

## World Heritage Sites

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## PUTORANA PLATEAU RUSSIAN FEDERATION

*This basalt dome in northern Siberia above the Arctic Circle is at the northern end of a vast basalt effusion which occurred at the Permian-Triassic boundary 250 million years ago. As a result of tectonic uplift it is deeply dissected by canyons with slopes eroded into giant steps. It lies between northern taiga and Arctic tundra on the border between a humid cyclonic and a dry continental climatic regime and its flora is therefore relatively rich for its latitude. The area supports a wide range of Arctic ecosystems. It is also notable for many lakes and waterfalls, for an isolated population of Putorana snow sheep, and for the major avian flyway and reindeer migration route which cross it.*

### COUNTRY

Russian Federation

### NAME

Putorana Plateau

### NATURAL WORLD HERITAGE SITE

2010: Inscribed on the World Heritage List under Natural Criteria vii and ix.

### STATEMENT OF OUTSTANDING UNIVERSAL VALUE

The UNESCO World Heritage Committee adopted the following Statement of Outstanding Universal Value at the time of inscription:

#### Brief Synthesis

This site coincides with the area of the Putoransky State Nature Reserve, and is located in the central part of the Putorana Plateau in northern Central Siberia. It is situated about 100 km north of the Arctic Circle. The part of the plateau inscribed on the World Heritage List harbours a complete set of subarctic and arctic ecosystems in an isolated mountain range, including pristine taiga, forest tundra, tundra and arctic desert systems, as well as untouched cold-water lake and river systems. A major reindeer migration route crosses the property, which represents an exceptional, large-scale and increasingly rare natural phenomenon.

Comprising a vast area of 1,887,251 ha, the property is located in the centre of the Putorana Plateau in the northern part of Central Siberia. The part of the plateau inscribed on the World Heritage list harbours a complete set of subarctic and arctic ecosystems in an isolated mountain range, including pristine taiga, forest tundra, tundra and arctic desert systems, as well as untouched cold-water lake and river systems. The combination of remoteness, naturalness and strict protection ensure that ecological and biological processes continue at a large scale with minimal human influence. The property provides a dramatic demonstration of ecological processes, including the interactions between healthy populations of a full range of Arctic fauna. A major reindeer migration crosses part of the property. The property is also one of the very few centres of plant species richness in the Arctic.

**Criterion (vii):** A vast and diverse landscape of striking natural beauty, the Putorana Plateau is pristine and not affected by human infrastructure. Its superlative natural features include an extensive area of layered basalt traps that has been dissected by dozens of deep canyons; countless cold water rivers and creeks with thousands of waterfalls; more than 25,000 lakes characterized by a fjord-like formation that is associated with a large variation in the relief. The immense arctic and boreal landscapes remain intact with carpets of lichens and forest that are unusual at such northern latitudes.

**Criterion (ix):** The property displays a comprehensive set of ecological and biological processes associated with its diverse arctic and subarctic ecosystems. Its bio-geographical location, on the border of the tundra and taiga biomes

and at the transition between Western and Eastern Siberian floras, makes the property one of only a few centres of plant species richness in the Arctic. The combination of landscape diversity, remoteness, naturalness and degree of protection are extraordinary. In addition, the property may provide valuable evidence on the impacts of climate change to large-scale natural arctic ecosystems if proper monitoring and research take place.

### **Integrity**

The property is a strictly protected State Nature Reserve, or “Zapovednik”: its boundaries coincide with those of the Putoransky State Nature Reserve, established in 1987. The property is large and is surrounded by an extensive buffer zone of 1,773,300 ha. The property's size, remoteness and naturalness, as well as the degree of protection afforded to it are essential attributes in ensuring the protection of the full range of largely undisturbed landscapes and processes that are the basis of its Outstanding Universal Value. The property includes the key areas and features that are essential for maintaining the property's natural beauty. A full range of important natural features, such as lakes, canyons and waterfalls, is located within its boundaries. The property is also of sufficient size and contains the necessary elements to maintain the ecological and biological processes that are essential for the long term conservation of the property's ecosystems and biological diversity, and the migratory species that rely on its natural state.

