Wood Buffalo National Park Satellites

Name of Cluster

Wood Buffalo National Park Satellites

Area of Cluster

Ten provincially protected areas totalling 1,077,929 ha. All sites are near Wood Buffalo National Park which is already a World Heritage Site of 4,480,000 ha.

Country - Province

Canada-Alberta

Proposed by

Alberta Parks and Protected Areas, Canada

Name of Protected Areas

caribou Mountains Wildland Provincial Park, 591,008 ha

Richardson River Dunes Wildland Provincial Park, 32,033 ha,

Maybelle River Wildland Provincial Park, 15,309 ha,

Marguerite River Wildland Provincial Park, 196,302 ha,

La Butte Creek Wildland Provincial Park, 18,146 ha,

Colin-Cornwall Lakes Wildland Provincial Park, 70,428 ha,

Fiddler-Grey Willow Wildland Provincial Park, 6,521 ha,

Birch Mountains Wildland Provincial Park, 144,505 ha,

Athabasca Dunes Ecological Reserve, 3,677 ha,

Egg Island Ecological Reserve, 0.36 ha,

Altitude

Elevational range is similar to Wood Buffalo National Park ranging from 945m on the plateau of the caribou Mountains to about 220m for sites that border on Lake Athabasca.

Geographical Location

The cluster is located in the northeast corner of Alberta between about 59° 13'N to 59° 45'N and 110° W to 115° 40' W.

1. Outstanding Features of the Site

Physical Features

Climate

Vegetation

Fauna

Cultural Heritage

Regionally, physical features, climate, vegetation, fauna and cultural heritage are similar to those described for Wood Buffalo National Park. The following highlights the outstanding attributes, particularly where these differ they are different from those described for Wood Buffalo National Park.

caribou Mountains Wildland Provincial Park (5,910.08 km²) represents the diversity of the Sub-arctic Sub-region of the Boreal Forest. A rich bird environment, the caribou Mountains provide habitat for species found much further north including the gray-cheeked thrush, red-necked phalarope, red-throated loon, American tree sparrow, mew gull, pacific loon, and surf scoter. The wildland includes about 80% of the range of an important woodland caribou population – a threatened species in Alberta. A population of up to 120 wood bison, also an endangered species, lives in the Wentzel Lake area in small groups of up to 15 animals. Polar reed grass found in this area is believed to have been introduced by the bison. The Peat Plateau Bog and the northern Ribbed Fens are unique environments of provincial significance. The wildland shares a common boundary with Wood Buffalo National Park on the north and east.

Colin-Cornwall Lakes Wildland Provincial Park, east of Fort Chipewyan, at 704.28 km², is exceptionally diverse. Along with the rugged granite outcrops and deep clear lakes typical of the Canadian Shield, extensive sand and gravel outwash plains and wetland complexes provide habitats for provincially rare species.

Glacial meltwaters have effectively washed the granite outcrops clean of unconsolidated material. The exposed granite outcrops show signs of the recent glacial advance, and many exhibit the form of roche moutennees. Rocks imbedded in the advancing glacial ice produced striations, groves and crescentic chatter marks that all indicate the direction of ice advance from the northeast.

Lakes in Cornwall-Colin Wildland are a direct result of glacial erosion. Ice scour and rock basin lakes were created by the scouring action of ice that removed loose material or carved depressions in zones of weaker rock along fractures, faults and joints. Steep cliffs along some of the shorelines reflect the direction of these fault lines.

Figure 2. Map and pictures from Wood Buffalo National Park Satellites

As the glaciers retreated, great quantities of meltwater scoured the granite outcrops and washed and sorted the loose material into sand and gravel. Extensive areas of glaciofluvial material – or *outwash* as these sands and gravels are known – were deposited around Colin and Cornwall lakes. Kettle lakes pit these outwash deposits. Some of the finer sandy material has been reworked by wind to form sand dunes. These sandy areas contribute greatly to the diversity of the wildland. In addition to these well-drained, sandy uplands, the lower, wet sites have developed a variety of mineral wetlands. These landscapes provide habitats for several provincially rare species. Preliminary field studies have documented unique south facing grasslands with a number of rare plants. Mew gull and semipalmated plover, provincially rare birds, nest on Colin Lake.

La Butte Creek Wildland Provincial Park, located north of Fort Chipewyan, has a common western boundary with Wood Buffalo National Park. The wildland represents the stream courses and organic wetlands typical of the Canadian Shield along the Slave River in Alberta. La Butte Creek is the largest stream in the Kazan Upland Sub-region of Alberta, and flows through a diverse area of sand plains, wetland complexes and Precambrian granite outcrops. The most significant features of La Butte Creek Wildland are the river environments and associated wetlands not represented in other protected areas of the Canadian Shield. La Butte Creek is a very slow moving stream with almost no gradient throughout the length of the wildland. Water levels in La Butte Creek fluctuate with the rise and fall of the Slave River. This results in a reversal of the flow in La Butte Creek with turbid water from the Slave River flowing up La Butte Creek. The reversal of flow in La Butte Creek is not a seasonal event tied exclusively to spring snow melt. Waters in the Slave River also rise in response to summer rainfall and to prolonged easterly winds. These winds raise the water levels in the western end of Lake Athabasca by up to several metres, and in turn the levels of the Slave River, backing up the flow of La Butte Creek.

As these turbid waters recede, they deposit their silt load, forming levees along La Butte Creek. These are the only such levees in Alberta's protected areas network. Perhaps in response to the silts and the usual water fluctuations, a narrow strip along the water's edge supports communities of rare species. Blue or square-stemmed monkey flower (*Mimulus ringens*) grows in the zone that alternates between standing water and water's edge. First documented to occur in Alberta in 2001, this is the only known location of this species in the province. Frequently a band of another rare species, false dragonhead (*Physostegia ledinghamii*) lines the fertile banks of the levee. A strip of balsam poplar, sometimes only two or three trees wide, forms a sinuous string along the top of the levee. Wetlands trapped behind the levees tend to be primarily awned sedge (*Carex atherodes*) meadows, with spangletop (*Scolochloa festucacea*) communities in areas of deeper water, similar to those of the Peace/Athabasca delta.

A number of distinctive wetland communities exist in the wildland. Interesting equisetum wetlands are mostly in the wet meadows paralleling the Slave. In the meander scrolls there are huge alder and willow growing in dense tangles. The size is striking – some of the shrub species are decidedly tree-like. In some of these

parallel wetlands there are salt meadows, with completely different types of species.

A number of rare species have been found just outside the boundaries of the wildland. Small white water lily (*Nymphaea tetragona*) was only found in a few ponds just north of the park. Leopard frogs were found at Darwin Lake south of the wildland.

Along the lower stretch of the creek, occasional granite knobs rise above the surrounding wetlands. Jack pine and lichens may be found on these outcrops. Towards the eastern end of the wildland, granite outcrops are more continuous and form uplands that are about 30 to 40 metres above the level of La Butte Creek. Organic wetlands and occasionally small ponds occupy poorly drained rock basins within the granite uplands. Small streams flowing from these granite uplands cascade into La Butte Creek over a series of small waterfalls and rapids.

Birds of note include numerous kingfishers along La Butte Creek, as well as black swift colonies. Buffalo hair and scats attest to their use of the sedge meadows, probably as winter grazing areas.

Fidler-Greywillow Wildland Provincial Park, at an area of 65.21 km², includes a portion of the north shore of Lake Athabasca as well as a number of islands. The sandstone outcrops, beaches, beach dunes, islands and associated environments are the most significant features. The north shore segment includes sandstone outcrops, sandy beaches, active blowout dunes and stranded beach ridges. In some bays, extensive areas of sandy wetlands are trapped behind the active beach.

These diverse sand habitats are unusual in Alberta, and harbour unique species. The big, blue-green grass covering the dryer beach ridges is American dune grass (*Leymus mollis*). Prominent here, the north shore of Lake Athabasca is the only place it is known to occur in the province. Another rare species, Indian tansy (*Tanacetum bipinnatum* ssp. *huronense*) is often associated with the dune grass. Crowberry forms mats in spots, its juicy berry drawing bears to the shore in July.

Sparse communities of sedges and wire rush tend to dominate the backshore wetlands. In some spots, the sand is red with the leaves of two species of insectivorous sundew: oblong-leaved and round-leaved sundew. Rare plants here are species such as pearlwort (*Sagina nodosa*) and St. John's wort (*Hypericum majus*)

Moving further from the lakeshore, the granite outcrops of the Precambrian shield become a major part of the landscape. A thick black mat of *Umbilicaria* lichens covers the top of many of the outcrops, with lines of reindeer lichen marking fractures in the bedrock. Contrasting with these dry rock faces are the wetlands that form between them. Some are classic basin bogs of black spruce with a Labrador tea understory and a thick layer of Sphagnum mosses. Others are beaver ponds, ringed with sedges and willows.

The occasional stream threads its way through the rock. Where shaded with a dense thicket of river alder, the creek edges are moist and mossy, providing habitat for some rare liverworts. Small sandy deltas form when the creek meets Lake Athabasca. Excellent permafrost features (for example, palsas of various sizes) can

be found within the wildland. In one location, the south-facing slopes of a large palsa were disintegrating from the warm summer temperatures, resulting in slope slumpage and a tangled mass of shrubs and trees.

Lake Athabasca supports numerous species of waterfowl, including large flocks of common and red-breasted mergansers, and surf scoters. Several pairs of bald eagles nest in the area. Colonial nesters occur on some of the islands, notably common tern, California gull, herring gull and ring-billed gull. Sandhill cranes are commonly heard and observed in backshore wetlands and prey on amphibians such as Canadian toads as well as a variety of insects.

Bustard Island near the western end of the lake is an outstanding example of a sand island. With its scenic storm beaches and driftwood, Bustard is the largest sand island in Alberta. There are impressive backshore vegetated dunes, some quite large. Located where it intercepts water flowing in from both the Peace and Athabasca Rivers, Bustard Island has a number of unusual species. Thousands of plants of northern quillwort (*Isoetes echinospora*), another provincially rare plant, grow on sandy bottom in shallow water around the large lake on the island. The island is also home for a number of rare plant species characterizing sandy shores of the Athabasca Lake within the Wildland Park (e.g. American dune grass, St. John's wort, thread rush (*Juncus. filiformis*)).

During the spring season, large numbers of ladybird beetles of several species were found on and around the driftwood lying on the island's sandy beaches. Canadian toads and sandhill cranes live on the island. moose and coyotes are also present. Raptors such as northern goshawks are found in the woodlands and short eared owls have been spotted hunting over the island's interior fens.

Richardson River Dunes Wildland Provincial Park shares its western boundary with Wood Buffalo National Park, and is part of the largest sand dune complex in Canada. The wildland consists of a series of parallel northwest to southeast trending sand ridges. These are forested by jackpine with a ground cover of lichens. Small blowouts of unvegetated sand follow the tops of some of the dune ridges. Extensive areas have been burned and are vegetated by dense stands of young jackpine with few understory species and considerable deadfall. Stemless lady's-slipper orchids may be found in the more mature pine forests. Small sedge meadows have developed in the troughs between the ridges. The wildland protects the best of the paleo longitudinal dunes that formed by winds from the southeast soon after the glaciers retreated. Longitudinal dunes of this type, size and development are not recorded elsewhere in the circumpolar boreal forest. Also included in this site are paleo parabolic dunes and riparian areas along the Athabasca River. Plant communities along the Athabasca River add considerably to the diversity of the site. Beneath the dense tangle of river alder, a sea of ostrich fern reaches head-height by mid summer. Old growth forests of white spruce are carpeted with mosses, lichens or horsetails. Stands of balsam poplar 50 cm or more in diameter have a rich shrub understory of rose, red-osier dogwood and low-bush cranberry. These riparian communities provide habitat for species such as black bear and deer, which are scarce elsewhere in the wildland park.

Preliminary field studies have documented rare or unusual species and plant communities. Growing between some of the dune ridges are small sedge wetlands,

on a sand base. The main sedge growing in these wetlands is itself rare (few-seeded sedge or *Carex oligosperma*), and the plant community is the rare few-seeded sedge / twisted bog moss poor fen, known only from this part of the province. Often at the edge of the fen is another rare community, the leatherleaf – northern laurel / green reindeer lichen shrubland. This is composed of an unusual mix of lichens generally found in dry uplands with an overstory of shrubs associated with peatlands.

Birds for this part of the province include golden eagle as well as marbled godwit, which was not previously known north of Lesser Slave Lake. Blue jay and Baltimore oriole, are also found.

Maybelle River Wildland Provincial Park protects sand plain, dunes and kames, south of Lake Athabasca, surrounding Athabasca Dunes Ecological Reserve. The wildland consists of sand plains, rugged kames and small kettle lakes that drain into the Maybelle River. As glaciers advanced over the area during the last ice age, they ground the soft underlying Athabasca sandstone into sand and gravel. The glaciers and associated meltwater reworked this material into relatively flat outwash plains interspersed with rugged kames. Melting icebergs left numerous small kettle lakes. Since the retreat of the glaciers some 10,000 years ago, parts of the landscape have been reworked by wind to form sand dunes. As the water table rose, low areas became wetlands. The well-drained sandy uplands are forested by jackpine with a ground cover of lichens. Peatlands have formed in the wet depressions. These are dominated by stunted forests of black spruce with sphagnum mosses, Labrador tea and other shrubs dominating the ground cover. Riparian complexes are restricted, but are important areas of biodiversity.

A variety of significant and interesting features are found within Maybelle River Wildland Park and Athabasca Dunes Ecological Reserve. The Ecological Reserve includes Alberta's largest active sand dune, measuring about 8 km from north to south and about 1.5 km wide. A series of sand ridges, the active dunes are slowly migrating south-eastward, pushed by the strong prevailing winds from the northwest. As the dunes migrate, they bury the Jackpine forests and fill the small lakes in their path. As the dunes continue to advance the skeletons of long-buried pine trees are exhumed.

At the trailing edge of the dunes, plants slowly re-colonize and stabilize the sand. Two of the common colonizers, crow berry and sand heather are favoured food sources for black bear that frequent the area.

In between some dune ridges, downward wind erosion is gradually halted by the accumulation of stones at the surface. Stones in these gravel layers have been polished by blowing sand over the centuries, forming desert pavement similar to those found in the world's hot deserts. Arctic terns, not known to nest elsewhere in Alberta, are known to nest in these gravels.

The shifting, blowing sand makes a dry and difficult place for plants to grow. Species that survive are those that can both tolerate sand blasting, and alternately be buried or have roots exposed. Not surprisingly, these specialized conditions are home to specialized plants. Sand chickweed and Tyrrell's willow, for example, are

endemic species, known only from these dune complexes in Alberta and adjacent ones in Saskatchewan.

Although the active dune complex is an outstanding feature and established as an ecological reserve, there are many other significant features. A few ponds in the wildland are home to the only Alberta populations of northern water shield, first reported for the province in 2000. Rare wetlands with a notably high concentration of the rare pitcher plant, a carnivorous plant, are scattered around some of the little kettle lakes.

In the summer of 2000, a total of 167 species of moths and butterflies were collected in the region including three macro-moths new to Alberta.

Marguerite River Wildland Provincial Park (1963 km²) along the Saskatchewan border northeast of Fort McMurray includes landscapes not found in any of Alberta's other protected areas. The park encompasses part of the only area in Alberta where hummocky moraine and ground moraine deposited by continental glaciation are composed primarily of sand. This is due to the source of the glacial moraine material, which comes from the coarse grained Athabasca Sandstone along the margin of the Canadian Shield immediately to the north. Elsewhere in Alberta hummocky moraine and ground moraine are dominated by clays. The sandy landscape of the wildland is largely forested by jackpine with a ground cover of lichen. Peatlands have developed in the poorly drained depressions. These support forests of stunted black spruce with an understory of Labrador tea and sphagnum mosses. The north end of the wildland is dominated by a dissected kame. This extremely rugged landscape has local relief in excess of 200 metres.

West of the dissected kame the Richardson River meanders and braids across a broad flood plain. This is the best example of a braided stream valley in the Boreal Forest with other braided streams of this magnitude being found in the Rocky Mountain Natural Region.

Immediately south of the Marguerite River is an extensive area of hummocky moraine. A subsequent glacial advance overrode this moraine and produced a well-developed drumlin field. This is the only drumlin field included in Alberta's parks and protected areas network. Closely associated with the drumlin field are numerous small glacial flutings and several large eskers. A spectacular esker, with local relief in excess of 65 metres, marks the south end of the park. The landscape between these two features includes a drumlin field and glacial flutings.

The Snuff/otter Lakes area near the south end of the wildland represents some of the most pristine organic wetlands in the Boreal Forest of Alberta.

Included within the wildland is the unique Crag and Tail landscape consisting of granite crags with glacially deposited gravel tails on the lee side. The Crag and Tail landscape is part of the Canadian Shield Natural Region. Rock polypody, a rare fern, has been found in the Crag and Tail area. grizzly bear have recently been sited in the wildland.

Birch Mountains Wildland Provincial Park represents much of the diversity of the Boreal Highlands Sub-region. Legend, Namur, Gardiner, Big Island and Sand lakes that constitute the eastern edge of the wildland support populations of lake

trout, lake whitefish, cisco, arctic grayling, northern pike, walleye and yellow perch. Islands in the lakes are important white pelican nesting areas. osprey and bald eagles frequently nest in the larger trees around the lakes.

The landscape west of the lakes consists of hummocky moraine, often referred to as knob and kettle topography. The hills or knobs consisting of glacial till composed of clay with some sand, stones and boulders are well drained, and support mixed forests of aspen and spruce. The depressions between the knobs are the kettles. These are poorly drained and have formed peatlands forested by black spruce. The larger, deeper depressions form small lakes which are interspersed throughout the wildland.

Athabasca Dunes Ecological Reserve includes Alberta's largest active sand dune measuring about 8 km from north to south, and about 1.5 km in width. As a series of sand ridges, the active dunes are slowly migrating south-eastward, burying the Jackpine forests and filling small lakes. Arctic terns, not known to nest elsewhere in Alberta, nest in the reserve. Athabasca Dunes Ecological Reserve is entirely surrounded by Maybelle River Wildland Provincial Park.

Egg Island Ecological Reserve at 0.36 ha. is the smallest ecological reserve in Alberta. Egg Island is situated northeast of Burntwood Island in Lake Athabasca. Egg Island is the largest Caspian Terns colony in Alberta, with well over 100 nesting pairs. California Gulls also nest on the island.

2. Management Status

IUCN Management Category

(See Annex 3, p. 206 for IUCN Management Categories)

caribou Mountains Wildland Provincial Park, IUCN Category II

Richardson River Dunes Wildland Provincial Park, IUCN Category II

Maybelle River Wildland Provincial Park, IUCN Category II

Marguerite River Wildland Provincial Park, IUCN Category II

La Butte Creek Wildland Provincial Park, IUCN Category II

Colin-Cornwall Lakes Wildland Provincial IUCN Category II

Fiddler-Grey Willow Wildland Provincial Park, IUCN Category II

Birch Mountains Wildland Provincial Park, IUCN Category II

Athabasca Dunes Ecological Reserve, IUCN Category IB

Egg Island Ecological Reserve, IUCN Category IB

Date and History of Establishment

caribou Mountains Wildland Provincial Park, established 2001

Richardson River Dunes Wildland Provincial Park, established 1998

Maybelle River Wildland Provincial Park, established 1998

Marguerite River Wildland Provincial Park, established 2000

La Butte Creek Wildland Provincial Park, established 1998

Colin-Cornwall Lakes Wildland Provincial Park, established 1998

Fiddler-Grey Willow Wildland Provincial Park, established 1998

Birch Mountains Wildland Provincial Park, established 2000

Athabasca Dunes Ecological Reserve, established 1988

Egg Island Ecological Reserve, established 1992

Land Tenure

caribou Mountains Wildland Provincial Park, provincial Crown land, two small fly-in fishing lodges owned by the Little Red River Cree First Nations. Trap lines are located throughout the area.

Richardson River Dunes Wildland Provincial Park, provincial Crown land, trap lines are located throughout the area.

Maybelle River Wildland Provincial Park, provincial Crown land, trap lines are located throughout the area.

Marguerite River Wildland Provincial Park, provincial Crown land, trap lines are located throughout the area.

La Butte Creek Wildland Provincial Park, provincial Crown land, trap lines are located throughout the area.

Colin-Cornwall Lakes Wildland Provincial Park, provincial Crown land, trap lines are located throughout the area.

Fiddler-Grey Willow Wildland Provincial Park, provincial Crown land, trap lines are located throughout the area.

Birch Mountains Wildland Provincial Park, provincial Crown land, trap lines are located throughout the area. Two small fly-in fishing lodges. Small areas with petroleum and natural gas leases.

Athabasca Dunes Ecological Reserve, provincial Crown land.

Egg Island Ecological Reserve, provincial Crown land.

Conservation Value

No specific information provided

Conservation and Management Constraints

No specific information provided

Staff

There are no on-site staff associated with any of the sites.

3. Potential Threats

The sites are remote and there are few threats at this time. As road access north from Fort McMurray is developed, uncontrolled recreation use will become a management issue for the southern sites. Hunting, fishing and trapping are permitted activities in the Wildland Provincial Parks.

4. Local Populations Living on the Site

Local Human Population

There are no local human populations living in any of the sites. With the exception of the two Ecological Reserves the sites are covered by trap lines. A number of these are held by First Nation peoples who may spend extended periods of time in the sites.

5. Tourism Potential

Visitors and Visitor Facilities

There are small fly-in fishing lodges in caribou Mountains Wildland Provincial Park and Birch Mountains Wildland Provincial Park. There are no other visitor facilities at this time. The cluster of sites has very good potential for nature-oriented eco tourism in the future.

There are two small First Nations Reserves within Cornwall-Colin Lakes Wildland Provincial Park, sometimes used as fly-in fishing camps. There is also an Indian Reserve on the lakes at the eastern end of Birch Mountains Wildland Provincial Park. It is expected that these reserves will be used for future tourism developments.

6. Scientific Research Potential

The sites have excellent scientific research potential, and collectively (along with Wood Buffalo National Park) represent much of the environmental diversity of the boreal forest in this part of the world.

Scientific Research and Facilities

There are no research facilities at this time. Preliminary biophysical inventories in the summers of 2000, 2001 and 2002 have documented numerous rare plants and range extensions for plants, birds and insects.

7. Gaps Filled in the Canadian Boreal World Heritage System

The Wood Buffalo cluster of sites complements the World Heritage Site status of Wood Buffalo National Park. All of the sites contain landscapes and features that are not well represented within Wood Buffalo National Park.

Labrador/Québec Cluster

Name of Cluster

Labrador/Québec Cluster

Area of cluster

1 863 833 ha

Country-Province

Canada - Province of Newfoundland and Labrador - Province of Québec

Proposed by

Parks and Natural Areas Division, Department of Tourism, Culture and Recreation, Newfoundland and Labrador, Canada.⁸

Protected Areas

1. Proposed Lac Joseph-Atikonak Wilderness Reserve
2. Redfir Lake Ecological Reserve (Established 1999)
3. Proposed Massif des lacs Belmont et Magpie*
4. Proposed Buttes du lac aux Sauterelles*

* Reserves d'aires protégées

Area

1. 1 650 000 ha
2. 8 233 ha
3. 157 500 ha
4. 48 100 ha

Altitude

1600-2700 feet

Geographic Location

Located in the southwest corner of Labrador, in the province of Newfoundland and Labrador (Figure 3, p.71). The study area is located in the Taiga Shield Ecozone of Canada and the Mid Sub-arctic Forest (Michikamau) Ecoregion of Newfoundland and Labrador. The nearest communities are Labrador City and Wabush to the northwest, and Churchill Falls to the north northeast.

⁸ This proposal has not been discussed with the Province of Québec and pertains only to the Proposed Lac Joseph- Atikonak Wilderness Reserve

1. Outstanding Features of the Site

Physical Features

The Lac Joseph – Atikonak region is dominated by acidic metamorphic quartzofeldspathic gneiss, anorthosite and gabbro. Overlaying this bedrock are deep till and glacial fluvial deposits. Evidence of Late Wisconsin glaciation, esker and drumlin ridges are characteristic landscapes of this region. Drumlins are typically separated from each other by pockets of wetlands. Flat to rolling upland plateaus are also unique to this Ecoregion.

Climate

The climate of the Lac Joseph – Atikonak region has been described as sub-arctic continental as it is not influenced by the Atlantic Ocean. Summers are cool and short here, with an average growing season of 100 to 120 days. Average July temperatures vary from 11 to 13 degrees Celsius. Winters are long and severe with average February temperatures between minus 17 and minus 22 degrees Celsius. The average snowfall is between 3.5 to 4.5 meters. Precipitation ranges between 900 to 1000 millimetres.

