Nomination

"LENA PILLARS NATURE PARK"

(RUSSIAN FEDERATION)

Proposal for inscription on
THE UNESCO WORLD CULTURAL
AND NATURAL HERITAGE LIST

Prepared by:

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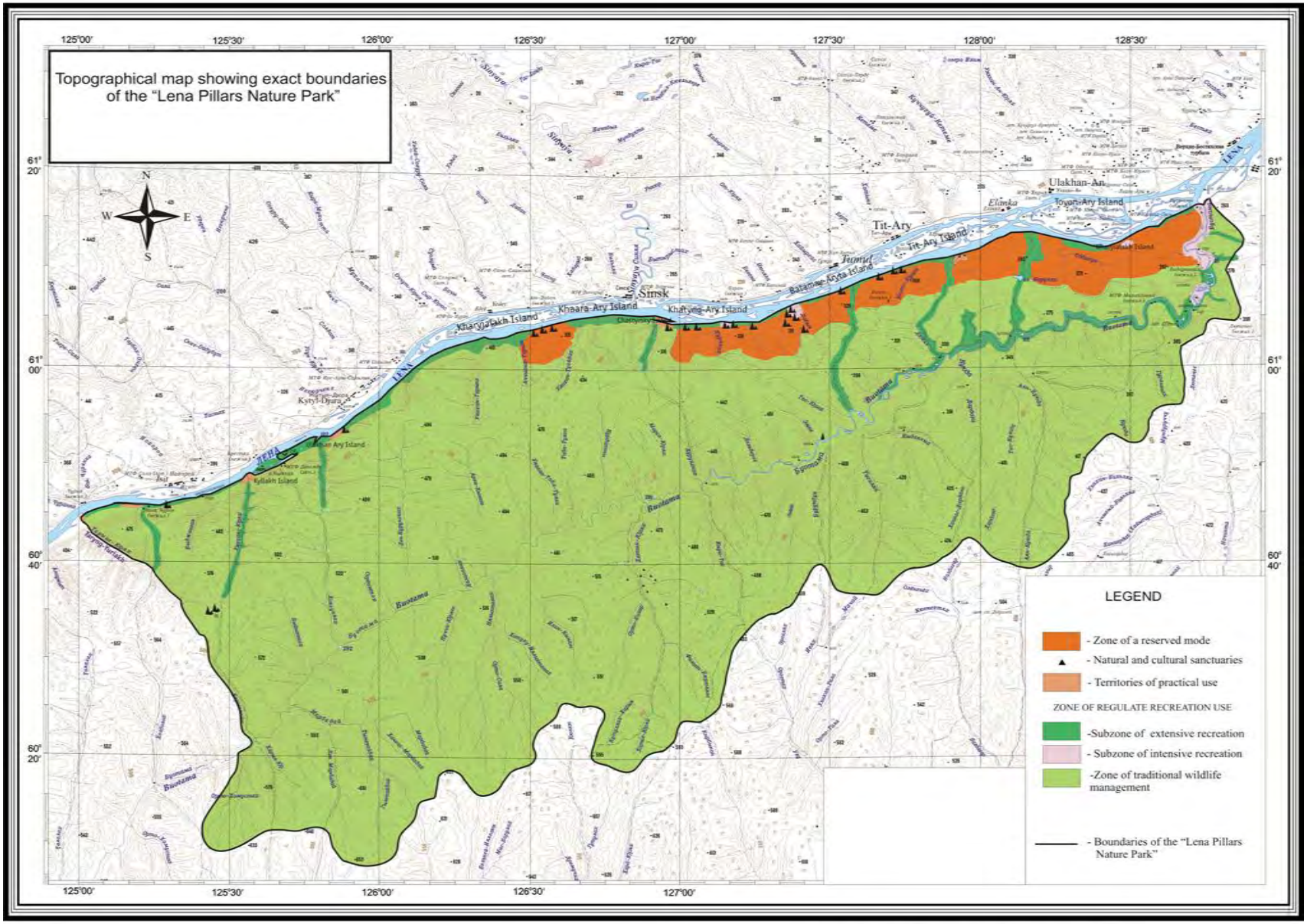
Institute of the Humanities and Indigenous People of the
Siberian Branch of the Russian Academy of Science

2010

Contents:

Executive summary

State Party	The Russian Federation.
State, Province or Region	Nominated property is located in Khangalassky and Olekminsky Uluses (districts) of the Republic of Sakha (Yakutia).
Name of Property	"Lena Pillars Nature Park".
Geographical coordinates to the nearest second	Nominated property occupies the right bank of the middle Lena River and is bordered by the following geographical coordinates: - extreme northern point: 61°16'30" N, 128°46'20" E; - extreme southern point: 60°06'30" N, 125°58'35" E; - extreme western point: 60°44'30" N, 125°02'00" E; - extreme eastern point: 61°13'20" N, 128°53'00" E.
Textual description of the boundary (ies) of the nominated property	**Northern boundary** of the nominated property starts from the Taryng-Yuryaha River mouth (right tributary of the Lena River), then it goes along the Lena River bank downstream to the Buotama River mouth and then to the Kachikatskaya branch (the south-westernmost tip of the Ary-Basa island). From here boundary goes downstream the Kachikatskaya branch to its crossing point with nameless branch. **Eastern boundary** starts from crossing point of Kachikatskaya branch and nameless branch, goes in south-easterly direction, passes westward of 263 m point. Then boundary comes southwards, passes 276 m point, and appears on watershed of the Lena and the Amga Rivers in upper reaches of the Lyutenge River, left tributary of the Amga River. **Southern boundary** goes in west-south-west direction along watershed of the Lena and the Amga Rivers till the source of the Bes-Yuryah River, right tributary of the Buotama River. **Western boundary** starts from the source of the Bes-Yurah River, goes down to the Buotama River along left the Bes-Yuryah valley side, crosses the Buotama in the mouth of the Bes-Yuryah and goes along the Khanyryaloh River, left tribytary of the Buotama River, till its sources. Then boundary crosses the Lena and the Buotama Rivers watershed, appears on the Taryng-Yuryah River source and goes down to the mouth along its stream way, i.e. to the prime point of description.
A4 (or "letter") size map of the nominated property, showing boundaries and buffer zone (if present)	Topographical map showing exact boundaries of the "Lena Pillars Nature Park".



A3. Topographical map showing exact boundaries of the "Lena Pillars Nature Park".

Justification: Statement of Outstanding Universal Value

The nominated property «Lena Pillars Nature Park» tells us three key-stories about our planet and the early evolution of life, namely: 1) the record of the "Cambrian Explosion", 2) the newcoming story of frozen ground karst phenomenon, and 3) the history of human deifying of a great natural monument.

1a) The site possesses a remarkable world-wide value being the most significant natural monument of the Cambrian Explosion, which was one of the pivotal points in the Earth's life evolution. Due to platformal type of carbonate sedimentation within tropical belt without subsequent metamorphic and tectonic reworking and magnificent impressive outcrops, the nominated property preserve the most continuous, fully documented, and richest record of the diversification of skeletal animals and calcified algae from their first appearances until the first mass extinction event which is excellent documented in parallel in three types of sedimentary basins during the first 35 m.y. of the Cambrian evolution.

1b) The «Lena Pillars» comprises the earliest and the largest, in both temporal and spatial senses, fossil metazoan reef of the Cambrian world. This reef being a site of Cambrian diversification is comparable to the Great Barrier Reef in modern world. The high preservation quality of both skeletal and soft-bodied fossils being coupled with high resolution isotope and palaeomagnetic records as well as with various well-preserved sedimentary fabrics allows researches to solve diverse ecological and evolutionary problems with a precision comparable with the study of modern biotas and communities.

2) Situated within the nominated territory Cambrian carbonates remained to be a place of unique ongoing geological processes now – the only model of recent frozen ground karst of karst plateaus. All the rock massif is touched by karst processes of perennially cryotic rocks under extremely continental semihumid climate conditions. The Lena and Buotama pillars are the only area on the globe where the processes of the fine disintegration of the rocks – cryohydration weathering – dominate in the shaping of carbonate pillar relief. These karst phenomena are enriched by thermokarst processes developed in the area of a great permafrost thickness (up to 600 m) which led to appearances of alases – thermokarst features of almost exclusively Yakutian affinities. The frozen ground karst in combination with thermokarst is an worldwide unique phenomenon of Eastern Siberia and in outstanding kind documented in the proposed property. It is quite different from all karst sites in the World Heritage List, which are located in humid areas. In turn, the semihumid continental climate conditions are expressed in a formation of tukulans which are eolian sand dunes being developed at almost polar latitudes.

3) Cambrian and present-day natural processes finally created Lena and Buotama Pillars known for inimitable beauty. Aesthetics effect of these large-scale rock river banks have no analogue all over the world. Improbable stone sculptures in form of uncountable fantastic pillars, steeples, towers with niches, passages, caves stretch for dozens of kilometers along the

banks of the Lena River and its tributaries. The Lena River itself, which is one of the biggest rivers in the world, is served as a magnificent animated and all times different pedestal for this tremendous scenery framed by the seasonal changing features of the taiga and mountain steppe vegetation.

The nominated area is the outstanding natural property providing an unmatched synthesis of Cambrian geological and palaeontological data which are the basis for our understanding of the far past, evolution of the Earth and of the life on our planet during one of pivotal and dramatic points of its development.

The "Lena Pillars Nature Park" could make a claim for its inscription on World Heritage List according to two criteria: vii and viii. Valuable geological (lower to middle Cambrian strata), paleontological (rich and exceptional fossils and biocenoses including the earliest metazoan reef belt) and unique geomorphological sites (frozen ground karst, thermokarst, and sand dune-tukulan) is combined here with outstanding natural scenic attractions.

Criteria under which property is nominated (itemize criteria)	VII, VIII

Name and contact information of official local institution/agency	Lena Pillars Nature Park. Address: Russian Federation, Republic of Sakha (Yakutia) 678010, Pokrovsk, Ordzhonikidze street, 56 Tel: (411244) 43-896 Fax: (411244) 45-289 e-mail: nppls@mail.ru

1 IDENTIFICATION OF THE PROPERTY

1a. Country (and State Party if different)

The Russian Federation.

1b. State, Province or Region

Nominated property is located in Khangalassky and Olekminsky Uluses (districts) of the Republic of Sakha (Yakutia).

1c. Name of Property

"Lena Pillars Nature Park".

1d. Geographical coordinates to the nearest second

The nominated property is bordered by the following geographical coordinates:

- extreme northern point: 61°16'30" N, 128°46'20" E;
- extreme southern point: 60°06'30" N, 125°58'35" E;
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1e. Maps and plans, showing the boundaries of the nominated property and buffer zone

A1. Location of the "Lena Pillars Nature Park" on the map of Russia (page 9 of the Identification of the property section).
A2. Location of the "Lena Pillars Nature Park" on the map of Yakutia (page 10 of the Identification of the property section).
A3. Topographical map showing exact boundaries of the "Lena Pillars Nature Park". Scale - 1:500 000 (rolled and to be found separately from the text).
A4. Geological map of the Lena-Aldan region (page 13 of the Description section).
A5. Karst phenomena of the "Lena Pillars Nature Park" (page 17 of the Description section).
A6. Map of forests (page 40 of the Description section).
A7. Landscape map (page 48 of the Description section).
A8. Scheme of zoning and ecotourism development (page 101 of the Protection and management section).
A9. Scheme of the Specially Protected Areas of the South of the Republic of Sakha (Yakutia) (page 91 of the State of conservation and factors affecting the property section).
A10. Geological map of the "Lena Pillars Nature Park". (Annex A10).
A11. Scheme of subcryogenic water bearing complexes of difficult water exchange zone (Annex A11).
A12. Scheme of locally water bearing cryogenic and talik complexes of free water exchange zone (Annex A12).

A1. Location of the "Lena Pillars Nature Park" on the map of Russia.

Atlas Physical Geography of Russia

A2. Location of the "Lena Pillars Nature Park" on the map of Yakutia.

©Atlas of agricultural economy of the Yakut ASSR, 1989

1f. Area of nominated property (ha.) and proposed buffer zone (ha.)

Total square of the property equals to 1 272 150 ha.

As far as there is no economic activity around the nominated territory, a buffer zone is not required for the territory. Besides, the nominated territory borders on local SPAs in the south – Verkhneamginsky, Kyrbykan, Munduruchchu Resource Preserves, and republic SPAs – Verkhneamginsky and Amma Resource Preserves which function as buffer zone (see Fig. 63 on page 91, "SPAs of the Central Yakutia".)

2 DESCRIPTION

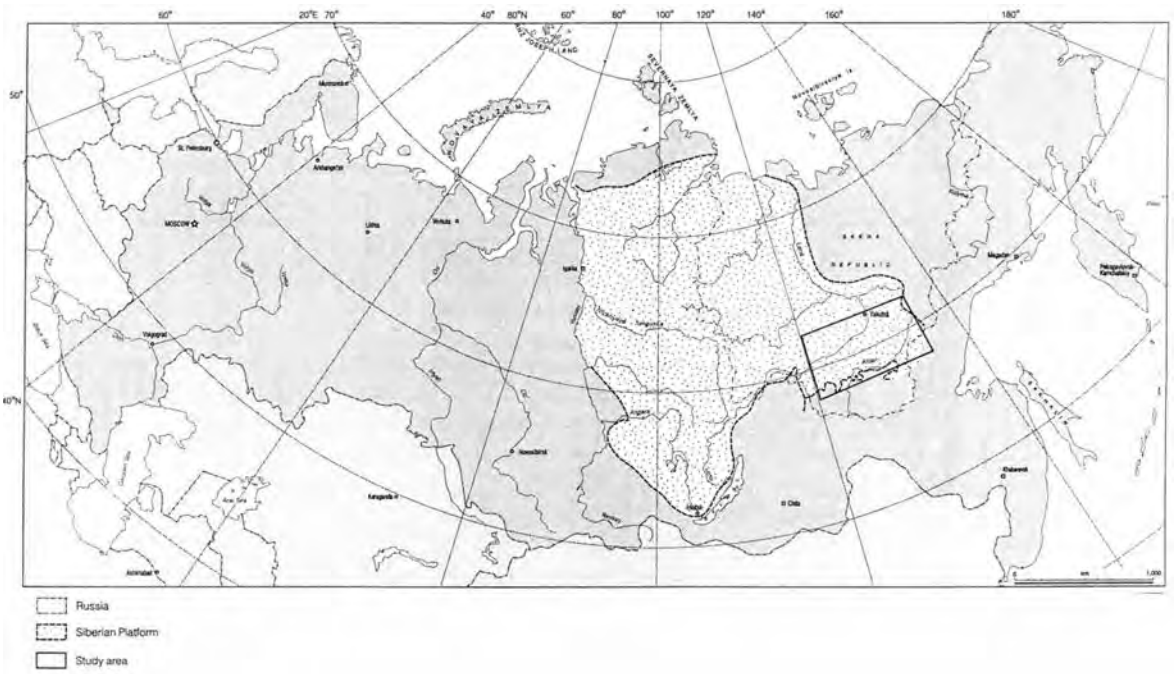
2a. Description of Property

The territory of the "Lena Pillars Nature Park" is located between the middle reaches of the Lena River in the North and the Buotama River basin in the South, in the Khangalassky and Olekminsky Uluses of the Republic of Sakha (Yakutia).

Geology

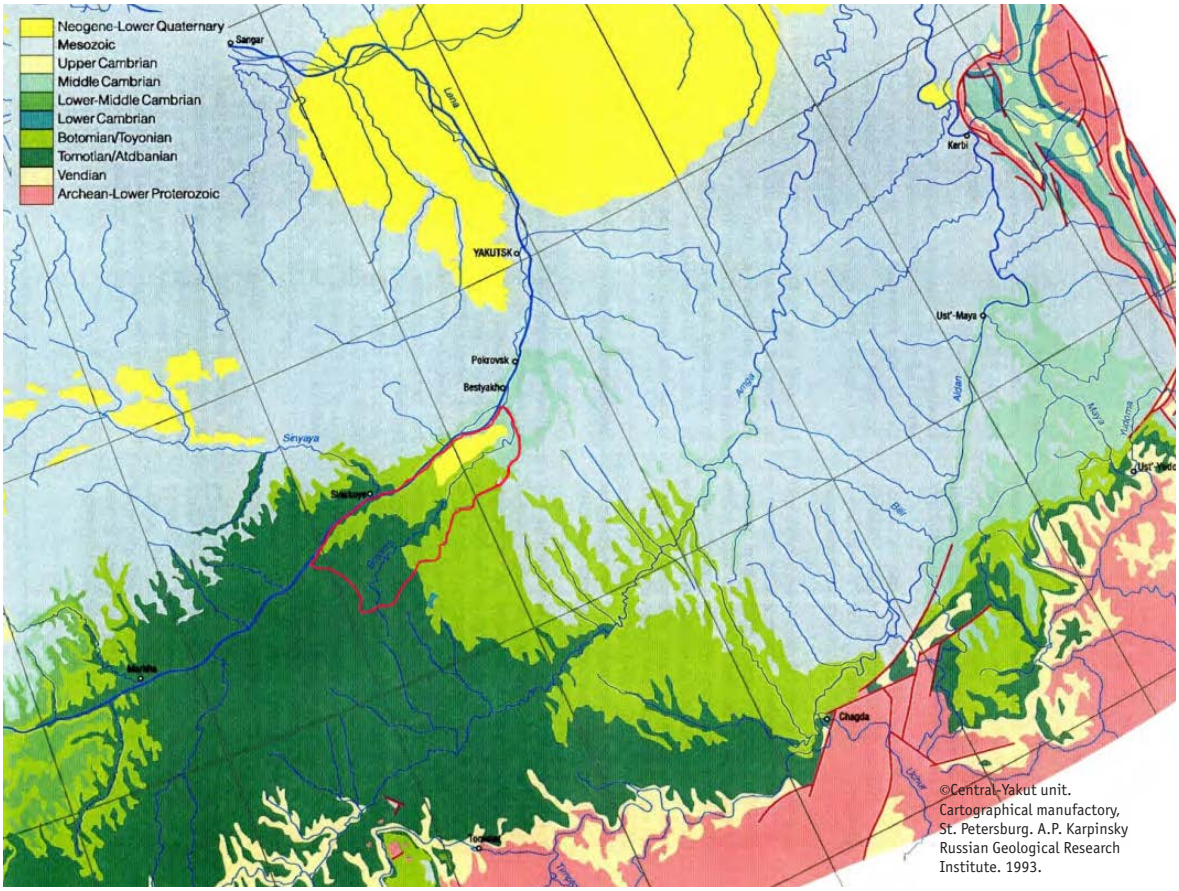
The "Lena Pillars Nature Park" is situated at the northern slope of the Aldan Anteclise at the south-eastern corner of the Siberian Platform. This region was involved in the entire sequence of processes undertaking by the platform as a whole. During its Phanerozoic geological development (since the distraction of Pannotia supercontinent in the Neoproterozoic and until the formation of Gondwana supercontinent in the Late Palaeozoic), the Siberian Platform was an isolated craton, known as Siberia, located largely at low latitudes and joint subsequently by a number of terranes which nowadays built its folded border (Altay-Sayan Foldbelt, etc.). Since the late Mesoproterozoic, the platformal stage sensu stricto of its development began and the submerged eastern part of the Siberian Platform has been little tectonically altered later on. As a result, the Neoproterozoic—Mesozoic succession outcropping here mostly have dips of less than two degrees. Of those, the latest Ediacaran and Cambrian marine fossiliferrous carbonates are most widely distributed here while the Ordovician and Silurian ones were denudated during the pre-Jurassic uplift and the Jurassic transgression. Here the Jurassic system is represented by both shallow marine and continental siliciclastics containing in places dinosaur bones. A weak tectonic activity of this region in the Jurassic, probably, related to collision of the Siberian Platform with terranes of the Verkhoyansk-Chukchi Foldbelt, brought out an appearance of some thin dolerite dykes which, however, do not disturbed the principal

Fig. 1. The territory of the Siberian Platform.



area of Lower Palaeozoic platformal strata. The Cenozoic sediments are represented mostly by Late Neopleistocene alluvial deposits related to the development of permafrost complex and containing a relatively rich assemblage of woolly mammoth fauna. Bony remains of these animals found practically in the same place present an important testimony of the mammoth fauna evolution. This assemblage includes bones which are well-preserved for a DNA analysis. The post-glacial Holocene complex includes alluvial, lacustrine, bog, and eolian deposits (for instance, "fossil" sandy dunes – tukulans). The Lena River valley started to form by the late Neogene and finally brought out the present rocky relief while the Pillars began to emerge during the Neopleistocene and their columnar appearance is mostly due to high diurnal temperature fluctuations and frozen ground karst processes.

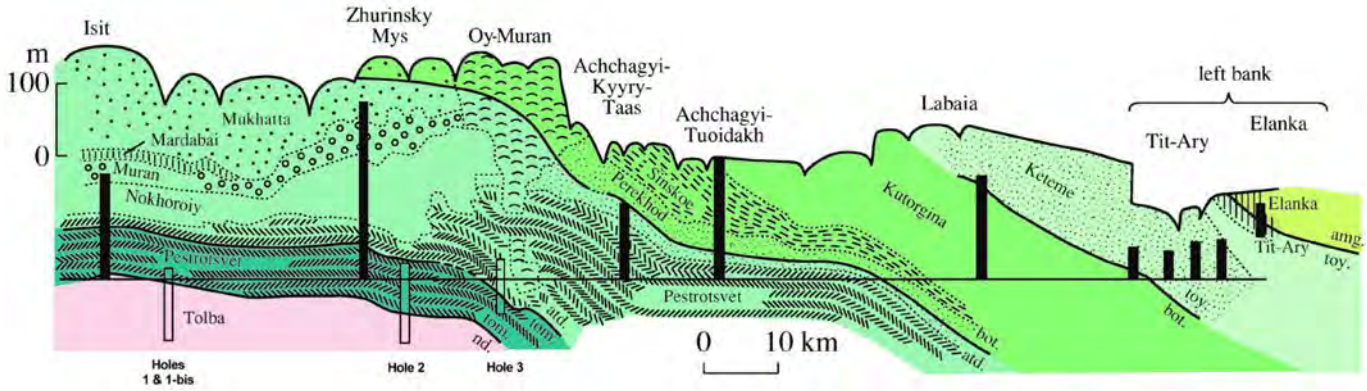
However, the principal sediments of this area are the lower to lower middle Cambrian richly fossiliferous continuous carbonates of various marine genesis. This strata characterise the Fortunian Stage, the Stage 2 (Terreneuvian Series), the stages 3 and 4 (Series 2), and the Stage 5 (Series 3) of the International Stratigraphic Chart issued by the International Commission on Stratigraphy (2008) and, thus, embraces an interval of c. 542-506 Ma. Those are the rocks that build the Lena Pillars as well as the Buotama Pillars themselves. The Cambrian sedimentary sequence commences with subtidal to intertidal mudstones of the Tolba Formation (Fortunian Stage) which is transgressively overlain by largely red argillaceous mudstones of the Pestrotsvet Formation (160-195m in thickness), which encompasses a large number of archaeocyathan-calcimicrobial reefs and



A4. Geological map of the Lena-Aldan region.

reefal complexes of the Cambrian stages 2 and 3. The 20-kilometres wide Oy-Muran Reef Massif forms a carbonate barrier on the border of inner (western) and outer (eastern) basins. The Oy-Muran Reef Massif itself composes of multiple isometric archaeocyathan-calcimicrobial bioherms of dome-like shape up to 5 metres in diameter. (Archaeocyaths are extinct calcareous rigid aspiculate sponges and calcimicrobes are calcified probable cyanobacterians.) The inner basin facies are represented mostly by various back-reef limestones such as cross-bedded ooid-shoal of the Churan Member and shelly grainstones and calcimicrobial boundstones of the Marbaday Member and the Mukhatta Unit (80-120 m in total thickness) as well as by intensely burrowed lagoonal dolostones of the Nokhoroy Member (40-80 m in thickness). The outer basin facies comprise deep subtidal Perekhod Formation (25-75 m in thickness) containing spongal clotted mud mounds and following dysoxic finely bedded calcareous mudstones of the Sinsk and Kutorgina formations (190-280 m in total thickness) bearing features of deep-water slope deposition. Later on (during the Cambrian stages 4 and 5) due to a ramp progradation, reefal belt displaced eastward at present coordinates and the uppermost Keteme, Tit-Ary, Elanka, and Kychik formations (up to 360 m in total thickness) are represented mostly by lagoonal dolostones and back-reef facies including abundant carbonate tempestites.

Fig. 2. Profile of the Cambrian formations along the Lena River (after Savitskiy & Astashkin, 1979). Black columns mark sections sampled for carbon isotopy and paleomagnetic properties, white columns mark drillholes, horizonal line shows a river water level.



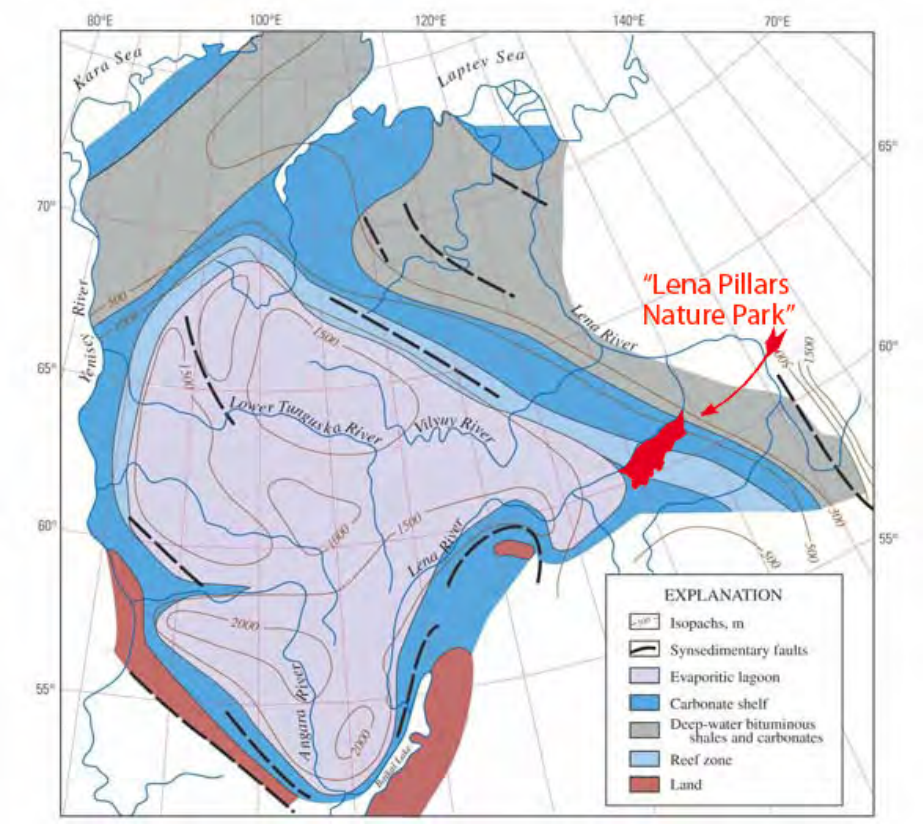


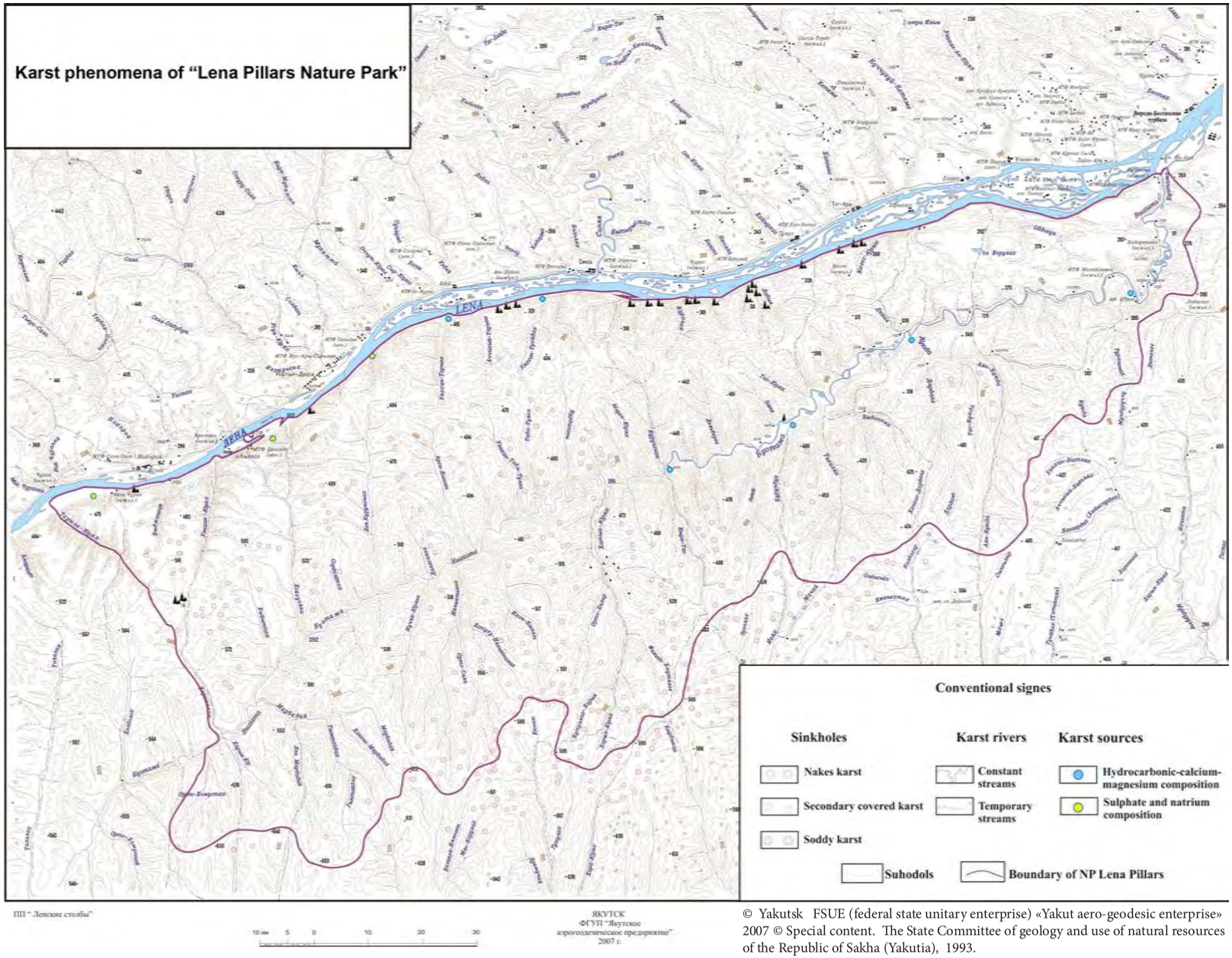
Fig. 3. Palaeogeography of the Siberian Platform in the early Cambrian (based on Savitskiy & Astashkin, 1979).

Karst phenomena and Relief

Karst phenomena of the "Lena Pillars Nature Park"

Frozen ground karst of the nominated property is the emblem of the plain plateau: karst develops in the limestones and dolomites dated by Lower Cambrian (thickness 400-500 m outcrop) in the area of the spread of continuous permafrost in the Sub-Arctic extreme continental and dry climate. In spite of the insignificant quantity of the precipitations falling on the territory of the "Lena Pillars Nature Park", karst processes are widespread here. The main reason is the role of the permafrost in relation to the water which is the principal factor of the karstification. On the one hand, in spring and summer periods the evaporative capacity practically equals zero as a consequence of the low temperatures of the soil. Moreover, in the warmer parts of the year the chilled surface condenses actively the water from the air because of the considerable difference of temperatures between the air and the soil. On the other hand, the permafrost blocks the quick filtration of the precipitations into karst massifs. That is the reason of the accumulation of the water, causing the karst processes on the surface. Therefore the development of karst relief in the regions with permafrost needs some times less of precipitations than the ones where the permafrost is absent (Trofimova, 2007). Additionally, the infiltration of the summer precipitations along the deep fissures of carbonate rocks, as well as the considerable snow accumulation, causing the warming impact on the cryolithozone, have done much to support the activity of karst process on the territory of the "Lena Pillars Nature Park". Moreover, the factor of carbonate reaction plays a significant role in the development of the processes considered: the displacement of the temperature maximum lowers the base of the seasonal thawing layer, favoring the formation of intra-permafrost taliks, are the features of the regions with the carbonate karstifying rocks.

Fig. 4. Prilenskoe plateau. *Photo by N. Kalitin*



A5. Karst phenomena of “Lena Pillars Nature Park”.

So, three main morpho-genetic types of the karst are developed here: naked, secondary covered and soddy ones. Naked karst is observed mainly in the valley band of the right bank's parts of Prilenskoe plateau and in the bedrock slope of the valley of Lena adjacent to the one, where the karst rocks are bared immediately on the surface in consequence of the rainwash of the loose deposits. Secondary covered karst is noted both on the erosion terrace of Lena, and on the valley band of Prilenskoe plateau, as well as on the watershed of the Lena, the Buotama and the Amga Rivers, covered by the cryogen-eolian sediments. The soddy type is one is marked on the slopes of the valleys, where the surface loose cover usually is unconsiderable.

The following surface and underground karst forms are fixed on the territory of the "Lena Pillars Nature Park".

1) Numerous oval karst *sinkholes*, mainly cone-shaped, more rarely, asymmetric, and saucer-shaped ones are present in the area. The formation of the sinkholes is due to the karst process, as well as to the processes of the frost and cryohydratational weathering, favouring the increase of karst rock surface's solution and the growth of the activity of the erosion processes. The diameter of sinkholes varies from 5-10 to 20-40 m and the depth of 0,5 to 10 m. Some sinkholes, placed on the bottom of dry channels, have in diameter 100-150 m and a depth of 20-30 m. Saucer-shaped ones are characterized by the sizes up to 50-100 m in diameter and 0,5 m in the depth. In the conditions of naked karst the cleft ponors are fixed very often at the bottom of sinkholes. Ponors, found at the bottom of sinkholes in secondary covered karst, indicate the presence of the cleft karst limestones under the sand deposits, providing the drainage of the surface waters. The last is the confirmation of the recent activity of karst processes.

The following peculiarities are revealed in the disposition of the sinkholes. The majority of them are concentrated according to certain lines which are coinciding with small erosion depressions. The orientation of these depressions corresponds to the main systems of the tectonic fissuring of karst rocks – diagonal and orthogonal, developed on the nominated territory. The sinkholes emerge on the surface of the plateau.

Fig. 5. Collapse sinkhole of Ulakhan-Taryn.
Photo by V. Samsonova

Fig. 6.

Fig. 7.

Fig. 6, 7. Karst sinkholes in the mouth of Buotama. *Photo by L. Kipriyanova*

Fig. 8. Ponor at the bottom of sinkhole. *Photo by L. Kipriyanova*

In dry season the sinkholes are without water. A humid diluvium cover is observed at the bottom of the deepest ones. These sinkholes are bushy, but sedges are growing at their bottoms. The sinkholes are filled by rain. As time goes on the water from these lakes penetrates into the clefts and the lakes disappear.

Fig. 9. Dry channel of Labiya. *Photo by V. Samsonova*

2) The formation of the karst-erosion valleys with the temporary flow – dry valleys, having the local name – *suhodol* was caused by the coalescence of karst sinkholes, situated along main tectonic systems. The length of suhodol achieve more than 10 km: for the river Kuuda there is 21 km, for the stream Arga-Kinat – 15 km, for the stream Tigilyan – 10,5 km, etc. M. Pulina and J.-N. Salomon (2005) consider the suhodol as the classic form of the cold karst.

3) *Karst lakes* are formed in consequence of the coalescence of the several neighbouring karst sinkholes in conditions of the filling of karst cavities in the cleft limestones by the sandy-clay deposits. The largest lakes are placed on the watershed area of the Lena, the Buotama and the Amga Rivers occupying the depressions by the sizes till a few kilometres in diameter. (Obviously, these depressions are the relic of paleokarst). Usually the shores and bottoms of the lakes are frozen, their depths don't exceed 2 m (Korzhuev, 1961; Spector, Spector, 2009). But small drainage lakes (till 10-30 m in diameter), related by the short parts of the stream channels, are the most spread.

Fig. 10. Lake on the watershed of the Lena and the Buotama Rivers (satellite image).

Small sizes, oval forms and steep high shores (up to 5 m) are the confirmation of karst origin of the lakes. Frequently the limestones are exposed on the shores of the water bodies, separate debris of the limestone are observed at the bottom of the lakes. Processes of landsliding and solifluction are exposed on the steep slopes of the water bodies.

Mineralisation of the lake waters is less 100 mg/l. The last indicates the damping of solution processes and the recharge of lake waters only by the atmospheric precipitations.

4) *Dissappearances of rivers and streams* is the feature of the regional hydrographical network. With the exception of the Buotoma River, all karst rivers and streams of the nature park have the interrupted water cources either in the head reach or in the middle

course and lower reach, by example river Marbaday, streams Nucha-Uryage, Arga-Kinat, etc., during which the karstholes in the form of sinkholes and clefts, frequently with the ponors, are fixed in the river beds.

5) *Karst sources* are represented by two types: edge low-pressure ground waters of the hydrocarbonic-calcium-magnesium composition (their mineralisation is 200-400 mg/l), supplying by the aquifers, situated supra and intra of the permafrost, and related with the taliks in the slope foots; and waters under the pressure of the sulphate and natrium composition (their mineralisation reaches up to 2000 mg/l), belonging to the deep aquifers, situated intra and beneath of the permafrost, which are unloaded to the bottom of the rivers and streams.

The edge low-pressure sources are observed more often. As a rule, the ones are characterized by the small debits and by the rough change of the regime and chemical composition in course of the year. Under the pressure sources are distinguished by the considerable debits (till several tens of litres per minute) and by the constance of regime and chemical composition.

6) Specific forms of karst relief – *karren*, are noted on the watershed of Lena and Buotama. The karren were formed in the conditions of the naked karst on account of the uneven solution of the karst rocks. Rock-rills karren (Rillekarren after A. Bugli) are fixed on the steep limestone slopes in the form of the small and narrow (till 2-3 cm) parallel scallops, orientated according to the dip of the slopes. The scallops are separated by the rough crests. Cleft karren – named "limestone pavements" – (Klaftkarren) were revealed on the smooth surface, where the water flow down slowly, along the clefts dissecting the rocks (predominantly by the orthogonal and diagonal directions). Sometimes the shallow, named kamenitza, with the flat bottoms and hanging over walls – basins of solution, are observed. The sizes of kamenitza in diameter reach 10-15 cm at the depth of 5 cm. Karren are destroyed very quickly because of activity of the cryogen weathering processes of the outcropping limestones.

Lena pillars are the peculiar form of the underground (deep) karst, dissected by the Lena River under episodic incisions into Lena plateau. The pillars stretching along the shores of the Lena River both in the form of the separate pillars, and in the form of the cogged walls. The height of the pillars achieve 200-350 m. Development of deep karst is associated with the work of intra and beneath permafrost waters.

Fig. 11. Lena Pillars. *Photo by P. Kolosov*

Lena Pillars were formed predominantly 400 thousands years ago (Spector, Tolstihin, 2004). By now the Siberian platform is lifted for 200 m owing to the tectonic movements, causing the deep incision of the Lena River valley and the increase of karst process activity. Every small fissure in carbonate massif was exposed to the karst process including the solution and export of the rocks. As a result of this, on the one hand, the widening of the fissures and the separating the next blocks from the main massif of the rocks was effected, and on the other hand, the formation of numerous niches, clefts, sheds, karst arches, as well as the small caves (channels) was carried out.

Fig. 12. Fissures widened in Lena Pillars. *Photo by V. Ryabkov*

Fig. 13. Karst arch. *Photo by L. Kipriyanova*

Fig. 14. Karst niche. *Photo by V. Ryabkov*

The sizes of niches, clefts and sheds are small; up to 2 m in the width and to 3-4 m in the depth.

The disposition of the groundwater flow channel fragments on the different levels indicate the periods of the decrease of the Lena River incisions which are characterized by the most favourable conditions for the horizontal circulation of underground waters. Underground galleries are marked in the valley of the Buotama River too. Karst caves have lengths up to 30 m.

Fig. 15. Enrances of cave Tit-Ary.
Photo by L. Kipriyanova

Fig. 16. Scallops in cave Tit-Ary.
Photo by L. Kipriyanova

Fig. 17. Dead end in cave Tit-Ary.
Photo by L. Kipriyanova

Fig. 18. Undeground gallery in valley of the Buotama River. *Photo by V. Samsonova*

Fig. 19. Fragments of the ground water flow channels.
Photo by V. Spector

Numerous split cavities, situated along the clefts of unloading of the cliff face parallelly to the river, are widespread on the upper parts of valley of the Lena River. Its sizes reach to 50-100 m length and 0,5-2,0 m width. Solution pipes and natural pits are the doubtless evidence of the activity of karst processes on the nominated territory.

Fig. 20.

Fig. 21.

Fig. 20, 21. Clefts of unloading of the cliff face valley of Lena. *Photo by V. Spector*

Fig. 22. Karsthole. *Photo by V. Spector*

Fig. 23. Solution pipe. *Photo by V. Spector*

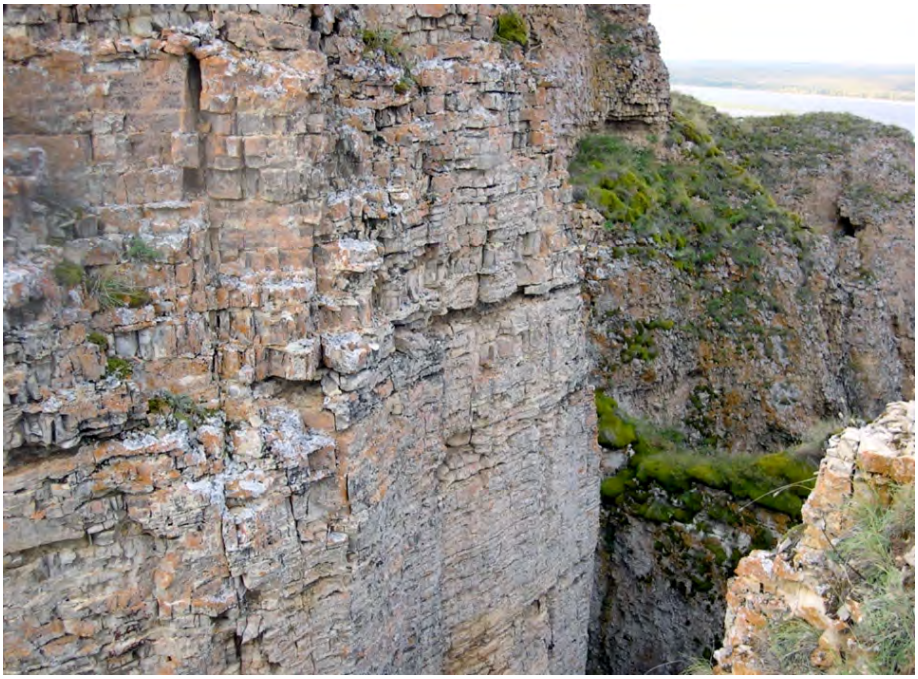


Fig. 24. Natural pit. *Photo by V. Spector*

At present the cryogenic weathering of the limestones, as well as the gravitational-slope, karst, fluvial and abrasion processes play the important role in the recent modeling of Lena Pillar relief.

Relief

The Park's area is located mainly within the low bedded denudation plateau with absolute watershed points between 200 and 400 m. Smooth relief is interrupted at areas of original rocks exposures at river valley sides. The Park's area is located at the south-western edge of the vast Central Yakutian plain, which gradually turns into split Lena plateau to the west of Erge-Echite creek. The boundary between these geomorphologic structures lies along watersheds with absolute heights about 300 m.

The relief of the "Lena Pillars Nature Park" is a bedded denudation plateau formed as the result of transformation of ancient Paleozoic structures under influence of several erosion and denudation cycles after Paleozoic era. Features of this prolonged continental development of the area are shown in the modern relief.

Along the Lena River valley, the low plateau level is generally observed, with absolute heights below 400 m (average 200-300 m). Sharply expressed high plateau level is located in the west outside the nominated property. Within the area of the Nature Park, the plateau is vastly denuded. Here its surface is cut by valleys of rivers and creeks into separate round-loaf-like flat-topped massifs. In the area of the Buotama River mouth, the water divides are narrowed and look like slender ridges.

In the valley part of the plateau, for instance, in the Lena Pillars area, Cambrian limestone is cut into blocks series by a complex system of cracks. Along these cracks, blocks break off into abrupt rocks. Depending on the decay degree, the blocks fall apart into pillars, steeples, towers and separate skerries quite often corroded by small caverns and niches.

Ubiquitous spreading of cavernous limestone is the reason of karst meso- and micro-relief forms development. Karst is often displayed at separated parts of the plateau, where it is actively developed at slopes and small creeks' beds. Besides this, karst is concentrated in areas of circulation of ground and subsoil waters.

Thermokarst relief forms are confined to super flood plain terraces and to areas of talus accumulation, with polygonal vein ice taking part in cryogenic construction of sediments. They are typical mostly for the left bank of the Lena River.

Where the Lena River cuts through limestone, riversides are typically rocky. In many places such banks are split by deep perched valleys – creek valleys and less deep erosive ravines. Their outfalls often do not reach the Lena River line and bear on either towpath, or surface of low terraces, creating debris cones there.

As a whole, the examined area is a transitional zone from the high western parts of the plateau to the multiple terraced surface of alluvial valley of Central Yakutia.

The latest and modern uplift of the area has led to deep cutting in of valleys of small rivers, and to active denudation development at original slopes, which finally has caused significant partition of relief in valley parts of the plateau.

Fig. 25. The valley of the Buotama River - right tributary of the Lena River. *Photo by V. Ryabkov.*

Relief forms related with the perennial permafrost

Most well developed cryogenic processes are cryogenic weathering of rocks, permafrost karst, thermokarst, and frost shattering.

Cryogenic weathering is most intensive at slopes. The recent lifting of Lena plateau contributed to activation of cryogenic weathering, evidenced by denudated rocky slopes of the Lena River and large volumes of debris under them.

Permafrost karst is widespread. There is both deep underground and ground karst. Deep karst was most active before the appearance of permafrost. Deep caverns are usually filled with fine materials, however, at present they are frozen. Ground karst results in karst dolines and depressions. Their diameter can reach 20-40 m, and they are as deep as 5-10 m (Korzhuev, 1961). Usually they are fixed by plant cover and are filled with fine materials. Karst lakes are widespread in the region, especially at the Lena-Buotama interfluves.

Thermokarst is developed on high terraces of the River Lena that consist of sandy-loam lake-alluvial deposits. Thermokarst relief forms are found at points of repeat-vein ice thawing. Such landscapes are represented by polygonal-subsidence forms of microrelief (bylar in Sakha language), primary thermokarst depressions (dyuedya), full-flowing thermokarst lakes (tympy), and upland thermokarst depressions (alas).

Frost shattering is common for flood plain areas and dealluvial trails with the finest clay deposits. Processes of frost shattering going on in seasonally thawing and seasonally freezing layers are observed everywhere. Evidence of such processes on the ground can be seen in the formation of a slightly uneven relief.

Hydrography

The nominated property is located on the right bank of the great Siberian river Lena. The drainage area of the Lena equals 2490 km^2 and occupies the 8-th place in the world (Mostakhov, 1972). Starting from the Baikal Ridge branches, it is running to the Arctic Ocean, with a total length of 4,400 km. The Lena river is filled up with the waters of over 545 tributaries more than 10 km long, with annual average water discharge of about 1700 m^3/sec (Glushkov, 1996). Tremendous masses of water transfer great amount of heat from the south to the north, where insufficient thermo-supply is the main limiting factor. In such a way the Lena not only forms unique mezzo-climatic conditions for plants and animals inhabiting its shores, but also provides a unique «ecological channel» for southern species of flora and fauna, entering far to the North (Solomonov, 1998).

Fig. 26. Panorama of the Lena river from a viewing point. *Photo by V. Ryabkov*

In the region of the Lena Pillars the river is 5-10 km wide. Just from the concerned point the Lena river bed changes its character. Sandbanks give place to numerous big and small towheads, and the left bank is isolated from a fairway by nearly continuous chain of islands. Due to plenty of islands, sandy rifts and shoals Lena has a very instable fairway in this section. It is notable that many big islands are in fact chains of smaller ones (Korzhuev, 1959).

In the region of the Lena Pillars there is a very peculiar drainage network, associated with the main tectonic fractures what determines rectangular structure of the modern river drainage to a large extent.

In contrast to other, more northern parts of Central Yakutia, lakes are not numerous and rather small here.

The main rivers are Lena and its right tributary Buotama. Other streams are mainly temporary ones and form visible run-off only in spring period or in rainy seasons.

Large water masses of the Lena river form peculiar conditions that leave their traces not only in form of deeply developed right bank, being in fact the Lena Pillars, but also play essential role in forming of unique climate of this region.

Climate

The climate of the "Lena Pillars Nature Park" is unique too: annual temperature difference reaches 100°C, precipitation is low (like in steppes or semi deserts), and the solar energy in summertime is as high as in the regions of Central Asia. All these factors result in a unique sharply continental climate, but at the same time this territory is covered by middle-taiga forests. Large water masses of the great Siberian river Lena also contribute their share in formation of unique meso-climatic conditions for Central Yakutia.

The strong continental climate is a prerequisite for the unique phenomenon of frozen ground karst (low precipitation, but additional water from air wetness condensation at frozen ground, Criteria VIII). It is also the reason for the outstanding seasonal changes of landscape features (related to Criteria VII).

Considering its geographical location, the Lena Pillars Nature Park is situated in Central Yakutia with a severe and peculiar climate. It is stipulated by geographical position of the region and the character of prevailing relief. Due to considerable remoteness from the Atlantic Ocean and natural barriers from the Pacific Ocean (high mountains of the Southern and Eastern Siberia), the named two oceans produce practically no influence on the climate of Central Yakutia. But at the same time this region is easy accessible to invasions of Arctic air masses from the Arctic Ocean, that greatly influence the climate.

All these factors result in a rather distinctive, pronounced continentality of this region's climate, with considerable annual ranges (Korzhuev, 1959).

Fig. 27. The Lena river is covered with ice till June. *Photo by V. Ryabkov.*

Winter in Central Yakutia is rather long (over 6 months) and cold (-40, -60°C). In this season a severe winter Siberian anticyclone prevails here. Under the conditions of anticyclone a clear, frosty, dry and calm weather occurs. Stagnation of air stipulated by light breeze and clear sky produces great cooling and sharp temperature inversion. Under the conditions of clear and calm weather air temperature falls down to -50, -60°C (Gavrilova, 1973).

Spring is very short and late here. It is characterized with unstable weather, wind gain and relatively more often precipitation. In spring the temperature grows quickly owing to supply of warm air from the south and intensive income of solar energy.

Summer in Central Yakutia lasts for 3 months (from June until August). The continentality of the climate plays a great role. In this period mean daily temperature of the air exceed +10°C. At daytime in summer the temperature can reach +30, +35°C. Due to significant warming up a diffuse depression forms here. As a result of strengthening of cyclonic activity and enhancement of absolute air humidity summer is the time of maximum precipitation, though it is rather modest – about 120 mm a year (Gavrilova, 1973).

Autumn is also very short like spring lasting from late August till September. It is characterized by strengthening of anticyclone activity that produces establishing of clear and frosty weather. Cyclones are accompanied with arctic air masses causing immediate lowering of temperature.

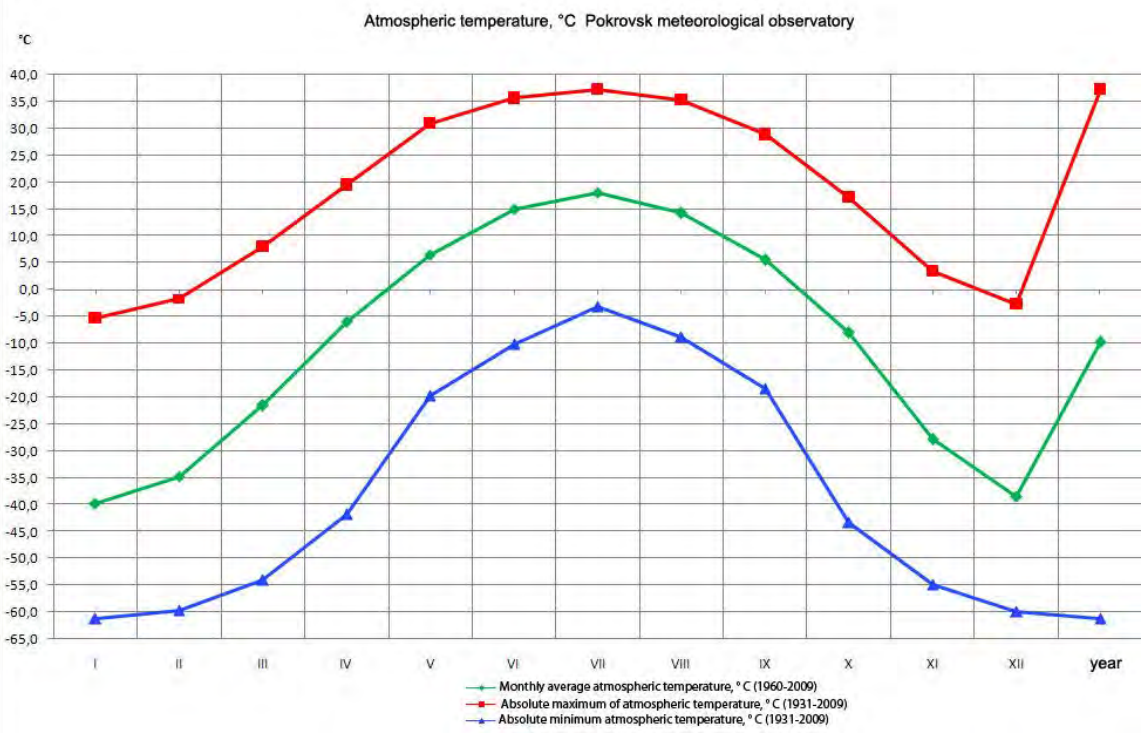


Fig. 28. Atmospheric temperature, °C Pokrovsk meteorological observatory

Average annual precipitation equals to 251 mm in Pokrovsk close to the Lena Pillars Nature Park. Maximum depth of snow cover in the forests is 39 cm, and in the fields - 33 cm. Average date of snow cover formation - 13.X, the earliest – 28.IX, and the latest one – 26.X. Melting of seasonal snow cover occurs in the 1-st decade of May. Total number of days with snow cover is about 203 (Kononov, 1982).

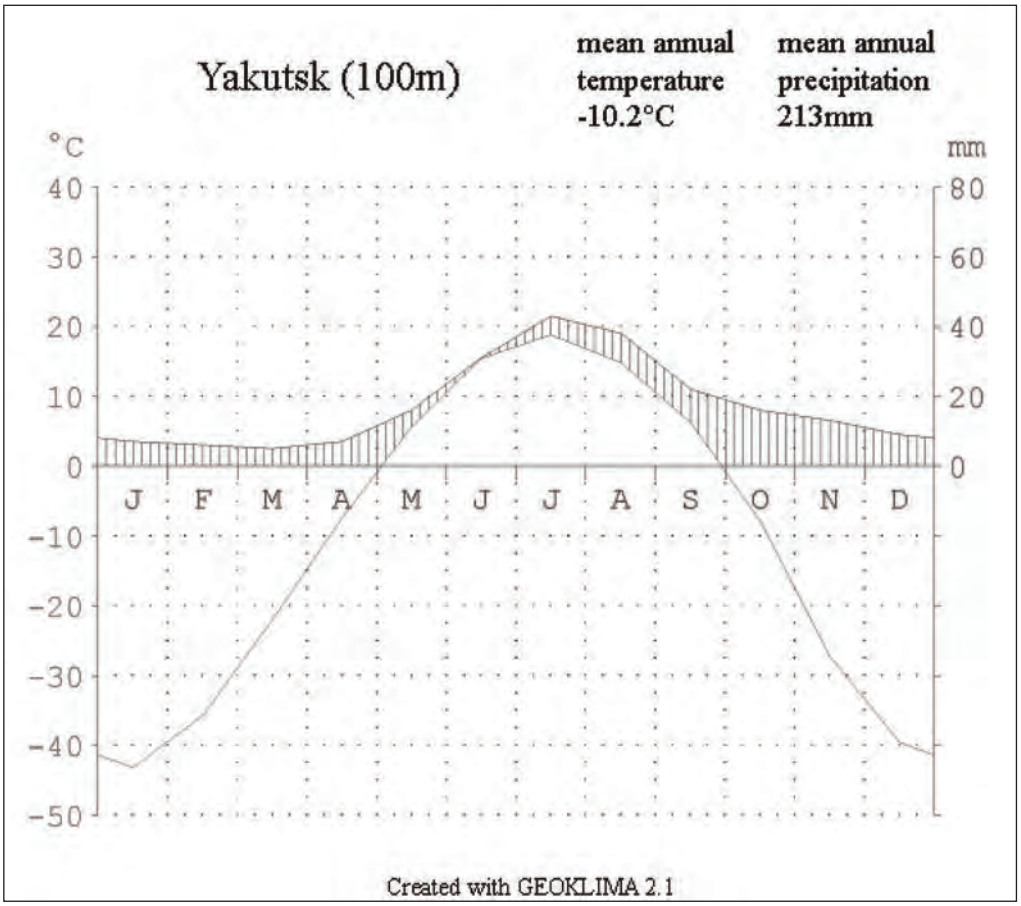


Fig. 29. Climate diagram in the format by Walter and Lieth.

Table 1. Pokrovsk meteorological observatory data for 1960-2009

Parameter	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Year
Monthly average atmospheric temperature, °C (1960-2009)	-40,2	-34,9	-21,9	-6,4	6,2	14,9	18,2	14,4	5,7	-7,8	-27,8	-38,4	-9,8
Absolute maximum of atmospheric temperature, ° C (1931-2009)	-5	-2	8	20	31	36	37	35	29	17	3	3	37
Absolute minimum atmospheric temperature, ° C (1931-2009)	-61	-60	-54	-42	-20	-10	-3	-9	-18	-43	-55	-60	-61
Monthly amount of precipitations, mm (1960-2009)	9	7	6	8	20	36	46	42	32	18	15	10	249

Permafrost soils

One of the specific features of natural environment of Yakutia is continuous spreading of permafrost. That is frost penetration at considerable depth inside the earth's crust, with the frozen condition of permanently frozen ground lasting for years, centuries, millenniums. Layers of permafrost grounds with zero or below zero temperature form a permafrost zone. Under the conditions of Central Yakutia depth of permafrost depends on many factors, among them: relief character, drainage, soil supply with moisture, type of vegetation, etc. In well-drained areas permafrost lies deeper than in over wetted lowlands; and in forests depth of seasonal soil thawing is considerably smaller than in open spaces.

The permafrost soil is the prerequisite for the unique phenomena of frozen ground karst and thermokarst because of the air wetness as additional water to low precipitation. Moreover, the permafrost blocks the infiltration of the superficial water into karst massif.

Depth of permafrost soils. Existing cartographic surveys (e.g., Melnikov, 1970; Fotiev et al, 1974; Baranov, 1977; Engineering... 1977; Kondratieva, 1989; Soloviev, 1991) show that the data on the depth of permafrost soils is quite diverse, ranging from 100 to 400 m at watersheds and 100-200 m in river valleys. However, there is no factual data obtained by drilling within the bounds of the described region.

In neighbouring regions, south of the Lena Pillars Nature park territory, according to S.M. Fotiev et al. (1974) in the upper reaches of the River Khayisardakh, and according to B.V. Volodko (Bosikov, Vasiliev, Fedorov, 1985) in the valleys of rivers Sylgylyr and Ulu, Jurassic and Cambrian rocks are frozen to the depth of 600 m and below. To the west, in the region of the Tuolba River lowlands the depth of permafrost soils is 200 m (Sevonko, 1952). Based on this data it is possible to estimate the maximum depth of permafrost soils at watersheds exceeding 400 m.

Widespread development of karst and many ground exits of inter- and under permafrost waters show that the permafrost is not monolithic. Under the riverbeds of the Lena River tributaries above the permafrost taliks may be developed indicated by nearby poplar forests.

Cryogenic composition was studied in detail during the 1:200 000 geological survey (Gravis, Konchenko, 1986; Drozdov, Ponamoreva, 1986; Gravis et al., 1987). Cracking of limestone causes the development of fracture cryogenic textures to the depth of 20 m. In cavernous karst rocks icing can reach even greater depths. For example, in Buotama-Amga interfluves icy content was discovered in hydrogeological wells at the depths of 300-400 m. The total humidity is 15%.

Eluvial deposits of watersheds contain little ice. In coarse eluvium crusty and massive cryogenic textures with a humidity of 5% are prevalent, and in loam eluvium massive and lens shaped cryogenic textures with a humidity of up to 20% are common.

Eolian sands are characterised by massive cryogenic texture with a humidity of up to 5%. Lake thermokarst deposits have a broken-lens, irregular-latticed and massive cryogenic textures with a humidity of 25 to 40% depending on the peat content of deposits.

Alluvial deposits of low terraces sometimes contain ground and ice veins with a strength of 3-5 m, and top down view width of 0.5 m. Sand deposits with massive cryogenic texture are characterised with a humidity of up to 20%, sandy-loamy up to 30-40%.

Lake-alluvial deposits of high terraces containing repeat-vein ice are found in inter-alas spaces. Their humidity reaches 40-50% and cryogenic structures are lens shaped and lens-latticed.

The depth of seasonally thawing layer and the temperature of rocks on the territory of the Lena Pillars Nature Park was not researched specifically, that is why we used the results of such research conducted in neighbouring regions (e.g., Bosikov, Vasiliev, Fedorov, 1985; Stashenko, 1985; Varlamov, Skachkov, Skryabin, 2002). Spatial distribution of these important features of permafrost depends on landscapes. On karst subtype of upland locality type ledum-blueberry-cowberry and cowberry-green larch forests are prevalent. The depth of seasonally thawing layer (STL) under ledum-blueberry-cowberry cover in loamy soil with detritus content is 1.2-1.4 m, and under cowberry-green cover is 0.9-1.1 m. In such landscapes the temperature of rocks varies from -1.5 to -2.5° C.

Upland sandstone subtype of locality is present sporadically on the far north-east of the Nature Park. On drained watershed areas under bearberry-lichen pine forests on sands the depth of STL is 2.0-2.2 m, and the rock temperature is -1.0 to -1.5°. Under bearberry-cowberry pine forests the depth of STL changes from 1.8 to 2.0 m with the rock temperature of -1.5 to -2.0°. On relatively weakly drained areas with ledum-cowberry larch forests in sandy-loam deposits the depth of STL drops to 1.2-1.4 m. The rock temperature is -2 to -2.5°.

The slope type of locality is characterised by contrasting conditions of active layer and soil temperature regime formation. Within the frames of the described region there is a clear distinction between shadowed forested and highly illuminated steppe slopes depending on exposure. On the slopes of northern exposure under alder-cowberry-green larch forests in fragmental rocks with loamy filler the depth of STL varies from 0.6 to 1.3 m. The rock temperature is between -2 and -4°. On steppe slopes of southern exposure the depth of STL is 2.5-4 m on average. Rock temperatures on such locations can be above 0°, and below zero values may reach -1.5°.

Ancient terrace type of locality is composed of sandy-loamy deposits and covered in cowberry and cowberry-green larch forests. The depth of STL here varies from 0.8 to 1.4 m, and the rock temperature changes from -2 to -3.5°. At burned out locations the depth of STL rises to 1.6-2.2 m.

Sand-ridge type of locality consists of the following prevalent stows: lichen-bearberry pine forests (STL 2.0-2.5 m, rock temperature -0.5 to -1°), bearberry-cowberry larch-pine forests (STL 1.8-2.0 m, rock temperature -1.0 to -1.5°), cowberry larch and cowberry-green birch-larch forests (STL 1.3-1.5 m, rock temperature -2.0 to -2.5° C).

Low terrace type of locality is distinguished by the contrast of STL depth and rock temperatures. Spruce-larch and cowberry-green larch forests on clay sands of above the flood plain terraces are characterised with an STL depth of 0.8-1.0 m, and rock temperatures of -1.0 to -3.0°; steppe forbs-grains meadows on clay sands of above the flood plain terraces have an STL depth of 1.8-2.2 m and rock temperature of -0.5 to -2°; flood plain forbs-grains meadows STL depth is 1.2-1.4 m, rock temperature is -0.5 to -2°; on low flood plains with osiers and forbs-grains meadows in sandy-loam deposits STL depth is 1.2-1.4 m and rock temperature is -0.5 to -1°; and on sand deposits STL depth is 2.5-3 m and rocks have above zero temperatures.

Small valley type of locality is also distinguished by contrasting landscapes. STL depths of 2.5-3 m and above zero rock temperatures are characteristic for sand-shingle spits with osiers and alders, and some poplars in places. The depth of STL in green spruce forests in sandy-loam-shingle-sand deposits is 1.0-1.2 m, rock temperature is -1 to -2°; in cowberry-green larch forests in sandy-loam deposits STL depth is 1.0-1.2 m, rock temperature is -2 to -3°. Peculiar slope-valley complexes on the verge of slope trails and stream valleys with spruce-larch cowberry-green forests have an STL depth of 0.6-0.8 m and rock temperatures of -3 to -4°. Similar temperatures are characteristic of yerniks with moss-peat cover where the depth of STL is only 0.4-0.6 m.

Soil cover

Soil cover of the Lena Pillars Nature Park is complex and diverse, including 16 sub-types of cryogenic soils. Here, at a relatively small area, are found major soil types of Central and Southern Yakutia, from cryogenic taiga soils, pale, podzolic and sod-calcareous soils to cryogenic chernozem. One can clearly observe the dependence of spatial soils spreading from relief conditions and soil-forming rocks.

The middle and high Lena River terraces, flood plain parts along the Lena and Buotama Rivers, and river valleys' and plateau slopes of different steepness take part in the Buotama River outlet relief structure (Korzhuev, 1959). Vegetation cover of the area is presented by different types of larch and pine forests at watersheds, brakes over the narrows, meadows and bushes at flood plains and watersheds, and also by dry steppe areas along the slopes of the Buotama valley. The soil-forming rock at high Lena terraces is carbonate loam, at Bestyakh terrace, ancient alluvium sediments of loamy sand and sand. Along river valleys, the soil-forming rocks are modern loamy and sandy-loamy sediments.

Starting from big differences between the soil-forming rocks of zonal and intrazonal soils, taking into consideration their spatial location and complex structure of river valleys soil cover (multicomponent structure, sharp syngenetic differentiation, contrast range, etc.), the soil cover of the area is considered as a complicated mixture of flood land soils developed against a background of zonal soils combinations. 11 cryogenic soil types take part in forming soil cover structure.

Soil cover of the Saamys Kumaga tukulan also has complex structure (multicomponent structure, contrast range, etc.) and is considered as a complex combination of zonal soils in conjunction with flood land soils developing in the Lena valley. Distinguishing feature of this area is the presence of significant mass of blown sands at the watershed. 10 cryogenic soil sub-types take part in the soil cover structure. The prevailing soil type is typical pale cryogenic soils in combination with solodized soils at high terraces, and cryogenic taiga podzolic soils at middle terraces. The brightest feature of tukulan is the presence of cryogenic podzolic and cryogenic pale grey soils.