Difficult access is also a contributor to the property's integrity: there are no roads within the property and large parts of the buffer zone, thus the property is only accessible by helicopter or boat. The property is also unaffected by the impacts of mining and other land-uses incompatible with its values. Important natural values linked to the property are located in the buffer zone, and their conservation is also an essential requirement.

### **Protection and management requirements**

The property was declared a strictly protected State Nature Reserve (Zapovednik) in 1987. No land or resource uses are allowed other than scientific research and monitoring. A number of other federal and regional laws and regulations on nature conservation, land use planning, scientific research and monitoring, and environmental education apply to the property. The combination of a strict legal and management framework, remote location and lack of any road infrastructure enables effective management of the property with relatively modest staffing and funding levels for a protected area of this magnitude. Increasing tourism in the buffer zone carries the risk of unauthorized access to the property, including for hunting and fishing. There is a need for unambiguous and rigorously enforced land use and building arrangements in the buffer zone and for regulations of tourism, including strict limits on air traffic.

Mining is a potential threat to the property. The Federal Law on Specially Protected Natural Areas prohibits mining in the property. It must be ensured that the impacts of existing and future mining outside the property will not affect in any way the Outstanding Universal Value and/or integrity of the property, for example through air pollution, pipelines or the development of any supporting infrastructure. One of the most important inter-regional reindeer migration routes crosses the property. As the continuation of this natural phenomenon depends strongly on the natural conditions of the areas within and outside the property, effective legal and management systems are required to ensure that human use, including tourism, mining and other development will not adversely affect this phenomenon.

## **IUCN MANAGEMENT CATEGORY**

1a Strict Nature Reserve

## **BIOGEOGRAPHICAL PROVINCE**

West Eurasian Taiga (2.3.3) / High Arctic Tundra (2.26.9)

## **GEOGRAPHICAL LOCATION**

The property lies on the Putorana plateau, south of the Taymir Peninsula and east of the Yenisei River in Krasnoyarsky Krai, northern middle Siberia, 1,400 km due north of Krasnoyarsk. Its bounding coordinates are: 69°53'30"N by 93°28'30"E to 68°20'00"N by 94°46'40"E and 69°00'40"N by 91°45'40"E to 68°42'30"N by 96°38'00"E.

## **DATES AND HISTORY OF ESTABLISHMENT**

1987: Putoransky Zapovednik, including a 1,773,300 ha buffer zone, was created by Decision 482 of the Krasnoyarsky Krai Soviet Peoples Deputies Executive Committee;

1993: Putoransky Zapovednik enlarged.

## **LAND TENURE**

Federal property, within Krasnoyarsky Krai province, 1,363,321 ha in the Taymyrsky and 523,930 ha in Evenkiysky Autonomous Districts. Managed by the Putoransky State Nature Reserve under the Protected Nature Territories Department, Federal Service for Nature Management Supervision.

## **AREA**

The World Heritage site covers 1,887,251 ha. This excludes the 1,773,300 ha buffer zone.

## **ALTITUDE**

~ 500-1,678m (Kamen Peak)