Vegetation

The Mid Sub-arctic Forest Ecoregion is dominated by typical boreal forest. Forested areas of black Spruce are predominantly found in wet areas, whereas open lichen woodlands consisting of caribou mosses (lichens) and black Spruce cover vast areas of the Ecoregion. Shrubs such as Labrador tea and Dwarf birch are also found in the open woodland forests. Where bogs intercept with the open woodland forest, black Spruce with an understory of *Sphagnum* moss can be found. At the northern extent of the Ecoregion, vegetation profiles more characteristic of well drained soils exist. white Spruce replaces black Spruce on dry sites in the northern regions. On protected slopes where drainage is higher, white Spruce and Balsam Fir thrive. Larch or Tamarack can also be located within the Lac Joseph – Atikonak region growing on wet sites. Trembling Aspen may also be located on drier sites. Jack Pine is a species that can be found in this Ecoregion that is not found elsewhere in the Province. Red Fir Lake – Kapatagas Channel Ecological Reserve protects several natural stands of Jack Pine. This reserve is located to the southwest of the proposed Lac Joseph – Atikonak Wilderness Reserve. String bogs and ribbed fens are the dominant peatland types occurring over large areas in this region. Grasses, sedges and rushes dominate the vegetation cover in wetlands. Pitcher Plants, Sundews and Bladderworts – plant species which rely on insect matter for nutrients – are scattered throughout these wetlands.

Fauna

Lac Joseph and George River caribou Herds

caribou of the Lac Joseph herd occupy the proposed Wilderness Reserve, and their distribution is one of the defining characteristics on which the boundaries were based. These woodland caribou, designated as “threatened” by COSEWIC, occupy barren areas of the region.

Figure 3. Map and pictures from Québec-Labrador Cluster

Historically, this herd consisted of approximately 5000 animals. However, due to a number of factors, the herd has decreased to 500-1000 animals and appears to have moved further south towards Lac Joseph – Atikonak Lake. The proposed Wilderness Reserve will assist the long term viability and recovery of the Lac Joseph caribou herd. In recent years approximately 250 (1994 estimate) individuals from the George River caribou herd have occupied regions within the proposed Lac Joseph – Atikonak reserve as their wintering grounds from October to May.

Other Mammals

Mammals found occupying forest and shrub habitats include porcupine, moose, mink, flying squirrel, red-backed vole, masked shrew, woodchuck, snowshoe hare, star-nosed mole, little brown bat, lynx, marten, red squirrel, heather vole, and woodland jumping mouse. Fishers occupy forested areas near water bodies. In wetland habitats northern bog lemming and meadow jumping mouse can be found. beaver, water shrew, muskrat, and river otter occur in aquatic realms. Those mammals known to occupy a variety of habitats include black bear, least weasel, red fox, short-tailed weasel and wolf. The variety of habitats found within the Lac Joseph region also offer pristine breeding and feeding areas for numerous bird species. The vast majority of bird species within the Lac Joseph region breed locally, but are not resident as they migrate south for the winter. Willow ptarmigan and ravens are residents in the Ecoregion. Characteristic bird species of forests include spruce grouse, osprey, merlin, great horned owl, three-toed woodpecker, black-backed woodpecker, gray jay, boreal chickadee, ruby-crowned kinglet, hermit thrush, and fox sparrow. In shrub and thicket habitats common breeders include tree sparrow, yellow-rumped warbler, Wilson's warbler, white-throated sparrow, and northern waterthrush. In wetland regions, nesting rusty blackbird and Lincoln sparrow can be observed in the summer months. Numerous shorebird species occupy wetlands of this region, including common snipe, greater yellowlegs, least sandpiper, red-necked phalarope and short-billed dowitcher. Waterfowl breeders include Canada goose, surf scoter, red-breasted merganser and common loon. Within this Ecoregion, several amphibian species have been recorded including the American toad, wood frog, blue-spotted salamander and the two-lined salamander.

Cultural Heritage

There is a long history of use by aboriginal groups and human habitation in this area. Due to time constraints, precise information could not be collected. More information could be made available upon request.

2. Management Status

IUCN Management Category

Wilderness Reserves fall under IUCN Category 1a and are established under the authority of the Wilderness and Ecological Reserves Act.

Date and History of Establishment

This area is proposed for Wilderness Reserve status. It was first identified as a candidate area in 1973. Since that time the study area has been refined and preliminary public consultations were held in the mid 1990's. In 1995 the area was identified on the Crown Lands Atlas and the area was proposed as new Crown Land. For a number of reasons the proposal was put on hold in the late 1990s. Parks and Natural Areas Division is currently pursuing Provisional Wilderness Reserve status.

Land Tenure

The land is currently Crown land, though there are land claims by Aboriginals groups.

Conservation Value

Lac Joseph-Atikonak is proposed as a Component 1 Reserve in the province's Natural Areas System Plan. Component 1 Reserves protect large wilderness areas that are defined using the critical habitat of high-level, wide ranging native species – for example, the Labrador woodland caribou. It will also fulfil the Natural Areas System Plan goal to protect a representative portion of the Mid-sub-arctic Forest Ecoregion (Component 2 Reserves).

The study area contains ground-moraine lakes studded with islands, black spruce forests rich with ground lichen and extensive wetlands. It is also home to the Lac Joseph caribou herd which is struggling to survive. This species is currently listed as "threatened" by the COSEWIC.

Conservation and Management Constraints

The Upper Churchill Hydro Project transmission lines cross through the study area, and a possible Lower Churchill Hydro Project could mean that a new transmission line would be created in the area. In addition, there are a number of cabins and outfitters within the study area. With cooperation between agencies and individuals, these developments could be managed to minimize their negative impacts.

Staff

Currently, Parks and Natural Areas Headquarters staff, including a Manager of Natural Areas, Biologist, Planner and GIS Specialist, are working to establish the wilderness reserve. If the reserve were established, a site manager and provincial enforcement staff would monitor the reserve.

3. Potential Threats

In the past, the forestry, mining and energy industries have expressed little interest in this area. However, a hydro development plan that would flood part of the area was recently proposed. That plan has since been rejected, and another project on the Lower Churchill River introduced. Although this Lower Churchill River project would not directly impact the reserve, the possibility exists of putting another power line through the Lac Joe study area.

4. Local Populations on Site

There are no communities within the study area. There are a number of cabins and the area is used by local Aboriginal groups.

5. Tourism Potential

Wilderness Reserves are established to preserve ecological interactions, species diversity and large areas of wilderness. They are also established to “provide for the continued existence of those areas as large wilderness areas to which people may come and in which they may hunt, fish, travel and otherwise experience and appreciate a natural environment” (Section 4 of Wilderness and Ecological Reserves Act). The pristine lakes, rivers and forests of the area make for an ideal location for a high quality wilderness recreation and associated adventure tourism opportunities.

Visitors and Facilities

Visitors are encouraged to visit and enjoy wilderness reserves, but generally recreational activities are limited to hiking, camping, boating and canoeing, snowmobiling, fishing and hunting (where appropriate) – i.e. low impact activities. The Wilderness and Ecological Reserves Act prohibits the development of any new structures within a reserve. Therefore visitors would have to avail of existing outfitters in the reserve or facilities located outside the reserve.

6. Scientific Research Potential

The area provides excellent opportunities to conduct baseline studies in both physical and biological sciences, and serves as a benchmark to compare with areas which have been impacted by human habitation and industrial development.

Research and Facilities

The Wilderness and Ecological Reserves Act prohibits the development of any new structures within a reserve. Therefore, researchers would also have to avail of existing structures in the reserve or facilities located outside the reserve. Generally, reserve management plans permit the construction of temporary blinds or shelters for the purpose of research.

7. Gaps Filled in the Canadian Boreal World Heritage System

Redfir Lake-Kapitagas Channel Ecological Reserve (IUCN 3) protects the only known natural stands of Jack Pine (*Pinus banksiana*) in the province (a Management Plan is available upon request).

Atikaki - woodland caribou Wilderness Area: Manitoba component

Name of Cluster:

Atikaki - woodland caribou Wilderness Area

Components of Cluster:

1. Atikaki Provincial Park in Manitoba
2. woodland caribou Provincial Park in Ontario
3. First Nations Adhesion: Poplar River, Pauingassi, Little Grand Rapids, Bloodvein and Pikangikum First Nations (with potential to include Lac Seul, Wabaseemoong and Grassy Narrows First Nations)

Area of Cluster:

~ 2,500,000 hectares (25,000 km²)

Country- Province:

Canada – Manitoba & Ontario

Proposed by

Management, Planning and Heritage Rivers, Manitoba Conservation, Canada

Name of Protected Area

1. Atikaki Provincial Park in Manitoba

Area of Park

398,100 hectares (3,981 km²)

Altitude

Average 310 to 350 metres

Geographical Location

Eastern boundary is Ontario - Manitoba border, western border roughly Lake Winnipeg. 51 30' 00" – 95 31' 00"

1. Outstanding Features of the Site

Physical Features

Atikaki is classified under Manitoba's *Provincial Park Act* as a Wilderness Park, and encompasses an outstanding diversity of central boreal upland landforms and plant and animal communities. It features four river corridors, including the Manitoba portion of the Bloodvein Canadian Heritage River. Together with the Bloodvein, the Pigeon, Leyond, and Gammon rivers drain the area and there are resulting expanses of wetlands underlain by organic soils. Significant natural heritage features identified for the Bloodvein River include cliffs, waterfalls and

cascading rapids. Evidence of faulting along the river and its marshes are considered nationally significant.

Climate and Vegetation

The park is florally diverse with representation from prairie and eastern deciduous forest species at the limits of their range. Located within a region of cold continental climate, Atikaki, however, may encompass the warmest and driest environment in Manitoba's boreal forest. Prairie plants grow here, including prairie spikemoss and prairie rush, species not normally found in shield terrain.

Fauna

The park is a core area for a segment of the woodland caribou population, providing both winter and summer habitat. COSEWIC lists the woodland caribou as threatened. In addition to woodland caribou, the park supports marten, lynx, black bear, moose, timber wolves, fisher, bald eagles, turkey vultures, great grey owls and a myriad of waterfowl.

The park also supports a number of noteworthy aquatic species. northern pike and Walleye form the mainstay of the recreational fishery. Lake trout occur in Aikens, Eakins and McMurray Lakes. The chestnut lamprey, whose only known occurrence in Canada is in Manitoba and Saskatchewan, has been reported in both the Bloodvein and Pigeon Rivers. It is listed as a species of "special concern" by COSEWIC, due to its narrow distribution in Canada, as well as its low abundance and sensitivity to habitat degradation.

Cultural Heritage

Atikaki is Saulteaux for "land of the caribou." Aboriginal peoples have been using the area for thousands of years, migrating seasonally between it and Lake Winnipeg. A number of sites of high archaeological significance are known, including the remains of an early commercial fishing operation and a site thought to be an early fur trade post.

Human heritage themes represented by the Bloodvein River also contain elements considered to be outstanding cultural heritage resources. As a secondary fur trade route, the Bloodvein facilitated trade between First Nations peoples and the Hudson's Bay Company. Intact rock cairns and outstanding representative prehistoric red ochre rock paintings or pictographs are found along the river course.

2. Management Status

IUCN Management Category

(Provincial Park) Natural World Heritage Site – Criteria ii, iii, iv

Figure 4. Map and pictures from Atikaki Provincial Park

Date and History of Establishment

In 1985 Atikaki was designated as Manitoba's first wilderness park under the authority of what is now the Provincial Parks Act.

Land Tenure

3,977.5 ha Government of Manitoba, 3.5 ha private land.

Conservation Value

Atikaki Provincial Park affords protection to a core area of the COSEWIC-listed woodland caribou population, providing both winter and summer habitat. The park also affords protection to the COSEWIC-listed chestnut lamprey, whose only known occurrence in Canada is in Manitoba and Saskatchewan.

Conservation Management

The administration and operation of Atikaki Provincial Park is the responsibility of the Government of Manitoba through the Department of Conservation (Manitoba Conservation). The Department utilizes its Eastern Region's Integrated Resource Management Team (IRMT), consisting of natural resource officers and fisheries, forestry, lands, parks and wildlife managers, to review and monitor land use activities.

The Atikaki Provincial Park and Bloodvein Canadian Heritage River Draft Management Plan is currently completing a second public review and is expected to be completed in 2003. The completed Management Plan will guide future management of the park.

In 2000, Manitoba began the East Side Lake Winnipeg Broad Area Planning Initiative. Atikaki Provincial Park comprises a portion of this planning area. The planning process acknowledges existing protected areas, and is intended to develop a vision for land and resource use in the area. First Nation communities, various stakeholder groups and governments are represented and actively participating. Land allocation decisions, including the pursuit of new protected areas, have been deferred to this process.

In 2002, Pikangikum First Nation from Ontario together with Poplar River, Paungassi, Bloodvein, and Little Grand Rapids First Nations in Manitoba, signed an Accord to manage and protect traditional territories through community-based planning and local First Nations stewardship. The Accord indicates that support and recognition of a network of linked protected areas will be sought in the form of UNESCO World Cultural Heritage and World Natural Heritage designations.

While the referenced Manitoba First Nations continue to actively work towards establishing protected areas, only the traditional lands of Poplar River First Nation have been recognized with some form of protection. The Poplar River/Nanowin Park Reserve, located north-west of Atikaki Provincial Park and within the planning area of the East Side Lake Winnipeg Broad Area Planning Initiative, is currently under a five-year designation to protect the land until boundaries can be finalized and final designation determined.

Constraints

As a relatively remote fly-in location, Atikaki Provincial Park does not have a high level or frequency of management activities.

Staff

Natural Resources Officers out of Manitoba Conservation's Eastern Region office patrol the park regularly. This generally corresponds to seasonal activities. Other members of the IRMT, staff from Parks and Natural Areas Branch and other Manitoba Conservation personnel fly into the park as required. Administrative facilities in the park include a fire tower, cabin and boathouse on Sasaginnigak Lake.

3. Potential Threats

Areas around the park are anticipated to develop further over time. Activities such as forest harvesting, a proposed all weather road up the east side of Lake Winnipeg, and proposed hydro corridors could lead to increased human encroachment.

4. Local Populations Living on the Site

Local Human Population

There are no permanent residences or communities in the park. Nearby communities include the town of Bissett and Bloodvein, Little Grand Rapids and Hollow Water Indian Reserves. These First Nations have Registered Trap Lines and traditional areas within the park, and continue to exercise treaty and aboriginal rights and practice traditional activities. These include but are not limited to hunting, fishing, trapping and gathering. Tent and trapper cabins associated with these activities provide temporary and seasonal accommodations.

Seasonal populations in the park include staff and visitors to fishing lodges and individuals involved in wild rice harvesting, trapping, canoeing and camping.

5. Tourism Potential

Visitors and Visitor Facilities

Atikaki Provincial Park is seen as having enormous potential for growth in adventure travel and ecotourism. An on-going wilderness/canoe survey is expected to confirm increased interest in this regard. Creation of the proposed inter-provincial park, with associated shared marketing and other such considerations, would likely further the potential for growth in ecotourism and adventure tourism.

Five existing hunting and fishing lodge operations and their associated outcamps are the only permanent visitor facilities. These lodges and outcamps bring in hundreds of visitors to the park each year. Limited and controlled expansion of these may be allowed on a case by case basis. New full service lodges will not be allowed. Designated camping facilities do not exist in the park. No-trace camping is encouraged.

6. Scientific Research Potential

Scientific Research and Facilities

Research potential is excellent, with Atikaki Provincial Park offering a large, pristine wilderness of diverse and impressive flora, fauna, waterways and cultural heritage.

On-going research is being conducted on Woodland caribou in the park. Research on Sturgeon has been conducted on the Bloodvein and Pigeon Rivers. Taiga Biological Station, located south of the park in the South Atikaki Park Reserve, is a research field station of the Department of Zoology, University of Manitoba, dedicated to the study of the ecology of the northern boreal forest. The station's study area extends north into the park, up to Aikens Lake.

7. Gaps Filled in the Canadian Boreal World Heritage System

While the existing three World Heritage Boreal Forest sites in Canada represent Arctic Cordillera, Boreal Plains, and Boreal Cordillera terrestrial ecozones, there is presently no representative site for the Boreal Shield terrestrial ecozone. Atikaki Provincial Park, as part of the proposed inter-provincial park, would contribute significantly to a large central Canadian transboundary protected area, and provide an outstanding example of a Canadian Boreal Shield.

Atikaki - woodland caribou Wilderness Area: Ontario Component

Name of Cluster:

Atikaki - woodland caribou Wilderness Area

Components of Cluster:

1. Atikaki Provincial Park in Manitoba
2. woodland caribou Provincial Park in Ontario
3. First Nations Adhesion: Poplar River, Pauingassi, Little Grand Rapids, Bloodvein and Pikangikum First Nations (with potential to include Lac Seul, Wabaseemoong and Grassy Narrows First Nations)

Area of Cluster:

~ 2,500,000 hectares (25,000 km²)

Country- Province:

Canada – Manitoba & Ontario

Proposed by

Ontario Ministry of Natural Resources

Name of Protected Area:

2. woodland caribou Provincial Park (4,500km²)

Altitude

Ranges from 309 m to 430 m

Geographical Location

30 km west of the community of Red Lake in North-western Ontario and extending approximately 100 km along the Manitoba/Ontario border 50° 35'-51° 30'N, 95° 30'-94° 25'W.

1. Outstanding Features of the Site

Physical Features

Located at the heart of Canada's Precambrian shield, WCPP is a large un-roaded wilderness area housing an extensive network of rivers, lakes and wetlands which ultimately spill into Lake Winnipeg and beyond to the arctic waters of Hudson's Bay. Dominant features include glacial striae (bedrock scars), thin till deposits, and strong evidence of glacial Lake Aggasiz, including lacustrine deposits of sand, silt and clay (which predominate the Bloodvein and Gammon river systems), wave-cut beach terraces and large tracts of bare bedrock cleared of debris by lake action. Also prominent is the extensive eagle-Finlayson moraine at Indian House Lake, a discontinuous double ridge of sand, gravel and boulders with extensive outwash sand deposits representing a major halt in the retreating of the Labradoran glaciers. Other areas of till, and numerous small kame, cross-valley moraine and ground

moraine deposits, survive in discrete localities throughout the park. On a macro scale, the park exhibits a glacially scoured landscape in which ice-moulded bedrock forms such as whalebacks, stoss-and-lee roche moutonne, and elliptically elongated hills are characteristic. Geologically, the park is composed mainly of early Precambrian granite and granitic gneisses, which form the foundation of the North American continent and are believed to be some of the oldest rocks on Earth. Some remnant volcanic rock is present and represents the western termination of the Red Lake Greenstone Belt, one of the most economically important mineral areas in Ontario. Dividing the park is a large fault zone known as the Wanipigow-Wallace Lakes Fault, a zone of intense shearing and rock deformation containing well-layered rock-forming minerals called mylonites.

Climate

WCPP has a continental boreal climate which is uniquely prairie-influenced, characterized by hot, dry summers and cold, clear winters. The park area itself is provincially unique in that it is influenced by three major continental air masses: the very cold arctic air mass situated over the ice cap regions, the cold polar air mass located over the Northwest Territories and the dry prairie air mass that originates to the south-west from the foothills of the Rockies. Temperatures range from daily means of -25°C (January) to 24°C (July). Winds are generally from the northwest, southwest and west; however, during the spring and early summer there is an increase in easterly winds. The park's average annual precipitation is the second lowest in Ontario at 60.9 cm, two-thirds of which falls from May to September. Due to the dry, prairie-influenced nature of the climate in WCPP, the incidence of naturally occurring forest fires is much greater here than in any other part of Ontario.

Vegetation

The vegetative landscape of WCPP has been strongly influenced by wildfire. Upland forests of fire-dependent Jack Pine therefore dominate the landscape alongside mixed upland forests, which also include black Spruce, Trembling Aspen and white Birch. Other typically boreal species are present to a lesser extent, and include white Spruce, Balsam Poplar, Alder and Willow. black Spruce and Tamarack characterize the wet, organic deposits found commonly throughout in bedrock depressions. WCPP also contains locally significant graminoid bog communities characterized by floating mats of sphagnum moss; open grassy meadows with scattered dwarf willows and ericaceous shrubs, as well as unusually large and representative examples of regionally significant wild rice marshes. In addition, unique climatic conditions in WCPP have produced a significant prairie vegetation influence. The Prairie Rush, for example, occurs in the park at the very east of its range along with other provincially rare species such as Prairie Spikemoss, Parsley Fern, and Floating Marsh-marigold. Red Pine is also located in the park at the northern extent of its range.

Figure 5. Map and pictures from woodland caribou Provincial Park

Fauna

WCPP contains critical summer and wintering habitat for the woodland caribou, a species-at-risk, classified as “threatened” by COSEWIC. Also present in the park is the Bald eagle, an endangered species in Ontario. Wolverine, a species of special concern in Canada, has also been spotted in the park and has been recommended for threatened status in Ontario. In addition to these species-at-risk, WCPP supports a full-range of boreal-associated mammal species such as fisher, marten, snowshoe hare, river otter, black bear, timber wolf, lynx, moose, and beaver. WCPP also supports a complex of bird species including (but not limited to) osprey, great blue heron, great gray owl, merlin, belted kingfisher, common nighthawk, 5 species of woodpecker, and a diverse array of waterfowl. Herpetiles are limited within the park but include the mink and wood frogs, the snapping and western painted turtles, and the red-sided garter snake. The park also boasts a highly productive freshwater fishery with a large number of lakes supporting healthy lake trout populations. Walleye and northern pike are ubiquitous and one muskellunge lake exists in the park.

Cultural Heritage

The cultural landscape and heritage resources of WCPP are both abundant and important, representing a major expression of the prehistoric, historic and contemporary aboriginal peoples of the boreal forest and Canadian Shield. The high density of undisturbed archaeological and cultural sites in the park confirms a high level of occupancy by aboriginal peoples who have continued to occupy the area for the last 6,000 years. Of particular significance are the numerous high-quality rock art (pictograph) sites, and the ecologically rich sites such as planted Manomin fields within the park. One of the country’s largest concentrations of pictographs, a series of connected sites at Artery Lake, may be of international importance. These sites are located along Ontario’s portion of the Bloodvein River. Part of the Canadian Heritage Rivers System, the Bloodvein River once served as a secondary fur trade route for the Hudson’s Bay Company. Remnants of the fur trade era still exist by way of an abandoned Hudson’s Bay Company Post at the Southeast tip of the park.

2. Management Status

IUCN Management Category

(Provincial Park) Natural World Heritage Site -Criteria ii, iii, iv

Date and History of Establishment

WCPP was established in 1983 as a wilderness park. In 1999 Ontario’s Living Legacy Land Use Strategy identified several proposed additions to WCPP; these include the Anchor, Peisk, Sydney and Douglas Lake park additions, the eagle-Snowshoe Conservation Reserve and the Pipestone-Macintosh Enhanced Management Area. The combined additions would add an extra 85,796 ha to WCPP to create a total of 537,355 ha of protected or semi-protected area. These additions would also set aside a larger array of locally, regionally and significant plant communities as well as several species not seen to occur in WCPP. Ontario Parks is

currently in the process of developing a management strategy for this area, collectively known as the “woodland caribou Signature Site”.

Land Tenure

Government of Ontario

Conservation Value

WCPP affords protection to a core population of the COSEWIC listed woodland caribou, a threatened species in Canada. It also provides habitat for several species-at-risk including the provincially endangered Bald eagle and the Wolverine. In addition, the unique climatic conditions surrounding the park result in a high and interesting floral diversity, including several locally, regionally and provincially significant plant species.

Conservation Management

The administration and operation of woodland caribou Provincial Park is the responsibility of Ontario Parks. Staff are located in Red Lake and report to the Zone Manager of Ontario Parks situated in Thunder Bay.

A Communications Plan for the woodland caribou Signature Site Strategy has received approval, and will soon begin a series of public consultations and stakeholder meetings which will eventually result in an approved Strategy. The completed Management Strategy will guide future management of the park and is expected to reach completion by May 2005.

Management Constraints

The major limitation to effective management of WCPP is lack of adequate funding, due in large part to its distance from major urban centres and the corresponding lack of visitation and received revenue. Heightened funding and staffing would greatly increase the park’s capacity to carry out enforcement activities, backcountry canoe route maintenance, data collection, and program development. A UNESCO designation would arguably generate more interest, and therefore funding for the park.