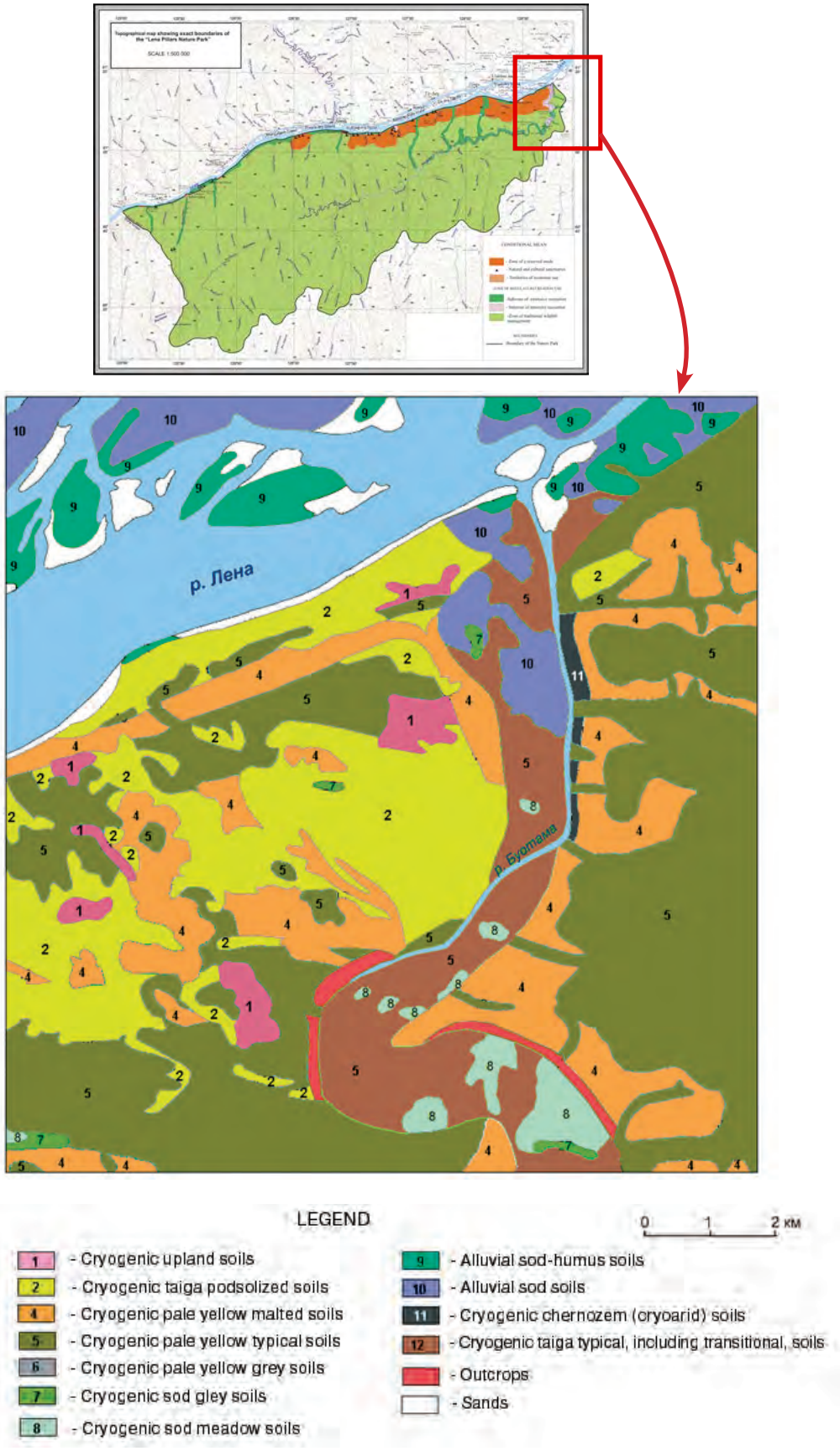
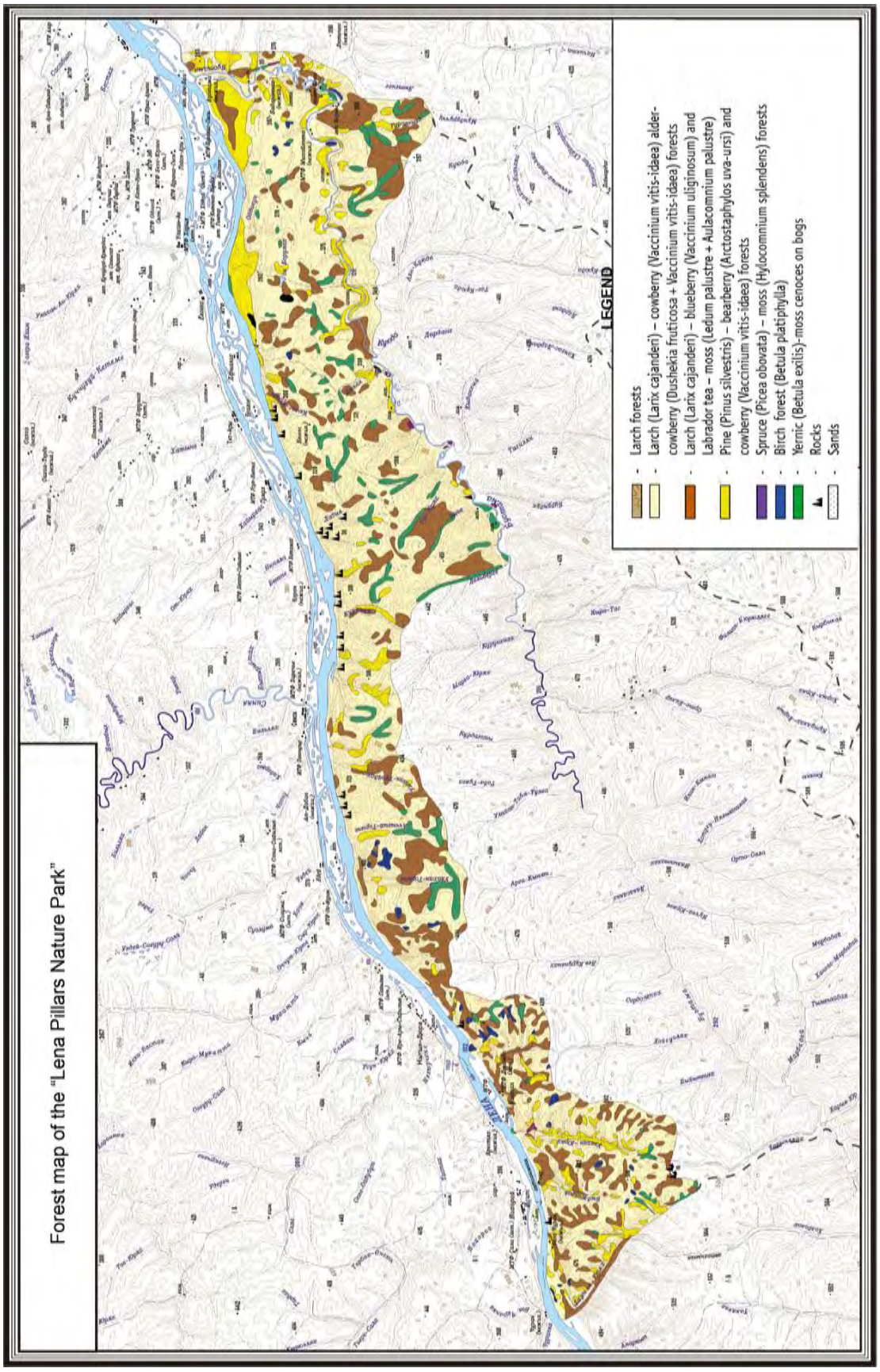


Fig. 30. Scheme map of the Buotama river outlet soil cover

Vegetation



A6. Forest map of the "Lena Pillars Nature Park".

Peculiarities of soil cover determine features of the vegetation. The Park's territory is covered mainly by low larch taiga with participation of pine forests, relatively wide distribution of alassy in the eastern part, and meadow and steppe vegetation in river valleys. Among the forests larch forests prevail covering 87,0 %, pine forests cover 7,6 %, and 5,4 % is covered by fir-woods, birch-woods and yerniks (dwarf birch bushwood). Valleys of the Buotama River, small taiga rivers and creeks are covered with yerniks of dwarf birch, *Betula divaricata*, sometimes – *Betula exilis*, sedge-grass meadows, rarer - forb meadows. Fragments of steppe vegetation are spread on well warmed bedrock slopes of the Lena and specially Buotama riverbanks.

Fig. 31. Autumn colours of the Lena Pillars. *Photo by V. Ryabkov.*

This vegetation complex is in primeval state and natural dynamic, nearly untouched by human influence. The deciduous larch taiga is typical for the strong continental climate with semihumid conditions and permafrost in the Eastern parts of the Boreal zone in Eurasia.

It contains the very specific and diverse flora of vascular plants, mosses, lichens, and fungi, which is adapted to the specific climatic conditions of Eastern Siberia.

Fig. 32. Pine and larch forests of the Park. *Photo by V. Grigoryev*

Fig. 33. *Redowskia sophiifolia* – a local endemic of the Lena Pillars. *Photo by V. Ryabkov*

The vegetation cover is responsible for the exceptional/exciting landscape character of the proposed property. In combination with the rock formations it forms unique landscape features with totally different seasonal aspects. In spring, the spectacular pillars are framed by the light green larch trees, in summer by colorful flowers of herbs, but in autumn by an impression of a "golden coat" (Crit. VII).

In the areas of rare psammophyte vegetation there occur so called "tukulans" (masses of windblown semistabilized and stabilized sands).

The occurrence of the local endemic plant species *Redowskia sophiifolia* (*Brassicaceae*) indicates the special biogeographical position of the Lena Pillars region from a biodiversity point of view.

Fauna

For the North-East of Russia, the zoogeographical complex of the Lena Pillars also has a number of unique features, based on the special peculiarities of this region: original climate which forms the distinct character of landscape, vegetation and fauna.

The region of the Lena Pillars situated in the border area of Prilenskoe Plateaue and Central Yakutian plain is characterized by a singular combination of faunistic complexes. Here, along with dominating forest elements, there also occur representatives of mountain-taiga (musk deer, maral) and mountain steppe (northern pika) complexes. There is also a northern boundary of areals of many vertebrate species: reptiles and chiropterans.

Invertebrates

Among the animals inhabiting the territory of the Lena Pillars insects stand out for their great diversity, wide spreading in all the forest, open meadow and steppe biocenosis, in stagnant-water and running water reservoirs.

Systematic studying of faunistic diversity of insects of the Lena Pillars NP was conducted in course of complex expedition for bio-ecological justification of the necessity of establishing the Park (1991-1992). In result of these and further investigations there was published a comprehensive list of insects, comprizing 645 species from 96 families and 8 отрядов (Averensky, 2001; Bagachanova et al., 2001, Potapova, Zhirkov, 2001).

Ichthyofauna

Due to enhanced protection regime in the territory of the Lena Pillars NP, and particularly at the Buotama river, this area plays significant role in conservation of the central Yakutian Ichthyofauna which contains lake and mainly river types. There are non-migratory as well as semianadromous species of fish.

Amphibia and reptilia

Amphibia and reptilia are presented with two species: Siberian salamander *Salamandrella keyseplingii*, Dybowski, 1870 and Siberian frog *Rana amurensis* Boul, 1888, common lizard *Lacerta vivipara* Jacquin, 1787 and common northern viper *Vipera berus* Linnaeus, 1758.

The territory of the Lena Pillars is the northern boundary of areals of few reptiles of these cold region.

Avifauna

The territory of the Lena Pillars plays a significant role in the recovery of species diversity and resources of considerably transformed avifauna of Central Yakutia.

Fauna of nesting birds is presented with 105 species (that is about 80% of fauna of all the nesting birds of Central Yakutia). Ornitho-complexes of meadow, skirt and forest birds are presented here completely or almost completely. Wetlands' complex is rather modest, however, after the introduction of a protection regime a considerable

increase of their numbers and diversity has been registered. The basis of winter avifauna of the studied region is formed with nonmigratory birds (26 species). Baikal teal, osprey, golden eagle and peregrine are listed into the Annex to CITES Convention being protected species of international importance.

Mammals

Species diversity of mammals of the Lena Pillars NP is rather abundant considering the regional scale and represents over 56% of total composition of Yakutian mammals. According to preliminary data, this region of the Middle Lena valley can be considered a center of biodiversity of the studied group of animals in Yakutia.

The territory of Park is inhabited by 38 species of mammals. On the whole, complex of mammals' species presents a typical fauna of middle-taiga subzone of Palaearctic.

Wood Bison

Wood bison is inscribed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). It is included in the IUCN (International Union for Conservation of Nature) Red Book, which was recognized as world catalogue for endangered species of animals.

On April 6, 2006, 30 wood bison (mainly underyearlings – 15 females and 15 males) were transported from Elk Island National Park, Canada, to Lena Pillars Nature Park, Yakutia, which has a specially constructed farm named Ust'-Buotama that includes a network of pens and a number of special and residential buildings.

The main aim of the mission is elaboration of theoretical, methodical and applied approaches to the project on restoration of historic habitats of wood bison on the territory of Yakutia, thus enriching the bio-diversity of northern ecosystems and increasing their productivity and stability.

Since the brood stock on the territory of Lena Pillars Nature Park has been created, it now can be said that the first stage of wood bison re-acclimatization in Yakutia has been accomplished and the next stage has begun – re-settlement of the species across the territory of Yakutia.

Fig. 34. Wood bison at the Ust`-Buotama farm. *Photo by A. Butorin*

Landscapes

The territory of the park is located at interface of three landscape provinces: Leno-Amginskaya alas province, Leno-Amginskaya sandstone province, and Leno-Aldanskaya karst province (Permafrost & Landscape Map …, 1991). This factor provides for fairly wide range of conditions influencing functioning and evolution of genetically and structurally diverse typological geographical landscapes.

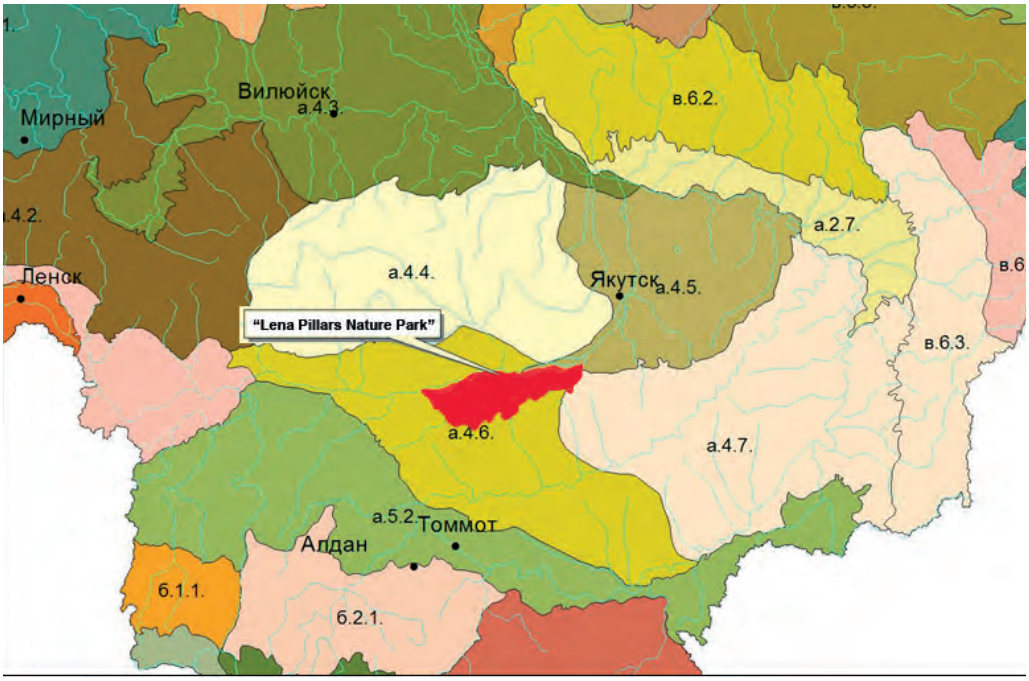
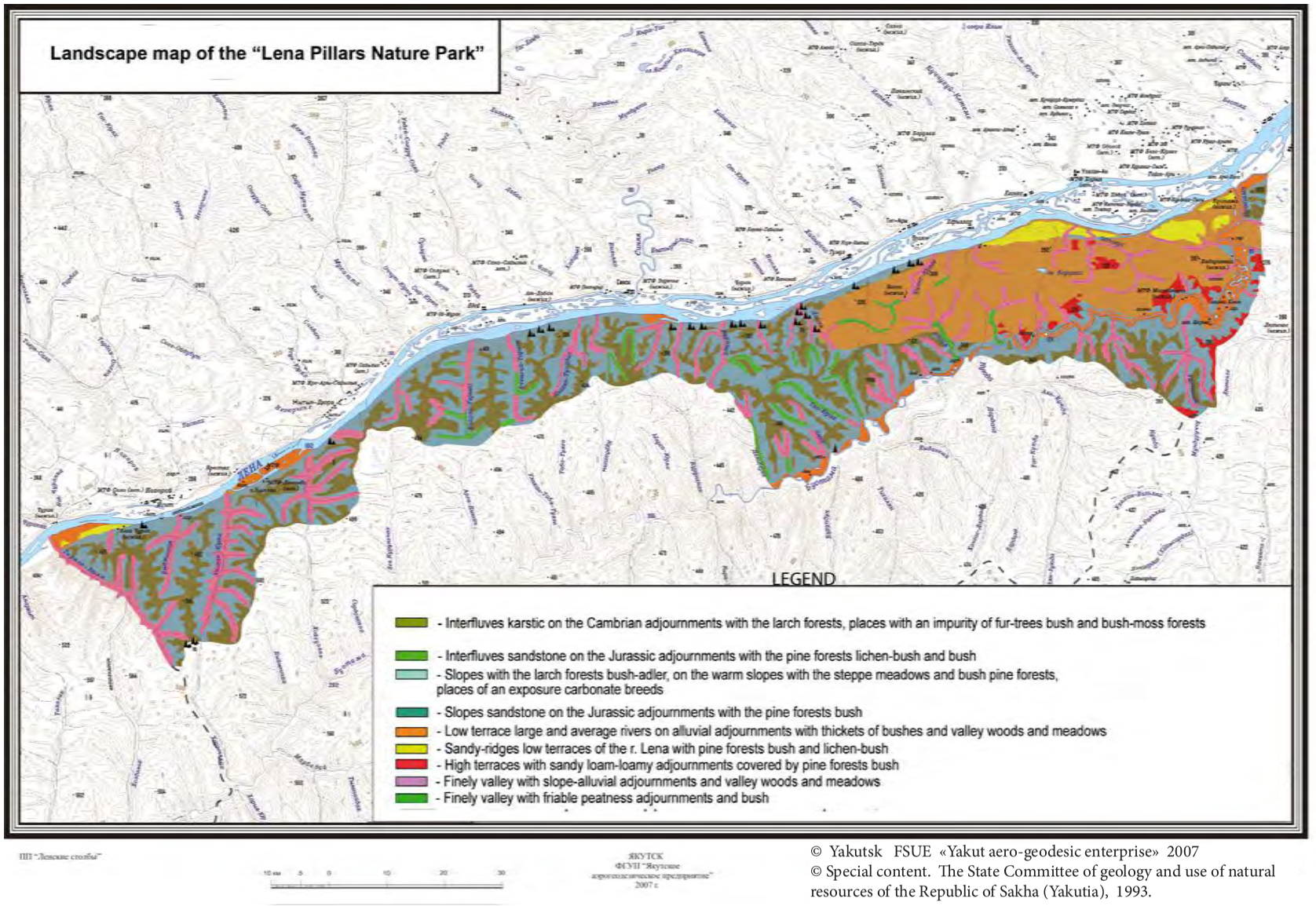


Fig. 35. Location of the "Lena Pillars Nature Park" on the Cryogenic landscape map of Central Yakutia:
a.4.5. - Lena-Amga alassy,
a.4.7. - Lena-Amga sandstone,
a.4.6. - Lena-Aldan karst

Within limits of these provinces in the territory of the Park two types of landscapes are distributed – mid-taiga continuous perennially frozen rocks (PFR) and intrazonal mid-taiga continuous PFR with understream taliks, presented by following types of localities: upland, slope, old-terraced, sandy-ridge type of mid-altitudinal terraces, inter-alas, and low-terraced, and shallow valley (Permafrost Landscapes …, 1989).

Upland type of locality is distinguished by non-homogeneous lithogenic base and can be divided into two sub-types. Karst upland sub-type with low-bush and low-bush-moss larch forests with sporadic spruce is distributed in Cambrian rock eluvium. Jurassic eluvium shows sandy upland sub-type with lichen-low-bush and low-bush pine forests.

Shallow valley localities with alluvial sediments are covered with valley forests, yerniks, and willow-shrubs.



A7. Landscape map of the “Lena Pillars Nature Park“.

Slope type underlain by carbonaceous Cambrian rocks is mainly represented by low-bush-alder larch forests. On warm aspect slopes these forests are replaced by steppificated meadows and low-bush pinewoods, and by rock vegetation at plots with active denudation processes and Cambrian rocks outcropping.

Inter-alas type localities with sabulous-argillaceous sediments are occupied by low-bush and low-bush-moss larch forests; such types can be found in the eastern part of the Park.

The Park also contains sandy-ridgy type of locality, displayed on mid-altitudinal sandy terraces of Lena River with low-bush, lichen-low-bush, and low-bush-lichen pinewoods.

Alluvial sediments within boundaries of low-terraced type of locality typically display valley forests, willow-shrubs, and meadows.

Landscape structure of Lena Pillars Nature Park was investigated within three most tourist-prospective plots of the Park – Labiya Creek influx, Saamys Kumaga tukulan (drift sands), and Buotama River influx. Field study results and remote sensing data interpretation provided information on current state of landscapes, revealed regular patterns of natural complexes distribution, and provided materials for 1:500 000 scale landscape maps.

The quantitative composition and peculiarities of landscape complexes differentiation, as well as differences in their genesis and components show that the territory of the Lena Pillars Nature Park has quite a complex landscape structure. Areas of the park that are presently used for recreational purposes are distinguished by composition of the main elements of their landscape structures (table 2).

Study of landscape differentiation features allowed for the identification of landscape complexes on the territory of these recreational zones that are of high educational or aesthetical value and are rarely found in other regions of Russia. Such unique landscapes are a valuable part of recreational potential.

Remarkable landscapes that attract tourists with their beauty are usually structural elements (facies, stows) of typological natural and territorial complexes of higher rank (group types of stows and location types). Analysis of landscape structures on the territory of recreational zones led to identification of a number of remarkable and noteworthy sites (table 3). Such landscapes on the territory of the Lena Pillars Nature Park include:
- Cliff, eolian, cryogenic, karst, and erosive formations;
- Steppe slopes and dry riverbeds characteristic of karst regions;

Table 2. Landscape pattern of the Lena Pillars Nature Park

Landscape types	Recreational lands		
	Mouth of the Labyja Brook	Mouth of the Buotama River	Saamys-Kumaga tukulan
Lena River floodplane	+	+	+
Medium-height terraces of the Lena River	-	+	+
High terraces of the Lena River	-	+	+
Near-watershed portions of the Plateau	+	+	-
Hard-rock outcrops	+	+	-
Steep slopes of river valleys	+	+	-
Medium-gradient slopes	+	+	+
Low-gradient slopes	+	+	+
Drainage rills and creek valleys	+	+	+
Bottoms of small river valleys	+	+	-
Drift sands	-	+	+

Table 3. Notable natural landscapes within the territory of the Lena Pillars Nature Park

Notable landscape	Recreational lands		
	Mouth of the Labyja Brook	Mouth of the Buotama River	Saamys-Kumaga tukulan
Steppificated meadows on slopes	+	+	-
Steppificated meadows in valleys	-	+	-
Spruce forests in valleys	+	+	-
Poplar forests in valleys	+	-	-
Suffosion lows	-	+	+
Lena Pillars geological nature monument	+	-	-
Drift sands	-	+	+
Hard-rock outcrops	+	+	-
Karst funnels	+	-	-
Cryogenic landscapes	-	+	-
Pine forests	-	+	+

- "Warm" valley complexes of talik zones with their associated plant communities (poplar forests);
- "Cold" valley complexes with spruce forests;
- "Kyrdal" steppe communities typical for the regions with sharp continental climate;
- Park pine forests promising from the recreational point of view.

On the basis of landscape research results justification was prepared for the establishment of tourist routes in locations "Labyia", "Saamys-Kumaga", and "Labyia Stream mouth". 6 routes have been developed with description of 25 remarkable landscapes from the point of view of ecotourism, which reflect the natural and landscape structure features of the park territory. Maps for the tourist routes have been made with a scale of 1:100 000 and 1:25 000. All of this was used for the publication of "The Lena Pillars" pamphlet in 2000.

The remarkable nature of karst landscapes is revealed by the content of excursions at "Labyia" area, where they are represented by rock formations, "mountain" elements that break the monotony of plains taiga landscape of Central Yakutia, as well as steppe regions, dry riverbeds in small valleys etc. Excursion to "Saamys-Kumaga" Tukulan, "desert" element of the middle taiga landscape, underlines the uniqueness of the park's nature, introduces tourists to eolian landscapes of Yakutia and conditions of their formation. Excursions to remarkable landscapes at the Buotama River mouth enrich the knowledge and ideas about the nature of the park gained in the previous locations.

The landscape approach allows for an even representation and complex reflection of specific features of geological, geomorphological, botanical, and other monuments of

Fig. 36. A Christmas tree on the Lena Pillars. *Photo by A. Kamenev*.

nature using information about the history of their development, place and role in present day natural environment, evolution of natural objects. Using this method when developing the content for excursions leads to tourists forming a coherent picture about the nature of the park, raises the informational content and attractiveness of the trip, develops ecological way of thinking.

One of the most prospective directions for landscape research is the study of peculiarities of formation, morphology, and dynamics of eolian landscapes of the park. On the basis of analysis of data from climate reference books, maps and aerial surveys of different years geomorphologic and climatic conditions for the formation of eolian landscapes were researched (Vasiliev, Samsonova, 2000).

During the field research of 1998-2000 the surrounding areas and the top of Saamys-Kumaga ridge was explored, as well as the ridge bank, eolian formations of the brow side, and base of the Lena River Lena 4th terrace fragment ledge near the Buotama River mouth. Information was gained on meso- and microforms of eolian relief, their spatial distribution. Dynamics of eolian processes, activated in north-eastern part of Saamys-Kumaga massif after a fire that destroyed a forest in that location, are being monitored.

It has been confirmed that the 4th terrace of the Lena River has often been a site for forest fires in the past. Digs at the lithogenic base of the sand-ridge type of locality at the mouth of the Buotama River down to the depth of 3.5-4.0 metres have yielded horizons with traces of fires at the depths of 1.0, 2.0, and 2.5 metres. This fact allows considering fires as one of the main factors for the eolian relief formation at this location on the Lena River. Results of research into eolian landscapes significantly add to and expand the contents of the existing excursion materials for locations Saamys-Kymaga and the Buotama River mouth.

Study of the canyon (specific fragment of a river valley typical for karst regions) at the Oldokun River mouth showed that this location has valuable recreational resources for the development of tourism and can be used to expand the existing excursion programme. In order to provide the necessary information for organising excursions in this part of the park and Labyia stream mouth it is necessary to organise and conduct research to study karst formations.

An important direction is the study of landscape behaviour in modern climatic conditions. Ideas that will be given to tourists by guides on the basis of such research will help to create ecologically justified behaviour in everyday professional and recreational activities. With an aim of studying the present day landscape dynamics on the territory of Yakutia the area of the Lena Pillars Nature Park is used as one of the research grounds. Dendroclimatologic materials enrich excursions with information on climate change on the territory of the park and Central Yakutia as a whole, which is of particular importance considering the climate warming and landscape changes.

The next task for implementing the programme of creating a complex landscape basis for planning and organising nature conservation and recreational activities on the

territory of the park is a physical-geographical zoning with an aim of regulating the recreational nature management. As a result of the work principal patterns of distribution and dynamics of landscapes will be revealed in each physical-geographical zone, for every one of which the number of recreational objects will be defined, recreational potential and capacity will be evaluated, and types of recreational nature management will be identified.

Research into the nature of the Lena Pillars Nature Park continues and use of all possibilities offered by the landscape method to study its specifics will expand the list of remarkable landscapes on the territory of the park in the future and the geographic spread of sites for educational tourism taking into account the recreational capacity of natural complexes.

Major cryogenic ecosystems

At the nominated area are spread the most important modern cryogenic ecosystem types with peculiar soil cover, vegetation and fauna with high number of rare and disappearing species.

Steppe ecosystems are developed over the unique soils for the extra-continental climate – cryogenic chernozem. Specific features of cryogenic chernozem soils are: presence of icy permafrost and slight gleization indications (rusty spots) in the profile; traces of former flood plain soil-formation stage; intense dehydration of the upper horizon (0-30 cm) during almost whole vegetation period; and, at the same time, increased humidification of the super-cryogenic horizon; close deposition of the carbonate horizon; foliate structure; tongue-like humus and carbonate horizons; significant humus content in the upper horizon (0-20 cm). Vegetation is presented by petrophyte communities notable for their systematic and ecological flora composition with constant ecological vegetation structure. Vertebrate species composition is not very diverse and is presented by birds of open landscapes (kestrel, skylark, etc.); of mammals, typical inhabitants are narrow-skulled vole and Siberian roe.

Fig. 37. A thermokarst lake in the Park's territory. *Photo by V. Ryabkov*

Forest ecosystems are presented mainly by ecosystems of spruce, pine and larch taiga. Larch forest ecosystems prevail. These are characterized by relatively thick, for the region concerned, cover (20-30 cm) of cryogenic pale solodized soils. The main forest-forming species is Kajander's larch, in the underbrush dominate red whortleberry, bearberry, great bilberry and wild rosemary. Vertebrate population is presented by typical taiga complex species.

Tukulan ecosystem. Soil cover of tukulan has complex multi-component and contrast structure and is considered as an aggregate combination of zonal soils in conjunction with flood plain soils of the Lena valley. A distinguishing feature of this area is presence of significant mass of weaving sands over the watershed. Vegetation here is very poor and is presented by psammophytes. Here grows the endemic of Central Yakutian tukulan – *Koeleria skrjabinii*. Here and there, one can meet single specimen or small groups of xerophyte species: *Equisetum arvense, Artemisia commutate, Aconogonon ocreatum, Thymus mongolicus, Corispermum sibiricum* etc. No terrestrial vertebrate animals typical for the given landscape element, are present. As open stations among dense forest, they attract a number of insectivore birds.

Rocky outcrop ecosystem. Cryogenic sod-carbonate immature soils are developed at steep slopes of the Lena Pillars. These are characterized by rubbleness, thin silt profile (up to several centimeters) and close dislocation of dense rocks. Total vegetation coverage does not exceed 10%. Floristic composition is mainly presented by steppe species. At rock benches and ledges are noted single plants with participation of xerophilous and petrophilous species. Here grows *Redowskia sophiifolia* – local endemic of the Lena pillars. Besides, at rocks and crevices are met firns *Cystopteris fragalis* and *Woodsia glabella.* Here dwell prey birds (peregrine, kestrel, etc.), swift, house martin; of mammals typical inhabitant is a musk deer.

2b. History and Development

Nominated territory is situated within Khangalassky and Olekminsky uluses where Lena River and its numerous big and small tributaries flows – one of the biggest water artery of the North of Eurasia. That's why Lena River remains to be the main line of people's insights from south to north for long years. According to some sources of information, the populating in particular began in Paleolith along Lena River, and then, step by step, people subdued the whole Asian North-East, and then populated America straight across the Bering neck.

In 1982 the Diring-Yuryah site was allocated – a unique antique monument enclosed archeological monuments vary in time and tools of Early Paleolith similar to Oldoway tools of Africa. This allowed Yakut archeologists to put forward a hypothesis on extra-tropical descent of man and more ancient history of area development. However, monuments of follow-up periods of Early and Middle Paleolith have not found yet. Thus, we can suggest only culture of Late Paleolith which evidence (monuments) was found within the whole territory of Republic, and also on Sink IV-V and Diring-Yuryah sites. Pioneer settlers which started to develop huge and vast areas were Pleistocene animals' hunters. This is evidenced by the burials of mammoth, bison, woolly rhinoceros, Lena horse and reindeer near Lena Pillars and along Kuranah, Labyya and Buotama rivers.

As a result of new human entry from south and mammoths extinction the inhabitants became moose (Alces alces), reindeers' and other taiga animals' hunters in ensuing millennia. Neolith people started to make bulk of faceted tools which assisted to improve hunting and fishing tools. The main hunt aim appeared to be big taiga animals, especially moose (Alces alces). The image of moose holds a central position in numerous petroglyphs situated within the nominated territory on Lena and Buotama rocks.

With the advent of new Ust-milsky culture carriers (from the end of IV millennium B.C.E. till middle of II millennium B.C.E.) fishing evolved in national economy. Technology of tools handling and ceramics are greatly improved. The Bronze Age began in the middle of II millennium B.C.E. and alternated by the Early Iron Age in V century B.C.E. In such a way, Middle Lena inhabitants, conserving their aged system of survival, got into iron, and iron techniques and ironmongery were wide spread and developed during follow-up centuries. This was assisted by iron deposits along Buotama and Lyutenga rivers. Ferriferous concretions found at that time within the nominated territory were related to sedimentary deposits and could not be mention as characteristic of large iron-ore deposits.

According to scientists, bearers of Ust-milsky culture were the forefathers of Yukaghirs – primordial North-Asian nation. Insight of small groups of Tungus-language tribes began in the Iron Age, and more strong migration of Evenk forefathers began in second part of A.D. who opened up riding and packing in reindeer breeding – a new type of economic activity in region. Part of the territory of Park became a pasture area for deer breeding from this moment. Besides, rich wild animals and plants remained to be an important extra source of Evenks and other people survival.

A ranking place in history of development belong to Yakuts, whose forefathers, few in number Turcoman-language people, appeared in VI-VII centuries. Yakuts were populated the far bank of Lena River and its tributaries and were able to keep and to adapt horse-breeding and stock-raising economic structure in extremely natural and climatic conditions, to ensure trades, especially farriery. They widely used ironstone from Lyutenga and Buotama rivers watershed for trade tools and other economic needs.

A new step in economic development of territory began with insight of Russian people. Spread of agriculture became the most important result in economic development. Hunting trade tools were greatly improved, shotgun appeared, household things and clothes, dwelling, feeding were changed. Russian old identity of Prilenie not only introduced innovation in economic structure, but also opened up much elements of material and spiritual culture of indigenous people.

During the II expedition on Kamchatka under command of V. Bering on Tamma River in 1735-1744 (Megino-Kangalassky ulus) the Tamginsky iron foundry was on-stream and was supplied by means of ironstone from the current territory of Park as that ironstone was enclosed 45,5% of iron. Small co-operative farms of reindeer-breeders "Buotama" and "Combine" were organized in XX century within the territory of Park in the mouth of Buotama River and in Dikimde locality in the end of 1920 and had survived till sixties of XX century. Except of traditional crafts and trades (reindeer breeding, hunting, fishing) those co-operative farms were occupied with goods traffic for gold mining on Aldan.

In such a way, in millennium past and currently the nominated territory appears as a place for traditional survival of Evenks who keeps traditional types of economic activity based on smart limit of consumption and environmentally friendly use of natural resources.

View of Yakutsk town and the Lena Pillars. Charle de Lespinass (after Julio Ferrario "Il costume antico e modern, o, storia di tutti I popoli antichi e moderni" (Asia. Volume 4. Milan. 1818).

Fig. 38. Ice ridges on the Lena River. *Photo by V. Ryabkov.*

3 JUSTIFICATION FOR INSCRIPTION

3a. Criteria under which inscription is proposed (and justification for inscription under these criteria)

The "Lena Pillars Nature Park" is nominated under the following criteria:

vii Contains unique natural objects of outstanding beauty and aesthetic significance

"Lena Pillars Nature Park" – is a unique natural monument and a monument of the coldest and severe region inhabited by people all around the year. It occupies more than 1 272 thousand ha which include a range of unique and outstanding aesthetical value sites, first of all the famous cliffs which are lined up as solid walls along the right bank of great Siberian River Lena and its tributary Buotama River. Fabulous rocky statues up to 100 m high stretch almost 40 km along the Lena River. Lonely cliffs, standing against rockslides and green forested slopes, can be seen along around 200 km. During more than half a billion years the light-brown, brown-grey laminated limestones eroded. Within the previous 2 million years, fluvial masses of red sands deposited here after karst and erosion processes formed various fanciful rocks.

Fig. 39. A thin pillar. *Photo by V. Ryabkov.*

There are many outstanding karst landscapes around the World, with unique outcrop formations, different geologic structure and age, criteria and space structure. The most valuable landscapes are already inscribed into World Heritage List (see Comparative analysis chapter), most of them are, for example, much higher than the Lena Pillars. But if we take into account the exceptional variety of the outcrop formations, and the fact that they continously stretch along such a significant distance (such phenomena, according to our knowledge, have never been noted around the already inscribed World Heritage Sites), then the global value of the Lena Pillars becomes obvious.

Thus we can claim that the Lena Pillars have a relief with completely unique features and with exclusively high aesthetic potential. With wind and water, heat and cold, the «nature-artist» has created the genuine masterpiece made of colonnades, towers, cathedrals, caves and holes. These agents created human and animal like figures in the fantastic statues of rocky boulders.

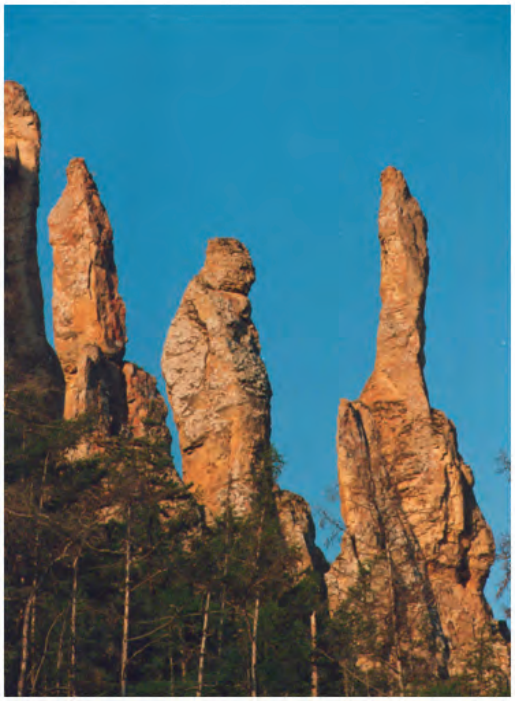


Fig. 40. Stone monuments of mysterious creatures. *Photo by P. Kolosov.*

Fig. 41. Kihi-Taas – the stone man. *Photo by P. Kolosov.*

The nominated territory boasts very rich an diverse vegetation, which contributes to the landscape diversity and enhances the aesthetic evaluation of the "Lena Pillars Nature Park": larch taiga with pine forest inclusions and alas on the watersheds turns to meadows and steppe in the Lena and Buotama Rivers valleys, then numerous islands with amazing sceneries full of flowers, shrubby and grassy plants (more than 300 species). Here can be observed the exotic phenomena of the Yakutian nature: tukulans - real sand dunes in the sea of endless taiga.

The variety and surprising combination of Lena Pillars rocky forms had been attracted the attention of humans since the old days and keep attracting people till today. Since 2000 BC these voiceless rocky giants became bystanders and treasurers of vanished and existent civilizations, expressed in the ancient art - petroglyphs. The virgin soil gave birth to new centers of civilization, which contributed to the further development of human culture in the north lands and exploration of its immense space. Thousands of years of living in extreme natural and climatic conditions formed the special strategy of sustenance of native people, based on optimal functioning of system «nature – human – production – ecologic traditions». That's why all native people treated every natural site and phenomena as divinity and having a «soul-master». The special meaning in the traditional outlook was given to the Lena Pillars, which has been treated as Sacred and which were places for worship, ceremonies and rituals. People used rock painting on Lena cliffs to deliver to descendants their vision of world order, spiritual and cultural experience, humanistic ecologic traditions, which now perform the outstanding scientific and aesthetic value.

Fig. 42. Neolithic rock painting with a moose family. *Photo by A. Kamenev.*

With its glamorous beauty the Lena Pillars dazzled many travelers, explorers, artists and writers. I. Standling, a Swedish journalist, who visited the Lena Pillars in the late 19th century, noted exceptional natural beauty of the Lena Pillars: «Colossal rocks of red sandstone alternating with forested hills are reflected in the waters of the giant river. Here rise Cyclopean sandstone walls brought one against another by some supernatural forces… Here under the low-browed cliff is the eternal giant whirlpool, while away there are dominating kind of countless spires of temples and minarets or ruins of colossal

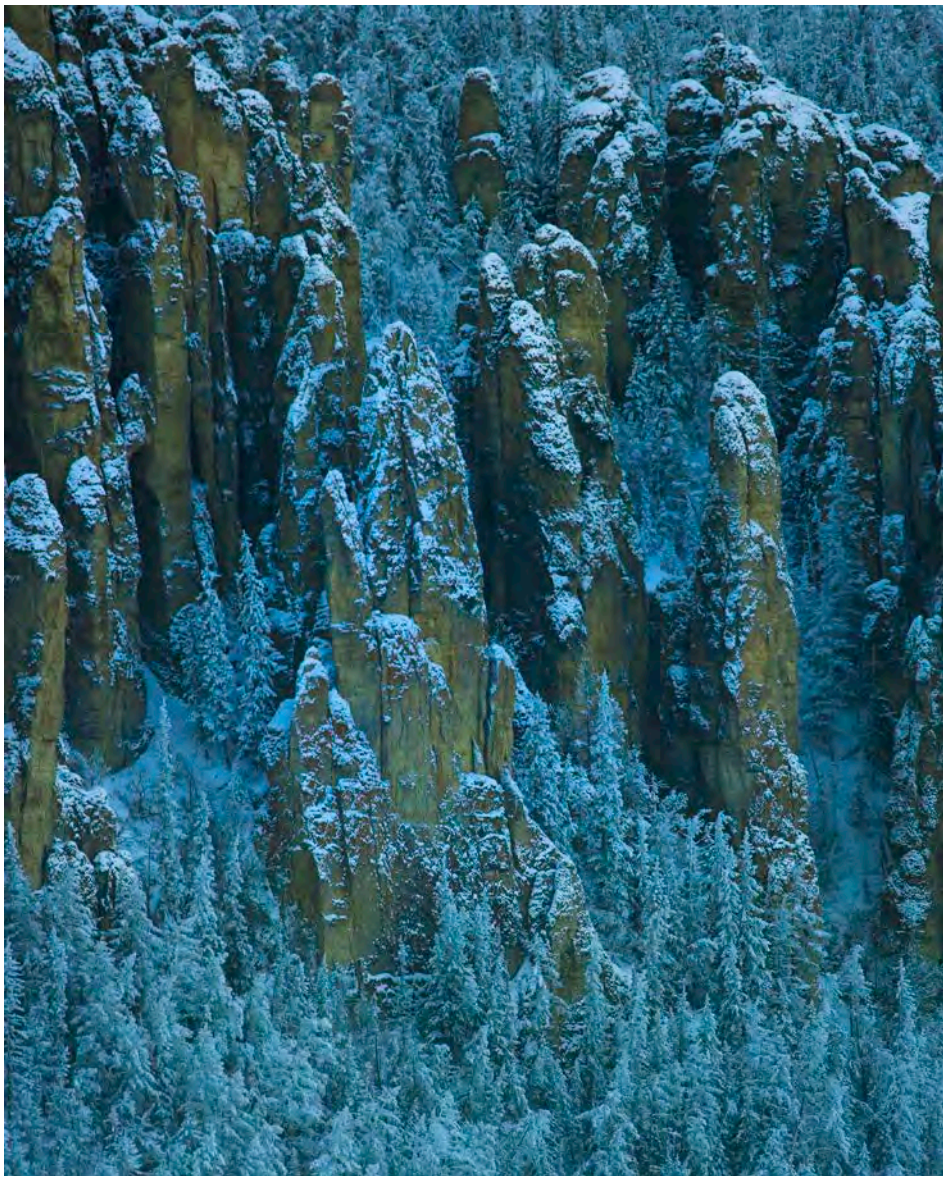


Fig. 43. The Pillars. *Photo by A. Kamenev*

castles made of pale-gray limestone. Columns of slender larches and Siberian firs stand in the ravines as it were armies ready to assault the fortresses, formidably dominating over them, while far away, at its highest, there are lonely firs, like soldiers, climbing uphill to the fortress. Then slaty layers flash and give the river shores the fantastic view. Here and there one can see the dark hole of underground grotto, in other places there are warm sulfurous springs spouting from mountain».

Fig. 44. The Buotama river. *Photo by A. Ogloblin*

Bewitched from the amazing beauty and greatness of the Lena Pillars, the Siberian poet Anatoly Olkhon wrote (Anatoly Olkhon, 1903 - 1950):

«Rocks? No, there are no rocks,
There are ancient creatures in a line,
Raising their bared teeth,
Burning with the rainbow colors.
Mountains? No, they are not like mountains,
They are towers, castles, chambers,
Colonnades, terraces, cathedrals,
Minarets, tombs, houses…
Will you say to me – cliffs? Indeed,
This is a herd of flying horses,
Rhinoceros, elephants, hippopotamus…"
(Olkhon, 1951)

The essential part of the "Lena Pillars Nature Park" is virtually untouched, a virgin region, which by itself is the significant factor of high aesthetic value. Prof. O.N. Tolstikhin, writes: «Maybe the main feature of nature is to give people rest, return them to the world of beauty and happiness, lead off from misery and heavy worries which fell to our society. By conserving nature we conserve ourselves, our souls and not only resources necessary for expanded reproduction». This masterpiece made by nature is wonderful at any season and any day or night. Especially it is impressive at evenings, when cliffs, covered by sunset light, are getting ignited, getting pink as if they rise from their reflections in the calm water, and coming to life from churning waters after light wind or passing ships and boats. The aesthetical value is intensified by the rich colors of the four seasons which are exceptionally well pronounced by the strong continental climate. The impressive beauty

of the nominated territory is the permanent object for famous artists, photographers, writers, tourists. The fabulous statues of rocky boulders, numerous rifts and rapids of the Buotama river, sand dunes, endless taiga with seasonally changing coloration from light to dark green in spring and summer to yellow in autumn and black and white in winter and the integrity of multifaced virgin nature of this wonderful place have been echoed in many movies, pictures, paintings, books and folklore.

Being a Special Protected Area with unique natural landscapes, rich flora and fauna, conserved traditional aboriginal activities (reindeer breeding, fishery, subsistence hunting, cattle breeding), cultural and ethnographic sights, the "Lena Pillars Nature Park" has been Yakutia's "business card" for many years. To date, the "Lena Pillars Nature Park" is one of the main tourist destinations for Russians and foreigners in Siberia - like Lake Baikal and the Volcanoes of Kamtchatka.

«My admiration is endless, and I am standing still before this beauty. The Lena river banks, the unbounded Lena Pillars….and silence. The beauty of rough nature. I feel quite small standing before the Lena Pillars. I dare not to touch this nature for fear to disturb it. I look at all this in wonderment. I am fine here. I breathe in air which is so clean! I've absorbed this nature so deep in myself that it will always be kept in my soul» (Bruno Alend, France).

And this is another exceptional aesthetic value of the nominated territory with inimitable and mythic beauty - when a human of modern post industrial civilization begins (as our ancient ancestors) to feel himself as integral part of nature, a grain of sand in the Universe and directly joins the circle of nature.

Such values can be regarded as "transformative values" sensu Bryan G. Norton which stand in contrast to plain demand values. Nature in its diversity and beauty - as represented by the "Lena Pillars Nature Park" - can function as a central transformative value: "Through experiences of nature, a new sense of value emerges" (Norton 1987, p. 192).

The "Lena Pillars Nature Park" has not only demand value for humans for satisfying needs and preferences. The awe-inspiring Lena Pillars Nature Park also possesses transformative value by providing occasions for us to examine, deliberate over, and revise our own values - and that is, to grow as human beings.

Fig. 45. Gigantic karren of the valley of Lena. *Photo by P. Kolosov*

viii Be outstanding example 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.

viii (a) Be outstanding example representing major stages of Earth's history, including the record of life.

The Lena River and its tributaries provide within the boundaries of the nominated territory natural cuts of the uppermost Ediacaran (Precambrian) to middle Cambrian strata of a total thickness from 980 to 1370 m on the distance of over 150 km. The strata themselves were accumulated in platformal environments and were not subsequently objects of either metamorphic hit or strong tectonic dislocations. As a result, each stratum of a few centimetres thickness only is easily traceable for dozens of kilometres mostly having dips of less than two degrees (Savitskiy & Astashkin, 1979; Spizharski et al., 1986; Astashkin et al., 1991; Sukhov, 1997; Pegel, 2000; Varlamov & Rozanov, 2008). Also, the pillar relief itself provides an excellent outcropping of Cambrian rocks. Various palaeogeographic reconstructions based on comprehensive palaeomagnetic, tectonic, sedimentological, and biogeographic criteria place the Siberian Platform at low, tropical, latitudes during the Cambrian (Kirschvink et al., 1997; Debrenne et al., 1999; Smith, 2001; Cocks & Torsvik, 2007; Meert & Lieberman, 2008).

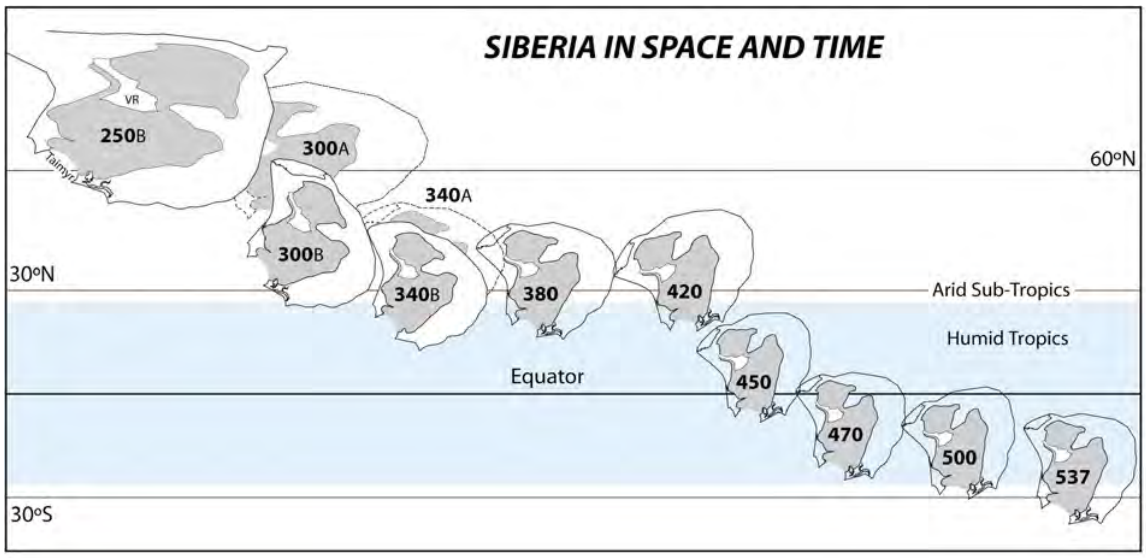


Fig. 46. Siberia in space and time (after Cocks & Torsvik, 2007). The Cambrian position is marked by number 500 Ma.

These strata were formed during the latest Ediacaran – early to middle Cambrian interval, the interval which is called the "Cambrian Explosion" and which was one of the major diversification events on the Earth where all the body plans still existing now have appeared (as well as many completely extinct ones). Finally, this is Siberia only where this interval is represented by marine carbonates of a high facies diversity while carbonates are the best sediments for the skeletal fossil preservation. Due to the presence of three different contemporary epeiric basins here, which are an inner platformal basin, a transitional reefal belt, and outer deep-water platformal basin, an analysis of a parallel evolution of faunas and floras is possible in this area including an origin of deep water fauna. An observed progradation of the carbonate ramp is expressed in eastward displacement of transitional reefal belt during the early-middle Cambrian. All these extraordinary circumstances allow scientists to ground unique researches here.

Fig. 47. Thin plan-parallel lamination of Cambrian strata. *Photo by A. Zhuravlev*

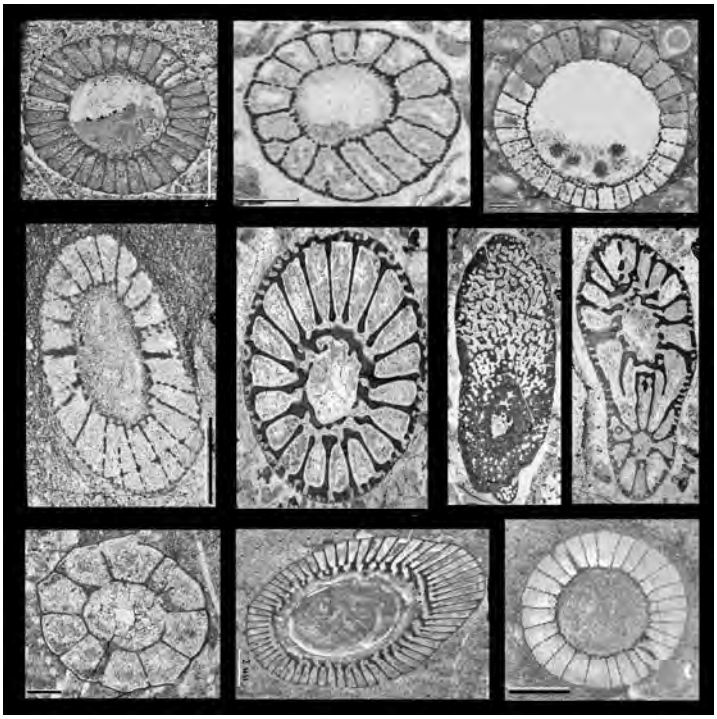


Fig. 48. Thin sections of archaeocyaths (calcified aspiculate sponges) from lower Cambrian reefs of the"Lena Pillars Nature Park".

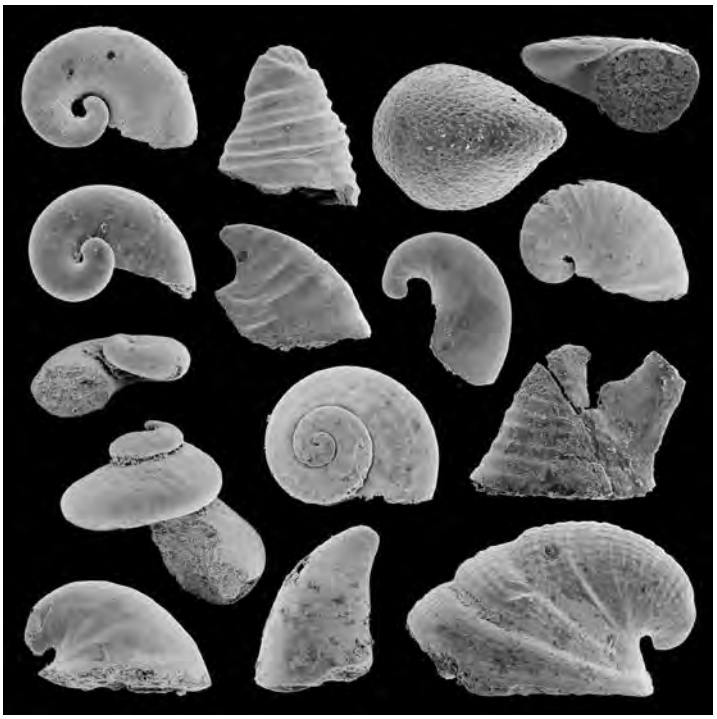


Fig. 49. Mollusc shells from lower Cambrian reefs of the "Lena Pillars Nature Park".

Due to a continuous succession, carbonate composition, and excellent outcropping of the Lena Pillars, leading geochemists and geophysicists developed the most detailed records of the palaeomagnetic and stable isotope alternations for the early to middle Cambrian interval (Kirschvink & Rozanov, 1984; Magaritz et al., 1986, 1991; Magaritz, 1989;

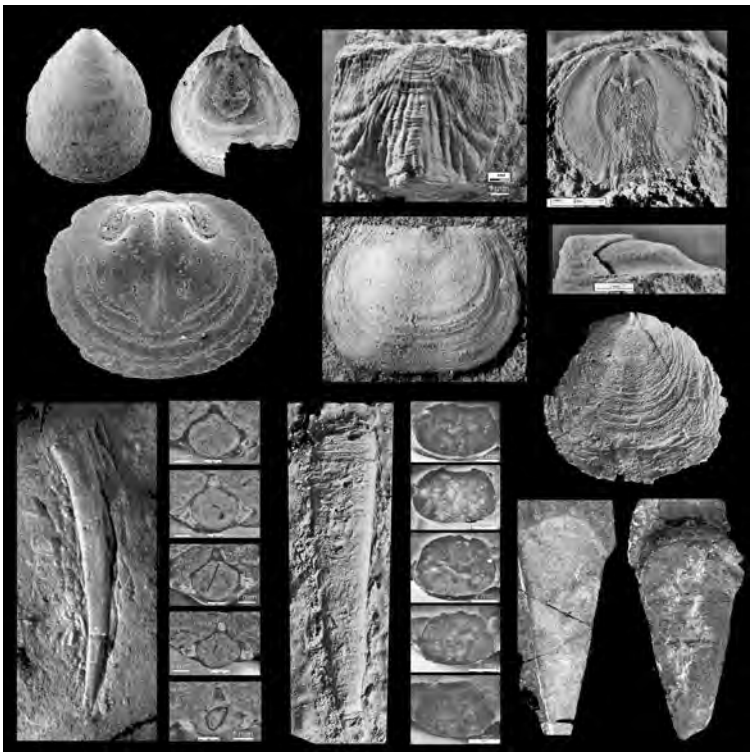


Fig. 50. Hyolith and brachiopod shells from lower Cambrian reefs of the "Lena Pillars Nature Park".

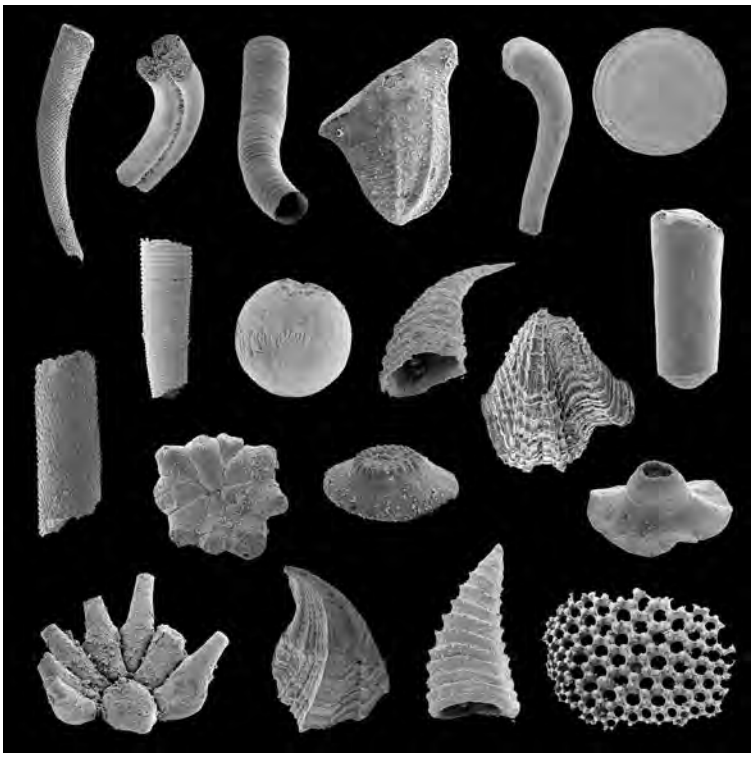


Fig. 51. Small shelly fossils from the lower Cambrian of the "Lena Pillars Nature Park".

Kirschvink et al., 1991; Brasier et al., 1994a, b; Derry et al., 1994; Ripperdan, 1994; Nicholas, 1996; Schields, 1999). Carbon and strontium isotope curves as well as palaeomagnetic scale established here serve the reference scales for the whole world. Data of such a precision are necessary for understanding of the evolution of the Earth lithosphere, hydrosphere, and atmosphere and are very important for the global Cambrian stratigraphy as well as for palaeogeographic and other general geological and palaeoecological implications.

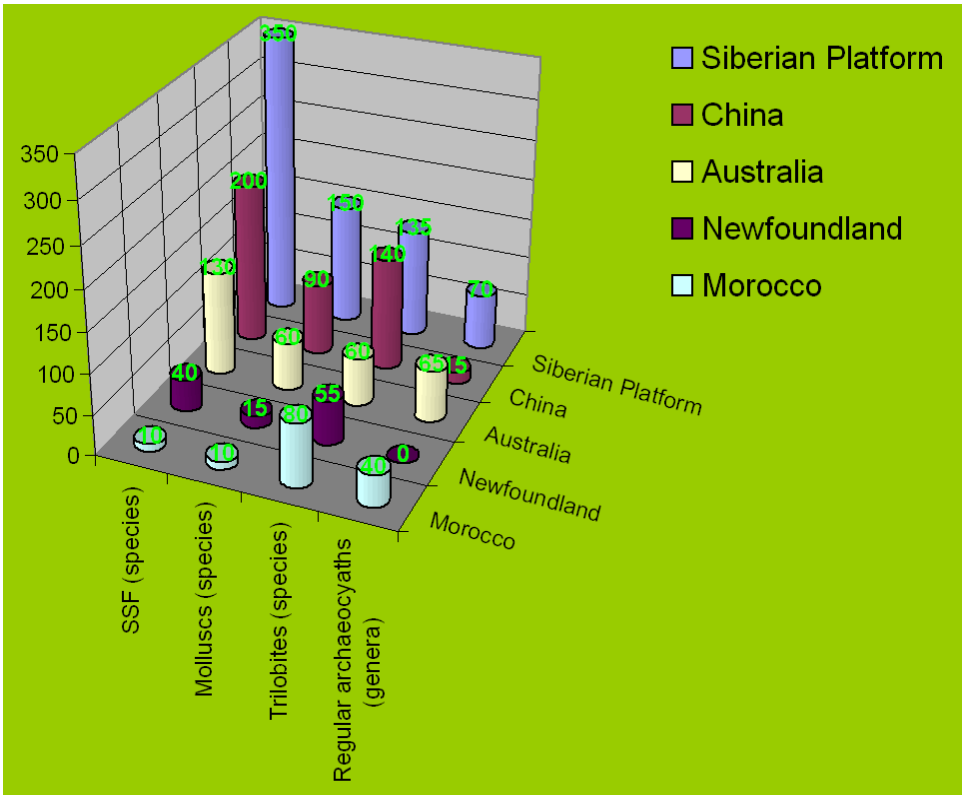


Fig. 52. Species and generic diversity in early Cambrian key regions of the world.

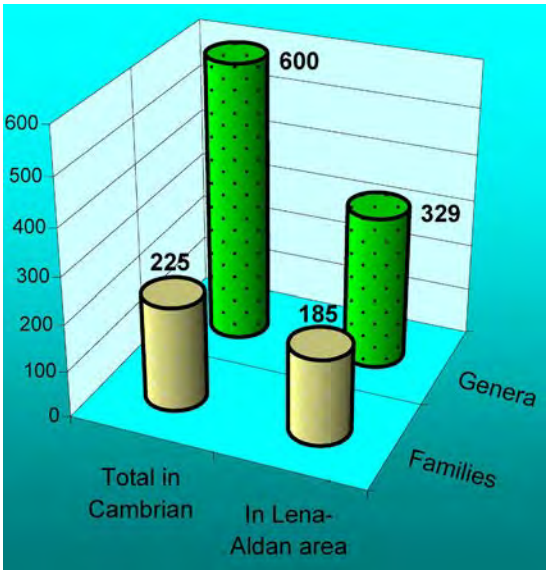


Fig. 53. The total number of fossil animal genera and families described from the Cambrian, and number of taxa known from the Lena-Aldan region of the Siberian Platform.

The Lena Pillars' sections allow scientists to estimate the early stages of multicellular animal evolution in its full diversity and dynamics. It should be emphasized that among approximately 2,000 early Cambrian genera, which are known today, about 350 are described from the area under discussion – and this is a really amazing number (Sepkoski, 1992; Zhuravlev & Wood, 1996; Zhuravlev & Riding, 2001; Dixon et al., 2001; Varlamov & Rozanov, 2008; Rozanov et al., 2008). This list is enlarged almost every year. These genera include the first archaeocyaths (rigid aspiculate calcified sponges), radiocyaths, coralomorphs (skeletal primitive cnidarians), brachiopods, and some other groups of animals with mineralized skeletons while the contemporary general diversity of this region was the highest in the early Cambrian of the world. This is the area where the very systematics of archaeocyaths, hyoliths, and many other problematic groups, which comprise the core of the animals involved in the Cambrian skeletal revolution, is developed since 19th century (Schmidt, 1886; Toll, 1899; Zhuravleva, 1960, 1969; Korde, 1961; Khomentovskiy & Repina, 1965; Rozanov et al., 1969; Sysoev, 1972; Luchinina, 1975; Lipps & Signor, 1992; Palmer & Repina, 1993; Dzik, 1994; Scrutton, 1997; Hooper & van Soest, 2002; Debrenne et al., 2011). For some of the aforementioned groups, this area was also the center of their origin (Rozanov, 1984). Additionally, a number of complete and intact specimens of extraordinary preservation – the so-called Sinsk Biota, which contains a number of unique species including those with phosphatized soft tissues and cells as well as their embryos, is described here (Ivantsov, 1999; Ivantsov & Wrona, 2004; Ivantsov et al., 2005a, b).

Fig. 54. A Cambrian bioherm of the Oy-Muran Reef Massif. *Photo by A. Zhuravlev*

The most outstanding object in the nominated territory are reefal facies. Excellent preservation, high diversity, and multiple localities of reefal fauna in the Lena Pillars (Byd'yangaya, Negyurchene, Oy-Muran and other reefal areas) provide a firm basis for detailed palaeoecological and population dynamics' studies of the earliest metazoan reefal biota which are comparable in precision with studies of modern reefs only. However, if modern reefs represent a single time slice only, the Lena Pillars provide over 20 such time slices which let research understand a real evolutionary process from its very beginning (because metazoan reefs appeared here and during this first 5 million years existed on the Siberian Platform only) which shaped the communities of organisms if they were a co-evolved entities or simply occasional sets of co-existing species. Additionally, such features of communities can be studied in relation to the significance the significance of alpha-, beta, and gamma-diversities; hub-species and their influence on the community structure; interspecific and intraspecific interactions; ecological successions; trophic webs; tiering, and many others. The Oy-Muran Reef Massif occupying the central part of

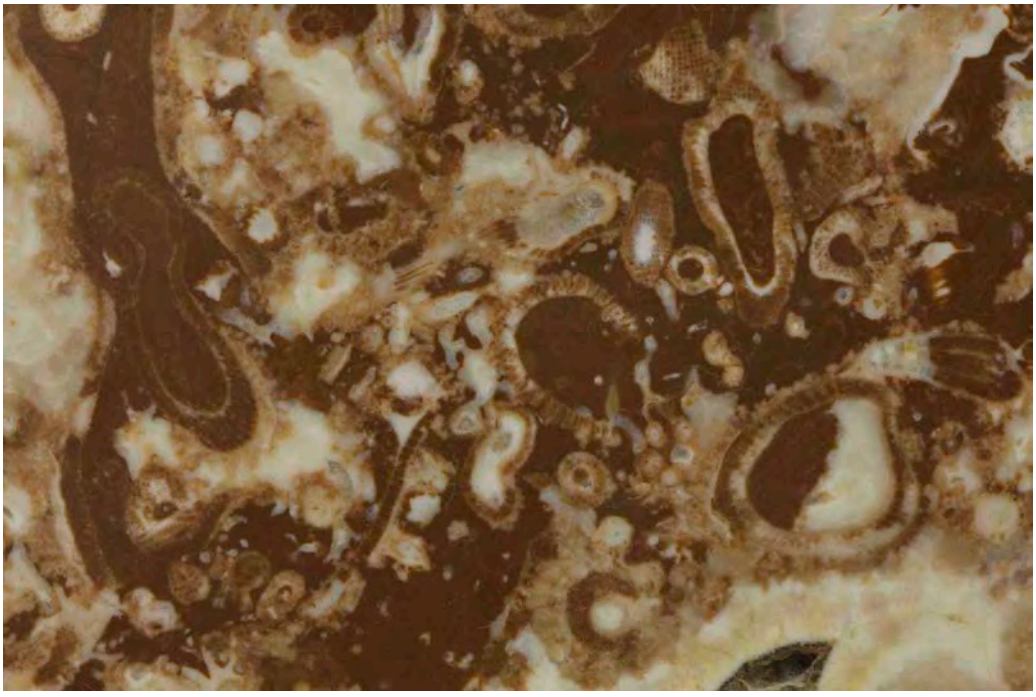


Fig. 55. A longitudinal polished section of an Oy-Muran reefal sample with *in situ* archaeocyaths and other reefal organisms. Cambrian Stage 2. *Photo by V. Il'ynsky.*

the Lena Pillars was of the same significance for the Cambrian world as the Great Barrier Reef is for the modern Earth. Certainly, there are other interesting reefs on the planet now but the Great Barrier Reef is still a unique phenomenon. Besides, the Lena Pillars' region is the very region where the first metazoan reefs appeared. As a result, the Lena Pillars became a field laboratory for leading sedimentologists and palaeoecologists. These

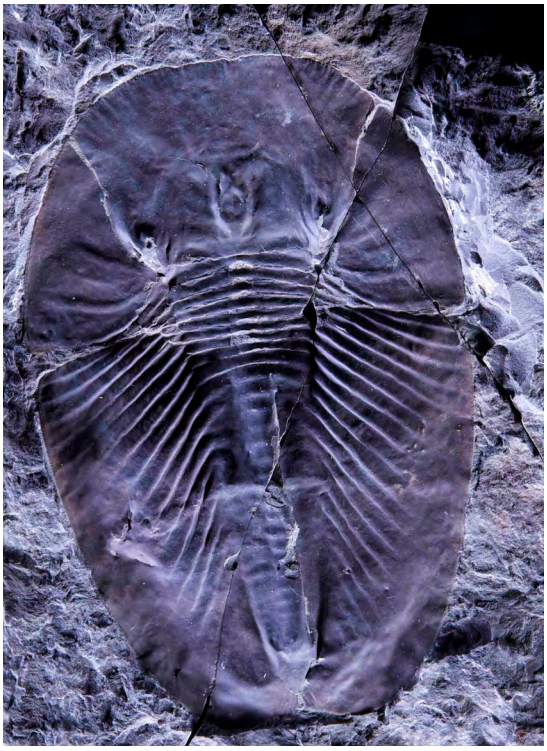


Fig. 56. Intact complete giant arthropods *Phitophylaspis* of the Sinsk Biota. Cambrian Stage 3. *Photo by V. Il'ynsky.*

studies drastically changed our understanding of the reef evolution and their results are now cited in text-books and treatises (James & Debrenne, 1980; Chuvashov & Riding, 1984; Riding & Voronova, 1984; Rowland & Gangloff, 1988; Riding, 1991; Wood et al., 1992; Wood, 1993, 1995, 1999; Copper, 1994; Kruse et al., 1995; Zhuravlev & Wood, 1995; Stanley, 2001; Rowland & Shapiro, 2002; Kiessling et al., 2003; Rowland & Hicks, 2004; Zhuravlev & Naimark, 2005; Debrenne, 2007; Gandin & Debrenne, 2010).