## **PHYSICAL FEATURES**

The Putoransky Reserve covers three-quarters of the Putorana Plateau. This is a low highland dome of basaltic trappe (rock steps) lying north of the Arctic Circle. It is bounded by 300-800m scarps except to the south and is mostly between 800-1,000m high but rises to 1,701m. Its rugged markedly eroded relief is dissected by deep canyons in places up to 1,500m deep. Typical of the area are the huge stepped slopes and river thalwegs of basalt between eroded layers of sedimentary rock. The original plateau surface of Paleozoic sandstone, claystone and clay slate strata was uplifted in the late Permian 250 million years ago, accompanied by massive outpouring over a long period of thick layers of basalt, diabase dykes, sills and dolerite, alternating with now deeply eroded layers of tuff and sandstone tuff. In the Triassic period, the 2,000m-thick dome began a still continuing rise which, with glaciation, deeply incised the existing river valleys, many of which are now long lakes. In the west 20-30 basalt rock trappe steps, each of three layers of differing volcanic rock are exposed. This vast flood of basalt, exposed from Norilsk almost to Krasnoyarsk, 1400 km south, was of a scale and type of volcanism similar to that of the Deccan in India which there coincided with the mass extinction of life at the end of the Cretaceous period. Other such sites are the Columbia Plateau in northwestern U.S.A. and the lava plateaus of Ethiopia and western Arabia (Saunders & Reichow, 2006).

The early Tertiary tectonic fracturing imposed a conflicting pattern on the dome, diverting the earlier river network at sharp angles, re-forming and entrenching dense networks of fast-flowing rivers, both aggrading and degrading, forming deep lake-filled cracks. There are more than 25,000 small lakes, 18 of which are over 50 km<sup>2</sup> in area, covering some 10% of the plateau. The largest in the Reserve is Lake Ayan, 55 km long and 256m deep. The number also includes, mostly just west of the buffer zone, several of the longest and deepest natural lakes in Siberia (the fjord-like lakes Lama, Keta, Glubokoye and Khantaiskoye), between 50-150 km long and 50-420m deep, with floors well below sea level. They form the second largest fresh water reservoir in Russia after Lake Baikal. Most lakes freeze solid to as deep as 2m in the east, melting for 5-7 weeks in the summer. The water table fluctuation even of large lakes in the east reaches 4 to 5 metres. The water is pure and high in oxygen though coloured greyish by minerals and is low in phosphates and nitrates. The plateau has Russia's highest concentration of past lake sediment lenses, and abundant waterfalls which become walls of ice in winter. One of these on the Kanda River is 108m high, one of the highest in Russia. In the northeast and north, 22 tiny glaciers still remain.

Strong autumn and winter winds create huge snowdrifts, which form perfect thermo-isolators, preventing rivers from freezing, and decreasing the thickness of the permafrost which covers the major part of the plateau. This increases from 80-150m in valleys to 300-400m at high elevations and in the east, melting in spring to form an active soil layer up to 2m thick. In friable soils to the west, the resulting thermokarst process is very intensive and promotes high groundwater percolation. The southern and western foothills are covered by morainic clay containing pebbles and glacier-moved boulders. Above 1,000m, soils are non-existent. Elsewhere they are skeletal, slowly forming under permafrost or, in the forested valleys, poorly developed and sub-fallow. The area is part forest, part tundra, and is virtually undisturbed by man.

## **CLIMATE**

The Putorana lies north of the Arctic Circle and at its centre the polar day lasts 53 days between the end of May to mid July, the polar night, 31 days from early December to early January. The climate is continental with long and severe winters dominated by the Asian anticyclone, and short but warm summers. Although it is located on the line between taiga and tundra latitudes, nowhere else in sub-arctic Russia is a single landscape so closely and clearly longitudinally differentiated. In summer, its western side is subject to cyclonic activity which is hardly felt in the east. Unimpeded humid Atlantic air masses meet the 1,000m high slopes of the plateau, condense and annually drop 750-1000 mm of rain, August being the wettest month. East of 93-94 degrees however, high wind speeds and cloudiness decrease and the rainfall lessens to 300mm or less. Annually the average precipitation is 453mm, falling mostly as snow which appears in mid September before the harsh frosts and lies about 8 months, melting by the end of the second week of June; though snow can occasionally fall even in summer.

Over the last 25 years the average annual air temperature has been minus 9.7°C, the average January temperature minus 27.5°C and the average July temperature 14.2°C (the absolute maximum was 31.9°C in July 1978). The difference is noticeable between the cool humid summer of the west and the dryer warm summer to the east. In the west, winter temperatures never fall lower than minus 60°C; in the east they often fall to minus 67°C and the annual temperature range can reach 100 degrees. The change to and from 0°C occurs in late September to early October when the snow cover forms, and in late May to early June. Spring begins in April with frequent thaws, but ice on the lakes does not melt until June. In summer the temperature normally drops 0.5°C per 100m of height.