Staff

WCPP has a full-time park superintendent and one seasonal assistant superintendent (also a Deputy Conservation Officer). In addition, a park planner (contract), a seasonal park warden, a species-at-risk biologist (contract), a youth intern (contract) and three Summer Experience Students currently staff the park. woodland caribou Provincial Park is patrolled regularly during the summer by two-person crews performing various tasks. Enforcement flights are undertaken periodically by park staff and Red Lake District Conservation Officers.

3. Potential Threats

Commercial outpost lodges operating within the park may place increased pressure on the freshwater fishery and timber extraction and other resource developments happening adjacent to park boundaries may have a negative long-term effect on the viability of woodland caribou presently using the park. Future forest roads

adjacent to the park may open up unregulated access to the park in certain areas, and site degradation and heightened potential for wildlife disturbance may result from increased use of the park by wilderness canoe enthusiasts.

4. Local Populations Living on the Site

Local Human Population

There are no permanent residences or communities in the park. However, occupancy of the park by First Nations people has continued from the historic period to the present. First Nations people pursue hunting, fishing, trapping and gathering as well as constructing temporary (camping) and semi-permanent (cabins) dwellings. Other seasonal populations include staff and visitors to fishing lodges, and individuals involved in wild rice harvesting, trapping, canoeing and camping. Four First Nations have traditional territories and traplines in the park. These are the Wabaseemoong (pop 750), Grassy Narrows (pop. 700), Pikangikum (pop. 2,200) and Little Grand Rapids (pop 1,000). Discussions are currently underway with Lac Seul First Nation to better define their territory. All would consider themselves as members of the Ojibway (Anishinaabe) Nation. The population of Red Lake, the nearest municipality at approximately 30 km east of WCPP, is estimated at 4,500. The next largest centre is Ear Falls, population 1,050, located approximately 70 km South of Red Lake.

5. Tourism Potential

Visitors and Visitor Facilities

woodland caribou Provincial Park is seen as having enormous potential for growth in adventure travel and ecotourism. Currently an approximate 1,000 people visit WCPP each summer for wilderness canoeing. Presently there are 4 commercial fishing lodges and 13 outpost camps operating on a seasonal basis in WCPP. These facilities bring in hundreds of visitors to the park each year. Backcountry travel in woodland caribou is primitive as there are no washroom facilities, fire barrels or wood “furniture” at campsites in WCPP.

Currently WCPP is preparing a Recreational Inventory Report based in large part on recreational use surveys. This, along with the management planning process, should identify some key areas for improving existing tourism opportunities in the park. Expansion to the proposed inter-provincial park/wilderness area, with associated shared marketing and other such considerations, would further the potential for growth in controlled ecotourism and adventure tourism.

Ontario Parks is beginning the management planning process for woodland caribou Provincial Park. This process will include discussing new opportunities with First Nations that have traditional territories within the park.

6. Scientific Research Potential

Scientific Research and Facilities

Research potential in WCPP is unique, as the park essentially provides a control for studies of how the natural world functions over a landscape that has not experienced industrial forestry. Studies have been completed on woodland caribou by the Provincial Ministry of Natural Resources, and a study evaluating landscape-level planning for woodland caribou is currently underway. Exciting opportunities exist for research partnerships to emerge between First Nations and research scientists.

A Heritage Centre has been proposed for the town of Red Lake. Natural and cultural history research, from both a scientific and a First Nation perspective, could be exhibited in this facility.

7. Gaps Filled in the Canadian Boreal World Heritage System

While the existing three World Heritage Boreal Forest sites in Canada represent Arctic Cordillera, Boreal Plains, and Boreal Cordillera terrestrial ecozones, there is not presently a representative site for the Boreal Shield terrestrial ecozone. Like Atikaki Provincial Park in Manitoba, woodland caribou Provincial Park, as part of the proposed cluster, would contribute significantly to a large central Canadian transboundary protected area, and provide an outstanding example of a Canadian Boreal Shield terrestrial ecozone.

Atikaki - woodland caribou Wilderness Area: First Nations Component

Name of Cluster

Atikaki - woodland caribou Wilderness Area

Components of Cluster

1. Atikaki Provincial Park in Manitoba
2. woodland caribou Provincial Park in Ontario
3. First Nations Adhesion: Poplar River, Pauingassi, Little Grand Rapids, Bloodvein and Pikangikum First Nations (with potential to include Lac Seul, Wabaseemoong and Grassy Narrows First Nations)

Area of Cluster

~ 2,500,000 hectares (25,000 km²)

Country- Province

Canada – Manitoba & Ontario

Proposed by

3. First Nations Adhesion: Poplar River, Pauingassi, Little Grand Rapids, Bloodvein and Pikangikum First Nations (with potential to include Lac Seul, Wabaseemoong and Grassy Narrows First Nations)

First Nation Traditional Territories (Traplines)

Poplar River First Nation, Pauingassi First Nation, Little Grand Rapids First Nation, Bloodvein First Nation, Pikangikum First Nation

1. Outstanding Features of the Cluster

Physical Features:

Located at the heart of Canada's Precambrian Shield, the cluster encompasses an expansive, un-roaded central boreal highland mosaic. The range of biophysical features span from the extensive beaches on Lake Winnipeg (some more than 30 km in length) to the vast forests, muskeg wetlands and fens of the upper Throat River and Berens River areas (whitefeather Forest Planning Area). The scale of the proposed cluster offers the potential of a world-class protected area network in the sub-arctic headlands of the Hudson's Bay watershed. The cluster includes waters ranging from the large and strikingly clear lake Kitchi Washagemis (or, Cairns Lake) in the whitefeather Forest Planning Area, to the estuaries of the Poplar and Nanowin Rivers on Lake Winnipeg. Other dominant physical feature sites, including glacial striae (bedrock scars), thin till deposits, and strong evidence of glacial Lake Aggasiz, are also vital cultural markers of the Ojibway people who have lived in the cluster region since time immemorial. Additionally, sites such as the extensive eagle-Finlayson moraine at Indian House Lake in Ontario, contain the northern fluorescence of the great Manomin (wild rice) north-middle American 'breadbasket' established by the Ojibway people and maintained by them to the present time.

Climate:

(See WCPP/Atikaki submissions.)

Vegetation:

The vegetative landscape has been strongly influenced by wildfire. However, it also exhibits features of the remnant vegetation yards, corridors and mosaics established through Ojibway pyrotechnology. The upper Throat River region contains unique bog communities and fens that contain “mushkiigowuk minnissuk” – “Muskeg caribou calving islands (hills)”.

Fauna:

(See WCPP/Atikaki submissions.)

Cultural Heritage:

The cluster constitutes a cultural landscape: a “geographical area that has been modified, influenced, or given special cultural meaning by people” (Parks Canada). The indigenous peoples (as defined by the United Nations) possess expansive heritage resources within the cluster, representing prehistoric, historic and contemporary aspects of aboriginal peoples of the boreal forest and Canadian Shield. The high density of undisturbed archaeological and cultural sites confirms a high level of occupancy by Aboriginal peoples who inhabited the area for the last 6,000 years. Of particular significance are the numerous high-quality rock art (pictograph) sites and ecologically rich sites such as planted Manomin fields throughout the cluster. They complement the other heritage resources found within the cluster landscape. The Bloodvein, Berens and Poplar Rivers served as important fur trade routes for the Hudson’s Bay Company. Remnant trading post sites still exist throughout the cluster.

2. Management Status

Conservation Value:

The scale of the proposed cluster offers the potential of a world-class protected area network, constituting a full ecosystem perspective (e.g. protecting sturgeon on the basis of a whole watershed basis and protecting woodland caribou through a world class protected forest corridor).

Conservation Management:

The First Nations are either in the planning process or initiating planning processes for their areas within the cluster. Partnership-based planning models are being developed for protected areas by Canadian First Nations. (See WCPP/Atikaki text submissions for status on protected areas.)

Figure 6. Map of the First Nations Accord

Management Constraints/Opportunities:

The cluster will provide new models of planning, management and partnership approaches for protected areas in association with Canadian First Nations. This will fill the current gap in cross-cultural partnerships in the region.

3. Potential Threats

Consumptive tourism (e.g. sport fishing) will have to be carefully managed within the protected areas of the cluster developed pursuant to the Accord process. Robust partnerships will have to be developed to manage the non-consumptive tourism activities that will be available within the cluster.

4. Local Populations Living in the Cluster

Local Human Population:

Occupancy throughout the cluster mosaic by First Nations' peoples has continued from the historic period to the present. First Nations' peoples pursue hunting, fishing, trapping and gathering as well as constructing temporary (camping) and semi-permanent (cabins) dwellings. The five First Nations within the cluster mosaic have a combined population in excess of 5,000. All consider themselves as members of the Ojibway (Anishinaabe) Nation.

5. Tourism Potential

New Tourism Trends:

With its scale and its natural and cultural features, the proposed cluster has the potential to offer world-class northern tourism experiences. Tourism is the largest industry in the world, and eco-tourism is its fastest growing sector. Within eco-tourism, indigenous cultural tourism is especially popular – the First Nations have a rich cultural heritage that uniquely positions them to interpret the cluster from a cultural heritage and Indigenous Knowledge perspective.

6. Scientific Research Potential

Scientific Research:

Opportunity exists for innovative research partnerships to emerge between the knowledge tradition of the First Nations, that of the larger Canadian society, and of the international community. This context could yield research in areas ranging from new models for protected areas management, to climate change, to the relationships between cultural diversity and biological diversity.

7. Gaps Filled in the Canadian World Heritage System

This cluster will fulfil gaps in the ecological representation for the Canadian World Heritage System. Furthermore, the cluster will also provide new models of planning,

management and partnership for Canadian First Nations protected areas. (See also Atikaki and woodland caribou submissions.)

8. Current Status of Development of The First Nations Adhesion Portion of the Cluster

Pikangikum is currently undertaking community-based Land Use Planning. This is an innovative planning partnership between the whitefeather Forest Management Corporation of Pikangikum, and the Province of Ontario. The planning process was developed and is being led by Pikangikum. It utilizes Indigenous Knowledge and ecological gap analysis to identify protected area candidate zones within the whitefeather Forest Planning Area. Pikangikum and Ontario are working together, using consensus-based decision-making to harmonize Community-Based Land Use Planning. Broader-scale planning issues and provincial responsibilities with respect to protected areas development are also being addressed. Areas identified through the Pikangikum planning process will be part of the Accord process used by the First Nation to pursue its World Heritage designation goals. Protected areas developed within the whitefeather Forest Planning Area will become part of the cluster's protected areas network.

Poplar River has achieved interim protected areas designation for the Poplar/Nanowin River Park Reserve. Poplar River is carrying out additional Community-Based Land Use Planning activities in its area (traplines), including the protected area. Pauingassi and Little Grand Rapids First Nations have indicated intentions to seek protection for their trapline territories in North-western Ontario, which run along the western edge of the whitefeather Forest Planning Area. They have carried out Community-Based Land Use Planning projects for the respective planning areas, and are developing new initiatives to facilitate their protected areas objectives. Bloodvein First Nation has carried out planning projects and will be pursuing further planning initiatives to advance its protected areas goals. Poplar River, Pauingassi, Little Grand and Bloodvein First Nations are using the Accord process to pursue their World Heritage designation goals.

Ontario Parks and Manitoba Conservation (Parks and Natural Areas) will continue to work closely with Accord "member" First Nations as traditional trapline territories within Atikaki and woodland caribou Provincial Parks are incorporated into the proposed network of linked protected areas.

Natashquan River Valley

Name of Cluster

Does not apply

Country - Province

Canada- Québec

Proposed by

Ministere de l'Environnement du Québec and Societé de la faune et des parcs du Québec

Name of Protected Areas

Natashquan River Valley

Area

4089 km² (408 900 hectares)

Altitude

The altitude varies between 140 m and 620 m

Geographical Location

The Natashquan River Valley is situated in the *natural province* of Québec's Lower North Shore and in the *natural region* of the Petite Mécatina plateau, as designated by Québec's ecological reference framework (Li et Ducruc, 1999). It is part of the Boreal Shield ecozone (Wiken, 1996). Located between 61.5° and 62° longitude west, the Natashquan River Valley is about 70 km north of Natashquan Village and extends to the Labrador border (Tracé de 1927 du Conseil privé). A single road leads to the village, and can otherwise be reached by aircraft or boat. The site proposed for protection covers a large part of the river's watershed. It is adjacent to the Labrador border, and includes the valley's headwater, making this site a significant candidate for transboundary protection.

1. Outstanding Features of the Site

Physical Features

The rock base is composed of felsic rock in the northern part of the region and of clastic rock in the south. A landscape comprises rolling hills covered with moraine deposits. The valley is bordered by sand and gravel terrasses where colluvial deposits are abundant, due to the steep slopes of the Natashquan River Valley.

On the Lower North Shore plain, the Natashquan River is a long and magnificent. The site covers a large part of the watershed, thus protecting many types of water courses found in the *natural province*. For the most part, its lakes are small, with the exception of two larger lakes which extend over more than 3,000 ha.

Climate

The north of the area experiences a cold, sub-polar and sub-humid climate and short growing season; the southern part is milder.

Average annual temperature for entire area: – 1.5 °C

Summer average : 11.2 °C

Winter average : - 15.0 °C

Annual precipitation : 1098 mm

Growing season : 139 days

Vegetation

The primary old-growth forest is composed predominantly of black Spruce and Fir (63%). Dry moorlands (19%) are confined to rocky areas with dry soil conditions. Other landscape features include peat bogs and white Birch or Poplar forests. There is little evidence of recent forest fires (2%).

Fauna

Of the region's aquatic fauna, as the region's symbol, salmon is of crucial importance. moose, black bear, marten, and woodland caribou are the most important mammals.

Cultural Heritage

Does not apply.

2. Management Status

IUCN Management Category

Designated a '*salmon river*', the Natashquan River is an IUCN category VI protected area. This designation applies only to a forested band of 60m wide on each side of the river, with the expectation that the rest of the area will be set aside for the purpose of eventual protection.

Date and History Of Establishment

The protection of the 60m. band was applied at the time of enactment of the *Loi sur les forêts et les normes d'interventions en milieu forestier (Law on Forests and intervention norms in the forested environment)*, which entered into force in 1987. An area of 4089 km² was reserved for protection on 29 May 2002.

Land Tenure

The land is in the public domain of the Province of Québec.

Conservation Value

With its vast sandy plains (Figure 7. photo 1, p.99), numerous deep river sections punctuated with magnificent waterfalls (Figure 7. photo 2, p.101), and its wetlands and peat bogs (Figure 7. photo 3, p.101), the Natashquan River Valley is an example of the kind of river that occupies the extraordinary Lower North Shore.

Figure 7. Map and pictures of Natashquan River Valley

Clothed in a vast virgin forest of black spruce, this is a landscape in which nature's dynamic processes take place virtually untouched by human activity.

Conservation Management Constraints

An overall management plan needs to be developed and put into action. One of the key elements of the future protected area's management will be the inclusion of provisions for traditional uses by First Nations.

Staff

None, at the present time.

3. Potential Threats

At present, a government decree that sets aside this area for future protected status ensures the region is safeguarded. The potential risks to it are associated only with natural disturbances such as forest fires and insect infestations, primarily from the Eastern Hemlock Looper.

4. Local Populations Living on the Site

Local Human Population

The land occupied by the Natashquan village community is not part of the protected area. The Montagnais community (Innus) of some 800 people, that live at the River's mouth, use the territory for fishing, hunting, and trapping.

5. Tourism Potential

The site is accessed via the road leading to the village of Natashquan. The river itself holds enormous potential for ecotourism (kayaking, rafting, canoeing) due to its fast-flowing waters, complemented by the splendour of the natural landscape that surrounds it. Trekking and wildlife observation have great potential in this future protected area.

Visitors and Visitor Facilities

None, at the present.

6. Scientific Research Potential

As this ecosystem is still entirely natural, the potential for scientific research on the boreal region's rich virgin forest, the study of the processes that maintain natural forest dynamics, and fundamental research on biodiversity is high. The region has an extraordinary potential for the study of Atlantic salmon and the limnology of the boreal region.

Scientific Research and Facilities

None, for the present.

7. Gaps Filled in the Canadian World Heritage System

This site has been set aside as a unique example of North America's Great Rivers of the North and the Lower North Shores. No other river of the eastern boreal black spruce forest has yet attained protected status. This site is one of few protected areas serving the function of maintaining a river's ecological integrity.

Literature Cited

Li, T. et J.-P. Ducruc. 1999. Les provinces naturelles. Niveau I du cadre écologique de référence du Québec. Ministère de l'Environnement du Québec, 90 p.

Wiken, E. 1996. Ecosystems : frameworks for thought. World Conservation. Volume 27, no 1. IUCN, Gland, Switzerland.

Map 2. Protected Areas on Intact Boreal Forests in Alaska

Alaska (United States)

Clusters from database search:

The Conservation Biology Institute, as a member of Global Forest Watch, offers two potential boreal zone World Heritage Sites for the State of Alaska (see Figure 1, p.49). The aforementioned forest intactness analysis found that both sites contain multiple existing protected areas, as well as large areas of unprotected intact forest landscapes. The sites are also centred on the major waterways situated within the boreal zone of Alaska. Site I lies along the border of the Alaska and the Yukon Territory of Canada and Site II lies at the heart of the Alaskan boreal region (Map 4, p.105) . Provided below are short descriptions and rationale for each site.

SITE I. ARCTIC - YUKON - CHARLEY

Site I, which lies just northeast of Fairbanks, Alaska contains three existing protected areas surrounded by large expanses of intact forest landscapes. The region encompasses the upper reaches of the Yukon River and all of the Porcupine and Charley Rivers. This area is most threatened by increased oil exploration, development and logging throughout the unprotected areas, especially where human infrastructure is already in place. The protected area anchors are summarized below.

The forested portion of the **Arctic National Wildlife Refuge** makes up one major component of this potential World Heritage Site. According to the U.S. Fish and Wildlife Service, the refuge is among the most complete, pristine, and undisturbed ecosystems on earth. Dominated by the rugged and majestic Brooks Range, the Arctic Refuge contains an impressive variety of wildlife including many wilderness-dependent species. It is most recognized for its tundra, though large expanses of boreal forest make up the southern third of the Refuge. Ecological and evolutionary processes are still fully functional in the Refuge – an increasingly rare attribute for Earth's natural ecosystems.

Yukon Flats National Wildlife Refuge is the site of millions of migrating birds that come from four different continents to raise their young. The Refuge contains one of the highest nesting densities of waterfowl in North America, and contributes more than two million ducks and geese to the migratory flyways of North America. Mammal populations are abundant and include moose, caribou, wolves, black and grizzly bears. McNab and Avers (1994) identified this region as the most productive Arctic wildlife habitat in North America. salmon from the Bering Sea ascend the Yukon River to spawn in the freshwater streams throughout the region and into Canada. Runs of King, Coho, and Chum salmon pass through and spawn in the region each summer, forming the longest salmon run in the U.S.

The **Yukon-Charley Rivers National Preserve** is located on the US-Canadian border and comprises approximately 400,000 ha of boreal forest wilderness. The preserve contains the highest nesting density of Peregrine Falcons in North America. The region also contains populations of wilderness-dependent mammal species such as wolves, moose, caribou, and grizzly bears. Numerous forest neotropical migrant songbirds spend their summers in the area before flying south

to winter in South America. The preserve is also rich in geologic history spanning 800 million years and exhibiting an extensive fossil record.

SITE II. KOYUKUK - INNOKO - NOWITNA - DENALI

The second site is also focused on major rivers in the Alaskan boreal zone. It is located west of Fairbanks, Alaska. The region consists of four existing protected areas, as well as large, intact boreal forest landscapes with considerable conservation values as described below.

The **Koyukuk National Wildlife Refuge** encompasses nearly 1.6 million ha and is centered on the floodplain of the Koyukuk River, north of its confluence with the Yukon River in west-central Alaska. This extensive floodplain lies within a forested solar basin that is surrounded by hills and low rolling mountains. Lowland boreal forests of Spruce, Birch and Aspen are abundant. Extensive wetlands occur along the Koyukuk River supporting over 200,000 ducks, geese, swans, and cranes. The moose population exceeds 11,000 due to the excellent habitat that exists along the numerous floodplains and river corridors. In addition, caribou from two herds, Western Arctic and the Galena Mountain, winter on the Refuge. Other mammals such as wolves, black bears, and grizzly bears are common. Chinook and Chum salmon populations are strong. The Refuge also contains unusual geological features, most notably the Nogahabara Sand Dunes, one of two sand dune fields in Alaska formed more than 10,000 years ago.

The **Nowitna National Wildlife Refuge** lies within another solar basin encircled by rolling hills capped by alpine tundra. The Nowitna River, a nationally designated Wild River, bisects the refuge and forms a broad meandering floodplain. The Refuge contains important wetland habitat that supports numerous waterfowl and fish populations including King and Chum salmon, northern pike, one of only three resident Sheefish populations in Alaska, and Arctic grayling. The forested lowlands contain mature white Spruce that provides valuable habitat for marten, moose, wolves, lynx, Wolverine, black and grizzly bear range throughout the Refuge.

The **Innoko National Wildlife Refuge** is located in the central Yukon River Valley. The refuge comprises most of the Innoko River basin and approximately 2-million ha. About 80 percent of the refuge constitutes wetlands, which provide nesting habitat for at least 250,000 waterfowl. The Refuge also provides important habitat for wolves, moose, black bears, wintering caribou, and numerous furbearers. The region is particularly famous for beaver abundance.

Denali National Park features North America's highest mountain: 6,194-meter-tall Mount McKinley. Denali's more than 2.5 million ha encompasses a complete sub-arctic eco-system, with large mammals such as grizzly bears, wolves, dall sheep, and moose. The northern extent of the park at lower elevations contains important boreal forest habitat. The Park was designated an international biosphere reserve in 1976.

Figure 8. Pictures from Alaska

Chapter 2: Russia

Clusters and sites from expert consultation (priority sites):

1. Panayarvi National park (Republic of Karelia)
2. Basegi Nature Reserve (Perm province), or Vishersky Nature Reserve as an extension of "Virgin Forests of Komi"
3. Malaya Sosiva Nature Reserve and Verkhne-Kondinsky Wildlife Refuge (Khanty-Mansi Autonomous Area)
4. Putoransky Nature Reserve (Taimyr Autonomous Area)
5. Tungusky Nature Reserve (Krasnoyarsk Province)
6. Verkhnebikinsky Wildlife Refuge and Traditional Landuse Area in the middle stream of river Bikin (Primorsky Province)
7. Magadansky Nature Reserve (Magadan Province)
8. Kurilsky Nature Reserve and Malye Kurily Federal Wildlife Refuge (Sakhalin Province)

Special mentions:

1. Valdaisky NP and Centralno-Lesnoi (Central Forest) Biosphere Nature Reserve (Novgorod and Tver1 provinces)
2. Pinezhsky Nature Reserve (Arkhangelsk Province)
3. Tsentralnosibirsky (Central Siberian) Biosphere Nature Reserve (Krasnoyarsk Province)
4. Sayano-Shushensky Biosphere Nature Reserve and Shushensky Bor NP (Krasnoyarsk Province)

Russia

Clusters and sites from expert consultation (priority and special mentions):

(From West to East)

1. Panayarvi National park (Republic of Karelia)
2. Valdaisky NP and Centralno-Lesnoi (Central Forest) Biosphere Nature Reserve (Novgorod and Tver1 provinces)
3. Pinezhsky Nature Reserve (Arkhangelsk Province)
4. Basegi Nature Reserve (Perm province), or Vishersky Nature Reserve as an extension of "Virgin Forests of Komi"
5. Malaya Sosiva Nature Reserve and Verkhne-Kondinsky Wildlife Refuge (Khanty-Mansi Autonomous Area)
6. Tsentralnosibirsky (Central Siberian) Biosphere Nature Reserve (Krasnoyarsk Province)
7. Sayano-Shushensky Biosphere Nature Reserve and Shushensky Bor NP (Krasnoyarsk Province)
8. Putoransky Nature Reserve (Taimyr Autonomous Area)
9. Tungusky Nature Reserve (Krasnoyarsk Province)
10. Verkhnebikinsky Wildlife Refuge and Traditional Landuse Area in the middle stream of river Bikin (Primorsky Province)
11. Magadansky Nature Reserve (Magadan Province)
12. Kurilsky Nature Reserve and Malye Kurily Federal Wildlife Refuge (Sakhalin Province)

Map 3. Protected Areas on Intact Boreal Forests in Russia

«Paanajarvi-Oulanka» International Russian-Finnish Site

Name of Cluster

«Paanajarvi-Oulanka» international Russian-Finnish site

Country – Province

Russian Federation – Republic of Karelia

Name of Protected Areas

Paanajarvi National Park

Area

103,404 ha

Altitude

Ranges from 130 to 210 m

Geographical Location

The Paanajarvi National park is located near the North polar circle on the northwest of the Republic of Karelia. Geographical coordinates: 66°09' - 66°27' N, 29°40' - 30°40' E.