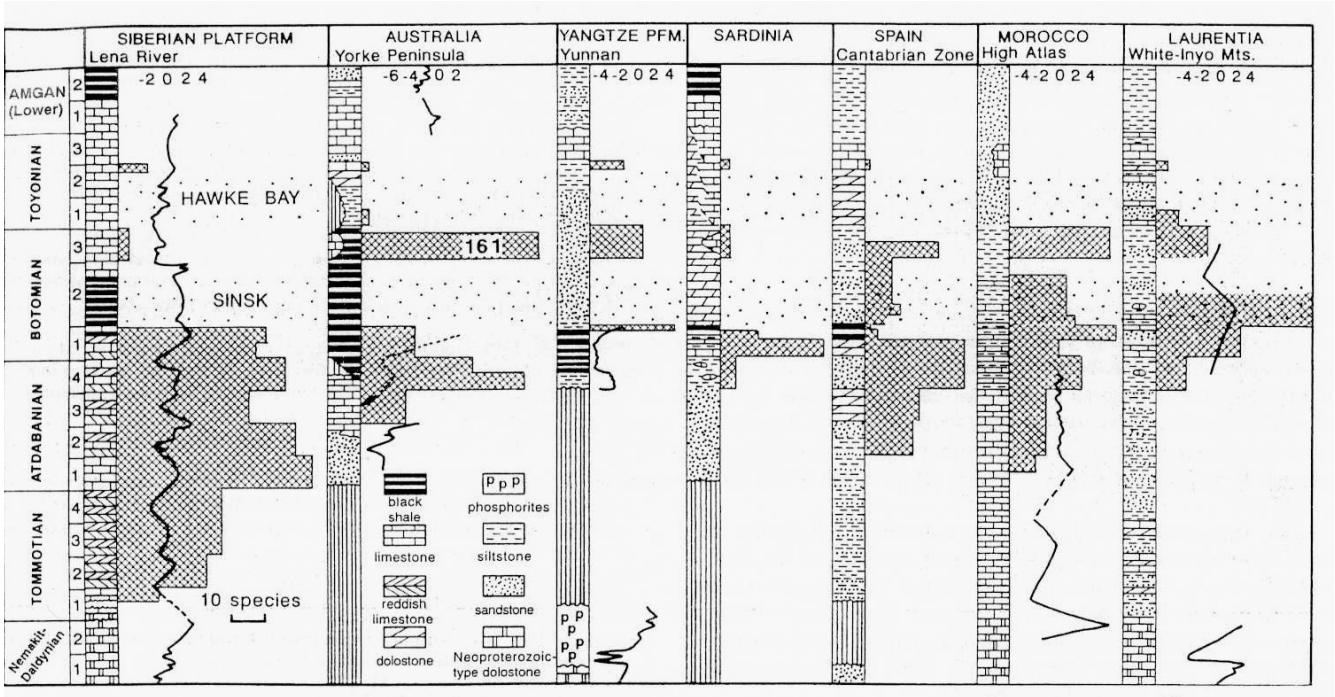
The Lena Pillars' carbonate, mostly reefal and perireefal facies, let researches to analyze palaeoclimate alternations on the eve of the first Greenhouse Epoch in the Phanerozoic because only here it is possible to use in concert a representative enough (for statistics) data on faunal diversification, reliable data on carbon and strontium isotopes, and correct data on diverse carbonate mineralogies. This data also allow us a better understanding of the fate of modern reefs due to a possible global warming because alike their early Cambrian analogies modern reefs are built by organisms possessing volatile aragonite and high-magnesium calcite skeletons and by sedimentary fabrics of the same composition (Zhuravlev & Wood, 2008, 2009).

Fig. 57. Ooid shoal of Cambrian back-reef facies. *Photo by A. Zhuravlev.*

Fig. 58. Tempestites of Cambrian back-reef facies. *Photo by A. Zhuravlev.*

The same facies are suitable for statistic analyses of a high precision of stratigraphic distribution of various skeletal groups. An accumulation of statistic data brought out a distinguishing of the fist mass-extinction events in the Earth history which are known as the Sinsk and Toyonian extinction events and even the very names of this events are borrowed from the toponymy of the Lena Pillar's area. It had been shown that these events were the pivotal points in animal evolution comparable with the well-known Permo-Triassic extinction event because the so-called Early Cambrian (Tommotian) Evolutionary Fauna which has gone during that time was comparable by its uniqueness with the following Palaeozoic Evolutionary Fauna which has gone during the Permo-Triassic extinction event (Brasier, 1992, 1995; Rozanov, 1992; Hart, 1996; Zhuravlev & Wood, 1996, 2008; Erwin, 1998; Hallam, 2005).

Fig. 59. Global diversification and mass extinction (Sinsk) of Cambrian reefal fauna (after Zhuravlev & Wood, 1996). Note the complete absence of reefal organisms elsewhere but the Siberian Platform during the earliest Cambrian (here named the Tommotian and the early Atdabanian).



viii (b) Be outstanding example representing significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features.

Frozen ground karst

Karst of the "Lena Pillars Nature Park" is the only and unique example in the world of the recent development of the frozen ground karst on the plain plateau at 200-500 m above sea level, constituted by the limestone and dolomites of Lower Cambrian. All rock mass is covered by the karst process in the conditions of the perennially cryotic rocks to 500 m thickness. Karst is developed in the Sub-Arctic extreme continental and dry climate. (See Chapter 2a "Karst phenomena of the "Lena Pillars Nature Park"" for detailed information.)

The Lena River is the only place on the globe where the processes of the fine disintegration of the rocks – cryohydratational weathering, are the dominant in the modeling of limestone pillar relief.

Frozen ground karst of the nominated territory is divided into a) the surface the surface karst (associated with the supra permafrost aquifers) and b) the underground one (related with the intra and beneath permafrost aquifers) one. Classic surface and underground karst forms are: karst sinkholes, ponors, suhodols, karst lakes, disappearances of the rivers, karst sources, karren, karst niches, karst pillars are the clear confirmation of the karstification. Activity of the recent karst processes on the territory of NP Lena Pillars is estimated by 21,4 mm per 1000 years.

The on-going development of Lena Pillars is controlled considerably by the gravitational-slope processes, conditioned, on the one hand, by the ancient tectonic joints, on the other hand, by the unloading of the cliff face parallel to the river. Generally, the development of the recent Lena Pillars karsts is related with the fissures of unloading of the cliff face.

Recent fluvial processes play the peculiar role in the formation of pillar's relief. The moving valley's talus, witnessing about on-going weathering processes of limestone pillars, are wide spread along the bedrock shores of Lena River. River waters of these rivers undermine the shores and carry off the weathering material. New products of the cover, creeping from above, are accumulated in exchange of the talus creeped and washed. Thus, the process of slope disintegration is accomplished constantly, which is due to, on the whole, the widening of the river valley.

3b. Proposed Statement of Outstanding Universal Value

The nominated property «Lena Pillars Nature Park» tells us three key-stories about our planet and the early evolution of life, namely: 1) the record of the "Cambrian Explosion", 2) the newcoming story of frozen ground karst phenomenon, and 3) the history of human deifying of a great natural monument.

1a) The site possesses a remarkable world-wide value being the most significant natural monument of the Cambrian Explosion, which was one of the pivotal points in the Earth's life evolution. Due to platformal type of carbonate sedimentation within tropical belt without subsequent metamorphic and tectonic reworking and magnificent impressive outcrops, the nominated property preserve the most continuous, fully documented, and richest record of the diversification of skeletal animals and calcified algae from their first appearances until the first mass extinction event which is excellent documented in parallel in three types of sedimentary basins during the first 35 m.y. of the Cambrian evolution.

1b) The «Lena Pillars» comprises the earliest and the largest, in both temporal and spatial senses, fossil metazoan reef of the Cambrian world. This reef being a site of Cambrian diversification is comparable to the Great Barrier Reef in modern world. The high preservation quality of both skeletal and soft-bodied fossils being coupled with high resolution isotope and palaeomagnetic records as well as with various well-preserved sedimentary fabrics allows researches to solve diverse ecological and evolutionary problems with a precision comparable with the study of modern biotas and communities.

2) Situated within the nominated territory Cambrian carbonates remained to be a place of unique ongoing geological processes now – the only model of recent frozen ground karst of karst plateaus. All the rock massif is touched by karst processes of perennially cryotic rocks under extremely continental semihumid climate conditions. The Lena and Buotama pillars are the only area on the globe where the processes of the fine disintegration of the rocks – cryohydration weathering – dominate in the shaping of carbonate pillar relief. These karst phenomena are enriched by thermokarst processes developed in the area of a great permafrost thickness (up to 600 m) which led to appearances of alases – thermokarst features of almost exclusively Yakutian affinities. The frozen ground karst in combination with thermokarst is an worldwide unique phenomenon of Eastern Siberia and in outstanding kind documented in the proposed property. It is quite different from all karst sites in the World Heritage List, which are located in humid areas. In turn, the semihumid continental climate conditions are expressed in a formation of tukulans which are eolian sand dunes being developed at almost polar latitudes.

3) Cambrian and present-day natural processes finally created Lena and Buotama Pillars known for inimitable beauty. Aesthetics effect of these large-scale rock river banks have no analogue all over the world. Improbable stone sculptures in form of uncountable fantastic pillars, steeples, towers with niches, passages, caves stretch for dozens of kilometers along the banks of the Lena River and its tributaries. The Lena River itself, which is one of the biggest rivers in the world, is served as a magnificent animated and all times different pedestal for this tremendous scenery framed by the seasonal changing features of the taiga and mountain steppe vegetation.

The nominated area is the outstanding natural property providing an unmatched synthesis of Cambrian geological and palaeontological data which are the basis for our understanding of the far past, evolution of the Earth and of the life on our planet during one of pivotal and dramatic points of its development.

The "Lena Pillars Nature Park" could make a claim for its inscription on World Heritage List according to two criteria: vii and viii. Valuable geological (lower to middle Cambrian strata), paleontological (rich and exceptional fossils and biocenoses including the earliest metazoan reef belt) and unique geomorphological sites (frozen ground karst, thermokarst, and sand dune-tukulan) is combined here with outstanding natural scenic attractions.

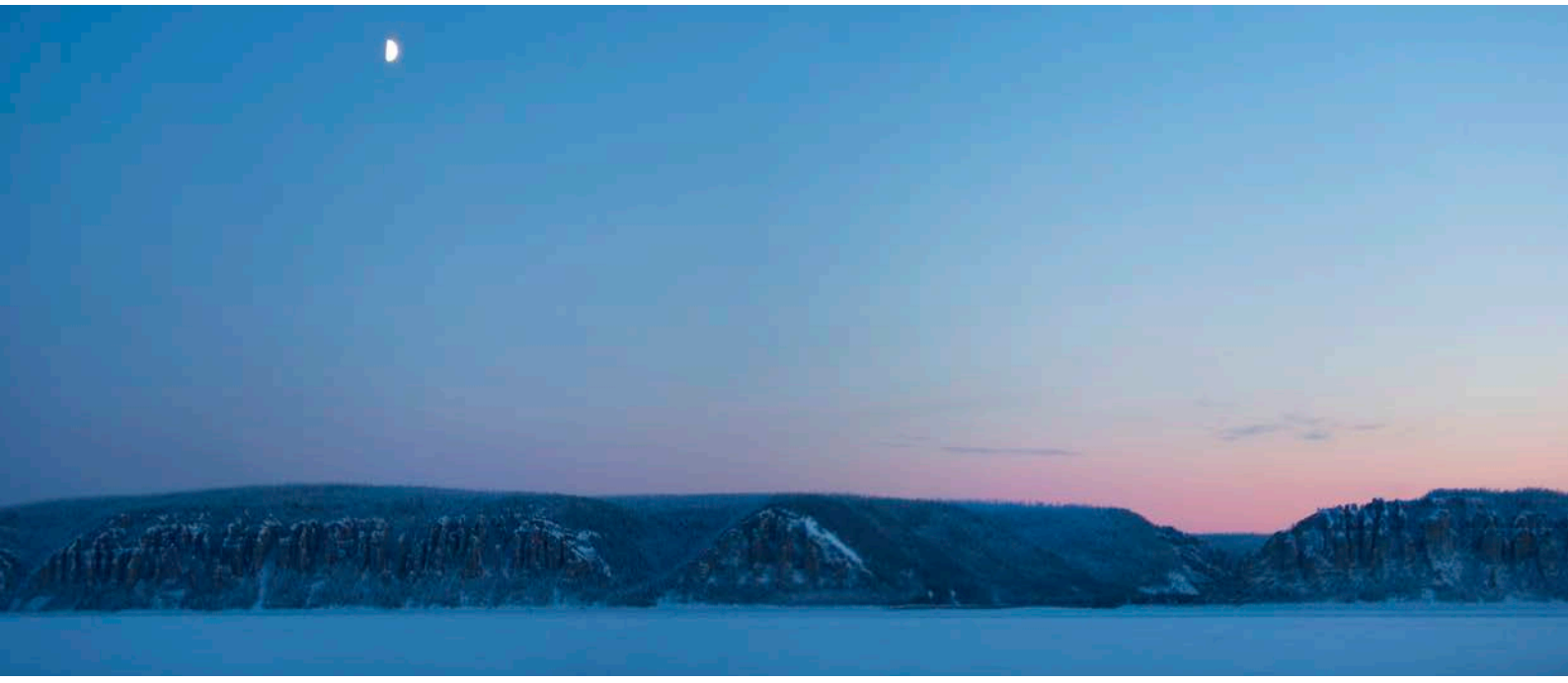


Fig. 60. View of the Lena Pillars across the Lena River in middle November. *Photo by A. Kamenev*

3c. Comparative analysis (including state of conservation of similar properties)

1. GEOGRAPHICAL ANALYSES

1.1. The Udvardy scheme analyses – biogeographical realms level

Eastern Palaearctic – is one of the greatest biogeographical realms allotted upon the prominent M. Udvardy natural demarcation scheme (1975). However, there is only a few World Natural Heritage Sites – about 15 - in comparison with the other regions of the Earth. Moreover, they are distributed very irregularly. So, most of the sites are accumulated in the southern and south-eastern parts of Eastern Palaearctic (in China, Northern India, and Nepal). Another three sites are located in its central part – in mountains and plateaus of southern Russia («Golden Mountains of Altai», «Uvs Nuur Basin», «Lake Baikal»). There are some more sites in the eastern part of the region, in its coastal: two in Japan and two in Russia («Central Sikhote-Alin», «Volcanoes of Kamchatka»). One more Russian site stands apart: it is the «Wrangel Island» in the Chukchi Sea, being the northernmost of World Natural Heritage Sites. At the same time, practically all the northern part of Eastern Palaearctic (tundras, open woodlands and taiga of Russian Siberia and the Far East) presents a vast region with not a single World Natural Heritage Site until now. This disproportion is just partly corrected by the Russian World Heritage site Putorana Plateau, inscribed in 2010.

The "Lena Pillars Nature Park" is situated in Central Yakutia, i.e. in the north-eastern sector of Eastern Palaearctic, and in such a way can partially cover that significant gap clearly seen on the global scheme of World Natural Heritage Sites location.

2. COMPARISON WITH OTHER WNH SITES

The nominated property comprises a segment of the Lena river about 200 km long that plays a role of main nature axis, «the frame» of the protected area. And from this point of view the concerned region is a rather interesting one. If we consider World Natural Heritage Sites which also comprise rather extensive sections of large rivers, it turns out that there are only few of such sites in the world (at that, small rivers are abundantly represented in WNH sites).

Some of the large rivers are plain ones, slowly running, sometimes meandering greatly (like Jau and Rio-Negru – site Central Amazonia, Niger – in park «W»). Other rivers are running in canyons (Grand-Canyon of Colorado river in the USA, Nakhanny in Canada) or deep gorges («Three parallel rivers» in China). There are also segments of rivers with giant waterfalls (Iguasu, Victoria at the Zambezy river).

CRITERION VII

The Pillars stretching along the Lena river channel are famous for their really fancy and fantastical contours and present the main aesthetic resource of the Park. They can be easily seen from a rather long distance. Just because this magnificent nature decoration the proposed region can really pretend for a high appreciation considering Criterion (vii).

Table 4 presents comparison of the Lena Pillars with a number of World Natural Heritage sites (both natural and cultural-natural) which also comprise a series of skerries and were included into the World Natural Heritage List in particular considering Criterion (vii), i.e. they were recognized extremely picturesque and exotic ones. Some of them are also situated along rivers' banks, while the others are geographically isolated and have no relation to rivers.

Table 4. Comparison of the Lena Pillars with rock pillar landscapes in other World regions (including WH properties).

Name of property / status	Short description	Genesis	Height of skerries
The Lena Pillars Nature Park (Russia) / Property, nominated to inscription into the World Natural Heritage List	A many kilometers «chain» of skerries, formed with ancient limestones, along the Lena river right bank, graceful and wondrous diverse forms of rock pillars.	Frozen ground karst, erosion and cryohydratational weathering	Up to 50-100 m
Meteora (Greece) / World cultural-natural Heritage property	Massive and high rocks of sandstone with flat apexes and steep slopes, located in a compact group.	Ancient tectonics, erosion and weathering	Up to 200-300 m
Uishan Mountains (China) / World cultural-natural Heritage property	A series of massif sandstone mountains-skerries with steep slopes and rounded domelike apexes along the channel of "Nine Turns River"	Ancient tectonics, erosion and weathering	Up to 50 m
Ulin-Yuan' (China) / World Natural Heritage property	Hundreds of high peaks with steep slopes made of sandstone and located in a rather compact group	Erosion and weathering	Up to 200 m
Shilin (China) / Cluster of the World Natural Heritage property South China Karst	The unique «stone forest» with exceptional diversity of forms and colours of spire-shaped limestone pillar rocks and outcrops around lake	Early tectonics, karst, erosion and weathering	Up to 30-50 m
Ha-Long Bay (Vietnam) / World Natural Heritage property	Hundreds of small limestone islands-mountains in a shallow coastal zone of the Gulf of Tongking	A classic example of tropic «tower» karst	Up to 150-200 m
Cindjy-du-Bemarakha (Madagaskar) / World Natural Heritage property	Limestone «stone wood», located on a high bank of the Manombolo river and forming a rather compact massif	Swallow holes – one of the widespread forms of karst relief	Up to 20-30 m

Nahanni (Canada) / World Natural Heritage property	High mountaine landscape (up to 2,972m a.s.l.), massiv forms of rocks, Waterfalls, canyons and outcrops (limestone, sandstone) along the Nahanni river channel	Karst, erosion and cryogenic weathering	Up to 100-200 m
Bryce Canyon (USA) / National park	Picturesque compact massif of red sandstone outcrops (towers, pillars, spires, «stone forest»)	Erosion and weathering	Up to 100-150 m
Arches (USA)/ National park	Unique stone statues of red sandstone on the waste mountainous plateau	Erosion and weathering	Up to 50 m
Cévennes (France) / at the Tentative List (Cultural landscape)	High mountainous cultural landscape with separate outcrop relief forms, allocated on the vast territory (limestone steeps, towers, pillars, spires, «stone forests»)	Karst, erosion and weathering	Up to 100-200 m

Considering the immense length of the almost continuous rock pillars chain (about 40 km) spreading along the channel of a giant river of some kilometers width, one of the largest on the continent, we can surely acknowledge, that the present site does not have any analogues in the World. Indeed, the last majority of sites considered in the Tab.3 are geographically separated and do not have such close connection with rivers (heavilly dissected high mountainous areas, dry canyons with erosion relief, compact groups of outcrops – massif and small, «stone forests» and others). And only few of these similar sites include the river parts with picturesque rock pillars along the banks, as the described Russian site does; however these rivers are relatively small compared to the Lena river, and the amount of rock pillars along their channels, is far less (Wuyi Shan, Cévennes), or there are canyons instead of rock outcrops (Nahanni).

Morover, the aesthetic perception of the Lena Pillars is considerably increases due to two more facts, which gainfully outline this Yakutian phenomenon against other similar territories, namely:

- **Excellent observational** possibility in two major perspectives: firstly, when watching from «inside», downwards, i.e. from the outcrops side, with Lena river, its islands and opposite bank in the middle distance; secondly, from the side of river (from bank or shipboard) – upwards. By the way, there are some intermediate (lateral) observational perspectives. As one Russian proverb has it, «visible as it was in your hands» (plainy visible). Meanwhlie, not every similar site from those listed above, has the same observational possibilities. Thus, in mountainous heavy-going areas the observation is generally possible from definite routes and sightseeing points (Wulingyuan). The site «Tsingy de Bemaraha», the natural «karst badland» is totally impassable. The most «visually accessible» are the American national parks – Arches and Bryce Canyon, open shallow bay Halong, and massif outcrops of Meteora, dominating above the vast plain.

- **Pronounced seasonality**, which enriches the landscape perception and notably increases its aesthetic potential. In the Lena Pillars case we can talk about some periods: violent spring vegetation and summer nature blossom; short but very colourful «golden autumn» (mainly thanks to deciduous larch, which is abundant along the Lena river banks); and the longest running period with thick snow cover which is an essential part of the northern taiga scenery during 7-8 months. This natural «scene change» is the result of northern location of the site and the extremely continental climate. Meanwhile, many other sites listed above are located much more southward – in subtropic or tropic latitudes, sometimes in the mild coastal climate (Halong, Meteora, Wuyi Shan, Shilin, Tsingy de Bemaraha). That is why we can not observe the permanent and thick snow cover there as the natural surrounding of unique outcrops – this important aesthetic landscape component is absent here. The change of seasons in tropic and subtropic latitudes goes another way compared to high latitudes: there is no «golden autumn» in Russian meaning. The most similar site in this meaning is only one – the Canadian park Nahanni, which is located in the same northern latitudes (61-62 degrees), in the taiga zone and in the continental climate, and the compositional basis of this park consists of the relatively large river – Nahanni. Bryce Canyon and Arches are also covered with snow for the certain period, but there is no «golden autumn» in this mountainous rocky territories.

Considering aesthetics, the important aspect is the conservation of wild, untamed territory. Some of the analogues considered above, are much more developed as the Lena Pillars region which resembles a wilderness area in most parts. The Cévennes site is virtually cultural landscape, which has been intensively developed by humans for long.

CRITERION VIII

A) CAMBRIAN SYSTEM

Only two sites related to the Cambrian Period of the Earth's history are listed in the World Cultural and Natural Heritage List nowadays, namely, the Canadian Rocky Mountain Parks and the Grand Canyon National Park (U.S.A.). The third one, which is the lower Cambrian Chengjiang site in the Yunnan Province of the P.R. China, has been included recently in the Tentative List.

The Canadian Rocky Mountain Parks houses the Burgess Shale which is one of the most significant fossil areas of the world. Despite exquisitely preserved softbodied marine fossils, this site is c. 10 m.y. younger than the comparable Sinsk Biota of the Lena Pillars is and, actually, represents only the second wave of the Cambrian Explosion following the first mass extinction event which already took out a large number of creatures representing in the Lena Pillars (e.g., entire reefal fauna). The sites are differed also by the type of fossil preservation and by the matrix composition. The Burgess Shale fossils are preserved being replicated in clay minerals and silica while those of the Sinsk Biota are replaced by phosphates which replicate tiny soft tissue structures and even individual cells and emryos. The Sinsk Biota is the only Cambrian Lagerstatte occurring in carbonates while all others Cambrian Lagerstätten including the Burgess Shale itself are restricted to siliciclastics. Finally, the Sinsk Biota represents a small part of the Cambrian fauna and other phenomena of the Lena Pillars while the Burgess Shale is the best Cambrian

site of the Canadian Rocky Mountain Parks. **The Canadian Rocky Mountain Parks do not contain any fossiliferous Cambrian reefal rock, their skeletal fossil record is very poor, and the entire interval of Cambrian strata is much shorter here.**

The Grand Canyon National Park in the U.S.A. is the most spectacular gorge in the world cutting strata which retrace the geological history of the past 2 billion years. However, the Cambrian System itself is represented here by poorly fossiliferous Tonto Group consisting of mostly barren shallow-marine to fluvial siliciclastics and intertidal carbonates. These strata bearing low diverse trilobites, brachiopods, and a few isolated sclerites comprise approximately one seventh or even less of the interval represented in the Lena Pillars (c. 5 m.y.) and is correlated with the uppermost formations of the Lena Pillars. **The Grand Canyon National Park embraces almost barren Cambrian strata only.**

The Chengjiang site of the P.R. China represents c. 2 m.y. Cambrian interval which again is comparable with a minor portion of the Lena Pillars' Cambrian which is the Sinsk Biota. Again, the Sinsk Biota is comparable by its significance with Chengjiang site which is slightly older than the Sinsk biota but much younger than the basal Cambrian strata of the Lena Pillars. Again, the Sinsk Biota is the only Cambrian Lagerstätte in carbonate facies and here soft tissues are preserved mainly due to phosphatization while Chengjiang Lagerstätte is represented by siliciclastics and soft-tissue preservation is relied mostly upon pyritization of organic matter here. As a result, cell structures and embryos are visible in the Sinsk fossils only due to a unique state of phosphatization. The Sinsk biota only represent an absolutely unique combination of both types of extraordinary fossil preservation, namely, a Burgess Shale-type Lagerstätte and an orstentype. In addition, the Sinsk Biota includes the most diverse assemblages of fleshy algae, distinct hexactenellids and demosponges, palaeoscolecid worms, and one of the biggest Cambrian animals, the trilobitomorph *Phytophylaspis* which is a half-meter in length. The Chengjiang site does not contain any fossiliferous Cambrian reefal rock, its skeletal fossil record is very poor, and the entire interval of Cambrian strata is much shorter here.

Cambrian reefal rocks are known from Morocco (northern Africa), South Australia, western (MacKenzie Mountains) and eastern (eastern Labrador and western Newfoundlan) Canada, western United States (Nevada and California), some European countries (Spain, France, Sardinia), and some others. However, **in all these sites, the earliest Cambrian strata do not contain reefs and mostly are barren**, in a better case containing a few fossils. None of them comprise the earliest Cambrian reefs which are the most important for the understanding for the beginning of the evolution of the earliest reefal biota. None of them contains fossil assemblages which are richer than those of the Lena Pillars. Of all these sites, only the Lena Pillars have a continuous carbonate Cambrian record and the richest assemblages of skeletal fossils.

Table 5. World Cultural and Natural Heritage properties representing the Cambrian System, and further important Cambrian sites.

Site	Principal sediments	Fossiliferrous Cambrian interval	Reefs	Generic diversity	Lagerstätte
Lena Pillars (Russia)	carbonates	c.35 m.y. (542-506 Ma)	present Including the earliest ones	c.350	soft-tissue, cells, embryos
Rocky Mountains (Canada)/ World Heritage Property	siliciclastics	c.10 m.y. (516-506 Ma)	-	c.100	soft-tissue
Grand Canyon (USA) / World Heritage Property	siliciclastics	c.5 m.y. (511-506 Ma)	-	c.30	-
Chengjiang P.R. (China) / at the Tentative List	siliciclastics	c.2 m.y. (522-520 Ma)	-	c.150	soft-tissue
MacKenzie Mountains (Canada)	siliciclastics carbonates	c.10 m.y. (520-510 Ma)	present	c.40	-
Eastern Canada	siliciclastics carbonates	c.5 m.y. (510-505 Ma)	present	c.20	-
Western U.S.A.	siliciclastics carbonates	c.30 m.y. (542-510 Ma)	present	c.40	-
South Australia	carbonates siliciclastics	c.25 m.y. (535-510 Ma)	present	c.100	-
Anti-Atlas (Morocco)	carbonates siliciclastics	c.15 m.y. (525-510 Ma)	present	c.50	-
South Europe (Spain, France, Sardinia)	carbonates siliciclastics	c.15 m.y. (525-510 Ma)	present	c.40	-
Other areas of the Siberian Platform	carbonates	c.35 m.y. (542-506 Ma)	present	c.100	embryos

Some other areas of the Siberian Platform, namely, sections of the Sukharikha, Kotuykan, Yudoma, Gonam, and Aldan rivers also provide a rich record of skeletal fossils across entire lower Cambrian interval. However, **these sections do not contain reefal complexes or includes a few small reefs only and, as a result, their fossil assemblages are much poorer than those of the Lena Pillars Nature Park.**

B) FROZEN GROUND KARST

Karst plateaus are the classic forms of the relief in the karst regions composing more than 30 % of the land's area. The term "karst" came from the name of plateau Karst or Kras (at 380-430 m above sea level) in Slovenia, formed in the limestones dated by the Cretaceous. Karst plateaus are widely represented in different regions of the globe: plateau Grands Casses, rising to 700-1000 m in the limestones and dolomites of the Jurassic, and the one Vaucluse (338-950 m) in the limestones of Lower Cretaceous in France; plateau "Rock sea", reaching 2500-3000 m in the limestones and marles of Trias with the participation of the carbonate rocks referring to Jurassic and Cretaceous (Austria); the series of the plateaus on the Slovac-Hungary boundary in the limestones dated by Trias: Coniar, Pleshivets, Silotskoe and Yasovskoe (at 650-950 m); limestone plateau Yarangobilly (Silurian-Devonian) at the altitudes approximately 1100 m in Australia; the famous Mammoth Cave Plateau in the limestones of Carboniferous in Northern America, etc.

Four karst plateaus - Hallstatt-Dachstein Salzkammergut Cultural Landcape (Austria), Wulong (Chongqing) (South China), Henderson Island (UK: Pitcairn Islands), Phong Nha-Ke Bang National Park (Vietnam) – are situated now in the List of the World Natural Heritage (World…, 2008). The development of the karst is realized in the conditions of the humid climate for the all four karst plateaux: there is the humid temperate one, rising to subalpine and alpine in Hallstatt-Dachstein Salzkammergut Cultural Landcape, continental humid subtropical climate in Wulong, tropical humid maritime climate on the Henderson Island and humid tropical monsoonal one in Phong Nha-Ke Bang NP. The permafrost is absent in the all plateaus.

Only in NP Nahanni (Canada) the karst process is developed in the similar, as the "Lena Pillars Nature Park", climatic conditions: here is the same cold continental climate, although there is not extreme continental, one. But, if on the territory of NP Nahanni fall 400-600 mm of the precipitations per year, so will in the "Lena Pillars Nature Park" only 200-250 mm per year. What is more in distinction to the "Lena Pillars Nature Park" (altitude is to 500 m), NP Nahanni is placed in the high mountain area till 2972 m above sea level – in Mackenzie Mountain, where the mountain glaciation, instead permafrost, has the decision role in karst formation.

At present in the WH List there are already outstanding pillar landscapes, including Wulingyuan, Shilin and Danxia (China), Tsingy de Bemaraha (Madagascar). Some spectacular areas that are not in the WH List at present, such as Arches NP and Bryce Canyon (both in USA) and Numbung (Australia). These pillar landscapes were formed by different ways and some are in sandstones rather than limestones. Only in limestone pillars of NP Nahanni (Canada) the development of relief is effected at the dominance of the same, as for NP Lena Pillars, geomorphologic processes: processes of cryogenic weathering. But NP Nahanni is characterized by the cold climate with humid winter (climate 8Df by Koeppen) during the course of which the moistening of the rocks is realized by the atmospheric precipitations, conditioning the processes of the rough disintegration of the rocks by the frosty weathering. Climate of the "Lena Pillars Nature Park" is cold with dry winter (climate 9Dw by Koeppen), that is the reason why the moistening of the rocks is accomplished by the condensed waters, causing the processes of the fine disintegration of the rocks – cryohydratational weathering. That is why the pillars of NP Nahanni are distinguished by the massive forms of limestone pillars whereas Lena Pillars are characterized by graceful and whimsical forms.

C) UNIQUE FORMS OF EOLIC RELIEF – TUKULANS

Tukulans, as they call hummocky sands in Yakutia, are spread only in the region of the Middle Lena course and in the basin of its big tributary Vilyui river. It is a real natural phenomenon: nowhere else in the world are such prominent eolic land forms (massifs of moving sands) developed under the conditions of permafrost, in such high latitudes and in such continental climate (as is well known, dunes are most typical for estuaries and coastal regions, and, of course, for desert arid areas).

Results of comparison analyses of tukulans of the "Lena Pillars Nature Park" with other dune complexes of Eurasia situated within the World Natural Heritage Sites, are presented in Table 5. The main conclusion is that the exceptional specificity of Yakutian tukulans as a natural phenomenon has no analogues in other regions of Eurasia and the world. Notably, that they are interesting not regarding their size, but due to their genesis and conditions of origin.

Table 6. Comparative analyses of tukulans of the "Lena Pillars Nature Park" with other dune complexes of Eurasia , which are located in World Heritage properties.

Name of property	Dunes' height	Geogr. latitude	Conditions of origin
Yakutian tukulans («Lena Pillars Nature Park», Russia)	Up to 20-30 m	About 62° N	Boreal zone, permafrost, harsh continental climate
Kuronian spit (Russia/Lithuania)	Up to 70 m	About 55° N	Temperate zone, Baltic coast
Ubsunur Hollow (Russia/Mongolia)	Up to 15-20 m	About 51° N	Temperate zone, harsh continental arid climate, closed desert hollow in Central Asia
Danube Delta (Romania)	Up to 10 m	About. 45° N	Boreal zone, river delta, the Black Sea coast
Dunes in the Gvadalkvivir river delta (park Koto-Donyana, Spain)	Up to 40 m	About 37° N	Meridional zone, river delta, Atlantic coast

Fig. 61. Shifting sands of a tukulan. *Photo by A. Ogloblin*

Fig. 62. Saamys Kumaga tukulan. Space image

3d. Integrity and/or Authenticity

Integrity substantiation has been in accordance with the «Operational Guidelines».

Paragraph 88:

(a) The "Lena Pillars Nature Park" presents a single nature complex, its main components are inseparably tired with each other by common origin, history and the dynamics of natural development, and include all the elements necessary to express its outstanding universal value.

(b) By its size (1 272 150 ha) the nominated property is great enough to support the functioning of nature complexes and to ensure the complete representation of the features and processes which convey its significance. Besides, local and republican Resource Preserves adjacent to the Park's boundaries give additional integrity guarantees for the nominated property.

(c) The territory proposed for inscription on the World Natural Heritage List presents an integral system. Natural ecosystems, numerous nature monuments, and also evidences of human activity from ancient times are being sustainable preserved in its limits over a long period of time. Practically the whole territory proposed for inscription on the WNH List lies in the limits of the "Lena Pillars Nature Park" and so is provided with professional guarding by the Park administration and the staff on the basis of laws and decrees of the Governments of the Russian Federation and the Republic of Sakha.

Traditional nature management and license use of biological resources by local residents from eight communities of small nationalities of the North inhabiting the Park territory (and absolute absence of permanent settlements) present the main condition for conservation of nature monuments and biological diversity of ecosystems of the concerned territory.

Paragraph 90:

The biophysical processes and landform features of the nominated area are intact (see Section 4 for detailed information).

Paragraph 92:

The nominated property includes all the elements essential for maintaining its aesthetic features, first of all - great variety of skerries relief forms: fancy pillars, spires, towers, columns, complicated with grottos, passages, and caves, stretching along the riverbanks of the Lena and Buotama for dozens of kilometers. All the components of landscape bringing the "Lena Pillars Nature Park" an outstanding aesthetic significance are in natural interrelationship stipulated by the common genesis of the nominated property.

Paragraph 93:

The area of the "Lena Pillars Nature Park" has passed a long and complex period of geological development since Early Cambrian. The nominated property reflects both significant geological processes of surface development and outstanding geomorphological relief features. All significant relief forms of the property are interrelated and interdependent elements in their natural relationships.

4 STATE OF CONSERVATION AND FACTORS AFFECTING THE PROPERTY

4a. Present state of conservation

The area of the property

Natural complexes of the nominated property have not experienced significant economic influence of man and at present are in the state of conservation which is close to natural. After the establishment of the Nature Park, human pressure over the environment has been minimized. Forest cutting, mining and hunting (excluding licensed sable hunting) have been prohibited (see Chapters 5b and 5c).

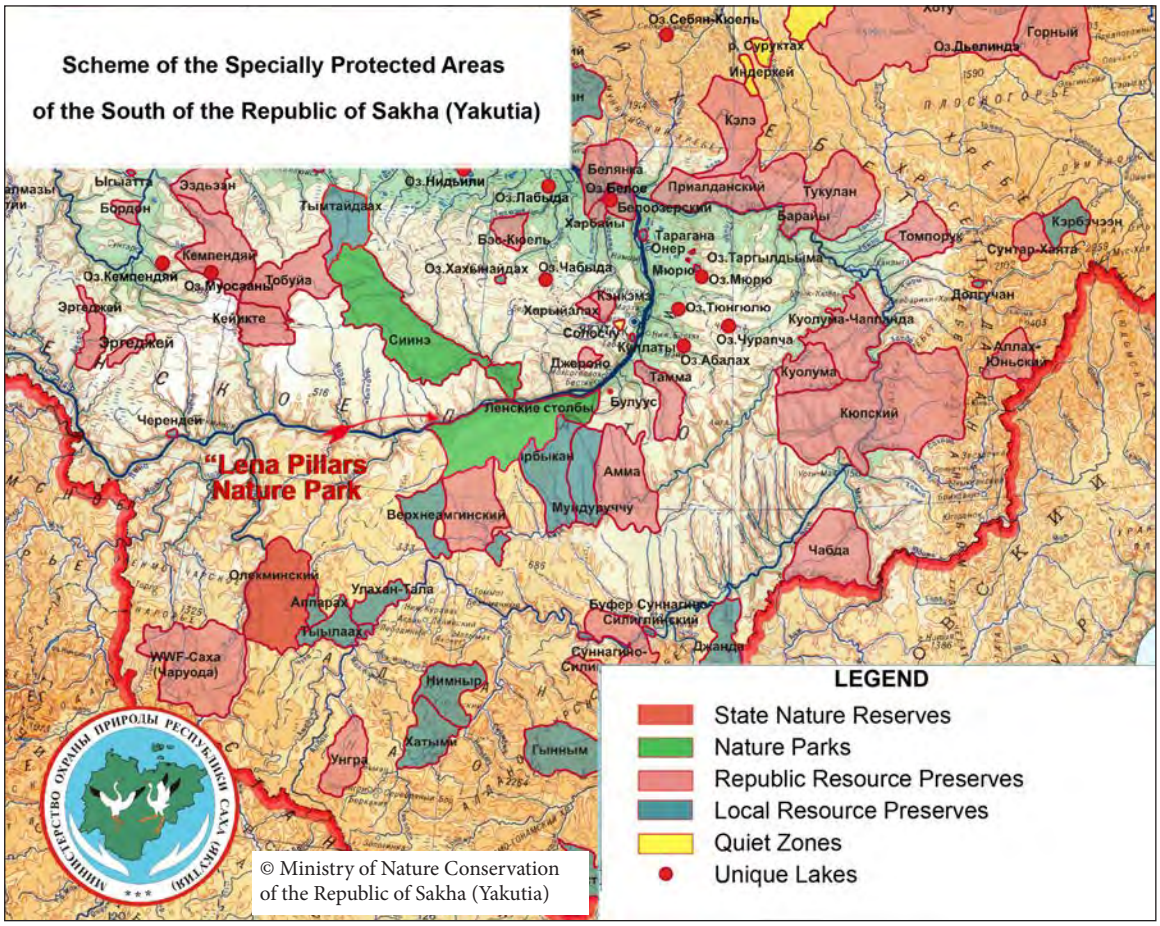


Fig. 63. Scheme of the Specially Protected Areas of the South of the Republic of Sakha (Yakutia)

4b. Factors affecting the property

Development Pressures (e.g., encroachment, adaptation, agriculture, mining)

There are no industrial enterprises within the nominated property and in the surrounding area.

Traditional economic activity is led within the Park's area: licensed sable hunting, horse breeding in the Boutama River mouth, deer farming and haymaking. 884 thousand ha of land or about 60% of area of the Park are assigned to 6 Evenk ancestral farms. One of them does deer farming, the other two, horse breeding, the rest live on fishing and hunting of hoofed animals. Upon the understanding with the Park's administration, the Khachykaat collective farm breeds 150 horses at the Park's area. Agricultural lands occupy about 300 ha of land.

Over last 30-40 years the area is limitedly used as a hunting. Hunters drop in occasionally, mainly during the sable hunting season. Members of ancestral farms annually bag 600-800 sable skins.

After the establishment of the Nature Park, tourist infrastructure is being developed.

Industry:
Emergency water discharge by oil-tankers and other large ships is possible.

Solution:
Water surface monitoring and taking part in breakdown elimination together with Ministry of Emergency Situations.

Agriculture:
Unauthorized spring grassland fires at grasslands of land-users. Unauthorized cattle grazing.

Solution:
Strengthening control over the agricultural lands in spring and summer periods.

Adaptation:
Introduction of the Canadian bison within bounded enclosures with the aim of the specie conservation, upon the International Agreement between the Russian Federation and Canada.

Solution:
Solicitation Ministry of Nature Conservation of Yakutia for transferring bisons away from the Park's area.

At the present time there is no economic activity negatively affecting to the natural complexes of the nominated property.

(ii) Environmental pressures (e.g., pollution, climate change, desertification)

To ecological factors influencing the natural complexes of the Park, one can relate global climate warming.

Noted from the end of XX century, the global warming has already influenced greatly the biota of the Earth (Gruza et al., 2001; Climate Change, 2001). Upon data by M.K.Gavrilova (1998), by mid XXI century the significant warming would take place over the whole north. Both annual average temperatures and monthly maximal and minimal temperatures would rise. The following data is given by V.T.Balobaev et al. (2003): for the last 100 years, winter temperatures in Central Yakutia (including the area of the "Lena Pillars Nature Park") has increased on average 10 °C, summer temperatures have remained almost the same +10 °C, annual average temperature has increased by 2.5 °C. Prediction value of annual average temperature in the global 2 °C increase scenario will make -5 °C, in the global 4 °C increase scenario, -2 °C. The permafrost boundary would be correspondingly moved further to the north to 5° N under the first scenario, and to 10° N under the second one.

Upon data by the Cryopedology Institute of the Siberian Branch of the Russian Academy of Sciences, from 1951 to 1991, due to global climate warming, annual average temperature at the Lena Pillars area has increased by 1.0 °C (Dobrolet weather station).

Mentioned climatic changes has no influence to the state of conservation of the Cambrian and other paleontological objects; possible influence to the Karst phenomena on the territory of the «Lena Pillars Nature Park» is not investigated.

(iii) Natural disasters and risk preparedness (earthquakes, floods, fires, etc.)

A threat to integrity of landscapes is fires. In summer 2001 the thunderstorm caused 11 forest fires over the area of 18 224 ha. In 2006 one forest fire near the Labydia River has been recorded. The area covered by the fire made 130 ha.

Administration of the Lena Pillars Nature Park and Khangalassky forestry have signed a cooperation agreement in the field of forest management within the area of the Lena Pillars Nature Park. The mutual activity plan worked out annually includes the following items:
- joint work for fires detection and explanation work through mass media;
- revelation of persons guilty of forest fires, giving an opinion, calculation of damaged caused, in 5 days;
- establishment of fire-hazardous periods till special order of the ulus administration.

Annual association agreement on mutual fires extinguishing is signed with the Aircraft Fire Extinguishing Brigade of Pokrovsk (branch of Aircraft Fire Extinguishing Service of Yakutia).

Occurring more rapid last years, the Lena River floods cannot significantly influence the main integrity factors of the natural complexes of the Park.

(iv) Visitor/tourism pressures

Today the Lena Pillars are the only widely advertised tourist brand of the Republic of Sakha (Yakutia). Upon the design value, the maximal size of visitors that does not bring damage to the Park is 23 thousand people. Presently the Park receives up to 10 thousand of tourists, which do not render negative effect over natural complexes of the Park (see Chapter 5h).

(v) Number of inhabitants within the property and the buffer zone

Estimated population constantly inhabiting the nominated area: 5-6 persons – the staff of the Brolog hydropost.
The buffer zone: no permanent inhabitants.
Total: 6 persons.
Year: 2006

5 PROTECTION AND MANAGEMENT OF THE PROPERTY

5a. Ownership

The area of the Lena Pillars Nature Park is the Republican property.

5b. Protective designation

Nature Park of the Republic of Sakha (Yakutia).

Juridical status is determined by the State and the Republican legal acts:

1. Extract from the federal Law of the Russian Federation «On specially protected natural areas» of 14.05.1995 (read with the Federal Law of 29.12.2004 N 199-FL) (Annex B1);
2. Law of the Republic of Sakha (Yakutia) "On Specially Protected Natural Areas in the Republic of Sakha (Yakutia)". Enacted by Ordinance of State Assembly (Il Tumen) of the Republic of Sakha (Yakutia) No.3N 214-III of December 25, 2003 (read with the Law of the Republic of Sakha (Yakutia) of 14.02.2007 429-3 N 873-III) (Annex B2);
3. Resolution of Government of the Republic of Sakha (Yakutia) «On establishment of the National Lena Pillars Nature Park in the territories of Khangalassky and Olekminsky Uluses» of 10.02.1995 N 39 (Annex B3);
4. STATUTE of the State Enterprise Nature Park (Aan Aiylgyly) "Lena Pillars" of the Republic of Sakha (Yakutia) (Annex B5).

5c. Means of implementing protective measures

Legal instruments for protection of the property are determined by the Regulations of the Nature Park confirmed by the Government of the Republic of Sakha (Yakutia). The Regulations include:

- protection regime;
- rights of persons in charge of protection of the territory;
- responsibility for violation of the protection regime.

The Park has the Protection Department with staff consisting of 9 persons equipped with necessary transport and communication devices. Besides, there is a Public Inspector Network of the Specially Protected Areas. Yakut Territorial Committee for Environmental Protection, Special Poaching Inspection of Ministry of Environmental Protection take part in the Park's protection. Upon the agreement with the Nature Park, in the summer period the Yakutia Aircraft Fire Extinguishing Brigade fulfills fire prevention measures.

5d. Existing plans related to municipality and region in which the proposed property is located (e.g., regional or local plan,conservation plan, tourism development plan)

The work of the Nature Park is based upon the basic program documents confirmed by the Government of the Republic of Sakha (Yakutia):

1. Decree of the President of the Republic of Sakha (Yakutia) "On measures for development of the Specially Protected Areas" № 837 of 16 August 1994.
2. State ecological policy of the President of the Republic of Sakha (Yakutia) for the transition period (7 March 1996).
3. International and National Tourism Development Program of the Republic of Sakha (Yakutia) confirmed by the Decree of the Government of the Republic of Sakha (Yakutia) of 6 September 1996 № 362.

5e. Property management plan or other management system

According to the Law "On Specially Protected Areas", the Lena Pillars Nature Park falls into the category of the national nature reserve under the jurisdiction of the Republic of Sakha (Yakutia). According to the Russian legislation, it is the Nature Park. It takes intermediate position between 2 and 3 IUCN Categories of protected area.

Regulations of the Nature Park confirmed by the Government of the Republic of Sakha (Yakutia) is a basic document regulating the activity of the Nature Park (Annex 5). The Regulations fully describe:

- juridical status;
- ownership form and privity;
- mission of the Park;
- management;
- protection regime;
- rights of persons in charge for protection of the territory;
- responsibility for violation of the protection regime;
- economic and financial activity;
- boundary description.

General aims of the Nature Park are:

1.1. Maintenance of the protected natural complexes in primary state and biodiversity conservation;
1.2. Revival and development of the traditional forms of management of local population;
1.3. Conservation of model and unique natural complexes and objects, monuments of nature, history and culture, and other sites of cultural heritage;
1.4. Creating conditions for regulated tourism and recreation;
1.5. Carrying out ecological monitoring;
1.6. Carrying out scientific research;
1.7. Restoration of damaged natural, cultural and historical complexes;
1.8. Organization of ecological education for local population.

In accordance with this, the Nature Park is divided into the following functional zones with different protection and management regime:

- Preservation regime zone
- Recreational zone
- Traditional management activity zone (lands of nomadic ancestry farms)
- Regulated management zone (for agricultural enterprises).

Administrative and criminal responsibility is determined for violation of the protection regime.

In 2008 the professional management-plan for 2008-2012 has been elaborated in conformity with Order of the Federal Service for Supervision of Natural Resource Usage of the Russian Federation №491 of 03.12.2007. (Annex B11).

5f. Sources and levels of finance

The Park is financed mostly from the Republican budget. Besides, the Park independently commands finance received from:

- tourism;
- scientific, conservancy, publication and advertisement activity;
- compensation paid by juridical and physical persons for bringing damage to complexes and objects within the Parks' area;
- selling forfeit of hunting, fishing and illegal nature management expropriated in the stated order;
- non-budget funds;
- grants and charitable contributions.

Table 6. Sources and levels of finance of the Lena Pillars Nature Park.

	2006	2007	2008	2009	2010	Total
Budget funds	11261,6	8861,9	9577,4	9972	9440,4	49113,3
Extra budgetary funds	850,0	1974,5	1000,0	2820,7	3390,2	10035,4
Investment funds	2700,0	1500,0	1500,0	6938,0	5500,0	18138
Directed funds	0	0	3452,9	650,0	39,4	4142,3
Thous. Rubles	14811,6	12336,4	15530,3	20380,7	18370	81429
$ UDS	439,9 тыс.	415,4	522,9	686,2	618,5	2741,7
€ EURO	359,2 тыс.	299,1	376,6	494,2	445,4	1974,5

5g. Sources of expertise and training in conservation and management techniques

Issues of management, training and raising the skill level of the staff are solved through Ministry of Nature Protection of the Republic of Sakha (Yakutia) and Ministry of small-scale business, tourism and employment development of the Republic of Sakha (Yakutia).

During last years the staff of the Nature Park have gone through the following training and educational programs:

- Meeting of the SPAs assistance Union, the Altay-Sayansky Eco region, 2010.
- RF National parks managers meeting, Smolensky Lakeland, 2010.
- Navy officers advanced training, Yakutsk, Sakha Republic (Yakutiia), 2010.
- Advanced training «Procurements management for federal and municipal purposes», Yakutsk, 2009.
- Ecological education workshop, Eco center «Zapovedniki», Moscow, 2008.
- Inter regional research and practice conference «Priorities of tourism development», Yakutsk, Sakha Republic (Yakutiia), 2008.
- The President Management Institute Courses of the Republic of Sakha (Yakutia), 2005-2007;
- Record keeping and personnel management courses, Krasnodar Study Center, June 2006;
- Courses of the Bookkeeping Institute in Yakutsk, June 2006 and in Moscow, December 2006;
- "Licensing the person in charge of navigation safety" courses, April 2006;
- Practical seminar "Organization and fulfillment of swoops against illegal use of bio-resources (poaching) at Specially Protected Areas", September-October 2005;
- Advanced training «Travel services sales management», Yakutsk, 2004.
- Courses of Yakutsk Commander Naval School, 1999;
- Seminar for inspectors of the Protected Areas upon the special program of the Ministry of Nature Protection of the Republic of Sakha (Yakutia), with the financial support of WWF, 1998;
- Expert Ecologist courses of Moscow State University, 1994.

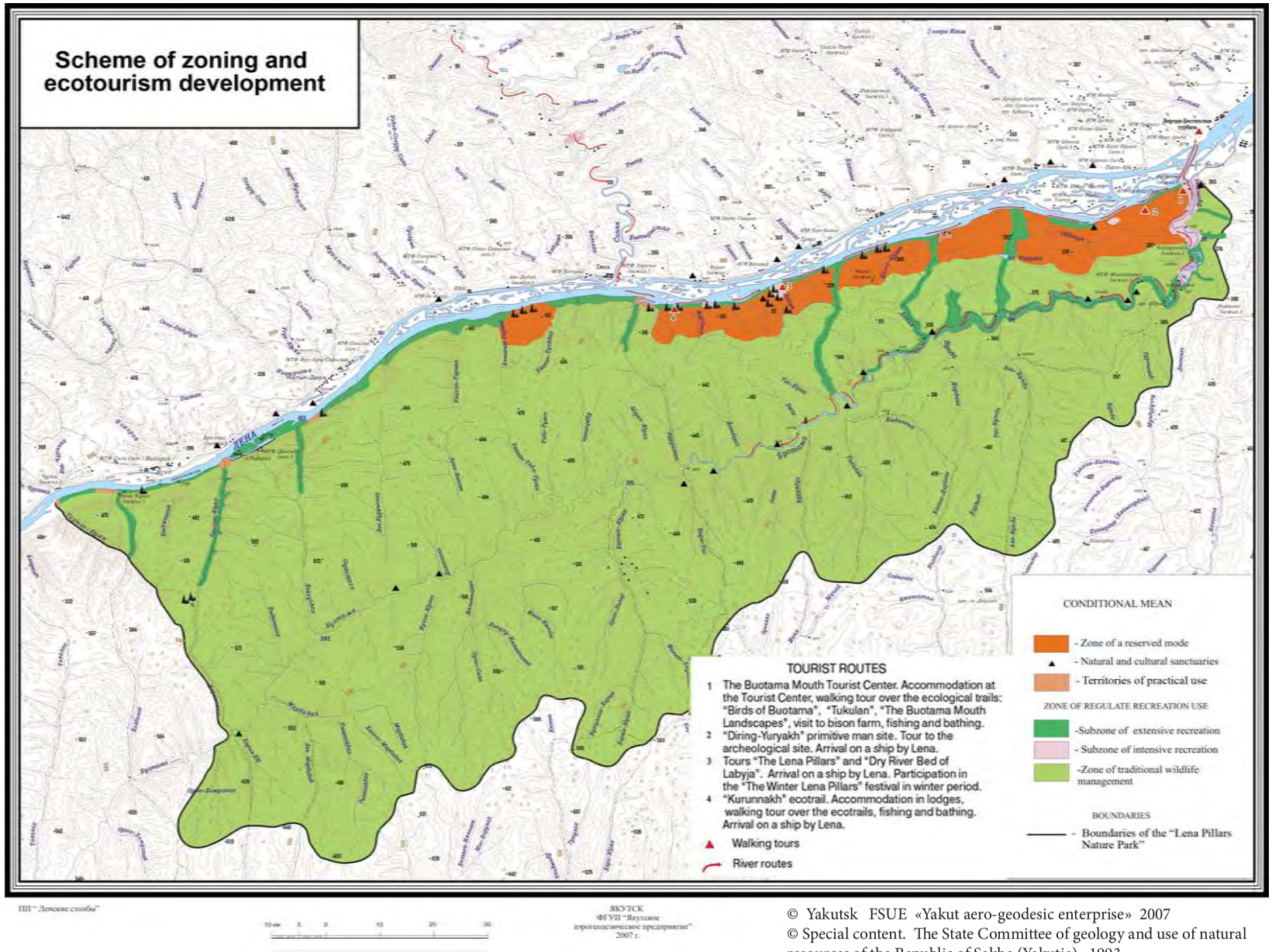
5h. Visitor facilities and statistics

The central office of the Nature Park is situated in Pokrovsk, which is located 80 km away from Yakutsk. Pokrovsk can be reached by the main road or by the Lena River. The main tourist routes go along the Lena River side. For conveyance of passengers the Park has 2 motor ships. The Center of Ecological Education – the modern building constructed with the support of WWF, is situated in Pokrovsk. The Park has 3 tourist centers, 7 inspector's lodges and 2 winter cabins. Bestyakh tourist center is situated 37 km away from Pokrovsk up the Lena River. It has the Inspector's house, garage, bath-house, 3 summer cabins and a visit-center. Ust'-Buotama tourist center is situated on the opposite side of the Lena River. It has the Inspector's house, diesel cabin, 10 summer cabins and a visit center. The Labyja river tourist center (located directly at the Lena Pillars) has 2 cabins.

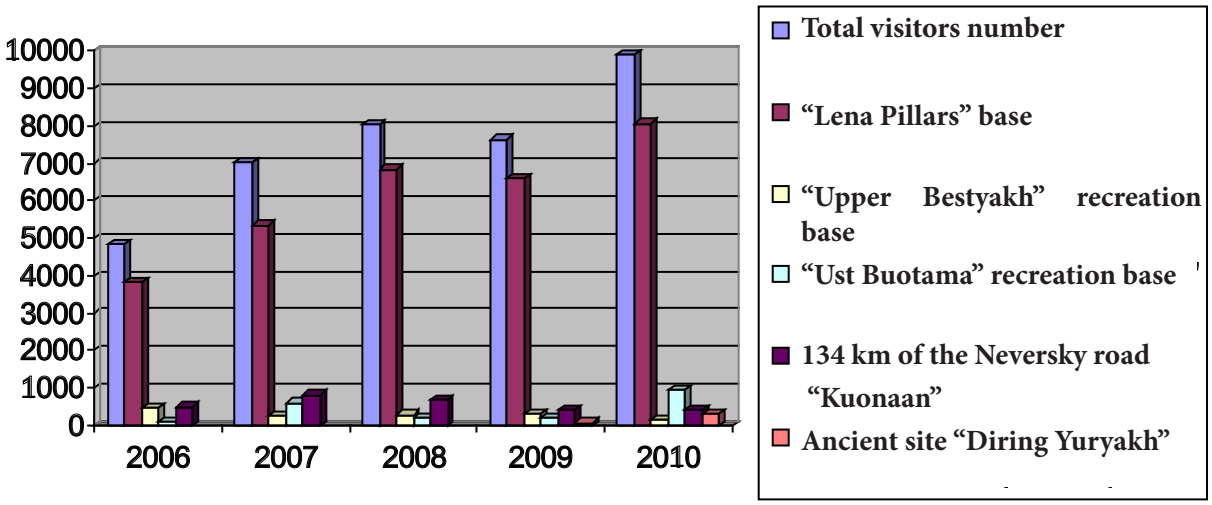
According to estimated data, the Park can be visited by 23 thousand of people every year without any damage for nature. At present time, the Park admits up to 10 thousand of guests during the best tourist seasons. The statistics shows the Park's visits for the recent 5 years:

Table 7. The statistics shows the Park's visits for the recent 5 years

	2006	2007	2008	2009	2010	Total for 5 years
Total visitors number	4838	7016	8025	7631	9917	37427
"Lena Pillars" base	3838	5349	6833	6603	8064	30687
"Upper Bestyakh" recreation base	395	246	290	327	151	1409
"Ust Buotama" recreation base	108	602	228	229	962	2129
134 km of the Neversky road "Kuonaan"	497	819	674	400	420	2810
Ancient site "Diring Yuryakh"	-	-	-	72	320	392



A11. Scheme of zoning and ecotourism development.



In particular, the statistics shows the Park's visits in 2006 is:

"Lena Pillars" base
The first motor ship came to the Lena Pillars Tourist Center on June 10, the last, on September 23. In 2006, the Center was visited by 3838 people, which came through tourist agencies upon contracts with the Park.

"Upper Bestyakh" recreation base
At the Upper Bestyakh Tourist Center the tourist season lasted 100 days, from June 8 till September 15. The Center was visited by 495 people.

"Ust'-Buotama" recreation base
From this center start the "Birds of Buotama" and "Tukulan" eco-trails. In 2006 the Center was visited by 108 people, many of which watched bisons.

134 km of the Neversky road "Kuonaan"
Between June 10 and September 5, the Buotama was visited by 497 people (over 100 of them have come by invitations). The most favorable period for tourism and rafting is the first part of summer, when the Buotama is full.

In all for 2006, the Park's area was visited by 4838 persons received by the excursion tour group tickets. Besides, over 100 persons visited the Park by invitations.

Fig. 64. Traditional travel mode. *Photo by V. Ryabkov*

Building and improvement of touristic sites was conducted until 2010.

Finished and put in commission:
- Observation site and ladder to the Labiya River;
- Ladder to the Diring-Yuryakh;
- inspector's house on the Labiya River;
- hardscape elements on the Labiya River;
- Visit center "Diring-Yuryakh";
- Visit center "Lena Pillars".

5i. Policies and programmes related to the presentation and promotion of the property

Activity of the Park is supported by the following Republican Aimed Programmes:
1. "Environmental protection of the Republic of Sakha (Yakutia) in 2003-2006" of 26 December 2002 № 644;
2. "Environmental protection of the Republic of Sakha (Yakutia) in 2007-2011" of 19 December 2006 № 402-3;
3. "Development of business undertakings and tourism of the Republic of Sakha (Yakutia) for 2007-2011" of 19 December 2006.

The Park is a member of many regional and international tourist exhibitions.

Regional tourist exhibition: "Sakha travel" – permanently;

Russian tourist exhibitions: Mitt, MTF – 2002-2005;

International tourist exhibitions:
1. London - 2003.
2. Berlin – 2004.
3. Kharbin – 2005.
4. Moscow – 2006.
5. Seoul – 2007.
6. Moscow – 2007.
7. Inchon (South Korea) – 2009.
8. IUCN park presentation – 2010.
9. Expo-Shanghai – 2010.

The Park is a permanent base for the Republican biological, conservancy and eco-tourism conferences. Every year the Park runs ecological camps for schoolchildren and invites students of Yakutsk State University (biological and geographical faculty) (BGF YGU) for summer fieldwork.

A number of video films about the Park's nature has been shot; monographic articles and diverse advertising printed matter have been published; souvenirs of local artists and signs have been produced.

Since 2006 the Park started publications of thematic pages in the ulus newsletter «Khangalas». Every year five pages are devoted to the Park's activities. Till 2009 the «Park's Bulletin» was published by the Park's stuff every quarter, which was distributed among school teachers and ulus organisations (the total coverage - 300 units). Besides these print editions, the articles about Park constantly appear in the Republican newsletters «Yakutiya», «Sakha sire», «Yakutsk vecherny», «Bayanay», «Kyym», «Zapovednoye bratstvo», «Nashe vremya» and others.

Moreover, the close work with the «Khangalas» TV and radio studio is conducted since 2004, the best reportings and translations were run through the National broadcasting

company «Sakha». Also the reporting series were run in the central Media. The Park's stuff constantly takes part in the talk shows, radio programs and news editions devoted to ecology and ecologic tourism. Besides TV programs, the movies «The time architecture» by MPR TV studio and «The Lena Pillars» by NVK «Sakha» in 2006. The English channel «Discovery» filmmakers worked in the Buotama river mouth in the July of 2006. Two TV Andrei I's programs «Seekers» were on the 1 central TV channel. In the beginning of the 2010 the Lena Pillars were visited by the French guest, who took dogsled from Yakutsk. It was shown on the central Media news.

The «Park's march» event is held every year. In the April 2006, within the event the Park in collaboration with BGF YGU arranged the eco tourism and eco education workshop in the Park's headoffice. Every year this event expands. Thus, in 2010 it covered 10 localities and 14 general education institutions. The total amount of partisipants was 700 persons.

The Park's work priorities is the ecologic education of the younger generation. Within this activity the ecologic educational summer camps work every year. In 2010 the Park admitted 11 camps, which covered 500 children. One of these camps is the regional scholar research-educational expedition «Shenken» under direction of the academician N.G. Solomonov. This expedition started to work in 2001 and conducts the field works in the Park every year. Also, every year the military-patriotic camp «Teenager» for intractable children takes place in the Buotama river mouth. Pupils of international child's fund «Children of Asia» raft down the Buotama river every year. Moreover, there are 5 ecological clubs in the Visit center of Pokrovsk town, which cover 74 pupils. The studies are held by the Park's stuff and young naturalists from the Oy village.

Every year students from the BGF YGU, the Pokrovsk business college, Yakutsk and central higher educational institutions came to the Park for the summer field works. The plain air «Gold of Pillars» takes place in the Park every year since 2001. The N.M. Zasimov's art gallery of the Pokrovsk cultural center «Sargy Tyusyulgete» arranges the likenamed exhibition, which attracts attention of art devotees every year. In 2009 the exhibition was held in the cultural center of the Yakutsk state university of M.K. Ammosov. During one month the exhibition was visited by more than 2000 of students, citizens and guests of Yakutsk.

5j. Staffing levels (professional, technical, maintenance)

By the early 2007, the staff of the Nature Park counted 36 persons, 15 of which have higher education, 17- specialized secondary education and 4 - secondary education:
Director, 1
Vice-Director, 2
Bookkeeper, 2
State inspector, 9
Eco-education specialist, 1
Methodologist, 1
Tourism specialist, 2
Secretary , 1
Motor ship captain, 2
Motor ship technical personnel, 5
Security guard, 6
Maintenance personnel, 2
Driver, 2

6 MONITORING

6a. Key indicators for measuring state of conservation

Indicator	Periodicity	Location of records
State of landscapes	Annual	The Park's Office; Institute of Biological Problems of Cryolitozone of the Siberian Branch of the Russian Academy of Sciences (IBPC SB RAS)
State of geological objects	Annual	The Park's Office; Institute of Geology of Diamonds and Noble Metals of the Siberian Branch of the Russian Academy of Sciences (IGDNM SB RAS)
Vegetation and florescence of *Redowskia sophiifolia* Cham. et Schlecht.	Annual	The Park's Office; IBPC SB RAS
Sable population density	Annual	The Park's Office; IBPC SB RAS; Biological Resources Department of the Ministry of Environmental Protection of the Republic of Sakha (Yakutia) (BRD MEP RS(Y))
Red deer population density	Annual	The Park's Office; IBPC SB RAS; BRD MEP RS(Y)
Waterfowl seasonal migrations	Annual	The Park's Office; IBPC SB RAS; BRD MEP RS(Y)
Meteorological data	Annual	The Park's Office; IBPC SB RAS; BRD MEP RS(Y)

6b. Administrative arrangements for monitoring property

Monitoring within the Lena Pillars Nature Park territory is provided by the staff of Institute for Biological Problems of Cryolithozone RAS SB, Institute for Cryopedology RAS SB, and Yakutsk State University. Members of Institute for Biological Problems of Cryolithozone RAS SB are annually conducting count of ungulate and sable numbers, organize field researches of flora, fauna, and ecological condition of the Park's nature complexes.

In 2006, geological expedition of Siberian Research Studies Institute for Geology, Geophysics and Mineral Resources (SNIIGGiMS, Novosibirsk) conducted field researches in the Park. Representatives of SNIIGGiMS and the Moscow Paleontological Institute RAS took part in these investigations too. It was a preliminary stage for International Field Researches in 2007.

6c. Results of previous reporting exercises

Landscape state monitoring

At the stage of establishment of the Lena Pillars Nature Park, we have studied the landscape structure of three sites most perspective for tourism: Labyja creek mouth, Samys Kumaga tukulan and Buotama mouth. Based on the full-scale study and the remote sensing data interpretation we have received information on the modern state of landscapes, revealed the nature complexes spreading pattern and made up 1:100 000 landscape maps. In total at these sites, we have picked out 25 typological landscape units of the landscape type – subtype – group of tract types level.

The following study of peculiarities of landscape differentiation in 1999-2005 allowed outlining landscape complexes of the Park of educational and aesthetic value, which are rarely found in other regions of Russia. Such are:
- rock, eolian, cryogenic, karst and suffosive formations;
- steppe slopes and dry river-beds typical for karst spreading regions;
- warm valley complexes of talik zones with typical vegetation (poplar woods);
- cold valley complexes with spruce forests;
- kyrdal steppe communities typical for regions with sharp continental climate;
- park-like pine forests perspective for recreation.

On the basis of the landscape research we have worked out eco-trail routes at the sites of Labyja, Saamys Kumaga and the Buotama River mouth. Six routes and descriptions of 25 notable landscapes from the point of view of eco tourism reflect peculiarities of nature and landscape structure of thet Park. 1 : 100 000 and 1 : 25 000 tourist route schemes have been worked up. During the field research, we have studied surroundings, bank and surface of Saamys Kumaga ridge, eolian formations of the near-edge area and bench basis of the Lena River IV terrace fragment near the Boutama River mouth. Data on eolian meso- and microrelief forms and their spatial distribution has been collected. We observe the dynamics of eolian process which has been activated in the northeastern part of the Saamys Kumaga massif after the fire has destroyed forest at this part of the Park. It was stated that the Lena River IV terrace has formerly been periodically subject to fires. In geological sections studied in lithogenic basis sediments of sandy-ridge locality type in the Boutama River mouth down to 3.5-4.0 m horizons with traces of fires at depths of 1.0, 2.0 and 2.5 m have been found. This fact gives reasons to consider fires abs one of the main eolian relief forming factor at this part of the Lena River valley. The results of studying eolian landscapes significantly expand the informal part of the trail interpretation material for Saamys Kumaga and the Boutama River mouth. Investigation of the canyon, the river valley fragment typical for karst spreading regions located in the Oddokun River mouth, has showed that this site has valuable recreational potential for the tourism development and can be used for broadening the existing excursion program. For the trail interpretation in this area and in the Labiya River mouth additional karst formations research is necessary.