## VEGETATION

The southern two thirds of the plateau are covered by taiga forests which penetrate north along river valleys; the northern third is covered by subarctic tundra. Above 400m is mountain tundra; above 1,000m, high Arctic desert. The area, with biota of both taiga and tundra, has many endemic, rare and disappearing species of flora and fauna. Between 90 and 94 degrees east is the eastern limit of western taiga vegetation such as Siberian spruce *Picea obovata*, mountain birch *Betula tortuosa*, and Siberian larch *Larix sibirica*. To the east of this border Dahurian larch *Larix gmelini* predominates. There are 569 species of vascular plants in 209 genera and 57 families, in three altitudinal bands: 224 forest species (39%), 183 mountain species (32%) and 162 high-mountain species (29%). Circumpolar species predominate: 250 species (44%), then Siberian 178 (31%), Eurasian 86 (15%) and Asian-American 55 (10%).

There are three forest zones, sub-arctic, eastern and western north taiga. The sub-arctic zone covers most of the uplands and peaks with sparse valley forests of Dahurian larch to 750-800m with 70% lichen ground cover, understory of green alder *Alnus viridis*, willows *Salix* sp., dwarf birch *Betula nana* and juniper *Juniperus* sp. with low shrubs of cowberry *Vaccinium vitis idaea*, crowberry *Empetrum* sp. and bog whortleberry *Vaccinium uliginosum*. Taiga and mountain grasses and a mosaic of lichen-moss are typical, with lichen tundra on the bald tops. The eastern north taiga zone is similar. The western north taiga zone is patchily spread in river valleys in the west and southwest of the plateau. It is typically Siberian spruce-Dahurian larch forest with larch-mountain birch forest at higher altitudes with a bush-moss-lichen cover. Between 500 and 700m is an alder-moss-lichen belt.

The plateau marks the northern or southern limits of distribution of many boreal, mountain and alpine species. A few south Siberian species have also spread to the Putorana along the Yenisei river, becoming low arctic subspecies. Other populations separated from those in south or east Siberia are supposedly high mountain relicts of early Holocene, Pleistocene and even Pliocene epochs: golden rhododendron *Rhododendron aureum*, long beechfern *Phegopteris connectilis*, *Lomatogonium carinthiacum*, and *Gentiana algida* found in the west or south-west; and on the east side, Middendorff's birch *Betula divaricata* and the Arctic dwarf birch *B. humilis* may have spread to the west with the Siberian larch. Notable among rare species are rose-root stonecrop *Rhodiola rosea*, lady's slipper *Cypripedium guttatum*, *Euphrasia putoranica* and Siberian globeflower *Trollius asiaticus*; also the local endemics whitlow grass *Draba sambukii*, marigold *Caltha serotina*, yellow poppy *Papaver variegatum* and Putorana oxytropis *Oxytropis putoranica*, a regionally endemic fescue *Festuca auriculata pilosa*, and three central Siberian species, rush *Juncus longirostris*, oxytropis *Oxytropis karga* and dandelion *Taraxacum longicorne*.

## FAUNA

The fauna of the Putorana mountains is much less sharply separated from the surrounding plains than the flora. The plateau, lying between the forests of the northern taiga and Arctic tundra, and on a climatic border between humid cyclonic and dry continental regimes has a relatively high diversity for the region. But this is a typical combination of taiga, tundra and widely spread mountain species, only distinctive because many reach their northern or southern limits of distribution here. In total, 38 mammal, 140 bird and 36 fish species are recorded. The plateau's main bisecting river, the Kureika, and the many lakes attract one of the great global migration routes, the Central Asian flyway. The plateau is also crossed by the migration route of the world's biggest population of wild reindeer *Rangifer tarandus* of over 500,000 animals which spend 5-6 months there. The only endemic is the Putorana snow sheep *Ovis nivicola borealis*, a subspecies of the snow sheep *Ovis nivicola* which split off 15,000 years ago. Around one third of its home range is in the Reserve. From a low in the 1960s of 1,400, the population reached almost 3,500 by the mid 1980s, due to the creation of the Reserve.