1. Outstanding Features of the Site

Physical Features

The park features 15 large geological sites and 54 separate monuments of scientific value. To geological sites of world importance include the laminated intrusion of Kivaka and Tsypringa (Pyajnur mountain), Nuorunen granite, Paanajarvi expansion with Ruskeakallio rock, sections of Paanajarvi-Kandalaksha deep-seated fault and an ancient system of water-glacier deltas of Olanga-Tsypringa. Unique sites of scientific and conservation value are local palaeo-seismic dislocations, low-mountain massifs, the Raaktundra cusp (structural-denudation relief type), glacial forms in the northern part of the park (hillocky and ribbed moraines) and to the south of Paanajarvi lake (drumlins), and also the fluvio-glacial eskers and deltas system between lakes Paanajarvi and Tsypringa.

Climate

Climate is moderately cold, transitional from marine to continental. Throughout the year, North Atlantic air masses cause active cyclonic activity. The average annual temperature is near 0 degrees Celsius, and precipitation is 500-520 mm. The warmest month is July (+15 °C), the coldest are January-February (-13 °C). Average snow cover height is 70-80 cm, but often can be over 1 m. In winter, air masses descend into the lake valley, and during harsh frosts temperature amplitude can reach 20 °C. Taking into consideration extreme temperatures of the

Paanajarvi-Olanga basin, the area of the park can be regarded as the most continental area of Fennoscandia.

Vegetation

The park's vegetation most distinctive. It is characterized by three major factors: low-mountain relief; carbonate rocks (dolomites) favourable for calciphilous species; and large undisturbed natural communities. The diversity of plant species is much richer than on adjacent plains. In total, about 570 vascular plants species (some 95% of Karelian northern taiga), including 108 rare species (67 species are listed in the Red Data Book of Karelia, 12 – in the Red Data Book of Russia), 283 moss and 450 lichen species have been identified. Many plant species are found at the margin of their range.

The flora of mosses and lichens in the park are particularly unique. The park is the only habitat of *Diphyscium foliosum*.

The predominate vegetation cover is forest. Unique types are Crowberry-lichen forests (*Empetrum nigrum* – *Cladina* spp., *Cetraria* spp.) and thin Birch forests also exist.

Fauna

The national park is home to 217 vertebrate species: 36 mammal species, 160 bird species, 3 amphibian and reptile species, 17 fish and 1 specie of the Cyclostomata order. The study of Paanajarvi terrestrial vertebrates enables the identification of special zoogeographical regions of the Karelian north taiga, referred to as Karelian Laplandia. The Paanajarvi region is the southern boundary of the Fennoscandian mountain-taiga circumpolar complex. Large predators – brown bear and wolf – and also wild reindeer are typical species in Paanajarvi. Paanajarvi is proud of its sustainable populations of large birds: common crane, whooper swan, bean goose (*Anser fabalis*), black-throated diver, golden eagle, white-tailed eagle, osprey, capercailie (*Tetrao urogallus*), among others. The Olang Sea trout population is thought to be the last pure population with undamaged age-sexual structure in Karellia and Finland.

Cultural Heritage

The region has a long history of human habitation – the Pjaozero shores were inhabited from early the Mesolithic stage (IV – early V thousand years B.C.). Archaeological site Kollat'-3 is one of the largest Mesolithic monuments in northern Karelia. Settlements from the Neolith, Eneolith, Early Iron, and Middle ages were also found here. The most valuable and interesting discovery is the large Laplander shrine on the top of Kivakka mountain, consisting of many stone structures (called "seids"). In all of Fennoscandia, there are only four comparable shrines of Lapp people.

2. Management Status

IUCN Management Category

IUCN Category II.

(WHS Criteria: Ni, Nii, Niii, Niv)

Date and History of Establishment

The Paanajarvi National park was established in 1992 by the Decree of the Government of Russian Federation. Its western border coincides with the Russian-Finnish state border. From the Finnish side, the Paanajarvi is adjoined by Oulanka National park.

Land Tenure

The Government of The Russian Federation.

Conservation Value

Paanajarvi and Oulanka National parks protect typical geological features and natural communities of Fennoscandia, undisturbed by the human activity, for environmental, recreational, educational and scientific purposes.

Conservation Management and Management Constraints

The following functional zones are singled out within the park's area:

1. Special regime zone (7% of the total area);
2. Strictly protected zone (18%);
3. Educational tourism zone (5%);
4. Regulated recreational use zone (69%);
5. Visitor services zone (1%).

The special regime zone provides due conditions for protection of the Russian Federation state border. In the strictly protected zone, any human activity is strictly forbidden, only research and monitoring are permitted. This zone includes representative sites of all park ecosystems, and all major types of wildlife habitats. Some of the areas within the buffer zone are strongly recommended to be included in the park's area.

Natural communities of the National Park have long been protected due to the status of the frontier zone, and remain in a well-preserved state.

Staff

The staff of the national park includes 35 people:

- Administration – 3
- Enforcement department – 12
- Environmental education department – 6

- Science department – 4
- Technical department – 10

3. Potential Threats

No significant economic activity is being carried out within National Park. The park area does not include settlement. Even protection outposts are mostly located in the buffer zone. Industry has no direct influence on the state of park's ecosystems.

4. Local Populations Living on the Site

Local Human Population

There is no permanent human population within the area of Paanajarvi National Park.

5. Tourism Potential

Visitors and Visitor Facilities

At present about 200 people visit the National park annually. The park has five tourist routes (water and hiking). Tourists can stay in one of the four forest huts (each for ten people), or put up tents. Sport fishing is permitted outside the strictly protected zone.

6. Scientific Research Potential

Scientific Research and Facilities

Aquafauna inventory, monitoring and research are regularly carried out by the Institute of Biology of Karelian Scientific Center of the Russian Academy of Sciences.

7. Gaps Filled in the Russian Boreal World Heritage System

The proposed area features typical natural ecosystems of Fennoscandia. At present, these are not represented in the system World Heritage Sites.

Valdai - the Great Watershed

Name of Cluster

Valdai – the Great Watershed

Area of Cluster

182 908 ha

Country – Province

Russian Federation – Novgorod and Tver Provinces

Name of Protected Areas

Valdaisky National Park

Central Forest Reserve

Area

Valdaisky National Park: 158 461 ha

Central Forest Reserve: 24 447 ha

Altitude

Valdaisky National Park: ranges from 63 to 296 mamsl

Central Forest Reserve: ranges from 220 to 280 mamsl

Geographical Location

Valdaisky National Park is located in the north of the Valdai Hills (the European part of Russia). Geographical coordinates: 57°25' - 58°21' N, 32°45' - 33°35' E

The Central Forest Reserve is located in the south-west of the Valdai Hills. Geographical coordinates: 56°26' - 56°39' N, 32°39' - 33°01' E.

1. Outstanding Features of the Site

Physical Features

The site includes two protected areas and is located in the Valdai Hills within the main Caspian Sea/Baltic Sea watershed. The largest rivers in the Russian (East European) Plain arise here, but belong to different sea basins. The Volga River flows into the Caspian Sea, the Dnieper River into the black Sea and the Western Dvina River into the Baltic Sea basins. The Valdai Hills stretch for over 350 km in a north-easterly direction, and have a width of about 160 km. The absolute height of the Hills range from 60m - 300 m.

The Great Watershed area is the least anthropogenic-transformed part of the Hills. It is, above all, strong evidence of the last European glacial period, also called the Valdai Glaciation. Here, all the typical postglacial forms of relief are evident. Human activity, insignificant by its scale and intensity, has not affected the state of communities, and the mosaic of landscapes has helped to preserve all typical forms

of post-glacial relief. Traces of glacial activity, such as eskers, sandy dunes on zandr fields, glacier lakes, boulder crowdings, carbonate moraines, stony riverbeds, lake and swamp basins with island ridges, hillocky relief and disappearing, active and appearing watercourses, are perfect illustrations of the Earth's history over the last 15 000 years. Several metres of silt sediment in the lakes and peat bogs have preserved information on the climate, flora and fauna of that period.

This area features many geological monuments recognized as classical examples of glacial relief forms (Lakes Valdaiskoye and Uzhin) and *karst* carbonate clumpy moraine (on the east bank of the Valdaika River).

Climate

The site is located in the moderate continental climate zone, with moderate-to-warm summers, and long moderately-cold winters. The average annual temperature is +3.2 degrees Celsius. while the annual average temperature of the coldest months (January and February) is –9/10 degrees Celsius. The average temperature of the warmest month (June) is +16/17°C. The annual amplitude of monthly average temperatures is 26.2°C. Annual precipitation is 828 mm, with minimum precipitation falling in February and March, and maximum precipitation in July and August. The climate in Valdai is characterized by high weather changeability.

Vegetation

Forests, providing favourable conditions for the functioning of complete terrestrial and aquatic ecosystems, underline the importance of the Great Watershed as a representative area for conservation of biodiversity in Eastern Europe.

- 1) The area of the National Park is situated on the boundary between the south taiga and conifer/broadleaf forests sub-zones. It is remarkable for its forest communities and landscapes. The area covered by forest is 133,000 ha, and the diversity of relief and sub-soils explains the high diversity of plant community mosaics. The list of vascular plants numbers more than 750 species and the diversity of mosses is no less than 126 species. *Isoetes setacea*, *Cladium mariscus*, *Cypripedium calceolus*, *Dacylorhiza baltica*, *Liparis loeselii* and *Orchis militaris*, all of which occur in the Park, are listed in the Red Data Book of Russia.
- 2) Boreal and nemoral (oak-forest) plant species dominate the Reserve's flora. There are 546 species of higher plants belonging to 87 families and 275 genera. Vegetation in the Reserve is typical for the south taiga sub-zone, and is considered the baseline of undisturbed ecosystems in the vast area of moraine topography in the central part of the Russian Plain.

Fauna

Being the most densely forested part of the Valdai Hills, the area of the Great Watershed serves as a corridor for seasonal migrations of ungulates. Valdai also features a large number and concentration of bird migration routes, along which birds rest and feed in the fields, meadows, marshes and wetlands and shelter in the forests and on the floodplains. Coniferous, broadleaf and mixed forests, with

frequent windfall patches and some recent clear-cut areas, are home to numerous animals and birds, including species rare in Europe. The pure waters of the Valdai streams, lakes and rivers host rare fish, invertebrates and plant species.

Valdaisky National Park: The Park is home to about 50 mammal species, no less than 180 bird species, five reptile species, seven amphibian species and about 45 fish species. Red Data Book of Russia species, such as white-tailed eagle, golden eagle (*Aquila chrysaetos*), Nesting black stork (*Ciconia nigra*) and osprey (*Pandion haliaetus*), are encountered here.

Central Forest Reserve: The Reserve serves as a habitat for 54 mammal species, 211 bird species, five reptile species, six amphibian species and 21 fish species. The charismatic and rare European mammals are the brown bear (*Ursus arctos*), lynx (*Felis lynx*), elk (*Alces alces*), European mink (*Mustela lutreola*), common otter (*Lutra lutra*) and beaver (*Castor fiber*). More than a half of the bird species (143) nest within the Reserve, while such species as capercaillie (*Tetrao urogallus*), hazel hen (*Tetrastes bonasia*), black grouse (*Lyrurus tetrrix*) and willow grouse (*Lagopus lagopus*) and a number of birds of prey and owls also live within the Reserve. Four bird species – the golden eagle (*Aquila chrysaetos*), black stork (*Ciconia nigra*), white-tailed eagle (*Haliaeetus albicilla*) and Peregrine (*Falco peregrinus*), are listed in the IUCN Red Data Book. One species, the lesser white-fronted goose (*Anser erythropus*), is listed in the Red Data Book of Europe, while 10 species feature in the Red Data Book of Russia.

Cultural Heritage

The Valdai “Great Watershed” site contributes the following cultural heritage attributes:

- It is a unique and rich area of cultural traditions. Here in the Valdai Hills, both old and relatively recent traditional crafts, such as wood-carving, pottery, willow-twigs weaving and bell-casting (Valdai bells are famous throughout Russia), are maintained. In addition, the collection of berries and walnuts and traditional fur hunting and fishing are common;
- It is an outstanding example of the concentration of ancient settlements during the founding stages of the Russian nation. Large numbers of burial-mounds, ancient villages and settlements of the Iron and Stone Ages are found throughout the area;
- It offers outstanding examples of typical Russian villages of the 18th Century (especially villages adjacent to Seliger Lake and the area surrounding the town of Toropets), and conserves traditional elements of wooden architecture (roofs, windows.);
- It features elements of 17th Century Russian architecture in churches, monasteries and houses;
- It has over 200 archaeological monuments, no less than 30 monuments of stone architecture and the unique multi-storied Ioanna Predtechi Church.

In addition, the Great Watershed in the Valdai Hills is a crossroads of three large civilisations. These include peoples from the forests of Europe (moving along the Zapadnaya Dvina River), peoples of the black and Mediterranean Seas (along the Dnieper River) and peoples of different regions of Eastern Europe and Asia (along the Volga River). Numerous and diverse archaeological findings within the proclaimed site confirm this fact.

2. Management Status

IUCN Management Category

Valdaisky National Park: IUCN Category II

Central Forest Reserve: IUCN Category I

(WHS Criteria: Ni, Nii, Niv, Cv)

Date and History of Establishment

Valdaisky National Park was created by the Decree of the Government of The Russian Federation in 1990. The Polomet' River Basin, which for hydrologists serves as a baseline system for small rivers, has been included in the World List of small rivers requiring special protection.

Central Forest Reserve was established by the Decree of the Government of The Russian Federation in 1930, covering an area of 31 900 ha. In 1951, the Reserve was closed down. It was re-opened in 1960, but over a smaller area of 24 447 ha. In 1985, the Reserve received the status of a UNESCO Biosphere Reserve.

Land Tenure

The Government of the Russian Federation.

Conservation Value

The proposed area is a unique part of the Great Watershed of the Russian Plain and includes the headwaters of three major rivers – Volga, Dnieper and Zapadnaya Dvina. Through this watershed, the cultures of the East and the West, the North and the South have been intermixing with one another. Despite settlement in the area since ancient times, the Valdai Hills contain pristine ecosystems and have a higher biodiversity than many other regions in Eastern Europe. The nominated site has the richest flora and fauna gene pool in the central part of Eastern Europe.

Conservation Management and Management Constraints

Valdaisky National Park: the territory is managed under a special hydro-conservation regime. The following functional zones are found in the Park:

- Special preservation regime zone;
- Regulated recreational and development regime zone of lake;
- Regulated recreational and development regime zone of near-lake territory;
- Visitor services zone.

The protection zone, which is 1.5-15 km wide and is adjacent to the Park, features natural, historical and cultural monuments which haven't been incorporated into the Park.

Central Forest Reserve: management of the Reserve is undertaken according to the *Regulations of the Central Forest State Nature Biosphere Reserve*, approved by the Ministry of Nature Resources of the Russian Federation in January 2001.

The Reserve has a strictly protected zone and a buffer zone, for which the new Regulations came into effect in 2000. Within the buffer zone, it is prohibited to use toxic chemicals for agricultural and forestry practices, or to carry out any natural resource use without prior approval of the Reserve's administration. All forms of logging are prohibited within a one-kilometre zone around the periphery of the Reserve.

Forest sites disturbed by forest cuttings, local fires and windfalls in the past are regenerating their initial structure without any human assistance. Typical South Taiga species, such as brown bear, lynx, mink, pine marten and capercaillie, have sustainable populations. At the same time, natural factors restrict the growth of elk and Wild Boar populations, which consequently remain small.

Staff

Valdaisky National Park – 186 people in total (data 2000):

- Law enforcement department, including department of forest, terrestrial and water fauna protection and use – 168;
- Science department – 8;
- Administration and technical department – 19.

Central Forest Reserve – 67 people (data 2000), including:

- Law enforcement department – 17;
- Science department – 16;
- Department of environmental education and tourism – 5;
- Administration – 8;
- Technical department – 21.

3. Potential Threats

Valdaisky National Park: The primary and significant source of pollution in the National Park is the Moscow-St. Petersburg highway which passes through the area. The highway has a high traffic density and is treated with salt-sandy defrosters.

The considerable topographical damage is linked to the decommissioning of a missile base within the framework of international demilitarisation initiatives. Sanitation and restoration of this area is funded by the Ministry of Defence.

The largest threat to natural communities within the National Park was the construction of the Moscow-St. Petersburg high-speed railway and the Novgorod State regional electric generating station (20 km away from the buffer zone on the side of prevailing north-western winds). Public campaigns and efforts by state environmental control institutions helped stop the realisation of these potentially harmful projects.

Central Forest Reserve: The Reserve is located on the watershed itself, making water pollution unlikely. The absence of industry near the Reserve, as well as the considerable forested area in adjacent territories, means that air pollution is minimal.

4. Local Populations Living on the Site

Local Human Population

Valdaisky National Park: 169 villages, with a permanent population of 38,000 people, are located within Valdaisky National Park. In addition, approximately 12,000 people live in its buffer zone. In the summer period, seasonal residents, tourists and holidaymakers increase significantly, adding to the permanent population of the area.

Central Forest Reserve: 153 people live within the Reserve. Nine villages, with a total population of no more than 150 people, are located within the buffer zone.

5. Tourism Potential

Visitors and Visitor Facilities

Valdaisky National Park: The National Park has capacity to accommodate over 600,000 people per year for recreational activity. In 2000, 40,537 people visiting the park. This is in sharp contrast to the 500,000 visitors the park received per year in the early-1980s. With improved standards park infrastructure, considerable growth of visitor flow is again expected.

The staff of the National Park has designed six summer excursion routes (bus-and-foot, water-and-foot, water) of 12, 40, 84, 150 and 320 km in length. Park visitors can choose among a holiday home, two hotels and 10 tourist hostels. In addition, visitors can spend a night in one of the numerous summer tented camps. There are 96 picnic sites and 54 camping sites within the Park.

Central Forest Reserve: In the Reserve, one can find an ecological training trail, a visitor centre, a nature museum and three ecological routes. Two additional ecological routes are being designed. The Reserve's infrastructure includes a guesthouse for nine people, a hotel for 12 people, a hostel for 15 people and a conference hall.

Tourists and guest visitors can also stay with the families of Reserve's employees. This increases visitor capacity by 15-20 people. In 2000, the number of organized visitors to the Reserve, including students doing field work, amounted to 696.

6. Scientific Research Potential

Scientific Research and Facilities

Valdaisky National Park: Since 1934, regular hydrological research has been carried out in Valdaisky National Park. This includes research on the modification of methods of field and forest watershed study, and on the hydrological cycle of lake and river ecosystems. Considerable input into the ecosystem study on the National Park area has been made by the Laboratory of Biogeography of the Institute of Geography of the Russian Academy of Sciences (RAS) and by the Severtsov Institute of Ecology and Evolution of the RAS during a 15-year period.

Central Forest Reserve: Regular environmental monitoring has been carried out in the Reserve since the 1930s. Forest survey and environmental monitoring data has been kept in the Reserve's archives, providing opportunities to trace changes since the late-1930s. One of the general monitoring reports is the annual *Nature Chronicles* volume.

Since 1967, the Reserve has carried out integrated ecosystem research. Studies on the primary and secondary productivity of ecosystems conducted within the Reserve have received wide scientific recognition. The results have been published in ten books and in more than 350 scientific papers. The Reserve takes part in numerous Russian and international scientific programs and projects.

7. Gaps in the Russian Boreal World Heritage System Filled

The site contains very well-preserved south taiga communities, which are of high importance as a biodiversity refuge on the Russian Plain. The cultural landscape of the Great Watershed witnessed the traditional way-of-life of old Russian villages. This is the first area in Russia nominated as a mixed natural and cultural site.

Pinezhsky State Nature Reserve

Name of Cluster:

Does not apply

Country - Province

Russian Federation – Arkhangelsk Province

Name of Protected Area

Pinezhsky State Nature Reserve

Area

51,500 ha

Altitude

Ranges from 500 to 994 m

Geographical Location

The Reserve is located in the north of the East European Plain, in midstream of the Pinega River, a tributary of the Severnaya Dvina. Geographical coordinates: 64°35' - 64°46'N, 42°57' - 43°25'E.

1. Outstanding Features of the Site

Physical Features

Within the area of the Reserve, three geomorphological regions have been identified – the flat bogged watershed plain, the elevated hillocky structural-denudation plateau with red marl and sandstone and the karst plain. The basin of the Pinega River is the northernmost region of surface karst within the East European plain. The karst phenomena is made possible by the close-to-surface perm gypsum, anhydride and marine salts deposited 180 million years ago as small lagoons and inlets dried up.

Karst forms a variety of striking surfaces. Deep and narrow sinkholes, huge rectangular blocks dissected by deep joints and giant karst pinnacles are found here. The karst pinnacles are particularly rare formations, found only in few places. The richest area with diverse karst formations is in the Eraskiny Lakes region with its very picturesque landscapes. Karst cave network density is one of the highest in the world, up to 500 per 1 000 km². Many caves are several kilometres in length. The diverse forms of underground galleries and halls, creeks and waterfalls, stalagmite “palings”, subsurface glaciers and karst lakes are of outstanding aesthetic value.

Very specific soils (“coarse humus, underdeveloped”) occur on soddy karst. It is one of few regions in the world where this soil type occurs.

Climate

The River Pinega midstream belongs to the Arctic-Atlantic climate region of the temperate zone. It is characterized by cold winters and cool summers. The frost-free period lasts 85-95 days. The average annual temperature is –0.2 degrees Celsius. The average temperature for July is +15.5 degrees Celsius, while for January it is –16.6 degrees Celsius. At full extremes, temperatures can range from +31.8 degrees Celsius, to absolute lows of –48.6 degrees Celsius. Annual average precipitation is 510 mm, evenly distributed throughout the year.

Vegetation

Over 480 higher vascular plant species and about 200 moss and lichen species have been identified within the Reserve. The flora features many relict arctic-alpine and south-taiga species. white Dryas, Alpine Bartsia, Arctous and Reticulate willow are arctic-alpine relicts, while Urals Peony, Siberian Spruce, Siberian Atragene, Siberian Lettuce, Siberian Fowl-grass and Small Can-dock are south taiga relicts. European Russia North-East endemics, such as northern Hemlock Parsley, Urals *Gypsophilla* and *Taliev* Thyme, are also found in the Reserve.

River Pinega midstream belongs to the East European province of the north taiga sub-zone. The most common vegetation type in the Reserve is forest, covering 91% of the area. Approximately 25% of this is intact forest. Spruce forests prevail (72,5%), while the other forest types are Pine forests (16%), Birch forests (7%) and Larch forests (4,6%). The distribution of forest types depends on the relief, underlying rocks and the mosaic of bogs.

Fauna

The fauna of Pinezhsky Reserve is very typical for the taiga. Within the Reserve, the ranges of Siberian and European species overlap. Siberian species, such as Siberian newt, Siberian jay, nutcracker, deaf cuckoo, northern red-backed vole, Siberian chipmunk and wood lemming live side-by-side with European species like wood-pigeon, cuvier, bank vole and common and tiny shrew. Some species occur on the margins of their habitat.

Typical mammal species are brown bear, elk, fox, lynx, wolf, glutton, blue hare, Wood lemming, beaver, weasel, ermine, pine marten and otter.

Avifauna is represented by 137 species, 97 of them nest in the Reserve. Traditional migration routs of nine species pass through the area. The osprey is listed in the Red Data Book of Russia.

The fish fauna consists of 11 species. Pike, common perch and roach are the common lake species. The rapidly-flowing Sotka River abounds with grayling, whitefish and salmon.

The rare butterflies, *Papilio machaon* and *Parnassius mnemosyne*, are listed in the Red Data Book of Russia.

Cultural Heritage

The cultural heritage of the site needs to be studied and described. The Pinega is a navigable river. Its valley is a traditional rural area with settlements of northern Russian *pomory* (coast-dwellers) people. Between the 16th and 19th Centuries, the Pinega served as a place for political exiles. The repressed favourite of Tsarina Sophia, Prince Vasily Golytsin, was buried here.

2. Management Status

IUCN Management Category

IUCN Category I

(WHS Criteria: Ni, Niii, Niv)

Date and History of Establishment

The Reserve was established in 1974 with the aim of protecting and studying the natural processes in the north taiga of the East European Plain, the unique karst formations and their influence on wildlife and inanimate nature, and of protecting and studying rare and endemic flora and fauna species.