7 DOCUMENTATION

7a. Photographs, slides, image inventory and authorization table and other audiovisual materials

IMAGE INVENTORY AND PHOTOGRAPH AND AUDIOVISUAL AUTHORIZATION FORM

№	Format (slide/ print/ video)	Caption	Date Of photo (mo/yr)	Photographer/Director of the video	Copyright owner (if different than photographer/ director of the video)	Contact details of copyright owner (Name, address, tel/fax, and e-mail)	Non exclusive cession of rights
	1	2	3	4	5	6	7
	Video	Lena Pillars NP	2006-2007	D. Ermolaeva, O. Zakharova	NVK "Sakha"	677000, Yakutsk, Ordzhonikidze st., 48, tel/fax: 35 3951, e-mail: nvk@sakha.ru	Yes
1	Photo	Freeze-up at the Lena river.	10.2005	A. Yermakov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
2	Photo	Panorama of the Lena river from a viewing point.	06.2005	V. Ryabkov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
3	Photo	Shifting sands of a tukulan.	08.2005	A. Ogloblin	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
4	Photo	The Lena river is covered with ice till June.	05.2006	V. Ryabkov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
5	Photo	A thin pillar.	06.2005	V. Ryabkov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
6	Photo	The Park rents two cruise ships for tourists' service.	09.2005	A. Ogloblin	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
7	Photo	The Lena River.	06.2005	V. Ryabkov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes

№	1	2	3	4	5	6	7
8	Photo	*Redovskia sophiifolia* – a local endemic of the Lena Pillars.	05.2006	V. Ryabkov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
9	Photo	A thermokarst lake in the Park's territory.	06.2005	V. Ryabkov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
10	Photo	A thermokarst lake in the Park's territory.	06.2005	V. Ryabkov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
11	Photo	A winter scenery.	11.2005	A. Yermakov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
12	Photo	Fissures widened in Buotama Pillars.	09.2005	A. Ogloblin	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
13	Photo	Pillars have varied and fantastical forms.	05.2006.	V. Ryabkov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
14	Photo	Pillars have varied and fantastical forms.	05.2006.	V. Ryabkov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
15	Photo	Saamys-Kumaga tukulan.	08.2005	A. Ogloblin	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
16	Photo	The Buotama River.	09.2005.	A. Ogloblin	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
17	Photo	Panorama of pillars.	06.2005	V. Ryabkov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
18	Photo	Traditional travel mode.	02.2000	V. Ryabkov	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes

№	1	2	3	4	5	6	7
19	Photo	Panorama of the Lena River from a viewing point.	06.2006	V. Grigoryev	V. Grigoryev		Yes
20	Photo	Pine and larch forests of the Park.	06.2006	V. Grigoryev	V. Grigoryev		Yes
21	Photo	Pillars at the right Lena riverbank.	06.2006.	V. Grigoryev	V. Grigoryev		Yes
22	Photo	Lena Pillars in September.	09.2005	A. Ogloblin	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
23	Photo	The valley of the Buotama River - right tributary of the Lena River.	09.2005	A. Ogloblin	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
24	Photo	Buotama Pillars.	09.2005	A. Ogloblin	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
25	Photo	Buotama Pillars.	09.2005	A. Ogloblin	PENTA Ltd. Publishing House	tel/fax: +7 (495) 508 7055, e-mail: info@penta-photo.ru	Yes
26	Photo	Karst arch.	06.2009	L. Kipriyanova	L. Kipriyanova	nppls@mail.ru	Yes
27	Photo	Collapse sinkhole of Ulakhan-Taryn.	07.2010	V. Samsonova	V. Samsonova		Yes
28	Photo	Thin plan-parallel lamination of Cambrian strata.	07.2008.	A. Zhuravlev	A. Zhuravlev	Ayzhur@mail.ru	Yes
29	Photo	Ooid shoal of Cambrian back-reef facies.	07.2008.	A. Zhuravlev	A. Zhuravlev	Ayzhur@mail.ru	Yes
30	Photo	Intact complete giant arthropods Phitophylaspis of the Sinsk Biota. Cambrian Stage 3.	10.2010	V. Il'ynsky	V. Il'ynsky		Yes

7b. Texts relating to protective designation, copies of property management plans or documented management systems and extracts of other plans relevant to the property.

Regulation Documents presented in Annex B.

B1. Extract from the Federal Law of the Russian Federation «On specially protected natural areas» of 14.05.1995 (read with the Federal Law of 29.12.2004 N 199-FL);

B2. Law of the Republic of Sakha (Yakutia) On Specially Protected Natural Areas In The Republic of Sakha (Yakutia). Enacted by Ordinance of State Assembly (Il Tumen) of the Republic of Sakha (Yakutia) No.3N 214-II of December 25, 2003;

B3. Resolution of Government of the Republic of Sakha (Yakutia) «On establishment of the National Lena Pillars Nature Park on the territories of Khangalassky and Olekminsky Uluses» of 10.02.1995 N 39;

B4. Resolution of Government of the Republic of Sakha (Yakutia) «On rename of National Nature Parks into Nature Parks of the Republic of Sakha (Yakutia) and approval of the Standard Statute of a Nature Park of the Republic of Sakha (Yakutia)» of 6.11.2006 N 495;

B5. STATUTE of the State Enterprise Nature Park (Aan Aiylgy) «Lena Pillars» of Sakha Republic (Yakutia) of 6.11.2006 N 495;

B6. Draft Regulation of the Government of Republic of Sakha (Yakutia) "On "Lena Pillars" Nature Park boundaries statement";

B7. Description of boundaries of the Lena Pillars Nature Park;

B8. Letter of President of the Republic of Sakha (Yakutia) on representation of the "Lena Pillars Nature Park" for inscription on the UNESCO World Heritage List of 22.12.2010;

B9. Letter of Dr. Allison Palmer, President, Institute for Cambrian Studies, of April 2, 2007;

B9.1. Letter of Acad. Prof. Dr. Andrej Kranjc, Secretary-General of the Slovenian Academy of Sciences and Arts, of December 1, 2010;

B10. Answers to questions in the IUCN Fossil Site Evaluation Checklist;

B11. Management plan of the Lena Pillars Nature Park for the period 2008- 2012.

7c. Form and date of most recent records or inventory of property

- Monographic collected articles "National Nature Park. Geology, soils, vegetation, fauna. Conservation and management". Publication of Yakutsk State University, 264 p., 2001;
- Annual reports of the national Lena Pillars Nature Park for 2000-2006;
- "Gold of the Lena Pillars" album, 2006;
- "The Lena Pillars National Nature Park" booklet, 2006.

7d. Address where inventory, records and archives are held

Ministry of Nature Conservation of the Republic of Sakha (Yakutia)
Address:

677000, Russian Federation, the Republic of Sakha (Yakutia),
Yakutsk, Dzerzhinskogo st., 3/1.
Tel.: (4112) 34-12-90, 34-49-15
Fax: 42-13-72,
E-mail: sterh@sakha.ru

The Lena Pillars Nature Park
Address: 678010, Russian Federation, the Republic of Sakha (Yakutia),
Pokrovsk, Ordzhonikidze st., 56.
Tel: (411244) 43-896
Fax: (411244) 45-289
e-mail: nppls@mail.ru

7e. Bibliography

Annex D has over 100 titles of the most significant scientific publications dedicated to the Lena Pillars.

8 CONTACT INFORMATION OF RESPONSIBLE AUTHORITIES

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8b. Official Local Institution/Agency

Nature Park is the nature conservation institution of the Republic of Sakha (Yakutia) and is under the jurisdiction of Ministry of Nature Conservation of the Republic of Sakha (Yakutia):

Russian Federation,
The Republic of Sakha (Yakutia)
677000, Yakutsk, Dzerzhinskogo st. 3/1.
Tel.: (4112) 34-12-90, 34-49-15
Fax: 42-13-72
e-mail: sterh@sakha.ru
Minister: Vladimir A. Grigoryev

At local level the site management is executed by the Lena Pillars Nature Park:

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The Republic of Sakha (Yakutia)
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e-mail: nppls@mail.ru
Director: Lyubov D. Kipriyanova

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   Yakutsk, Dzerzhinskogo st., 2, ltf.lorp@mail.ru
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   677000 Yakutsk, Lenina av., 24,
   tel.: +7 (4112) 42-47-01, fax: +7 (4112) 36-69-21, +7 (4112) 34-12-21
3. Sakha Tour Company
   677000 Yakutsk, Kurashova st., 24, office 5,6,
   Tel.: +7 (4112) 34-43-65, e-mail: sakhatour@mail.ru
4. Tour Service Center Company
   Yakutsk, Poyarkova st., 12-53
5. Ministry of entrepreneurship and tourism
   http://www.minpred.ru/
6. Archaeology and Ethnography Museum of Yakutsk State University
   Yakutsk, Kulakovskogo st., 48,
   tel.: +7 (4112) 49-68-41
7. Biology Institute of the Yakutsk office of the Siberian branch of the Russian Academy of Sciences
   677891 Yakutsk, Lenina avenue, 41
   e-mail: ogai@nauka.yacc.yakutia.su
   www.sakha.ru/sakha/ync/biology.htm
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   677010 Yakutsk-10
   tel.: +7 (4112) 44-46-96, fax: +7 (4112) 44-44-76,
   e-mail: v.v.shepelev@sci.yakutia.ru , l.u.fedorova@sci.yakutia.ru

8d. Official Web address

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Contact name: Protodyakonova M.S.
Tel.: +7 (4112) 43-72-87, 8 (244) 45-2-89
E-mail: nppls@mail.ru

9. SIGNATURE ON BEHALF OF THE STATE PARTY

Deputy Minister of Natural Resources
and Environment of the Russian Federation **Igor I. Maydanov**

Nomination

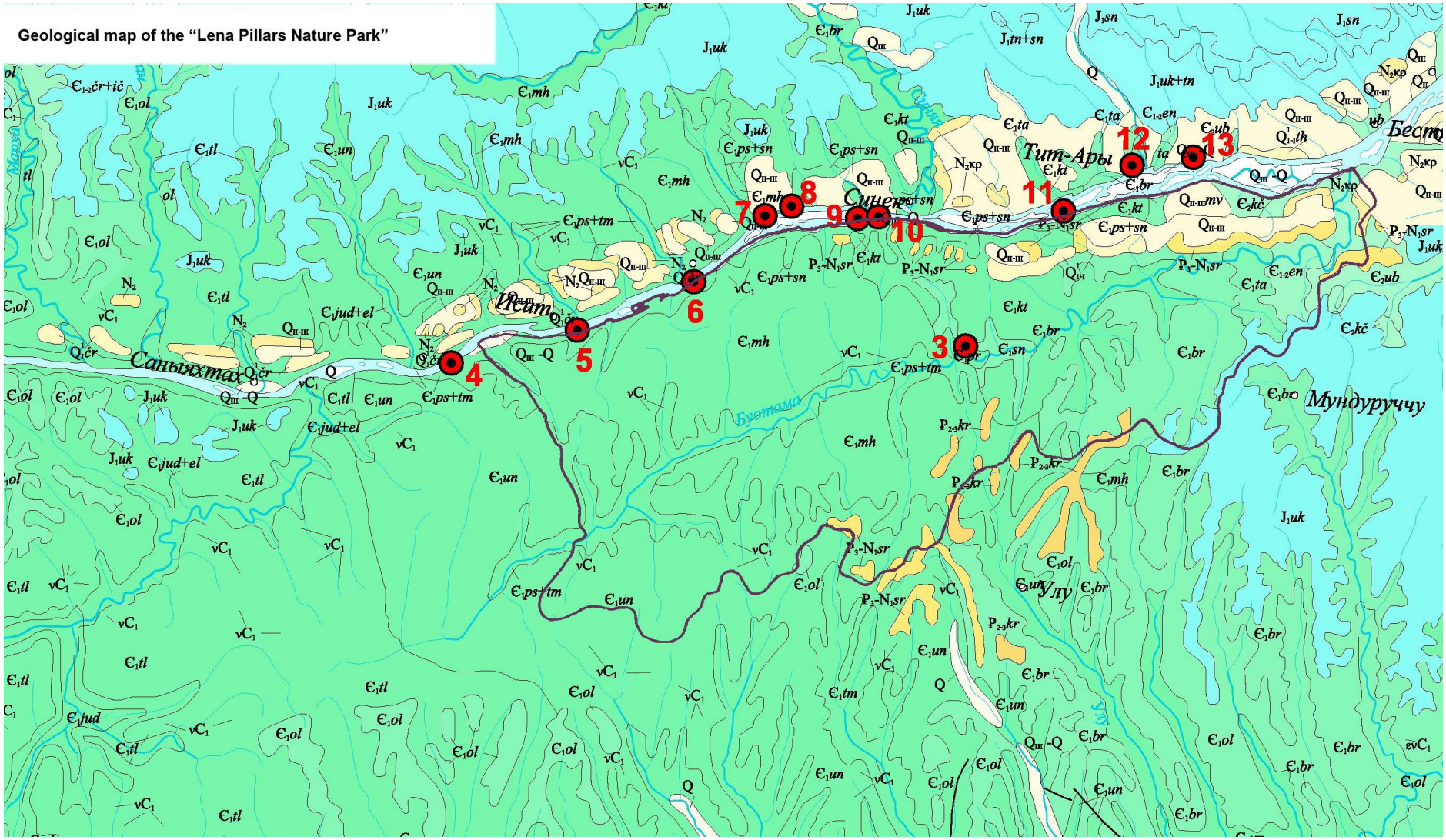
"LENA PILLARS NATURE PARK"

(RUSSIAN FEDERATION)

ANNEX

ANNEX A
MAPS AND SCHEMES

A1. LOCATION OF THE "LENA PILLARS NATURE PARK" ON THE MAP OF RUSSIA (PAGE 9 OF THE IDENTIFICATION OF THE PROPERTY SECTION).
A2. LOCATION OF THE "LENA PILLARS NATURE PARK" ON THE MAP OF YAKUTIA (PAGE 10 OF THE IDENTIFICATION OF THE PROPERTY SECTION).
A3. TOPOGRAPHICAL MAP SHOWING EXACT BOUNDARIES OF THE "LENA PILLARS NATURE PARK". SCALE - 1:500 000 (ROLLED AND TO BE FOUND SEPARATELY FROM THE TEXT).
A4. GEOLOGICAL SCHEME OF THE LENA-ALDAN REGION (PAGE 13 OF THE DESCRIPTION SECTION).
A5. KARST PHENOMENA OF THE "LENA PILLARS NATURE PARK" (PAGE 17 OF THE DESCRIPTION SECTION).
A6. MAP OF FORESTS (PAGE 40 OF THE DESCRIPTION SECTION).
A7. LANDSCAPE MAP (PAGE 48 OF THE DESCRIPTION SECTION).
A8. SCHEME OF ZONING AND ECOTOURISM DEVELOPMENT (PAGE 101 OF THE PROTECTION AND MANAGEMENT SECTION).
A9. SCHEME OF THE SPECIALLY PROTECTED AREAS OF THE SOUTH OF THE REPUBLIC OF SAKHA (YAKUTIA) (PAGE 91 OF THE STATE OF CONSERVATION AND FACTORS AFFECTING THE PROPERTY SECTION).
A10. GEOLOGICAL MAP OF THE "LENA PILLARS NATURE PARK" (ANNEX A10).
A11. SCHEME OF SUBCRYOGENIC WATER BEARING COMPLEXES OF DIFFICULT WATER EXCHANGE ZONE (ANNEX A11).
A12. SCHEME OF LOCALLY WATER BEARING CRYOGENIC AND TALIK COMPLEXES OF FREE WATER EXCHANGE ZONE (ANNEX A12).



© GUP RS(Y) “Sakha, Geoinform“, 2010

A10. Geological map of the “Lena Pillars Nature Park”.

ANNEX A10

Legend:

Phanerozoic Eonothem

Cenozoic Erathem

Quarternary System

Q – Holocene: alluvial, lacustrine, bog, and eolian deposits, including sandy dunes – tukulans;

Q_{II-III} – Neopleistocene: alluvial deposits;

Q_{II-III}*mv* – Mavra Formation of Neopleistocene: lacustrine-alluvial deposits;

Q_{I-I} – Eopleistocene: polygenetic deposits.

Neogene System

N_2*kp* – Red Sandstone Unit of Pliocene: sandstone, pebblestone.

Paleogene and Neogene systems

Þ$_{2-}$ N_1*sr* – Syrsary Unit of Oligocene-Miocene: sand, gravelstone, kaolinized siltstone, brown iron ore.

Paleogene System

Þ$_{2-3}$*kr* – Karbykan Unit of Eocene-Oligocene: sand, kaolinized clay, brown iron ore.

Mesozoic Erathem

Jurassic System

J_1*uk* – Ukugut Formation of Hettangian-Pliensbachian: conglomerate, pebblestone, sand, sandstone, siltstone, clay, coal.

Paleozoic Erathem

Cambrian System

Є$_2$*ub* – Ust'-Botoma Formation of Cambrian Stage 5: mudstone, argillaceous mudstone;

Є$_2$*kč* – Kychik Formation of Cambrian Stage 5: back-reef tempestite, flat-pebble conglomerate, gravelstone;

Є$_{1-2}$*el* – Elanka Formation of Cambrian stages 4 and 5: reefal gravelstone, wackestone, packstone, and mudstone;

Є$_1$*ta* – Titary Formation of Cambrian Stage 4: dolostone with bird-eye structures;

Є$_1$*kt* – Keteme Formation of Cambrian Stage 4: mudstone, wackstone, packstone;

Є$_1$*br* – Barylay Formation of Cambrian Stage 4: dolostone with bird-eye structures;

Є$_1$*ol* – Olekma Formation of Cambrian Stage 4: mudstone, gravelstone, dolostone;

ANNEX A10

$Є_1$***sn*** – Sinsk Formation of Cambrian Stage 4: black mudstone, chert;

$Є_1$***ps+sn*** – Pestrotsvet and Sinsk formations of Cambrian stages 3 and 4;

$Є_1$***mh*** – Mukhatta Unit of Cambrian Stage 3: back-reef conglomerate, gravelstone, ooid packstone;

$Є_1$***un*** – Yungele Formation of Cambrian Stage 2: mudstone, dolostone;

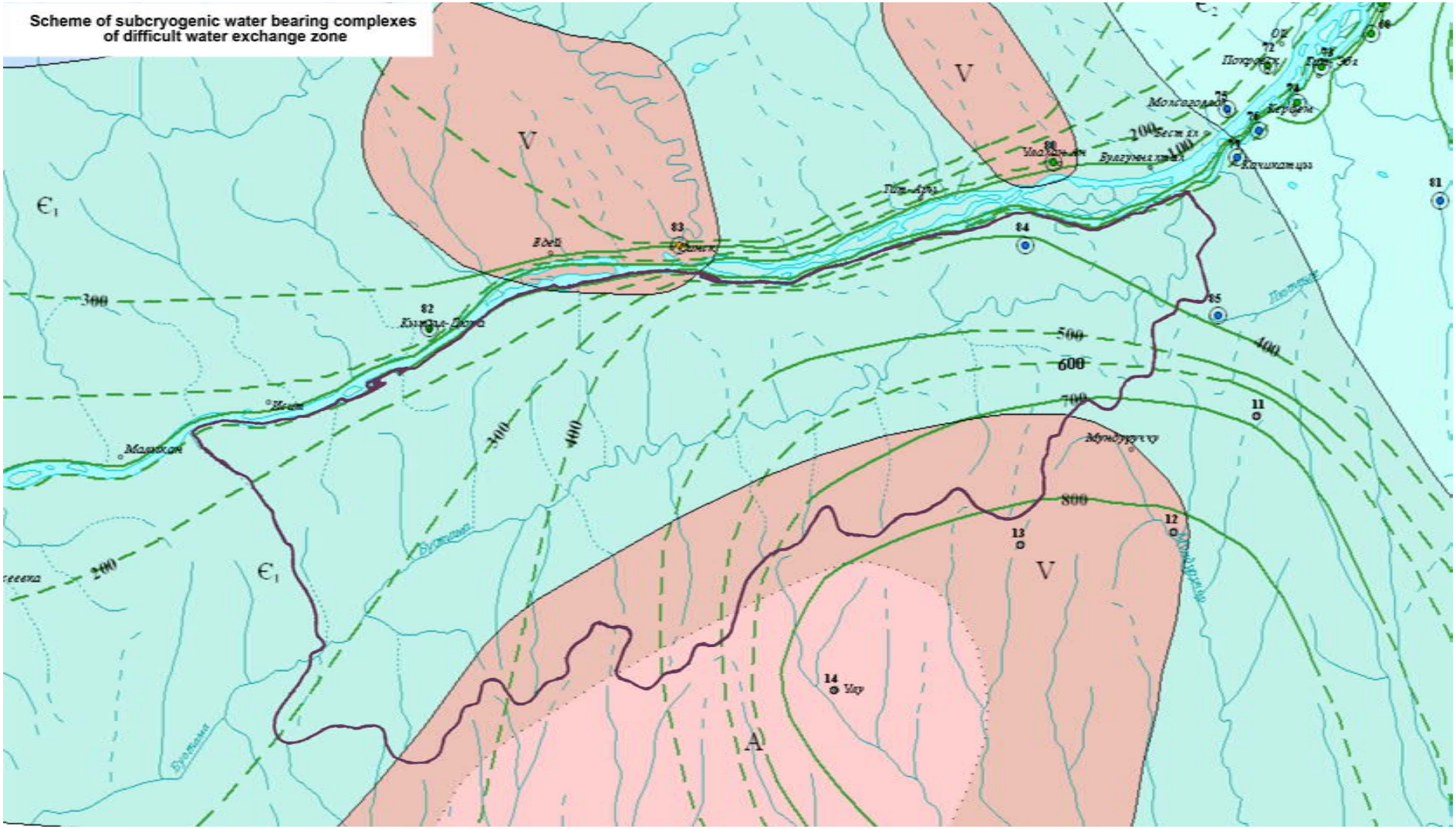
$Є_1$***tl*** – Tolbachan Formation of Cambrian Stage 2: argillaceous mudstone, anhydrite, gypsum;

$Є_1$***ps+tm*** – Pestrotsvet and Tumuldur formations of Cambrian stages 1 and 2: argillaceous mudstone, ooid packstone, dolostone;

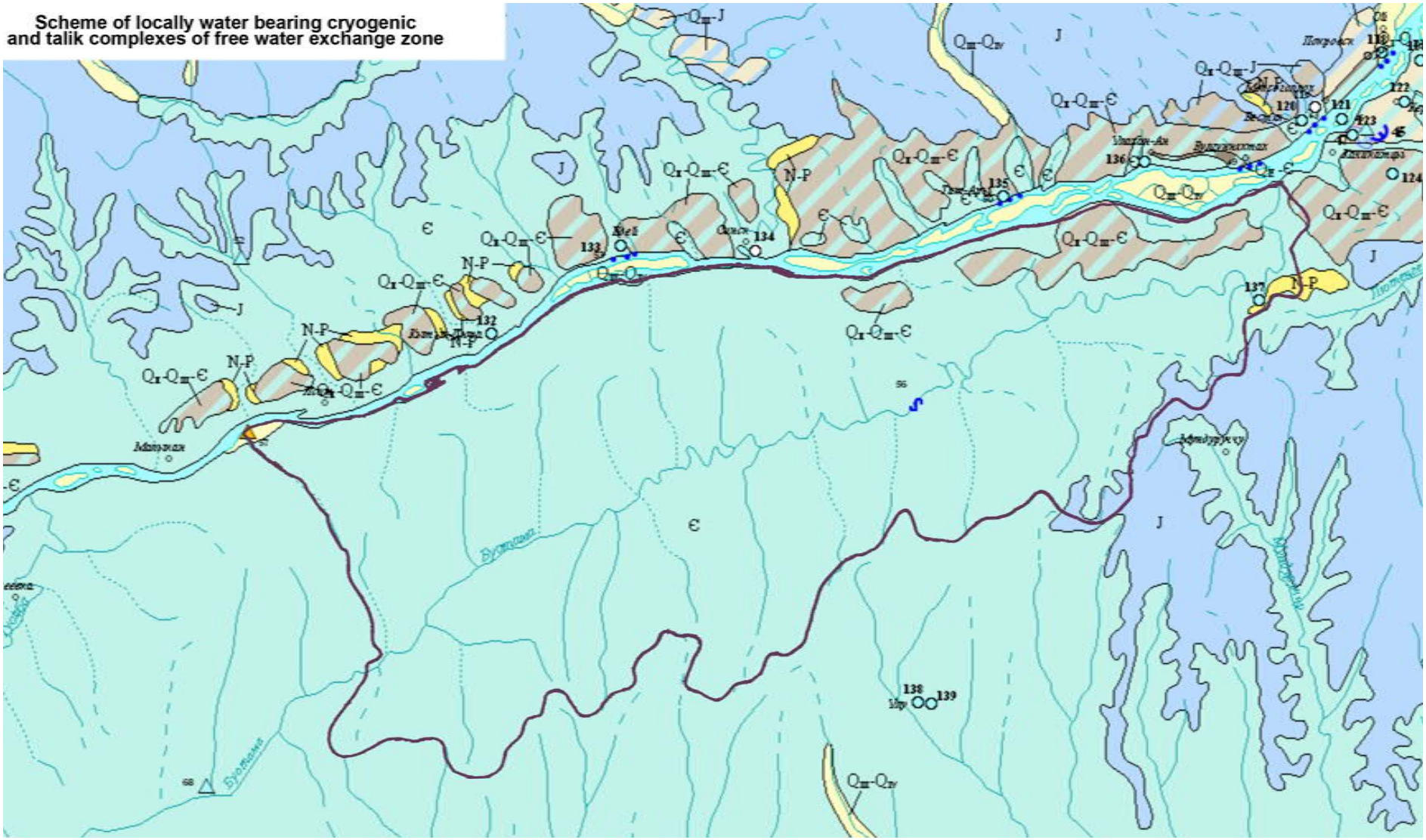
$Є_1$***ps*** – Pestrotsvet Formation of Cambrian stages 1 to 3: red argillaceous mudstone, reefal wackstone, packstone, boundstone, and cementstone.

$Є_1$***jud+el*** – Yuedey and El'gyan formations of Cambrian stages 1 and 2: argillaceous mudstone, dolostone, gypsum;

v$Є_1$ – transitional Ediacaran-Cambrian strata: argillaceous mudstone, dolostone.



A11. Scheme of subcryogenic water bearing complexes of difficult water exchange zone.



A12. Scheme of locally water bearing cryogenic and talik complexes of free water exchange zone

ANNEX A11, 12

Legend

Local water-carrying cryogenic subgelisol formations of free water exchange zone

Q9-Q0 — Water-carrying cryogenic subgelisol formation of Holocoen-Upper Pleistocene limnetic, lacustrine-boggy and eolian deposits of channel, flood plain and low terraces. Clay loams, sand clays, sands, gravels, peat, silts.

Q9 — Water-carrying cryogenic subgelisol formation of Upper Pleistocene deposits of glacial plane. Stony clay loams.

Q9-J — Water-carrying cryogenic subgelisol formation of Upper Pleistocene-Jurassic alluvial cryogenic-eolian and limnetic deposits of middle terraces. Sands, gravels, sand clays, clay loams, silts, peat, sandstones, siltstones, aleurolits, argillites, coals.

Q8-Q9-J — Water-carrying cryogenic subgelisol formation of Upper-Middle-Pleistocene-Jurassic covering limnetic-alluvial and polygenetic deposits of middle terraces. Sands, clays, gravels, clay loams, sand clays, sandstones, aleurolits, argillites, coals.

Q8-Q9-Є — Water-carrying cryogenic subgelisol formation of Upper-Middle-Pleistocene-Cambrian covering limnetic-alluvial and polygenetic deposits of middle terraces. Sands, clays, gravels, clay loams, sand clays, marlstones, limestones, dolomites.

Q_{E}-J — Water-carrying cryogenic subgelisol formation of Eo-pleistocene-Jurassic limnetic-alluvial and alluvial deposits of upper terraces, plains and plateaus. Sands, gravels, sandstones, siltstones, aleurolits, argillites, coals.

Q_{E}-Є — Water-carrying cryogenic subgelisol formation of Eo-pleistocene-Cambrian limnetic-alluvial and alluvial deposits of upper terraces, plains and plateaus. Sands, gravels, marlstones, limestones, dolomites.

N-P — Water-carrying cryogenic subgelisol formation of Neogene-paleogene terrigenous deposits of plains and plateaus. Sands, gravels, clays, siltstones, lignites.

J — Water-carrying cryogenic subgelisol formation of Jurassic terrigenous deposits of plains and plateaus. Sands, sandstones, siltstones, aleurolits, argillites, coals.

Є — Water-carrying cryogenic subgelisol formation of Cambrian carbonate-terrigenous deposits of plateaus. Marlstones, limestones, dolomites, argillites, aleurolits.

Q9-J — *Water-carrying formation is represented by two stratigraphic frameworks. Wide bars show the colour of first after surface stratigraphic framework, narrow bars show the colour of second one.

Subcryogenic water-carrying formations of the impeded water exchange zone

J — Subcryogenic water-carrying complex of terrigenous Lower-Jurassic deposits. Sands, sandstones, gravels, conglomerates, gravelites, coals, aleurolits, argillites, clays.

$Є_2$ — Subcryogenic water-carrying complex of carbonate Middle-Cambrian deposits. Algal limestones, organogenic limestones, arenaceous limestones, clayey limestones, dolomites, limestone aleurolits, marlstones, gypsum.

$Є_1$ — Subcryogenic water-carrying complex of carbonate Lower-Cambrian deposits. Dolomites, arenaceous dolomites, bituminous dolomites, clayey dolomites, oolitic and algal dolomites, brecciated dolomites with anhydrite, breccia of anhydrite rocks, limestones, brecciated limestones, organogenic limestones, clayey limestones, dolomitic limestones, bituminous limestones, marlstones, anhydrite, gypsum, rocksalt

V — Subcryogenic water-carrying complex of terrigenous-carbonate Sorbian deposits. Dolomites, gypsified dolomites, clayey dolomites, bituminous limestones, sandstones, calcareous sandstones, quartzitic sandstones, marlstones, breccia.

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Natural and anthropogenic water ingresses

55 / 8 Wells*, revealed water-carrying cryogenic subgelisol formations and continuous thaw zone waters. Well number see on top.

10 / S Wells*, revealed water-carrying subcryogenic formations and complexes. Well number see on top.

3 / 8 Wells*, not revelaed water-carrying subcryogenic formations and complexes beneath the bottom of permafrost rocks. Well number see on top.

T The ground waters source with 10 l/s discharge.

Underchannel continuous thaw zone

Interpermafrost water-carrying formations

Ice crust

Ice-hole

* The filling colour is relevant to the water anionic composition:

8 - hydrocarbonate S - sulphate S - chloride S - no data

Other data

A Lithologic aquiclude of the Archean metamorphic rocks

Isolines of the bottom of permafrost rocks, via 100 m:

a) 300 a) fixed

b) 200 b) supposed

Rivers:

a) a) surface

b) b) nonperennial

c) c) underground

Lakes

ANNEX B
DOCUMENTS

B1. EXTRACT FROM THE FEDERAL LAW OF THE RUSSIAN FEDERATION «ON SPECIALLY PROTECTED NATURAL AREAS» OF 14.05.1995 (READ WITH THE FEDERAL LAW OF 29.12.2004 N 199-FL);
B2. LAW OF THE REPUBLIC OF SAKHA (YAKUTIA) ON SPECIALLY PROTECTED NATURAL AREAS IN THE REPUBLIC OF SAKHA (YAKUTIA). ENACTED BY ORDINANCE OF STATE ASSEMBLY (IL TUMEN) OF THE REPUBLIC OF SAKHA (YAKUTIA) NO.3N 214-II OF DECEMBER 25, 2003;
B3. RESOLUTION OF GOVERNMENT OF THE REPUBLIC OF SAKHA (YAKUTIA) «ON ESTABLISHMENT OF THE NATIONAL LENA PILLARS NATURE PARK ON THE TERRITORIES OF KHANGALASSKY AND OLEKMINSKY ULUSES» OF 10.02.1995 N 39;
B4. RESOLUTION OF GOVERNMENT OF THE REPUBLIC OF SAKHA (YAKUTIA) «ON RENAME OF NATIONAL NATURE PARKS INTO NATURE PARKS OF THE REPUBLIC OF SAKHA (YAKUTIA) AND APPROVAL OF THE STANDARD STATUTE OF A NATURE PARK OF THE REPUBLIC OF SAKHA (YAKUTIA)» OF 6.11.2006 N 495;
B5. STATUTE OF THE STATE ENTERPRISE NATURE PARK (AAN AIYLGY) «LENA PILLARS» OF SAKHA REPUBLIC (YAKUTIA) OF 6.11.2006 N 495;
B6. DRAFT REGULATION OF THE GOVERNMENT OF REPUBLIC OF SAKHA (YAKUTIA) "ON "LENA PILLARS" NATURE PARK BOUNDARIES STATEMENT";
B7. DESCRIPTION OF BOUNDARIES OF THE LENA PILLARS NATURE PARK;
B8. LETTER OF PRESIDENT OF THE REPUBLIC OF SAKHA (YAKUTIA) ON REPRESENTATION OF THE "LENA PILLARS NATURE PARK" FOR INSCRIPTION ON THE UNESCO WORLD HERITAGE LIST OF 22.12.2010;
B9. LETTER OF DR. ALLISON PALMER, PRESIDENT, INSTITUTE FOR CAMBRIAN STUDIES, OF APRIL 2, 2007;
B9.1. LETTER OF ACAD. PROF. DR. ANDREJ KRANJC, SECRETARY-GENERAL OF THE SLOVENIAN ACADEMY OF SCIENCES AND ARTS, OF DECEMBER 1, 2010;
B10. ANSWERS TO QUESTIONS IN THE IUCN FOSSIL SITE EVALUATION CHECKLIST;
B11. MANAGEMENT PLAN OF THE LENA PILLARS NATURE PARK FOR THE PERIOD 2008-2012.

ANNEX B1

EXTRACT FROM THE FEDERAL LAW OF THE RUSSIAN FEDERATION
«ON SPECIALLY PROTECTED NATURAL AREAS»

Part IV. NATURE PARKS

Article 18. General provisions.
1. Nature parks are state environmental recreational institutions managed by regions of the Russian Federation whose areas and water bodies include natural landscapes and properties of high environment and esthetical value and which are intended for use in environmental, educational, and recreational purposes.

2. Nature parks occupy lands which are granted to them in unlimited (permanent) use, in some cases they are on lands of other land owners, users, holders or tenants.

3. Nature parks are entrusted with the objectives, as follows:
a) Protecting environment, natural properties and complexes of high conservation, scientific, historic and cultural or esthetical value, recreational resources;
b) Ensuring person's rights for recreation in favorable environment;
c) Public environmental education;
d) Developing and implementing effective methods of nature protection and sustaining ecological balance under recreational use of nature parks.

Article 19. Procedure for establishing nature parks.
1. A nature park is established by a law of executive agencies of the constituent entities of the Russian Federation on presentation of federal conservation authorities.
(item 1 read with the Federal Law of 29.12.2004 N 199-FL)
2. The establishment of nature parks related to the withdrawal of land parcels or water bodies used for national purposes is executed by the approval of the executive agencies of the constituent entities of the Russian Federation on the agreement with the Government of the Russian Federation.

Article 20. Legal status of nature parks.
1. Nature parks are legal entities which have no purpose of making profit, i.e. non-profit organizations, established as environment institutions financed from the budget of the region of the Russian Federation.

2. Means of nature parks which they command in accordance with the established procedure are the following financial means obtained by the administrations of nature parks:

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a) From the indemnification of damage done by individuals and legal entities;
b) From recreational, advertising, publishing, and other activities which do not contradict their purposes;
c) As gratuitous aid of natural persons and legal entities, including foreign citizens and international organizations;

3. Became invalid. – Federal Law of 29.12.2004 N 199-FL.

Article 21. Protection regime of nature parks
1. Different protection and use regimes are established in nature parks, depending on environmental and recreational value of natural areas.

2. Based on this, conservational, recreational, agricultural, and other functional zones may be established in nature parks, including protection zones of properties of historical and cultural heritage.

3. Any activities causing changes of a historically formed natural landscape, reduction or destruction of environmental, esthetical, or recreational values of nature parks as well as violating the maintenance regime of properties of cultural heritage are prohibited in nature parks.

4. Activities reducing environmental, esthetical, cultural, or recreational value of the area may be prohibited or limited in nature parks.

5. Issues of social and economic activities of legal entities within nature parks and development projects of inhabited areas shall be agreed with nature parks.

6. Specific features, zoning and regime of every nature park is defined by its Regulation Statute approved by the authority bodies of corresponding constituent entities of the Russian Federation by agreement with the federal conservation authorities охраны and the appropriate bodies of local self-government.

In the cities of federal importance Moscow and St-Petersburg, authorities of the local self-government bodies of city municipal formations for participation in agreement of regulations on nature parks are defined in accordance with organization features of local self-government in the cities of federal importance stipulated by the Federal Law.
(item 6 read by the Federal Law of 29.12.2004 N 199-FL)

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LAW
OF THE REPUBLIC OF SAKHA (YAKUTIA)
ON SPECIALLY PROTECTED NATURAL TERRITORIES
IN THE REPUBLIC OF SAKHA (YAKUTIA)

Enacted by Ordinance of
State Assembly (Il Tumen)
of the Republic of Sakha (Yakutia)
No.3N 214-III of December 25, 2003

The Present Law is governing the relationships within the sphere of establishment, utilization, and protection of the natural territories with an account of natural climatic character of the nature of the North, and with the aim of preserving distinctive and unique natural complexes and objects, remarkable natural formations, biological resources, preserving their genetic variety, investigating global biosphere processes as well as monitoring their condition.

Chapter One. GENERAL PROVISIONS

Article 1. Legislature of the Republic of Sakha (Yakutia) on Specially Protected Natural Territories

1. The legislature of the Republic of Sakha (Yakutia) on specially protected natural territories is based upon the Constitution of the Russian Federation, federal laws, other statutory acts of the Russian Federation, the Constitution (basic law) of the Republic of Sakha (Yakutia), laws of the Republic of Sakha (Yakutia), other statutory acts of the Republic of Sakha (Yakutia).

2. Relationships referring to utilization of earth, water, forest, air, and other natural resources of specially protected natural territories are also governed by the corresponding legislature of the Russian Federation and the Republic of Sakha (Yakutia).

Article 2. Types and Categories of Specially Protected Natural Territories

1. Specially protected natural territories can be of federal, republican or local value.

Specially protected natural territories of republican value are the state property of the Republic of Sakha (Yakutia) and under the jurisdiction of public authorities of the Republic of Sakha (Yakutia).

Specially protected natural territories of local value are the public property of municipal communities and under the jurisdiction of local government authorities.

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2. With due account for peculiar properties and the status of nature-conservative institutions thereon, specially protected natural territories have the following categories:

1) Specially protected natural territories of republican and local values are established in accordance with the republican legislature. They form the republican system of specially protected natural territories (ytyk kere sirder), are under the jurisdiction of the Government of the Republic of Sakha (Yakutia) and local authorities. Their functions are regulated by the present Law and statutory acts issued in terms of such. The republican system of specially protected natural territories (ytyk kere sirder) includes:

- Natural parks (aan aiylgylar);
- Resource reserves (erkeeiy sirder);
- Protected landscapes (uluu tuelbeler);
- Natural monuments (aiylha menelere);
- Traditional nature management territories of indigenous peoples of the North;
- Botanical gardens;
- Sacral natural objects.

2) Health-improving recreational funds established and functioning in accordance with the legislature of the Republic of Sakha (Yakutia). Health-improving recreational funds comprise the following establishments:

- City and district gardens;
- Parklands and water protection areas;
- Health resorts and therapeutic sanitary localities.

3. Legal regulation of establishment, protection, and utilization of traditional nature management territories of indigenous peoples of the north is carried out in accordance with the legislature of the Russian Federation and the Republic of Sakha (Yakutia).

4. The Government of the Republic of Sakha (Yakutia) and local governments, in accordance with the legislature of the Republic of Sakha (Yakutia), have the right of defining other categories of specially protected natural territories (unique lakes, relaxation zones, children's environmental parks etc.).

5. Specially protected natural territories are taken into consideration at elaboration of integrated territorial plans, land management patterns, and district planning. On the basis of plans of development of specially protected natural territories, the Government of the Republic of Sakha (Yakutia) takes decisions on reservation of territories predesigned as specially protected and on restrictions of economical activity within such territories.

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Article 3. Control and Administration over Establishment and Functioning of Specially Protected Natural Territories

1. Control and administration over establishment and functioning of specially protected natural territories are carried out by specially authorized executive bodies of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection and by federal executive bodies acting in the sphere of environmental protection.

2. Control and administration over establishment and functioning of specially protected natural territories of local value are carried out by local authorities.

Article 4. Participation of Citizenry and Legal Entities in Establishment, Protection, and Functioning of Specially Protected Natural Territories

Citizens and legal entities including public associations and religious communities, render assistance to state and local authorities in providing measures aimed at establishment, protection, and functioning of specially protected natural territories. State and local authorities providing such measures take proper account of proposals advanced by the citizens and public associations.

Article 5. Order of Establishment of Specially Protected Natural Territories

1. Establishment of specially protected natural territories is made in accordance with plans of development of specially protected natural territories designed with due account for zonal geographical, ecological system, social, historical, didactic, scientific research principles.

2. Decision on establishment of specially protected natural territories of republican value is taken by the Government of the Republic of Sakha (Yakutia) at the recommendation of a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection and in coordination with local authorities, excluding natural parks the decision on establishment of which is taken by the Government of the Republic of Sakha (Yakutia) at the recommendation of federal executive bodies acting in the sphere of environmental protection.

3. Decision on establishment of specially protected natural territories of local value is taken by a representative body of the local government with an allowance of opinion of the residential population and in coordination with a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection.

4. Establishment of specially protected natural territories concerned with retirement of land or withdrawal of water areas utilized for state needs is carried out by means of an Ordinance of the Government of the Republic of Sakha (Yakutia) in coordination with the Government of the Russian Federation.

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5. Establishment of specially protected natural territories of republican and local values is not associated with entire or partial withdrawal of hunting grounds, fishery areas, and reindeer grazing lands located on the lands of tribal nomad communities of indigenous peoples of the North.

6. Establishment of specially protected natural territories is carried out with or without withdrawal of areas of other lands categories.

Chapter Two. THE REPUBLICAN SYSTEM OF SPECIALLY PROTECTED NATURAL TERRITORIES (Ytyk Kere Sirder)

Article 6. The Republican System of Specially Protected Natural Territories (Ytyk Kere Sirder)

The republican system of specially protected natural territories (ytyk kere sirder) is an assemblage of natural objects and complexes entirely or partially withdrawn from economical activity accompanied by imposition of particular regimes of attendance and utilization of natural resources (without land retirement), with due account for local customs, traditions, and beliefs, aimed at preservation of natural environment, subsurface resources, and traditional economies.

Article 7. Natural Parks (Aan Aiylgylar)

1. Natural parks include territories and complexes under special protection of law and traditions of indigenous peoples of the North, both general and distinctive landscapes of environmental, moral, educational, recreational, and scientific significance, comprising habitats of wild plants and animals, places of relaxation, ceremonies, traditions, and beliefs of indigenous peoples of the North, tourism, and excursions, contributing to environmental education of the people.

2. The territory of a natural park consists of the combination of the following zones differing by the grade of their recreational and economical capacities:

- Reserved zone (tyytyllybat sirder) — area of full forbiddance of all types of economical and recreational activity;
- Sacred places (ytyk sirder) — areas of traditional folk rituals;
- Restricted recreational zone — area of restricted entrance for limited number of visitors;
- Active recreational zone — area of educational tourism for environmental education and acquaintance with remarkable places of interest in natural parks as well as for recreation;
- Traditional nature management zone (terut sirder, ethnic territories) — area of full forbiddance of industrial development, forbiddance or restriction of traffic, permittance of natural resources utilization in forms assuring protection of native

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habitats of indigenous peoples and preservation of their traditional way of life;
- Zone of artificial keeping and breeding of rare and extinct animal species;
- Protected historical or archaeological zone.

3. Natural parks are specially protected natural territories of republican value under the jurisdiction of a specially authorized executive body of the Sakha Republic (Yakutia) acting in the sphere of environmental protection.

4. Establishment of a natural park is accompanied by, in coordination with the Government of the Russian Federation, partial withdrawal of land and water areas, subsurface and biological resources from economical activity, excluding the lands of traditional nature management zone (ethnic territories, terut sirder).

5. Privity in the sphere of utilization, protection, organization, and functioning of a natural park is governed by civil legislation unless otherwise stated by the Federal Law "On Specially Protected Natural Territories".

6. Withdrawal or other termination of rights on land and other natural resources included into the natural park are prohibited.

7. Regime of land utilization in traditional nature management zones within the natural park is defined in the regulations of natural parks approved by a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection.

8. To ensure research activities in the sphere of environmental protection, natural parks can be provided with biological stations as parts of the former.

9. Particular features, zonation, and regime of each natural park are defined in the regulations of the natural park approved by a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection.

Article 8. Resource Reserves (Erkeeiy Sirder)

1. Resource reserves are established for the purpose of:
- preservation of natural resources of the particular territory for future generations through preclusion and restrain of economical activity on the scientific basis;
- provision of conditions necessary for protection of species, their populations, and species groups or physical objects of environment;
- preservation of natural habitat of indigenous peoples of the North and provision of optimal conditions for natural development of their cultures, preservation of traditional forms of economic activity and way of life, for environmental education of the peoples.

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2. Resource reserves comprise a zone or a combination of the following zones:
- absolute rest zone (tyytyllybat sirder) — area of full forbiddance of all types of all types of human activities;
- sacred lands (ytyk sirder);
- zone of licensed withdrawal of biological resources;
- zone of seasonal withdrawal of natural resources;
- zone of traditional nature management.

3. Resource reserves can be both of republican and local value.

4. Proclamation of territories as resource reserves is allowed both with and without withdrawal of land, water, and other resources.

5. Economic relations with landowners located on resource reserves territories are made on the contract basis with a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection.

6. Particular features, zonation, and regime of each resource reserve are defined in the regulations of the natural park approved by a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection.

Article 9. Protected landscapes (uluu tuelbeler)

1. As protected landscapes are proclaimed the areas of land and water surface with the purpose of preservation of natural landscapes (river valleys, alases, lakes, forestlands, mountains) considered by aborigine population sacred and featured by harmonious interrelations of man and earth, as well as of providing possibilities for their wide usage for tourism and recreational purposes with regulated economic activity on their territories.

2. Protected landscapes are combined anthropogenic landscapes of high aesthetic and economical value. Proclamation of objects as protected landscapes is made without withdrawal of land, water, and other resources.

3. Particular features, zonation, and regime of each protected landscape are defined in the regulations of the natural park approved by a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection.

Article 10. Natural monuments (aiylha menelere)

1. Natural monuments are rare or unique natural objects of environmental, scientific, historical, and cultural value.

2. Natural monuments occupy relatively small areas.

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3. Natural monuments and their territories are passed for protection to persons under the jurisdiction of which they are delivered, completion of writ of protection, passport, and other documents are carried out by a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection.

4. Proclamation of natural complexes and objects as natural monuments, as well as that of territories occupied by the former as the territories of natural monuments are allowed with or without retirement from owners and nominees of land and other locations occupied by the latter.

5. Necessity of land retirement or water withdrawal used for state needs, proclamation of natural complexes and objects as natural monuments, as well as that of territories occupied by the former as the territories of natural monuments are defined in accordance with acting legislature.

6. Objectives and functioning of specially protected natural territories, special regime of their protection, and order of utilization of natural resources are defined in the model regulations approved by the Government of the Republic of Sakha (Yakutia).

Article 11. Botanical gardens

1. Botanical gardens are environmental institutions aimed at creation of special plant collections with the purpose of preserving variety and enriching flora, as well as carrying out scientific, instructional, and educational activities.

2. On the territories of botanical gardens any activity is forbidden that is not connected with fulfillment of their tasks and can damage flora objects safety.

3. Botanical gardens territories can be subdivided into various functional zones, including:
- exposition attended with permission granted in the order determined by management of botanical gardens;
- scientific experimental attended only by research officers of botanical gardens as well as experts of other research institutions.

4. Objectives, scientific profile, characteristics of legal status, organizational arrangement, characteristics of regime of special protection of specific botanical gardens are defined in the regulations of botanical gardens approved by the Government of the Republic of Sakha (Yakutia).

5. Financing of botanical gardens is provided at the expense of budgetary funds of the state budget of the Republic of Sakha (Yakutia).

6. Financial assets of botanical gardens they can command in an established order are formed by incoming financial resources received by botanical gardens:

- as reparation of damages caused in result of physical persons and legal entities activities;
- from recreational, advertising services, publishing, and other activities non-discordant with tasks incumbent on them;
- gratis aid of physical persons and legal entities, including foreign citizens and international organizations.

Article 12. Sacral natural objects

1. Sacral natural objects are esteemed by the people landscape elements (trees, brooks, rocks, hills, and others) being places of worship, rites, and consentaneously elements of ethnic cultural heritage meaningful as special places uniting humans and nature.

2. On the territories of sacred natural objects excavations, collectors construction, sampling, and any other interferences resulting in disturbance of original state of natural objects or their territories, accompanying research works on historical, archaeological, paleontologic or other monuments (objects) of scientific interest are forbidden.

3. Protection of sacral natural objects is carried out with full consent and support of the people preserving traditions of worshipping the objects and keeping to the corresponding traditions.

Article 13. Competence of Public Authorities of the Republic of Sakha (Yakutia) and Local Authorities in the Sphere of Administration of Specially Protected Natural Territories

1. Competence of the Government of the Republic of Sakha (Yakutia) comprises:
1) establishment of general provisions in administration of relations of possession, usage, and disposition of the republican system of specially protected natural territories (ytyk kere sirder);
2) elaboration, development, and approval of republican statutory acts on protected territories; approval of plans of development of the republican system of specially protected natural territories; taking decisions on establishment of specially protected natural territories of regional value;
3) delimitation, in agreement with the corresponding executive authorities, of the borders of territories with special regime of protected territory in places of residence and economical activity of indigenous peoples and ethnic groups;
4) composition, in cooperation with executive authorities concerned, approval and realization of republican programs on protection, reproduction, restoration, and conservation of biological resources in association with other nature-conservative measures; approval of republican integrated specific-purpose programs in the sphere of protection, financing, and material support;
5) approval of statutory acts on utilization of biological resources, excluding animal

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and plant objects liable to protection, regulation, utilization, and control provided by federal executive authorities acting in the sphere of animal life protection;
6) coordination of activities of republican authorities, legal entities, and physical persons in the sphere of protection and utilization of specially protected territories objects;
7) approval of model regulations of and statutory acts on protected territories;
8) taking decisions on establishment of territories of traditional nature management of indigenous peoples of the North of regional value.

2. Competence of the specially authorized executive authority of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection comprises:
1) elaboration and development of statutory acts on specially protected natural territories;
2) coordination with local authorities of the borders of specially protected natural territories;
3) approval of regulations of a specific specially protected territory;
4) composition and realization, in cooperation with scientific research and other institutions, of the programs on protection, reproduction, restoration, and conservation of biological resources in association with other nature-conservative measures;
5) approval of technical and economic assessments, feasibility and ecological studies of the projects of specially protected natural territories;
6) examination and approval of the chronicle of nature;
7) organization of protection, financing, and material support of specially protected natural territories;
8) construction of manufacturing and administration objects of specially protected natural territories at the expense of capital investments and self-financing;
9) control over legal entities locating within specially protected natural territories;
10) popularization of protection and conservation of specially protected natural territories and education of the population in this field;
11) organization of advanced training courses for government comptrollers of specially protected natural territories;
12) calculation and evaluation of conditions of specially protected natural territories;
13) organization and realization of cadastre and monitoring of specially protected natural territories;
14) coordination of research subjects on of specially protected natural territories;
15) regulation of quantity and distribution of biological resources of specially protected natural territories, excluding fauna and flora objects liable to liable to protection, regulation, utilization, and control provided by federal executive authorities acting in the sphere of animal life protection;
16) issue of permanent and single permissions for entering specially protected natural territories to persons licensed to utilization fauna attributed to hunting and fishery

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objects;
17) regulation and administration of pass regime for vehicles;
18) elaboration and approval of lists of officials of bodies responsible for environmental control over specially protected natural territories of republican and local value.

Article 14. Features of Legal Status of Natural Parks (aan aiylgylar)

1. Natural parks possess the status of legal entities which does not have profit earning among their aims, thus being non-commercial entities established in the form of nature conservative institutions financed by state budgetary funds of the Republic of Sakha (Yakutia).

2. Financial assets of natural parks they can command in an established order are formed by incoming financial resources received by botanical gardens:
- as reparation of damages caused in result of physical persons and legal entities activities;
- from recreational, advertising services, publishing, and other activities non-discordant with tasks incumbent on them;

gratis aid of physical persons and legal entities, including foreign citizens and international organizations.

3. Production of graphic, printed matter, souvenirs, and other replicated products as well as consumer goods bearing images of natural and historical cultural complexes and objects located within the territories of natural parks as well as their designated names are carried out with permission of natural parks directorate on payment basis determined according to established order.

4. Natural parks can initiate and participate in funds, associations, and other institutions favoring development of specially protected natural territories.

5. Matters of socio-economic activities of economical entities as well as plans of development and improvement of settlements located within the territories of natural parks are coordinated with the corresponding natural parks.

Article 15. Procedure of Utilization of Resources of the Republican System of Specially Protected Natural Territories (Ytyk Kere Sirder)

1. Within the objects of the republican system of specially protected natural territories (ytyk kere sirder) any kind of activity is permanently or temporarily prohibited that does not comply with its goals and tasks and damage environment.

2. Depending on established regime of the territories of the objects of the republican

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system of specially protected natural territories (ytyk kere sirder), scientific, cultural, educational, and health-improving activities as well as traditional economic activities, can be allowed.

3. Regime of special protection presumes entire or partial land retirement and withdrawal of adjacent water and air areas as well as subsurface mineral resources.

4. Organization of activities in the sphere of controlled environmental tourism and recreation within the territories of the objects of the republican system of specially protected natural territories (ytyk kere sirder) is carried out in accordance with approved programs of environmental tourism development within specially protected territories with permission of administrative bodies of natural parks or a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection in concord with the purposes of specially protected territories without damaging natural complexes and objects of historical and cultural heritage.

5. Procedure of usage of resource reserves is determined by the present Law and a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection.

6. Procedure of usage of specially protected natural territories of local value is determined by local authorities in accordance with nature conservative legislature.

7. Within specially protected natural territories
- mineral reserves development;
- hydraulic engineering and melioration;
- employment of pesticides and fertilizer;
- final harvesting;
- construction and deployment of industrial objects, high-voltage transmission lines, trunk pipelines, and motor road;
- commercial fishery, commercial production of meat and fur of wild animals, are entirely forbidden.

8. In zones of traditional nature management of specially protected natural territories utilization of natural resources in forms providing for protection of native habitats of indigenous peoples of the North of the Republic of Sakha (Yakutia) and preservation of their traditional way of life.

9. Other activities associated with utilization of resources is ruled by regulations and regimes of protection of particular specially protected territories approved by a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection.

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Chapter Three. ORGANIZATION OF STATE ECOLOGICAL CONTROL AND PROTECTION OF SPECIALLY PROTECTED NATURAL TERRITORIES OF REPUBLICAN AND LOCAL VALUES

Article 16. Protection of Natural Complexes and Objects. State Ecological Control Over Specially Protected Natural Territories of Republican and Local Values

1. Protection of natural complexes and objects as well as state ecological control over specially protected natural territories of republican value are exercised by state controllers of specially protected natural territories of a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection and ecological security.

2. Protection of natural complexes and objects within specially protected natural territories of local value is exercised by local authorities.

3. State ecological control over specially protected natural territories of local value is exercised by state controllers of specially protected natural territories of a specially authorized executive body of the Republic of Sakha (Yakutia) acting in the sphere of environmental protection and ecological security.

4. Within the corresponding specially protected natural territories of republican and local values state controllers of specially protected natural territories have the power of state nature conservation controllers of the Republic of Sakha (Yakutia) conditioned by the legislature of the Russian Federation and the Republic of Sakha (Yakutia).

5. Protection of natural complexes and objects within specially protected natural territories of republican and local values can be carried out by law-enforcement agencies and voluntary nature conservation controllers.

Article 17. Legal Authority of State Controllers of Specially Protected Natural Territories

1. State controllers of specially protected natural territories have the right to:
1) check visitatorial power of the persons within specially protected natural territories;
2) check the documents affirming the right of nature management and other activities within specially protected natural territories;
3) detain, within specially protected natural territories, those violating the laws of the Russian Federation and the Republic of Sakha (Yakutia) on specially protected natural territories and convey violators to law-enforcement agencies;
4) draw up statements of the case and pass decisions in cases of administrative violation in the sphere of protection of specially protected natural territories;
5) draw up and send in to state bodies of respective authority reports on violation of nature conservation laws presuming administrative and criminal responsibility;

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6) take, in the sphere of their authority, appropriate measures to provide for administrative proceedings;
7) have unimpeded access to any objects located within specially protected natural territories in order to check compliance with the legislature of the Russian Federation and the Republic of Sakha (Yakutia) on specially protected natural territories.

2. State controllers of specially protected natural territories also have the right to:
1) prohibit, by court decision, any economical and other activities non-compliant with the established regime of specially protected natural territories;
2) impose administrative penalties for violation of the legislature of the Russian Federation and the Republic of Sakha (Yakutia) on specially protected natural territories;
3) advance claims to physical persons and legal entities on recovery of damages caused to natural complexes and objects of specially protected natural territories by violation of the established regime of specially protected natural territories.

3. State controllers on protection of specially protected natural territories have, in the course of duty, the right to employ special means (handcuffs, rubber batons, tear-gas, war-dogs etc.) in the following cases:
1) to repulse an attack over officials and citizens in the course of their service or civil duty of protection of environment, natural and historical heritage;
2) to repulse an attack over buildings, constructions, facilities, and vehicles belonging to specially protected natural territories and their officials;
3) to detent offenders, convey them to law-enforcement agencies or other office premises, in case of their disobedience or resistance, if there is good reason to expect their escape or harm to those around or themselves;
4) to stop a vehicle the driver of which did not comply with the order to stop made by a state controller.

4. State controllers of specially protected natural territories in the course of discharge of their official duties imposed by the present Law, can bear fire-arms.

Procedure of purchasing, keeping custody, and use of fire-arms are regulated by the laws of the Russian Federation.

5. State controllers of specially protected natural territories are provided with means of personal defense.

6. State controllers of specially protected natural territories are liable to obligatory state insurance in accordance with the laws of the Russian Federation.

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Chapter Four. RESPONSIBILITY FOR VIOLATION OF REGIME OF SPECIALLY PROTECTED NATURAL TERRITORIES

Article 18. Responsibility for Violation of Regime of Specially Protected Natural Territories

1. Violation of established regime or other rules of protection and utilization of environment and natural resources within specially protected natural territories and their protection zones implies legal liability as stated by federal laws, laws of the Republic of Sakha (Yakutia) and other statutory acts in the sphere of environmental protection and legal regulation of specially protected natural territories.

Article 19. Reparation of Damages

Damages caused to natural objects and complexes within specially protected natural territories is liable to indemnity in accordance with tariffs and computational procedures of reimbursement legally stated by the laws of the Russian Federation and in the absence of the former, at the rate of actual expenses for compensation

Chapter Five. INTERNATIONAL COOPERATION IN THE SPHERE OF SPECIALLY PROTECTED NATURAL TERRITORIES

Article 20. Participation in International Cooperation in the Sphere of Specially Protected Natural Territories

The Republic of Sakha (Yakutia) participates in activities of international organizations in the sphere of specially protected natural territories, in preparation and holding international conferences, in elaboration and realization of international environmental programs, in exchange of experts delegations in the sphere of specially protected natural territories, in compliance with procedures of coordination with federal bodies (in the frame of authority of the subjects of the Russian Federation).

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Chapter Six. CONCLUSIVE PROVISIONS

Article 21. Law Effectiveness

The present law takes effect from the official issue date.

Article 22. Correspondence of Statutory Acts of the Republic of Sakha (Yakutia) with the Present Law and Federal Legislature

1. From the effective date of the present Law the Law of the Republic of Sakha (Yakutia) of May 6, 1996 No.113-1 "On Specially Protected Natural Territories in the Republic of Sakha (Yakutia)" becomes invalid and not applicable in the territory of the Republic of Sakha (Yakutia).

2. State bodies of the Republic of Sakha (Yakutia) and local authorities are liable to bring their statutory acts to conformity with the present Law.

City of Yakutsk
December 25, 2003
105-3 No.213-III

President,
Republic of Sakha (Yakutia)
V. Shtyrov

ANNEX B3

GOVERNMENT OF THE REPUBLIC OF SAKHA (YAKUTIA)
RESOLUTION
of February 10, 1995 N 39

ON ESTABLISHMENT OF THE NATIONAL LENA PILLARS NATURE PARK
ON THE TERRITORIES OF KHANGALASSKY AND OLEKMINSKY ULUSES

The unique nature complexes of the Middle Lena river constitute national patrimony and pride of our Republic.

Picturesque rocks "Lena Pillars", site of ancient people "Diryng-Yuryakh", tukulans, rich flora and fauna of the Lena-Buotama interfluve, amazingly beautiful landscapes of the Sinyaya river present special ecological, historical and aesthetic value.

Wild unorganized tourism, barbarous attitude towards unique nature objects of outstanding scientific and historical value, uncontrolled use of nature resources, numerous forest fires deteriorate ecological state of the Lena Pillars and raise public awareness.

In order to provide protection and rational management of the Lena Pillars natural complexes being of outstanding cultural, aesthetic, scientific and educational value in the name of present and future generations, revival of traditional trades, in pursuance of Decree of the President of the Republic of Sakha (Yakutia) of 16.08.1994 N 837 the Government of the Republic of Sakha (Yakutia) here resolves:

1. To establish the National Lena Pillars Nature Park on the territories of Khangalassky and Olekminsky Uluses including the two sites: "Pillars" and "Sinsky" and the buffer zone.

2. To approve Regulatory Statute on the the National Lena Pillars Nature Park and its buffer zone (Annexes NN 1-4).

3. Ministry of Nature Protection (Alexeev), administration of the Khangalassky Ulus – to complete the National Lena Pillars Nature Park with the staff, transport and inventory.

4. To exempt the National Lena Pillars Nature Park from all types of federal and local taxes and duties.

5. State committee for science and technology (Kuzmin) – to provide funding of research and development of the National Lena Pillars Nature Park in the establishment period.

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6. Public Assets Management Funds (Fedorova) - to transfer recreation center in Verkhy Bestyakh village of the Khangalassky Ulus from the balance of the State National Television and Radio Broadcasting Company to the balance of the established Park.

7. Ministry of Finance (Ptitsyn) – to provide operation and maintenance of facilities costs for the National Lena Pillars Nature Park in the limits of budget appropriations, allotted to the Ministry of Nature Protection for 1995.

8. State committee for economy (Burnashov) – to provide capital investment for supplying production facilities of the National Park total 600 million rubles.

9. To impose control for realization of the present Resolution on Ministry of Nature Protection (Alexeev).

Chairman of the Government
of the Republic of Sakha (Yakutia)
Yu. KAIDYSHEV

ANNEX B4

GOVERNMENT OF THE REPUBLIC OF SAKHA (YAKUTIA)

RESOLUTION
Of November 6, 2006 N 495

ON RENAME OF NATIONAL NATURE PARKS INTO NATURE PARKS OF THE REPUBLIC OF SAKHA (YAKUTIA) AND APPROVAL OF THE STANDARD STATUTE OF A NATURE
PARK OF THE REPUBLIC OF SAKHA (YAKUTIA)

With a view to bring regulatory legal acts of the Republic of Sakha (Yakutia) regarding specially protected nature areas to conformity with the Federal Law of December 29, 2004 N 199-FL, in pursuance of clause 3 of the Resolution of Government of the Republic of Sakha (Yakutia) of September 28, 2003 N 615 "On bringing of regulatory legal acts of the Government of the Republic of Sakha (Yakutia) to conformity with the federal legislation", the Government of the Republic of Sakha (Yakutia) here resolves:

1. To rename the following National Nature Parks of the Republic of Sakha (Yakutia) into Nature Parks of the Republic of Sakha (Yakutia):

The National Lena Pillars Nature Park in Khangalassky and Olekminsky Uluses established in accordance with the Resolution of Government of the Republic of Sakha (Yakutia) of February 10, 1995 N 39 "On establishment of the National Lena Pillars Nature Park on the territories of Khangalassky and Olekminsky Uluses";

National Nature Park " Sinyaya" in Gorny Ulus, established in accordance with the resolution of Government of the Republic of Sakha (Yakutia) of August 12, 1996 N 337 "On establishment of the National Nature Park "Sinyaya" in Gorny Ulus and Resource Reserves "Kytalyk" in Allaikhovsky and "Lena-Delta" in Bulunsky Uluses";

National Nature Park "Ust-Vilyuisky" in Kobyaisky Ulus, established in accordance with the resolution of Government of the Republic of Sakha (Yakutia) of May 15, 1997 N 196, in consequence of reorganization of the Reserve (zakaznik) of the same name;

National Nature Park "Momsky" in Momsky Ulus, established in accordance with the resolution of Government of the Republic of Sakha (Yakutia) of June 18, 1996 N 260 " On establishment of the National Nature Park (Aan Aiylga) "Momsky" and Resource Reserve (Erkeeiy Sir) "Eseliakh" in Momsky Ulus";

National Nature Park "Kolyma" in Srednekolymsky Ulus established in accordance with resolution of the Government of Republic of Sakha (Yakutia) of July 11, 2000 N

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371 "On establishment of the National Nature Park "Kolyma" in Srednekolymsky Ulus, Resource Reserves "Allakit", "Bur" in Oleneksky, "Vilyuisky", "Chonsky" in Mirninsky, "Kiupsky" in Ust-Maisky, "Tyukian", "Syugdzher", "Eedieen" in Nyurbinsky, "Erged-zhey" in Lensky, and "Kharyialaakh" in Vilyuisky Ulus".

2. To provide funding of costs for rename of National Nature Parks into Nature Parks of the Republic of Sakha (Yakutia) as equity financing of the Nature Parks.

3. To approve the Standard Statute of a Nature Park of the Republic of Sakha (Yakutia) according with the Annex to the present Resolution.

4. Ministry of Nature Protection of the Republic of Sakha (Yakutia) (V.A. Grigoriev) by December 31, 2006:

- to work out corresponding Regulation Statutes for the renamed Nature Parks of the Republic of Sakha (Yakutia) in accordance with the supplied Standart Statute and to submit them for approval of Ministry of Property Relations of the Republic of Sakha (Yakutia);
- to make alterations into the State Cadastre of specially protected nature areas of the Republic of Sakha (Yakutia) due to rename of National Nature Parks into Nature Parks of the Republic of Sakha (Yakutia);
- to realize measures for state registration of changes regarding information of legal entities.

5. Ministry of Property Relations of the Republic of Sakha (Yakutia) (G.M. Makarova) - to include lands of the established specially protected nature areas of re-gional importance into the List of estates of the Republic of Sakha (Yakutia) subject to property rights.

6. To impose control for realization of the present Resolution on the Deputy Chairman of the Government of the Republic of Sakha (Yakutia) D.F. Naumov.

Chairman of the Government of the
Republic of Sakha (Yakutia)
E. BORISOV

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STATUTE

of the State Enterprise

Nature Park (Aan Aiylgy) "Lena Pillars"

of Sakha Republic (Yakutia)

The present Statute settles procedures of establishment and activities of the Nature Park (Aan Aiylgyly) on the territory of the Sakha Republic (Yakutia) and is composed on the basis of the Civil Code of the Russian Federation, the Law of the Russian Federation of March 14, 1995 No.33-ФЗ "On Specially Protected Natural Territories" (ed. of December 29, 2004) and the Law of Sakha Republic (Yakutia) of December 25, 2003 No.214-III "On Specially Protected Natural Territories of Sakha Republic (Yakutia)".

1. GENERAL PROVISIONS

1.1. The State Enterprise "Nature Park (Aan Aiylgyly) Lena Pillars of Sakha Republic (Yakutia)" was set up by the Decree of the President of Sakha Republic (Yakutia) of August 16, 1994 No.837 "On Measures For Development of Specially Protected Natural Territories" and by the Regulation of the Government of Sakha Republic (Yakutia) of February 10, 1995 No.39 "On Organization of the 'Lena Pillars' National Nature Park On the Territory of Khangalasskii and Olekminskii Uluses".

1.2. The State Enterprise "Nature Park (Aan Aiylgyly) Lena Pillars of Sakha Republic (Yakutia)" (hereinafter referred to as Nature Park) is a state-operated nature conservation recreation agency established by the Government of Sakha Republic (Yakutia) represented by the Ministry for Privity Sakha Republic (Yakutia).

The Nature Park comprises natural territories and complexes specially protected either by law or customs of indigenous peoples of the North, including both typical and rare landscapes of environmental and moral educational value, habitat of wild plant and animal communities, places of organized rest and recreation, of customs and traditional beliefs of indigenous peoples of the North, of environmental tourism and excursions contributing to ecological education of the people.

1.3. The Nature Park is situated on the territory of Khangalasskii and Olekminskii districts and consists of two isolated areas, of which "Sinskii" is located on the left bank of the Lena river upstream the mouth of the Siniaia river, and the main area of the Park territory is located on the right bank of the Lena river following the border of Khangalasskii district including the part of Olekminskii district along the watershed of the Buotama river.

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The territory of the Nature Park includes, as its organization departments, the natural relics and monuments (Lena, Buotama, and Siniaia Pillars), historical and cultural sites, archaeological and paleontological objects (Diring Yuriakh archaeological site, places of sacrifices, and old rock paintings "pisanitsy").

1.4. The Nature Park is a non-profit institution organized in the form of a state nature conservation agency financed at the expense of the state budget of Sakha Republic (Yakutia) and other sources. The Nature Park has its independent balance, an official seal with the National Emblem of Sakha Republic (Yakutia) and the Nature Park designation, a personal account opened at the Department of the Republican Treasury, fiscal boards of the Ministry of Finance of Sakha Republic (Yakutia), as well as a currency account in banking establishments.