The northern edge of the plateau is the northern limit for many mammals of the central Siberian taiga: northern pika *Ochotona hyperborea*, Siberian flying squirrel *Pteromys volans*, red squirrel *Sciurus vulgaris*, wood lemming *Myopus schisticolor*, Siberian weasel *Mustela sibirica*, sable *Martes zibellina*, lynx *Lynx lynx* and elk *Alces alces*. Other species include 8 species of insectivora, blue hare *Lepus timidus*, Siberian chipmunk *Tamias sibiricus*, muskrat *Ondatra zibethica*, Siberian brown lemming *Lemmus sibiricus*, Arctic lemming *Dicrostonyx torquatus*, 7 species of vole, wolf *Canis lupus*, red fox *Vulpes vulpes*, Arctic fox *Alopex lagopus*, brown bear *Ursus arctos*, ermine *Mustela erminea*, least weasel *Mustela nivalis*, Eurasian otter *Lutra lutra* and wolverine *Gulo gulo*.

The Putorana is the only protected area in the Central Palaearctic where a diverse northern taiga avifauna of 66 species is enriched by mountain species from east and west, by waterside and waterbirds (49 breeding species) and a huge migrating population. Notable among the latter are: yellow-billed diver *Gavia adamsii*, red-breasted goose *Branta ruficollis* (EN), lesser white-fronted goose *Anser erythropus* (VU: 130-140 pairs within the property), bar-headed goose *Eulabeia indica*, Bewick's swan *Cygnus bewickii*, golden eagle *Aquila chrysaetos*, osprey *Pandion haliaetus*, white-tailed eagle *Haliaeetus albicilla*, gyrfalcon *Falco rusticolus*, peregrine *Falco peregrinus*, little curlew *Numenius minutus* and grey-tailed tattler *Heteroscelus brevipes*. Three of these species are Siberian endemics, and nine nest in the Putorana, including gyrfalcon, white-tailed eagle, and slender-billed curlew. The plateau has several Arctic species and is the northern limit for many birds of the central Siberian taiga: goshawk *Accipiter gentilis*, capercaillie *Tetrao urogallus*, black-billed capercaillie *Tetrao parvirostris*, hazel hen *Tetrastes bonasia*, cuckoo *Cuculus canorus*, Himalayan cuckoo *Cuculus saturatus*, northern hawk-owl *Surnia ulula*, great grey owl *Strix nebulosa*, Ural owl *Strix uralensis*, woodpeckers and many species of *Charadriiformes* and *Passeriformes*. The Reserve is important for the conservation of the white-tailed eagle and gyrfalcon populations which have decreased through by-catching in fox-traps and poaching; also for the lesser white-fronted goose (VU). The hooded crane *Grus monacha* (VU) may be present.

Historically, several river basin networks in the area have contributed to the great variety of fish species, subspecies and endemic forms, the taxonomical status of many of which is not yet defined. Siberian endemic species and forms found in the Reserve include taimen *Hucho taimen*, the lake chars Boganida char *Salvelinus boganidae*, Lake Yesei char *S. tolmachoffi* (EN), Dryagina char *S. drjagini*, Arctic char *S. alpinus*, and Taimyr char *S. taimyricus*, banded mountain loach *Acanthocobitis urophthalmus*, Putorana loach, abyssal loach, lenok *Brachmistax lenok*, burbot *Lota lota*, humpback whitefish *Coregonus lavaretus pidschian* (VU), muksun *C. muksun*, round whitefish *C. cylindraceum* and Siberian grayling *Thymallus arcticus*.