Land Tenure

The Government of the Russian Federation.

Conservation Value

The area of the Reserve features a diversity of karst formations, unique on a world scale. The features have an outstanding geographical and aesthetic value. Rare under-developed coarse humus soils occur here. The ecosystems in the Reserve feature many relict, endemic and rare species.

Conservation Management and Management Constraints

Conservation management is undertaken according to the *Regulations of the State institution The State Nature Reserve Pinezhsky* approved by the Ministry of Natural Resources of the Russian Federation.

The major goals of Pinezhsky Reserve are the conservation of typical and unique natural communities with all their components (gene pool), the monitoring of biota and environmental education and public awareness in the region.

The buffer zone for the Reserve is two kilometres wide.

Before the establishment of the Reserve, part of the area had suffered from human impacts. Half of the mature Spruce and Pine forests had been cut down, but had regenerated naturally between 1960 and 1970. The rest of the forest remains undisturbed.

Staff

The staff of the Reserve amounts to 48 people:

- Administration – 8;
- Law enforcement department – 18;
- Science department – 15;
- Department of environmental education and tourism – 2;
- Technical department – 5.

3. Potential Threats

At the present time, neither the area of the Reserve nor the adjacent territory are subjected to any serious threat. The Region has no developed industry or transport network.

4. Local Populations living on the Site

Local Human Population

The Reserve has no permanent population. For carrying out scientific research and providing protection, 15 huts have been built within the Reserve.

5. Tourism Potential

Visitors and Visitor Facilities

The Reserve has two ecological routes, a guesthouse for eight people and five hostels for five to seven people.

Guest visitors can also stay with the families of the Reserve's employees. In 2001, the number of organized visitors, including students on fieldwork, amounted to 50.

6. Scientific Research Potential

Scientific Research and Facilities

Since 1978, the Reserve has annually kept a record in the *Chronicles of Nature* biota monitoring report.

The Reserve has a network of trails and long-term monitoring plots, including 12 botanic and 13 phenological areas. A mammal and game species census is carried out twice a year on 10 established trails, covering a total length of about 125 km.

A large-scale soil map and an inventory of flowering plants, amphibians, reptiles, birds and mammals have been produced. In addition, long-term data on hydrology, phenology and karst have been accumulated.

Scientific studies in the Reserve are also carried out by the Leningrad and Arkhangelsk departments of the Russian Geographical Society, the Institute of Geography of the Russian Academy of Sciences, the Leningrad and Moscow Pedagogical Institutes, the Leningrad Mining Institute and the Perm and Udmurt Universities.

7. Gaps Filled in the Russian Boreal World Heritage System

This is the first Russian site seeking to preserve the outstanding geographical and aesthetic value of the unique karst formations.

Basegi Nature Reserve

Name of Cluster:

Does not apply

Country - Province

Russian Federation – Perm Province

Name of Protected Area

Basegi Nature Reserve

Area

37,900 ha.

Altitude

Ranges from 500 m to 994 m.

Geographical Location

The Reserve is located on western branches of Middle Urals.

Geographical coordinates: 58° 47' - 59° 0' N; 58° 21' - 58° 34' E.

1. Outstanding Features of the Site

Physical Features

Basegi ridge is of great scientific value for geologists. Sedimentation of the so-called Basegi series – developed here – fills the gap in the classical Riphean South Urals sequence, and form an independent stratigraphic horizon in the unified chart of the Precambrian period of this region. The ridge, monolith in remote geological periods, now consists of three separate massifs (South, Middle, and North Basegi), each divided by deep hollows. Quartz outcrops have been found here, and sometimes rock crystal druses are found. The complex relief features a combination of mountain ridges with mounds and tongues of scattered broken rocks and narrow river valleys. Absolute heights reach 1000 m above the level. Mountain terraces, mostly covered with forest, are numerous. Lower terraces are relict, and upper are of modern origin.

Climate

The Reserve's area belongs to the Atlantic-Continental European region of temperate climate zone. Climate is continental, due in part to the intrusion of arctic air masses in the spring. Summer is relatively warm – the average temperature for July is +13.3 degrees Celsius. The January-February average temperature is –17.9 degrees Celsius. The precipitation level is higher than in adjacent plain regions, and has high seasonal amplitude (from 496 to 1071 mm). The precipitation on the Western slopes is 25-130 mm higher than the eastern.

Vegetation

The Reserve has been established for conservation of typical mountain taiga communities. Basegi mountain ridge is the only site in the Middle Urals featuring primary taiga forests. The Reserve presents unique sequences of vertical zones for this part of Urals, including mountain-forest, sub-golets and mountain tundra. The mountain-tundra belt is formed by thick paludal dark-coniferous taiga. Patches of open woodlands and crooked forests are found in the sub-golets belt. Flora and fauna includes both European and Siberian species.

In the Ice Age, the Basegi ridge served as the “survival area” for many flora and fauna species. The flora of the Reserve includes over 15 endemic species and some Interglacial relicts (*Anemonoides biarmiense*, *Rhodiola iremelica*, *Dryas punctata*, *Cotoneaster melanocarpus*). Over 520 plant species have been identified. Some of them are listed in the Red Data Book of Russia, and some are Urals endemic species. The high-mountain endemic group includes six species; the rock-mountain-steppe endemic group includes three species.

Fauna

The Reserve is home to 51 mammal species, over 150 bird, two reptile and three amphibia species. Mammals like elk, reindeer, Roe, Marten, Least weasel, Common weasel, Siberian weasel, lynx, brown bear are common; wolf, Skunk, and bear occasionally enter the area of the Reserve. Many animals are presented in the area by the Urals subspecies not found anywhere else outside this highland, like Mole, Common Shrew, Common Field Mouse, northern Redbacked vole, Root and Field voles; and bird species like capercailzie, Goshawk and Ural Owl. Rare birds like Peregrine Falcon and Erne are nesting here; Fish Hawk and golden eagle are registered during migrations. Valuable fish species (Taimen - *Hucho Taimen*, grayling) spawn in the rivers. Basegi ridge is the only taiga site in the Middle Urals, which had never experienced logging and the only area playing the role of refuge for many flora and fauna species of the region.

Cultural Heritage

The cultural heritage of the site needs to be studied and described. It remains a traditional place for fishing, hunting, and deer breeding of indigenous Mansy and Khanty peoples, and served as a refuge for Russian Old Believers in XVII – XX Centuries.

2. Management Status

IUCN Management Category:

IUCN Category I.

(WHS Criteria: Ni, Niv)

Date and History of Establishment:

“Basegi” State Nature Reserve was established by the Decree of the Government of Russian Federation in 1982.

Land Tenure

The Government of The Russian Federation.

Conservation Value

The area provides protection of numerous rare, endangered and endemic species of plants and animals, as well as unique ecosystems and natural phenomena.

Conservation Management and Management Constraints

Conservation management is executed according to “Regulations of the State Institution.” The State Nature Reserve “Basegi” was approved by the Ministry of Nature Resources of Russian Federation.

Major goals of Basegi Reserve are conservation of typical and unique natural communities with all their components (genetic fund), monitoring of biota, as well as environmental education and public awareness in the region.

The Reserve has a surrounding buffer zone of 25 600 ha.

Before the establishment of the Reserve, part of its area had suffered from human impact. Tourists had blazed trails, trampled down berry patches, resulting in the reduction of rare plant species. Hay making and cattle grazing are reflected in the floristic composition and structure of some meadow ecosystems. Ruderal plant species dominate the plant communities of old clear-cuts, which cover up to 5% of the Reserve’s area. The rest of the forest remains undisturbed.

Staff

The staff of the Reserve amounts to 38 people:

- Administration – 7;
- Enforcement department – 16;
- Science department – 8;
- Department of environmental education and tourism – 2;
- Technical department – 5.

3. Potential Threats

The South Ural industrial complex, located south from the Reserve, has almost no impact on the area because of its relative distance and the predominantly western winds.

Illegal hunting, fishing and tourism occasionally take place, but have a minor impact on Reserve’s ecosystems.

4. Local Populations living on the Site

Local Human Population

There are no settlements on the Reserve.

5. Tourism Potential

Visitors and Visitor Facilities:

The Reserve has an ecological route, a guesthouse for six people, and few hostels for five to seven people each.

Guest visitors can also stay with the families of the Reserve's employees. The number of organized visitors and students on practice amounted to 60 in 2001.

6. Scientific Research Potential

Scientific Research and Facilities

The abundance of rare plants, high diversity of fauna, well-expressed altitudinal zonality, and outstanding geological outcrops make "Basegi" a distinctive place for researchers. The Scientific research department carries out phenological studies and biota monitoring. Accumulated data provides a good basis for the detailed ecological study of species and communities in the Basegi ridge. The most important task of the Reserve is to conserve and study rare and endangered Urals species and their communities.

7. Gaps Filled in the Russian Boreal World Heritage System

The site features pristine Middle Urals taiga ecosystems, undisturbed by human activity.

Malaya Sos'va Nature Reserve

Name of Cluster

Does not apply

Country – Province

Russian Federation – Khanty-Mansi Autonomous Area, Sovetsky and Beresovsky districts

Name of Protected Area

Malaya Sos'va Nature Reserve

Area

225,600 ha

Altitude

40 - 200 m above the sea level

Geographical Location

The Reserve is located in the northern Trans-Urals, western part of Western Siberia. Geographical coordinates: 61° 45' - 62° 30' N, 63° 50' - 64° 30' E.

1. Outstanding Features of the Site

Physical Features

Typical of taiga, the elevated and disjointed relief provides the area with good drainage. Owing to its geographical location, the area is warmer than the other regions located further to the east. Thus, the Reserve is like a thermal oasis within the vast, cold, and moist taiga areas of Western Siberia.

The tectonic structure and relief of the area make it a transition zone between mountains and plain. The metamorphic foothills of the Urals slopes eastward. Soils are composed of loose fluvial and fluvioglacial accumulations; subsoil is composed of ancient marine sedimentation.

The present-day relief was formed by glacier and ancient/modern water flows. Facilitated over the last 10-15 thousand years by a gradually warming climate, water erosion has separated ancient interfluves and modern intensively changing river valleys. The hydrological system of the Reserve comprises the Malaya Sos'va River and its numerous tributaries, as well as lakes and marshes. The length of the Reserve's river network totals nearly 900 km. In the north-eastern part of the Reserve, wetlands occupy many thousands of hectares, facilitating the study of Western Siberia's unique wetlands.

Climate

The climate is milder than in eastern regions of Western Siberia, but is nevertheless continental, with typically contrasting seasons. The annual average temperature is –2.1 degrees Celsius. The average January temperature is –19.9 degrees Celsius. The height of snow cover averages is 62 cm, well below that of the eastern regions of Western Siberia. The average July temperature is +16 degrees Celsius. Also the most humid month, up to 80 mm of rain falls in July.

Vegetation

The Reserve features middle taiga communities of Western Siberia. Forests cover more than 84% of the area.

The flora consists of boreal circumpolar species. Due to the relatively warm climatic condition (the area is called the “thermal oasis of Western Siberia”) cold-resistant (arctic high-mountain and hypo-arctic) plants and those typical of southern areas (forest-steppe, nemoral, south-taiga species) are found next to each other. Many of these are relicts.

About 150 fungi species, 138 bryophytes species, 121 lichen species and 390 species of vascular plants have been identified within the Reserve. Among these species are honey plants (20 types) and medicinal plants (80 types).

The area is home to 95 species of rare vascular plants, 73 of which are native, and 20 of which are listed in regional Red Data books and Red Data Book of Russia.

Two types of vegetation are especially typical of the Reserve:

1. Middle taiga. Pine forests growing on watersheds and river terraces constitute 58.7% of the Reserve’s area. Less common are spruce-cedar forests in areas formerly affected by fires. Western Siberia dark-coniferous, light-coniferous and small-leafed bogged forests occupy 25% of the Reserve’s area.
2. Intrazonal (southern) taiga. Coniferous forests, willow bushes and meadows occupy lower elevation areas. Old floodplain forests, of spruce or cedar, take up 3.6% of the Reserve’s area. Birch, larch and fir can also be found.

Fauna

The Reserve serves as a habitat for 14 fish, two amphibian, one reptile, 38 mammal and 180 bird species. The composition of forest and wetland fauna differs considerably.

The Reserve is home to the unique native population of European beaver (subspecies *Castor fiber pohlei*). As the primary subject for protection efforts, the European beaver inhabits an area of Verkhne-Kondinsky wildlife refuge (241,600 ha) located within the Reserve. Wild reindeer, elk, brown bear, lynx, sable ermine, fox, blue hare, Squirrel, chipmunk are typical mammal species. Among the birds the most common are: capercaillie, black grouse, hazel hen, Willow grouse, nutcracker. Ten Russian Red List bird species are found here, including osprey, white-tailed eagle, eagle Owl, golden eagle, Red-breasted goose, and Peregrine.

Fish species include Sos'va Herring, Pelyad white-fish (*Coregonus peled* Gmelin) and grayling.

Cultural Heritage

Khanty indigenous people have traditionally used the territory adjacent to the Reserve.

2. Management Status

IUCN Management Category

IUCN Category I.

(WHS Criteria: Nii, Niv)

Date and History of Establishment

The Reserve was established in 1976 by the Decree of the Council of Ministers of the Russian Federation. It occupies part of the former Kondo-Sos'vinsky Reserve (with an initial area of 800,000 ha), created in 1928 to protect the Asian population of European beaver. The Kondo-Sos'vinsky Reserve closed in 1951.

Initially, the Reserve of 92,200 ha was comprised of river protection forests in the Malaya Sos'va river floodplain, adjoining marshes, and several residual forest plots after logging companies had made their claims. beaver habitats were not protected in this original area. In 1993, the basin of the River Soda – a Malaya Sos'va tributary – was added to the Reserve, enlarging it to 255,600 ha.

The Reserve has a buffer zone of 160,000 ha. A federal wildlife refuge, (the Verkhne-Kondinsky), occupies 241,600 ha within the Reserve. A regional nature monument and shrine for the Khanty people, Rangué-Tur Lake (2238.5 ha), is also found within the Reserve.

Land Tenure

The Government of Russian Federation.

Conservation Value

The Reserve protects natural communities typical of the Western Siberian middle taiga, the principal habitat of native populations of European beaver (listed in the Red Data Books of IUCN and Russia) and many endangered birds of prey.

Conservation Management and Management Constraints

The protection of the Reserve is carried out by state inspectors (guards) through regular individual surveys and occasional collective patrolling.

The Reserve has a core (strictly protected zone) and the buffer zone.

Following the closure of the Kondo-Sos'vinsky Reserve in 1951, the hunting ban was removed. Populations of wild reindeer, sable and capercaillie suffered the most. The beaver was nearly exterminated.

In the early 1970s, industrial development also began to affect the areas surrounding the Reserve. Changes in landscape, noise and chemical pollution, poaching, and invasive plants were introduced. The 1993 expansion of the Reserve attempted, in part, to remedy these negative trends. It included large areas of clear-cut forests, which, together with forest plantations occupy 1.37% of the Reserve's current area.

Staff

55 people (in 2001), including:

- Administration – 6;
- Enforcement department – 28;
- Science department – 8;
- Department of environmental education and tourism – 4;
- Technical department – 9.

3. Potential Threats

Logging, as well as the construction and maintenance of transport infrastructure (power transmission lines, pipelines, railway) affect the area.

Further, the threat of pollution from petroleum products and from sewage increases with the expansion of villages.

4. Local Populations Living on the Site

Local Human Population

Two of the Reserve's outposts (Khangokurt and Shukhtungort) are located within former Khanty and Mansy villages. The other two outposts – Zapadny and Belaya Gora – are situated within the buffer zone.

5. Tourism Potential

Visitors and Visitor Facilities

Services include a visitor center, a nature museum, and three ecological routes (with one more under development). For accommodations, there is a guesthouse for nine people, and a hostel for an additional 24 people.

Tourists and guest visitors can also stay with the families of the Reserve's employees, increasing the accommodations capacity by 25-30 people. In 2001 the number of organized visitors and students reached 60 people.

6. Scientific Research Potential

Scientific Research and Facilities

Extensive fauna research was carried out on the Kondo-Sos'vinsky Reserve, including the study of beaver, sable, and other avifauna and mammals. This research was interrupted with the failure of the Kondo-Sos'vinsky Reserve, but was renewed after the "Malaya Sos'va" Reserve was established. It includes flora and fauna inventory, ecosystem mapping, beaver ecology study, and environmental education of the local people.

7. Gaps Filled in the Russian Boreal World Heritage System

This area will be the first site featuring typical natural communities of Western Siberian middle taiga as well as protecting a native population of European beaver.

Tsentralno-Sibirsky Biosphere State Nature Reserve

Name of Cluster

Does not apply

Country - Province

Russian Federation – Krasnoyarsk Province

Name of Protected Areas

Tsentralno-Sibirsky State Nature Biosphere Reserve

Area

972 017 ha

Altitude

Ranges from 100 to 600 mamsl

Geographical Location

The Reserve is located in Central Siberia, along the margins of the Central Siberian Plateau and on the westernmost part of the Western Siberian Plain along the Yenisei River. Geographical coordinates: 61°45' - 63°05' N, 88°30' - 92°10' E.

1. Outstanding Features of the Site

Physical Features

Formed during the Archaeozoic era, the Central Siberian Plateau along the eastern boundary is the most ancient part of Siberia. The western part of the territory, the Western Siberian Plain, started to form in the second half of the Palaeozoic Period. In the Quaternary Period, the northern part of the Plain underwent folding, whereas the southern part was lifted up, shifting the basis of erosion to the north regions of Western Siberia.

Today, the western part of the site features hilly plains with slightly contrasting relief.

The relief of the north-eastern part represents table-shaped watersheds with hills and ridges dominating the area.

The Reserve demonstrates the diversity of Central Siberian rivers. These include the Yenisei River (one of the world's longest rivers at 4 102 km in length), its largest tributary (the Podkamennaya Tunguska) and a number of other large and small tributaries.

Thick relict permafrost of the Quaternary Period can be traced all over the Reserve's extent. Presently, it can only be found in the eastern part of the Reserve in islands that are 10-20 metres thick.

Climate

The climate is moderately continental. The mean temperature in January is approximately -25 degrees Celsius, while the absolute low can go to -62 degrees Celsius. The mean temperature in July is +16, while the maximum is +37 degrees Celsius. Average annual precipitation increases eastwards, from 400 to 580 mm. The Central Siberian Plateau is also known as one of the most snowy places in Siberia. Moving eastward, the snow layer increases from 120 to 140 cm. Long winters, dynamic springs, short summers and early autumns make up the typical seasons found in the Reserve. The average length of the frost-free period is 65 days in the east and 96 days in the west.

Vegetation

In general, the vegetation of the Reserve can be described as typical for central taiga, with some the elements of northern and southern communities (relic alpine/arctic and steppe communities).

The dominant vegetation type is taiga, which is divided into valley, watershed and pine forest communities. Valley communities are the most diverse in species composition, structure and the number of life forms. This intricate system comprises water, riverside, meadow, bush, forest and marsh communities. Watershed forests consist mostly of dark coniferous, dominated by Cedar, Spruce and Fir. Secondary post-fire Birch and Aspen forests cover large areas. Pinewoods and Larch forests (Siberian larch) are infrequent and occur on sandy soils.

The Reserve provides habitat for more than 500 species and subspecies of vascular plants belonging to 73 families. The Yenisei valley represents a high-rank floristic border between the West and East Siberian botanical and geographical units.

The flora features many rare and endangered species listed in the Red Data Books of the former USSR and IUCN. These are *Cypripedium calceolus*, *Calypso bulbosa*, *Paeonia anomala*, *Rhodiola rosea*, 14 species of orchid.

Fauna

The characteristics of the fauna are guided by the fact that the Yenisei valley serves as a bio-geographical boundary – the most important meridian faunistic borderline in the Palaearctic. A large number of species found in the Yenisei taiga are at the western- or eastern-most margins of their ranges.

One species of lamprey and 33 species of fish, including salmon species such as Siberian salmon and sterlet, live in the Reserve's rivers or migrate to the Reserve to spawn. The Yenisei River in its midstream plays a vital role as a spawning ground for salmon and whitefish, and a hibernation site for salmon and sterlet.

A large variety of birds find suitable habitats along the many rivers and streams, in the forest and in the vast floodplain of the Yenisei River. Siberian spotty pipit, chickadees, gold-crested chiffchaff, Siberian reel, nutcracker, hazel hen and capercaillie are the most common taiga species. Waterfowl nesting on floodplain lakes and swamps include teal, tufted duck, widgeon, pintail, whooper swan, taiga bean goose, red-throated and black-throated diver and red-necked grebe. There

are many rare birds of prey, including the golden eagle, white-tailed eagle, Peregrine, osprey and merlin.

The Reserve, together with the adjoining area, provides habitat for 46 species of mammals. The mammal fauna is typical for taiga regions, and is mostly represented by common Palaearctic species, such as the brown bear, sable and Siberian polecat.

The distribution of mammal species demonstrates the zoo-geographical boundary that exists and which limits the westward spread of Siberian Palaearctic species, such as musk deer, northern pika and elk.

Cultural Heritage

The cultural heritage of the site has yet to be studied. The area has long been a traditional hunting and fishing ground for the Keto and Evenki peoples, with Keto indigenous communities still being found here. Russian old believers settled in the area in the 17th and 18th Centuries.

2. Management Status

IUCN Management Category

IUCN Categories I, IV (traditional use zone)

(WHS Criteria: Nii, Niv)

Date and History of Establishment

The first reserve in Central Siberia, Tsentralno-Sibirsky Nature Reserve, was established in 1985 and received the status of UNESCO Biosphere Reserve the following year.

The Yeloguysky Nature Refuge (747 600 ha) is contained within the Reserve, and forms part of its multi-use (biosphere polygon) zone. In 1990, the Refuge was given an ethno-ecological status, as it is aimed to protect both the biodiversity and traditional land use of the Keto, the Indigenous peoples of the Siberian North.

Land Tenure

The Government of the Russian Federation.

Conservation Value

The Tsentralno-Sibirsky State Nature Biosphere Reserve is representative of the most common natural communities found in Central Siberia. The Reserve is of utmost importance for conducting ecological research on the borderline area between two large physical/geographical units.

Conservation Management and Management Constraints

Conservation management is undertaken according to the *Regulations of the State Institution: The State Nature Biosphere Reserve Tsentralno-Sibirsky*, approved by the Ministry of Natural Resources of the Russian Federation.

The major goals of the Reserve are the conservation of typical and unique natural communities, the monitoring of biota, environmental education and public awareness in the region and the non-destructive use of land within the buffer zone.

In the past, the Reserve's natural communities have not been used for economic purposes.

The background level of pollution within the Reserve is one of the lowest in Siberia, with the biggest sources of contamination (Krasnoyarsk, Norilsk) located more than 1,000 km away.

Within the Reserve, the most serious and irreversible damage to the ecosystems results from the construction of two hydroelectric stations (Krasnoyarskaya and Sayano-Shushenskaya). These were constructed in the upper part of the Yenisei River basin in the 1970s and 1980s.

Staff

The staff of the Reserve amount to 46 people:

- Administration – 9;
- Law enforcement department – 21;
- Science department – 9;
- Department of environmental education and tourism – 2
- Technical department – 5.

3. Potential Threats

Within the proposed WHS, no mineral resources are found. However, huge Tungusky coal and iron ore basins, as well as large deposits of manganese ore, are located close to the Reserve. It is a potential site for the construction of a large mining and processing industrial complex.

4. Local Populations living on the Site

Local Human Population

There are no permanent settlements within the Reserve. The Reserve's headquarters are located outside the Reserve in the large village of Bor on the bank of the Yenisei River.

5. Tourism Potential

Visitors and Visitor Facilities

The Reserve has two ecological routes, a guesthouse for seven people and seven hostels for five-seven people each.

Visitors can also stay with the families of the Reserve's employees. In 2001, the number of organized visitors and students on fieldwork amounted to 40.

6. Scientific Research Potential

Scientific Research and Facilities

The Reserve meets the highest criteria of a biosphere reserve and is a convenient location for conducting ecological research and monitoring.

Ecological research is conducted on the following topics:

- The study and monitoring of nature in a typical region of the Siberian Plain taiga;
- The study of the Yenisei meridian biogeographical boundary in the Palaeartic.

Both expeditionary and stationary research has been conducted in the area since 1956. Special attention has been and is being paid to the study of plants, birds, game and small mammals. In the last 10-15 years, studies have also been conducted on invertebrates.