1.5. The Nature Park acts on the basis of the Statute approved by the Ministry for Privity of Sakha Republic (Yakutia) and agreed with the Ministry for Nature Protection of Sakha Republic (Yakutia).

1.6. The Nature Park has the right to stand as claimant and defendant in court and arbitrage, to exercise all rights and bear all responsibilities vested in legal entities.

1.7. The property of the Nature Park is the state property of Sakha Republic (Yakutia) and is formed by transferred budgetary funds and other sources permitted by the legislation of the Russian Federation and Sakha Republic (Yakutia), that property assigned to the Nature Park by the right of operational management.

1.8. The territory of the Nature Park occupies the land granted to it for perpetual tenure, in some cases, the land of other users and owners.

1.9. Withdrawal and other termination of rights on land and other natural resources located within the territory of the Nature Park are prohibited.

1.10. In some cases ground areas of other users and owners can be situated within the borders of the Nature Park.

1.11. Land owners, land proprietors, and land users located within the territory of the Nature Park are required to obey to special protection regime established in the Nature Park and liable to administrative, criminal and other responsibility for its violation.

1.12. The territory of the Nature Park is taken into account at composing territorial integrated plans, land management patterns, and at district planning.

1.13. Matters of socioeconomic activities of legal entities and physical bodies as well as other economic entities acting within the territory of the Nature Park, development and improvement plans and designs of townships and settlements are coordinated with the Nature Park directorate.

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1.14. Decision on establishment of the Nature Park is taken by the Government of Sakha Republic (Yakutia) at the proposition of federal executive bodies acting in the sphere of environmental protection.

1.15. The full official name of the Nature Park:

in Russian — "Государственное учреждение «Природный парк (Аан Айылгы) «Ленские Столбы» Республики Саха (Якутия)»;

shortened — ГУ «ПП «Ленские Столбы» РС(Я)»;"

in English: The State Enterprise "Nature Park 'Lena Pillars' of Sakha Republic (Yakutia)";

in Yakut: Судаарыстыбаннай учреждение «Аан Айылгы «Олуонэ туруук Хайалара»».

1.16. Legal address: 56 Ordzhonikidze Street, Pokrovsk, Khangalasskii District (Ulus), 678000 Sakha Republic (Yakutia), Russian Federation.

2. goals and objectives, subject AND kinds of activity of the Nature Park

2.1. The Nature Park is established in the aim of preservation of reference and unique sites of natural, historical, and cultural complexes and objects economically and historically valuable by virtue of favorable combination of various elements of natural landscapes and with the goal of their utilization in recreational, educational, scientific, and cultural purposes.

2.2. Major tasks of the Nature Park include:

2.2.1. Maintenance of the natural state of protected natural complexes and preservation of biological diversity.

2.2.2. Revival and development of traditional economies of the local population.

2.2.3. Preservation of reference and unique natural complexes and objects, monuments of nature, history, and culture as well as other objects of cultural heritage.

2.2.4. Arrangement of conditions for controlled tourism and organized rest in natural conditions.

2.2.5. Environmental monitoring.

2.2.6. Scientific research.

2.2.7. Restoration of damaged natural and historical cultural complexes.

2.2.8. Arrangement of environmental education of the population.

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2.3. Subject and kinds of activity of the Nature Park:

2.3.1. Securing protection of assigned territories together with existing natural and historical-cultural objects.

2.3.2. Creating conditions for all kinds of controlled tourism, excursion services and public recreation, for learning the Park's natural environment, its cultural and historical monuments.

2.3.3. Preservation (restoration) of natural complexes as places of traditional economic activities of the local population.

2.3.4. Information, advertising, and publishing activities aimed at publishing scientific and popular literature covering all spheres of the enterprise's activity (scientific works, guidebooks, information bulletins, reference books, pamphlets, booklets on excursions and lectures, commemorative booklets, postcards, posters, photo albums etc.).

2.3.5. Recovery of nature of the territories involved in economic activities with economically and culturally valuable plant and animal species, ensuring contribution to the system of regional monitoring to maintain general ecological optimum in the region.

2.3.6. Keeping and breeding wild animals within the zone of artificial keeping and breeding of rare and endangered animal species.

2.3.7. Environmental education and training, organization of open-air museums and expositions, creation and equipment of excursion paths and routes; organization of environmental associations and centers; organization of educational and practical training for students of institutions of higher and specialized secondary education of respective professions; coverage of the Nature Park activities in mass media; other forms and methods of socio-environmental education and popularization of environmental knowledge.

2.3.8. The Nature Park can act as a hunting resources user.

2.3.9. Realization of business (commerce, trade, intermediate trade, public services) and other kinds of industrial and economic activity unrepugnant to the legislation of the Russian Federation and Sakha Republic (Yakutia) as well as to the present Statute, independently or through purposefully organized small subsidiary enterprises, farms, workshops, sales outlets; manufacture of various kinds of agricultural and hunting products:

manufacture and sale of souvenirs, foodstuff trade, selling of board lumber, firewood after sanitary felling etc;

strictly limited gathering of timber and technical raw of vegetable and animal origin within restricted and active recreational zones and the zone of traditional nature management;

wild and cultured berries and mushrooms gathering within the zone of traditional nature management;

participation in construction, repair, and restoration.

2.3.10. Paid services to individuals and legal entities:

excursions and tourist services within restricted and active recreational zones and in sacred places;

hiring-out of equipment and implements;

transportation services;

amateur hunting and fishing by agreement with the directorate of the Nature Park within the active recreational and traditional nature management zones.

3. PROPERTY AND ASSETS OF THE NATURE PARK

3.1. Property of the Nature Park is accounted on an independent balance and includes key assets and floating funds necessary for implementation goals and tasks of the Nature Park in accordance with the present Statute.

3.2. In accordance with the established order, the Nature Park disposes of the property and assets formed on account of:

budget and non-budget funds;

property transferred by an owner or authorized institution;

credits from banks and other lenders by consent of an owner;

capital investments and budget grants;

reparation of damages caused by activities of individuals and legal entities;

recreational, advertizing, and publishing activities unrepugnant to functions and tasks of the Nature Park;

granting opportunities and/or direct participation of the Park in realization of research and educational programs beyond the scope of immediate interests and plans of the Nature Park;

sales of products, works, and services as well as other kinds of economical activity permitted to the Nature Park;

gratis aid of individuals and legal entities including foreign citizens and international agencies;

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grants from foreign organizations;

other forms specified in the acting legislation.

3.3. The Nature Park has no right to alienate or in any other way dispose of its settled estate including land and property acquired by budget allowances.

3.4. Revenues collected from tourism, publishing, and independent economic activities permitted by the Statute of the Nature Park as well as property acquired by non-budget means are accounted in other personal accounts

opened at the departments of the Republican Treasury of the Ministry of Finance of Sakha Republic (Yakutia) and are assigned to the Nature Park by the right of operational management.

3.5. Penalties paid in administrative procedure for ecological infringements and recovered by decisions of public officers of the Nature Park come to the budget of Sakha Republic (Yakutia).

3.6. Production of graphic, printed matter, souvenirs, and other replicated products as well as consumer goods bearing images of natural and historical cultural complexes and objects located within the territory of the Natural Park as well as their designated names, cine and video filming are carried out on payment basis in agreement with the directorate of the Natural Park.

3.7. Exercising the right of operational management of its balanced property, the Nature Park:

3.7.1. Provides insurance of the state property of Sakha Republic (Yakutia) on balance of the Nature Park.

3.7.2. Provides safety and use according to its intended purpose of the property assigned to the Nature Park by the right of operational management.

3.7.3. Excludes deterioration of the technical state of the property assigned to the Nature Park by the right of operational management; this requirement does not cover deterioration caused by standard operation time of the property.

3.8. The Nature Park is liable to:

3.8.1. Bear responsibility, in compliance with the legislation of the Russian Federation and Sakha Republic (Yakutia), for breach of the contract, credit, payment, and tax obligations as well as of other rules of economic management.

3.8.2. Observe standards, norms, and rules of fire safety; comply with decisions of the state fire safety control authorities.

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3.8.3. Carry out technical inventory (certification) of its real property.

3.8.4. Carry out operational accounting of the results of production, economic, and other activities, statistical and financial statements, report on the results of activities in accordance with the established procedures and terms assigned by the Ministry for Privity and the Ministry for Nature Protection of Sakha Republic (Yakutia) in the frame of acting legislations.

In case of misrepresentation of state reporting public officers of the Nature Park are liable to disciplinary, administrative, and criminal responsibility stated by the legislation of the Russian Federation.

3.9. Control and inspection over activities of the enterprise are carried out by the Ministry for Nature Protection of Sakha Republic (Yakutia) along with tax, nature protection, and other authorities vested by acting legislation and legislative acts of the Russian Federation and Sakha Republic (Yakutia) with the right to control state enterprises.

Control over the property assigned to the Nature Park by the right of operational management is carried out by the Ministry for Privity of Sakha Republic (Yakutia).

4. Nature Park Management

4.1. The Nature Park is in authority of the Ministry for Nature Protection of Sakha Republic (Yakutia) that exercises general guidance and coordination of the Nature Park activities.

4.2. The Nature Park is headed by a director appointed by the Minister for Nature Protection of the Sakha Republic (Yakutia).

4.3. The Director manages the Nature Park on the principle of undivided authority, bearing full responsibility for the Nature Park activities, providing for law observance, state discipline, and accomplishment of the tasks the Nature Park is entrusted with.

4.4. To consider the matters of scientific research, nature conservation, recreation, and education, Scientific and Technical Council can be affiliated with the directorate of the Nature Park. Structure and staff of the Scientific and Technical Council is approved by the Ministry for Nature Protection of Sakha Republic (Yakutia).

4.5. To solve the problems related to indigenous population, the Commission of the Nature Park can be affiliated with the directorate of the Nature Park. The commission comprises representatives of the local population, authorized members of the local nasleg (village), ulus (region) administration, of ulus (regional) Committee of the Ministry for Nature Protection of Sakha Republic (Yakutia) and invitees from scientific institutions superintending the Nature Park activities.

4.6. The commission has the prerogative of discussing the disputable matters of licensing, territorial zoning, formation of subsidiary transportation routes, necessity of uti-

lization of the natural resources by the local population over arranged rate, and other questions of the Nature Park activities if they affect interests of indigenous population. The Commission holds its meetings as may be necessary.

4.7. Decisions of the Commission are of recommendation character.

5. Regime of the Nature Park

5.1. Within the territory of the Nature Park the differentiated regime is established of security, protection, and utilization of natural resources with regard to local natural, historical, cultural, and social peculiarities.

Accordingly, the following zones can be defined within the territory of the Nature Park:

5.1.1. Reserved zone (tyytyllybat sirder) — area of full forbiddance of all types of economical and recreational activity except vehicular and pedestrian traffic of organized groups of tourists, resters, and members of Evenk tribal communities permitted to cross the protected territory by roads and pathways used for recreational and organized tourism purposes.

The territory on the right bank of the Lena River is divided to the following portions:

"Achchygyi Taryng — Ulakhan Tuoidakh"

A 6045-hectare site is situated on the right bank of the Lena River in the interfluve of Achchygyi Taryng and Ulakhan Tuoidakh rivers. Its northern border starts on the right bank of the Achchygyi Taryng river mouth at the lower talus line and goes eastward along the lower line of hillside waste to rock debris on the left bank of the Ulakhan Tuoidakh river mouth. The eastern border starts on the right bank of the Lena River at the Ulakhan Tuoidakh river mouth from rock debris on the left bank of the mentioned stream. Further, the border passes southward along the left bank upstream of the Ulakhan Tuoidakh river through points with true altitudes (subsequently referred to as altitudes) of 253, 300.7, and 369.1 m to 395.2 m altitude point. The southern border starts at 395.2 m altitude point and passes westward across the watershed crossing 427.7 m altitude point and comes to 385.9 m altitude point on the right bank of the Achchygyi Taryng river. The western border starts on the right bank of the Achchygyi Taryng river at 385.9 m altitude point and further goes downstream northward on the right bank of the Achchygyi Taryng river passing 390.5 and 295.6 m altitude points. Further, the border goes to the Achchygyi Taryng river mouth to the lower line of rock debris.

"Chys — Buotama river mouth"

A 65,720 hectare site is situated on the right bank of the Lena River from the Chys river mouth to the Buotama river mouth. Its northern border starts at the right bank of the Chys river mouth and goes generally eastward along the lower line of hillside waste and rock debris. Further it goes along the upper shoreline to the Buotama river mouth. The

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eastern border starts at the Buotama river mouth going further along the floodplain edge at the hill base southward to the river mouth end opposite the Byiyttakh river flowing on the right bank in the Buotama river. Then the border passes southward along the floodplain at the hill base upstream Buotama River to the Khary Khan River. The southern border starts at the point of the two rivers junction at the Chys river head, then follows upstream along the right bank of the stream flowing in the Chys river, to its headwaters. Further, going generally eastward, it follows along the line between Nos.74-102, 75-103, and 76-103 quarters. Then it goes along the left bank of the stream flowing in the Kuranakh river until its junction with the Kuranakh river further crossing the Kuranakh river coming at its right bank, going upstream towards its junction with a nameless stream. Going upstream along the right bank of the nameless stream the border comes to its headwaters. Further it goes eastward to the Kuranakh - Uettekh - Khangas Labyia rivers watershed and comes to headwaters of the stream flowing in the Khangas Labyia River. After that it passes along the left bank of the stream northeastward downstream to the stream junction with the Khangas Labyia River, crossing the riverbed and coming to the right bank. Further southeastward, it goes upstream Khangas Labyia river to its headwaters and along the line between No.81-110 quarters crosses the watershed to a nameless stream flowing in the Labyia River. Along the left bank of the nameless stream, it follows northward to the point of junction with the Ochchugui Iuriakh River. Along the right bank of the mentioned river it goes northeastward upstream reaching the point of junction with the Suordakh River. Along the right bank of the Suordakh River, it goes upstream to the point of the two streams junction (286.0 m altitude). Further, along the pathway marking the border between Nos.18-19 quarters, it crosses the watershed between the Suordakh and Kiuges Iuriue rivers and comes to the stream flowing in the Kiuges Iuriue River. Along the left bank of the stream, it comes to its junction with the Kiuges Iuriue river and along its left bank goes to crossing with the border of Nos.313-381 quarters at the point of junction with a nameless stream flowing in the Kiuges Iuriue river on the right bank. Then it goes to the right bank of Kiuges Iuriue River and northeastward to the watershed of Kiuges Iuriue - Khotu Dzhukaia Rivers. Further, it goes generally eastward along the watersheds of Kiuges Iuriue - Khotu Dzhukaia, Khonku Iuriue - Orto Dzhukaia, and Echita - Khakhannakh rivers, through 312.1, 310.5, 300.8, 313.4, 309.2, 303.3, and 305.6 m altitude points. From 305.6 m altitude it goes northeastward to headwaters of the stream flowing in the Khakhannakh Lake. Along the left bank of the stream it goes downstream to the Khakhannakh lake, rounding it at the left side and passing to headwaters of Ieree Biuteidiakh stream flowing in the Borulakh lake. Along the left bank of the Ieree Biuteidiakh river it goes to the Borulakh Lake, rounding it at the southern side and goes southeastward along the right bank of the stream flowing in Borulakh lake to the stream headwaters. Further the border crosses the watershed and goes downstream reaching the Bulgunniakhtakh river headwaters, then going downstream along the left bank of the mentioned stream to the junction of the two streams with the Bulgunniakhtakh river. Then it crosses the watershed of the Bulgunniakhtakh and Atyrdzhakh Khatyng rivers going to the left bank of the latter. Then it goes downstream the Atyrdzhakh Khatyng river to the junction of the stream with the Borokhu stream, passing to the left bank of the Borokhu river and southeastward upstream the Borokhu river to the point of junction with a nameless stream on the left bank at the border of No.331 and 333 quarters. Along the left bank of the nameless stream it goes northward to the

nameless stream headwaters. Then it goes along the watershed of the Borokhu - Diring Yuriakh – Daban Rivers and reaches 287.9 altitude. Then it turns southeastward reaching the watershed of the Kyrsagai - Kien Yuriakh at 282.3 m altitude point. Further the border passes eastward reaching the Khary Khan river headwaters and going along the left bank of the mentioned stream downstream the Buotama river.

The western border starts at the Chys river headwaters, going upstream along the right bank of the stream to the point of junction of two nameless streams at the Chys river headwaters.

The Sacred Place (Ytyk Sire) serving as a place of traditional folk rituals is situated in the Labyia river headwaters in the active recreational zone between portions of preservation zone.

5.1.3. Restricted recreational zone with restricted entrance of the limited number of visitors. The total area of the zone is 12657.7 hectares. The zone includes the following parts:

"Lena river bank" is situated on the right bank of the Lena River along the shore line from the Taryng Yuriakh River northeastward along the Lena river bank to the Buotama river mouth (8287.5 hectares).

"Echita river – Buotama river road" starts on the right bank of the Lena river at the point where the road to the Buotama river begins, then follows the road across the watershed of the Lena and Buotama rivers to the point where the road reaches the left bank of the Buotama river in the Men'shikovo locality (210 hectares).

"Oddokun river – Buotama river road" starts at the Oddokun river mouth on the right bank of the Lena river, then follows the road across the watershed of the Lena and Buotama rivers to the point where the road reaches the left bank of the Buotama river in the Sanga Kiuel' locality (340 hectares).

"Bysyt Yuriakh river road" starts at the junction of two rivers at the Bysyt Iuriakh river headwaters, and then goes along the road downstream to the Bysyt Iuriakh river headwaters (30 hectares).

"Buotama river mouth – Tukulan road" starts at the point where the road reaches the floodplain part of the Buotama river mouth, then goes along the road southwestward to sandy (tukulans) (65 hectares).

"Buotama River" starts at the Del'berge river mouth on the left bank of the Buotama River, then goes along the floodplain part of the Buotama River downstream to the Byiyttakh river mouth (3,725 hectares).

"Siniaia River" starts at the northern border of the Siniaia part of the Nature Park on Siniaia River. Then it goes along the floodplain part of the mentioned river along its left and right banks, downstream to the southern border the Siniaia part at the point

where the tractor road reaches the left bank of the Siniaia river. The part includes a winter road passing from the western border of Siniaia part of the Nature Park at the watershed of the Billiakh and Siniaia rivers, then passing along the road to Siniaia river and further along the road across "Eiim" locality on the Siniaia river and along the bank of the mentioned river to the northern border of Siniaia part of the Nature Park (2,885 hectares).

5.1.4. Active recreational zone — area of educational tourism for environmental education and acquaintance with remarkable places of interest in Nature Parks as well as for recreation. The total area of the zone is 1,368 hectares. It includes the following parts:

"Kuranakh River" is situated on the right bank of the Lena River including the floodplain part from the Kuranakh river mouth to the Uettiakh river mouth (237.5 hectares total area). The northern border starts on the left bank of the Kuranakh River and follows the lower shoreline eastward to the Uettiakh river mouth. The southern border starts on the left bank of the Kuranakh River and follows the lower hillside waste and rock debris line eastward to the Uettiakh river mouth.

"Labyia river" is situated on the right bank of the Lena river at the Labyia river mouth in 1 km distance to the left and right of the Labyia river mouth along the shoreline limited by the lower shoreline and lower rocks (30 hectares total area). It also includes tourist routes located in the Labyia river valley.

"Buotama river mouth" is situated near the mouth in the Buotama river floodplain (762.5 hectares total area). The northern border starts at the eastern end of sand taluses on the right bank of the Lena River at the Buotama river mouth, and then goes northeastward along the shoreline to the Buotama river mouth. Then, crossing the moth part of the Buotama River, it goes eastward to the Kachikattsy branch mouth. Further, it goes southeastward rounding the Tit Kuturuga and along the Nature Park border reching the shore. The eastern border starts at the border of the Nature Park at the point where it reaches the right bank, further going southwestward along the edge of the floodplain part at the hill base to the Atakh Yuriakh river mouth. Then it goes along the shoreline to the Byiyttakh river mouth. The southern border starts at the Byiyttakh river mouth on the right bank of the Buotama river, crossing the Buotama river westward goes to the left bank of the mentioned river and reaches the hill base over the floodplain part. The western border starts at the western top of the sand talus line at the Buotama river mouth and follows southward along the top of the elevation at the Buotama river mouth and follows southward along the top of the elevation over the mouth floodplain of the Buotama River along the road to tukulan. The it follows the floodplain edge near the hill base southward to the end of the floodplain part opposite the Byiyttakh river flowing in the Buotama river on the right bank..

"Bysyt Yuriakh river" is situated in the floodplain part of the Buotama river near the Bysyt Yuriakh river mouth (the road outcome from the 131st km of Nizhnii Bestiakh - Bol'shoi Never highway) (182.5 hectares). The northern border starts at the northwestern end of the Darkylakh lake bay, then goes further eastward along the lake shore across the Buotama river bay on the left bank to the river mouth. Then it crosses the

river mouth and reaches the right bank of the Buotama River. Then the border passes along the right bank downstream the right branch of the Buotama River eastward. It reaches the edge of the floodplain part near the hill base of the native shore in the place where the right branch turns from east to the north. The eastern border starts at the hill base on the right bank of the Buotama river the turn of the right river branch from east to the north and passes southward upstream along the edge of the floodplain part near the hill base of the native shore to the Bysyt Yuriakh river mouth. The southern border starts at the Bysyt Yuriakh river mouth and follows westward ,crosses the Buotama river mouth and reaches the left bank of the former riverbed mouth at the "Kuonan" locality. The western border starts on the left bank of the Buotama River from the former riverbed mouth at the "Kuonan" locality and follows northeastward to the southern end of the Darkylakh Lake. Then the border goes northwestward to the western end of the Darkylakh Lake.

"Khaara-Uu" locality is situated in the Buotama river midstream (150 hectares). It starts at the rocks on the left bank of the mentioned river between the Maiagastakh and Dzhukaia rivers. It passes the floodplain part of the Buotama River to the mouth of the Sylgy Ytar River flowing in the Buotama River on the right.

"Diring Yuriakh river" is situated at the site of archaeological excavations in the Diring Yuriakh river mouth, including the path k=leading from the bank of the Lena river (5.5 hectares).

"Eiim" locality on the Siniia River is situated at the place of the Kyry Tas river inflow in the Siniia River (53.1 hectares). The northern border passes along the road from the landmark of the border between No.100-111 quarters eastward to the road to the Siniia River. The eastern border starts at the road outcome to the Siniia River southeastward along the river bank to the Kyry Tas river mouth. The southern border goes from the Kyry Tas river mouth westward crossing the Siniia river bed and reaching its right bank. Further westward, it crosses the southern end of the lake and reaches the Siniia river bank. Crossing the Siniia river bed, it goes to the left river bank to the outcome of the border between No.100-111 quarters. The western border starts on the left bank of the Siniia river from the place of the outcome of the border between No.100-111 quarters and goes further along the mentioned border to the north of the road.

5.1.5. Traditional nature management zone (terut sirder, ethnic territories) — area of full forbiddance of industrial development, forbiddance of traffic outside public roads, permission of natural resources utilization in forms assuring protection and reservation of natural complexes and of native habitats of indigenous peoples and preservation of their traditional way of life. Passage of traffic is allowed only when warranted (a tourist voucher, drive permission) for entrance to the Park territory with clear reference to a particular kind of transport vehicle and its license plate number.

The zone is divided into the following parts:

"Taryng Iuriue – Buotama Rivers" is situated in the watershed of the Lena and Buotama

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rivers from the Taryng Yuriakh River northeastward to the Buotama River, excluding the territories of nature reserves, active and restricted recreational zones. The total area is 286,252.05 hectares including, according to the Decree of the Ulus Administration of Khangalasskii ulus of March 03, 1998 No.161, summer encampments (saiylyks) and a hydrological post.

"Siniaia River" is situated in the Siniaia river basin, excluding the territories of active and restricted recreational zones (85,905 hectares).

5.1.6. Zone of artificial keeping and breeding of rare and extinct animal species. The zone is intended for compensation of number of species peculiar to the given established natural community. The territory of the bison farm in the Buotama river mouth is 4 hectares.

5.1.7. Protected historical or archaeological zone is represented by historical and archaeological monuments and paleontological objects located in the Nature Park territory.

5.2. Within the territory of the Nature Park, with the exceptions envisaged in the present Statute of the Nature Park and compliant with the acting nature conservation legislation of the Russian Federation and Sakha Republic (Yakutia) forbidden are the following:

5.2.1. Activities altering the hydrological regime of surface and underground water.

5.2.2. Construction and placement of industrial objects, high-voltage transmission lines, trunk pipelines, motor roads, and other communications excluding those necessary for maintenance of the Nature Park.

5.2.3. Survey work and mineral resources development, all kinds of soil, vegetation, mineral prospect, and rock exposure disturbances, ploughing, blasting operations.

5.2.4. Traffic and parking of machine vehicles outside the roads and waterways of general use and outside specified places, timber rafting on watercourses and basins, cattle driving.

5.2.5. Unauthorized residence of persons not concerned by their official duties with keeping and development of traditional nature management and the Nature Park activities.

5.2.6. Hunting, fishery, extermination and catching of wild animals and birds, with the exceptions envisaged in the present Statute of the Nature Park and other statutory acts of the Russian Federation and Sakha Republic (Yakutia).

5.2.7. Destruction of burrows, nests, and other covers and shelters of wild animals as well as all kinds of alterations in animal habitats.

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5.2.8. Introduction of plants and animals alien to local flora and fauna as well as measures favoring increase in population strength of some animal species over natural land capacity.

5.2.9. Major harvesting, medicinal and industrial plant collecting as well as other kinds of forest exploitation with the exceptions envisaged in the present Statute of the Nature Park.

5.2.10. Employment of chemicals as fertilizers, chemical weed and pest killers, and animal population controllers.

5.3. Within reserved, sacred, and restricted recreational zones are forbidden:

5.3.1. Airplane and helicopter flights below 500 meters above land and water level (excluding forest management duties), breaking sonic barrier by machine vehicles as well as other kinds of noise nuisance over stated norms.

5.3.2. Leasing land, water, and other natural resources.

5.3.3. Collection of zoological, botanical, and mineralogical samples except those envisaged in research programs within the territory of the Nature Park.

5.3.4. Other kinds of activities entailing deterioration of environmental, scientific, cultural, recreational, and economical significance of the territory of the Nature Park are prohibited.

5.4. The territory (water area) of the Nature Park can host:

5.4.1. Actions on preservation and prevention of alterations in natural complexes resulting from anthropogenic impacts.

5.4.2. Necessary veterinary measures aimed at elimination of extremely dangerous diseases common for man and animals.

5.4.3. Rehabilitation measures in the areas affected by natural disasters or disturbed by human activities.

5.5. The usage of the territory of the Nature Park can be allowed for:

5.5.1. Within the reserved zone:

scientific research;

fire prevention, sanitary, and epidemiologic surveillance of necessity;

in exceptional cases, rehabilitation measures in the areas affected by natural disasters or disturbed by human activities as well as measures aimed at prevention of alterations in

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natural complexes resulting from economical activity in adjacent territories;

collection and other samples necessary for fulfillment of scheduled research works;

traffic and parking within the road/footpath network of allowed vehicles servicing the Nature Park officials while on official duty.

5.5.2. Within the restricted recreational zone:

actions allowed within the reserved zone;

construction of objects necessary for excursion and tourism services for visitors, rest of the local inhabitants;

road/footpath network formation and improvement;

sanitary measures of necessity to improve aesthetic value of landscapes, to facilitate availability and vision of the monuments and of animate and inanimate nature objects;

tourist services for visitors, movement and stops of tourist groups and individual visitors along established routes in accordance with calculated recreational load;

traffic and parking within the road/foot-path network of allowed vehicles servicing the Nature Park officials while on official duty;

licensed shooting (catching) animals and licensed fishing in quota limits, strictly limited plant harvesting.

5.5.3. Within the active recreational zone:

actions allowed within the restricted recreational zone;

excursion services and popular rest, stops and movement of tourist groups along the road/foot-path network in accordance with calculated recreational load;

traffic and parking within the road/foot-path network of the vehicles belonging to local inhabitants in case their actions comply with goals and tasks of the Nature Park;

amateur hunting and fishing (chargeable) in agreement with the directorate of the Nature Park and licensed by authorized state organs in compliance with the acting Hunting and Fishing Rules, with allowed hunting and fishing gear, in scheduled periods, of fauna objects besides those protected within the territory of the Nature Park.

5.5.4. Within the traditional nature management zone:

all actions allowed within the active recreational zone;

transit, along established routes, of the workers of tribal communities, collective farms,

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other land users passing to their proper land areas;

construction, repair, and functioning of production, technical, and commercial objects of tribal communities, collective farms;

traditional economical activities (hunting, fishing, reindeer breeding, horse breeding, cattle breeding, mowing, wild berries and mushrooms gathering) by permanent land users and proprietors within the vested territories.

5.6. In some areas of the Nature Park later used as agricultural lands, can be allowed, in agreement with the administration of the Nature Park:

5.6.1. Subsidiary farming for sustenance of the Nature Park personnel and their relatives.

5.6.2. Pasturing cattle belonging to the Nature Park and its employees including retired, with the uninterrupted length of service in the Nature Park of 5 (five) years. Pasturing cattle by workers and retired employees of the Nature Park residing in its territory is allowed in agreement with the trade-union committee and administration of the Nature Park. Other citizens are allowed to pasture cattle only in case of their permanent residence in the territory of the Nature Park. Pasturing cattle is allowed only under permanent control of cattle owners and in the presence of an authorized herdsman. Cattle owners are fully responsible for injury to vegetation outside proper pasturing places.

5.6.3. Granting, in conformity with the Land Code of the Russian Federation, other laws of the Russian Federation, laws of Sakha Republic (Yakutia), and other statutory acts, employees of the Nature Park including retired but residing in its territory, with plots of arable land and hay lands.

5.6.4. Fuelwood storing by improvement felling to supply the needs of the Nature Park and its permanent residents.

5.6.5. Mushrooms, nuts, and berries gathering by the Nature Park employees and its permanent inhabitants for their personal needs (without power of sale).

5.6.6. Amateur fishing by the Nature Park employees and its permanent inhabitants for their personal needs (without power of sale) with allowed gear and in scheduled periods.

5.7. Animal shooting and catching within the territory of the Nature Park is permitted exclusively by the Ministry for Nature Protection of Sakha Republic (Yakutia).

5.8. Residence within the territory of the Nature Park of citizens and officers not belonging to the staff of the Nature Park and the Ministry for Nature Protection of Sakha Republic (Yakutia) is permitted exclusively by the directorate of the Nature Park.

5.9. Particular features of zoning and regime of the Nature Park are determined by the

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present Statute and can be changed in agreement of Ministry for Nature Protection and the Ministry for Privity of Sakha Republic (Yakutia).

5.10. The Nature Park territory is marked by information and caution signs.

6. Organization of Security IN the Nature Park

6.1. Security of the Nature Park is provided by special inspection responsible for protection of the territory of the Nature Park fully qualified as state control in the sphere of nature protection of specially protected nature territories.

6.2. Law-enforcement agencies and local inhabitants as voluntary nature conservation controllers can be drawn to protection of the Nature Park.

6.3. Special inspection is in the staff of the Nature Park, its list of members approved by the director of the Nature Park.

6.4. Rights of inspectors protecting the Nature Park are regulated by the acting legislation in the sphere of specially protected nature territories.

7. Responsibility for Violating Regime of the Nature Park

7.1. Violation of the established regime or other rules of utilization and protection of the Nature Park implies legal liability as stated by the laws of the Russian Federation and of Sakha Republic (Yakutia).

7.2. Damages caused to natural objects and complexes within the borders of the Nature Park are liable to indemnity in accordance with legally stated computational procedures of reimbursement definition and in the absence of the latter, at the rate of actual expenses for compensation.

8. activity arrangement

8.1. Scientific research of the Nature Park is aimed at elaboration and application of scientific methods of preserving biological diversity, natural and historical cultural complexes and objects in the context of recreational and economical utilization, long-term monitoring over natural processes dynamics, evaluation and forecast of environmental situation in the region, reproduction and resources conservation.

8.2. Scientific research in the Nature Park is carried out by:

8.2.1. Members of staff of scientific sections and laboratories of the Nature Park in accordance with research plans approved by Scientific and Technical Councils of the Nature Parks.

8.2.2. Scientific institutions and institutes of higher education of respective specialities on a contractual basis in the framework of programs common with the Nature Park and agreed with the Ministry for Nature Protection of Sakha Republic (Yakutia).

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8.3. To carry out scientific research in the area of Nature Protection within the borders of the Nature Park, a biological station or other research department can be formed, the research area of the latter being approved by the directorate of the Nature Park.

8.4. Plans of bioengineering, revegetation, restoration, and forestry works as well as measures to regulate population size of wild animals within the territory of the Nature Park are obligatorily considered at the meetings of the Scientific and Technical Council.

8.5. Economic activity of the Nature Park is aimed at providing for proper protection of natural and historical cultural objects, taking measures on their maintenance and restoration as well as organizing tourism and recreation in natural environment, preservation and revival of extensive forms of traditional nature management.

8.6. The Nature Park is independent in its economic (entrepreneurial) activity in the limits stated by the legislation of the Russian Federation and Sakha Republic (Yakutia) as well as by the present Statute.

8.7. The relations of the Nature Park with other enterprises, institutions, and organizations in all the spheres of economic activity are on a contractual basis. In its activity the Nature Park takes account of the public needs, ensures quality of its products, work, and services.

8.8. The Nature Park can act as a founder and participate in activities of funds, associations, and other organizations promoting development of the specially protected nature territories in agreement with the Ministry for Privity of Sakha Republic (Yakutia).

8.9. Development of controlled tourism and rest in natural environment is carried out by the directorate of the Nature Park as well as other legal entities and individuals as users due to licenses and civil contracts.

8.10. Construction and exploitation of hotels, camping sites, holiday camps, public catering establishments, and other tourist service objects, provision of services for public recreation, cultural and general services are carried out by concerned state, public, and private institutions on conditions stated by contracts with the directorate of the Nature Park.

8.11. In case of absence of legal entities interested in construction and exploitation of tourist and recreation objects, the Nature Park can independently carry out such works at the expense of its budgetary funds, incomes of tourist service objects use accounted in the estimate of expenditure of the Nature Park.

8.12. Hunting activities within the territory of the Nature Park is carried out by the Nature Park through contractual granting hunting grounds to other hunting subjects on the basis of long-term contracts.

8.13. Formation of subsidiary farms, hotels, fish hatcheries, animal nurseries, hotels, tourism (including scientific) development and servicing, wild plants gathering, ama-

teur fishery on payment basis, other economical activities of the Nature Park are permitted in legal order after their examination and positive decision made by the Scientific and Technical Council of the Nature Park.

8.14. Any kind of activity within the territory of the Nature Park is permitted exclusively by the positive decision by the Scientific and Technical Council and the permission acquired by the director from the Ministry for Nature Protection of Sakha Republic (Yakutia).

9. Remuneration of labor in the Nature Park

9.1. Payments and working conditions of the staff of the Nature Park are governed by the acting labor legislation of the Russian Federation and Sakha Republic (Yakutia).

11. liquidation and reorganization of the Nature Park

11.1. Termination of the Nature Park activities can be carried out exclusively in the form of its liquidation or reorganization.

11.2. Liquidation or reorganization of the Nature Park is carried out in order established by law and by the decision of supreme body of state power of Sakha Republic (Yakutia) in agreement with the Ministry of Nature Protection of Sakha Republic (Yakutia).

11.3. The enterprise to forfeits the rights of legal entity and is considered nonexistent since its exclusion from the state registry.

11.4. At liquidation or reorganization of the enterprise the discharged employees are guaranteed observance of their rights and interests in compliance with the acting legislation.

11.5. The property of the liquidated Nature Park, after settlements made in established order with the budget, lenders, and the enterprise employees is given to the Ministry for Privity of Sakha Republic (Yakutia).

ANNEX B6

Government of Republic of Sakha (Yakutia)

REGULATION

On "Lena Pillars" National Park boundaries statement

In accordance with Federal Law №33-FZ, dated 14 of March 1995, "On specially protected natural areas", Republic of Sakha (Yakutia) Law №213-III, dated 25 of December 2003, 105-Z "On specially protected natural areas of Republic of Sakha (Yakutia)", Executive Order of Republic of Sakha (Yakutia) President №362-RP, dated 24 of August 2009, "On organizational management of "Lena Pillars" National Park document preparation", Government of Republic of Sakha (Yakutia)

render a decision:

1. To confirm "Lena Pillars" National Park boundaries in accordance with boundaries description (Annex).

2. To Ministry of Nature Conservation of Republic of Sakha (Yakutia) (A.V. Grigoriev): to develop and to confirm a Regulation on "Lena Pillars" National Park.

3. To Ministry of Property Relations of Republic of Sakha (Yakutia) (V.P. Efimov) jointly with Ministry of Nature Conservation of Republic of Sakha (Yakutia) (A.V. Grigoriev): to amend an Articles of Agreement of "Lena Pillars" National Park" Public Agency.

4. To Ministry of Finance of Republic of Sakha (Yakutia) (V.A. Novikov): to foresee funding for maintain an additional staff of inspectors and building of additional cordons.

5. To GU "Department of Biological Resources of Ministry of Nature Conservation of Republic of Sakha (Yakutia) (Y.S. Sivtsev): to complete a map of land development sites situated within the lands of State Forestry Fund, SPAs and objects, with entries on State Register of Real Property.

6. To publish current Regulation in mass media.

7. To saddle Stepanov A.I., the Deputy of Government Chairman of Republic of Sakha (Yakutia), with the responsibility of execution control of current Regulation.

Chairman of Republic of Sakha (Yakutia) Government **G.I. Danchikova**

ANNEX B7

Annex
to the Government of Republic of
Sakha (Yakutia) Regulation
from «___» _____ 2010 г.
№ _____

BOUNDARY DESCRIPTION OF THE LENA PILLARS NATURE PARK

The boundary description realized after the topographic map of 1952, scale 1:100 000. The territory of the Lena Pillars Nature Park includes two isolated clusters “Pillars” and “Sinsky”. Total square of the park equals to 1 353 120 ha.

1. Pillars cluster (1 272 150 ha)
Northern boundary of the Park starts in Taryng-Yuryah River mouth, right tributary of Lena River, then it goes along Lena River coastline downstream to Buotama River mouth and then to Kachikatskaya branch (south-west of Ary-Basa Island). From here boundary goes downstream the Kachikatskaya branch to its crossing point with nameless branch.

Eastern boundary starts from crossing point of Kachikatskaya branch and nameless branch, goes in south-east direction, passes westward of 263 m point. Then boundary goes southward, passes through 276 m point and comes to Lena and Amga rivers watershed in upper reaches of Lyutenge River, left tributary of Amga River.

Southern boundary goes in west-south-west direction along Lena and Amga rivers watershed till source of Bes-Yuryah River, right tributary of Boutama River.

Western boundary starts from source of Bes-Yuryah River, goes down to Buotama River along left valley side Bes-Yuryah Rivert, passes Buotama in the mouth of Bes-Yuryah and goes along Harynyaloh River, the left tributary of Buotama River, till its sources. Then boundary crosses watershed of Lena and Buotama, goes to the source of Taryng-Yuryah River and goes down along it till the mouth, i.e. primary point of description.

2. Sinsky cluster (80 970 ha)
The boundary of Sinsky cluster starts from the mouth of Billyah River and goes up the stream of Billyah River to its crossing point with administrative boundary of Hangalassky and Gorny ulus.

Northern boundary goes on the administrative boundary of Hangalassky and Gorny ulus to the crossing point of Hatyn River, then boundary goes on Hatyn River to its crossing point with tractor road. Then its goes on tractor road through the source of Haiyrgas and Bete Rivers to the crossing point of Sinyaya River, then on Sinyaya River to primary point of description.

ANNEX B8

PRESIDENT OF THE SAKHA (YAKUTIA) REPUBLIC
677022, 11 Kirova Str., Yakutsk
To Minister of Foreign Affairs of Russian Federation, Lavrov S.V.
22.12.2010

Dear Sergey Viktorovich,

Let me apply to you regarding the nomination of the Lena Pillars Nature Park into the UNESCO World Heritage List.

During the 33rd Session of the UNESCO World Heritage Committee in Seville, according to the recommendations of Russian Federation Ministry of Natural Resources, the nomination was recalled.

During the recent period, the Lena Pillars Nature Park nomination was improved with regard to the notes of the International Union for Conservation of Nature and Natural Resources (IUCN).

In accordance with expert report of prof. Paul Williams, prepared in followup with visit of the Park in September 2009, we plan to introduce the improved Lena Pillars Nature Park nomination for consideration by the 35th Session of the World Heritage Committee.

In this regard, we direct you the Lena Pillars Nature Park nomination project for your approval.

I take the opportunity and express my sincere appreciation for your invaluable help and support in promoting of this project.

Faithfully, E. Borisov

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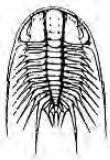

Institute for Cambrian Studies

A nonprofit organization dedicated to international research in the earth sciences

April 2, 2007

Dr. Petr N. Kolosov
Institute of Geology
39 Lenina Str.
Yakutsk, Republic of Sakha (Yakutia)
677980 Russian Federation

Dear Dr. Kolosov:

This letter is in strong support for designation of the Pillars of the Lena as a World Heritage Site. I have had the privilege twice to visit that area on geological field trips in 1976 and 1990. It is a truly spectacular area. From the actual pillars downstream for many kilometers, dramatic exposures of Cambrian rocks in the river bluffs record some of the richest records of the earliest shell-bearing organisms on Earth. All of these exposures can be examined from any shallow-draft boat and are easily accessible. This is the only area on the planet that can be reached easily in which such an extensive development of nearly undisturbed, richly fossiliferous marine rocks of Early Cambrian age is exposed. The stratigraphic and paleontologic details are already well known from the classical publications of Khomentovskiy and Repina (1965) and later authors. The exposures also include some of the earliest reefs known on Earth.

My personal memories of the dramatic dolomite pillars rising from the forested shores of the Lena River left me with the thought that these pillars became part of the mythological lore of the early migrating peoples whose descendants crossed the Bering land bridge to inhabit the western coast of Canada and northwestern United States. In the absence of the pillars, and ancient stories about their images, they perhaps were inspired to create totem poles.

Thus, I am happy to recommend to Mr. Matsuuro that the Pillars of the Lena, already included in the Global Indicative List of Geological Sites by the International Union of Geological Sciences, be designated as a World Heritage Site

Sincerely,

Dr. Allison R. Palmer
President, Institute for Cambrian Studies

ANNEX B9.1

H.E. Mrs. Mai Bint Muhammad Al Khalifa
The World Heritage Centre, 7, place de Fontenoy
F - 75352 Paris 07 SP, France

Matter: Lena Pillars National Park

Dear Mrs. Mai Bint Muhammad Al Khalifa,

I was informed that the National Park Lena Pillars (Siberia) have been proposed to be listed on the UNESCO List of World Natural Heritage. I went through the published material and consulted some of my colleagues regarding this natural phenomenon. Being a karstologist by profession and also an active member of Cave and Karst Task Force of IUCN I am very glad, that the National Park Lena Pillars is proposed to be on the UNESCO List and I fully support the eventual inscription.

The Pillars are extraordinary geomorphic and karst features; there are very few examples in the World to compete with them. Not only their location in the high latitudes where special climatic and environmental conditions (extreme continental climate, permafrost) occur but also the processes of their formation and actual transformation are not common or better, they are unique, not mentioning the prevailing karst processes.

By my opinion the Lena Pillars fully correspond to the UNESCO Natural Criteria VII – IX. It has to be emphasized that this is very well preserved natural environment with an unimportant human impact. I am sure that the inscription on the World Heritage List is the best guarantee for the safeguarding and preservation of such an important natural phenomenon.

Acad. Prof. Dr. Andrej Kranjc

Secretary-General of the Slovenian Academy of Sciences and Arts
Member of the Slovenian Commission for the UNESCO

Ljubljana, December 1, 2010

ANNEX B10

ANSWERS TO QUESTIONS IN THE IUCN FOSSIL SITE EVALUATION CHECKLIST

1. Does the site provide fossils which cover an extended period of geological time: i.e. how wide is the geological window?

The Lena Pillars Nature Park is marked by a high diversity of animal genera comprising about 350 which is about one sixth part of the entire early Cambrian generic diversity. Many of them were first established from the outcrops the Park. These fossils continuously cover an extended interval of geological time of about 35 m.y. (542-506 Ma). This geological window is one of the most important in the Earth's life evolution representing the so-called Cambrian Explosion from the first appearance of the many major groups of skeletal animals and algae until their first mass extinction and the beginning of the following recovery interval.

2. Does the site provide specimens of a limited number of species or whole biotic assemblages: i.e. how rich is the species diversity?

The are provide a number of whole fossil biotic assemblages, both reefal and deep-water ones, preserved well enough to study such features of palaeocommunities the significance of alpha-, beta, and gamma-diversities; hub-species and their influence on the community structure; interspecific and intraspecific interactions; ecological successions; trophic webs; tiering, and many others with a high precision.
The entire fossil species diversity is over 500 species (see Annex C).

3. How unique is the site in yielding fossil specimens for that particular period of geological time: i.e. would this be the "type locality" for study or are there similar areas that are alternatives?

The site is entirely unique because here only the complete early to middle Cambrian record is represented by continuous carbonate succession bearing rich fossils. The Oy-Muran and other reefs are especially important because they represent the earliest record of metazoan reefs in the world. The establishing of metazoan reef ecosystem delayed in other regions for about 10 m.y. and this was the territory of modern southern Yakutia where principal Cambrian reefal groups of animals were originated.

4. Are there comparable sites elsewhere that contribute to the understanding of the total "story" of that point in time/space: i.e. is a single site nomination sufficient or should a serial nomination be considered?

Although there are a number of important Cambrian sites in the world, the Lena Pillars Nature Park only contributes fully to the understanding of the total story of the Cambrian skeletal explosion especially in reefal facies (see paragraph 3c).

5. Is the site the only main location where major scientific advances were (or are) being made that have made a substantial contribution to the understanding of life on Earth?

On the Lena Pillars, leading geochemists and geophysicists developed the most detailed records of the palaeomagnetic and stable isotope shifts. A combination of fossil and isotope records allowed researchers to establish here the fist mass-extinction events in the Earth history which are known as the Sinsk and Toyonian. It had been shown that these events were the pivotal points in animal evolution comparable with the well-known Permo-Triassic extinction event. In turn, a combination of fossil record with precise mineralogical data let scientists to analyse palaeoclimate changings on the eve of the first Greenhouse Epoch because only here it is possible to use in concert a representative enough (for statistics) data on faunal diversification, reliable data on carbon and strontium isotopes, and understandable data on diverse carbonate mineralogy. These studies brought out a new concept of the global climate trend showing a general cooling during the last 540 million years.

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Excellent preservation, high diversity, and multiple localities of reefal fauna in the Lena Columns provide a firm basis for detailed palaeoecological and population dynamics' studies which are comparable in precision with studies of modern reefs only. However, if modern reefs represent a single time slice only, the Lena Columns represent over 20 such time slices which let researches an understanding of a real evolutionary processes from its very beginning which shaped the communities of organisms if they were a co-evolved entities or simply occasional sets of co-existing species.

6. What are the prospects for ongoing discoveries at the site?

The site provides a large area for further discoveries of fossil soft-bodied organisms, larvae, and embryos of an extraordinary preservation. Additionally, each new expedition brings out new skeletal fossils and large amount of data on sedimentology, geochemistry, and other disciplines. Multiple time-slice analysis of reefal palaeocommunities will provide further large data sets for challenging of major current evolutionary and ecological paradigms.

7. How international is the level of interest in the site?

On the Lena Pillars, international teams of leading palaeontologists, sedimentologists, geochemists, and geophysicists worked since the beginning of 1970-es which is expressed in a large number of seminal books and papers (see List of References, Cambrian).

8. Are there other features of natural value (e.g. scenery, landform, and vegetation) associated with the site: i.e. does there exist within the adjacent area modern geological or biological processes that relate to the fossil resource?

The considerable Cambrian phenomena are combined here with remarkable geomorphological features (frozen ground karst, fossil sandy dunes—tukulans, and exceptional Yakutian thermokarst phenomena—alases), unique permafrost soils, some recent endemic plants and relic Neopleistocene steppes, Neolithic rock paintings and sacral sites, and amazing picturesque landscapes to create a really outstanding nature monument of a universal value.

9. What is the state of preservation of specimens yielded from the site?

Here complete and intact species of extraordinary preservation (with soft-tissues having been preserved) were described. These fossils represent so-called Sinsk Biota which contains a number of unique species for the understanding of relationships of major animal phyla. The Sinsk soft-bodied biota is the only one which is preserved in carbonate rocks, soft tissue structure and even cell structure and embryos are described here due to a unique state of phosphatization.
In turn, the skeletal fauna is extremely well preserved allowing scientist to study their morphology, mineralogy, microstructure, geochemical and isotope composition with a high resolution.

10. Do the fossils yielded provide an understanding of the conservation status of contemporary taxa and/or communities: i.e. how relevant is the site in documenting the consequences to modern biota of gradual change through time?

The extinction of the earliest metazoan reefal biota was directly relied upon the pCO_2 rise and the following commence of the first Phanerozoic Greenhouse Epoch. The fate of the modern reefs, which are built by organisms using the same skeletal mineralogies as their early Cambrian predecessors, is, thus, predictable by comparison with the early to middle Cambrian succession of biotic and abiotic events and their interplay recorded in the Lena Pillars.

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«APPROVED»

Acting Director, the Russian
Nature Surveillance Inspectorate
for Sakha Republic (Yakutia)
_____ Semenov V.R.

January ___ , 2008

MEDIUM TERM MANAGEMENT PLAN FOR THE PERIOD OF 2008-2012

Pokrovsk 2008

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INTRODUCTION

The medium term management plan of the "Lena Pillars" Nature Park has been developed in accordance with the Regulations of the development, coordination, and approval of the documents on planning the activities of the state nature reserves and national parks, and the Recommendations for the development of medium term management plans of the state nature reserves and national parks approved by the Order of the Federal Nature Management Surveillance Service of December 3, 2007 No.491.

The prospective working plan of the "Lena Pillars" Nature Park is based on the Program of Development of Specially Protected Nature Territories Activities of the Ministry for Nature Protection of Sakha Republic (Yakutia) and takes into account the primary goal and tasks set for the Park in the period of its creation.

The medium term plan includes the works on nature protection, scientific researches, environmental education, and recreation activities of the "Lena Pillars" Nature Park as well as the definition of sources of financing the planned works at the expense of the federal budget funds, the Park income from its business and other yielding interest activity as well as other attracted financial sources.

The Plan provides for the prospects of the Park activities along all directions: preservation of the natural complexes and objects, development of environmental educational tourism, protection of the territory of the Park, cooperation with other institutions and collaborative participation in the nature protection, environmental educational, tourist, and other activities positively influencing the Park work. In its turn, the prospective Plan accounts for the annual plans of the Park work for the certain period in the immediate future.

The "«Lena Pillars»" Nature Park is located in the Central Yakutia within the limits of Khangalsskii and Olekminskii uluses (districts). Territory of «Lena Pillars»" Nature Park consists of two isolated parts: Lena-Buotamskii and Sinskii. To protect natural complexes of the Park from unfavorable influence of anthropogenic activities in areas near the Nature Park, the protected zone of limited wildlife management was created.

The total area of the Park is 485,022 hectares. The territory of the Nature Park is located on the land granted to it on the terms of a usufructary right, including the territories of tribal Evenk communities. All matters of the Nature Park activity are regulated by "The Statute of the State Enterprise 'Lena Pillars' Nature Park (Aan Aiylgy) of the Sakha Republic (Yakutia)" approved by the Ministry for Privity of Sakha Republic (Yakutia) in coordination with the Ministry for Nature Protection of Sakha Republic (Yakutia). In July 2006, the "Lena Pillars" Nature Park was approved in the Preliminary List of the Russian Federation to enter the List of the World Cultural and Natural Heritage of UNESCO.

The primary goals of the Nature Park are the following:

- Maintenance of the natural conditions of protected natural complexes and preservation of their biological variety peculiar for the natural zone of the Lena River midstream.
- Revival and development of traditional forms of the local population economy.

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- Preservation of model and unique natural complexes and objects, monuments of nature, history, and culture, other objects of cultural heritage.
- Creation of conditions for the organized tourism and recreation, acquaintance with the nature of the Park, cultural, historical, and natural monuments in the territory of the Nature Park.
- Environmental monitoring.
- Scientific research in compliance with the nature protection legislation of the Russian Federation and Sakha Republic (Yakutia).
- Restoration of disturbed natural, historical, and cultural complexes by means of the funds assigned from the Republic budget or other financing (sponsorship, contributions of nature protection organizations).
- Arrangement of the environmental education of the public.

The means obtained by the Nature Park for visiting and exploitation of natural resources in its territory, servicing visitors, sponsorship, grants and voluntary donations of the Russian and foreign legal entities, public organizations and funds, as well as individuals, are used to improve the work of internal structures of the Nature Park.

Goals and tasks of the management plan

The purpose of the present management plan is the optimization of the management system and definition of prospects of the further development providing steady functioning of the specially protected territory of the "Lena Pillars" Nature Park in view of preservation of biological and landscape diversity. The management plan of the "Lena Pillars" Nature Park solves the following problems:

- Maintenance of reliable protection of natural complexes and objects in the territory of the Park.
- Control over limited economic activities and wildlife management within the territory of the Nature Park and its protected zone.
- Evaluation of actual expenses and sources of financing.
- Coordination of scientific research with nature protection activity.
- Development of environmental education at local and regional levels.
- Improvement of cooperation of the Nature Park with governmental bodies, local self-government, scientific and nature protection institutions.
- Reception of wide public support at local, regional and federal levels.
- Optimization of structure and personnel, professional development of its employees.
- Preservation of historical and cultural heritage.
- Integration of the Park into the social and economic structure of the region.
- Creation of conditions for environmental tourism development.

Information on the Period of Preparation and Developers Team of the Management Plan

The present management plan has been created for six months by common efforts of the Park employees led by Director Kipriianova Liubov' Danilovna, the permanent Honored Ecologist of Russian Federation.

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The creative team includes:

- Rozhin Valerii Ivanovich — a senior state inspector of the "Lena Pillars" Nature Park, graduate from Irkutsk Agricultural Institute, biologist, forest warden;
- Protod'iakonova Maiia Sergeevna — a methodologist of the "Lena Pillars" Nature Park, graduate from Moscow University of Design, programmer-designer;
- Fedorova Anastasiia Vasil'evna — an expert of the Department of Environmental Education of the "Lena Pillars" Nature Park, graduate from Yakut State University, philologist, translator.

Scientific councilors: N. G. Solomonov, DBS, Academician of the Russian Academy of Sciences, professor, I. M. Okhlopkov, CBS, scientific secretary, the Institute of Biological Problems of Permafrost Zone, Siberian Branch of the Russian Academy of Sciences, A. A. Kugaevskii, director, Yakutsk branch (division) of the Council of Productive Forces Studies, the Ministry of Economic Development of the Russian Federation and the Russian Academy of Sciences.

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1. THE TERRITORY ARRANGEMENT PLAN

1.1. The structure of land tenure

The typical and unique nature of natural, historical, and cultural complexes is the most significant criterion that defines the territorial arrangement of the Nature Park.

Situational plan (see Nomination. Appendix: Maps).

The main levels of territorial management of the Park are borders of Park and its security zone, functional zoning of territory, system of tourist routes and patrolling. The mechanism of the management of the territory development is defined by its functional zoning.

The functional zoning, that is distribution of the equipment in territories by various regimes of protection and utilization held by the West Siberian Designing and Prospecting Expedition of Glavokhota of the Russian Federation in 1991-1992.

Functional zoning scheme (see Nomination. Appendix: Maps).

Seven functional zones are isolated in the territory of the Park.

In the territory of the Nature Park different regimes of protection and natural resources utilization operate, considering local natural, historical, cultural, and social features.

According to the current nature protection legislation the following zones are located in the Nature Park:

The preservation zone — places where all kinds of economic and recreational activity are forbidden, except for transit, travel of the organized groups of tourists, local citizens and members of the Evenk tribal communities that have the sanction for crossing of the reserved territory on road-route network of recreational purpose and places of organized tourism. The territory has total area of 71765 hectares and is located on the right bank of the Lena River.

The sacred place — serves for performing traditional national rituals. It is located in the Labydya River mouth, in the zone of active recreational activity, between the preservation zone sites.

The zone of limited recreational activity — visiting of strictly regulated number of people is authorized. Total area is 12657.5 hectares.

The zone of active recreational activity — places of tourism for environmental education and acquaintance with the sights of the Nature Park, as well as for recreation. Total area is 1368 hectares.

The zone of traditional management *(ethnic territories)* — places where industrial development is forbidden, travel of all kinds of vehicles outside roads of general purpose is forbidden, utilization of natural resources in the forms providing protection and safety

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of natural complexes and original habitat of indigenous peoples and preservation of their traditional way of life is supposed. Transit of vehicles is permitted only if approved (tourist permit, sanction for transit) with the right of visiting the Park, with the indication of the type of a transport facility and its state registration number.

Zone of artificial maintenance and cultivation of rare and endangered kinds of animals.

— intended for recovery of various species peculiar to the given settled natural complex. Territory of the bison farm in the Buotama River mouth is four hectares.

The protected historical or archeological zone — represented by monuments of history of both archaeological and paleontological objects located in the territory of the Nature Park.

With the aim of protecting natural complexes of the Nature Park from anthropogenic influence and in conformity with the Federal Law "On Specially Protected Natural Territories", the protected zone with the limited rules of nature management is separated.

Land areas of State Forest Fund of the Khangalasskii, Aldansii, and Olyokminskii uluses with the area of 8681.2 sq.km are the part of the protected zone.

There is no farming industry in the security zone; sable hunting is conducted under the license of the "Sakhabult" concern.

The major positive feature is that the lands are arranged within "«Lena Pillars»" Nature Park, so that the absence of other land users promotes operative and efficient control over the territory of the Park.

Activity scheme (see Nomination. Appendix: Maps)

Arrangement of "Lena Pillars" Nature Park lands

No. **Category of land tenure**		**Area**	
		(hectare)	**%**
1	Protected areas	429 629	88,58
2	Area of settlements	1,6	0,003
3	"Brolog" Hydrostation	2,4	0,005
4	Others	55 389	11,412
5	Total area	485 022	100

Agricultural works are not conducted in territory of the Park, area that belongs to saiylyk facilities belongs to settlements, and 2.9 hectares belong to "Brolog" hydrostation.

The "Sakhabult" concern relates to managing subjects of the Park, as it manages sable hunting by the hunters licensed and contracted with the Park.

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The agricultural production in the territory of the Park includes herd horse breeding. The "Kachikatsky" enterprise breeds 5-6 herds in the territory of the Park.

Reacclimatization of wood bisons is a young branch of economy. In 2006 thirty wood bisons were brought to the Buotama River mouth from Canada, now there are 27 of them left.

1.2. Information on the protected zone

The borders of the protected (buffer) zone of the "Lena Pillars" Nature Park.

The northern border of the protected zone starts between the Lena and Buotama rivers, a watershed dividing sources of the Taryng Iuriakh (the right tributary of the Lena River) and the Kharylakh (the left tributary of the Buotama River) rivers, passing to source of Delberge stream, coinciding with administrative border between Khangalasskii and Olekminskii uluses. Then it goes southward, down Delberge stream up to its mouth, then downward along Buotama River up to the point opposite to Oddokun stream source, then turns northeast and to Atyrgakh-Hatyn streams sources, Borohu and further to the Oddokun stream, to the Diring Iuriakh and Buotama rivers watershed, then to Lena River right coast down to the point limited in the west by the basic place of "«Lena Pillars»" Nature Park and in the east by Amur-Yakut highway. The southern border of the protected zone passes along axial line of Amga water-separate ridge, further along the administrative border between Aldanskii and Olekminskii uluses, reaching Bes-Iuryakh stream source, up to its mouth, downward along Buotama River, to Kharyialah stream mouth and then up to its source.

The protected zone is located in the territories of the Khangalasskii and Olekminskii uluses occupying the area of 868.12 thousand hectares.

The protected zone of the Park has been created with the purposes of:
1. Preservation (restoration) of natural complexes and their components in places of traditional residence of indigenous peoples of the North;
2. Protection of natural complexes of the Nature Park from effects of economic activity in adjacent territories;
3. Restoration and development of traditional forms of wildlife management, way of life, culture, and recreation of indigenous peoples of the North;
4. Organization of constant observation over conditions of the natural complexes under influence of economic activities and recreational use of territory;
5. Maintenance of full employment and social security of indigenous peoples of the North.

In the territory of its security zone the Nature Park has to:
1. Regularly take security and other measures aimed at preserving (restoring) the natural complexes and their separate components, as well as at increase of land productivity.
2. Promote development of traditional methods of utilization of natural resources of environmental and aesthetic value;
3. Promote organization of consumer goods production, tourism and recreation of the population;
4. Carry out control over compliance with prescribed norms and rules at conducting economic activities by the major land users and tenants;

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5. Promote fire-prevention, sanitary and epidemiological actions;

The regime of the protected zone.

The regime of the protected zone is aimed at performance of duties assigned to the Nature Park according to the Park Statute. In the territory of the protected zone, the following activities are forbidden:

1. Travel, transit, and presence of unauthorized outsiders not hired by major land users, persons not having proper sanctions (permissions) to visit the territory with recreational purposes;
2. Usage of all kinds of chemical pesticides;
3. Actions changing the hydrological regime of the territory;
4. Exploration and mining;
5. Felling and crossing, as well as gathering of flowers, destruction of rare and disappearing plants, and burning any vegetation;
6. Travel, Parking of river and motor vehicles, trucks, caterpillar tractors, and other types of vehicles outside road networks during outdoor recreation without special sanctions (permissions) or without industrial necessity;
7. All kinds of unorganized recreation and tourism, stations, campings, Parking, and making fires outside designated places;
8. Contamination of territory with garbage, household and industrial waste;
9. Other activities damaging natural complexes and their components, not specified by the status of the security zone without agreement with the administration of the Nature Park and the tribal community.

In the territory of the protected zone, it is permitted to:

1. Build roads, track pathways, install cables connected with activity of the Nature Park and other land users;
2. Carry out topographic, geodesic and forest arrangement works;
3. Organize tourism and recreation of the population, move organized tourist and excursion groups, send visitors along the established routes accompanied by members of Evenk tribal communities and workers of the Nature Park or without above-mentioned at the presence of special sanction (permission);
4. To manage amateur hunting, fishery, wild berries and mushrooms gathering without the right of realization of production in the established places and terms, at the presence of proper sanction given out by representatives of the state bodies;
5. Introduce plants and animals with the purpose of acclimatization, and to carrying out the actions promoting increase of number of separate kinds of animals up to limits not exceeding admissible capacity of lands;
6. To carry out research by collectives or separate persons on the topics concerning studies of protected biological objects, their habitats, and rational utilization of natural resources;
7. To make other actions not in conflict with the purposes and tasks of the protected zone (Evenk nomadic tribal communities).

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2. ACTIONS PLAN

2.1. Prospects of the "Lena Pillars" Nature Park Development

The long-term working plan is based on the Program of Development of Specially Protected Natural Territories approved by the Ministry for Nature Protection of Sakha Republic (Yakutia), considering the main purpose and tasks put before the Park during its creation.

The plan provides prospects of activity in all spheres: preservation of nature complexes and objects; development of environmental educational tourism; protection of the Park; cooperation with other bodies and teamwork in the sphere of nature protection, environmental educational tourism and other activities, which are favorable for the work of the Park. The long-term plan takes into account annual plans of the Park work for the nearest future.

Now, due to changes in the legislation of the Russian Federation in the field of nature management and activities of nature protection organizations, economic development and solution of social problems of the population near the territory of the Park have undergone significant changes. These changes were directly reflected in scheduling the work of the Nature Park that acts based on cooperation in the interests of all parties in compliance with the federal legislation.

2.1.1 "Preservation of Natural Complexes in Conditions of Developing Tourism Activity"

Program

Purpose: Rational use, restoration and maintenance of the natural complexes and protection of the objects in the territory of the Park.

Primary goals:
- Enhancement of efficiency of state inspection in protection of "«Lena Pillars»" Nature Park territory.
- Control over rational nature management and preservation of a biological diversity within the borders of the Nature Park.
- Legal regulation of nature management matters on the land allocated to users.

Increase of state inspection activity in protection of the territory of the "Lena Pillars" Nature Park

Management goals:
- The improvement of state inspection work in the Park in the sphere of prevention of the nature protection legislation infringements.
- Maintenance of cooperation with ulus municipal bodies of territorial administration, the ulus law-enforcement bodies, bodies of management of forestry and forest protection, education organizations and inspections of nature management of Ministry for Nature Protection of Sakha Republic (Yakutia).

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Measures:

- Modification in the duty regulations of inspection staff in consideration of changes of the federal legislation.
- Staging performances in mass media, giving lectures in educational institutions and for visitors of the Park, as well as attraction of the local population's attention to activities of the Park.
- Attraction of skilled workers of the Ministry of Nature Management of Sakha Republic (Yakutia), Ministry of Home Affairs, Ministry of Emergency and Forestry Management to improve professional skills of inspection staff. Conducting guidance of personnel before going for inspection.
- Certification of inspection staff according to instruction and in terms set by Ministry of Nature Management of Sakha Republic (Yakutia).
- Forming public inspection of the Park by law-abiding local residents who have not infringed the Park rules or the nature protection legislation.
- Creating an electronic database by types of infringements.

Improving material resources of the state inspection of the Park

Measures:

- Improvement of material resources of the security service by financing from Ministry for Nature Protection of Sakha Republic (Yakutia): purchase of service weapons, horses, motor boats; transmission equipment, digital photo and video cameras.
- Forming and equipping cordons in the Park sites.
- Supply of working clothes and uniforms.
- Providing obligatory social insurance.

Expected results:

- Reduction of infringements of nature protection legislation by visitors and locals.
- Higher social security of state inspectors.
- Attraction of the public to nature protection actions in the Park.
- Professional development of inspectors as a result of training courses.
- Conducting an electronic database on patrolling the territory of the Park.
- Possibility of patrolling the territory.

Indicators:

- Expansion of duties assigned to inspectors working in interaction with local population and visitors of Park.
- More reports made by public inspectors.
- Social insurance of state inspectors.
- Equipping staff with uniforms, special security facilities, service weapons.
- Equipment by computers and training of staff.
- New buildings for staff.
- Availability of necessary mechanized and a cartage transport means.
- Decrease in the inspection staff turnover.

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Control over rational nature management and preservation of a biological diversity in the Nature Park.

Management goals:

- Preservation and increase of environmental, recreational, scientific, and cultural value of forest ecosystems.

Measures:

- Forestry measures based on natural inspections, forest monitoring, and purposeful scientific programs.
- Forest protection and fire prevention.
- Purchase of forest protection equipment. Low quality timber processing for the needs of the Park.
- Participation of local population in informing the Park employees of setas of fire.

Projected Activities on Forestry and Forest Restoration in the "Lena Pillars" Nature Park in 2008-2012

Activity	**Measure-ment**	**Volume**	**Year**					**Cost (thousand rubles)**
			2008	2009	2010	2011	2012	
Felling	Hectares	240	40	50	50	50	50	
Other felling	Hectares	40	8	8	8	8	8	
Forest restoration	Hectares	100	20	20	20	20	20	
Sylvula care	Hectares	270	100	70	50	30	20	
Forest regulation	Thousand hectares	485	200	200	85	-	-	

Projected Activity Volumes on Forest Protection and Fire Safety in the "Lena Pillars" Nature Park in 2008-2012

Activity	**Measure-ment**	**Volume**	**Year**					**Cost (thou-sand rubles)**
			2008	2009	2010	2011	2012	
Forest pathology study	Hectares	1500	500	500	300	100	100	
Fire-prevention mineral strips	km	100	20	20	20	20	20	
Strip maintenance	km	200	40	40	40	40	40	
Road repair	km	25	5	5	5	5	5	
Stock purchase	thousand rubles							100,0

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Maintenance of poiums

Measures:
- The regular control of economic activities of cooperative farms of the Evenk tribal economies in the Park.

Expected results:
- Elimination of improper use of assigned land and natural resources.
- Maintenance by land users of water-security zones regulations.
- Preservation and improvement of hunting wealth of land.

Measures:

- Biotechnical actions and registration.

Project of Biotechnical Activity Volumes in the "Lena Pillars" Nature Park in 2008-2012

Activity	**Measurement**	**Volume**	**By years**					**Cost (thousand rubles)**
			2008	2009	2010	2011	2012	
1. Building and repair of feeding racks	pcs.	25	5	5	5	5	5	62,5
2. Building and repair of feeding points	pcs.	5	1	1	1	1	1	50,0
3. Hay preparation and furnishing for wild ungulates	centner	62,5	12,5	12,5	12,5	12,5	12,5	312,5
4. Purchase and furnishing salt	kg	625	125	125	125	125	125	12,5
5. Making artificial nests for puddle ducks	pcs.	75	15	15	15	15	15	37,5
6. Winter routes registration	km	30	30	30	30	30	30	250,0
7. Anti-suffocation activity in lakes	hectares	1,5	0,3	0,3	0,3	0,3	0,3	5,0
8. Shooting and capture of wolves and wild dogs	heads							100,0
9. Preparation of branch food for ungulates	pcs.	625	125	125	125	125	125	31,25
TOTAL:								**861.25**

Expected results:
- Increase in number of game animals in the territory of the Park.
- Increase in number of waterfowl.
- Elimination of fish kill in lakes.
- Reduction in number of wolves and stray dogs.