The sole amphibian Siberian salamander *Salamandrella keyserlingii* is rare but typical of the Siberian taiga.

## CONSERVATION VALUE

The Putorana Plateau is on the site of a vast basaltic flood from Permian-Triassic times, now a pristine highland between northern taiga forest and Arctic tundra, with both humid and dry climates which make its flora unusually rich for an area north of the Arctic Circle.

## CULTURAL HERITAGE

The surrounding area is thinly inhabited by indigenous Dolgan and Evenk hunter-gatherer / reindeer-herding groups. A few traces of past occupation remain, but these have not damaged the area.

## LOCAL HUMAN POPULATION

The Reserve has no inhabitants except for transient Park staff using four compounds, and scientists at three temporary research posts. In the buffer zone there is one village, Khantaisky, beside Lake Khantaiskoye, where 400 of its 500 inhabitants are indigenous peoples who live off reindeer herding, fishing and hunting. The major industrial city of Norilsk (population 135,000) is 160 km west.

## VISITORS AND VISITOR FACILITIES

Within the Reserve itself, less than 500 people visited in 2005. In the same year visitors in the buffer zone numbered 160-200 in winter and up to 1,500 in summer, including tourists, fishermen and wild food collectors. The fishing is excellent and the lakes attract over 600 boats during summer weekends. 9 tourist and 5 ecological trails have been set up in the buffer zone; there is a guest house on the Michkanda river

for tourists as well as for scientific teams and a few guesthouses and hotels on the long lakes west of the Reserve, and individual hunting and fishing shelters. Tourist access is via Norilsk city.

## **SCIENTIFIC RESEARCH AND FACILITIES**

Research is ongoing into the Putorana snow sheep, lake and river hydrology, meteorology and flora. Other research subjects are Arctic ecology, limnology, the fauna, soil fauna, avifauna, aquatic flora and migratory reindeer. Biological field research stations are established at Lake Ayan in the center of the Reserve and on Lakes Keta and Kutaramakan in the buffer area, the former being set up with the State Scientific Research Institute of the Far North. Scientific compounds are established at Lake Manumakli in the core zone and on Lakes Sobach'e and Diupkin in the buffer area. Teams from the Russian Academy of Sciences in Moscow and St. Petersburg, from Moscow State University, the Russian Institute for Cultural and Natural Heritage and the Dresden University of Technology visit the area. Recent studies on the long eruptions of Siberian flood basalts at the Permian-Triassic boundary hypothesize that they so polluted the atmosphere with carbon dioxide and methane as to greatly increase warming of both oceans and land, which coincided in time with a mass extinction of life (Kidder & Worsley, 2004; Saunders & Reichow, 2006).

## **MANAGEMENT**

The Reserve is protected on the basis of the Putoransky Zapovednik Regulations, confirmed by the Ministry of Nature Resources order 66 of 2005, to be revised every five years. Its main natural protection lies in its inaccessibility. Management of the core zone aims to protect and monitor the natural landscape. Control of recreational hunting and fishing and the promotion of indigenous use and of eco-tourism are mainly confined to the buffer zone. The lake waters are monitored biennially, vegetation communities and animal populations annually and meteorological and hydrological conditions daily at two scientific stations.

## **MANAGEMENT CONSTRAINTS**

The industrial city of Norilsk is 160 km upwind to the west. Periodic smelter emissions from its metallurgical complex are stated in the nomination to create air pollution, acid rain defoliation and degeneration of the vegetation in the western part of the Reserve's protected zone and in the buffer zone. In this part, there is also little control of tourist pollution, small scale mining and building, woodcutting and poaching. There are ICBM missile silos in the Putorana mountains which, with the existence of the strategic heavy metal ore deposits west of Norilsk, have necessitated controls on visitors to the area (Wikipedia, 2007).