Within the biosphere multi-use zone, in particular in the Yeloguysky Nature Refuge, ethno-ecological studies are being conducted. They are focused on the Keto communities, the indigenous minority people of the North who are living almost entirely within the borders of the Reserve's biosphere multi-use area.

7. Gaps Filled in the Russian Boreal World Heritage System Filled

The proposed site is one of the few remaining pristine, natural communities of the Central Siberian taiga and the central region of the Eurasian continent.

Sayano-Shushensky State Nature Reserve

Name of Cluster

Does not apply

Country - Province

Russian Federation – Krasnoyarsk Province

Name of Protected Area

Sayano-Shushensky State Nature Reserve

Area

390 400 ha

Altitude

Ranges from 600 to 2770 mamsl

Geographical Location

The Reserve is located in the southern region of Eastern Siberia in the middle of the Western Sayan Mountain Range. Geographical coordinates: 51°50' - 52°35' N, 91°30' - 92°25' E.

1. Outstanding Features of the Site

Physical Features

The Reserve includes part of the axial Sayan Mountain Ridge, the eastern branches of the Kantegirsky Ridge and the northern slopes of the Hemchiksky Ridge. The Sayan Ridge stretches in a north-easterly direction through the central part of the Reserve. Its sharpened peaks rise to an altitude of 2 400–2 600 m, the highest one being 2 772 m. At the northern and southern extremities, the altitude of the Hemchiksky Ridge gradually decrease to 2 100–2 200 m. The axial line of the Sayan Ridge divides the Reserve into two parts - the northern and southern parts, each of which experience very different climatic conditions.

In the central part of the Sayan Ridge, alpine landforms prevail – pointed peaks, narrow edges of watersheds, cirques and kars that have steep, vertical walls plunging down hundreds of metres. The remnants of glacial moraines are well preserved in river valleys at altitudes of between 1 500 and 1 800 m. To the south of the axial part of the Sayan Ridge, as well as on the Hemchiksky Ridge, the alpine relief is replaced by smooth, gentle watershed surfaces. The mountain tops are flat, whereas the slopes are abruptly steep (30-40°).

The major water artery is the Yenisei River, which has a narrow and steep valley through the Western Sayan. In 1988, a water reservoir was constructed here.

Climate

The climate of the Sayano-Shushensky State Nature Reserve is diverse. The Sayan Ridge intercepts the paths of major air masses, resulting in abundant precipitation over the windward side of the slopes, and much less on its leeward side.

The Sayan Ridge also serves as a boundary between areas of the Atlantic and Arctic air masses, and the Central Asia areas. Annual precipitation on the northern slopes is 1,000–1,500 mm, whereas on the southern slopes it is only 400 mm. Average annual air temperature is –2.1 degrees Celsius on the southern side, as compared to –3.9 degrees Celsius in the mountain thin forest on the northern slopes.

The absolute low temperature of the steppe zone (-50 degrees Celsius) sharply contrasts that of the mountain thin forest maximum (41 degrees Celsius).

Vegetation

As might be expected of an area with great climactic variance, the Reserve's vegetation is also diverse. The vegetation of this mountainous topography – where the Siberian taiga and the steppes of Central Asia meet – is particularly vivid on the slopes of the Sayan Ridge.

Altitudinal belts are also well developed. Larch forest-steppe patches occur on the lower parts of slopes. The northern slopes are covered with dark coniferous forests of Siberian Cedar, Siberian Fir and Siberian Spruce, changing at higher altitudes to pure Cedar forests, which in turn give way to Moss Cedar forests in the upper forest belt boundary. In the high mountain area, sub-alpine and alpine meadows and mountainous tundra with lichens have developed. On the southern slopes, light coniferous taiga prevails, dominated by Siberian larch. In all, forests occupy about 60 % of the territory. The flora is of mixed character, including representatives of several floristic regions with large numbers of endemic species. The Sayan-Altay endemics (*Poa altaica*, *Agropiron krylovianum*, *Aquilegia borodini*), Angara-Sayan endemics (*Anemonoides jennisseensis*) and Tuva-Sayan endemics (*Silene turgida*) make up specific communities of endemics. There are many relic plant species, such as *Cruciata krylovii*, *Rhododendron dauricum* and *Thalictrum baikalense*. The total number of identified vascular plants stands at 1,027 species, including rare ones, such as *Dendranthema sinuatum*, *Epipogium aphyllum* and *Anemonoides baikalens*.

Fauna

The diversity of the Reserve's current ecological conditions and its location at the junction of the Siberian taiga zone and the arid continental steppes of Central Asia, account for the variety in the wildlife. More than 50 mammal species are recorded, including Siberian roe, musk deer, maral, wild reindeer, elk, Asiatic ibex, sable, common weasel, brown bear, wolf, slunk bear and lynx. Two rare species, the snow leopard and Palla's cat, are listed in the Red Data Book of Russia. The Reserve is home to 300 bird species, including the nutcracker, wood grouse, hazel grouse, black grouse, daurian partridge and kestrel. Among rare birds are the Baikal snow partridge, golden eagle, white-tailed eagle, saker falcon and Peregrine falcon. The Reserve also supports 21 fish species, including the Siberian grayling, Taimen

(*Hucho taimen*), Lenok (*Brachymystax lenok*) and five species of reptiles, including *Elaphe dione* and the Moccasin.

Cultural Heritage

The cultural heritage remains a future area of study. Before construction of the dam and the proclamation of the Reserve, the area served as a traditional place for fishing, hunting and deer breeding for the Altai-Sayan indigenous peoples. Nowadays, it is a research ground for investigation of ecological and sociological effects of dam construction on the Yenisei River - a serious anthropogenic stress.

2. Management Status

IUCN Management Category

IUCN Category I

(WHS Criteria: Nii, Niii, Niv)

Date and History of Establishment

The first protected area, the Kazysruk Hunting Reserve, was established here as early as 1917 to protect the sable – then a most valuable fur-bearing animal. Nowadays, the basin of the Kazysruk River is part of the present-day Reserve's buffer zone.

The State Nature Reserve Sayano-Shushensky as it exists today, was established in 1976 by the Decree of the Government of The Russian Federation.

In 1988, the Reserve received the status of UNESCO Biosphere Reserve.

Land Tenure

The Government of the Russian Federation.

Conservation Value

The protected area is of exceptional value for the conservation of biological diversity. It is home to a large number of endemic, relic and rare plant and animal species. Moreover, the area has been served as a research ground for the study of the influence of a reservoir on natural communities.

Conservation Management and Management Constraints

Conservation management is undertaken according to the *Regulations of the State Institution The State Nature Biosphere Reserve Sayano-Shushensky* approved by the Ministry of Nature Resources of the Russian Federation.

The major goals of the Reserve are the conservation of typical and unique natural communities, the monitoring of biota and the ecological effects of dam construction on the Yenisei River, environmental education and public awareness in the region, and the promotion of ecological friendly land use in the buffer zone.

The 1979–1988 construction of the Sayano-Shushenskaya hydroelectric station on the Yenisei River caused the river valley within the Reserve to flood. The reservoir

covers a total of 4,506 ha, or 1.2 % of the Reserve's entire area. The influence of the Sayan reservoir on the environment – both climactic and I in the fluctuation of ground water levels – is most prominent in the Reserve. Noticeable changes in climate as well as in the structure of ecosystems have been registered within the Yenisei valley. Despite these changes, most of the Reserve remains unaffected by the reservoir.

Staff

The staff of the Reserve constitutes 77 people:

- Administration – 8;
- Guard service – 36;
- Science department – 18;
- Department of environmental education and tourism – 9;
- Technical department – 6.

3. Potential Threats

Its distance from major centres of economic activity helps to maintain the Reserve as one of few undisturbed areas in the Sayans.

With no transportation routes, the area has never experienced logging or mining. Hunting and cattle breeding were done in the past on a very small scale.

No economic activity is planned within the protected area and its surrounding areas.

4. Local Populations living on the Site

Local Human Population

There are no settlements within the Reserve.

5. Tourism Potential

Visitors and Visitor Facilities

The Reserve has six ecological routes, more than 20 hostels (each for five-seven people) and a tourist boat for ten people.

In 2001, the number of organized visitors, including students on field work, amounted to 200.

6. Scientific Research Potential

Scientific Research and Facilities

The staff of the Reserve, in collaboration with the Institute of Forest of the Russian Academy of Sciences (RAS), have taken inventory of flora; forest fauna of insects,

mammals and birds; soil and floristic maps; and have carried out an ecological and floristic classification of the vegetation. Studies are presently being conducted on large predators and ungulates, regarding their roles in the ecosystems and also on the ecology and conservation of rare species in the Western Sayan. The effects of the reservoir on the environment have always been a focus of the research.

Biota monitoring plots have been established at three different sites in the Yenisei valley – Karakem (northern part, taiga), Uzunsuk (central part, forest-steppe), and Hemlerék (southern part, steppe).

In addition, there are 47 forest monitoring sites, 283 km of trails for zoological studies and a research plot, maralye Ozero, to monitor large mammals.

The Science department of the Reserve is responsible for maintaining the biota monitoring program – “Chronicles of Nature”. It has done so since 1978. Special studies are carried out in collaboration with the Institute of Forest and the Institute of Geography of the Siberian Branch of RAS, the Far Eastern Branch of RAS, the Dokuchaev Soil Science Institute, the Severtsov Institute of Ecology and Evolution and other research institutions.

7. Gaps Filled in the Russian Boreal World Heritage System

The Reserve represents pristine natural communities of the Sayan Mountains, which are of exceptional value for conservation of biodiversity on a world scale.

Putoransky State Nature Reserve

Name of Cluster:

Does not apply

Area of Cluster

1 887 251 ha

Country - Province

Russian Federation – Doudinka and Khatanga districts of the Taimyr Autonomous Area and Ilimsk District of the Evenki Autonomous Area of Krasnoyarsk Province

Name of Protected Areas

Putoransky State Nature Reserve

Area

1,887,251 ha

Altitude

300 - 1701 m (the highest point - Kamen' peak)

Geographical Location

The Nature Reserve is located within the Putorana plateau in the north-west part of the Central Siberian plateau, to the south of the Taimyr peninsula: 68°24' - 69°53' N, 91°45' - 96°38' E.

1. Outstanding Features of the Site

Physical Features

The plateau with its area of more than 2.5 million ha (area of the Putoransky Reserve is 1 887 300 ha) is Siberia's largest basalt trappean highland undisturbed by the human activity. The length of this highlands is more than 500 km, the width is about 250 km. Average altitude is 900-1,200 m. The depth of canyons can be as deep as 1,500 m. The highest point of the Putorana mountains is Kamen' peak, at 1,701 m.

The plateau is known for its trappean relief forms, unique to the former USSR, and probably in the world. In size, the deep canyons are comparable to the Colorado Grand Canyon. The scale and density of waterfalls are unparalleled in the world.

With over 25,000 lakes, Putorana exhibits a matchless number of deep lakes at high altitude. These lakes are the largest in Siberia after Baikal and Teletskoye lake, with depths reaching 180-420 m. After Lake Baikal, these lakes make the second largest fresh water reservoir in Russia.

Deep canyons, trappean relief forms, picturesque lakes and numerous waterfalls give an outstanding aesthetic value to the site.

Climate

The modern climate of the Putorana is similar to the climate of the late Quaternary Period. The difference between the cool and humid summers of the western Putorana, and dry and warm summers of the eastern Putorana is noticeable. The climate of the Putorana is extreme continental. The average January temperature for the past 25 years is -27.5 degrees Celsius, and the snow cover lasts about eight months. Summer is short but warm. The average July temperature for the past 25 years is +14.2 degrees Celsius, with record highs reaching +31.9 degrees Celsius in July, 1978. In the central part of the plateau, the polar day lasts 53 days (from 27 May to 13 July), whereas polar nights lasts 31 days (5 December to 5 of January).

The plateau is located at the junction of longitudinal and latitudinal natural geographical zones. In its southern part lies the line between sub-arctic and temperate geographical zones.

Permafrost covers a major part of the plateau, however, separate talik spots are located in river valleys and lake depressions. Permafrost thickness increases from valley beds (80-150 m) to watershed heights (300-400 m). In spring time, the upper permafrost melts, forming an active layer of up to 2 m.

Vegetation

The flora of the Putorana plateau includes 569 species of vascular plants, related to 209 genera and 57 families. They are found in three altitude groups: forest - 224 species (39%), mountain - 183 species (32%), and high-mountain - 162 species (29%). Circumpolar species predominate, accounting for 44% of the total. Asian (Siberian) species account for 31%, Eurasian species for 15%, and Asian-American species for 10%.

The major climatic borders divide the Putorana plateau in two directions. One line runs between northern taiga and forest tundra. It goes altitudinally over the plateau dome. The other line (between 90 and 94 °E) divides the plateau onto western and eastern parts, and defines the eastern border of west taiga vegetation, which includes Siberian Spruce (*Picea obovata*), Birch (*Betula tortuosa*), Siberian Larch (*Larix sibirica*) and a complex of accompanying plants. To the east of this border Dahurian Larch (*Larix gmelini*) prevails, reflecting the fact that the climate is more continental.

The Putorana plateau is the only habitat for many flora and fauna species, such as the endemic *Draba Sambukii*, *Caltha Serotina*, *Oxytropis Putoranica*, *Euphrasia Putoranica*, *Festuca Auriculata* var. *Pilosa*, and *Papaver Variegatum*.

Fauna

The fauna of terrestrial vertebrates is a combination of tundra, taiga and common mountain species. The Reserve is home for 34 mammal species, 140 bird species, and 25 fish species.

Perhaps the most striking and unique phenomenon is the massive seasonal migrations of the Wild reindeer. The Taimyr population of Wild reindeer is over 500,000 animals. Between 400,000 and 480,000 cross Putorana plateau at migration time. The Putorana bighorn sheep is prevalent on the plateau, recognized as an individual subspecies *Ovis nivicola borealis*, and listed in the Red Data Book of Russia. Its natural habitat occupies the central part of the Putorana mountains, and is hundreds of kilometres away from the ranges of other bighorn sheep subspecies.

Putoransky Reserve serves as a habitat for the following endemic species: *Salvelinus Boganidae*, *Salvelinus Tolmachoffi*, *Salvelinus Drjagini*, *Salvelinus Taimyricus*, *Coregonus Lavaretus Pidschian*, *Coregonus Muksun*, *Prosopium Cylindraceum*, *Thymallus Arcticus*.

The Reserve and its surrounding areas are home to 12 bird species included on the IUCN Red List. These include the diver Gavia (*Adamsii Gray*), red-breasted goose (*Rufibrenta Ruficollis Pall*), lesser white-fronted goose (*Anser Erithropus L*), bar-headed goose (*Eulabeia indica Lath*), Bewick's swan (*Cygnus bewickii Yarr*), golden eagle (*Aquila Chrysaetos L*), osprey (*Pandion Haliaetus L*), white-tailed eagle (*Haliaeetus albicilla L*), Jer-falcon (*Rusticolus L*), Peregrine (*Falco peregrinus L*), crane grus monacha (*Curlew Numenius Minutus Gould*).

Cultural Heritage

There are no human settlements in or around the reserve.

2. Management Status

IUCN Management Category:

IUCN Category I.

(WHS Criteria: Ni, Nii, Niii, Niv)

Date and History of Establishment:

In 1984, the Putoransky Nature Refuge was created on the central Putorana plateau, for the conservation of mountain taiga and lake ecosystems, unique flora, and rare animal species. Four years later, its area was included in the Putoransky State Nature Reserve, created in 1988 by the Decree of the Government of Russian Federation.

Land Tenure

The Government of Russian Federation.

Conservation Value

The Plateau is distinguished by its peculiarity relief, including basalt traps cut by deep canyons, enormous number of waterfalls and over 25 000 lakes.

The Putorana is the only habitat for many endemic species of flora and fauna, including the bighorn sheep – one of the largest wild sheep in the world.

The migration route of the world's largest Wild reindeer population traverses the area of the Reserve.

Conservation Management and Management Constraints

The Putoransky Reserve is a territory extremely difficult to access, with no inhabitants but for its staff. The protection of the Reserve is enforced by staff.

Staff

27 people (by 2001), including:

- Administration – 4;
- Protection unit – 8;
- Science department – 6;
- Department of environmental education and tourism – 2;
- Technical department – 7.

3. Potential Threats

Relatively new forms of human impact on ecosystems of the Putorana plateau include the building of villages, mining, industrial air pollution, using caterpillar transport, recreational pressure, and poaching. These are all negative consequences of the development of the Norilsk industrial complex, the biggest industrial complex above the Arctic circle in the world. At present, these factors have almost no impact on the core ecosystems of the Reserve and affect only the western part of the plateau (the buffer zone of the Reserve). The Norilsk metallurgic plant is situated at a distance of approximately 200 km from the western border of the Reserve. Its air wastes containing oxides of sulphur, carbon, dust and heavy metals cause degradation of vegetation in the western part of the buffer zone.

4. Local Populations living on the Site

Local Human Population

As the territory of the Reserve is remote and hard to reach, it has no permanent settlements. The three research stations and four outposts are regularly patrolled by changing guard teams.

The vast protected (buffer) zone of the Reserve has four large corporate recreational centres, eight communal and individual reindeer-breeding camps, and about 350 huts built by hunters and fishermen. The total number of (temporary) inhabitants is seasonally contingent. In winter, 160-200 people remain in the Reserve. By contrast, the population grows in July and August to 1,200-1,500 people, including mushroom and berry collectors, fishermen, and tourists.

5. Tourism Potential

Visitors and Visitor Facilities

Four specially equipped ecological trails have been opened in the core area of the Reserve, and two such trails in its buffer zone. About 200 people visited them in 2001.

6. Scientific Research Potential

Scientific Research and Facilities

Two research stations ("Lake Kutaramakan" and "Lake Ayan"), and three outposts ("Lake Sobach'e", "Lake Diupkun" and "Lake Manumakli") exist within the area of the Reserve. Climatic and hydrological monitoring, observation of some bird and mammal species (including Wild reindeer migrations) are conducted annually during the field season at the research stations. The Reserve personnel also conduct studies on the flora dynamics, and make the yearly yield of mushrooms and berries.

The construction of a station for background environmental monitoring has begun in the protected zone of the Reserve at the mouth of Mikchangda River.

7. Gaps Filled in the Russian Boreal World Heritage System Filled

Putorana is the first Russian site located entirely above the Arctic circle. It features mountainous north-taiga and tundra ecosystems, and the largest Siberian basalt trappean highland. The highland's unique relief forms serve as habitat for the endemic subspecies – the Putorana bighorn sheep.

Tungusky State Nature Reserve

Name of Cluster:

Does not apply

Country - Province

Russian Federation – Krasnoyarsk Province, Evenki Autonomous Area

Name of Protected Areas

Tungusky State Nature Reserve

Area

296 700 ha

Altitude

250 - 533 m.

Geographical Location

The Reserve is situated in the Eastern Siberia, on the south of Central Siberian plateau. Geographical coordinates: 60°25' - 61°10' N, 101°30' - 102°35' E.

1. Outstanding Features of the Site

Physical Features

The Reserve is located in the part of Siberian platform named Tunguskaya Syncline. In the Palaeozoic Era the area was covered by a shallow sea, which facilitated large-scale mineral sedimentation. Tuff rocks can also be found, suggesting volcanic activity in the late Palaeozoic/early Mesozoic Era. The central part of the area is a giant crater of an ancient Mesozoic volcano, with numerous secondary craters. Products of volcanic outbursts and outflows – Siberian trapps (basalts and diabases) – are very common.

The modern relief of the area is a low plateau dissected by deeply incised river valleys. Some trappean outcrops are elevated and form cone-like hills or “table” mountains, with relative heights from 100 to 300 m. The highest point of the Reserve (533 m) is located on Lakursky mountain ridge.

The area is made famous by a unique event of recent history. On the 30 June 1908, a catastrophic collision of the Earth and a small cosmic object (most likely the core of a comet or an asteroid) occurred. The Tungusky Phenomenon is renowned, firstly for its scale (TNT equivalent of about 15—40 megatons, which is 500-2000 times stronger than the Hiroshima nuclear explosion), and, secondly for the high complexity of the event “scenario”. The explosion destroyed about 2,250 km² of forest area.

Climate

The climate is extreme continental, with typical day/night and seasonal temperature ranges, small precipitation, and distinct periods of summer droughts.

The average annual temperature is –6 degrees Celsius. The only frost-free month is July, with an average temperature of +16 degrees Celsius. In winter, temperatures reach –58 degrees Celsius which, due to low snow cover, causes deep soil freezing. Atlantic and Pacific cyclones do not influence the area, and clear sunny weather prevails. Annual average precipitation is 388 mm.

The Reserve is located on the southern margin of discontinuous permafrost.

Vegetation

The area of the Reserve is transitional between the south-taiga Pine forest zone of the Angara basin, and the north-taiga Larch forest zone to the north of the Nizhnyaya Tunguska River. Due to their proximity, the plant species of the two zones are interpenetrated and mixed, species' habitats are superimposed, and hybridisation is common. Vegetation cover consists of forests, marshy bush, bogs, meadows, petricolous communities on kurumniki (rock debris), and water plants. Forests, mostly mixed Larch-Pine and Birch-Pine-Larch, occupy about 70% of the area.

The Tungusky Phenomenon greatly impacted the wildlife of the region. Nearly a decade later, some ecological consequences are still apparent. Data on special features of explosion-destroyed ecosystems, on acceleration of tree growth, and background mutation changes is being collected. This area is an ideal ground for studying the effects caused not only by large natural cataclysms, but also by fall-out of cosmic substances which on a macro scale, seem to play an important role in the evolution of biosphere.

Fauna

The fauna of the Reserve is typical for a middle-taiga subzone of Central Siberia. The Reserve is home to 30 mammal species, 145 bird species, and over 30 fish species. Common mammal species include sable, brown bear, glutton, wolf, elk, wild reindeer, blue hare, and pika. fox, ermine, weasel, musk deer are also common. Avifauna is typical for taiga, and wetland species are especially common. Bean goose (*Anser fabalis*) and whooper swan are rare nesting species met in the Reserve. osprey, white-tailed eagle, golden eagle and Peregrine are rare birds of prey, listed in the Red Data Book of Russia. Important fish species include True Sturgeons (*Acipenser baeri*, *A. ruthenus*) and members of the salmon family (*Hucho taimen*, *Brachymystax lenok*).

Cultural Heritage

There is no cultural heritage of note within the area of the site.

2. Management Status

IUCN Management Category

IUCN Category I.

(WHS Criteria: Ni, Nii, Niv)

Date and History of Establishment

In 1985 the area of the Tungusky cataclysm was declared an Academic Nature Refuge, part of the Krasnoyarsk Institute of Forest of the Siberian Branch of the Russian Academy of Sciences. Ten years later, on October 9, 1995, Tungusky State Nature Reserve created by the Decree of the Government of Russian Federation.

Land Tenure

The Government of The Russian Federation.

Conservation Value

A major goal of the Tungusky Reserve is to protect the area of the unique natural phenomenon – the explosion of the “Tungusky Meteorite”. The natural characteristics of the area are also conducive to integrated research – both those directly connected with ecological consequences of the Tungusky catastrophe, and general environmental studies.

Conservation Management and Management Constraints

Conservation management of the Tungusky Reserve is executed according to “Regulations of the State institution “The Tungusky State Nature Reserve,” approved by the Ministry of Nature Resources of Russian Federation.

The Tungusky Reserve aims to conserve typical and unique natural communities, monitor biota, and provide environmental education and public awareness in the region.

Distant from big villages, the Reserve is difficult to access. However, the impending construction of roads threaten the unique post-explosion natural communities.

Staff

The staff of the Reserve amounts to 32 people:

- Administration – 3;
- Enforcement department – 11;
- Science department – 9;
- Department of environmental education and tourism – 2;
- Technical department – 7.

3. Potential Threats

At present, the ecosystems of the Reserve are unexposed to direct human influence, and are considered pristine communities. (And the prospect of disaster due to meteorites falling from the sky is unlikely in the proximate future.)

4. Local Populations living on the Site

Local Human Population

There is no permanent human population within the Reserve's area.

5. Tourism Potential

Visitors and Visitor Facilities

There are no ecological trails within the Reserve. There are four huts used by personnel and visitors. About 300 tourists visit the Reserve annually.

The development of tourism infrastructure is one of the Reserve's priorities. Currently, several qualified tourist companies from Krasnoyarsk, St. Petersburg, and Moscow organise ecological tours to the area.