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Indicators:
- Density upon winter routes registration results.
- Number of broods observed.
- Low level of spring fish loss in lakes.
- Reduction in number of ungulates baited by wolves.

Legal regulation of matters of nature management in lands assigned to users

Measures:
- Receiving of certificates copies on state registration of land users' rights.
- Making cooperation contracts on observance of rights of land users' rights and of the Park regulations.
- Prevention of infringements land users rights by other persons and rendering assistance in resolving contradictions.

Expected results:
- Observance of the rights and regulations of the Nature Park by Evenk tribal communities and farms.
- Cooperation of the Park employees and Evenk tribal communities and farms.
- Fewer infringements of the Park regulations and nature protection legislation by the visitors to the Park.

Forms of preventing infringements
1. Lectures by state inspectors on environmental matters at schools, enterprises, and labour collectives.
2. TV presentations, printed publications, address to population of municipal unions.
3. Environmental actions and quizes in cooperation with experts in ecology.
4. In cooperation with municipal bodies, making contracts on collaboration, contracts with law-enforcement bodies, forestry services. Explanation of importance of specially protected natural territories (SPNT) for preservation of flora and fauna, of SPNT functioning as nursery for biological diversity.
5. Acquaintance of visitors with the information on Nature Park regime, with zones in the territory, attraction of public attention towards environmental actions.
6. Patrolling the territory of the Park by local state inspectors by transport and on foot.
7. Posting information signs on the territory of the Park, collaboration with land users in representing their interests as for infringements of the Park regime.

Gathering information of operational character

Information of operational character is given by subdivisions of state inspectors of the Park — 9 persons, public inspectors of the Park — 14 persons, employees of Nature Protection Department, land users.

State inspectors:
Asekritov V. D. – Sinsk village
Gerasimov S. A. – Edyai village
Vladimirov V. A. – Kytyl-Dura village
Pavlov D. D. – Oddokun subdivision

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Platonov R. N. – Buotama River mouth subdivision
Ivanov E. N. – Buotama River, Kuonan subdivision
Kalitin V. N. – Yakutsk town
Pavlov A. A. – Pokrovsk town
Timofeev S.P.- Sinsk

Officially responsible for gathering and analysis of the information of operational character is Yadrishinsky I. R., Chief of the Park Inspection.

Basic sources of information

Public inspectors in settlements, hunters, and members of environmental camps, forestry workers, and volunteers provide sources of operational information on incidents in the territory of the Park.

Definition of forms and methods of information reception

Reception of information concerning protection and prevention of violating the Park regime is carried out by city and mobile phones.

Definition of means and forms of material encouragement of informants

In settlements where it is worthwhile to have informants and where the broadest review of the territory of the Park can be expected, voluntary informants are appointed whom the administration of the Park encourages financially.

Development of the protection service resource base

Resource base of the protection service now includes:
Motor boats of foreign manufacturers — 6 pcs
"Buran" snowmobile — 2 pc
Inside lighting — 5 pcs
Automobiles – 3 pcs
Boat KS-102- 1 pcs
Boat Yamaha-250 – 1 pcs
Wind-mill electric generating plant — 1 pc

Each inspector has a monocular for observation.

The program "Preservation of natural complexes"

Administrative problem	Activity	Results and indicators	Terms	Executors	Value, thousand rubles
1. Increase of activity's efficiency of the state inspection on territory protection					
1.1.1. Strengthening of work of the state inspection of Park on preventive maintenance of infringements of the nature protection legislation.	Modification of the duty regulations of inspection structure considering changes of the federal legislation.	Decrease in number of complaints to work of inspectors from outside local population and visitors of Park.	2008-2012	The chief of inspection, the senior state inspector.	
	Presentations in mass media, lectures in general educational institutions and for visitors of Park, local population attraction to Park activities.	Decrease in quantity of infringements from outside local population.	2008-2012	State inspectors.	125
	Hiring qualified employees of MEP RS (Y), Ministry of Home Affairs, Ministry of Emergency and Forestry Managements to improve professional skills of inspection personnel. Participation in seminars, competitions and other actions of MEP RS (Y).	Improvement of professional skills and professional training of inspection personnel. Positive decision under reports made.	2008-2012	The involved experts of MEP RS (Y), the Ministry of Home Affairs, the Ministry of Emergency Measures and others.	100
	Formation of public inspection of Park from the local residents who do not have propensities to infringement of a regime of Park and the nature protection legislation.	Trustworthy information reception about infringements of a regime of Park. Improvement of quality of spent nature protection actions.	2008-2012	Parks inspection.	240

1.1.2. Strengthening of material base of Park state inspection.	Strengthening of material base of service: the office weapon; horses; boat pendant motors; snowmobiles; a communication facility; digital a photo and video equipment.	Maintenance of protection of inspection structure and mobility on duty. Reduction of number of infringements of a regime of Park.	2008-2012	MEP RS (Y).	2500
	Maintenance with overalls, uniform regimentals.	Strengthening of positive image and preservation of health of inspection structure.	2008-2012	MEP RS (Y).	222
	Building and arrangement of cordons in territory of sites.	Improvement of inspectors working conditions.	2008-2012	Experts in building.	462
1.2. Control of rational wildlife management and biodiversity preservation in borders of Nature Park.					
1.2.1. Preservation and increase environmental, recreational, scientific and a cultural value of wood ecosystems.	Carrying out forestry actions based on natural inspections, wood monitoring, and within the limits of target scientific programs.		2008-2012	The forest warden state inspector.	1500
1.2.2. The decision of a question on carrying over bisons for Park territory	To prepare the letter addressed to the minister of MEP RS(Y) about adverse influence of bisons on ecosystems of a mouth of the river of Buotama.	Restoration of a vegetative cover, renewal of work of an environmental track, the bird's world of a mouth of the river of Buotama.	2008-2012	The ranger state inspector.	
1.2.3. Preservation and improvement of hunting economy values of lands.	Carrying out biotechnical actions and registration works. Increase in number of animals.	Reduction of quantity of the animals knocked down by wolves. Data of winter tracking.	2008-2012	Inspection.	861,25
1.3. Legal regulation of questions of wildlife management on the earths fixed to users.					
Reception of copies of certificates on the state registration of the rights of land users. To reflect the data in performances in bodies of the mass information and at work with visitors of territory of Park.		The positive relation from outside land users to Park work.	2008-2012	Inspection.	50
The conclusion of contracts on teamwork on observance of the rights of land users and observance of a regime of Park.		Rendering assistance from outside users in Park work.			50

TOTAL: 6110 thousand roubles

2.1.2. Program of cultural heritage preservation

No.	Management aim	Activity	Terms	Executors	Value, thousand rubles
1.	Discovery and systematization of objects of historical and cultural heritage.	Investigation of the territory during expeditions.	2008-2012	«Lena Pillars» Nature Park. Yakutsk State University.	1000
		Collecting and refinement of separate archive materials.	2008-2012	«Lena Pillars» Nature Park. Yakutsk State University. National Archive. Institutes of Siberian Branch of Russian Academy of Sciences.	100
		Making of complex database.	2008-2012	«Lena Pillars» Nature Park. Yakutsk State University. National Archive. Institutes of Siberian Branch of Russian Academy of Sciences.	50
2.	Assigning under protection of objects of historical and cultural heritage.	Certification of objects of historical and cultural heritage.	2008-2012	«Lena Pillars» Nature Park.	500
		Defining and setting of protection areas of objects of historical and cultural heritage.	2008-2012		500
3.	Attracting of locals for saving and reproduction of dynamic forms of culture heritage, including traditions of the culture.		2008-2012	«Lena Pillars» Nature Park.	125
4.	Preservation of manor in Echite place and belltower in Churan base.	Restoration of the manor and repair works.	2008-2012	«Lena Pillars» Nature Park.	5 000
5.	Saving of necropolises.	Research and description of old headstones.	2008-2012	«Lena Pillars» Nature Park.	10

6.	Preservation of archaeology monuments.	Systematic monitoring of archaeology heritage objects.	2008-2012	«Lena Pillars» Nature Park.	1 000
		Conservation of destructing monuments.	2008-2012		
		Maintenance of archeological heritage (setting of information screens, educational work with population, issue of information guides, making of video and slide materials, expositions).	2008-2012		
		Protection of archaeology monuments from rides and illegal excavations.	always		
7.	Saving of monuments in honor of World War II participants.		always	«Lena Pillars» Nature Park.	20
8.	Provision of the necessary facilities in territories.	Liquidation of rests of abandoned farms located in visually important places which disfigure the landscape	2008-2012	«Lena Pillars» Nature Park.	500
		Maintenance of the memorable places (setting of information screens, design of excursion routes).	2008-2012		200

TOTAL: 9005 thousand roubles

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2.1.3. The Program of environmental tourism development

The Program preconditions

One of the main spheres of the Nature Park activities is development of environmental tourism.

The Nature Park has great tourism, nature, recreational, historical, and cultural potential.

The territory of the Park is 485 thousand hectares; its main part is the Lena-Boutamskaya area between the two rivers with its unique nature complex. There are many nature monuments here: «Lena Pillars», Buotama and Sinskiye Pillars, Tukulans, places with rare kinds of plants, pure and fast Lena, Buotama and Siniaia rivers.

The "Lena Pillars" are the nature monument of the geological origin; the age of the Pillars is 530 million years. The Pillars have witnessed geological past of the Earth of the ancient Cambrian Sea. Here on limy layers it is possible to find remains of trilobites and archaeocyatha. The Pillars are relics of weathering in form of towers, castles; they extend along Lena River for 40 km.

The Pillars are among the most significant natural objects in Russia for their high aesthetical value.

There are many monuments of culture in the Park — the primitive humans archaeological site in Diring-Iuriakh, rock drawings, iron-smelting stoves, etc.

There are many objects of scientific interest in the Nature Park: karstic relief forms, thermokarst, eolian formations, relic forests, endemic species of animals and plants, paleontologic sites of mammoth fauna.

All mentioned makes tourist potential rather big.

Realization of the Program assumes fund raising from federal and republican budgets and off-budget sources.

Off-budget funds come from the Park own means from its commercial activities, grant projects, credit receipts.

Realization of the Program requires creation of the tourist complex for the organization of recreation for population of the Republic, mainly children and youth; it will help to solve a problem of employment of the ulus population, and attract financial resources to the ulus.

At full realization of the Program, the Park can accept up to 20 thousand tourists per year, while now it accepts 6 to 10 thousand tourists per year.

Development of tourism will enable significant tributary of funds to the municipal budget.

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Environmental tourism in the Park is carried out in following directions:

Buotama

This direction includes accommodation of tourists and camping in the Ust-Buotama and Verkhny-Bestyakh tourist centers, rafting down the Buotama River, «Fisherman House» in Kuonan, and excursions to site of primitive humans in Diring-Iuriakh.

This direction includes environmental tracks "Feathery World of Buotama", "Unique landscape of Buotama", «Tukulan», "Forest Bison Nursery», in the future — "Iron-Smelting Stoves of Buotama", and educational programs in environmental camps for schoolchildren and pupils of Buotama environmental school.

The environmental routes should be richer and include the historical and ethnographic objects, in this view a concept of an open-air museum «Site of Ancient Hunters of the Stone Age» and «Concept of a Complex of Historical-Ethnographic Museums in Open Air» have been developed.

"Lena Pillars"

The following environmental routes have been developed in "«Lena Pillars»" Nature Park: «Lena Pillars», «Dry Channel of Labydya», and «Kurunnakh».

There are guesthouse in Pillars and a small tourist center on Kurunakh River.

It requires a lot of scientific and research work; unfortunately, lack of financing constrains this work. It is planned to construct an all- year-round Visitors Center, a viewing platform, rising ladder, a gallery of rock drawings.

It is necessary to provide neighboring territories with facilities necessary to develop an entertaining infrastructure.

Numerous actions are carried out in «Lena Pillars», such as «Gold of «Lena Pillars» open-air folklore festivals and author's songs «Lena Pillars» in Winter».

Batamai

The place is on the left coast of Lena River opposite «Lena Pillars».

It is planned to develop a route alternative to the river route.

Because of costly oil products, tickets for river ships became very expensive and it is necessary to have such an alternative as an automobile route.

It is possible to fish, pick berries, etc during the rest. The Park has already accepted some groups of visitors along this route.

Here a part of "Winter «Lena Pillars»" festival takes place.

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Churan-Baza

The route has not yet been well developed; in the long term, it can be of great interest as an "extreme tourism route". Tourists reach Churan-Baza by river. Then they get to know history of Churan-Baza as a storage terminal for gold mining development in Aldan; then they reach Buotama by Tommot road and rift down Buotama (another option is rafting on Lena River).

The route is approved and promises to be quite competitive.

Rafting on the Siniaia River

The route will draw fans of extreme outdoor rest. Rafting starts with the river Matta, to Sinsk settlement, with 100 km distance in five days. It has the fourth complexity degree. Rafting is possible on kayaks and rubber boats. It is organized in June-July.

List of activities for the program realization

Activity	Terms	Executors
1. Development of environmental tourism in «Lena Pillars» Nature Park.	2009-2013	«Lena Pillars» Nature Park.
1.1. Certification of the culture and nature monuments in the Park.	2009-2013	«Lena Pillars» Nature Park.
1.2. Design of general scheme of environmental tourism development.	2009-2013	«Lena Pillars» Nature Park .
1.3. Sale of souvenirs at tourist centers.	Annually	Ministry of education of the Sakha Republic (Yakutia).
1.4. Realization of "Buotama" sub-program.		
1.5. Realization of «Lena Pillars» sub-program.	2006-2010	
1.6. Realization of "Churan-Baza" sub-program.		«Lena Pillars» Nature Park, Artists Union of Sakha Republic.
1.7. Realization of "Batamai" sub-program.	2008-2013	
1.8. Organization of historical environmental expedition of the school pupils to the Park.	2007-2010	
1.9. Organization of summer environmental tourism camps for school pupils.	Annually	«Lena Pillars» Nature Park, "Khangalasskii Ulus" municipal district.
1.10. Organization of «Gold of «Lena Pillars» open-air festival.	Annually	
1.11. Organization of «Lena Pillars» in winter» festival.	Annually	
1.12. turslet rafters on the river Buotama.	Annually	
1.13. Tourism Song Contest «Silver string Diring»	Annually	
1.14. Orienteering Competition «Treasures Deering Yuryakh».		
1. Improvement of tourist activity.	Annually	«Lena Pillars» Nature Park.
1.1. Casting and training of guides.	Annually	
1.2. Improvement of tourist centers equipment.	Annually	
1.3. Equipment of routes and environmental routes.	Annually	

TOTAL: 140 million rubles

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2.1.4 The program of environmental education development

Annually the department of environmental education of the Park carries out seminars for teachers, thematic and scheduled, usually three to four seminars a year. The seminars are carried out with participation of lecturers from Yakutsk, employees of the Institute of Biological Problems of Permafrost Zone of the Siberian Branch of the Russian Academy of Sciences, Yakutsk State University, Ministry for Nature Protection, the Ulus education management etc.

Summer environmental camps and expeditions are organized in the Nature Park annually. Stationary recreation camp with the training program has been working in Buotama River mouth since 2003. Experts from the Institute of Biological Problems of Permafrost Zone and from Yakutsk State University are invited to train children. Besides, children's scientific expeditions to interesting places of Nature Park take place.

Traditionally in spring months from March until June, competitions and quizzes are organized in schools timed to «March of Parks» days of National Parks and Reserves.

A plenty of the population is involved in annual environmental actions on cleaning settlements of trash (e.g. "The Cleanest Courtyard" action).

The Department of Environmental Education has started issuing methodical literature for ulus schoolteachers. Methodical manuals are distributed on diskettes due to difficulties in copying. Issue of periodic methodical literature for teachers is planned.

"The Bulletin of the Park" newspaper is issued four times a year, it is planned to increase quantity of issues and its circulation.

To attract tourists attention it is necessary to increase issue of advertising pamphlets, calendars, leaflets, badges, emblems etc. (as an advertising production).

The Park is in close cooperation with rural museums; in each of them, our experts have established expositions on the work of the Park. In schools and administrations of ulus, villages displays have been set that are constantly updated. Opening a museum on nature with interesting exhibits in the Visitors Center is planned.

There are plans of creating a video shop with movies on wonderful nature of the Park. To do this, professional video- and photocameras should necessarily be purchased.

***The purpose of the program*:**

- Creation of steady system of environmental education in the territory of «Lena Pillars»" Nature Park proper and in Khangalasskii ulus as a whole.

***Tasks*:**

- Increase of an educational level of teachers by carrying out seminars and conferences.
- Development of various forms and methods of work on environmental education.
- Rising interest of the local population in matters of nature management by giving comprehensive information.

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Possible actions on development of environmental education in the "Lena Pillars" Nature Park in 2008-2012 are listed below together with the estimate of necessary expenditures.

Year	Activity
1.	***Increase of an educational level of teachers by carrying out seminars and conferences***
2008-2012	1. Seminar for kindergarten and elementary school employees. 2. Seminar for teachers of ecology. 3. Seminar on tourist and local history activity of school pupils. 4. Organizational seminar for teachers on summer children camps. 5. "Step into future" scientific conference of pupils.
2.	***Development of various forms and methods of work on environmental education***
2008-2012	1. Organization of camps and field expeditions for practice of children and youth (annually). 2. Development of different forms of work with children and youth such as quizzes and exhibitions, activity in context of "Marche of Parks" (annually). 3. Attraction of population to ecologic actions – organization of annual nature protection action "Marche of Parks" (annually). 4. Annual action "The cleanest courtyard". 5. Lectures, discussions, hobby group work in winter time (annually). 6. Organization of spot-checks in schools of ulus with lectures (annually). 7. "Nature and we" action.
3.	***Ecologic literature***
	1. Issue of methodical literature for those who need information on environmental education. 2. Issue if periodical ecologic «The bulletin of the Park» newspaper. 3. Issue of pamphlets about the Park. 4. Issue of big photo album. 5. Issue of the book about the Nature Park.
4.	***Work with local history museums, organization of expositions and design of stands***
	1. Creation of a nature museum in Visitors Center. 2. Cooperation with rural museums. 3. Making displays, brochures, information screens. 4. Issue of advertising products (calendars, pamphlets, badges). 5. Making of movies, photos and slides.

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Estimation of expenditures on environmental educational activity

Activity	Materials required	Cost
3-4 seminars per year: 1) thematic; 2) about tourist activity; 3) preparations for summer camps.	For preparation of one seminar: ▪ hand-outs; ▪ paper; ▪ 10 pcs. of Whatman paper; ▪ invitation of lectors; ▪ visuals; ▪ expenditures.	 2000 rub. 200 rub. 100 rub. 1000 rub. 500 rub. 500 rub. TOTAL: 4300 rub.
Organization of camps and expeditions for 1st season	Required for one season camp or one expedition: ▪ transportation cost (petroleum, rent); ▪ salary for lecturers, trainers, cook, worker; ▪ stationary; ▪ mobile laboratories; ▪ tents - 10 pcs.; ▪ rubber boats - 4 pcs.; ▪ tourist stock (balls, volleyball net, swimming buoy, table games, etc).	 10000 rub. 10000 rub. 1000 rub. 2000 rub. 5000*10 pcs. =50000 rub. 7000*4 pcs. = 28000 rub. 10000 rub. TOTAL: 111000 rub.
Organization of quizzes, exhibitions.	▪ prizes, certificates, presents; ▪ mass-media advertisement cost.	2000 rub. 1000 rub. TOTAL: 3000 rub.
Organization of environmental actions.	▪ megaphones, loud-speakers; ▪ prizes, certificates, presents.	5000 rub. 2000 rub. TOTAL: 7000 rub.
Issue of methodical literature.	▪ paper; ▪ publishing cost.	500 rub. 2000 rub. TOTAL: 2500 rub.
Issue of periodical newspaper.	▪ paper; ▪ publishing cost; ▪ making-up of news-paper; ▪ photos, pictures.	1000 rub. 3000 rub. 1000 rub. 1000 rub. TOTAL: 6000 rub.
Creation of museum in Visit-center (stands, expositions).	▪ making of fiberboard stands; ▪ making of diorama; ▪ supply of expo materials.	10000 rub. 10000 rub. 15000 rub. TOTAL: 35000 rub.

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Work with mass-media.	▪ transportation of operators, correspondents (one report); ▪ advertisement cost (one ad.).	5000 rub. 5000 rub. TOTAL: 10000 rub.
Issue of advertising products (calendars, pamphlets, brochures).	▪ publishing cost (one pamphlet); ▪ photos, texts composition; ▪ making-up of the texts.	2000 rub. 3000 rub. 1500 rub. TOTAL: 6500 rub.
Making of video-, photo- materials.	▪ purchase of video camera; ▪ purchase of professional camera; ▪ photo-, video- films; ▪ work of operators, photographers.	25000 rub. 10000 rub. 2000 rub. 5000 rub. TOTAL: 42000 rub.
	TOTAL:	227300 rub.

2.1.5. Organization of scientific research and environmental monitoring

1. Inventory works

1.1. Inventory of the cartographic information.

For years of work of electronic Park maps have been made:
1) Topographical map of the Park, scale 1: 100 000;
2) Landscape map, scale 1: 500 000;
3) Map of woods, scale 1: 500 000;
4) Map of rare plant species, scale 1:500 000;
5) Map of the organization of environmental tourism, scale 1: 500 000;
6) Geological map of the Pillars, scale 1:100 000;
7) Map of zoning and the buffer zone, scale 1:100 000;
8) Landscape map, scale 1:500 000;
9) Map of the Khangalasskii region (all territory of Park included), scale 1:25 000.

The maps on the paper carriers:
1) Schematic map of quarter arrangement of forest, scale 1:200 000;
2) Schematic map of Park and forest, scale 1: 100 000;
3) Schematic map of territorial arrangement, scale 1 : 100 000.

The inventory of the scientific and historical information about the "Lena Pillars" Nature Park was published in the form of the bibliographic catalogue with at least 540 references.

The botanical and soil mapping is made by the Institute of Biological Problems of Permafrost Zone of the Siberian Branch of the Russian Academy of Sciences (maps see above).

At present, under the contract made with the Institute of Biological Problems of Permafrost Zone of the Siberian Branch of the Russian Academy of Sciences a cadastral plan is made.

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Organizing scientific research

Tasks of scientific research and environmental monitoring

The protected territories serve as a reference of the natural complexes of the region and can help in solving of environmental monitoring problems. Environmental monitoring includes geomorphological, geophysical, geochemical and environmental monitoring. It is necessary to organize a network of stationary platforms and routes in the Park to carry out complex environmental observation and organize biological monitoring. Thus, the main priority is location of the basic environmental system types of the Park. Then, in the most typical points of main environmental systems, stationary platforms are laid set by the area from 0.25 up to 1.00 hectares. Observation over land conditions (type, subtype, sort, kind, humus, pH, cation exchange etc.), vegetation, both herbaceous and forest (specific structure, covering, forest conditions, underbrush, undergrowth, living soil cover etc.), invertebrate surface and subsurface fauna is conducted on these platforms. For the observation of highly mobile forms of insects, amphibians, reptiles, and specially birds and mammals constant routes are more preferable than stationary platforms.

To carry out such complex research in the "Lena Pillars", it is of special interest to follow processes in soil of steppes and tukulans, conditions of main forest environmental systems of the Park (green moss fir groves in valleys of Lena and Buotama rivers, bear-berry pine forests on ancient alluvial sediments near Buotama River mouth, native Buotama River bank near Menshikov's site, alder-cowberry larch forest on the right bank of Lena River close to Egiyte River, blueberry-cowberry larch forests on carbonate rock). Constant observations should be carried out over bank rocks environmental systems.

Biological monitoring should be carried out in tourist routes and places for studying the influence of recreational pressure on a condition of environmental systems (soils, vegetation, and fauna) and for development of destruction prevention and restoration measures.

The major task of scientific research in «Lena Pillars» Nature Park is detailed studying of environmental system resistance to anthropogenic influence. It is especially important to carry out such research in places of the highest recreational pressure, i.e. at tourist steamships stops and on environmental tracks. Because of research of environmental systems, capacity standards of recreational pressure should be determined and measures of disturbed environmental systems restoration should be developed.

Perspective plan of scientific research

No.	Names of agreements	Terms	Executor	Value, rubles
1.	Monitoring of fish fauna on Buotama river.	2008-2010	YIB SB RAS.	1 789 389
2.	Studying of environmental, physiological and biochemical features of adaptation process of a wood bison in conditions of the Central Yakutia.	since 2008	YIB SB RAS.	2 000 000

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3.	Teamwork on stratification of Cambrian period in the territory of «Lena Pillars» Nature Park.	2006-2010	United geological team of SB RAS.	
4.	Mineralogical preconditions of Kimberlite magmatic display of Middle Paleozoic age in the Central Yakutia.	2006-2010	YIB SB RAS, Yakut State University, IDPMG SB RAS.	
5	Monitoring of water and land environmental systems of «Lena Pillars» Nature Park.	2008-2013	YIB SB RAS	650 000 Annually or 3250000 for 5 years
6	The study of rare plant species SPE "Lena Pillars" for introductions.	2008-2012	YIB SB RAS	
7	The study of modern karst processes in the park.	2010-2012		200 000
8	The study of permafrost and landscape in the PP "Lena Pillars".	2009-2012		300 000

Introduction of geoinformatic technologies

All maps are available on digital media and executed in CorelDraw 12. It is needed to convert all material to GIS format.

Two collections of scientific articles have been published:

The "Lena Pillars" National Nature Park: geology, land, vegetation, fauna, protection and use: the collection of scientific essays edited by correspondent member of the Russian Academy of Sciences, Doctor of Biology, Professor N. G. Solomonov, Candidate of Agricultural Sciences A. P. Isaev, candidate of Biological Sciences E. I. Ivanov. Yakutsk: Yakut State University Publishing House, 2001.

The "Lena Pillars" Nature Park: the past, the present and the future: the collection of scientific essays edited by N. G. Solomonov, I. M. Okhlopkov; Institute of Biological Problems of Permafrost Zone of the Siberian Branch of the Russian Academy of Sciences, Ministry for Nature Protection of Sakha Republic (Yakutia), the "Lena Pillars" Nature Park, Yakutsk, 2007.

Also in 2007 the illustrated album "Lena Pillars" Nature Park" has been issued in Moscow by PENTA Publishing House.

There are two scientific reference books on animals and geology of the Park to be issued this year.

Scientific maintenance of activity in the field of protection of the territory, environmental education, development of tourism and recreation

The bases for development of the above-stated directions were:

- the project of the organization of "Lena Pillars" National Nature Park, executed in 1991-92 by West Siberian Design and Survey Expedition of the Russian Federation.

- the characteristic of Nature Territorial Complexes of "Lena Pillars" National Nature Park and making landscape maps executed in 1995 by the Institute of Permafrost Studies named after Academician P. I. Melnikov of the Siberian Branch of the Russian Academy of Sciences.

- the report on research work under the contract "Landscape and geographical substantiation of tourist routes", executed in 1995 by short term creative team "Cryolandscape".

- Business plans for development of environmental tourism in the territory of "Lena Pillars" National Nature Park executed in 1999 and 2002.

- Scientific reports of the Institute of Biological Problems of Permafrost Zone of the Siberian Branch of the Russian Academy of Sciences.

Development of resource base of scientific research

The material and technical base of scientific research at present includes computers, office equipment, fibre-optical communication, motor transport, river transport for fieldwork tents, sleeping bags, overalls are available.

Participation in scientific conferences and meetings

Members of «Lena Pillars»" Nature Park collective constantly participates in meetings of various ranks. Experts of the Park have participated in school reserarch-and-applied conference "A Step Towards the Future"; besides, director Kipriyanova L. D. has reported at the Conference on Preservation of Cultural and Historical Heritage of Sakha Republic (Yakutia) in Yakutsk. This year the Park acts as co-organizer of two international conferences where lecturers Rozhin V. I., senior state inspector and Kipriyanova L. D., director of the Park participated:
- 13th International Conference on Cambrian Bottom, July 2008;
- International Conference on Elk, August 2008.
Training in postgraduate and doctoral studies, preparation to defend theses
- the Park has no scientific department; all scientific work in the territory of the Park is conducted under arrangement with various scientific institutions

Organization of environmental monitoring

Drawing up the program of environmental monitoring for the perspective period

Directions of monitoring:

Over 10 years in the Park monitoring observation has been made on changes in the level

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of biological diversity and qualitative structure of biota, over conditions of populations, of ecosystems, forest restoration after fires. Parameters of measurement are the number of animals, sample places for definition of vegetation etc.

Frequency of information gathering — annually.

Spatial organization of monitoring — annual winter routing: quantity of routes – 30 km, length of routes not less than 35 km, overall - 150 km. Labor expenditures — 35 to 20 people per days, material needs – 53,500 roubles.

Also available is a permanent platform 25 km2 in Buotama River mouth.

Administrative problem	Action	Results (indicators)	Terms of realization		Executors	Value, thousand rubles.
			beginning	ending		
1. To organize work of the winter routing account.	Monitoring fauna.	Account of quantity of animal and wintering birds.	On March, 1st annually.	On March, 7th annually.	Hunters, Park employees, research workers of YIB SB RAS.	53,5 annually.
2. To organize meteorological observations.	Monitoring climate.	Temperature of air. Temperature of soil.	Constantly Since 2008.	Constantly.	Yakut board of Hydromet, Park employees.	300
3. To establish constants places for sampling water.	Hydrochemical monitoring waters.	Hydrochemical analysis of waters.	Constantly Since 2008.		Park employees, Republic environmental monitoring information center of Ministry of environmental protection.	
4. To organize expedition on Buotama river.	Monitor research of fish fauna Buotama river.	Quantity of fish.	2008	2010	Park employees, research workers of YIB SB RAS.	1890
5. To organize expeditions on studying water and land environmental systems of Park.	Monitoring of water and land.	Hydrochemistry, hydrobiots, condition of a soil cover, geological objects, vegetation and fauna.	2008	2013	IDPMG SB RAS YIB SB RAS, Yakut state university.	

Basic Estate Information on the "Lena Pillars" Nature Park

No.	Name of property	Address	Year of construction	Type of building	Balance value of property as of 2009, thousand rubles
		1	2	3	5
1	Office building.	Pokrovsk, Zarechnaya street 2.	1990	wooden	1336
2	Center of environmental education.	Pokrovsk, St. Ordgonikidze 56.	2003	wooden	6266
3	Diring-Iuryakh tourist complex.	Diring-IIuryakh (visit-centre).	2007	wooden	8000
4	«Lena Pillars» tourist complex.	«Lena Pillars». 3 small houses, stairs.	2007	wooden	3000
5	"Batamai" tourist complex.	House, garage, bath-house.	2007	wooden	800
6	Cordon on a Buotama river mouth.	House.	1995	wooden	200
7	Cordon on Okdokun.	House.	1997	wooden	100
8	Cordon on Taryng.	House.	1997	wooden	100
9	Cordon on Djekimde.	House.	2006	wooden	100
10	Bison cattle at Buotama River mouth.		2005-2007	wooden	8000
11	Tourist base Verhnii Bestyakh 7 houses, fence.	Verhnii Bestyakh.	1995	wooden	3000
12	Tourist base on a Buotama river mouth 10 Houses, 1 office, 1-4 flat house.		1995	wooden	3000
13	Cordon "Eim," Siniaia River.		2005	wooden	120

* Service cost 5% annually of balance property value.

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Financial and Economic activities

Formation and servicing the fixed capital

Capital construction:

Construction of the visit-center in Yakutsk - 72 million rubles, 2009 – 2010.

Construction of objects of tourism - 140 million rbl. 2009 – 2014.

Major overhaul, reconstruction support of an infrastructure.

Major overhaul of objects is spent annually, spent from 150 up to 300 thousand rubles, reconstruction and support of an infrastructure is spent as required - it is spent from budgetary funds from 100 up to 300 thousand rubles.

Purchase of a fixed capital.

In 2008 the Park has bought boats Yamaha – 1500 thousand rbls., KC-102 - 1500 thousand rbls., tents, rubber boats, the car UAZ-minivan. The vehicles were bought with support of the state target program "Preservation of the environment". With support of, earned the Park gets tents, rubber boats, pendant motors "Johnson-4" and "Johnson-10". Purchase of two motor boats with outboard motors of a class is planned - "Yamaha", a minibus, a motor vehicle of high Passability.

Attraction of financing:
- Federal budget - 140 million rbl.
- Regional budget - 48 140 thousand rbl.
- Incomes of own activity - 2 million rbl. annually
- Payment for visiting the territory - 130 rbl.
- Payment for commercial videos and photofilming - 2800 rbl. for a day
- Payment for services of conductors, guides – 280 rbl for 1 persons
- Transport services: boat KC-102 - 21-rbl x 1 km x 1 person

Boat "Buotama" - 25-rbl x 1 km x 1 person

- Incomes of sale of souvenirs, badges and polygraphic production. 50 000 rbl.

Savings of financial assets

For economy of financial resources are used:

Reduction of motor vehicles by realization through the Ministry for Privity individuals, closing of not used garage, transition to the simplified system of the taxation, use of the stipulated privileges and clearings (clearing of the tax to the land, on property).

ANNEX B11

Plan of activity

Administrative task	Activity	Terms of realization		Executors	Value, thousand rbl.
1. Forming and service of basic funds.		2008	2013	Park administration.	8750
2. Construction of Visitors Centre in Yakutsk.	Definition of financing sources (participation in investment projects) and building	2009	2015	Park administration, YIB SB RAS.	72 000
3. Construction on the «Lena Pillars».	Construction of visit – centre on «Lena Pillars».	2008	2010	Park administration, MEP RS (YA), Ministry of constriction RS (YA).	2200
4. Organization of the equipment purchase.	Forming of interior technological equipment in Diring-Iuryakh	2008	2010	Park administration, MEP RS (YA), Ministry of constriction RS (YA).	640
5. Construction of tourist properties.	Participation in tender organized by Rosturizm, in order to gain investments for construction.	2009	2014	Park administration, Ministry of business and tourism RS (YA).	140 000
6. Organization of capital repairs, reconstruction and supporting of basic funds.		2008	2012	Park administration.	300
7. Basic funds purchasing.	Purchase of boat «Yamaha», boat «KC-102», tents, motoboats, car «UAZ-minivan», minivan.	2008	2013	Park administration, MEP RS (YA).	10 000

TOTAL: 233,890

ANNEX B11

2.2. Summary plan of the main activities, by years

	Value of realization (thousand rbl)					
	2008	**2009**	**2010**	**2011**	**2012**	TOTAL:
1. Increasing of activity efficiency of the state inspection on territory protection						
1.1Carrying out performances in mass-media, performance with lectures in general educational institutions of district and before visitors of Park.	25	25	25	25	25	125
1.2. Improving of inspection structure qualifications, participation in seminars, competitions and other. actions of MEP RS (YA).	20	20	20	20	20	100
1.3. Formation of public inspection from local residents.	480	480	480	480	480	240
1.4. Strengthening of material base of the state inspection.	500	500	500	500	500	2500
1.5. Maintenance with regimentals and overalls.	44,4	44,4	44,4	44,4	44,4	222
1.6. Building and arrangement of cordons.	92,4	92,4	92,4	92,4	92,4	462
2. Control of rational use and biodiversity preservation in borders of Nature Park						
2.1. Preservation and increase environmental, recreational, scientific and a cultural value of wood ecosystems.	300	300	300	300	300	1500
2.2. Carrying out biotechnical actions.	172,15	172,15	172,15	172,15	172,15	861,25
3. Legal regulation of questions of wildlife management on the earths fixed to users						
3.1. Reception of certificates copies on the state. registration of the rights of land users.	10	10	10	10	10	50
3.2. The conclusion of contracts on teamwork on observance of the rights of land users and observance of a regime of Park.	10	10	10	10	10	50
4. The program of preservation of a cultural heritage						

ANNEX B11

4.1 Revealing and ordering of objects of a historical and cultural heritage.	230	230	230	230	230	1150
4.2. Statement on protection of objects of a historical and cultural heritage.	200	200	200	200	200	1000
4.3. Local population attraction to preservation and reproduction of dynamical forms of a cultural heritage.	25	25	25	25	25	125
4.4. Preservation of Manor "Echite" and belltower "Churan-baza".	1000	1000	1000	1000	1000	5000
4.5. Preservation of necropolis.	2	2	2	2	2	10
4.6. Preservation of archaeological sites.	200	200	200	200	200	1000
4.7. Preservation of monuments to participants of the Second World War.	4	4	4	4	4	20
4.8. Cultural arrangement of objects.	180	180	180	180	180	900
5. The program of development of environmental tourism						
5.1. Realisation of the program of environmental tourism.	4	4	4	4	4	20
6. The program of development of environmental formation and education						
6.1. Realisation of the program of development of environmental formation and education.	45,46	45,46	45,46	45,46	45,46	227,3
7. The program of scientific research						
7.1. Carrying out monitoring and research actions.	1867,6	1867,6	1867,6	1867,6	1867,6	9229,389
8. The financial plan for development of "Lena Pillars" Nature Park						
8.1. Formation, service, building and acquisition of a fixed capital.	6590	1867,6				233 890
TOTAL:						258461.93

ANNEX B11

3. MONITORING AND REALIZATION ESTIMATION

Primary activity monitoring

The name of look-ahead indicators	Current value	Expected results				
		2008	2009	2010	2011	2012
1.Protection of natural complexes and objects: - quantity of spot-checks; - quantity of checks on observance of regime protected areas.	35 57	35 60	35 60	40 60	40 60	40 60
2. Forestry works: - sanitary felling; - post-felling inspection.	5 hectares 100 m^3	40 hectares 100 m^3	50 hectares 100 m^3	50 hectares 100 m^3	50 hectares 100 m^3	50 hectares 100 m^3
3. Quantity of kinds, (subspecies, populations) the animals included in the Red book of Russia: - Lesser White-fronted goose; - Osprey; - Golden eagle; - Gyrfalcon; - Peregrine falcon.	5	5	5	5	5	5
4. Measures on protection of rare species of animals: - explanatory conversations with local population; - studying and protection of habitats.	10 annually	10	10	10	10	10
5. Biotechnical actions (kinds and volume): - building and repair of feeding troughs; - building and repair feeding platforms; - preparation and the calculation of hay for wild hoofed animals; - acquisition and the salt calculation; - creation of artificial nests for ducks; - carrying out Winter tracing monitoring; - antiiceing actions on lakes; - shooting and catching of wolves and vagrant dogs; - preparation ofbranch forage for hoofed animals.	5 pcs. 1 pcs. 12.5 centners. 125 kg. 15 pcs. 450 km 0,3 hectares 125 pcs	5 1 12,5 125 15 450 0,3 125	5 1 12,5 125 15 450 0,3 125	5 1 12,5 125 15 450 0,3 125	5 1 12,5 125 15 450 0,3 125	5 1 12,5 125 15 450 0,3 125

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6. Scientific research: - performance of the program of environmental monitoring; - quantity passing, degree and course practice.	10	15	15	15	15	15
7. Ecoeducational actions - Excursions (3 visits-centres); - lectures; - actions: (coverage) • "A march of Parks"; • "The nature and We"; - Exhibitions: - District (regional); - Republican; - Russian; - International; - extra educational work (quantity/coverage); - performances in mass-media: • Periodicals; • Radio TV; Advertising-publishing: • the Outdoor advertising; • information placing on web sites; • the Edition of pamphlets and brochures; • Release "The Park bulletin"; • Video Cinema; - camp, expedition of schoolboys (quantity, coverage); - single actions.	25 15/300 persons. 500 200 2 2 2 2 2/20 10 6 4 2 pcs 1 sites 2 4 2 4/64 10	30 30/600 600 300 2 2 2 2 2/30 15 10 5 2 3 2 4 2 7/150 10	30 40/800 800 300 3 2 3 2 2/30 15 10 5 2 3 5 4 2 7/150 10	35 45/900 1000 350 3 2 3 2 3/40 20 12 5 2 4 5 4 2 8/170 10	35 50/1000 1000 400 3 2 3 2 3/40 20 12 5 2 4 5 4 2 8/170 10	40 50/1000 1000 400 3 2 3 2 3/40 25 15 5 2 5 5 4 2 8/170 10
8. The general look-ahead quantity of visitors of Park.	8000	10000	10500	11000	11500	12000
9. Preservation of objects of a cultural heritage: - repair and cultural arrangement of objects; - forwarding inspection of territory; - certification of objects.	2 1 -	2 1 5	2 - 5	2 - 5	2 - 5	2 - 5

ANNEX B11

RESUME

The main features

Each specially protected natural territory has the features distinguishing it from the others. These features, both positive and negative, certainly influence development of particular territory and its management. The following are among main features of "Lena Pillars" Nature Park:

- Valley character of the territory, located along the axes of Lena, Buotama and Siniaia rivers.
- Significant (220 km) extension of the Park along the right coast of Lena River.
- Cluster character of the territory including two isolated locations not incorporated into a uniform security (buffer) zone.
- Location of the Park on ownerless land excluded from economic operations.
- Presence of Amur-Yakut highway along the buffer zone and of a winter road, and shipping operations along Lena River that, on the one hand, secures accessibility of the Park any time of year, and, on the other hand, complicates regularity of visiting.
- Large settlements, including the city of Yakutsk in close vicinities of the Park.
- Various landscape provinces overlapping in the territory of the Park, mosaic physical and geographical conditions and natural territorial complexes.
- These and other features of "Lena Pillars" Nature Park, on the one hand, impart special appeal and originality to its territory, and, on the other hand, presume special approach to management of the Park and planning of its activity in prospect.

Key problems of the Park, negative effects and threats to its protected natural, historical, and cultural complexes and objects

The basic infringements are:

- infringements of the Park regime (visiting without permission, violation of terms of gathering wild-growing berries and plants, of rules of fishing and hunting);

- sharp increase in visitors of the Park during summer leads to higher recreational pressure on natural complexes of the Park. Pollution by garbage, violation of fire safety rules, gathering wild-growing berries and mushrooms result in depletion of flora of the Park.

The most visited places experiencing anthropogenic influence are:

- Water system in lower reaches of Buotama River.
- Water system in lower reaches of Siniaia River.
- Water system of Lena River within Buotama – "Lena Pillars" area.
- A mouth of the river Buotama.
- A mouth of the river Labyja around «Lena Pillars».
- Diring-IIuryakh area.

ANNEX B11

The greatest loss to natural complexes, historical and cultural objects of the Park is tied up with such disasters as floods, river jams, forest fires, reproduction and propagation of woodworms. For example, 1998 flood damaged the Park greatly: all cordons and campsites were under water. 2007 jam has completely erased visitors centre on Lena Pillars. Occasional forest fires and Siberian silkworm have caused an irreplaceable damage to wood resources of the Park in 2001-2002.

Basic directions of activity and the most important actions for preservation natural, historical and cultural complexes and objects

The basic directions of activity:

- Protection of vested territories as well as natural and cultural historical objects.
- Creation of conditions for all kinds of regulated tourism, excursion services and recreation facilities, acquaintance with the Park nature, its cultural and historical sites.
- Preservation and restoration of natural complexes as places of traditional economic activities of local population.
- Information and advertising campaigns, publication of scientific and popular literature on all aspects of activity of the Park (proceedings, guidebooks, information materials, reference books, pamphlets, booklets on excursions, lectures, instructions, maps, posters, picture albums etc.).
- Reproduction of the nature in the territories involved in economic circulation, of valuable kinds of plants and animals; participation in the system of regional monitoring and support of the general environmental optimum in the region.
- Maintenance and cultivation of wild animals within the zone of artificial cultivation of rare and vanishing species of animals.
- Realization of environmental education, organization of museums and open air expositions; creation and arrangement of excursion tracks and routes; organization of environmental associations and centers; practical work of students of higher and specialized secondary educational institutions of corresponding specializations, educating schoolchildren; coverage of the Nature Park activities in mass media; other forms and methods of social environmental education, formation and propagation of environmental knowledge.

Prospective nature protection, economic and social effects of the planned actions

The present management plan is created for strengthening of financial, technical base of the Park that will improve quality of protection of natural objects, will promote preservation of historical and cultural objects, and will give renewed impetus to development of environmental education and environmental tourism. Besides, the plan presumes expansion of scientific knowledge of flora, fauna, natural communities, and Park complexes that will allow more validly protect and operate the territory. It is important that the present plan envisages cooperation with local population of the region, when they do not only visit the Park as tourists, but take part in the territory protection (as public inspectors), environmental education and scientific research (summer environmental camps, study groups and societies, participation in various actions), work with personnel (increase in staff or attraction of businessmen to work in the field of tourism).

ANNEX C

CAMBRIAN TAXONOMIC DIVERSITY

?PHYLUM Cyanophyta
Family incertae sedis
Genus *Marpolia* Walcott, 1919
***Marpolia spissa* Walcott, 1919**
Order Renalcales Riding et Brasier, 1975
Family Parachabakoviaceae Korde, 1973
Genus *Renalcis* Vologdin, 1932
***Renalcis jacuticus* Korde, 1961**
***R. levis* Vologdin, 1940**
***R. pectunculus* Korde, 1961**
***R. subglobosus* (Luchinina in Belyaeva et al., 1975)**
***R. tuberosus* (Korde, 1961)**
Genus *Tarthina* Drozdova, 1975
***Tarthina gelatinosa* (Korde, 1961) Riding et Voronova,1984**
Genus *Gemma* Luchinina in Zhuravleva et al., 1982
***Gemma inclusa* Luchinina in Zhuravleva et al., 1982**
Order Epiphytales Korde, 1973
Family Epiphytaceae Korde, 1958
Genus *Epiphyton* Bornemann, 1886
***Epiphyton fruticosum* Vologdin, 1939**
***E. plumosum* Korde, 1955**
***E. scapulum* Korde, 1961**
Genus *Gordonophyton* Korde, 1973
***Gordonophyton durum* (Korde, 1961) Korde, 1973**
Genus *Tubomorphophyton* Korde, 1973
***Tubomorphophyton botomense* (Korde, 1955) Korde, 1973**
Genus *Korilophyton* Voronova in Voronova et Radionova, 1976
***Korilophyton inopinatum* (Voronova, 1969) Voronova et Radionova, 1976**
Genus *Kordephyton* Radugin et Stepanova, 1964
***Kordephyton crinitum* (Korde, 1955) Radugin et Stepanova, 1964**
Order Cambrinales Korde, 1973
Family Sajaniaceae Vologdin, 1962
Genus *Amgaina* Korde, 1973
***Amgaina compacta* Korde, 1973**
Order Garwoodiales
Family Fistulellaceae Korde, 1973
Genus *Bija* Vologdin, 1932
***Bija sibirica* Vologdin, 1932**
Genus *Buotamaella* Korde, 1958
***Buotamaella zelenovi* Korde, 1958**
Order Reitlingerellales Vologdin, 1958
Family Reitlingerellaceae Loeblich et Tappan, 1965
Genus *Obruchevella* Reitlinger, 1948
***Obruchevella delicata* Reitlinger, 1948**
Family Girvanellaceae Luchinina in Nikitin et al., 1974
Genus *Girvanella* Nicholson et Etheridge, 1878
***Girvanella sibirica* Maslov, 1956**
Genus *Razumovskia* Vologdin in Krasnopeeva, 1937
***Razumovskia grandis* Korde, 1961**
Family Batineviaceae Korde, 1973
Genus *Subtifloria* Maslov, 1956
***Subtifloria delicata* Maslov, 1956**

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Genus *Batinevia* Korde, 1966
***Batinevia ramosa* Korde, 1966**
Order Kenellales Korde, 1973
Family Vologdinellaceae Korde, 1957
Genus *Proaulopora* Vologdin in Krasnopeeva, 1937
***Proaulopora jacutii* (Maslov, 1937) Luchinina, 1971**
Genus *Tubophyllum* Krasnopeeva, 1955
***Tubophyllum glabrum* (Krasnopeeva, 1937) Krasnopeeva, 1955**

PHYLUM Rhodophyta
Class Rhodophyceae
Family incertae sedis
Genus *Lechampia* Krassilov in Ivantsov et al., 2005
***Lechampia moniliformis* Krassilov in Ivantsov et al., 2005**

PHYLUM Chlorophyta
Family incertae sedis
Genus *Lenodesmia* Krassilov in Ivantsov et al., 2005
***Lenodesmia filiformis* Krassilov in Ivantsov et al., 2005**
Genus *Lenocladium* Krassilov in Ivantsov et al., 2005
***Lenocladium rhizomatum* Krassilov in Ivantsov et al., 2005**
Genus *Laenigma* Krassilov in Ivantsov et al., 2005
***Laenigma striatum* Krassilov in Ivantsov et al., 2005**
Genus *Aldanophyton* Kryshtofovich, 1953
***Aldanophyton antiquissimum* Kryshtofovich, 1953**
Genus *Amgaella* Korde, 1961
***Amgaella amgaensis* Korde, 1961**

PHYLUM Porifera
Class Hexactinellida
Order incertae sedis
Family Protospongiidae Hinde, 1887
Genus *Diagoniella* Rauff, 1894
***Diagoniella* sp.**
Family incertae sedis
Genus *Lenica* Gorjansky, 1977
***Lenica unica* Gorjansky, 1977**
***L. rigbyi* Leguta in Ivantsov et al., 2005**
Class Demospongiae
Order incertae sedis
Family Choiidae de Laubenfels, 1955
Genus *Choia* Walcott, 1920
***Choia carteri* Walcott, 1920**
***C. utahensis* Walcott, 1920**
Family Wapkiidae de Laubenfels, 1955
Genus *Wapkia* Walcott, 1920
***Wapkia petila* A. Zhuravlev in Ivantsov et al., 2005**
Family Ivantsoviidae A. Zhuravlev in Ivantsov et al., 2005
Genus *Ivantsovia* A. Zhuravlev in Ivantsov et al., 2005
***Ivantsovia andreyi* A. Zhuravlev in Ivantsov et al., 2005**
Class Calcarea
Order, family incertae sedis
Genus *Dodecaactinella* Reif, 1968
***Dodecaactinella* sp.**
Class, order, family incertae sedis
Genus *Nabaviella* Mostler et Moslech-Yazdi, 1976
***Nabaviella* sp.**

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Genus *Cjulanciella* Fedorov in Fedorov et Pereladov, 1987
***Cjulanciella asimmetrica* Fedorov in Fedorov et Pereladov, 1987**
Class Archaeocyatha
Order Monocyathida Okulitch, 1935
Family Monocyathidae R. Bedford et W.R. Bedford, 1934
Genus *Archaeolynthus* Taylor, 1910
***Archaeolynthus polaris* (Vologdin, 1937)**
Family Tumuliolynthidae Rozanov in Rozanov et Missarzhevsky, 1966
Genus *Tumuliolynthus* Zhuravleva, 1963
***Tumuliolynthus primigenius* Zhuravleva in A. Zhuravlev et al., 1983**
Family Globosocyathidae Okuneva, 1969
Genus *Propriolynthus* Okuneva, 1967
***Propriolynthus vologdini* (Yakovlev, 1956)**
Order Ajacicyathida R. Bedford et J. Bedford, 1939
Suborder Dokidocyathina Volgdin, 1957
Family Dokidocyathidae R. Bedford et W.R. Bedford, 1936
Genus *Dokidocyathus* Taylor, 1910
***Dokidocyathus lenaicus* Rozanov in Zhuravleva et al., 1964**
***D. regularis* Zhuravleva, 1955**
Family Dokidocyathellidae Debrenne, 1964
Genus *Dokidocyathella*, Zhuravleva, 1960
***Dokidocyathella incognita* Zhuravleva, 1960**
Family Soanicyathidae Rozanov in Zhuravleva et al., 1964
Genus *Batchykicyathus* A. Zhuravlev in A. Zhuravlev et al., 1983
***Batchykicyathus angulosus* A. Zhuravlev in A. Zhuravlev et al., 1983**
Suborder Ajacicyathina R. Bedford et J. Bedford, 1939
Family Ajacicyathidae R. Bedford et J. Bedford, 1939
Genus *Orbicyathellus* Osadchaya in Zadorozhnaya et al., 1973
***Orbicyathellus* sp.**
Genus *Sibirecyathus* Vologdin, 1937
***Sibirecyathus suvorovae* (Zhuravleva, 1960)**
***S. polysynapticulosus* (Korshunov in Zhuravleva et al., 1969)**
Genus *Nochroicyathus* Zhuravleva, 1951
***Nochroicyathus aldanicus* Zhuravleva, 1960**
***N. anabarensis* (Vologdin, 1937)**
***N. tkatschenkoi* (Vologdin, 1937)**
***N. belvederi* (Rozanov in Rozanov et Missarzhevsky, 1966)**
***N. gigantoporus* (Zhuravleva, 1960)**
***N. kokoulini* Korshunov in Zhuravleva et al., 1969**
***N. lenaicus* Zhuravleva, 1951**
***N. mirabilis* Zhuravleva, 1951**
***N. dissepimentalis* Zhuravleva, 1960**
***N. prosper* Rozanov in Rozanov et al., 1969**
***N. consuetus* (Korshunov in Zhuravleva et al., 1969)**
***N. mutabilis* (Voronin, 1979)**
***N. pallidus* (Voronin, 1979)**
***N. infrequens* (Sundukov, 1979)**
***N. pseudoccultatus* (Rozanov in Rozanov et al., 1969)**
***N. ridiculus* Rozanov in Rozanov et al., 1969**
***N. similis* (Voronin, 1979)**
***N. simplex* (Vologdin, 1937)**
***N. subosensis* Korshunov, 1972**
***N. sunnaginicus* (Zhuravleva, 1960)**
***N. supervacuus* Rozanov in Rozanov et al., 1969**
***N. transitorius* (Voronin, 1979)**
***N. turbidus* (Rozanov in Rozanov et al., 1969)**
***N. virgatus* (Zhuravleva, 1960)**

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***N. vulgaris* Zhuravleva, 1960**
Genus *Rotundocyathus* Vologdin, 1960
***Rotundocyathus tenuimurus* (Vologdin, 1937)**
***R. grandis* (Zhuravleva, 1960)**
***R. biohermicus* (Zhuravleva, 1960)**
***R. ignotus* (Korshunov et Rozanov in Zhuravleva et al., 1969)**
***R. sublenaicus* (Korshunov et Rozanov in Zhuravleva et al., 1969)**
***R. jakshini* (Zhuravleva in Zhuravleva et al., 1969)**
***R. moori* (Vologdin, 1937)**
***R. novus* (Zhuravleva, 1960)**
***R. spinosoporosus* (Zhuravleva, 1960)**
***R. spinosus* (Zhuravleva, 1960)**
***R. syssoevi* (Korshunov in Zhuravleva et al., 1969)**
***R. expressus* (Voronin, 1979)**
Genus *Robustocyathellus* Konyushkov, 1972
***Robustocyathellus erbocyathoides* (Korshunov et Rozanov in Zhuravleva et al., 1969)**
***R. cancellatus* (Sundukov, 1984)**
Family Densocyathidae Vologdin, 1937
Genus *Leptosocyathus* Vologdin, 1937
***Leptosocyathus polyseptus* Latin in Zhuravleva, 1960**
Genus *Tennericyathus* Rozanov in Zhuravleva et al., 1969
***Tennericyathus malycanicus* Rozanov in Zhuravleva et al., 1969**
***T. annulatus* (Zhuravleva, 1960)**
Family Bronchocyathidae R. Bedford et J. Bedford, 1936
Genus *Gordonicyathus* Zhuravleva, 1959
***Gordonicyathus apprimus* (Korshunov in Zhuravleva et al., 1969)**
Genus *Taylorcyathus* Vologdin, 1955
***Taylorcyathus subtaylori* Zhuravleva in Zhuravleva et al., 1969**
***T. taylori* Zhuravleva, 1960**
Genus *Trininaecyathus* Zhuravleva, 1960
***Trininaecyathus macroporus* Zhuravleva, 1960**
Genus *Compositocyathus* Zhuravleva, 1960
***Compositocyathus muchattensis* (Zhuravleva, 1955)**
Family Ethmocyathidae Debrenne, 1969
Genus *Baikalocyathus* Yazmir in Zhuravleva, 1974
***Baikalocyathus rossicus* (Zhuravleva, 1960)**
Genus *Degeletticyathus* Zhuravleva in Zhuravleva et al., 1969
***Degeletticyathus galuschkoi* (Zhuravleva, 1960)**
***D. provisus* Sundukov, 1983**
Genus *Inessocyathus* Debrenne, 1964
***Inessocyathus pereladovi* (Sundukov, 1984)**
Family Sajanocyathidae Vologdin, 1956
Genus *Sajanocyathus* Vologdin, 1940
***Sajanocyathus egorovae* (Rozanov in Egorova et al., 1976)**
Genus *Irinaecyathus* Zhuravleva in Zhuravleva et Elkina, 1974
***Irinaecyathus schabanovi* Rozanov in Egorova et al., 1976**
***I. lenaicus* Rozanov in Egorova et al., 1976**
Genus *Zonacyathus* R. Bedford et W.R. Bedford, 1937
***Zonacyathus einastoi* (Zhuravleva in Zhuravleva et al., 1969)**
Family Bipallicyathidae Debrenne, Rozanov et A. Zhuravlev 1989
Genus *Heckericyathus* Zhuravleva, 1960
***Heckericyathus heckeri* (Zhuravleva, 1955)**
Family Robertocyathidae Rozanov, 1969
Genus *Robertocyathus* Rozanov, 1969
***Robertocyathus meshkovae* Zhuravleva in Zhuravleva et al., 1969**
***R. alexseevi* Sundukov, 1987**
Family Pretiosocyathidae Rozanov, 1969

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Genus *Pretiosocyathus* Rozanov in Rozanov et Missarzhevsky, 1966
***Pretiosocyathus lectus* (Korshunov, 1983)**
Family Erbocyathidae Vologdin et Zhuravleva, 1956
Genus *Pluralicyathus* Okulitch, 1950
***Pluralicyathus heterovallum* (Vologdin, 1928)**
Genus *Ladaecyathus* Zhuravleva, 1960
***Ladaecyathus sublimbatus* Zhuravleva in Zhuravleva et al., 1969**
Family Tegerocyathidae Krasnopeeva in Debrenne et al., 1989
Genus *Tegerocyathus* Krasnopeeva, 1955
***Tegerocyathus ketemensis* Rozanov in Egorova et al., 1976**
Family Tumulocyathidae Krasnopeeva, 1953
Genus *Tumulocyathus* Vologdin, 1937
***Tumulocyathus kotuyikensis* (Zhuravleva, 1960)**
***T. tuberculatus* (Sundukov, 1979)**
Genus *Plicocyathus* Vologdin, 1960
***Plicocyathus platiseptatus* (Zhuravleva, 1960)**
Genus *Isiticyathus* Korshunov, 1972
***Isiticyathus ultrus* (Korshunov in Zhuravlevaet al., 1969)**
Family Sanarkocyathidae Hill, 1972
Genus *Ringifungia* Korshunov in Zhuravleva et al., 1969
***Ringifungia vavilovi* Korshunov in Zhuravleva et al., 1969**
Family Geocyathidae Debrenne, 1964
Genus *Geocyathus* Zhuravleva, 1960
***Geocyathus Buotamanensis* (Zhuravleva in Zhuravleva et Zelenov, 1955)**
***G. krasnopeevae* (Zhuravleva, 1960)**
***G. latini* (Zhuravleva, 1960)**
Family Japhanicyathidae Rozanov in Debrenne et al., 1989
Genus *Japhanicyathus* Korshunov in Zhuravleva et al., 1969
***Japhanicyathus genurosus* Korshunov in Zhuravleva et al., 1969**
Family Lenocyathidae Zhuravleva in Vologdin, 1956
Genus *Lenocyathus* Zhuravleva, 1955
***Lenocyathus lenaicus* Zhuravleva, 1955**
Family Tumulifungiidae Rozanovin Debrenne et al., 1989
Genus *Subtumulocyathellus* Osadchaya in Osadchaya et al., 1979
***Subtumulocyathellus unicumus* (Zhuravleva, 1960)**
Genus *Sclerocyathus* Vologdin, 1960
***Sclerocyathus australis* (Rozanov in Rozanov et al., 1969)**
Family Jakutocarinidae Debrenne, Rozanov et A. Zhuravlev, 1989
Genus *Jakutocarinus* Zhuravleva, 1960
***Jakutocarinus jakutensis* Zhuravleva, 1960**
Genus *Rossocyathella* Zhuravleva, 1960
***Rossocyathella ninaekosti* Zhuravleva, 1960**
***R. shenfili* Zhuravleva in Zhuravleva et al., 1969**
Family Gagarinicyathidae Debrenne, Rozanov et A. Zhuravlev, 1989
Genus *Gagarinicyathus* Zhuravleva in Datsenko et al., 1968
***Gagarinicyathus tarynensis* Zhuravleva in Zhuravleva et al., 1969**
Family Fallocyathidae Rozanov in Zhuravleva et al., 1969
Genus *Fallocyathus* Rozanov in Zhuravleva et al., 1969
***Fallocyathus dubius* Rozanov in Zhuravleva et al., 1969**
***F. savitskyi* Sundukov, 1983**
Family Kijacyathidae Zhuravleva in Repina et al., 1964
Genus *Fansycyathus* Korshunov et Rozanov in Zhuravleva et al., 1969
***Fansycyathus lermontovae* Korshunov et Rozanov in Zhuravleva et al., 1969**
Genus *Yudjaicyathus* A. Zhuravlev in A. Zhuravlev et al., 1983
***Yudjaicyathus astashkini* A. Zhuravlev in A. Zhuravlev et al., 1983**
Family Carinacyathidae Krasnopeeva, 1953
Genus *Carinacyathus* Vologdin, 1932

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***Carinacyathus kigitasensis* Zhuravleva, 1960**
***C. pinus* (Zhuravleva, 1960)**
***C. squamosus* (Zhuravleva, 1954)**
Family Ethmophyllidae Okulitch, 1937
Genus *Squamosocyathus* Zhuravleva, 1960
***Squamosocyathus taumatus* Zhuravleva, 1960**
Family Botomocyathidae Zhuravleva, 1955
Genus *Botomocyathus* Zhuvavleva, 1955
***Botomocyathus astrumus* Korshunov in Zhuravleva et al., 1969**
***B. zelenovi* Zhuravleva, 1955**
Suborder Erismacoscinina Debrenne, Rozanov et A. Zhuravlev, 1989
Family Asterocyathidae Vologdin, 1956
Genus *Erismacoscinus* Debrenne, 1958
***Erismacoscinus rojkovi* (Vologdin, 1937)**
***E. gracilis* (Rozanov in Rozanov et al., 1969)**
***E. aculeatus* (Sundukov, 1986)**
***E. oymuranensis* A. Zhuravlev, 1990**
***E. mulrtifarius* A. Zhuravlev, 1990**
***E. batchykensis* A. Zhuravlev, 1990**
***E. fimbriatulus* A. Zhuravlev, 1990**
Genus *Retecoscinus* Zhuravleva, 1960
***Retecoscinus sakhaensis* A. Zhuravlev, 1990**
***R. zegebarti* Korshunov in Zhuravleva et al., 1969**
Genus *Antoniocoscinus* A. Zhuravlev in Debrenne et al., 1988
***Antoniocoscinus vsevolodi* (Korshunov in Zhuravleva et al., 1969)**
Family Agyrekocyathidae Konyushkov, 1967
Genus *Agyrekocyathus* Konyushkov, 1967
***Agyrekocyathus grigorievi* (Zhuravleva, 1960)**
***A. gratus* (Korshunov in Zhuravleva et al., 1969)**
Family Tumulocoscinidae Zhuravleva, 1960
Genus *Tumulocoscinus* Zhuravleva, 1960
***Tumulocoscinus atdabanensis* Zhuravleva, 1960**
***T. Buotamaensis* Korshunov in Zhuravleva et al., 1969**
Family Rozanovicyathidae Korshunov in Zhuravleva et al., 1969
Genus *Rozanovicyathus* Korshunov in Zhuravleva et al., 1969
***Rozanovicyathus alexi* Korshunov in Zhuravleva et al., 1969**
Family Tatijanaecyathidae Korshunov, 1976
Genus *Muchattocyathus* Rozanov in Debrenne et al., 1976
***Muchattocyathus sibiricus* Rozanov in Debrenne et al., 1976**
Order Capsulocyathida Zhuravleva, 1964
Suborder Capsulocyathina Zhuravleva, 1964
Family Cryptoporocyathidae Zhuravleva, 1960
Genus *Cryptoporocyathus* Zhuravleva, 1960
***Cryptoporocyathus junicanensis* Zhuravleva, 1960**
Family Uralocyathellidae Zhuravleva, 1964
Genus *Rhabdolynthus* Zhuravleva, 1960
***Rhabdolynthus conicus* Zhuravleva, 1960**
Family Tylocyathidae A. Zhuravlev, 1988
Genus *Korshunovicyathus* A. Zhuravlev in Debrenne et al., 1988
***Korshunovicyathus melnikovi* (Korshunov et Zhuravleva, 1967)**
Family Fransuasaecyathidae Debrenne, 1964
Genus *Fransuasaecyathus* Zhuravleva, 1960
***Fransuasaecyathus elegans* Okunev, 1969**
***F. subtumulatus* Zhuravleva, 1960**
Suborder Coscinocyathina Zhuravleva, 1955
Family Coscinocyathidae Taylor, 1910
Genus *Coscinocyathus* Bornemann, 1884

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***Coscinocyathus isointervallumus* Zhuravleva, 1960**
***C. latus* Korshunov in Zhuravleva et al., 1969**
***C. marocanoides* Zhuravleva in Datsenko et al., 1968**
Order Archaeocyathida Okulitch, 1935
Suborder Loculicyathina Zhuravleva, 1955
Family Loculicyathidae Zhuravleva, 1954
Genus *Neoloculicyathus* Voronin, 1979
***Neoloculicyathus sibiricus* (Sundukov, 1986)**
Genus *Okulitchicyathus* Zhuravleva, 1960
***Okulitchicyathus discoformis* (Zhuravleva in Zhuravleva et Zelenov, 1955)**
Genus *Cambrocyathellus* Zhuravleva, 1960
***Cambrocyathellus proximus* (Fonin in A. Zhuravlev et al., 1983)**
***C. tschuranicus* Zhuravleva, 1960**
Family Sakhacyathidae Debrenne et A. Zhuravlev, 1990
Genus *Sakhacyathus* Debrenne et A. Zhuravlev, 1990
***Sakhacyathus subartus* (Zhuravleva, 1960)**
Suborder Archaeocyathina Okulitch, 1935
Family Dictyocyathidae Taylor, 1910
Genus *Dictyocyathus* Bornemann, 1891
***Dictyocyathus translucidus* Zhuravleva, 1960**
***D. bobrovi* Korshunov, 1972**
Family Archaeopharetridae R. Bedford et W.R. Bedford, 1936
Genus *Dictyosycon* Zhuravleva, 1960
***Dictyosycon gravis* Zhuravleva, 1960**
Family Archaeocyathidae Hinde, 1889
Genus *Archaeocyathus* Billings, 1861
***Archaeocyathus okulitchi* Zhuravleva, 1960**
Family Copleicyathidae R. Bedford et J. Bedford, 1937
Genus *Spinosocyathus* Zhuravleva, 1960
***Spinosocyathus maslennikovae* Zhuravleva, 1960**

Class Cribricyatha Vologdin, 1961
Order Vologdinophyllida Radugin, 1964
Family Capillicyathidae Vologdin, 1964
Genus *Gracilocyathus* Vologdin et Jankauskas, 1968
***Gracilocyathus discoformis* (A. Zhuravlev et Sundukov, 1989)**

Class Radiocyatha Debrenne, H. Termier et G. Termier, 1970
Family Hetairacyathidae R. Bedford et J. Bedford, 1937
Genus *Girphanovella* Zhuravleva in Zhuravleva et al., 1967
***Girphanovella* sp.**
Genus *Gonamispongia* Korshunov, 1968
***Gonamispongia ignorabilis* Korshunov, 1968**

PHYLUM Cnidaria
Class Hydroconozoa Korde, 1963
Genus *Hydroconus* Korde, 1963
***Hydroconus* sp.**

Family Tannuolaidae
Genus *Khasaktia* Sayutina, 1980
***Khasaktia vesicularis* Sayutina, 1980**
Class, order, family incertae sedis
Genus *Cysticyathus* Zhuravleva, 1955
***Cysticyathus tunicatus* Zhuravleva, 1955**
Genus *Lenaella* Korde, 1959

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***Lenaella reticulata* Korde, 1959**
Genus *Cambrorhytium* Conway Morris et Robison, 1988
***Cambrorhytium minor* Ivantsov et Urbanek in Ivantsov et al., 2005**

PHYLUM Cephalorhyncha
Class Palaeoscolecida
Family Palaeoscolecidae Whittard, 1953
Genus *Wronascolex* Ivantsov et A. Zhuravlev in Ivantsov et al., 2005
***Wronascolex lubovae* (Ivantsov et Wrona, 2004)**
***W. spinosus* (Ivantsov et Wrona, 2004)**
Genus *Corallioscolex* Müller et Hintz-Schallreuter, 1993
***Corallioscolex labyrinthus* (Ivantsov et Wrona, 2004)**
Genus *Piloscolex* Ivantsov et A. Zhuravlev in Ivantsov et al., 2005
***Piloscolex platum* Ivantsov et A. Zhuravlev in Ivantsov et al., 2005**
Genus *Lenargyrion* Bengtson, 1977
***Lenargyrion knappologicum* Bengtson, 1977**
Genus *Nikolarites* Vassiljeva, 1994
***Nikolarites spasskii* Vassiljeva, 1994**
Class Louisellaia
Order Louisellida Adrianov et Malakhov, 1995
FamilyVladipriapulidae Ivantsov et A. Zhuravlev in Ivantsov et al., 2005
Genus *Vladipriapulus* Ivantsov et A. Zhuravlev in Ivantsov et al., 2005
***Vladipriapulus malakhovi* Ivantsov et A. Zhuravlev in Ivantsov et al., 2005**