## **COMPARISON WITH SIMILAR SITES**

The main bases for comparison with similar existing World Heritage sites are:

- (vii) the arresting scenery of the plateau trappe slopes, together with long narrow lakes, numerous waterfalls and thousands of smaller lakes;
- (viii) the distinctive stratigraphy of its basaltic trappe stepped canyon sides, eroded by tectonic uplift, with the resulting fjord-like lakes and waterfalls, originating in vast eruptions of basalt. These give the site significance as being coincident with the mass extinction of life at the Permian-Triassic boundary;
- (ix) the importance of its ecological processes displayed in:
  - the relative diversity of its sub-arctic ecosystems, and microhabitats derived from a marginal biogeographic position between taiga and tundra, humid and continental regimes;
  - the existing integrity of the mountains, preserved by their inaccessibility.
  - the relatively high floristic diversity for its latitude, accelerated sub-speciation and the presence of the Putorana snow sheep.

The greatest singularity of this undisturbed dissected basalt plateau is in its location well above the Arctic Circle between taiga and tundra ecosystems, and the marked longitudinal difference between its humid western and continental eastern sides, with consequent biogeographic variety. The prominent because unvegetated step or trappe erosion into deep canyons of the basalt layers of the plateau is hardly paralleled by other basaltic World Heritage sites such as the Giant's Causeway, Iguaçu and Mosi-oa-Tunya Falls, Simien in Ethiopia or the Central Eastern Australian Rainforest sites along eastern Australia's Great Escarpment which are largely single scarps. The undisturbed unvegetated subarctic Ilulissat and Wrangel Island sites are not very comparable, Ilulissat being almost totally glacial and Wrangel a sedimentary range of barren tundra. Cold temperate sites where the vegetation runs from

boreal forest to subarctic tundra at high elevations include the Laponian Area in Sweden, the Virgin Komi Forests in Siberia, the West Norwegian Fjords, the Kluane complex in Alaska and the Yukon, and the Volcanoes of Kamchatka. But any similar fjord-like lake forms are glacial in origin (as is Los Glaciares in Argentina) not tectonic, Komi is a karst range and the Kamchatkan volcanoes are explosive not extrusive in origin. Although Putorana is a large site twice the size of the Laponian Area, it is still only 20% of the size of the Kluane complex, 40% that of the Kamchatka and Wood Buffalo Parks and 60% of the area of the Komi Forests. The remaining sites by comparison are all far smaller. There is no doubt of Putorana's regional importance for its scenery and biota, and as strictly comparable sub-Arctic World Heritage sites are few, relatively greater emphasis might rest on the globally representative quality of its tectonic and trappe geology and its biogeographic location.

## STAFF

The staff of 31 includes the Director with 3 Vice-directors, for scientific research, preservation and general administration, an accounts department of 4, a science department of 8 and a preservation department of 12, an ecological education specialist and an engineer. 4 members are in active training or study and over half the guard force is experienced in forestry and in the regulation of hunting and fishing.

## BUDGET

Funding comes principally from the federal budget. In 2005 this was RuR 4,020,200, supplemented by RuR 917,000 from the local authority, RuR 46,400 from donations and a small sum from fines for violations of Reserve boundaries, totaling some RuR 5million (US\$172,300) Project funding has come from the German Federal Agency for Nature Conservation (BfN) and WWF Russia. Additional financial support is rendered by the United Nations Development Programme/Global Environmental Facility project «Conservation and sustainable use of biodiversity on the Taimyr Peninsula area». For years, a significant financial contribution has been coming from the Russian industrial companies, such as MMC Norilsk Nickel. Maintenance expenses were RuR 4,887,600 but the nomination states that normal functioning would require RuR 8,300,000 annually.

## LOCAL ADDRESSES

The Director, Putoransky State Nature Reserve, Taimyrsky AD, Krasnoyarsky Krai, 663302, Norilsk ul. Komsomolskaya, 1, Russian Federation.

The Director, Protected Nature Territories Department, Federal Service for Nature Management Supervision, 123995, Moscow, GSP-5, Bolshaya Gruzinskaya str. 4/6, D-242 Russian Federation.

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