6. Scientific Research Potential

Scientific Research and Facilities

Following the Tungusky Meteorite fall, the Tungusky region has been the primary subject of (ecological) scientific investigation in Central Siberia. The site has been examined by geologists and palaeovolcanologists, and the state of its ecosystems has been analyzed and monitored detail.

The Tungusky cataclysm zone and adjacent areas of the Reserve have for many decades been objects of comprehensive environmental studies, the importance of which move far beyond cosmic science. These long-term studies gathered exclusive data on ecology and dynamics of undisturbed north taiga ecosystems.

7. Gaps Filled in the Russian Boreal World Heritage System

The site is clearly exceptional not only for Russia, but also for the world. It is the nature conservancy area protecting the region of the most powerful meteor explosion in contemporary history.

The Bikin River Valley

Name of Cluster

The Bikin River valley (for extension of Central Sikhote-Alin World Heritage Site)

Area of Cluster

1,154,246 ha

Country - Province

Russian Federation – Primorski Province, Pozharski District

Name of Protected Areas

Verkhnebikinsky Regional Landscape Refuge “Verkhnebikinsky.”
Area of traditional nature use (TTNU) of the Udege indigenous people.
The two areas have a common border.

Area

“Verkhnebikinsky” Refuge: 746,482 ha;
TTNU Udege: 407,764 ha.

Altitude

Ranges from 200 m to 1 993 mamsl.

Geographical Location

The Landscape Refuge and TTNU Udege are situated in the Russian Far East, respectively on the western and eastern macro-slopes of the Central Sikhote-Alin in the upper and middle parts of the Bikin River valley. Geographical coordinates: 46° 10' - 47° 20' N, 135° 25' - 137° 54' E.

1. Outstanding Features of the Site

Physical Features

The geological and geomorphological diversity of the site is characterized by the considerable difference in heights between the highest points of the watersheds and the Bikin River valley (1,900-200 m), and by mixed rock composition. The higher part of the basin features one of the largest upper mountain belts in the Sikhote-Alin Mountain Bikin-Peisk volcanic plateau, while the lower part is the largest inter-mountain depression in Sikhote-Alin, and is filled with the friable alluvial sediments and dissected by numerous erosion breaches. Natural communities change gradually with altitude.

Climate

The climatic conditions of the Bikin River valley are determined by the typical monsoon climate of the Primorie region, though the valley has much more severe winters than areas to the south. The absolute temperature low on the watershed plateau is –40 degrees Celsius, and in the middle part of the Bikin River valley can fall to –50 degrees Celsius. The average duration of the frost-free period on the

eastern border is 120 days, while in the inner continental regions on the western outskirts, the frost-free period it is less than 100 days. The annual precipitation distributes unevenly. The annual precipitation over the larger part of the Bikin basin is 850-900 mm, whereas in the upper mountain belt precipitation can reach 1,500 mm. Snow accounts for 15-20% of total precipitation.

Vegetation

The prevailing vegetation types in the central region of the Central Sikhote-Alin are virgin cedar-broad-leaved, dark coniferous forests and patches of high mountain vegetation (with *Betula ermanii*, *Pinus pumila*, *Rhododendron* spp. and *Rhodococcum vitis-idaea*, *Cassiopeia*). Co-existence of the northern and southern species of plants and animals is typical for this region. The area is home to 1,200 species of higher plants, and features the largest number of rare and endangered species in all of Russia. Vulnerable populations of many of these occur within the nominated area.

About two thirds of the Bikin River valley has never experienced anthropogenic pressure. The largest intact massif of Korean Pine and broad-leaved forests has been preserved there. The Bikin River valley is characterised by a high concentration of rare and relic plant species. Over 20 plant species listed in the Red Data Book of Russia occur in the upper part of the Bikin River valley. Thirty-four species of vascular plants, such as *Rhododendron Redowskianum Maxim*, *Microbiota dicussata*, *Ilex rugosa*, *Bergenia pacifica*, *Rhodiola rosea*, are found on the margins of their range. The lush vegetation serves as a habitat for the Amur tiger (*Felis tigris amurensis*), Himalayan bear (*Ursus tibetanus*) and Manchurian wildcat (*Felis euptilura*).

Fauna

One of the purposes for seeking a Central Sikhote-Alin World Heritage Site is to ensure the protection of the population of Amur tiger, the largest cat in the world. In some habitats within the site, the density of tigers is very high. The Bikin River valley hosts 30-35 predators which migrate seasonally to the coastal areas of the Japanese Sea, following their prey – mainly deer and wild hogs. This area serves as a reproductive centre for the whole north-eastern group of the Amur tiger (about 100 animals in total).

Central Sikhote-Alin is also home to over 400 species of vertebrates, including 342 bird species. Thirty-one species of mammals live in the Korean pine and broad-leaved forests, including *Cervus elaphus*, *Sus scrofa*, *Ursus thibethanus*, *Martes zibellina* and *Sciurus vulgaris*. These are the primary game species for the indigenous Udege people. The key habitat of the Amur tiger is also found within these forests.

The diverse landscape features 38 rare bird species. In the downstream parts of the river are found *Grus japonensis* and *Grus monacha*, *Ciconia boyciana* and *Ciconia nigra*, *Turnix tanki*, *Numenius madagascariensis* and *Butastur indicus*. The valley forests are made up of species of *Ulmus*, *Fraxinus*, *Tilia* and *Chosenia*. The river midstream areas provide excellent nesting conditions for *Pandion haliaetus*, *Aix galericulata*, *Mergus squamatus*, *Ketupa blakistoni* and *Ninox scutulata*. The

upstream river areas, which are covered by Larch, Dark Coniferous and Stone Birch forests, serve as a habitat for *Tetrao urogalloides* and *Falci pennis falci pennis*.

The considerable size of the area gives the possibility of preserving natural communities in an undisturbed state. This is one of the main reasons for nominating The Bikin River valley as a World Heritage Site.

Cultural Heritage

The valleys of the Bikin and Bolshaya Ussurka (Iman) Rivers are home to the world's last indigenous communities of Udege (over 700 people). Their traditional way of life, caring and respectful attitude towards nature, and ancient culture are closely linked to the nature of the Ussuri taiga. The Udege have used the taiga resources sustainably, hunting, fishing and collecting wild plants.

The southern part of the Russian Far East, Primorie, played an important role in the evolution of east Asian ancient civilizations. The proposed site features a great number of geological, palaeontological, archaeological and historical monuments that have a large cognitive and cultural importance.

2. Management Status

IUCN Management Category

IUCN Category IV

(WHS Criteria: Nii, Niv and Ciii)

Date and History of Establishment

Verkhnebikinsky Refuge: the Landscape Refuge is of regional importance, and was established by the Decree of the Primorski Province Governor in 1998;

TTNU Udege: the Territory of Traditional Nature Use of the Indigenous Udege People was created by the Decree of the Head of Primorski Province Administration in 1992.

Land Tenure

The Government of the Russian Federation.

Conservation Value

The largest intact massif of cedar-broad-leaf forests serves as a reproductive centre for the north-eastern group of the Amur tiger.

The valleys of the Bikin and Bolshaya Ussurka (Iman) rivers are the last places in the world where indigenous Udege communities live.

Conservation Management and Management Constraints

Mining, industrial and transport development, and timber logging are prohibited within the proposed area. All other forms of land use, such as hunting, fishing, agriculture, tourism and the development of tourism infrastructure, have to be approved by regional environmental department (for the Refuge and TTNU) and by local administration (for the TTNU).

Conservationists and the Udege people clash with lumber companies and are against logging and the building of roads for the transportation of timber.

Staff

Since 1994, the specially-trained rangers team (“tiger”) of the regional environmental department has been working in the area. Its main task is to provide protection for Red Data Book species.

The Krasnoarmeyski local administration environmental committee conducts regular raids to prevent poaching and illegal logging in the district.

About 40 rangers are assigned to enforce the environmental protection laws within the Refuge and TTNU.

3. Potential Threats

Poaching, timber logging – both legal and illegal – and road construction are major threats to the area.

Forest fires are also a significant threat to the natural communities on the Western slopes of Sikhote-Alin.

4. Local Populations living on the Site

Local Human Population

The population density in Pozharsky District (Bikin River basin) is very low. Within an area of over 1,100 ha there are only four villages – Krasnyj Iar (958 people), Sobolinyj (321 people), Jasenevyj (128 people) and Okhotnichy with a permanent population of 15 people. The latter is located within the Verkhnebikinski Refuge.

5. Tourism Potential

Visitors and Visitor Facilities

A number of regional tour operators are interested and ready to organise and conduct adventure tours within the proposed site. These may include canoeing (by traditional Udege boat), fishing, hunting and accommodation with Udege families.

At present, though, the recreational activity is low. Only five-six groups of Russian and foreign tourists (about 100 people in total) visit the territory annually.

6. Scientific Research Potential

Scientific Research and Facilities

A number of foreign nongovernmental organizations (NGOs) and scientific institutions have shown great interest in the development of scientific and ecological tourism within the TTNU of Udege people. This include WWF-Germany, Audubon Society (USA), Global Security Network (GSN) (USA), Russian Nature Preserve Travel Company (Massachusetts, USA), Japanese Fund for Global Environment, Friends of the Earth-Japan, Taiga Rescue Network, IUCN, Canada

National Park Service among others. Some activities aim to revive the traditions of the Udege, by helping them reinvigorate their traditional land use practices.

7. Gaps Filled in the Russian Boreal World Heritage System

The Bikin River valley, which borders the Central Sikhote-Alin World Heritage Site, features unique natural communities of great importance for the protection of the Amur tiger. These communities are also home to the last remaining indigenous Udege people. For these factors, it is being proposed as an extension of the existing Site.

Magadansky Nature Reserve

Name of Cluster:

Does not apply

Country - Province

Russian Federation – Magadan Province

Name of Protected Areas

Magadansky Nature Reserve

Area

883,817 ha

Altitude

From the Sea of Okhotsk level to 1548 m (Koni peninsula)

Geographical Location

The Reserve is located on the Russian Far East near the northern coast of the Sea of Okhotsk and has four clusters:

1. Kava-Chelomdzhinsky cluster (624 456 ha) is situated in the interfluvium of the Kava and Chelomdzha rivers and occupies part of the Kava-Taujskaya valley;
2. Ol'sky cluster (103 426 ha) occupies the western part of the Koni peninsula;
3. Yamsky cluster (38 096 ha) consists of three parts. The main, continental part includes 45 km of river Yama floodland. Another, coastal part includes P'yagina peninsula coastal line 1 km wide and 51 km long from Cape Cherny to Cape Yapon. The third part includes Yamsky islands located in the southern part of Shelikhov bay;
4. Seimchansky cluster (117 839 ha) is situated in the continental part on the bank of the Kolyma River.

All clusters are separated from each other and situated at the distance of 100-630 km from the reserve's headquarter (located in the city of Magadan). Average coordinates of the site: 60°10' N, 146°50' E.

1. Outstanding Features of the Site

The site consists of four clusters scattered over the area of Magadan Province, each hundreds of kilometres apart. Each cluster features unique ecological characteristics, while the Reserve as a whole represents all types of intact natural communities of the vast Far East region.

Physical Features

Geology:

The nominated site represents the special territory where large tectonic zones – Mesozoic elements, areas of Cenozoic folding and volcanic belt – are tightly

interconnected. The area belongs to the northern part of Pacific segment of the Earth's crust, and is located within the transition zone between the continental and oceanic basins. This unique location and geological history define other attributes that comprise this distinctive area.

Relief:

Clusters of the Magadansky Reserve are situated within Okhotsk-Kolyma highland and span the water-divide between Arctic and Pacific oceans, the south-eastern part of Cherskogo Mountain Ridge, and several inter-mountain basins.

The **Kava-Chelomdzhinsky cluster** features disjointed mountain massifs of 1,200-1,500 m in height in the north and north-west. Marshy plains and lakes spread over much of the cluster.

The continental part of the **Yamsky cluster** is located primarily within the Yama lowland. Spurry plains extend from one bank of the river, while the opposite bank is rugged. The Yamsky islands and Pyagina peninsula coast feature rocky shores and stony beaches.

The **Ol'sky cluster** has a mountainous relief, with peaks rising to 1,500 m. Small, fast-flowing rivers run through the area. The central part features small lakes of volcanic origin. The glacier forms of the Koni peninsula relief are World Geological Heritage Sites. The peninsula is rich in geological monuments, including ancient lava outcrops, granitoid breaks, and deposits rich in organic material.

The **Seimchansky cluster** is mostly flat, excepting one undulating area, 400-700 m high, along its western and northern boundaries. Thick permafrost has developed on the cluster's terraces and in the highlands.

Climate

The Magadansky Reserve is located within subpolar and moderate climate zones, and is characterized by long, cold winters. The summer vegetation period is short and cool, with uneven humidity and frequent summer frost. Isolated intermountain basins have more favourable climates than the highlands. The climate of each cluster varies considerably.

The climate of the Kava-Chelomdzhinsky cluster and continental part of Yamsky cluster is continental, tempered by the marine influence. Temperature is below freezing from November through April. The average annual temperature is +8 degrees Celsius. The coldest month is January has an average temperature of -28 degrees Celsius, with absolute lows of -60 degrees Celsius. Summer is short, averaging +11 degrees Celsius in July, with occasional highs of up to +38 degrees Celsius. Annual average precipitation is 564 mm.

The climates of coastal areas of the Reserve (the Ol'sky cluster and coastal parts of the Yamsky cluster) are mitigated by ocean effect. The average annual temperature is +2 degrees Celsius; January average temperature is -12 degrees Celsius; and absolute lows reach -28 degrees Celsius. Summers are cool and rainy. August temperatures average +9 degrees Celsius, with absolute highs of +27 degrees Celsius. An average of 450 mm precipitation falls annually.

The Seimchansky cluster has an extreme continental climate. The annual average temperature is –12 degrees Celsius, January averages –39 degrees Celsius, but can go down to – 62 degrees Celsius. Spring is short, with day/night temperature fluctuations. Summer is also short but warm, with July temperatures averaging +15 degrees Celsius, and reaching up to +37 degrees Celsius. The average non-frost period is 51 days. Annual precipitation averages only 290 mm.

Widespread permafrost is a special feature of Magadansky Reserve. Its thickness reaches 200-250 m under river valleys, and 400-500 m under elevations. The maximum thawing depth in sandy and sandy loam soils is 2-4 m.

Vegetation

Species of the two major floristic zones – Asian-Bering and East-Siberian (Yakutian) – interpenetrate the region. The Reserve presents the most typical floristic zones of the South of Magadan Province. According to the latest data, areas of the three coastal clusters alone feature 638 species of vascular plants. The Seimchansky cluster, is a habitat for 236 species.

More than a half of the Cluster's total area is covered by coniferous forest. Larch is the most common tree in the region. In fact, the seven types of Larch forest differentiated in the Reserve account for 62% of the Reserve's total forest area.

The next most common tree species is the Dwarf Cedar (*Pinus pumila*). It covers 34% of forest area in the Reserve, growing both in pure communities and under Larch forest canopy.

Along rivers and brooks where there is no permafrost, so-called "belt forests" grow. Poplar, Chosenia (*Chosenia arbutifolia*), Alder and Dendrite willows grow exclusively in these belt forests, which are characterised by the highest diversity of plant and animals species. Relict valley forests with Poplar and Chosenia also grow along large rivers.

A relict range of Siberian Spruce in the Yama River floodplain is located 1,000 km away from its main ranges in Yakutia and Khabarovsk Province.

Fauna

The rivers and lakes of the Reserve are home to 32 fish species. The region's coastal clusters accommodate the largest salmon spawning grounds in the Magadan area (Humpback, Chum, Silver salmon). The Silver salmon spawning grounds in the Chelomdzha River are probably the most productive in the world.

Avifauna are rich and diverse. The Reserve is home to 173 bird species, 150 of which also nest there. Large bird colonies are found on the rocky coasts of the Ol'sky and Yamsky clusters, featuring auks, puffin (*Fratercula corniculata*), murre, guillemot, seagulls, and cormorants. The Yamsky islands are famous for the largest bird colonies in the northern Pacific, with over 7 million birds. Some species are listed in the Red Data Book of Russia. Of these, the most notable is the Steller's sea eagle (*Haliaeetus pelagocus*), an endemic species of the Far East, with a permanent population of about 50 nesting pairs in the Reserve. Other Red Data Book species are osprey, Peregrine, and a small populations of Fish eagle Owl (*Ketupa*

blakistoni), golden eagle, white-tailed eagle, Berwick's swan and white-billed northern Diver.

Wetlands spreading over major parts of the largest Kava-Chelomdzhinsky cluster of the Reserve abound with nesting water birds and sandpipers. The midstream of Kava River is known as the southernmost breeding site of white-fronted goose in Eurasia.

The largest of the Yamsky islands in the Sea of Okhotsk is the breeding site of Pinnipeds Lair. The coastal waters of the Koni and Pyagina peninsulas are home to three species of Phocidae family: *Erignatus barbatus*, *Phoca vitulina*, *Phoca hispida*.

There are 39 species of terrestrial mammals in the Reserve, including regionally rare bighorn sheep, wild reindeer, Kamchatka marmot, bats, water-shrew, large Japanese field mice, and lynx. The area is replete with chipmunk, blue hare, fox, sable, ermine, mink, elk, and brown bear.

Cultural Heritage

There is no cultural heritage within the Reserve.

2. Management Status

IUCN Management Category

IUCN Category I.

(WHS Criteria: Ni, Niii, Niv)

Date and History of Establishment

The Magadansky State Nature Reserve was established in 1974. Clusters location were chosen with an aim to give full representation of all natural communities in the region, especially those least affected by industrial activity, and also habitats and reproduction areas of common and rare flora and fauna species requiring protection. In 1982 it was officially established as protected area of federal level including 2 km wide protection zone along the borders of its clusters. Since establishing until now the size and configuration of the Reserve have not been changed.

Land Tenure

The Government of the Russian Federation.

Conservation Value

The proposed site features natural ecosystems, which are unique and extremely valuable for the conservation of biodiversity. The Yama and Chelomdzha Rivers are the largest salmon spawning grounds in the Magadan region. The Silver salmon spawning grounds in Chelomdzha River are arguably the most productive in the world. Vast area of the Taujskaya lowland is a major refuge for water birds. Finally, the bird colonies of Yamsky islands are the largest in northern Pacific.

Many ecosystems are located on the margin of their range or are at considerable distance from it. For instance, the Kava river features the southernmost Eurasian nesting ground of the white-fronted goose.

The glacier forms of the Koni peninsula relief are on the World Geological Heritage List.

Conservation Management and Management Constraints

The major objective of the Magadansky Reserve is the conservation of typical and unique natural communities, monitoring of biota, and environmental education and public awareness in the region. The Reserve's development plan until 2005 includes the following activities:

- Enlarge the area of the Reserve by incorporating adjoining water zones;
- Increasing the number of enforcement staff and reorganizing the protection scheme of the Reserve's area and water zone;
- Developing a strategy and methods of prevention for fighting forest fires using GIS;
- Developing GIS for the Reserve and the adjoining areas;
- Establishing regional centres for environmental education and public awareness.

Staff

In early 2001 the staff of the Reserve included 42 people:

- Administration – 3;
- Bookkeeping and Personnel department – 4;
- Enforcement department – 28;
- Science department, including environmental education sector – 5;
- Technical department – 2.

3. Potential Threats

The Reserve is a long way from settlements, there are no local human populations living on the site, and no economic activity is being pursued at this time. A majority of the outposts are located outside of the protected area in the buffer zone. Industry has only an indirect effect on the state of the natural communities.

In the **Kava-Chelomdzhinsky cluster**, upstream in the of Kava River in Khabarovsk Province, small-scale gold mining takes place. The sewage from gold mining is discharged into the river and might have a minor effect on the Reserve, located downstream.

Ol'sky and Yamsky clusters. Both clusters have a sea boundary passing along Koni and Pyagina peninsulas and Yamsky islands. If impending plans for oil drilling

on the Sea of Okhotsk shelf are realized, the coastal zone might be threaten by oil pollution.

Seimchansky cluster. The work of the Kolymenskaya Hydropower Station, situated upstream on the Kolyma River (village of Sinegorye) brings about considerable fluctuations in the water level downstream. This has an overall negative effect, causing degradation of the Chosenia Poplar communities of the protected islands.

4. Local Populations living on the Site

Local Human Population

There is no local population in the Reserve's area nor in its buffer zone. The research station of the Magadan department of the Pacific Institute of Oceanography and Fishing (PINFO) occupies 0.2 ha of the reserve area. The total area of the Reserve occupied by houses and other buildings is 0.5 ha.

5. Tourism Potential

Visitors and Visitor Facilities:

Five ecological trails have been proposed in the Reserve, but have not been equipped due to lack of funds. The Yamsky cluster has a guesthouse for 15 people, visited by about 200 tourists annually.

In 2000, a total of 174 Russian tourists and five groups of foreign tourist (48 people in total) visited the Reserve. The areas visited were mostly adjacent the buffer zone). Several tourist companies are willing to organise ecological tours in Magadan.

6. Scientific Research Potential

Scientific Research and Facilities

The Reserve carries out monitoring of flora and fauna, and long-term phenological observation. All data collected over the 19 years of the Reserve's existence is contained in 18 volumes of "Chronicles of Nature," making it possible to monitor the state of natural communities and to observe changes which have taken place during this period. The Reserve carries out special research on monitoring endangered (Steller's Sea eagle, osprey, Fish eagle Owl) and rare (Kamchatka Marmot, Otary) species.

Scientific studies in the Reserve are also being carried out by other research institutions, including the Institute of Biology of the North of Far East Branch of the Russian Academy of Sciences, and the Magadan Department of PINFO. Topics under investigation include "Structure and resources of flora complexes of the Magadansky Reserve", "Spatial distribution of mice mammals in taiga-tundra landscapes of North-Eastern Siberia", "Ecology and monitoring of birds (with a focus on wild geese) in Kava River midstream", and "Biomonitoring of the Pacific salmon population".

7. Gaps Filled in the Russian Boreal World Heritage System

The proposed clusters fully represent the natural communities typical of the Russian Far East.

The Kuril Islands

Name of Cluster

The Kuril Islands

Area of Cluster

151,840 ha

Country - Province

Russian Federation – Sakhalin Province, Kurilsk and Yuzhno-Kurilsk Districts

Name of Protected Areas

Kurilsky State Nature Reserve (Islands of Kunashir, Demina and Oskolki) with its buffer zone.

Maliye Kurily Nature Refuge of federal level (islands of the Smaller Kuril Range: Shikotan, Zeleniy, Yuri, Tanfilyeva, and Anuchina islands with adjacent rocks, reefs and marine protected area within the territorial waters of our country).

Area

Total area of 151 840 ha. This includes:

Kurilsky State Nature Reserve: 65 365 hectares

Buffer zone of Kurilsky State Nature Reserve (excluding marine protected areas): 41 475 ha including:

- 1) Rudny site: 15 218 ha;
- 2) Tyatya site: 628 ha;
- 3) Lovtsovsky site: 6 375 ha;
- 4) Stolbchaty site: 3 186 ha;
- 5) Sernovodsko-Golovninsky site: 16 068 ha.

Maliye Kurily Nature Refuge: 45 000 hectares, including:

- 1) Islands – 19 800 ha,
- 2) Marine areas – 25 200 ha.

Altitude

From sea level to 1 822 mamsl (Tyatya Volcano on the Island of Kunashir)

Geographical Location

The chain of Kuril Islands stretches from south-west to north-east, from Hokkaido Island in Japan to the Kamchatka Peninsula in Russia. The nominated site includes part of Southern Kuril Islands (43°20' – 44°32' N, 145 °22'- 146°56' E) and part of the Middle Kuril Islands (45°32' – 46°12' N, 149°19'- 150°35' E).

1. Outstanding Features of the Site

Physical Features

The Kuril Islands are a classic example of a global geological system called “island bends.” The islands form a typical oceanic island bend, characterized by distinctive tectonics, magmatism, landscape and natural mineral resources.

Situated in the open ocean, these areas are subjected to tsunamis, storms and the extensive rise and fall of the tides, and are frequently subject to various natural disasters.

These islands are part of the Kuril volcanic bend situated on the boundary of two gigantic tectonic plates: the Asian and Pacific plates. It is a region with high seismic and some volcanic activity.