PHYLUM Tardipolypoda
Order Xenusia Dzik et Krumbiegel, 1989
Xenusia gen. et sp. indet.
Family Eoconchariidae Hao et Shu, 1987
Genus Microdictyon Bengston, Matthews et Missarzhevsky, 1981
***Microdictyon effusum* Bengtson, Matthews et Missarzhevsky, 1981**
***M. inceptor* (Missarzhevsky in Missarzhevsky et Mambetov, 1981)**
***M.? tenuiporatum* Bengtson, Matthews et Missarzhevsky, 1986**
***M.* cf. *M. ovalum* (Hao et Shu, 1987)**
Genus *Cowiella* Hinz, 1987
***Cowiella cowiei* Vassiljeva, 1998**
Genus *Markuelia* Valkov, 1983
***Markuelia secunda* Valkov, 1983**

PHYLUM Arthropoda
Class Artiopoda
Subclass Conciliterga
Order Tuzoiida Simonetta et Delle Cave, 1975
Family Tuzoiidae Raymond, 1935
Genus *Tuzoia* Walcott, 1912
***Tuzoia* sp.**
Family Isoxyidae Brooks et Caster, 1956
Genus *Isoxys* Walcott, 1890
***Isoxys zhurensis* Ivantsov, 1990**
Family unknown
Genus *Phytophilaspis* Ivantsov, 1999
***Phytophilaspis pergamena* Ivantsov, 1999**
Class Trilobita
Order Agnostida Salter, 1864
Suborder Eodiscina Kobayashi, 1939
Superfamily Eodiscoidea Raymond, 1913
Family Calodiscidae Kobayashi, 1943

ANNEX C

Genus *Neocobboldia* Rasetti, 1952
***Neocobboldia dentata* (Lermontova, 1940)**
***N. paradentata* Repina in Khomentovskiy et Repina, 1965**
Family Hebediscidae Kobayashi, 1944
Genus *Hebediscus* Whitehouse, 1936
***Hebediscus attleborensis* (Shaler et Foerste, 1888)**
***H. vagus* Egorova in Egorova et Savitskiy, 1969**
Genus *Delgadella* Walcott, 1912
***Delgadella anabara* (Lazarenko, 1962)**
***D. lenaica* (Toll, 1899)**
***D. tolli* (Lermontova, 1951)**
Genus *Neopagetina* Pokrovskaya, 1960
***Neopagetina primaeva* (Lermontova, 1940)**
***N. shishkini* Egorova in Savitskiy et al., 1972**
***N. venusta* Lazarenko, 1962**
***N.* aff. *N. orbiculata* Lazarenko, 1962**
Family Pagetiidae Kobayashi, 1935
Genus *Triangulaspis* Lermontova, 1940
***Triangulaspis annio* (Cobbold, 1910)**
***T. lermontovae* Lazarenko, 1957**
***T. meglitzkii* (Toll, 1899)**
Genus *Triangulina* Repina in Khomentovskiy et Repina, 1965
***Triangullina parvula* Repina in Khomentovskiy et Repina, 1965**
Family Yukoniidae S. Zhang, 1980
Genus *Lenadiscus* Repina in Khomentovskiy et Repina, 1965
***Lenadiscus unicus* Repina in Khomentovskiy et Repina, 1965**
Suborder Agnostina
Family Peronopsidae Westergard, 1936
Genus *Peronopsis* Hawle et Corda, 1847
***Peronopsis* sp.**
Order Redlichiida
Suborder Olenellina Vogdes, 1893
Family Archaeaspididae Repina, 1979
Genus *Archaeaspis* Repina in Khomentovskiy et Repina, 1965
***Archaeaspis hupei* Repina in Khomentovskiy et Repina, 1965**
Family Fallotaspididae Hupe, 1953
Genus *Profallotaspis* Repina in Khomentovskiy et Repina, 1965
***Profallotaspis jakutensis* Repina in Khomentovskiy et Repina, 1965**
Genus *Repinaella* Geyer, 1996
***Repinaella explicata* (Repina in Khomentovskiy et Repina, 1965)**
Family Judomiidae Repina, 1979
Genus *Judomia* Lermontova, 1940
***Judomia lata* Repina in Khomentovskiy et Repina, 1965**
***J. mattajensis* Lazarenko, 1962**
***J. rosea* Jell et Repina, 1992**
***J. tera* Lazarenko, 1960**
Genus *Judomiella* Lazarenko, 1962
***Judomiella heba* Lazarenko, 1962**
Genus *Sinskia* Suvorova, 1960
***Sinskia optabilis* Suvorova, 1960**
Family Nevadiidae Hupe, 1953
Genus *Nevadella* Raw, 1936
***Nevadella subgroenlandica* (Repina in Khomentovskiy et Repina, 1965)**
Suborder Redlichiina Richter, 1932
Superfamily Redlichioidea Poulsen, 1927
Family Chengkouaspidae Zhang et Lin, 1980
Genus *Bulaiaspis* Lermontova, 1956

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***Bulaiaspis limbata* Repina, 1960**
***B. sajanica* Repina, 1960**
Genus *Pseudoresserops* Repina in Khomentovskiy et Repina, 1965
***Pseudoresserops oculatus* Repina in Khomentovskiy et Repina, 1965**
Genus *Resserops* Richter, 1940
***Resserops delicatus* Repina in Khomentovskiy et Repina, 1965**
Family Metadoxididae Whitehouse, 1939
Genus *Metadoxides* Bornemann, 1891
***Metadoxides patrium* Repina in Khomentovskiy et Repina, 1965**
Family Redlichinidae Zhang et Lin, 1980
Genus *Redlichina* Lermontova, 1940
***Redlichina tchernischevae* Repina in Khomentovskiy et Repina, 1965**
***Redlichina tuberculata* Pokrovskaya, 1959**
***Redlichina zhurinica* Repina, 1977**
Genus *Tungusella* Repina, 1960
***Tungusella manica* Repina, 1960**
Superfamily Paradoxidoidea Poulsen, 1927
Family Paradoxididae Hawlle et Corda, 1847
Genus *Paradoxides* Brongniart, 1822
***Paradoxides rozanovi* Egorova in Egorova et al., 1976**
Genus *Anabaraspis* Lermontova, 1951
***Anabaraspis splendens* Lermontova, 1951**
Genus *Schistocephalus* Tchernysheva, 1956
***Schistocephalus antiquus* Tchernysheva, 1956**
Superfamily Ellipsocephalacea Matthew, 1887
Family Ellipsocephalidae Matthew, 1887
Genus *Pauliceps* Repina in Khomentovskiy et Repina, 1965
***Pauliceps granulosa* Repina in Khomentovskiy et Repina, 1965**
Genus *Sailycaspis* Repina in Khomentovskiy et Repina, 1965
***Sailycaspis guttata* Repina in Khomentovskiy et Repina, 1965**
Order Corynexochida Kobayashi, 1935
Family Amgaspidae N. Tchernysheva, 1960
Genus *Amgaspis* N. Tchernysheva, 1956
***Amgaspis medius* N. Tchernysheva, 1956**
Family Corynexochidae Angelin, 1854
Genus *Bonnaspis* Resser, 1936
***Bonnaspis acinosa* Repina in Khomentovskiy et Repina, 1965**
Genus *Bonnaria* Lochman, 1956
***Bonnaria* sp.**
Genus *Amginoerbia* N. Tchernysheva, 1976
***Amginoerbia selecta* N. Tchernysheva, 1976**
Genus *Chilometopus* Rusconi, 1952
***Chilometopus consuetus* Suvorova, 1964**
***C. convectus* Suvorova, 1964**
***C. suvorovae* Tomashpolskaya, 1971**
Genus *Sinijanella* Repina in Khomentovskiy et Repina, 1965
***Sinijanella rara* Repina in Khomentovskiy et Repina, 1965**
Genus *Laticephalus* Pokrovskaya, 1959
***Laticephalus astrictus* Repina in Khomentovskiy et Repina, 1965**
Genus *Uktaspis* Korobov, 1963
***Uktaspis (Uktaspis) granulata* Korobov, 1963**
***Uktaspis (Prouktaspis) insolens* (Suvorova, 1960)**
Family Dinesidae Lermontova, 1940
Genus *Dinesus* Etheridge, 1896
***Dinesus granulosa* (Lermontova, 1940)**
Genus *Erbia* Lermontova, 1940
***Erbia sibirica* (Schmidt, 1886)**

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Genus *Erbiopsis* Repina in Khomentovskiy et Repina, 1965
***Erbiopsis doliaris* Repina in Khomentovskiy et Repina, 1965**
Genus *Proerbia* Lermontova, 1940
***Proerbia prisca* Lermontova, 1940**
Genus *Compsocephalus* Repina, 1964
***Compsocephalus generosus* Repina in Khomentovskiy et Repina, 1965**
Family Dolychometopidae Walcott, 1916
Genus *Amphoton* Lorenz, 1906
***Amphoton longus* N. Tchernyshova, 1961**
Genus *Dolichometopus* Angelin, 1852
***Dolichometopus perfidellis* Egorova in Savitskiy et Egorova, 1969**
Genus *Poliellina* Poletaeva, 1940
***Poliellina crassa* Repina in Repina et al., 1964**
***P. elongata* Pokrovskaya, 1959**
***P. poletaevae* Repina in Khomentovskiy et Repina, 1965**
Family Dorypygidae Kobayashi, 1933
Genus *Bonnia* Walcott, 1916
***Bonnia venefica* Repina in Khomentovskiy et Repina, 1965**
Genus *Kootenia* Walcott,1889
***Kootenia amgensis* N. Tchernyshova, 1961**
***K. anabarensis* Lermontova, 1951**
***K. deflexa* Tomashpolskaya, 1971**
***K. jakutensis* Lermontova, 1951**
***K. moori* Lazasenko, 1962**
***K. nebulosa* Repina in Khomentovskiy et Repina, 1965**
***K. ontoensis* N. Tchernyshova, 1961**
***K. rasilis* Suvorova, 1964**
***K. siberica* Lermontova, 1940**
Genus *Kooteniella* Lermontova, 1940
***Kooteniella acuta* N. Tchernyshova, 1961**
***K. sima* Suvorova, 1964**
***K. slatkowskii* (Schmidt, 1886)**
***K. turgida* Suvorova, 1964**
Genus *Olenoides* Meek, 1877
***Olenoides aptus* Suvorova, 1964**
***O. calvus* Lazarenko, 1954**
Genus *Atdabanella* Repina in Khomentovskiy et Repina, 1965
***Atdabanella plana* Repina in Khomentovskiy et Repina, 1965**
Genus *Miranella* Pokrovskaya, 1960
***Miranella* aff. *M. convexa* Pokrovskaya in Egorova et al., 1960**
Family Edelsteinaspidae Hupé, 1953
Genus *Edelsteinaspis* Lermontova, 1940
***Edelsteinaspis gracilis* Lermontova, 1964**
***E. granulata* Ivantsov in Ivantsov et al., 2005**
***E. ornata* Lermontova, 1940**
***E. plana* N. Tchernyshova, 1961**
Family Jakutidae Suvorova, 1959
Genus *Jakutus* Lermontova, 1940
***Jakutus amplus* Egorova in Egorova et al., 1976**
***J. primigenius* Ivantsov in Ivantsov et al., 2005**
Genus *Bathyuriscellus* Lermontova, 1951
***Bathyuriscops obtusus* Repina in Khomentovskiy et Repina, 1965**
***B. sinieneis* Ivantsov in Ivantsov et al., 2005**
***B.* aff. *B. robustus* Lermontova, 1951**
Family Ogygopsididae Rasetti, 1951
Genus *Ogygopsis* Walcott, 1889
***Ogygopsis batis* (Walcott, 1916)**

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Genus *Labradoria* Resser, 1936
***Labradoria asiatica* Repina in Khomentovskiy et Repina, 1965**
Family Zacanthoididae Swinnerton, 1915
Genus *Micmaccopsis* Lermontova, 1940
***Micmaccopsis conspecta* Suvorova, 1964**
***M. lata* Repina in Khomentovskiy et Repina, 1965**
***M. redlichoides* Lermontova, 1940**
***M. tarynica* Repina in Khomentovskiy et Repina, 1965**
Genus *Prozacanthoides* Resser, 1937
***Prozacanthoides* sp.**
Family incertae sedis
Genus *Muchattelina* Repina in Khomentovskiy et Repina, 1965
***Muchattelina translatica* Repina in Khomentovskiy et Repina, 1965**
Order Asaphida
Family Anomocaridae Poulsen, 1927
Genus *Pseudanomocarina* N. Tchernysheva, 1956
***Pseudanomocarina aojiformis* N. Tchernyshova, 1956**
Genus *Chondranomocare* Poletaeva, 1956
***Chondranomocare bidjensis* Poletaeva, 1956**
***C. eminens* N. Tchernyshova, 1961**
Genus *Koptura* Resser et Endo, 1937
***Koptura lata* N. Tchernyshova, 1961**
***K. oblonga* N. Tchernyshova, 1961**
Family Asaphidae Raymond, 1924
Genus *Proasaphicus* Resser et Endo, 1937
***Proasaphicus sibiricus* N. Tchernyshova, 1950**
Genus *Tankhella* N. Tchernyshova, 1961
***Tankhella devexa* N. Tchernyshova, 1961**
Order Ptychopariida
Suborder Ptychoparioidea
Family Ptychopariidae Matthew, 1888
Genus *Altitudella* Repina, 1974
***Altitudella tenera* Repina, 1974**
Genus *Eoptychoparia* Rasetti, 1955
***Eoptychoparia manifesta* Lazarenko, 1962**
Genus *Eospencia* Tchernyshova, 1961
***Eospencia* sp.**
Genus ***Erbiella*** Fedyanina, 1962
***Erbiella musta* Repina, 1972**
***E. pjankovskia* Fedyanina in Pospelov et al., 1962**
Genus *Kolbinella* Repina, 1960
***Kolbinella* sp.**
Genus *Laminurus* Repina, 1960
***Laminurus planus* Repina in Repina et al., 1964**
Genus *Ptychoparia* Hawle et Corda, 1847
***Ptychoparia magna* N. Tchernyshova in Egorova et al., 1960**
Genus *Parehmania* Deiss, 1939
***Parehmania lata* N. Tchernyshova in Egorova et al., 1976**
Genus *Gaphuraspis* Ivshin, 1957
***Gaphuraspis inornata* E. Romanenko, 1971**
Suborder Ellipsocepaloidea
Family Agraulidae Raymond, 1913
Genus *Elankaspis* Egorova in Egorova et al., 1976
***Elankaspis abrosa* Egorova in Egorova et al., 1976**
Genus *Lenagraulos* Egorova in Egorova et al., 1976
***Lenagraulos stabilis* Egorova in Egorova et al., 1976**
Genus *Tetragonocephalus* Repina in Khomentovskiy et Repina, 1965

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***Tetragonocephalus gratus* Repina in Khomentovskiy et Repina, 1965**
Family Aldonaiidae Hupé, 1952
Genus *Aldonaia* Lermontova, 1940
***Aldonaia convexalimbata* Repina in Khomentovskiy et Repina, 1965**
***A. pokrovskayae* Korobov, 1963**
***A. ornata* Lermontova, 1940**
***A. tersa* Suvorova, 1960**
Family Ellipsocephhallidae Matthew, 1887
Genus *Micmacca* Matthew, 1895
***Micmacca enormis* Repina in Khomentovskiy et Repina, 1965**
Genus *Paramicmacca* Egorova, 1967
***Paramicmacca peculiaris* Egorova, 1967**
***P. petropavlovskii* Suvorova, 1960**
***P. sibirica* Lermontova, 1951**
Family Paleolenidae Hupe, 1953
Genus *Validaspis* Repina, 1977
***Validaspis uzitata* (Repina 1972)**
Family Protolenidae R Richter et E Richter, 1948
Genus *Lermontovia* Suvorova, 1956
***Lermontovia dzevanovskii* (Lermontova, 1951)**
***L. grandis* (Lermontova, 1951)**
***L. lenaica* Suvorova, 1956**
Genus *Kadyella* Pokrovskaya, 1959
***Kadyella ubsanurica* Pokrovskaya, 1959**
***K. Buotamaensis* Repina in Khomentovskiy et Repina, 1965**
Genus *Bergeroniellus* Lermontova, 1940
***Bergeroniellus asiaticus* Lermontova, 1940**
***B. atlassovi* Lermontova, 1951**
***B. bellus* Egorova, 1967**
***B. expansus* (Lermontova, 1951)**
***B. flerovae* Lermontova, 1951**
***B. gurarii* Suvorova, 1956**
***B. lermontovae* Suvorova, 1956**
***B. ketemensis* Suvorova, 1956**
***B. micmacciformis* Suvorova, 1956**
***B. solitarius* Suvorova, 1956**
***B. spinosus* Lermontova, 1951**
Genus *Bergeroniaspis* Lermontova, 1951
***Bergeroniaspis divergens* (Lermontova, 1940)**
***B. dualis* Egorova, 1965**
***B. jucunda* Repina, 1977**
***B. kutorginorum* Lermontova, 1951**
***B. lenaica* Lazarenko, 1974**
***B. ornata* Lermontova, 1951**
***B. subornata* Suvorova, 1956**
Genus *Bigotina* Cobbold, 1935
***Bigotina (Bigotinella) rara* Repina in Repina et Luchinina, 1981**
Genus *Olekmaspis* Suvorova, 1956
***Olekmaspis bobrovi* Suvorova, 1956**
Family Solenopleuridae Angelin, 1854
Genus *Binodaspis* Lermontova, 1951
***Binodaspis lecta* Egorova in Egorova et al., 1976**
***B. paula* Suvorova, 1960**
***B. plana* Suvorova, 1960**
***B. secunda* Suvorova, 1960**
***B. spinosa* Lermontova, 1951**
Genus *Solenopleurella* Poulsen, 1927

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***Solenopleurella bella* (Rjonsnitzky, 1951)**
Order incertae sedis
Family Alokistocaridae Resser, 1939
Genus *Alokistocare* Lorenz, 1906
***Alokistocare deflexum* Egorova in Savitskiy et Egorova, 1969**
***A. laticaudum* Resser, 1939**
Genus *Lenacare* Egorova in Egorova et al., 1976
***Lenacare asperum* Egorova in Egorova et al., 1976**
Family Granulariidae Poletaeva, 1951
Genus *Granularia* Poletaeva, 1951
***Granularia grandis* Lermontova, 1961**
***G. muchattaensis* Repina in Khomentovskiy et Repina, 1965**
***G. obrutchevi* Poletaeva, 1951**
***G. protolenorum* Lermontova, 1951**
Family Namanoiidae Lermontova, 1951
Genus *Namanoia* Lermontova, 1951
***Namanoia incerta* N. Tchernyshova, 1961**
Genus *Inouyina* Poletaeva, 1936
***Inouyina lenaica* Egorova, 1976**
Genus *Juliaspis* Semashko, 1969
***Juliaspis solida* Semashko, 1969**
Genus *Chondrinouyina* Repina in Khomentovskiy et Repina, 1965
***Chondrinouyina olekmica* Repina in Khomentovskiy et Repina, 1965**
Genus *Tarynaspis* Repina in Khomentovskiy et Repina, 1965
***Tarynaspis brevis* Repina in Khomentovskiy et Repina, 1965**
Family Utiidae Kobayashi, 1935
Genus *Amginouyia* N. Tchernyshova, 1956
***Amginouyia elegans* N. Tchernyshova, 1956**
Genus *Chondrograulina* Pokrovskaya, 1960
***Chondrograulina ovalis* Pokrovskaya, 1960**
Genus *Chondragraulos* Lermontova, 1940
***Chondragraulos arcuata* N. Tchernyshova, 1961**
***C. convexa* N. Tchernyshova, 1960**
***C. curvae* N. Tchernyshova in Egorova et al., 1976**
***C. manca* Egorova in Egorova et al., 1976**
***C. minussensis* Lermontova, 1940**
***C. necopina* (Egorova, 1964)**
Genus *Sanaschtikgolia* Poletaeva, 1960
***Sanaschtikgolia vertebrata* Repina in Khomentovskiy et Repina, 1965**
***S. semisphaerica* Poletaeva, 1960**
Superclass Mandibulata
Class Crustacea
Superorder Bradoriamorphes
Order Bradoriida Raymond, 1935
Family Alutidae Huo, 1956
Genus *Sinskolutella* Melnikova, 1998
***Sinskolutella ordinata* (Melnikova in Grigorieva et al., 1983)**
Family Kunmingellidae Huo, 1965
Genus *Yakutingella* Melnikova, 1998
***Yakutingella intricata* Melnikova, 1998**
Family Duibianellidae Shu, 1990
Genus *Duibianella* Shu, 1990
***Duibianella* sp.**
?Family Monasteriidae Jones et McKenzie, 1980
Genus *Tubuterium* Melnikova, 2000
***Tubuterium ivantsovi* Melnikova, 2000**
Genus *Mongolitubulus* Missarzhevsky, 1977

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***Mongolitubulus squamifer* Missarzhevsky, 1977**
Family Cambriidae Lee, 1975
Genus *Cambria* Neckaja et Ivanova, 1956
***Cambria egorovae* (Melnikova in Grigorieva et al., 1983)**

PHYLUM Annelida
Class Polychaeta
Order Hyolithelmintida Fisher, 1962
Family Hyolithellidae Walcott, 1886
Genus *Hyolithellus* Billings, 1871
***Hyolithellus grandis* Missarzhevsky in Rozanov et al., 1969**
***H. isiticus* Missarzhevsky in Rozanov et al., 1969**
***H. tenuis* Missarzhevsky, 1966**
***H. tortuosus* Cobbold et Pocock, 1934**
***H. vladimirovae* Missarzhevsky, 1966**
Family Torellellidae Holm, 1893
Genus *Torellella* Holm, 1893
***Torellella curva* Missarzhevsky, 1966**
***T. lentiformis* (Sysoiev, 1960)**
Genus *Rushtonia* Cobbold et Pocock, 1934
***Rushtonia* sp.**

PHYLUM Mollusca
Class Polyplacophora
Subclass Diplacophora
Order Sachitida He, 1980
Superfamily Siphogonuchitoidea Qian, 1977
Family Siphogonuchitidae Qian, 1977
Genus *Siphogonuchites* Qian, 1977
***Siphogonuchites* sp.**
Genus *Lopochites* Qian, 1977
***Lopochites meshkovae* (Fedorov, 1984)**
Superfamily Halkierioidea Poulsen, 1967
Family Halkieriidae Poulsen, 1967
Genus *Halkieria* Poulsen, 1967
***Halkieria sacciformis* (Meshkova, 1969)**
Genus *Sachites* Meshkova, 1969
***Sachites proboscideus* Meshkova, 1969**
Family Wiwaxiidae Walcott, 1911
Genus *Wiwaxia* Walcott, 1911
***Wiwaxia* sp.**
Class Monoplacophora
Order incertae sedis
Family Maikhanellidae Missarzhevsky, 1989
Genus *Purella* Missarzhevsky, 1974
***Purella antiqua* (Abaimova, 1976)**
***P. cristata* Missarzhevsky, 1974**
Class Gastropoda
Subclass Archaeobranchia
Order Helcionelliformes Golikov et Starobogatov, 1975
Superfamily Helcionelloidea Wenz, 1938
Family Helcionellidae Wenz, 1938
Genus *Bemella* Missarzhevsky in Rozanov et al., 1969
***Bemella costata* Fedorov, 1984**
***B. inconspicua* Vassilieva, 1990**
***B. jacutica* (Missarzhevsky in Rozanov et Missarzhevsky, 1966)**

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***B. malycanica* (Missarzhevsky in Rozanov et Missarzhevsky, 1966)**
***B. parula* Missarzhevsky in Rozanov et al., 1969**
***B. septata* (Missarzhevsky in Rozanov et Missarzhevsky, 1966)**
***B. villemsonae* Vassilieva, 1990**
Genus *Ilsanella* Missarzhevsky, 1981
***Ilsanella savitzkii* (Missarzhevsky in Rozanov et al., 1969)**
***I. atdabanica* (Missarzhevsky in Rozanov et Missarzhevsky, 1966)**
Genus *Igorellina* Missarzhevsky, 1989
***Igorellina monstrosa* (Missarzhevsky in Rozanov et al., 1969)**
Genus *Securiconus* Jiang, 1980
***Securiconus costulatus* Missarzhevsky, 1989**
Genus *Auricullina* Vassilieva, 1998
***Auricullina papulosa* Vassilieva, 1998**
?Genus *Aldanolina* Pelman, 1976
***Aldanolina magna* Pelman, 1976**
Genus *Obtusoconus* Yu, 1979
***Obtusoconus honorabilis* (Qian, Chen et Chen, 1979)**
***O. mirabilis* Vassilieva, 1990**
***O. paucicostatus* Yu, 1979**
Family Igarkiellidae Parkhaev, 2001
Genus *Igarkiella* Vassilieva, 1998
***Igarkiella mirabilis* (Yu, 1979)**
Family Coreospiridae Knight, 1947
Genus *Latouchella* Cobbold, 1921
***Latouchella korobkovi* (Vostokova, 1962)**
***L. sibirica* (Vostokova, 1962)**
***L. memorabilis* Missarzhevsky in Rozanov et al., 1969**
Genus *Pseudoyangtzespira* Bokova, 1990
***Pseudoyangtzespira selindeica* Bokova, 1990**
Superfamily Yochelcionelloidea Runnegar et Jell, 1976
Family Yochelcionellidae Runnegar et Jell, 1976
Genus *Yochelcionella* Runnegar et Pojeta, 1974
***Yochelcionella pelmani* Vassilieva, 1990**
***Y. styllifera* Missarzhevsky in Missarzhevsky et Mambetov, 1981**
Family Rugaeconidae Vassilieva, 1990
Genus *Securiconus* Jiang, 1980
***Securiconus costatus* Missarzhevsky, 1989**
Genus *Obscurella* Vassilieva, 1990
***Obscurella reticulata* Vassilieva, 1990**
Genus *Parailsanella* Zhegallo in Voronova et al., 1987
***Parailsanella* sp.**
Family Stenothecidae Runnegar et Jell, 1980
Genus *Mellopegma* Runnegar et Jell, 1976
***Mellopegma indecora* (Missarzhevsky in Rozanov et al., 1969)**
Genus *Watsonella* Grabau, 1900
***Watsonella crosbyi* Grabau, 1900**
Order Pelagiellіformes Mackinnon, 1985
Family Pelagiellidae Knight, 1952
Genus *Pelagiella* Matthew, 1895
***Pelagiella adunca* (Missarzhevsky in Rozanov et Missarzhevsky, 1966)**
Family Aldanellidae Linsley et Kier, 1984
Genus *Aldanella* Vostokova, 1962
***Aldanella attleborensis* (Shaler et Foerste, 1888)**
***A. operosa* Missarzhevsky, 1966**
***A. utchurica* (Missarzhevsky in Rozanov et al., 1969)**
Genus *Nomgoliella* H. Zhegallo in Voronin et al., 1982
***Nomgoliella rotunda* H. Zhegallo in Voronin et al., 1982**

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Subclass Divasibranchia Minichev et Starobogatov, 1979
Order Khairkhaniiformes Parkhaev, 2001
Family Khairkhaniidae Missarzhevsky, 1989
Genus *Barskovia* Golubev, 1976
***Barskovia hemisymmetrica* Golubev, 1976**
***B. jucunda* Bokova, 1990**
Class Stenothecoida
Order, family incertae sedis
Genus *Stenothecoides* Resser, 1938
***Stenothecoides eleganta* Pelman, 1976**
Genus *Cambridium* Hornỳ, 1957
***Cambridium nikiforovae* Hornỳ, 1957**

PHYLUM Hyolitha
Class Orthothecimorpha
Order Circothecida Sysoiev, 1968
Family Spinulithecidae Sysoiev, 1968
Genus *Spinulitheca* Sysoiev in Sysoiev 1968
***Spinulitheca billingsi* (Sysoiev, 1962)**
***S. kuteinikovi* (Missarzehevsky in Rozanov et al., 1969)**
***S. secunda* Sysoiev, 1968**
Genus *Ladatheca* Sysoiev, 1968
***Ladatheca annae* (Sysoiev, 1959)**
Genus *Loculitheca* Sysoiev 1968
***Loculitheca sysoievi* (Meshkova, 1974)**
Family Aldanothecidae Meshkova, 1974
Genus *Aldanotheca* Meshkova, 1974
***Aldanotheca sulcata* Meshkova, 1974**
Genus *Malykanotheca* Meshkova, 1974
***Malykanotheca cuspidata* Meshkova, 1974**
Order Orthothecida Marek, 1966
Superfamily Tchuranithecoidea Sysoiev 1972
Family Tchuranithecidae Sysoiev, 1968
Genus *Ovalitheca* Sysoiev 1968
***Ovalitheca rasa* Sysoiev, 1968**
Genus *Tchuranitheca* Sysoiev, 1968
***Tchuranitheca simplicis* Sysoiev, 1968**
***T. sinuata* Sysoiev, 1968**
***T. curvata* Sysoiev, 1968**
***T. unciformis* Sysoiev, 1968**
Genus *Turcutheca* Missarzehevsky in Rozanov et al., 1969
***Turcutheca crassecochlia* (Sysoiev, 1962)**
***T. rugata* (Sysoiev, 1959)**
Genus *Uniformitheca* Sysoiev, 1972
***Uniformitheca jasmiri* (Sysoiev, 1959)**
***U. rhombiformis* (Sysoiev, 1963)**
Family Tetrathecidae Sysoiev, 1968
Genus *Tetratheca* Sysoiev, 1968
***Tetratheca clinisepta* (Sysoiev, 1960)**
***T. pentagona* Sysoiev, 1968**
***T. composita* Meshkova, 1974**
Superfamily Orthothecoidea Sysoiev, 1972
Family Allathecidae Missarzehevsky, 1969
Genus *Allatheca* Missarzehevsky, 1969
***Allatheca concinna* (Missarzehevsky in Rozanov et al., 1969)**
***A. corrugata* (Missarzehevsky in Rozanov et al., 1969)**
***A. degeeri* (Holm, 1893)**

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***A. recta* (Sysoiev, 1968)**
Genus *Antiquatheca* Missarzehevsky, 1974
***Antiquatheca pauca* Missarzehevsky, 1974**
Genus *Eonovitatus* Sysoiev, 1968
***Eonovitatus superbus* Sysoiev, 1968**
***E. obruptus* (Meshkova, 1974)**
***E. grandis* (Meshkova, 1974)**
Genus *Majatheca* Missarzehevsky in Rozanov et al., 1969
***Majatheca tumefacta* (Missarzehevsky in Rozanov et al., 1969)**
Genus *Egdetheca* Missarzehevsky in Rozanov et al., 1969
***Egdetheca aldanica* (Missarzehevsky in Rozanov et al., 1969)**
Family Novitatidae, Sysoiev, 1968
Genus *Novitatus* Sysoiev, 1968
***N. lermontovae* Sysoiev, 1968**
***N. laevis* Sysoiev, 1968**
***N. tarynicus* Sysoiev, 1972**
***N. incompletus* (Meshkova, 1974)**
***N. oblongus* (Meshkova, 1974)**
Genus *Orthotheca* Novak, 1886
***Orthotheca tarynica* Meshkova, 1974**
Superfamily Isitithecoidea Sysoiev, 1972
Family Sitithecidae, Sysoiev, 1968
Genus *Isititheca* Sysoiev, 1968
***Isititheca lenae* Sysoiev, 1968**
Genus *Plicitheca* Sysoiev, 1968
***Plicitheca inflecta* Sysoiev, 1968**
***P. sulcata* Sysoiev, 1968**
Family incertae sedis
Genus *Conotheca* Missarzehevsky, 1969
***Conotheca mammilata* (Missarzehevsky in Rozanov et al., 1969)**
***C. circumflexa* (Missarzehevsky in Rozanov et al., 1969)**
***C. curta* Missarzehevsky, 1981**
***C. tenuis* Missarzehevsky, 1989**
Genus *Laratheca* Missarzehevsky, 1969
***Laratheca nana* (Missarzehevsky in Rozanov et al., 1969)**
***L. tchurani* (Sysoiev, 1968)**
Family Exilithecidae, Sysoiev, 1968
Genus *Exilitheca* Sysoiev, 1968
***Exilitheca multa* Sysoiev, 1968**
***E. ancestralis* Sysoiev, 1968**
***E. oblonga* Sysoiev, 1968**
Genus *Holmitheca* Sysoiev, 1968
***Holmitheca obvia* Sysoiev, 1968**
***H. ulterior* (Sysoiev, 1968)**
***H. zhuravlevae* Sysoiev, 1972**
Genus *Lenatheca* Missarzehevsky, 1969
***Lenatheca dolosa* Sysoiev, 1972**
***L. groenlandica* (Poulsen, 1932)**
***L. incognita* Meshkova, 1974**
***L. pyramidata* (Sysoiev, 1968)**
***L. triconcava* (Sysoiev, 1968)**
Genus *Micatheca* Sysoiev, 1972
***Micatheca stupenda* Sysoiev, 1972**
***M. ancipitia* (Sysoiev, 1968)**
Family Obliquathecidae, Sysoiev, 1968
Genus *Obliquatheca* Sysoiev, 1968

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***Obliquatheca bicostata* (Missarzehevsky in Rozanov et al., 1969)**
***O. acostatae* Sysoiev, 1968**
***O. inermis* Sysoiev, 1968**
***O. pulchella* Valkov, 1975**
***O. aldanica* (Sysoiev, 1960)**
Family Gracilithecidae, Sysoiev, 1972
Genus *Gracilitheca* Sysoiev, 1968
***Gracilitheca ternata* Sysoiev, 1968**
***G. bayonet* (Matthew, 1899)**
Genus *Sokolovitheca* Sysoiev, 1972
***Sokolovitheca sokolovi* Sysoiev, 1972**
***S. insperata* Sysoiev, 1972**
Class Hyolithomorpha
Order Hyolithida Sysoiev, 1957
Suborder Hyolithoidei Sysoiev, 1983
Superfamily Crestjahitoidea Sysoiev, 1968
Family Amitidae Sysoiev, 1968
Genus *Oxytus* Sysoiev, 1968
***Oxytus sagittalis* Sysoiev, 1968**
Family Crestjahitidae Sysoiev, 1968
Genus *Crestjahitus* Sysoiev, 1968
***Crestjahitus compressus* Sysoiev, 1968**
Genus *Burithes* Missarzehevsky, 1969
***Burithes cuneatus* (Missarzehevsky in Rozanov et al., 1969)**
***B. distortus* (Sysoiev, 1962)**
***B. erum* (Missarzehevsky in Rozanov et al., 1969)**
***B. elongatus* (Missarzehevsky in Rozanov et al., 1969)**
Genus *Tuoidachites* Missarzehevsky, 1969
***Tuoidachites costulatus* Missarzehevsky in Rozanov et al., 1969**
***T. figuratus* Missarzehevsky in Rozanov et al., 1969**
Genus *Jacuticornus* Sysoiev, 1968
***Jacuticornus tenuistrigatus* (Sysoiev, 1962)**
Genus *Borealicornus* Sysoiev, 1968
***Borealicornus depsilis* Sysoiev, 1968**
Family Angusticornidae Sysoiev, 1968
Genus *Angusticornus* Sysoiev, 1968
***Angusticornus acutangulus* Sysoiev, 1968**
***A. reflexus Sysoiev*, 1968**
Genus *Firmicornus* Sysoiev, 1968
***Firmicornus obliteratus* Sysoiev, 1968**
Genus *Ketemecornus* Sysoiev, 1974
***Ketemecornus viduus* (Sysoiev, 1968)**
***K. ermakovi* Sysoiev, 1974**
***K. licitus* Sysoiev, 1974**
Family Galicornidae Valkov, 1975
Genus *Galicornus* Valkov, 1975
***Galicornus anabarus* Valkov, 1975**
***G. lenaicus* Valkov, 1975**
Superfamily Altaicornoidea Sysoiev, 1970
Family Altaicornidae Sysoiev, 1970
Genus *Erraticornus* Sysoiev, 1973
***Erraticornus debilis* Sysoiev, 1973**
***E. kordeae* Sysoiev, 1973**
Genus *Insignicornus* Sysoiev, 1973
***Insignicornus rectus* Sysoiev, 1973**
Genus *Nitoricornus* Sysoiev, 1973
***Nitoricornus pictus* Sysoiev, 1973**

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***N. subtilis* Sysoiev, 1973**
***N. vegetus* Sysoiev, 1973**
Suborder Notabilitoidei Sysoiev, 1983
Superfamily Notabilitoidea Sysoiev, 1968
Family Notabilitidae Sysoiev, 1968
Genus *Doliutus* Missarzehevsky et Sysoiev in Rozanov et al., 1969
***Doliutus inflatus* (Sysoiev, 1962)**
***D. brevis* Meshkova, 1974**
***D. laevis* Meshkova, 1974**
***D. ruminatus* Meshkova, 1974**
Genus *Notabilitus* Sysoiev, 1968
***Notabilitus costatus* Sysoiev, 1968**
***N. orientalis* Sysoiev, 1968**
***N. simplex* Sysoiev, 1968**
Genus *Oblisicornus* Sysoiev, 1968
***Oblisicornus compositus* Sysoiev, 1968**
***O. dupleconcavus* Sysoiev, 1968**
***O. tetraconcavus* Sysoiev, 1968**
Family Dorsojugatidae Sysoiev, 1968
Genus *Dorsojugatus* Sysoiev, 1968
***Dorsojugatus lateriacutus* Sysoiev, 1968**
***D. multicostatus* Sysoiev, 1968**
***D. sedecostatus* (Sysoiev, 1962)**
Genus *Trapezovitus* Sysoiev, 1958
***Trapezovitus sinscus* Sysoiev, 1958**
***T. latus* Valkov, 1975**
Family Atdabanithidae Meshkova, 1974
Genus *Atdabanithes* Meshkova, 1974
***Atdabanithes curvatus* Meshkova, 1974**
Superfamily Nelegerocornoidea Meshkova, 1974
Family Nelegerocornidae Meshkova, 1974
Genus *Jacutolituus* Missarzehevsky, 1974
***Jacutolituus fusiformis* Missarzehevsky, 1974**
Genus *Microcornus* Mambetov, 1972
***Microcornus simus* Missarzehevsky, 1974**

PHYLUM Brachiopoda
SUBPHYLUM Rhynchonelliformea
Class Chileata
Order Chileida Popov et Tikhonov, 1990
Superfamily Matutelloidea Andreeva, 1962
Family Matutellidae Andreeva, 1962
Genus *Matutella* Cooper, 1951
***Matutella amgensis* Andreeva, 1962**
Class Obolellata
Order Obolellida Rowell, 1965
Superfamily Obolelloidea Walcott et Schuchert, 1908
Family Obolellidae Walcott et Schuchert, 1908
Genus *Obolella* Billings, 1861
***Obolella chromatica* Billings, 1861**
Family Trematobolidae Popov et Holmer, 2000
Genus *Trematobolus* Matthew, 1893
***Trematobolus pristinus bicostatus* Gorjansky, 1964**
Genus *Sibiria* Gorjansky, 1977
***Sibiria magna* Gorjansky, 1977**
***S. squamosa* Gorjansky, 1977**
Family incertae sedis

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Genus *Nochoroiella* Pelman, 1983
***Nochoroiella isitica* Pelman in Grigorjeva et al.,1983**
Class Kutorginata
Order Kutorginida Kuhn, 1949
Superfamily Kutorginoidea Schuchert, 1893
Family Kutorginidae Schuchert, 1893
Genus *Kutorgina* Billings, 1861
***Kutorgina lenaica* Lermontova, 1940**
***K. flerovae* Lermontova, 1951**
Superfamily Nisusioidea Walcott et Schuchert, 1908
Family Nisusiidae Walcott et Schuchert, 1908
Genus *Nisusia* Walcott, 1905
***Nisusia kotujensis* Andreeva, 1962**
Class Paterinata
Order Paterinida Rowell, 1965
Family Cryptotretidae Pelman, 1979
Genus *Cryptotreta* Pelman, 1977
***Cryptotreta neguertchenensis* Pelman, 1977**
Genus *Aldanotreta* Pelman, 1977
***Aldanotreta sunnaginensis* Pelman, 1977**
Class Lingulata
Order Lingulida Waagen, 1885
Superfamily Acrotheloidea Walcott et Schuchert, 1908
Family Botsfordiidae Schindewolf, 1955
Genus *Botsfordia* Matthew, 1891
***Botsfordia caelata* (Hall, 1847)**
Superfamily Linguloidea Menke, 1828
Family Eoobolidae Holmer, Popov et Wrona, 1996
Genus *Eoobolus* Matthew, 1902
***Eoobolus siniellus* (Pelman, 1977)**
***E. dilatata* (Ushatinskaya, 1993)**
Order Acrotretida Kuhn, 1949
Superfamily Acrotretoidea Schuchert, 1893
Family Acrotretidae Schuchert, 1893
Genus *Linnarssonia* Walcott, 1885
***Linnarssonia rowelli* Pelman, 1973**
Genus Homotreta Bell, 1941
***Homotreta gorjanskii* (Pelman, 1973)**

PHYLUM Chaetognatha
Class Protoconodonta
Order, family incertae sedis
Genus *Protohertzina* Missarzhevsky, 1973
***Protohertzina unguliformis* Missarzhevsky, 1973**

PROBLEMATICS
Class Eldonioidea
Order Velumbrellida Dzik, 1991
Family Eldoniidae Walcott, 1911
Genus *Eldonia* Walcott, 1911
***Eldonia* cf. *E. ludwigi* Walcott, 1911**

Class Coeloscleritophora
Order Chancelloriida Walcott, 1920
Family Chancelloriidae Walcott, 1920
Genus *Allonnia* Dore et Reid, 1985
***Allonnia asteroidea* (Vassilieva, 1988)**

ANNEX C

***A. rossica* (Sayutina, 1988)**
***A. tripodophora* Doré et Reid, 1965**
Genus *Archiasterella* Sdzuy, 1969
***Archiasterella flabellata* (Vassilieva, 1985)**
***A. nizhnelenensis* (Vassiljeva, 1998)**
***A. palmiformis* Vassilieva in Vassilieva et Sayutina, 1988**
***A. sulugurica* (Vassilieva, 1988)**
***A. tetraspina* Vassilieva et Sayutina, 1993**
Genus *Chancelloria* Walcott, 1920
***Chancelloria aldanica* Zhuravleva et Korde, 1955**
***C. coronacea* Vassilieva, 1985**
***C. fragilis* Vassilieva, 1985**
***C. lenaica* Zhuravleva et Korde, 1955**
***C.? piriformis* (Vassilieva et Bokova, 1990)**
***C. spinulosa* Vassilieva, 1985**
***C. symmetrica* Vassilieva, 1985**
Genus *Platyspinites* Vassilieva, 1985
***Platyspinites digitatus* Vassilieva, 1985**
***P. floriformis* Vassilieva, 1994**

Family Anabaritidae Missarzhevsky, 1974
Genus *Anabarites* Missarzhevsky, 1969
***Anabarites trisulcatus* Missarzhevsky, 1969**
***A. tristichus* Missarzhevsky in Rozanov et al., 1969**
***A. isiticus* Missarzhevsky, 1974**
***A. rectus* Vassilieva, 1984**
***A. missarzhevskii* (Vassilieva, 1986)**
Family Lobiochreidae Valkov et Sysoiev, 1970
Genus *Lobiochrea* Valkov et Sysoiev, 1970
***Lobiochrea* sp.**
Genus *Tiksitheca* Missarzhevsky in Rozanov et al., 1969
***Tiksitheca licis* Missarzhevsky in Rozanov et al., 1969**
***T. korobovi* (Missarzhevsky, 1966)**
Genus *Cambrotubulus* Missarzhevsky in Rozanov et al., 1969
***Cambrotubulus decurvatus* Missarzhevsky in Rozanov et al., 1969**

Family Coleolidae Fisher, 1962
Genus *Coleolus* Hall, 1879
***Coleolus trigonus* Sysoiev, 1962**
Genus *Coleolella* Missarzhevsky in Rozanov et al., 1969
***Coleolella billingsi* (Sysoiev, 1962)**
***C. acuticostata* (Meshkova, 1969)**
Genus *Coleoloides* Walcott, 1889
***Coleoloides trigeminatus* Missarzhevsky in Rozanov et al., 1969**

Family Cupitthecidae Duan, 1984
Genus *Cupittheca* Duan in Xing et al., 1984
***Cupittheca mira* (He in Qian, 1977)**

Genus *Tumulduria* Missarzhevsky in Rozanov et al., 1969
***Tumulduria incomperta* Missarzhevsky in Rozanov et al., 1969**

Genus *Fomitchella* Missarzhevsky in Rozanov et al., 1969
***Fomitchella infundibuliformis* Missarzhevsky in Rozanov et al., 1969**

Genus *Archaeopetasus* Conway Morris et Bengtson in Bengtson et al., 1990
***Archaeopetasus excavatus* Conway Morris et Bengtson in Bengtson et al., 1990**

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Genus *Tommotitubulus* Fedorov, 1986
***Tommotitubulus savitzkyi* Fedorov, 1986**

Genus *Rhombicorniculum* Walliser, 1958
***Rhombicorniculum cancellatum* (Cobbold, 1921)**
***R. walliseri* Mambetov, 1977**

Genus *Archaeooides* Qian, 1977
***Archaeooides granulatus* Qian, 1977**

Order Tommotiida Missarzhevsky, 1970
Family Tommotiidae Bengtson, 1970
Genus *Camenella* Missarzhevsky in Rozanov et Missarzhevsky, 1966
***Camenella garbowskae* Missarzhevsky in Rozanov et Missarzhevsky, 1966**
***C. admiranda* (Missarzhevsky in Rozanov et Missarzhevsky, 1966)**
***C. elegantis* (Vassilieva, 1998)**
***C. kozlowskii* (Missarzhevsky in Rozanov et Missarzhevsky, 1966)**
***C. plana* (Missarzhevsky in Rozanov et al., 1969)**
Family Lapworthellidae Missarzhevsky, 1966
Genus *Lapworthella* Cobbold, 1921
***Lapworthella tortuosa* Missarzhevsky, 1966**
***L. bella* Missarzhevsky, 1966**
***L. dentata* Missarzhevsky in Rozanov et al., 1969**
***L. propria* Vassilieva, 1998**
Family Sunnaginiidae Landing, 1984
Genus *Sunnaginia* Missarzhevsky in Rozanov et al., 1969
***Sunnaginia imbricata* Missarzhevsky in Rozanov et al., 1969**
Family Kelanellidae Missarzhevsky et Grigorieva, 1981
Genus *Lugoviella* Grigorieva in Grigorieva et al., 1983
***Lugoviella ojmuranica* Grigorieva in Grigorieva, 1983**
Family Tannuolinidae Fonin et T. Smirnova, 1967
Genus *Tannuolina* Fonin et T. Smirnova, 1967
***Tannuolina* sp.**

Family Mobergellidae Missarzhevsky, 1989
Genus *Mobergella* Hedström, 1923
***Mobergella radiolata* Bengtson, 1968**
Genus *Brastadella* Missarzhevsky, 1989
***Brastadella brastadi* (Poulsen, 1932)**

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Additional scientific matters on the Lena Pillars Nature Park nomination prepared by inquiry of the IUCN expert Kyung Sik Woo

The Cambrian System on the Lena Pillars

The "Cambrian Explosion" took place at the first half of the Cambrian Period embracing approximately 542–510 million years ago interval and represented one of the pivotal points in the Earth's life evolution. This global event was expressed in an explosive diversification of multicellular animals belonging to modern phyla as well as in mass appearance of skeletal animals and in commence of entire ecosystems of modern types (such as the metazoan reefal ecosystem) and global changes in climate state from an Icehouse Epoch to a Greenhouse Epoch.

Currently, three sites representing the Cambrian System, which are either inscribed on or nominated into the UNESCO World Heritage List. These are the Grand Canyon National Park (U.S.A.; since 1979), the Canadian Rocky Mountain Parks (since 1980) and the Protection Zone of Chengjiang Fossil Lagerstätte (P.R. China). The latter is submitted to the Tentative List in 2005.

The Grand Canyon being the most spectacular gorge in the world and retracing the geological history of the past 2 billion years has no much interest for the Cambrian. Here, the Cambrian System itself is represented by extremely poorly fossiliferous and mostly non-marine strata, while the "Cambrian Explosion" interval, if present, lacks any fossils (Rose, 2006; http://whc.unesco.org/en/list/75).

The Canadian Rocky Mountain Parks, namely the Yoho National Park, yield the Burgess Shale site as a part of their attractions. The Burgess Shale site is one of the most significant fossil areas of the world, an "iconic" locality of extremely well preserved soft-body fossils (Lagerstätte) explored over 100 years. However, this locality represents only the aftermath of the Cambrian diversification following the first mass extinction event which already took out a large number of Cambrian creatures including the entire reefal fauna. In general, the Burgess Shale site of the Canadian Rocky Mountain Parks does not contain any fossiliferous Cambrian reefal rock, its skeletal fossil record is of low diversity, and the strata representing the "Cambrian Explosion" itself are not present here (Caron & Rudkin, 2009; http://whc.unesco.org/en/list/304).

The recently nominated Chengjiang site, embracing by the Chengjiang Nature Reserve and Chengjiang Fauna National Geographic Park, represents c. 2 m.y. Cambrian interval of siliciclastics. Although, the Chengjiang site is recognized nowadays as one of the richest Cambrian sites (175 genera according to the nomination) which indeed represent practically all the phyla in conditions of extraordinary soft-tissue preservation (Lagerstätte), it does not contain any fossiliferous Cambrian reefal rock, its skeletal fossil record is poor, and the entire interval of Cambrian strata is much shorter here and does not represent the lowermost Cambrian strata (Hou et al., 2004; http://whc.unesco.org/en/list/2045).

In general, the both Cambrian sites are inscribed/nominated into the UNESCO World Heritage List for the uniqueness of their local soft-bodied faunas representing very restricted intervals of 2–3 million years or less.

The Lena Pillars Nature Park possesses an outstanding universal value being the most significant natural monument of the "Cambrian Explosion" itself. Due to platformal type of carbonate sedimentation within tropical belt without a subsequent metamorphic and tectonic reworking, the Lena Pillars preserve the most continuous and richest record of the diversification of many groups of skeletal and fleshy fossil animals and algae from their first appearance until the first mass extinction event and subsequent recovery interval. This is Siberia only where this interval is represented by marine carbonates while carbonates are the best sediments for the skeletal fossil preservation. The

"Cambrian Explosion" process is observable here in parallel in three types of sedimentary basins during c. 35 m.y. (542–506 Ma).

The Lena River and its tributaries provide here natural cuts of the uppermost Ediacaran (Precambrian) to middle Cambrian strata of a total thickness from 980 to 1370 m on the distance of over 150 km (Savitsky & Astashkin, 1979; Spizharski et al., 1986; Astashkin et al., 1991; Sukhov, 1997; Pegel, 2000; Varlamov & Rozanov, 2008). The high quality of preservation of both skeletal and soft-bodied fossils being coupled with high precision isotope and palaeomagnetic records as well as with various well-preserved sedimentary fabrics allows researches to solve diverse ecological and evolutionary problems with a precision comparable with the study of modern biotas and communities. Due to its low latitudinal palaeogeographic position and an absence of large land masses Siberia only accumulated fossiliferous early Cambrian carbonates (Kirschvink et al., 1997; Debrenne et al., 1999; Smith, 2001; Cocks & Torsvik, 2007; Meert & Lieberman, 2008). As a result, the Lena Pillars house the earliest and the largest, in both temporal and spatial senses, fossil metazoan reefal massif. This massif being a site of Cambrian diversification is comparable in its significance to the Great Barrier Reef in modern world: both are the sites of the highest faunal diversity of the world, of the early Cambrian and of the modern times, respectively.

The principal sediments of this area are the lower to lower middle Cambrian richly fossiliferous continuous carbonates of various marine genesis. This strata embraces other a half of the Cambrian System (Cambrian Series 1 to middle Cambrian Series 3) and two thirds of the Cambrian time scale (36 m.y. of 54 m.y.) according to the International Stratigraphic Chart issued by the International Commission on Stratigraphy (2010; [illegible]). Those are the rocks that build the Lena Pillars as well as the Buotama Pillars themselves. The Cambrian sedimentary sequence commences with subtidal to intertidal mudstones of the lower Cambrian Series 1 which is overlain by argillaceous mudstones, which encompasses a large number of archaeocyathan-calcimicrobial reefs of the Cambrian stages 2 and 3. The 20-kilometres wide Oy-Muran Reef Massif forms a barrier on the border of inner and outer basins. The Oy-Muran Reef Massif itself composes of multiple isometric archaeocyathan-calcimicrobial buildups. (Archaeocyaths are extinct calcareous rigid aspiculate sponges and calcimicrobes are calcified probable cyanobacterians.) The inner basin yields various back-reef carbonates. The outer basin comprises relatively deep-water limestones bearing a soft-bodied fauna and fleshy algae of extraordinary preservation (Ivantsov, 1999; Ivantsov & Wrona, 2004; Ivantsov et al., 2005a, b; Dzik, 2011; Zhuravlev et al., 2011).

The Lena Pillars' sections allow scientists to estimate the "Cambrian Explosion" in its full diversity and dynamics. It should be emphasized that among approximately 2,000 early Cambrian genera, which are known today, about 350 are described from the area under discussion – and this is a really amazing number (Fig. 1). This list is enlarged almost every year. These genera include the first archaeocyaths (rigid aspiculate calcified sponges), radiocyaths, coralomorphs (primitive corals), brachiopods, hyoliths, and some other groups of animals with mineralized skeletons while the contemporary general diversity of this region was the highest in the early Cambrian of the world. This is the area where the very systematics of archaeocyaths, hyoliths, and many other problematic groups, which comprise the core of the animals involved in the Cambrian skeletal revolution, is developed (Schmidt, 1886; Toll, 1899; Zhuravleva, 1960, 1969; Korde, 1961; Khomentovskiy & Repina, 1965; Rozanov et al., 1969; Sysoev, 1972; Luchinina, 1975; Lipps & Signor, 1992; Palmer & Repina, 1993; Dzik, 1994, 2011; Scrutton, 1997; Bassett et al., 1999; Hooper & van Soest, 2002; Skovsted, 2003; Ivantsov et al. 2005a; Debrenne et al., 2011). For some of aforementioned groups, this area was also the center of their origin (Rozanov, 1984). The entire fossil species diversity is over 500 species (see Nomination Annex C). This the diversity of taxa (species and genera) only which allow us to quantify the "Cambrian Explosion" phenomenon and, thus, to obtain scientific understanding of this process.

The most outstanding object in the Lena Pillars and in the entire world are reefs. Excellent preservation, high diversity, and multiple localities of reefal fauna in the Lena Pillars provide a firm basis for detailed palaeoecological and population dynamics' studies of the earliest metazoan reefal

biota. These studies are comparable in precision with research on modern reefs. However, if modern reefs represent a single time slice only, the Lena Pillars provide over 20 such time slices which let researches an understanding of evolutionary processes, which shaped the communities of organisms from their very beginning. Such studies are possible because metazoan reefs appeared here and during this first 10 million years existed on the Siberian Platform only. Additionally, such features of communities can be studied as the significance of different factors of diversities; hub-species and their influence on the community structure; interspecific and intraspecific interactions; ecological successions; trophic webs; and many others. These studies drastically changed our understanding of the reef evolution and their results are now cited in text-books and treatises (James & Debrenne, 1980; Chuvashov & Riding, 1984; Riding & Voronova, 1984; Rowland & Gangloff, 1988; Riding, 1991; Wood et al., 1992; Wood, 1993, 1995, 1999; Copper, 1994; Kruse et al., 1995; Zhuravlev & Wood, 1995; Stanley, 2001; Rowland & Shapiro, 2002; Kiessling et al., 2003; Rowland & Hicks, 2004; Zhuravlev & Naimark, 2005; Debrenne, 2007; Gandin & Debrenne, 2010).

Volumetric Cambrian reefal rocks are known from Morocco (northern Africa), South Australia, western (MacKenzie Mountains) and eastern (eastern Labrador and western Newfoundlan) Canada, western United States (Nevada and California), some European countries (Spain, France, Sardinia), and some others. However, in all these sites, the earliest Cambrian strata do not contain reefs and mostly are barren. None of them comprise the earliest Cambrian reefs which are the most important for the understanding for the beginning of the evolution of the earliest reefal biota. None of them contain fossil assemblages which are richer than those of the Lena Pillars (Debrenne & al., 1990; Kruse & Zhuravlev, 1995; Zhuravlev & Wood, 1996) (Fig. 2). Of all these sites, the Lena Pillars only has a continuous carbonate Cambrian record and the richest assemblages of skeletal fossils. Some other areas of the Siberian Platform, namely, sections of the Sukharikha, Kotuykan, Yudoma, Gunam, and Aldan rivers also provide a rich record of skeletal fossils across entire lower Cambrian interval. However, these sections do not contain reefal complexes at all or yield small buildups only; as a result, their fossil assemblages are much poorer than those of the Lena Pillars.

Thus, the Lena Pillars represent an entirely unique site because here only the complete early to middle Cambrian record is represented by continuous carbonate succession bearing rich fossils. The Oy-Muran and other Lena Pillars' reefs are especially important because they represent the earliest record of metazoan reefs in the world. The establishing of metazoan reef ecosystem delayed in other regions for about 10 m.y. and this was the territory of modern southern Yakutia where principal Cambrian reefal groups of animals were originated. Although there are a number of important Cambrian sites in the world, the Lena Pillars only contribute fully to the understanding of the total story of the Cambrian skeletal explosion especially in reefal facies.

Both the rich fossil record of the Lena Pillars and the a continuous carbonate succession expressed in excellent outcrops allowed geochemists and geophysicists to develop here palaeomagnetic and stable isotope records of the highest fidelity for the early to middle Cambrian interval. Carbon and strontium isotope curves as well as palaeomagnetic scale established on the Lena Pillars serve the reference scales for the whole world (Kirschvink & Rozanov, 1984; Magaritz et al., 1986, 1991; Magaritz, 1989; Kirschvink et al., 1991; Brasier et al., 1994a, b; Derry et al., 1994; Ripperdan, 1994; Nicholas, 1996; Schields, 1999; Wotte et al., 2011).

Data of such a high precision are necessary for understanding of the co-evolution of the Earth lithosphere, hydrosphere, and atmosphere and are very important for the global Cambrian stratigraphy as well as for palaeogeographic and general geological and ecological implications which are already developed. An accumulation of such statistic data brought out a distinguishing of the fist mass-extinction events in the Earth history which are known as the Sinsk and Toyonian extinction events and even the very names of this events are borrowed from the toponymy of the Lena Pillar's area. It had been shown that these events were as significant in animal evolution as the well-known Permo-

Triassic extinction (Brasier, 1992, 1995; Rozanov, 1992; Hart, 1996; Zhuravlev & Wood, 1996, 2008; Erwin, 1998; Bambach et al., 2004; Hallam, 2005; Gouchet et al. 2009).
Moreover, the Lena Pillars' carbonate, ler researches to analyze palaeoclimate alterations on the eve of the firsi Greenhouse Epoch iii ihe Phanerozoic because only here it is possible io use in concert a representative enough (for statistics) data un faunal diversification, reliable daia on carbon and strontiiim isotopes, and correct data on diverse carbunate mineralogies. In nim, these studies brought out a new concept of ihe global cliniate trend showing a general cooling diiring the lasi 540 million years (Zhuravlev & Wood, 2008, 2009). Even ihe very iime of ihe first Phanerozoic Greenhouse Epoch commence is clarified here, which was a conundrum since seminal Sandberg's paper [illegible] poiined to this prubleni. This data also allow us a better understanding of the fate of modem reefs due to a possible global warming because alike their early Cambrian analogies modem reefs are built by organisms possessing volatile aragonite and high-magnesium calcite skeleions and by sedimentary fabrics of the same composition (e.g., Kleypas and Langdon, 2006). The extinciion of ihe earliest metazoan reefal biota could be directly relied upon the carbon dioxide rise and ihe following commence of the first Phanerozoic Greenhouse Epoch.

The Lena Pillars site provides a large area for further discoveries of fossil soft-budied organisms, larvae, and enibryos of an exiraordinary preservaiion. Each new expedition brings out new fossils and large amount of data un sedimentology, geochemistry, and other disciplines. Multiple iime-slice analysis of reefal palaeocommunities will pruvide further large data sets for challenging of major current evolutionary and ecological paradigms. In general, the nominaied area is ihe outsianding natural property providing a unique unmatched synthesis of Canibrian geological and palaeontological data which are the basis for uur understanding of ihe far past, evolution of the Earth and of the life on our planet during one of pivotal and dramatic intervals of its development.
The Lena Pillars National Park is nominated as a site housing a complete succession of carbonaie Canibrian strata recording the entire "Canibrian Explosiun" from its very beginning to the final stages rather ihan local sofi-bodied biotas representing iis peak (Chengjiang) and an aftennath (Burgess Shale), respectively, and being resiricied tu siliciclasiic rocks.

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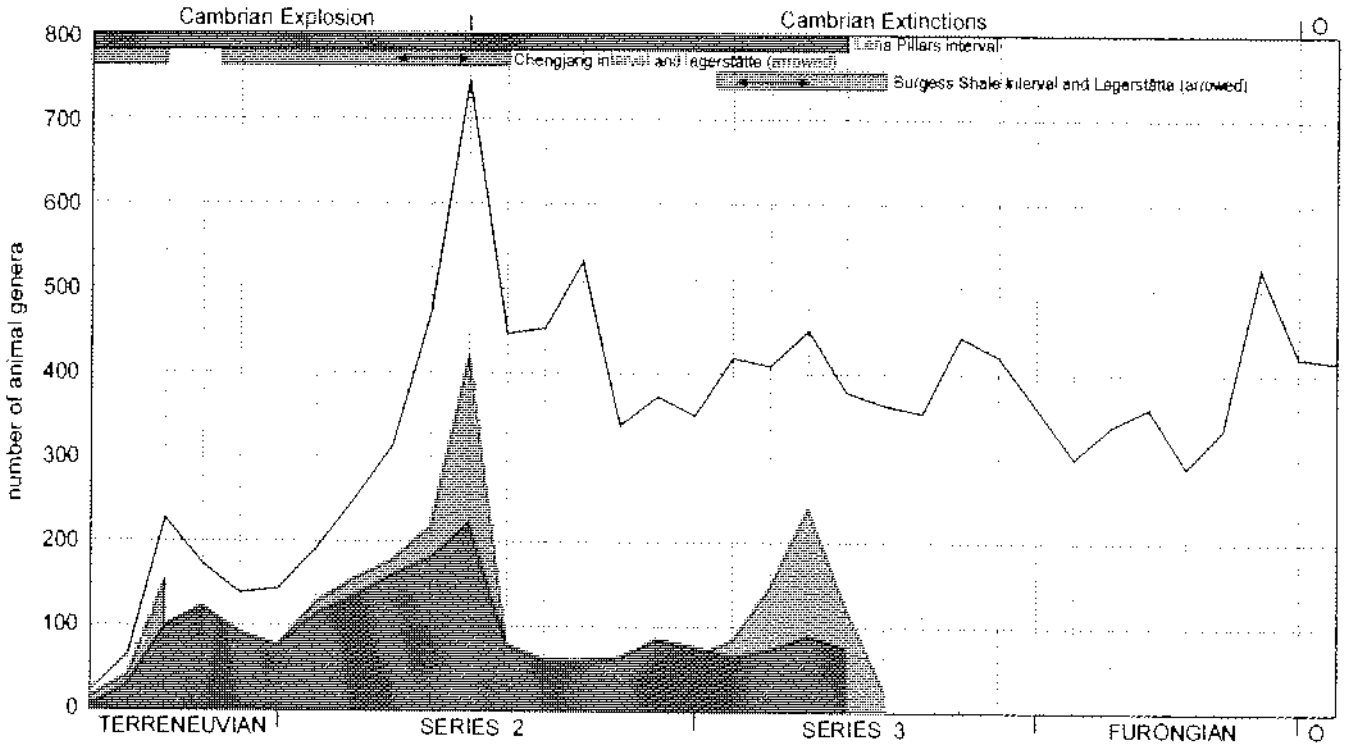
Figure caption

Fig. 1. The overall generic diversity of Cambrian animals with an indication of diversity expressed on the Lena Pillars, Russia (red), Burgess Shale, Canada (green), and Chengjiang, China (grey) areas (based on Zhuravlev & Riding, 2001; number of genera in the Chengjiang Lagerstätte is indicated in accordance with the nomination: http://whc.unesco.org/en/tentativelists/2045). The Burgess Shale and Chegjiang sites inscribed under protection are arrowed. O = Ordovician System (pars).