Contemporary landscape-forming processes within the nominated territory are broadly represented. On the Islands, volcanic, coastal (terraces, beaches and cliffs of various types, wave niches, caves, abrasion ruins) and aeolian (sand hills and dunes) landforms are found. The most impressive and obvious are the volcanic landforms, especially as volcanic and tectonic processes play the leading role in shaping the present-day surface of the Kuril Islands. These landforms include strato-volcanoes, slag cones, explosion craters, maars, lava and slag fields, extrusions, calderas, caldera and crater lakes, summit ruins and deformed crater edges, barranca, coastal lava cliffs, benches, prepared necks, stocks, dikes, extrusive formations, ruins and kekurs of various origin and fumaroles. There are several active volcanoes on the Islands (Trezubets, Berga, Tyatya, Ruruy and Golovnin) as well as many ancient volcanoes. Volcanic centres located on the Kunashir were active throughout the Pleistocene era, resulting in the accumulation of thick volcanogenic-sedimentary layers, representing sequences of palaeogeographic events over the last two million years.

The processes of contemporary mineral formation are also well represented here. Gas jets and bacteria in thermal and cold mineralised springs are major mineral-forming factors.

From a hydrological standpoint, the Kuril Islands are in an extraordinary location. The islands are situated on the boundary of two huge marine systems, and determine the water exchange between the warmer Pacific Ocean and the colder Sea of Okhotsk. The Kuril Archipelago is characterized by a specific system of warm and cold oceanic currents along the islands, up-wellings (rise to the surface of deep waters rich in biogenic compounds), and eruptions of surface and underwater volcanoes. Volcanic eruptions produce large amounts of diverse mineral substances.

The uniqueness of the Southern Kuril Islands (Kunashir Island and the Smaller Range) is linked to the formation of land bridges with neighbouring islands and the continent as a result of sea level drops during the cold periods of the Pleistocene Era. During the warmest periods when sea level was high, the islands were separated into yet smaller islands by shallow straits (so-called “repeated isolation”).

Climate

The climatic conditions of the Kuril Islands are distinctive and specific for the region. The climate is humid-oceanic, characterized by strong winds. The Southern Kuril Islands are considered the region of "snowy sub-tropics," with snowy and relatively mild winters, short vegetation periods, and only a few days of sunny weather each year. The average annual precipitation amounts to 1,300 mm. The phenological seasons of the year are shifted by 20-30 days when compared to calendar seasons.

Winter, the longest season, lasts 108 days. The average winter temperature is -3 degrees Celsius. Winter precipitation is the lowest (190 mm), and it unevenly distributed as snow is blown off the open areas accumulates in valleys and gorges. Summer usually begins in late-June to early-July and lasts about 85 days. The average summer temperature is +14 degrees Celsius.. Most precipitation falls in summer (an annual average of 424 mm) in the form of rain, rainstorms and frequent fogs.

Cyclones (typhoons), accompanied by heavy rains, are defining features of the Kuril climate in summer and autumn. Two months' precipitation can fall within two to three days, and storm winds reach up to 40 m/sec.

The meso- and micro-climate here is mainly determined by the landscape. The climate of some areas depends on the direction of mountain ranges, their altitude and the size of the island in question.

A special micro-climate is found in valleys that are protected from the wind, and also in areas near hot springs. In such areas, the density of thermophilic "southern" plants is the highest.

Vegetation

The geographic location of the Kuril Islands, on the boundary between the Sea of Okhotsk and the Pacific Ocean, combined with the variety of landscapes and climatic conditions, creates a diversity of species inhabiting the islands. The ecosystems found in the most extreme and severe conditions are comprised of cold-resistant, "northern" species. Meso- and micro-climatic features (active volcanoes and hydrothermal springs) allow the existence of relic, ancient ecosystems of thermopiles. Thus, representatives of the "northern" flora and thermophilic species often grow together on the islands. Species of Japan/Korean, Manchurian and Okhotsk/Kamchatka flora and fauna are also encountered here. For example, on the volcanoes of Golovnin, Ruruy and Tyatya, the combination of Bamboo (*Sasa*) and Japanese Pine (*Pinus pumila*), or dark coniferous trees entwined with Lianas demonstrate the paradoxes of the nature of the Kuril Islands. Some unusual combinations can be seen, such as Oak groves occurring next to Japanese Pine forests.

At the same time, critical conditions encourage the development of evolutionary adaptive processes. The resulting habitats contain the majority of Kuril endemic species that have evolved over the latest geological epochs (so-called neo-endemism).

Large numbers of diverse mineral compounds ensure the high productivity of soils and coastal waters. This region can be considered one of the most biologically productive of the world's oceans.

The inter-zonality phenomenon is a distinctive feature of the littoral zone on the Southern Kuril Islands and does not occur on the other Kuril Islands, Sakhalin or Hokkaido. The phenomenon is a disruption of patterns of flora and fauna distribution in relation to geographic latitude. This disruption occurs only when a complex structure of marine ecosystems is formed by different biogeographical elements within a relatively small (littoral ecosystems at the south of Kunashir Island and warm bay areas on Shikotan Island).

Tree species dominate the islands (48%). Highland and mountain multi-zonal species make up 21%, while meadow-swamp species make up 23%. The littoral coastal ecosystems are relatively poor in species (6%).

Boreal plant and animal species common in the Russian Far East prevail in the Southern Kuril Islands. Forests are the major vegetation type on Kunashir Island (approximately 74% of the territory). Dark coniferous trees make up 62% of the forest area. These include Glen's Spruce, which grow in the wetlands and on the slopes of volcanoes. Approximately 8% of the forested area consists of stone birch forests, mainly Erman's Birch (*Betula ermanii*) with some Flat-leaf Birch (*Betula platyphylla*). Dwarf Pine (*Pinus pumila*) groves occupy around 14% of the forested area.

The southern part of Kunashir Island features specific broadleaf forests, fragments of which can be found near the warm springs on the Ruruy Volcano.

The tall grass ecosystems on the Southern Kuril Islands are a natural phenomenon of the moderate zone. Strong tall grass grows to 2 –4 m on leeward sides of cliffs, on the coastal terraces and in the mouths of rivers and brooks. Far-Eastern tall grass communities, being a relic ecosystem, differ from the tall grass ecosystems of the Altai, Sayan, Caucasus and Alps in their specific floristic composition and height of grass.

Twenty-four vascular plant species registered in the protected areas of Southern Kurils are globally rare or endangered.

The Smaller Kuril district is floristically exceptional. Isolated fragments of dark coniferous (Ayan Spruce and Sakhalin Fir) and deciduous forests (Stone Birch, Alder) occupy about 40% of Shikotan Island. Small islands in this range feature many grasses and shrubs, but tree species are almost absent.

Forty-four species of mushrooms, higher, and lower plants in the State Nature Reserve and Maliye Kurily Reserve are listed in the Red Data Book of Russia.

Fauna

In addition to taxonomic diversity and the presence of endemic species, the mollusc fauna on the Islands features southern Japanese species as well as the more northern taxons.

The Kurils Islands are an important ornithological area. They are part of the transcontinental migration route for birds travelling to the northern regions of the

Far East. The coastal waters around the islands provide the largest wintering area in the Far East for coastal-marine and marine bird species (Anatidae, Gaviidae, Phalacrocoracidae, Lariformes, Alciformes). The ornithological fauna is very diverse. One can see northern taiga species (*Tarsiger cyanurus*, *Spinus spinus*) and species of southern coniferous-broadleaf and broadleaf forests (*Parus varius*, *Luscinia akahige*) occurring in the same forest site. The islands also feature peculiar concentrations of avifauna. Birds that are rare on the mainland are frequently found on the islands, whereas common mainland bird species are generally rare on the islands. In total, 273 bird species have been recorded within nominated site. Among these are 112 rare bird species, including 39 listed in the Red Data Books of IUCN and Russia. These include the Japanese crane (*Grus japonensis*), several pairs of which nest on Kunashir Island and on the islands of the Smaller Kuril Range. A small population (approximately 25 pairs) of a rare island subspecies of fish eagle Owl and Ketupa Blakistoni (Seeb) also inhabit Kunashir Island.

The Kuril Islands are situated on the boundary of the European/Siberian and Manchurian/Chinese sub-regions of the Palaearctic (Map 5, p.113). The Southern Kuril Islands are home to 28 species of mammals. Among these, three species of marine mammals, *Enhydra lutrus*, *Phoca vitulina stejnegeri* and *Eumetopias jubatus*, are listed in the Red Data Book of IUCN. A local endemic species, *Clethrionomys shicotanensis*, is found on Shikotan Island.

Local populations of salmon (Humpbacked and Siberian salmon) have one of the highest reproduction levels in the world. salmon, which spawn in the rivers and lakes of Kunashir Island, are the largest in the Far East.

The islands of the Smaller Kuril Range have large breeding grounds for Kuril Antur seals, including *Phoca vitulina stejnegeri* (2,500 individuals) and *Eumetopias jubatus* (1,000 individuals). Both species are listed in the IUCN Red Data Book.

Cultural Heritage

The cultural heritage of the islands has yet to be studied. The islands have long been traditional fishing and hunting grounds for indigenous peoples and also for pioneers from Alaska, China, Japan and Russia.

2. Management Status

IUCN Management Category

IUCN Category I

(WHS Criteria: Ni, Nii, Niii, Niv)

Date and History of Establishment

In 1974, a treaty on the protection of nesting and wintering grounds of resident and migratory sea birds was signed by the USSR and Japan. The ornithological reserve Maliye Kurily (Smaller Kuril Range Islands) was established in 1983 and encompasses islands and the adjacent waters. The Kurilsky State Nature Reserve was established in 1984. In 1996, the adjacent marine areas were given protected status and formed a buffer zone for the Reserve.

Land Tenure

The Government of the Russian Federation.

Conservation Value

The area provides protection for numerous rare, endangered and endemic species of plants and animals, as well as unique ecosystems caused by natural phenomena.

Conservation Management and Management Constraints

Conservation management is undertaken on the basis of the *Regulations of the State institution The State Nature Reserve Kurilsky* confirmed by the Ministry of Natural Resources of the Russian Federation.

The major goals of the Kurilsky Reserve and the Maliye Kurily Nature Refuge are the protection of typical and unique natural communities, the monitoring of biota and environmental education and public awareness in the region.

The Reserve is surrounded by a buffer zone of 41,475 ha.

Staff

The staffs of the Reserve constitutes about 60 people:

- Administration – 10;
- Guard service – 21;
- Science department – 6-8;
- Department of ecological education and tourism – 4;
- Technical department – 18-20.

3. Potential Threats

Little economic activity occurs within the nominated site. Their significant distance from industrial centres guarantee the islands a minimal level of air and water pollution, and an undisturbed state of natural ecosystems.

The Kuril Islands frequently experience earthquakes, volcanic eruptions, tsunamis and typhoons. These extraordinary natural phenomena are relatively normal, and the ecosystems of the islands have become adapted to them.

4. Local Populations living on the Site

Local Human Population

Two settlements, Golovnino and Dubovoye, with total population of 250 people, are found within the territory of the nominated site. The land belonging to these villages is excluded from the area of the site. In addition, several frontier posts are situated on the largest islands of the Smaller Range, and on Kunashir Island. Local residents own small private plots of land and work for the fishing industry.

5. Tourism Potential

Visitors and Visitor Facilities

Island ecosystems, both terrestrial and aquatic, are vulnerable to pressure from recreational activities. However, unstable climatic conditions and an unreliable transportation system, together with their remoteness from large human settlements, do not provide for a large flow of visitors. Local tourism has only been developed on Kunashir and Shikotan Islands. The district capital Yuzhno-Kurilsk, where Kurilsky Nature Reserve's headquarters are located, has a district museum. In 1999, the number of museum visitors amounted to 1,205, including 130 foreign tourists. Two ecological routes were designed within the Reserve. In total, 850 people have visited the Kurilsky State Nature Reserve in 1999.

6. Scientific Research Potential

Scientific Research and Facilities

Since 1984, the results of scientific studies and ecosystem monitoring have been continuously recorded in the *Chronicles of Nature*.

Economic activities on the islands are restricted, but this site serves as an excellent research ground to study the structure, dynamics and evolution of terrestrial and marine ecosystems.

7. Gaps Filled in the Russian Boreal World Heritage System

This site presents largely undisturbed natural communities of a typical oceanic island bend with accompanying features, such as tectonics, magmatism, corresponding landforms, volcanic ecosystems and attendant natural cataclysms.

Chapter 3: Scandinavia

Norway

Status

Norway intends to nominate four areas for the World Heritage List. An official tentative list was provided to UNESCO in October 2002 by the Royal Ministry of the Environment.

One of the four tentative areas is an extension to the Swedish "Laponian Area", and covers some boreal Birch and Pine forests in the existing Rago National Park. The potential World Heritage area also includes an area in the fjord of Hellemobotn. This part of the area is a proposed national park within the nation-wide plan for nature protection in Norway. The forests and woodlands consist of rich Birch woodland, but also have some Pine forests.

However the boreal forest is not the main value of this tentative extension to the Laponia World Heritage Site. It is also a core area for the Lule Sami settlement in Norway. The boundaries and criteria for its inclusion will be assessed more closely before the final proposal will be submitted to UNESCO.

Norwegian Boreal forest protected areas with potential for World Heritage status

The process of making a tentative list has concluded that none of the existing Norwegian protected areas with boreal forest cover an area large enough to meet the conventions criteria for natural sites. However, two types of boreal forest areas in Norway could possibly be suitable to the World Heritage List:

1. Natural boreal forests in transboundary areas. For example, boreal forests in northern Norway, bordering Finland and Russia.
2. In central Norway, the boreal forests are growing naturally in coastal areas. This area contains an oceanic climate not found in other parts of the Eurasian boreal forest. Furthermore, these forests, called "Boreal rainforests," contain a unique lichen flora.

As part of a transboundary site or as part of a cluster, it is possible that some of the Norwegian protected areas will be part of future WHS nominations.

Map 4. Intact Boreal Forest Landscapes in Scandinavia

Laponian Area Norwegian Extension

Name of Cluster

Laponian Area Norwegian Extension

Country- County

Norway - Nordland

Proposed by

Royal Ministry of the Environment

Name of Protected Areas

Rago National Park

Area

16,700 ha (167 km²)

Altitude

Not provided

Geographical Location

Rago is adjacent to the Swedish national parks of Padjelanta, Sarek and Stora Sjöfallet (The Laponian Area World Heritage Site).

1. Outstanding Features of the Site

Physical Features

Rago National Park was designated to preserve a special natural environment in the mountains of north Norway bordering onto Sweden. It is continuous with the Padjelanta, Sarek and Stora Sjöfallet parks in Sweden, and together they make up the largest protected area in Europe. Splendid scenery awaits ramblers visiting Rago. The landscape is full of contrasts and can offer still woodlands and smooth rock faces, and also jagged cliffs, thundering waterfalls, glaciers and snowfields. When the ice retreated from the Rago area at the close of the last Ice Age, it left behind numerous large and small granite blocks which now form a remarkable element of the landscape as they lie scattered around in the terrain.

The most common access route to Rago is along Storskogdalen, a valley that extends from Laksehola in the west between smooth, rock-strewn mountainsides, to a lake called Storskogvatnet. The river flowing down Storskogdalen from the lake is flanked by pine-clad slopes and precipitous crags. It features magnificent waterfalls and rapids in several places. East of the lake, the valley continues for some distance until it meets the steep, grey mountains in the northern part of the park. The desolate, magnificent Trolldalen valley is also situated here. The mountains of Lappfjell and Flatkjølen dominate the landscape in the southern part of the park. Together they form a partially glacier-covered ridge stretching towards Sweden. North of Lappfjell is a lake called Litle Værvatnet, from whose banks

mountainsides rise precipitously. At its western end is a pass, through which the lake drains over a more-than 100 m-high waterfall, to form the Storskogelva river.

Climate

Rago, in contrast to the neighbouring Swedish national parks, has a typical coastal climate with lots of precipitation, cool summers and mild winters.

Vegetation

The plant life in Rago National Park is relatively poor, due likely to nutrient-poor soil contains and to the severe climate. Pine dominates beside the river and lake in Storskogdalen, but upland Downy Birch gradually takes over up the slopes towards the tree line. The understorey vegetation is largely poor. However, exceptions are found and at the north end of Storskogvatnet, where some Goat Willow and Rowan trees are growing, it is possible to find Alpine Blue-sow-thistle, Globeflower and Whorled Solomons Seal. As the summers are cold, characteristic alpine plants like Roseroot, Alpine Ladys-mantle, Two-flowered Violet and the Easterly Species, Sceptred Lousewort, grow all the way down in the woodland. A typical coastal species, Dwarf Cornel, is also common in the birchwoods. In these lower parts of the park, bogs also form an important landscape element. As the granite in the area produces few nutrients, they are mostly poor fens where few-flowered Sedge is a characteristic plant. Purple Moor-grass and deergrass, both of which are mire plants that thrive best in a moist coastal climate, are also found here.

In the higher parts of the national park, there is a typical, sparse alpine vegetation. Trailing Azalea, Diapensia, Crowberry and Stiff Sedge are common in dry places, whereas species like Alpine Ladys-mantle, Sibbaldia, Dwarf Willow and Parsley Fern generally grow close to snow patches. The south-eastern corner of the protected area is exciting for those keen on botany. Thanks to some exposures of calcareous schist, several relatively rare alpine plants grow here, including Alpine Whitlowgrass, Thick-leaved Whitlowgrass, Polar Mouse-ear, Carpathian Fleabane and Snow Buttercup.

Fauna

Sparse vegetation is generally accompanied by poor fauna. This is the case at Rago. Perhaps the most exciting member of the national park fauna is the Wolverine, which has its dense and hunting territories among these rugged mountains. Lynx also roam here regularly. The elk, a relatively recent immigrant, is the only member of the deer family to make the park its permanent home. There are many brown bears across the border in the vast national parks in Sweden, and it would be natural to expect that some occasionally roam over the mountains to Rago.

Figure 9. Map and picture of Rago National Park

However, no bears have been recorded here since just after the last war. Red foxes, mink and Stoats are common among the smaller predators, but Arctic foxes and pine martens are rare. The protected area also houses Hares, Squirrels and various kinds of small rodents, but their numbers vary a great deal from year to year. Beavers were released in 1968, but the specie has disappeared from Rago.

Snow buntings, wheatears, meadow pipits and rock grouse are the most common birds to be seen on the Rago mountains, but birds are on the whole scarce in the higher parts of the national park. It is more lively around the River Rago, where song thrushes, redwings, fieldfares, willow warblers and garden warblers may be seen. However, the largest numbers occur in the tall-herb woodland north of Storskogvatnet. Since there are more insects there and it is easier to find cover, several species of thrushes, warblers, finches and tits are to be found there. The dipper favours the river in Trollidal, and bluethroats live in the willow thickets along its banks. There are not many aquatic birds in the park, but with goldeneye, red-throated divers and common gulls may be spotted occasionally. Common sandpipers nest regularly each year along the Storskogselva river. In some years, the birchwoods at Rago have relatively large numbers of willow grouse, and there are black grouse and capercaillie in the pinewoods.

Owing to the many large waterfalls along Storskogselva, the area that is now a national park originally lacked fish. However, between the two world wars, trout and char were released and there are now good fish stocks in several lakes in the park.

Cultural Heritage

The area that is now a national park was formerly used in various ways by different groups of people. The Sami (Lapps) once drove their reindeer through Rago when journeying from Sweden to their summer grazing in Norway, and people living in the Sørfold district periodically took timber from Storskogdalen even though the journey to the sawmill was long and arduous. An attempt was made to work silver and lead near Ragotoppen for a while before the First World War, but the claims were unprofitable and the venture soon ceased.

2. Management Status

IUCN Management Category

Category II

Date and History of Establishment

1971

Land Tenure

No information provided.

Conservation Value

No information provided.

Conservation and Management Constraints

No information provided.

Staff

No information provided.

3. Potential Threats

No information provided.

4. Local Populations Living on the Site

Local Human Population

No information provided.

5. Tourism Potential

Visitors and Visitor Facilities

Hiking, fishing and hunting for grouse, Hare, Wild mink and Red fox are the main activities in the park. There are self-service cabins for the use of visitors.

6. Scientific Research Potential

Scientific Research and Facilities

No information provided.

7. Gaps Filled in the European Boreal World Heritage System

The proposed park would increase the size of the current Laponian Area World Heritage Site located in Sweden, covering an extended area of 570,000 ha (5,700 km².) It would also make the "cluster of sites" transboundary.

Sweden

The Swedish mountain range stretches about 1,000 km along the Norwegian border in the western part of the country. In the mountain and pre-mountain regions, about 60 protected areas (nature reserves and national parks) are established. Natural, untouched mountains, forests, mires, lakes, streams and rivers are the main components of these protected areas. In total, these areas comprise about 3.5 million ha, of which about 1 million ha is boreal coniferous forests and about 700,000 ha are Birch forests. The area of single protected areas varies from 2,000 ha to 550,000 ha. The Laponian area (World Heritage Site) comprising four parks and two reserves is the biggest unit, with a total of 940,000 ha of which 100,000 ha are boreal coniferous forest.

To summarise, the protected areas of the Swedish pre-mountain region are outstanding according to wilderness and boreal forest values in western Europe. However, more information on the potential of these sites needs to be provided in order to assess whether some of these areas could be annexed to the Laponian area. In the near future, Sweden has no intention of nominating new areas as WHS.

Map 5. Swedish Protected Areas

Conclusion

Boreal forests are underrepresented on the list of Natural World Heritage Sites. As our Planet is subject to ever-intensifying anthropogenic stresses, the preservation of the boreal forests' diverse ecosystem is vital. Representing the habitat of many rare and endangered species, and serving as a carbon sink to mitigate the process of global warming, boreal forests are imperative for maintaining global homeostasis.

World Heritage status can facilitate the preservation of ecosystems like the boreal forest through such factors as:

- Securing guaranties of conservation and integrity of unique natural systems by increasing local and global awareness;
- Enhancing the prestige of the areas and of their managing institutions;
- Popularizing the sites included on the List, as well as the development of alternative land uses (for example, environmental tourism);
- Securing priority of financial support for World Cultural and Natural Heritage Sites, on behalf of the World Heritage Fund.

As a first step in the journey to add boreal forests to the list of Natural World Heritage Site, this study found that there are several exceptional protected area sites throughout the boreal ecozone meriting World Heritage Site status.

Two methods were used to identify candidate boreal forest sites. First, protected area experts from governmental agencies and nongovernmental organizations were identified and consulted in each of the contender countries. This process was largely successful, as most individuals contacted participated with enthusiasm. In Canada, the study also allowed for greater collaboration between governments and First Nations on protected areas issues. This was a significant yet unanticipated outcome.

A second method of site identification employed the services of expert organisations with databases on boreal forest protected areas. In addition to providing information on potential sites, these databases were used to generate maps of candidate World Heritage Sites. Some of the sites proposed by government and NGO experts corresponded with those proposed by the database experts.

With information obtained through these two methods, potential sites were proposed in each of the three world areas where boreal forests are found: North America, Russia, and Scandinavia.

Next steps

This study represents the first phase of a multi-phased process. Based on the outcomes of this study, it is premature to assess the merits of the individual proposed sites.

The second phase of this project will identify candidate sites. Assuming that sufficient funds are available, UNESCO and IUCN will convene a workshop in 2003

in Russia to bring together experts from all countries that participated in the boreal forest study. Their mandate will be to evaluate the different proposals, and assess their relative merit in accordance with World Heritage Convention criteria.

It is anticipated that the workshop will take place in Kostamus Zapovednik, Russia near the Finnish border, from 19-21 May 2003. Two co-Chairs will be facilitating the workshop: Mr. Tom Lee, Special Advisor to Parks Canada, and Ms. Natalia Danilina, Vice-Chair (Eurasia) of IUCN's World Commission on Protected Areas.

Experts participating in the workshop will be asked to:

- Identify and rank priority areas within the boreal forest ecosystem which could be recommended for World Heritage nomination;
- Identify opportunities for serial (cluster) and/or transboundary nominations where appropriate;
- Discuss issues affecting conservation of those areas and ways to address them, especially management issues and potential threats;
- Review opportunities for cooperation with different partners in order to achieve sufficient protection of those areas, as well as for getting support for the nomination process;
- Discuss limits of sustainable use to be allowed in WH boreal forests;
- Promote the use of the WH Convention as a tool to protect boreal forests and as a tool to help build up management capacity of boreal forest sites;
- Discuss what other international instruments would be appropriate to help improve the protection level of these sites, or at least to highlight their outstanding values;
- Discuss how many WHS are optimal to adequately protect the different types of boreal forests of the world in terms of number and total area protected;
- Discuss feasibility for nominating the identified priority areas.

Following the workshop, a published report will be prepared by IUCN and UNESCO, and publicly distributed.

If you have comments or suggestions, or if you would like to participate in the workshop, please contact Pedro Rosabal (pedro.rosabal@iucn.org) or Georgina Peard (georgina.peard@iucn.org).