Cambrian Explosion
Cambrian Extinctions
O
Lena Pillars interval
Chengjiang interval and Lagerstätte (arrowed)
Burgess Shale interval and Lagerstätte (arrowed)
number of animal genera
800
700
600
500
400
300
200
100
0
TERRENEUVIAN
SERIES 2
SERIES 3
FURONGIAN
O

Scientific note by the leading research fellow of the RAS Institute of Geology, voting member of the Cambrian Stratigraphy Commission of the International Stratigraphic Commission, Doctor of Biology A.Yu. Zhuravlev

Comparison of ground frozen karst of natural park "Lena Pillars" with the World Heritage properties having the significant karst features

NP Lena Pillars: *Key Karst Features* – Low plateau up to 300 m of flat lying Cambrian limestones, dolomites, marls and shales in Lena River basin. Frozen karst and thermokarst in permafrost 100-500 m thick. *Pillars with the height to 200 m*
Environmental context – Sub-Arctic extreme continental and dry climate. Taiga forests in valleys

N	State Party	World Heritage Property	Key Karst Features	Environmental context	Presence of the same	
					Key Karst Features	Environmental context
1	Australia	Tasmanian Wilderness	Many small areas of karst in limestone and dolomite, some in alpine zone. Caves often richly decorated with speleothems containing very long palaeoclimatic histories. Complete karst systems.	Cool temperate to alpine rain forest. Much of area was glaciated in the Pleistocene. High geodiversity and biodiversity.	No	No
2	Australia	Shark Bay	Located within coastal karst net deposition zone, with outstanding display of living stromatolites.	Warm temperate seasonally arid.	No	No

3	Australia	Australian Fossil Mammal Sites	These are vertebrate fossil sites. Riversleigh's fossil deposits are in Oligo-Miocene freshwater limestones set within Cambrian dolomitic limestone bedrock; Naracoorte has Pleistocene fossil deposits in caves in Oligo-Miocene limestones capped by Pleistocene dune limestones. Riversleigh has extensive low relief pinnacle karst and well developed karren, and gorges with rivers actively depositing tufa. It is mainly located on the output margin of the karst system. Naracoorte has numerous caves and collapse features. It is a small site in the karst input zone.	Riversleigh is in the seasonally arid tropics with monsoonal rains. Naracoorte is in the humid temperate zone.	No	No
4	Australia	Greater Blue Mountains	Many small areas of limestone with complete karst systems. Includes extremely old sites such as Jenolan Caves.	Warm to cool humid temperate zone with extensive forest.	No	No
5	Australia	Purnululu	Outstanding example of quartz sandstone fluviokarst with beehive-shaped hills separated by narrow sinuous gorges. Developed on the rocks of Devonian age.	Tropical savannah regime.	No	No
6	Austria	Hallstatt-Dachstein Salzkammergut Cultural Landscape	Dachstein massif of 574 km^2 is an excellent example of glaciokarst. It is glacially scoured karstic plateau averaging 1850 m that rises to almost 3000 m. It contains hundreds of caves with three open to public, including Dachstein-Rieseneishöhle, which is an ice cave.	Humid temperate rising to subalpine and alpine.	Yes	No

7	Bulgaria	Pirin National Park	Rugged mountainous area to 2915 m partly modified by glaciation. Extensive karst with 113 known caves in Proterozoic marbles.	Humid continental Mediterranean climate becoming alpine in the highlands. Coniferous and deciduous forest. Experienced alpine glaciation in the Pleistocene.	No	No
8	Canada	Nahanni National Park	World's foremost example of karst development in cold climate conditions. Contains a spectacular karst landscape, including poljes, caves and gorges, and hot spring with large tufa mound. Landscape is subject to active frost processes.	Cold continental climate with wide monthly variations in temperature and precipitation. Alpine tundra and mountainous taiga environments with discontinuous permafrost. Rich diversity of vegetation and wildlife.	Yes	Yes
9	Canada	Canadian Rocky Mountains Parks	Includes large areas of limestones and dolomites. Outstanding example of glaciokarst terrain. Many karren, subterranean streams, springs and caves. Columbia Icefield partly overlies and intrudes Castleguard Cave.	Located across continental divide between 1036 m to 3954 m. Continental cool temperate alpine climate with [illegible] Rich diversity of vegetation and wildlife.	No	
10	China	Huanglong	Hot spring emerging from carbonate rocks have precipitated extensive calcareous travertine deposits along valley floor with numerous rimstone pools. Represents depositional output landforms of deeply circulating karst groundwater system.	Warm temperate continental alpine environment. Forestered valleys surrounded by mountains to 5000 m.	No	No
11	China	Jiuzhaigou Valley	Extensive areas of limestone and dolomite. Carbonate tufa deposits from cold springs have formed a series of tufa-dammed lakes and tufa-coated cascades along valley floor. Represents depositional output landforms of shallow karst groundwater system with significant epikarst water contribution.	Warm temperate continental alpine environment. Forestered valleys surrounded by mountains to 4800 m.	No	No

12	China	Wulingyuan	A mixed quartz sandstone (66 %) and limestone (33 %) area, most notable for [illegible] separated by ravines and gorges. Limestone part contains about 40 known caves with rich decoration and two natural bridges, one of which is 357 m high. Includes entire Suoxi karst catchment.	Humid warm temperate climate with deciduous forest. Altitude range 450 m to 1264 m.	Yes	No
13	China	Three Parallel Rivers of Yunnan	1,7 M ha site with actively glaciated peaks to 6740 m and gorges in places 3000 m deep. Contains extensive area of glaciated alpine karst, caves to 27 km length, tufa dammed lakes and hot springs with travertine rimmed pools.	Subtropical continental alpine environment, immensely rich biodiversity.	No	No
14	China	South China Karst	Three first phase sites of a serial nomination. Wulong (Chongqing) is plateau karst with spectacular tiankeng, natural bridges and gorges; Shilin (Yunnan) comprises stone forests (Yunnan); and Libo has extensive forestered cone karst (fengcong and fenglin), poljes, gorges and caves. These three areas provide type-sites for their principal karst features.	Continental humid subtropical plateau (Wulong and Shilin) to subtropical monsoonal (Libo). Extensive natural forest cover at Libo.	Yes, Yes	No
15	Croatia	Plitvice Lakes National Park	International type-site for tufa-dammed lakes. Carbonate biolith barriers confine 16 lakes up to 0,8 km in area and up to 46 m deep. Mixed limestone and dolomitic limestone catchment area.	Continental humid warm temperate. Mixed coniferous and deciduous forested catchment.	No	No
16	Cuba	Viñales Valley	A cultural site set within a humid tropical karst landscape notable as a type locality of mogote karst tower and	Seasonally humid tropical.	Yes	No

			cone karst) in a wide flat-floored valley. The region also contains poljes and caves with a rich subterranean biodiversity.			
17	Cuba	Desembarco del Granma National Park	Spectacular staircase of uplifted coral terraces around Cabo Cruz that support ongoing development of karst landforms. Terraces extend from –180 m offshore to 460 m inland and reflect a combination of tectonic and glacio-eustatic processes. Excellent examples of littoral karst. Relatively recent uplift has permitted the commencement of karstification.	Moderately dry tropical with semideciduous forest.	No	No
18	Cuba	Alejandro de Humboldt National Park	A large inland plateau that includes both limestone karst and pseudokarst, but awaits formal scientific evaluation.	Humid tropical forested environment with high biodiversity.	Yes	No
19	France	Prehistoric Sites and Decorated Caves of the Vézère Valley	Some 147 identified and significant prehistoric sites, with 25 decorated caves including Rouffignac and the famous Grotte de Lascaux. Caves much more important for their cultural rather than karstic value.	Humid temperate.	No	No
20	France/ Spain	Pyrénées-Mount Perdu	Outstanding example of alpine glaciated karst to 3352 m with extensive karrenfield, deep canyons, deep caves and subterranean river systems. Incorporates complete karst systems.	Humid maritime alpine climate in north and drier Mediterranean climate to south with associated complex vegetation zonation.	No	No
21	Greece	Meteora	Sheer towers and pillars 10 to > 100 m high developed in early Tertiary detrital quartz conglomerate often fluted with closely spaces vertical karren (the towers support almost inaccessible	Mean altitude 300 m rising to 1000 m. Mediterranean climate.	Yes	No

			monastery buildings). Fluviokarst.			
22	Hungary/ Slovakia	Caves of Aggtelek and Slovak Karst	Area contains 712 caves. Variety of cave types, including Dobšinska Ice Cave, and speleothem forms with stalagmites to 32,7 m high. Surface landscape is a temperate doline karst with some evidence of a prior humid tropical or subtropical influence, which has evolved intermittently since the Cretaceous.	Continental humid temperate.	No	No
23	Indonesia	Lorentz National Park	Largest protected area in SE Asia (2,35 M ha). Continuous transect from snow caps (5030 m) to tropical coast. World's best example of tropical alpine glaciated karst. Extensive humid tropical karst occurs at lower elevations. Huge sinking rivers and springs.	From the mountains to the sea. Tropical glaciated alpine to lowland tropical rainforest.	No	No
24	Korea	Jeju Volcanic Island and Lava Tubes	Outstanding example of volcanokarst, a special style of pseudokarst. This includes Geomunoreum lava tubes, which are notable for spectacular decoration with carbonate speleothems, the carbonate being derived from overlying calcareous dune sands blown in from the coast.	Warm temperate monsoonal.	No	No
25	Madagascar	Tsingy de Bemaraha Strict Nature Reserve	Extensive areas of very sharp limestone pinnacle karst known locally as 'tsingy' with joint corridors up to 80 m deep occupied by forest. Traversed by river gorges. May be the world's most spectacular pinnacled terrain	Tropical seasonally arid.	Yes	No
26	Malaysia	Gunung Mulu	The park has a significant area of karst in Miocene limestone that contains large	Humid tropical rainforest with 17 vegetation zones covering altitude	Yes	No

			underground rivers and > 290 m of explored caves, including Sarawak Chamber (700 m long, 300-400 m wide and up 100 m high) – the world's underground room. Caves contain major speleothem deposits and 1,5 million year sediment sequences. Rich cave biota, especially notable for bats and swiftlets. Surface features include giant collapse dolines and spectacular razor-sharp pinnacle karst (ca 50 m high)	range to 2377 m.		
27	Montenegro	Durmitor National Park	Alpine glaciokarst in south-eastern Dinaric Alps with temperate karst features at lower elevations. Canyons induce deep karstification and some caves contain permanent subterranean ice.	Mediterranean alpine environment from 450 m to 2322 m. Dense pine and beech forests below alpine meadows.	No	No
28	Mexico	Sian Ka'an	Situated on the coastal edge of the emerged limestone plain of the cenote karst of Yucatan Peninsula. Only a small part of this important karst, which contains long and complex flooded cave systems, is within the World Heritage area, which was inscribed mainly for biological reasons.	Tropical seasonally humid with semi-evergreen, semi-deciduous forest.	No	No
29	Philippines	Puerto-Princesa Subterranean River National Park	Spectacular tropical karst landscape in middle Miocene limestone on Palawan Island extending from mountains to the sea. Contains polygonal karst, towers and poljes. Major underground river drains directly to the sea, lower portions of cave are tidal and navigable for 6 km.	Humid tropical rainforest environment. Most significant forest in Palawan Biogeographical Province.	Yes	No
30	Russian	Lake Baikal	A major part of the watershed (Irkutsk	Cool temperate extreme continental	No	No

	Federation		basin) surrounding Lake Baikal is located on karst, but its World Heritage value has not been scientifically evaluated.	climate.		
31	Russian Federation	Western Caucasus	A geologically complex region rising to over 3000 m. The northern section consists of alpine karst in Triassic limestones, much of it glaciated. Includes glaciokarst features, many deep gorges and deep caves. Incorporates complete karst systems.	Temperate to alpine continental climate. Largely undisturbed deciduous and coniferous forest and alpine meadows.	No	No
32	Seychelles	Aldabra Atoll	Four large coral islands enclosing a shallow lagoone. The islands rise to about 3 m above sea level and have well developed littoral karst forms. Inland are extensive areas of 'makatea' style pinnacled karren development. The islands represent the earliest stage of karst evolution.	Seasonally semi-arid tropical maritime climate.	No	No
33	Slovenia	Škocjan Caves	Located in the 'classical' karst of Europe. The site comprises a sinking river at the end of blind valley, the exposed course of the underground river flowing across the base of deep collapse depressions, and a large river with a high canyon passage. It is representative of the input of an allogenic river into a karst system.	Continental Mediterranean climate.	No	No
34	Solomon Islands	East Rennell	The site involves the southern third of Rennell Island, a particularly large coral atoll raised to 200 m with its former lagoon now a brackish lake with rugged limestone islands. Karst is scientifically	Humid tropical maritime climate (3000-4000 mm) with short dry season. Densely forested environment of Papuan Biogeographical Province.	No	No

			unevaluated but likely to be of international significance in representing the early stage of karstification.			
35	South Africa	Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai and Environs	A cluster of karst sites in Proterozoic dolomite bedrock that contains remains of some of the earliest hominids as well as many other species. The caves contain internationally outstanding examples of cave sediments and fossils that were deposited over an interval of several million years into very ancient karst systems.	Subtropical High Veldt savannah environment.	No	No
36	Thailand	Thungyai-Hua Kha Khaeng Wildlife Sanctuaries	A large and geologically complex forested mountainous region to 1500 m with savannah plains. Karst over part of the area, likely to be important but scientifically unevaluated.	Tropical monsoon climate. Evergreen and semi-deciduous forest in mountains with savannah in valleys and gallery forest along rivers. Outstanding biodiversity values.	No	No
37	Thailand	Dong Phayayen – Khao Yai Forest Complex	Contains karst terrain in west of area with gorges and caves, habitat of endemic species of reptiles and bats. Karst scientifically unexplored, but likely to be significant.	Tropical monsoon forest with long dry season.	No	No
38	Turkey	Hierapolis-Pamukkale	Extensive and 200 high valleyside travertine terrace with rimstone pools formed by carbonate deposition from geothermal water emerging at 59°C. Used as a spa since 2 century B.C. Possibly the world's earliest karst tourist site still in use. Significant human impact.	Warm temperate Mediterranean environment.	No	No
39	UK: Pitcairn	Henderson	Raised coral atoll 30 km^2 in area with	Tropical humid maritime climate	Yes	No

	Islands	Island	rough karstified 'makatea' plateau surface at about 30 m above sea level with central depression that may have been former lagoon. Island is bounded by 15 m high cliffs and fringing reef to 200 m wide. Limestone considered late Tertiary in age. An outstanding example of early phase of karstification with intact natural processes, but scientifically unevaluated. Some caves.	supporting thick cover of trees and dense undergrowth. The only raise and forested atoll with its ecology intact.		
40	USA	Grand Canyon National Park	Paleokarst and active karst development occurs in Permian, Mississippian, Devonian and Cambrian limestones and dolomites exposed in the walls of the 1500 m deep Grand Canyon. Doline karst on 2700 m Kaibab plateau north of the eastern Grand Canyon. Tufa cascades mark karst spring sites on canyon walls. Although karst represents only a small proportion of the Park, its caves contain dated evidence for the evolution of the Grand Canyon so are of international significance.	Warm temperature semi-arid mountaine climate on plateau surface.	Yes	No
41	USA	Mammoth Cave National Park	The longest cave in the world with 590 km of surveyed river passages, often large in dimension and gently sloping. The karst is developed in Lower Carboniferous (Mississippian) limestone and cave evolution commenced following uplift and exposure 3 to 4 million years ago. Extensive sinkhole plain at the surface. Large springs. Rich troglobitic fauna.	Humid warm temperate continental climate. Deciduous forest cover.	No	No

			The inflow margin of the karst is located beyond the Park boundary.			
42	USA	Carlsbad Caverns National Park	Huge caverns extensively decorated with speleothems are a major feature of the park. The 81 known caves mainly occur in uplifted Permian reef limestones. Outstanding karst extends into neighbouring Guadalupe National Park. The region's caves provide the world's foremost example of evolution by sulphuric acid dissolution, which occurred progressively between 12 and 4 million years ago. Surface topography on back-reef dolomites and limestones is dominated by dry valleys. High biodiversity, including about 1 million bat population.	Subtropical semi-arid continental climate.	No	No
43	Venezuela	Canaima National Park	The most outstanding example in the world of cave development in quartzite (Precambrian age). Caves occur to 10,8 km long and 383 m deep. Enclosed despressions and stream-sinks on plateau (tepuy) surface around 2650 m. Springs emerge in tepuy walls. A fluviokarst landscape.	Humid tropical upland rainforest environment.	Yes	No
44	Vietnam	Ha Long Bay	The world's most extensive and best-known example of tropical tower karst invaded by the sea. The Park area includes about 1600 islands, some with caves. Incorporated areas of fengcong and fenglin karst. Significant human impact from surrounding development.	Humid tropical monsoonal environment.	Yes	No
45	Vietnam	Phong Nha-Ke	Extensive and complex karst	Humid tropical monsoonal	Yes	No

		Bang National Park	development in dissected plateau environment to 1290 m above sea level that continues across border into Laos. Long history of karst landscape evolution, possibly since early Mesozoic. Major caves and underground rivers and extensive enclosed depressions (polje).	environment with largely undisturbed evergreen primacy forest. Rich biodiversity.		

First criterion - plateau:

Karst of NP Lena Pillars plateau is the first example of karst development in dry climate

In the framework of all plateaux, already inscribed to the List of World Natural Heritage, karst is developed in conditions of the humid climate, with the exception of Grand Canyon National Park, where the one is semi-arid

6 - Hallstart-Dachstein Salzkammergut Cultural Landscape - Humid temperate rising to subalpine and alpine
14 - South China Karst - Continental humid subtropical plateau (Wulong and Shilin) to subtropical monsoonal (Libo). Extensive natural forest cover at Libo
18 – Alejandro de Humboldt National Park - Humid tropical forested environment with high biodiversity
39 - Henderson Island - Tropical humid maritime climate supporting thick cover of trees and dense undergrowth. The only raise and forested atoll with its ecology intact
40 - Grand Canyon National Park - Warm temperature semi-arid mountaine climate on plateau surface
43 – Canaima National Park - Humid tropical upland rainforest environment
45 - Phong Nha-Ke Bang National Park - Humid tropical monsoonal environment with largely undisturbed evergreen primary forest. Rich biodiversity.
(I tried to compare the heights too: 6 – 1850-3000 m; 14 – 700-1875 m *(there is my information)*; 18 - ?; 39 – 30 m; 40 – 2700 m; 43 – 2650 m; 45 – 1290 m;

Second criterion – permafrost:

Only karst Natural park "Lena Pillars" is developed in conditions of continuous permafrost

8 – Nahanni National Park – discontinous permafrost
9 - Canadian Rocky Mountains Parks - mountain permafrost

Subterranean streams, springs and caves indicate that the discontinuous permafrost is occurred here.

Third criterion – cold karst:

Comparison	Nahanni National Park	Natural park "Lena Pillars"
Altitude, m	200-2(00	100-550
Glaciation/ permafrost	Western half experienced repeated alpine glaciation and eastern – quarter continental glaciation, but a central corridor was always ice-free, due to its aridity	Permafrost up to 300 -500 m thickness
Climate	Cold continental climate with wide monthly variations in temperature and precipitation: Annual temperatures being – 4° to – 12°C Precipitation is 400-600 mm, ~ 50 % falls as snow	Sub-Arctic extreme continental and dry climate: Annual temperature is –9,8°C Precipitation is 249 mm, 50 % falls as snow
Environment	Alpine tundra and mountainous taiga	Taiga forests in valleys
Geological conditions	Mixed: western park – granitic batholith, carbonate and clastic strata of Cretaceous age; eastern park – Devonian limestones and dolomites> 1000 m	Lower Cambrian limestones and dolomites with a thickness 400-500 m outcrop
Solutional denudation rates, mm/ ka	18-27	9,43-12,9
Karstic manifestations	Spectacular karst landscape, including poljes, caves and gorges, and hot spring with large tufa mound	Karst sinkholes, ponors, dry channels, disappearances of the rivers, karren, springs, small caves
Weathering	Landscape is subject to active frost processes	Landscape is subject to active frost and cryohydrotation processes
Karst pillars	Max heights are 30-40 m	Max heights are around 200 m

Fourth criterion – pillars:

Lena Pillars – first example of pillars development in conditions of dry climate, moreover in the competition of weathering and karst processes

12 – Wulingyuan - A mixed quartz sandstone (66 %) and limestone (33 %) area, most notable for 3100 sandstone pillars and peaks to 200 m high separated by ravines and gorges - Humid warm temperate climate with deciduous forest. Altitude range 450 m to 1264 m

14 - South China Karst - Shilin (Yunnan) comprises stone forests (Yunnan); and Libo has extensive forestered cone karst (fengcong and fenglin) - Continental humid subtropical plateau (Wulong and Shilin) to subtropical monsoonal (Libo). Extensive natural forest cover at Libo

16 – Viñales Valley - mogote karst (tower and cone karst) in a wide flat-floored valley - Seasonally humid tropical

21 - Sheer towers and pillars 10 to > 100 m high developed in early Tertiary deltaic quartz conglomerate - Mediterranean climate. Mean altitude 300 m rising to 1000 m

25 – Tsingy de Bemaraha Strict Nature Reserve - Extensive areas of very sharp limestone pinnacle karst known locally as 'tsingy' with joint corridors up to 80 m deep occupied by forest. Traversed by river gorges. May be the world's most spectacular pinnacled terrain - Tropical seasonally arid

26 - Gunung Mulu - spectacular razor-sharp pinnacle karst (ca 50 m high) - Humid tropical rainforest with 17 vegetation zones covering altitude range to 2377 m

29 – Puerto-Princesa Subterranean River National Park - Spectacular tropical karst landscape in middle Miocene limestone on Palawan Island extending from mountains to the sea. Contains towers - Humid tropical rainforest environment. Most significant forest in Palawan Biogeographical Province

32 - Aldabra Atoll - Inland are extensive areas of 'makatea' style pinnacled karren development - Seasonally semi-arid tropical maritime climate

44 – Ha Long Bay - The world's most extensive and best-known example of tropical tower karst invaded by the sea. Incorporated areas of fengcong and fenglin karst - Humid tropical monsoonal environment

Lena Pillars Nature Park

The Program of environmental tourism development in the Lena Pillars NP for the period 2012 - 2016

Pokrovsk 2012

The Program preconditions

One of the main spheres of the Nature Park activities is development of environmental tourism.

The Nature Park has great tourism, nature, recreational, historical, and cultural potential.

The territory of the Park is 485 thousand hectares; its main part is the Lena-Bonnamskaya area between the two rivers with its unique nature complex. There are many nature monuments here: «Lena Pillars», Buotama and Sinskiye Pillars, Tukulans, places with rare kinds of plants, pure and fast Lena, Buotama and Siniaia rivers.

The "Lena Pillars" are the nature mommment of the geological origin; the age of the Pillars is 530 million years. The Pillars have witnessed geological past of the Earth of the ancient Cambrian Sea. Here on limy layers it is possible to find remains of *trilobites* and *archaeocyatha*. The Pillars are relics of weathering in form of towers, castles; they extend along Lena River for 40 km.

The Pillars are among the most significant natural objects in Russia for their high aesthetical value.

There are many montments of culture in the Park — the primitive humans archaeological site in Diring-Iuriakh, rock drawings, iron-smelting stoves, etc.

There are many objects of scientific interest in the Nature Park: karstic relief forms, thermokarst, eolian formations, relic forests, endemic species of animals and plants, paleontologic sites of mammoth fauna.

All mentioned makes tourist potential rather big.

Realization of the Program assumes fund raising from federal and republican budgets and off-budget sources.

Off-budget funds come from the Park own means from its commercial activities, grant projects, credit receipts.

Realization of the Program requires creation of the tourist complex for the organization of recreation for population of the Republic, mainly children and youth; it will help to solve a problem of employment of the ulus population, and attract financial resources to the ulus.

At full realization of the Program, the Park can accept up to 20 thousand tourists per year, while now it accepts 6 to 10 thousand tourists per year.

Development of tourism will enable significant tributary of funds to the municipal budget and to the park budget.

Environmental tourism in the Park is carried out in following directions:

Buotama

This direction includes accommodation of tourists and camping in the Ust-Buotama and Verkhny-Bestyakh tourist centers, rafting down the Buotama River, «Fisherman House» in Kuranakh and excursions to site of primitive humans in Diring-Yuriakh.

This direction includes environmental tracks "Feathery World of Buotama", "Unique landscape of Buotama", "Tukulan", "Forest Bison Nursery", in the future — "Iron-Smelting Stoves of Buotama", and educational programs in environmental camps for schoolchildren and pupils of Buotama environmental school.

The environmental routes should be richer and include the historical and ethnographic objects, in this view a concept of an open-air museum «Site of Ancient Hunters of the Stone Age» and «Concept of a Complex of Historical-Ethnographic Museums in Open Air» have been developed.

"Lena Pillars"

The following environmental routes have been developed in "«Lena Pillars»" Nature Park: «Lena Pillars», «Dry Channel of Labydya», and «Kurumnakh".

There are guesthouse in Pillars and a small tourist center on Kurumakh River.

It requires a lot of scientific and research work; unfortunately, lack of financing constrains this work. It is planned to construct an all- year-round Visitors Center, a viewing platform, rising ladder, a gallery of rock drawings.

It is necessary to provide neighboring territories with facilities necessary to develop an entertaining infrastructure.

Numerous actions are carried out in «Lena Pillars», such as «Gold of «Lena Pillars» open-air folklore festivals and author's songs «Lena Pillars» in Winter».

The visitors come to the Lena Pillars by river ships - "Demyan Bednyi", "Mikhail Svetlov" and "Mechanic Kulibin" from Yakutsk.

Batamai

The place is on the left coast of Lena River opposite «Lena Pillars».

It is planned to develop a route alternative to the river route.

Because of costly oil products, tickets for river ships became very expensive and it is necessary to have such an alternative as an automobile route.

It is possible to fish, pick berries, etc during the rest. The Park has already accepted some groups of visitors along this route.

Here a part of "Winter «Lena Pillars»" festival takes place.

Churan-Baza

The route has not yet been well developed; in the long term, it can be of great interest as an "extreme tourism route". Tourists reach Churan-Baza by river. Then they get to know history of Churan-Baza as a storage terminal for gold mining development in Aldan; then they reach Buotama by Tommot road and rift down Buotama (another option is rafting on Lena River).

The route is approved and promises to be quite competitive.

Rafting on the Siniaia River

The route will draw fans of extreme outdoor rest. Rafting starts with the river Matta, to Sinsk settlement, with 100 km distance in five days. It has the fourth complexity degree. Rafting is possible on kayaks and rubber boats. It is organized in June-July.

Development of the tourist rout visiting for 5 years.

	Tourist rout	2012	2013	2014	2015	2016	Total
1	Lena Pillars	10 000	11000	12000	13000	14000	60 000
2	Buotama mouth	1000	1010	1010	1020	1020	5060
3	Verhnii Besyakh	1000	1010	1010	1020	1020	5060
4	Diring Uryakh	500	500	510	510	520	2540
5	Rafting on the r. Buotama	1000	1000	1010	1010	1020	5040
	Total	**13500**	**14520**	**15540**	**16560**	**17580**	**77700**

The "Lena Pillars" Nature Park

Sakha Republic (Yakutia)

MEDIUM TERM MANAGEMENT PLAN

for the period of 2012-2016

Pokrovsk 2012

Introduction

The medium term management plan of the "Lena Pillars" Nature Park has been developed in accordance with the Regulations of the development, coordination, and approval of the documents on planning the activities of the state nature reserves and national parks, and the Recommendations for the development of medium term management plans of the state nature reserves and national parks approved by the Order of the Federal Nature Management Surveillance Service of December 3, 2007 No.491.

The prospective working plan of the "Lena Pillars" Nature Park is based on the Program of Development of Specially Protected Nature Territories Activities of the Ministry for Nature Protection of Sakha Republic (Yakutia) and takes into account the primary goal and tasks set for the Park in the period of its creation.

The medium term plan includes the works on nature protection, scientific researches, environmental education, and recreation activities of the "Lena Pillars" Nature Park as well as the identification of sources of financing the planned works at the expense of the federal budget funds, the Park income from its business and other yielding interest activity as well as other attracted financial sources.

The Plan provides for the prospects of the Park activities along all directions: preservation of the natural complexes and objects, development of environmental educational tourism, protection of the territory of the Park, cooperation with other institutions and collaborative participation in the nature protection, environmental educational, tourist, and other activities positively influencing the Park's work. In its turn, the prospective Plan accounts for the annual plans of the Park work for the certain period in the immediate future.

The "Lena Pillars" Nature Park is located in the Central Yakutia within the boundaries of Khangalsskii and Olekminskii uluses (districts). Territory of «Lena Pillars» Nature Park consists of two isolated parts: Lena-Buotamskii and Sinskii. To protect natural complexes of the Park from unfavorable influence of anthropogenic activities in areas near the Nature Park, the protected zone of limited wildlife management was created.

The total area of the Park is 485,022 hectares. The territory of the Nature Park is located on the land granted to it on the terms of a usufructary right, including the territories of tribal Evenk communities. All matters of the Nature Park activity are regulated by "The Statute of the State Enterprise 'Lena Pillars' Nature Park (Aan Aiylgy) of the Sakha Republic (Yakutia)" approved by

the Ministry for Property Relations of Sakha Republic (Yakutia) in coordination with the Ministry for Nature Protection of Sakha Republic (Yakutia). In July 2006, the "Lena Pillars" Nature Park was approved in the Preliminary List of the Russian Federation to enter the List of the World Cultural and Natural Heritage of UNESCO.

The primary goals of the Nature Park are the following:

- Maintenance of the natural conditions of protected natural complexes and preservation of their biological diversity peculiar for the natural zone of the Lena River midstream.
- Revival and development of traditional forms of the local population economy.
- Preservation of model and unique natural complexes and objects, monuments of nature, history, and culture, other objects of cultural heritage.
- Creation of conditions for the organized tourism and recreation, acquaintance with the nature of the Park, cultural, historical, and natural monuments in the territory of the Nature Park.
- Environmental monitoring.
- Scientific research in compliance with the nature protection legislation of the Russian Federation and Sakha Republic (Yakutia).
- Restoration of disturbed natural, historical, and cultural complexes by means of the funds assigned from the Republic budget or other financing (sponsorship, contributions of nature protection organizations).
- Arrangement of the environmental education of the public.

The means obtained by the Nature Park for visiting and exploitation of natural resources in its territory, servicing visitors, sponsorship, grants and voluntary donations of the Russian and foreign legal entities, public organizations and funds, as well as individuals, are used to improve the work of internal structures of the Nature Park.

Goals and tasks of the management plan

The purpose of the present management plan is the optimization of the management system and identification of prospects of the further development providing steady functioning of the specially protected territory of the "Lena Pillars" Nature Park in view of preservation of biological and landscape diversity. The management plan of the "Lena Pillars" Nature Park solves the following problems:

- Maintenance of reliable protection of natural complexes and objects in the territory of the Park.
- Control over limited economic activities and wildlife management within the territory of the Nature Park and its protected zone.
- Evaluation of actual expenses and sources of financing.

- Coordination of scientific research with nature protection activity.
- Development of environmental education at local and regional levels.
- Improvement of cooperation of the Nature Park with governmental bodies, local self-government, scientific and nature protection institutions.
- Reception of wide public support at local, regional and federal levels.
- Optimization of structure and personnel, professional development of its employees.
- Preservation of historical and cultural heritage.
- Integration of the Park into the social and economic structure of the region.
- Creation of conditions for environmental tourism development.

Information on the Period of Preparation and Developers Team of the Management Plan

The present management plan has been created for six months by common efforts of the Park employees led by Director Kipriianova Liubov' Danilovna, the Honored Ecologist of Russian Federation.

The creative team includes:

- ⇨ Rozhin Valerii Ivanovich — a senior state inspector of the "Lena Pillars" Nature Park, graduate from Irkutsk Agricultural Institute, biologist, forest warden;
- ⇨ Protod'iakonova Maiia Sergeevna — a methodologist of the "Lena Pillars" Nature Park, graduate from Moscow University of Design, programmer-designer;
- ⇨ Fedorova Anastasiia Vasil'evna — an expert of the Department of Environmental Education of the "Lena Pillars" Nature Park, graduate from Yakutsk State University, philologist, translator.

Scientific councilors: N. G. Solomonov, DBS, Academician of the Russian Academy of Sciences, Professor, I. M. Okhlopkov, CBS, scientific secretary, the Institute of Biological Problems of Permafrost Zone, Siberian Branch of the Russian Academy of Sciences, A. A. Kugaevskii, director, Yakutsk branch (division) of the Council of Productive Forces Studies, the Ministry of Economic Development of the Russian Federation and the Russian Academy of Sciences.

I. THE TERRITORY ARRANGEMENT PLAN

1.1. The structure of land tenure

The typical and unique nature of natural, historical, and cultural complexes is the most significant criterion that defines the territorial arrangement of the Nature Park.

Situational plan (see Nomination. Appendix: Maps).

The main levels of territorial management of the Park are borders of the Park and its security zone, functional zoning of territory, system of tourist routes and patrolling. The mechanism of management of the territory development is defined by its functional zoning.

The functional zoning, that is distribution of the equipment in territories by various regimes of protection and utilization held by the West Siberian Designing and Prospecting Expedition of Glavokhota of the Russian Federation in 1991-1992.

Functional zoning scheme (see Nomination. Appendix: Maps).

Seven functional zones are isolated in the territory of the Park.

In the territory of the Nature Park different regimes of protection and natural resources utilization operate, considering local natural, historical, cultural, and social features.

According to the current nature protection legislation the following zones are located in the Nature Park:

The preservation zone — places where all kinds of economic and recreational activity are forbidden, except for transit, travel of the organized groups of tourists, local citizens and members of the Evenk tribal communities that have the sanction for crossing of the reserved territory on road-route network of recreational purpose and places of organized tourism. The territory has the total area of 71765 hectares and is located on the right bank of the Lena River.

The sacred place — serves for performing traditional national rituals. It is located in the Labydya River mouth, in the zone of active recreational activity, between the preservation zone sites.

The zone of limited recreational activity — visiting of strictly regulated number of people is authorized. Total area is 12657.5 hectares.

The zone of active recreational activity — places of tourism for environmental education and acquaintance with the sights of the Nature Park, as well as for recreation. Total area is 1368 hectares.

The zone of traditional management *(ethnic territories)* — places where industrial development is forbidden, travel of all kinds of vehicles outside roads of general purpose is forbidden, utilization of natural resources in the forms providing protection and safety of natural complexes and original habitat of indigenous peoples and preservation of their traditional way of life is supposed. Transit of vehicles is permitted only if approved (tourist permit, sanction for transit) with the right of visiting the Park, with the indication of the type of a transport facility and its state registration number.

Zone of artificial maintenance and cultivation of rare and endangered kinds of animals. — intended for recovery of various species peculiar to the given settled natural complex. Territory of the bison nursery in the Buotama River mouth is four hectares.

The protected historical or archeological zone — represented by monuments of history of both archaeological and paleontological objects located in the territory of the Nature Park.

With the aim of protecting natural complexes of the Nature Park from anthropogenic influence and in conformity with the Federal Law "On Specially Protected Natural Territories", the protected zone with the limited rules of nature management is separated.

Land areas of State Forest Fund of the Khangalasskii, Aldanskii, and Olyokminskii uluses with the area of 8681.2 sq.km are the part of the protected zone.

There is no farming industry in the security zone; sable hunting is conducted under the license of the "Sakhabult" concern.

The major positive feature is that the lands are arranged within «Lena Pillars» Nature Park, so that the absence of other land users promotes operative and efficient control over the territory of the Park.

Activity scheme (see Nomination. Appendix: Maps)

Arrangement of "Lena Pillars" Nature Park lands

No.	Category of land tenure	Area (hectare)	%
1	Protected areas	429 629	88,58
2	Area of settlements	1,6	0,003
3	"Brolog" Hydrostation	2,4	0,005
4	Others	55 389	11,412
5	**Total area**	**485 022**	100

Agricultural works are not conducted in territory of the Park, area that belongs to saiylyk facilities belongs to settlements, and 2.9 hectares belong to "Brolog" hydrostation.

The "Sakhabult" concern relates to managing subjects of the Park, as it manages sable hunting by the hunters licensed and contracted with the Park.

The agricultural production in the territory of the Park includes herd horse breeding. The "Kachikatsky" enterprise breeds 5-6 herds in the territory of the Park.

Reacclimatization of wood bison is a young branch of economy. In 2006 thirty wood bison were brought to the Buotama River mouth from Canada, now there are 27 of them left.

1.2. Information on the protected zone

The borders of the protected (buffer) zone of the "Lena Pillars" Nature Park.

The northern border of the protected zone starts between the Lena and Buotama rivers, a watershed dividing sources of the Taryng Iuriakh (the right tributary of the Lena River) and the Kharylakh (the left tributary of the Buotama River) rivers, passing to source of Delberge stream, coinciding with administrative border between Khangalasskii and Olekminskii uluses. Then it goes southward, down Delberge stream up to its mouth, then downward along Buotama River up to the point opposite to Oddokun stream source, then turns northeast and to Atyrgakh-Hatyn streams sources, Borohu and further to the Oddokun stream, to the Diring Iuriakh and Buotama rivers watershed, then to Lena River right coast down to the point limited in the west by the basic place of «Lena Pillars» Nature Park and in the east by Amur-Yakut highway. The southern border of the protected zone passes along axial line of Amga water-separate ridge, further along the administrative border between Aldanskii and Olekminskii uluses, reaching Bes-Iuryakh stream source, up to its mouth, downward along Buotama River, to Kharyialah stream mouth and then up to its source.

The protected zone is located in the territories of the Khangalasskii and Olekminskii uluses occupying the area of 868.12 thousand hectares.

The protected zone of the Park has been created with the purposes of:

1. Preservation (restoration) of natural complexes and their components in places of traditional residence of indigenous peoples of the North;

2. Protection of natural complexes of the Nature Park from effects of economic activity in adjacent territories;

3. Restoration and development of traditional forms of wildlife management, way of life, culture, and recreation of indigenous peoples of the North;

4. Organization of constant observation over conditions of the natural complexes under influence of economic activities and recreational use of territory;

5. Maintenance of full employment and social security of indigenous peoples of the North.

In the territory of its security zone the Nature Park has to:

1. Regularly take security and other measures aimed at preserving (restoring) the natural complexes and their separate components, as well as at increasing of the land productivity.

2. Promote development of traditional methods of utilization of natural resources of environmental and aesthetic value;

3. Promote organization of consumer goods production, tourism and recreation of the population;

4. Carry out control over compliance with prescribed norms and rules at conducting economic activities by the major land users and tenants;

5. Promote fire-prevention, sanitary and epidemiological actions;

The regime of the protected zone.

The regime of the protected zone is aimed at performance of duties assigned to the Nature Park according to the Park Statute. In the territory of the protected zone, the following activities are forbidden:

1. Travel, transit, and presence of unauthorized outsiders not hired by major land users, persons not having proper sanctions (permits) to visit the territory with recreational purposes;

2. Usage of all kinds of chemical pesticides;

3. Actions changing the hydrological regime of the territory;

4. Exploration and mining;

5. Felling and crossing, as well as gathering of flowers, destruction of rare and vanishing plants, and burning any vegetation;

6. Travel, Parking of river and motor vehicles, trucks, caterpillar tractors, and other types of vehicles outside road networks during outdoor recreation without special sanctions (permits) or without industrial necessity;

7. All kinds of unorganized recreation and tourism, stations, campings, Parking, and making fires outside designated places;

8. Contamination of territory with garbage, household and industrial waste;

9. Other activities damaging natural complexes and their components, not specified by the status of the security zone without agreement with the administration of the Nature Park and the tribal community.

In the territory of the protected zone, it is permitted to:

1. Build roads, track pathways, install cables connected with activity of the Nature Park and other land users;

2. Carry out topographic, geodesic and forest arrangement works;

3. Organize tourism and recreation of the population, move organized tourist and excursion groups, send visitors along the established routes accompanied by members of Evenk tribal communities and workers of the Nature Park or without above-mentioned at the presence of special sanction (permit);

4. To manage amateur hunting, fishery, wild berries and mushrooms gathering without the right of realization of production in the established places and terms, at the presence of proper sanction given out by representatives of the state bodies;

5. To introduce plants and animals with the purpose of acclimatization, and to carry out the actions promoting increase of number of certain kinds of animals up to limits not exceeding admissible capacity of lands;

6. To carry out research by collectives or individuals on the topics concerning studies of protected biological objects, their habitats, and rational utilization of natural resources;

7. To make other actions not in conflict with the purposes and tasks of the protected zone (Evenk nomadic tribal communities: " Kelet", "Jona", "Bjutchen", "Kytakh", "Morso", "Kynat", "Sugar").

2. ACTION PLAN

2.1. Prospects of the "Lena Pillars" Nature Park Development

The long-term working plan is based on the Program of Development of Specially Protected Natural Territories approved by the Ministry for Nature Protection of Sakha Republic (Yakutia), considering the main purpose and tasks set before the Park during its creation.

The plan provides prospects of activity in all spheres: preservation of nature complexes and objects; development of environmental educational tourism; protection of the Park; cooperation with other bodies and teamwork in the sphere of nature protection, environmental educational tourism and other activities, which are favorable for the work of the Park. The long-term plan takes into account annual plans of the Park work for the nearest future.

Now, due to changes in the legislation of the Russian Federation in the field of nature management and activities of nature protection organizations, economic development and solution of social problems of the population near the territory of the Park have undergone significant changes. These changes were directly reflected in scheduling the work of the Nature Park that acts based on cooperation in the interests of all parties in compliance with the federal legislation.

2.1.1. "Preservation of Natural Complexes in Conditions of Developing Tourism Activity" Program

Purpose: Rational use, restoration and maintenance of the natural complexes and protection of the objects in the territory of the Park.

Primary goals:

- Enhancement of efficiency of state inspection in protection of «Lena Pillars» Nature Park territory.
- Control over rational nature management and preservation of a biological diversity within the borders of the Nature Park.
- Legal regulation of nature management matters on the land allocated to users.

Increase of state inspection activity in protection of the territory of the "Lena Pillars" Nature Park

Management goals:

- The improvement of state inspection work in the Park in the sphere of prevention of the nature protection legislation infringements.
- Maintenance of cooperation with ulus municipal bodies of territorial administration, the ulus law-enforcement bodies, bodies of management of forestry and forest protection, education organizations and inspections of nature management of Ministry for Nature Protection of Sakha Republic (Yakutia).

Measures:

- Modification in the duty regulations of inspection staff in consideration of changes of the federal legislation.
- Staging performances in mass media, giving lectures in educational institutions and for visitors of the Park, as well as attraction of the local population's attention to activities of the Park.
- Attraction of skilled workers of the Ministry of Nature Management of Sakha Republic (Yakutia), Ministry of Home Affairs, Ministry of Emergency and Forestry Management to improve professional skills of inspection staff. Conducting guidance of personnel before going for inspection.
- Certification of inspection staff according to instruction and in terms set by Ministry of Nature Management of Sakha Republic (Yakutia).
- Forming public inspection of the Park by law-abiding local residents who have not infringed the Park rules or the nature protection legislation.
- Creating an electronic database by types of infringements.

Improving material resources of the state inspection of the Park

Measures:

- Improvement of material resources of the security service by financing from Ministry for Nature Protection of Sakha Republic (Yakutia): purchase of service weapons, horses, motor boats; transmission equipment, digital photo and video cameras.
- Forming and equipping cordons in the Park sites.
- Supply of working clothes and uniforms.
- Providing obligatory social insurance.

Expected results:

- Reduction of infringements of nature protection legislation by visitors and locals.
- Higher social security of state inspectors.
- Attraction of the public to nature protection actions in the Park.
- Professional development of inspectors as a result of training courses.
- Maintaining an electronic database on patrolling the territory of the Park.
- Possibility of patrolling the territory.

Indicators:

- Expansion of duties assigned to inspectors working in interaction with local population and visitors of the Park.
- More reports made by public inspectors.

- Social insurance of state inspectors.
- Equipping staff with uniforms, special security facilities, service weapons.
- Equipping with computers and training of staff.
- New buildings for staff.
- Availability of necessary mechanized and a cartage transport means.
- Decrease in the inspection staff turnover.

Control over rational nature management and preservation of biological diversity in the Nature Park.

Management goals:

- Preservation and increase of environmental, recreational, scientific, and cultural value of forest ecosystems.

Measures:

- Forestry measures based on natural inspections, forest monitoring and purposeful scientific programs.
- Forest protection and fire prevention.
- Purchase of forest protection equipment. Low quality timber processing for the needs of the Park.
- Participation of local population in informing the Park employees of sites of fire.

Projected Activities on Forestry and Forest Restoration in the "Lena Pillars" Nature Park in 2012-2016

Activity	Measure-ment	Volume	Year					Cost (thousand rubles)
			2012	2013	2014	2015	2016	
Felling	Hectares	240	40	50	50	50	50	
Other felling	Hectares	40	8	8	8	8	8	
Forest restoration	Hectares	100	20	20	20	20	20	
Sylvula care	Hectares	270	100	70	50	30	20	
Forest regulation	Thousand hectares	485	200	200	85	-	-	

Projected Activity Volumes on Forest Protection and Fire Safety in the "Lena Pillars" Nature Park in 2012-2016

Activity	Measure-ment	Volume	Year					Cost (thousand rubles
			2012	2013	2014	2015	2016	
Forest pathology study	Hectares	1500	500	500	300	100	100	
Fire-prevention mineral strips	km	100	20	20	20	20	20	
Strip maintenance	km	200	40	40	40	40	40	
Road repair	km	25	5	5	5	5	5	
Stock purchase	thousand rubles							100,0

Maintenance of poiums

Measures:

▪ The regular control of economic activities of cooperative farms of the Evenk tribal economies in the Park

Expected results:

▪ Elimination of improper use of assigned land and natural resources.

▪ Maintenance by land users of water-security zones regulations.

▪ Preservation and improvement of hunting wealth of land.

Measures:

▪ Biotechnical actions and registration.

Project of Biotechnical Activity Volumes in the "Lena Pillars" Nature Park in 2012-2016

Activity	Measure-ment	Volume	By years					Cost (thousand rubles)
			2012	2013	2014	2015	2016	
1. Building and repair of feeding racks	pcs.	25	5	5	5	5	5	62,5
2. Building and repair of								

feeding points	pcs.	5	1	1	1	1	1	50,0
3. Hay preparation and furnishing for wild ungulates	centner	62,5	12,5	12,5	12,5	12,5	12,5	312,5
4. Purchase and furnishing salt	kg	625	125	125	125	125	125	12,5
5. Making artificial nests for puddle ducks	pcs.	75	15	15	15	15	15	37,5
6. Winter routes registration	km	30	30	30	30	30	30	250,0
7. Anti-suffocation activity in lakes	hectares	1,5	0,3	0,3	0,3	0,3	0,3	5,0
8. Shooting and capture of wolves and wild dogs	heads							100,0
9. Preparation of branch food for ungulates	pcs.	625	125	125	125	125	125	31,25
TOTAL:								**861.25**

Expected results:

- Increase in number of game animals in the territory of the Park.
- Increase in number of waterfowl.
- Elimination of fish kill in lakes.
- Reduction in number of wolves and stray dogs.

Indicators:

- Density upon winter routes registration results.
- Number of broods observed.
- Low level of spring fish loss in lakes.
- Reduction in number of ungulates baited by wolves.

Legal regulation of matters of nature management in lands assigned to users

Measures:

- Receiving of certificates' copies on state registration of land users' rights.
- Making cooperation contracts on observance of land users' rights and of the Park regulations.
- Prevention of infringements of the land users rights by other persons and rendering assistance in resolving contradictions.

Expected results:

- Observance of the rights and regulations of the Nature Park by Evenk tribal communities and farms.

- Cooperation of the Park employees and Evenk tribal communities and farms.
- Fewer infringements of the Park regulations and nature protection legislation by the visitors to the Park.

Forms of preventing infringements

1. Lectures by state inspectors on environmental matters at schools, enterprises, and labor collectives.
2. TV presentations, printed publications, address to population of municipal unions.
3. Environmental actions and quizzes in cooperation with experts in ecology.
4. In cooperation with municipal bodies, making contracts on collaboration, contracts with law-enforcement bodies, forestry services. Explanation of importance of specially protected natural territories (SPNT) for preservation of flora and fauna, of SPNT functioning as nursery for biological diversity.
5. Acquaintance of visitors with the information on Nature Park regime, with zones in the territory, attraction of public attention towards environmental actions.
6. Patrolling the territory of the Park by local state inspectors by transport and on foot.
7. Posting information signs on the territory of the Park, collaboration with land users in representing their interests as for infringements of the Park regime.

Gathering information of operational character

Information of operational character is given by subdivisions of state inspectors of the Park — 9 persons, public inspectors of the Park — 14 persons, employees of Nature Protection Department, land users.

State inspectors:

Asekritov V. D. – Sinsk village

Gerasimov S. A. – Edyai village

Vladimirov V. A. – Kytyl-Dura village

Ivanov G.N. – Oddokun subdivision

Platonov R. N. – Buotama River mouth subdivision

Iljin D.I.– Buotama River, Kuonan subdivision

Kalitin V. N. – Protected (buffer) zone

Pavlov A. A. – Pokrovsk town

Timofeev S.P.- Sinsk

Officially responsible for gathering and analysis of the information of operational character is Pavlov A.A., the Park Inspector

Basic sources of information

Public inspectors in settlements, hunters, and members of environmental camps, forestry workers, and volunteers provide sources of operational information on incidents in the territory of the Park.

Definition of forms and methods of information reception

Reception of information concerning protection and prevention of violating the Park regime is carried out by city and mobile phones.

Definition of means and forms of material incentives of informants

In settlements where it is worthwhile to have informants and where the broadest review of the territory of the Park can be expected, voluntary informants are appointed whom the administration of the Park rewards financially.

Development of the protection service resource base

Resource base of the protection service now includes:

Motor boats of foreign manufacturers — 6 pcs

"Buran" snowmobiles — 2 pc

Inside lighting — 5 pcs

Automobiles – 3 pcs

Boat KS-102- 1 pcs

Boat Yamaha-250 – 1 pcs

Wind-mill electric generating plant — 1 pc

Each inspector has a binocular for observation.

The program "Preservation of natural complexes"

Administrative problem	Activity	Results and indicators	Terms	Executors	Value, thousand rubles
1. Increase of activity's efficiency of the state inspection on territory protection					
1.1.1. Strengthening of work of the state inspection of Park on preventive maintenance of infringements of the nature protection legislation.	Modification of the duty regulations of inspection structure considering changes of the federal legislation.	Decrease in number of complaints to work of inspectors from outside local population and visitors of Park.	2012-2016	The chief of inspection, the senior state inspector.	
	Presentations in mass media, lectures in general educational institutions and for visitors of Park, local population attraction to Park activities.	Decrease in quantity of infringements from outside local population.	2012-2016	State inspectors.	
	Hiring qualified employees of MEP RS (Y), Ministry of Home Affairs, Ministry of Emergency and Forestry Managements to improve professional skills of inspection personnel. Participation in seminars, competitions and other actions of MEP RS (Y).	Improvement of professional skills and professional training of inspection personnel. Positive decision under reports made.	2012-2016	The involved experts of MEP RS (Y), the Ministry of Home Affairs, the Ministry of Emergency Measures and others.	
	Formation of public inspection of Park from the local residents who do not have propensities to infringement of a regime of Park and the nature protection legislation.	Trustworthy information reception about infringements of a regime of Park. Improvement of quality of spent nature protection actions.	2012-2016	Parks inspection.	
1.1.2. Strengthening of	Strengthening of material base of service: the office weapon; horses;	Maintenance of protection of inspection structure and	2012-2016	MEP RS (Y).	

material base of Park state inspection.	boat pendant motors; snowmobiles; a communication facility; digital a photo and video equipment.	mobility on duty. Reduction of number of infringements of a regime of Park.			
	Maintenance with overalls, uniform regimentals.	Strengthening of positive image and preservation of health of inspection structure.	2012-2016	MEP RS (Y).	
	Building and arrangement of cordons in territory of sites.	Improvement of inspectors working conditions.	2012-2016	Experts in building.	
1.2. Control of rational wildlife management and biodiversity preservation in borders of Nature Park.					
1.2.1. Preservation and increase environmental, recreational, scientific and a cultural value of wood ecosystems.	Carrying out forestry actions based on natural inspections, wood monitoring, and within the limits of target scientific programs.		2012-2016	The forest warden state inspector.	
1.2.2. The decision of a question on carrying over bisons for Park territory	To prepare the letter addressed to the minister of MEP RS(Y) about adverse influence of bisons on ecosystems of a mouth of the river of Buotama.	Restoration of a vegetative cover, renewal of work of an environmental track, the bird's world of a mouth of the river of Buotama.	2012-2016	The ranger state inspector.	
1.2.3. Preservation and improvement of hunting economy values of lands.	Carrying out biotechnical actions and registration works. Increase in number of animals.	Reduction of quantity of the animals knocked down by wolves. Data of winter tracking.	2012-2016	Inspection.	
1.3. Legal regulation of questions of wildlife management on the earths fixed to users.					
Reception of copies of certificates on the state registration of the rights of land users. To reflect the data in performances in bodies of the mass information and at work with visitors of territory of Park.		The positive relation from outside land users to Park work.	2012-2016	Inspection.	
The conclusion of contracts on teamwork on observance of the rights of land users and observance of a regime of Park.		Rendering assistance from outside users in Park work.			

TOTAL: 17225 thousand rubles

2.1.2. Program of cultural heritage preservation

No.	Management aim	Activity	Terms	Executors	Value, thousand rubles
1.	Discovery and systematization of objects of historical and cultural heritage.	Investigation of the territory during expeditions.	2012-2016	«Lena Pillars» Nature Park. Yakutsk State University.	
		Collecting and refinement of separate archive materials.	2012-2016	«Lena Pillars» Nature Park. Yakutsk State University. National Archive. Institutes of Siberian Branch of Russian Academy of Sciences.	
		Making of complex database.	2012-2016	«Lena Pillars» Nature Park. Yakutsk State University. National Archive. Institutes of Siberian Branch of Russian Academy of Sciences.	
2.	Assigning under protection of objects of historical and cultural heritage.	Certification of objects of historical and cultural heritage.	2012-2016	«Lena Pillars» Nature Park.	
		Defining and setting of protection areas of objects of historical and cultural heritage.	2012-2016		
3.	Attracting of locals for saving and reproduction of dynamic forms of culture heritage, including traditions of the culture.		2012-2016	«Lena Pillars» Nature Park.	
4.	Preservation of manor in Echite place and bell-tower in Churan base.	Restoration of the manor and repair works.	2012-2016	«Lena Pillars» Nature Park.	

5.	Saving of necropolises.	Research and description of old headstones.	2012-2016	«Lena Pillars» Nature Park.	
6.	Preservation of archaeology monuments.	Systematic monitoring of archaeology heritage objects.	2012-2016	«Lena Pillars» Nature Park.	
		Conservation of destructing monuments.	2012-2016		
		Maintenance of archeological heritage (setting of information screens, educational work with population, issue of information guides, making of video and slide materials, expositions).	2012-2016		
		Protection of archaeology monuments from rides and illegal excavations.	permanently		
7.	Saving of monuments in honor of World War II participants.		permanently	«Lena Pillars» Nature Park.	
8.	Provision of the necessary facilities in territories.	Liquidation of rests of abandoned farms located in visually important places which disfigure the landscape	2012-2016	«Lena Pillars» Nature Park.	
		Maintenance of the memorable places (setting of information screens, design of excursion routes).	2012-2016		

2.1.3. The Program of environmental tourism development

The Program preconditions

One of the main spheres of the Nature Park activities is development of environmental tourism.

The Nature Park has great tourism, nature, recreational, historical, and cultural potential.

The territory of the Park is 485 thousand hectares; its main part is the Lena-Boutamskaya area between the two rivers with its unique nature complex. There are many nature monuments here: «Lena Pillars», Buotama and Sinskiye Pillars, Tukulans, places with rare kinds of plants, pure and fast Lena, Buotama and Siniaia rivers.

The "Lena Pillars" are the nature monument of the geological origin; the age of the Pillars is 530 million years. The Pillars have witnessed geological past of the Earth of the ancient Cambrian Sea. Here on limy layers it is possible to find remains of *trilobites* and *archaeocyatha*. The Pillars are relics of weathering in form of towers, castles; they extend along Lena River for 40 km.

The Pillars are among the most significant natural objects in Russia for their high aesthetical value.

There are many monuments of culture in the Park — the primitive humans archaeological site in Diring-Iuriakh, rock drawings, iron-smelting stoves, etc.

There are many objects of scientific interest in the Nature Park: karstic relief forms, thermokarst, eolian formations, relic forests, endemic species of animals and plants, paleontologic sites of mammoth fauna.

All mentioned makes tourist potential rather big.

Realization of the Program assumes fund raising from federal and republican budgets and off-budget sources.

Off-budget funds come from the Park own means from its commercial activities, grant projects, loans.

Realization of the Program requires creation of the tourist complex for the organization of recreation for population of the Republic, mainly children and youth; it will help to solve a problem of employment of the ulus population, and attract financial resources to the ulus.

At full realization of the Program, the Park can accept up to 20 thousand tourists per year, while now it accepts 6 to 10 thousand tourists per year.

Development of tourism will enable significant influx of funds to the municipal budget.

Environmental tourism in the Park is carried out in following directions:

Buotama

This direction includes accommodation of tourists and camping in the Ust-Buotama and Verkhny-Bestyakh tourist centers, rafting down the Buotama River, «Fisherman House» in Kuonan, and excursions to site of primitive humans in Diring-Iuriakh.

This direction includes environmental tracks "Feathery World of Buotama", "Unique landscape of Buotama", "Tukulan", "Wood Bison Nursery", in the future — "Iron-Smelting Stoves of Buotama", and educational programs in environmental camps for schoolchildren and pupils of Buotama environmental school.

The environmental routes should be richer and include the historical and ethnographic objects, in this view a concept of the open-air museum «Site of Ancient Hunters of the Stone Age» and «Concept of a Complex of Historical-Ethnographic Museums in Open Air» have been developed.

"Lena Pillars"

The following environmental routes have been developed in «Lena Pillars» Nature Park: «Lena Pillars», «Dry Channel of Labydya», and «Kurunnakh".

There are guesthouse in Pillars and a small tourist center on Kurunakh River.

It requires a lot of scientific and research work; unfortunately, lack of financing constrains this work. It is planned to construct an all- year-round Visitors Center, a viewing platform, rising ladder, a gallery of rock drawings.

It is necessary to provide neighboring territories with facilities necessary to develop the entertaining infrastructure.

Numerous actions are carried out in «Lena Pillars», such as «Gold of «Lena Pillars» open-air folklore festivals and author's songs «Lena Pillars» in Winter».

Batamai

The place is on the left coast of the Lena River opposite «Lena Pillars».

It is planned to develop a route alternative to the river route.

Because of costly oil products, tickets for river ships became very expensive and it is necessary to have such an alternative as an automobile route.

It is possible to fish, pick berries, etc during the rest. The Park has already accepted some groups of visitors along this route.

Here a part of "Winter «Lena Pillars»" festival takes place.

Churan-Baza

The route has not yet been well developed; in the long term, it can be of great interest as an "extreme tourism route". Tourists reach Churan-Baza by river. Then they get to know the history of Churan-Baza as a storage terminal for gold mining development in Aldan; then they reach Buotama by Tommot road and raft down Buotama (another option is rafting on Lena River).

The route is approved and promises to be quite competitive.

Rafting on the Siniaia River

The route will draw fans of extreme outdoor rest. Rafting starts with the river Matta, to Sinsk settlement, with 100 km distance in five days. It has the fourth complexity degree. Rafting is possible on kayaks and rubber boats. It is organized in June-July.

List of activities for the program realization

Activity	Terms	Executors
1. Development of environmental tourism in «Lena Pillars» Nature Park.	2012-2016	«Lena Pillars» Nature Park.
1.1. Certification of the culture and nature monuments in the Park.	2012-2016	«Lena Pillars» Nature Park.
1.2. Design of general scheme of environmental tourism development.	2012-2016	«Lena Pillars» Nature Park .
1.3. Sale of souvenirs at tourist centers.	Annually	Ministry of education of the Sakha Republic (Yakutia).
1.4. Realization of "Buotama" sub-program.		
1.5. Realization of «Lena Pillars» sub-program.	2012-2016	«Lena Pillars» Nature Park, Artists Union of Sakha Republic.
1.6. Realization of "Churan-Baza" sub-program.		
1.7. Realization of "Batamai" sub-program.	2012-2016	«Lena Pillars» Nature Park, "Khangalasskii Ulus" municipal district.
1.8. Organization of historical environmental expedition of the school pupils to the Park.	2012-2016	
1.9. Organization of summer environmental tourism camps for school pupils.	Annually	
1.10. Organization of «Gold of «Lena Pillars» open-air festival.	Annually	
1.11. Organization of «Lena Pillars» in winter» festival.	Annually	
1.12. Rafters tourslet on the river Buotama.	Annually	
1.13. Tourism Song Contest «Silver string Diring»	Annually	
1.14. Orienteering Competition «Treasures Deering Yuryakh».	Annually	
2. Improvement of tourist activity.	Annually	«Lena Pillars» Nature Park.
2.1. Casting and training of guides.	Annually	
2.2. Improvement of tourist centers equipment.	Annually	
2.3. Equipment of routes and environmental routes.	Annually	

TOTAL: 120 million rubles

Development of the tourist rout visiting, for 5 years.

	Tourist rout	2012	2013	2014	2015	2016	Total
1	Lena Pillars	10 000	11000	12000	13000	14000	60 000
2	Buotama mouth	1000	1010	1010	1020	1020	5060
3	Verhnii Bestyakh	1000	1010	1010	1020	1020	5060
4	Diring Uryakh	500	500	510	510	520	2540
5	Rafting on the r. Buotama	1000	1000	1010	1010	1020	5040
	Total	**13500**	**14520**	**15540**	**16560**	**17580**	**77700**

2.1.4. The program of environmental education development

Annually the department of environmental education of the Park carries out seminars for teachers, thematic and scheduled, usually three to four seminars a year. The seminars are carried out with participation of lecturers from Yakutsk, employees of the Institute of Biological Problems of Permafrost Zone of the Siberian Branch of the Russian Academy of Sciences, Yakutsk State University, Ministry for Nature Protection, the Ulus education management etc.

Summer environmental camps and expeditions are organized in the Nature Park annually. Stationary recreation camp with the training program has been working in Buotama River mouth since 2003. Experts from the Institute of Biological Problems of Permafrost Zone and from Yakutsk State University are invited to train children. Besides, children's scientific expeditions to interesting places of Nature Park take place.

Traditionally in spring months from March until June, competitions and quizzes are organized in schools timed to «March of Parks» days of National Parks and Reserves.

A plenty of the population is involved in annual environmental actions on cleaning settlements of trash (e.g. "The Cleanest Courtyard" action).

The Department of Environmental Education has started issuing methodical literature for ulus schoolteachers. Methodical manuals are distributed on diskettes due to difficulties in copying. Issue of periodic methodical literature for teachers is planned.

"The Bulletin of the Park" newspaper is issued four times a year, it is planned to increase quantity of issues and its circulation.

To attract tourists attention it is necessary to increase issue of advertising pamphlets, calendars, leaflets, badges, emblems etc. (as an advertising production).

The Park is in close cooperation with rural museums; in each of them, our experts have established expositions on the work of the Park. In schools and administrations of ulus, villages displays have been set that are constantly updated. Opening a museum on nature with interesting exhibits in the Visitors Center is planned.

There are plans of creating a video shop with movies on wonderful nature of the Park. To do this, professional video- and photocameras should necessarily be purchased.

The purpose of the program:

- Creation of steady system of environmental education in the territory of «Lena Pillars»" Nature Park proper and in Khangalasskii ulus as a whole.

Tasks:

- Increase of an educational level of teachers by carrying out seminars and conferences.
- Development of various forms and methods of work on environmental education.
- Rising interest of the local population in matters of nature management by giving comprehensive information.

Possible actions on development of environmental education in the "Lena Pillars" Nature Park in 2008-2012 are listed below together with the estimate of necessary expenditures.

Year	Activity
1.	***Increase of an educational level of teachers by carrying out seminars and conferences***
2012-2016	1. Seminar for kindergarten and elementary school employees. 2. Seminar for teachers of ecology. 3. Seminar on tourist and local history activity of school pupils. 4. Organizational seminar for teachers on summer children camps. 5. "A Step Toward the Future" scientific conference of pupils.
2.	***Development of various forms and methods of work on environmental education***
2012-2016	1. Organization of camps and field expeditions for practice of children and youth (annually). 2. Development of different forms of work with children and youth such as quizzes and exhibitions, activity in context of "Marche of Parks" (annually). 3. Attraction of population to ecologic actions – organization of annual nature protection action "Marche of Parks" (annually). 4. Annual action "The cleanest courtyard". 5. Lectures, discussions, hobby group work in winter time (annually). 6. Organization of spot-checks in schools of ulus with lectures (annually). 7. "Nature and we" action.
3.	***Ecologic literature***

annually	1. Issue of methodical literature for those who need information on environmental education. 2. Issue of periodical ecologic «The bulletin of the Park» newspaper. 3. Issue of pamphlets about the Park. 4. Issue of big photo album. 5. Issue of the book about the Nature Park.
4.	***Work with local history museums, organization of expositions and design of stands***
annually	1. Creation of a nature museum in the Visitors Center. 2. Cooperation with rural museums. 3. Making displays, brochures, information screens. 4. Issue of advertising products (calendars, pamphlets, badges). 5. Making of movies, photos and slides.

Estimation of expenditures on environmental educational activity per 1 year.

Activity	Materials required	Cost
3-4 seminars per year: 1) thematic; 2) about tourist activity; 3) preparations for summer camps.	For preparation of one seminar: ▪ hand-outs; ▪ paper; ▪ 10 pcs. of Whatman paper; ▪ inviting of lectors; ▪ visuals; ▪ expenditures.	10 000 rub
Organization of camps and expeditions for 1st season	Required for one season camp or one expedition: ▪ transportation cost (petroleum, rent); ▪ salary for lecturers, trainers, cook, worker; ▪ stationary; ▪ mobile laboratories; ▪ tents - 10 pcs.; ▪ rubber boats - 4 pcs.; ▪ tourist stock (balls, volleyball net, swimming buoy, table games, etc).	150 000 rub
Organization of quizzes, exhibitions.	▪ prizes, certificates, presents; ▪ mass-media advertisement cost.	12 000 rub
Organization of environmental actions.	▪ megaphones, loud-speakers; ▪ prizes, certificates, presents.	20 000 rub
Issue of methodical literature.	▪ paper; ▪ publishing cost.	10000 rub
Issue of periodical newspaper.	▪ paper; ▪ publishing cost; ▪ making-up of news-paper; ▪ photos, pictures.	40 000 rub

Creation of museum in the Visit-center (stands, expositions).	▪ making of fiberboard stands; ▪ making of diorama; ▪ supply of expo materials.	120 000 rub
Work with mass-media.	▪ transportation of operators, correspondents (one report); ▪ advertisement cost (one ad.).	30 000 rub
Issue of advertising products (calendars, pamphlets, brochures).	▪ publishing cost (one pamphlet); ▪ photos, texts composition; ▪ making-up of the texts.	20 000 rub
Making of video-, photo-materials.	▪ purchase of video camera; ▪ purchase of professional camera; ▪ photo-, video- films; ▪ work of operators, photographers.	30 000 rub
Office supply	▪ computer, notebook, projector	140 000 rub
		582000 rub

2.1.5. Organization of scientific research and environmental monitoring

1. Inventory works

1.1. Inventory of the cartographic information.

For years of work of electronic Park maps have been made:

1) Topographical map of the Park, scale 1: 100 000;

2) Landscape map, scale 1: 500 000;

3) Map of woods, scale 1: 500 000;

4) Map of rare plant species, scale 1:500 000;

5) Map of the organization of environmental tourism, scale 1: 500 000;

6) Geological map of the Pillars, scale 1:100 000;

7) Map of zoning and the buffer zone, scale 1:100 000;

8) Landscape map, scale 1:500 000;

9) Map of the Khangalasskii region (all territory of Park included), scale 1:25 000.

The maps on the paper carriers:

1) Schematic map of quarter arrangement of forest, scale 1:200 000;

2) Schematic map of Park and forest, scale 1: 100 000;

3) Schematic map of territorial arrangement, scale 1 : 100 000.

The inventory of the scientific and historical information about the "Lena Pillars" Nature Park was published in the form of the bibliographic catalogue with at least 540 references.

The botanical and soil mapping is made by the Institute of Biological Problems of Permafrost Zone of the Siberian Branch of the Russian Academy of Sciences (maps see above).

At present, under the contract made with the Institute of Biological Problems of Permafrost Zone of the Siberian Branch of the Russian Academy of Sciences a cadastral plan is made.

Organizing scientific research

Tasks of scientific research and environmental monitoring

The protected territories serve as a reference of the natural complexes of the region and can help in solving of environmental monitoring problems. Environmental monitoring includes geomorphological, geophysical, geochemical and environmental monitoring. It is necessary to organize a network of stationary platforms and routes in the Park to carry out complex environmental observation and organize biological monitoring. Thus, the main priority is location of the basic environmental system types of the Park. Then, in the most typical points of main environmental systems, stationary platforms are laid set by the area from 0.25 up to 1.00 hectares. Observation over land conditions (type, subtype, sort, kind, humus, pH, cation exchange etc.), vegetation, both herbaceous and forest (specific structure, covering, forest conditions, underbrush, undergrowth, living soil cover etc.), invertebrate surface and subsurface fauna is conducted on these platforms. For the observation of highly mobile forms of insects, amphibians, reptiles, and specially birds and mammals constant routes are more preferable than stationary platforms.

To carry out such complex research in the "Lena Pillars", it is of special interest to follow processes in soil of steppes and tukulans, conditions of main forest environmental systems of the Park (green moss fir groves in valleys of Lena and Buotama rivers, bear-berry pine forests on ancient alluvial sediments near Buotama River mouth, native Buotama River bank near Menshikov's site, alder-cowberry larch forest on the right bank of Lena River close to Egiyte River, blueberry-cowberry larch forests on carbonate rock). Constant observations should be carried out over bank rocks environmental systems.

Biological monitoring should be carried out in tourist routes and places for studying the influence of recreational pressure on a condition of environmental systems (soils, vegetation, and fauna) and for development of destruction prevention and restoration measures.

The major task of scientific research in «Lena Pillars» Nature Park is detailed studying of environmental system resistance to anthropogenic influence. It is especially important to carry out such research in places of the highest recreational pressure, i.e. at tourist steam-ships stops and on environmental tracks. Because of research of environmental systems, capacity standards

of recreational pressure should be determined and measures of disturbed environmental systems restoration should be developed.

Perspective plan of scientific research

No.	Names of agreements	Terms	Executor	Cost, rubles
1.	Monitoring of fish fauna on Buotama river.	2012	YIB SB RAS.	50
2.	Studying of environmental, physiological and biochemical features of adaptation process of a wood bison in conditions of the Central Yakutia.	since 2008	YIB SB RAS.	State target program
3.	Teamwork on stratification of Cambrian period in the territory of «Lena Pillars» Nature Park.	2012-2015	United geological team of SB RAS.	500
4	Monitoring of water and land environmental systems of «Lena Pillars» Nature Park.	2012-2013	YIB SB RAS	650
5	The study of rare plant species SPE "Lena Pillars" for introductions.	2012-2016	YIB SB RAS	State target program
6	The study of modern karst processes in the park.	2012-2016		200

Total: 1400 thousand rubles

Introduction of geoinformatic technologies

All maps are available on digital media and executed in CorelDraw 12. It is needed to convert all material to GIS format.

Two collections of scientific articles have been published:

The "Lena Pillars" National Nature Park: geology, land, vegetation, fauna, protection and use: the collection of scientific essays edited by correspondent member of the Russian Academy of Sciences, Doctor of Biology, Professor N. G. Solomonov, Candidate of Agricultural Sciences A. P. Isaev, candidate of Biological Sciences E. I. Ivanov. Yakutsk: Yakut State University Publishing House, 2001.

The "Lena Pillars" Nature Park: the past, the present and the future: the collection of scientific essays edited by N. G. Solomonov, I. M. Okhlopkov; Institute of Biological Problems of Permafrost Zone of the Siberian Branch of the Russian Academy of Sciences, Ministry for Nature Protection of Sakha Republic (Yakutia), the "Lena Pillars" Nature Park, Yakutsk, 2007.

Also in 2007 the illustrated album "Lena Pillars" Nature Park" has been issued in Moscow by PENTA Publishing House.

There are two scientific reference books on animals and geology of the Park to be issued this year.

Scientific maintenance of activity in the field of protection of the territory, environmental education, development of tourism and recreation

The bases for development of the above-stated directions were:

- the project of the organization of "Lena Pillars" National Nature Park, executed in 1991-92 by West Siberian Design and Survey Expedition of the Russian Federation.
- the characteristic of Nature Territorial Complexes of "Lena Pillars" National Nature Park and making landscape maps executed in 1995 by the Institute of Permafrost Studies named after Academician P. I. Melnikov of the Siberian Branch of the Russian Academy of Sciences.
- the report on research work under the contract "Landscape and geographical substantiation of tourist routes", executed in 1995 by short term creative team "Cryolandscape".
- Business plans for development of environmental tourism in the territory of "Lena Pillars" National Nature Park executed in 1999 and 2002.
- Scientific reports of the Institute of Biological Problems of Permafrost Zone of the Siberian Branch of the Russian Academy of Sciences.

Development of resource base of scientific research

The material and technical base of scientific research at present includes computers, office equipment, fibre-optical communication, motor transport, river transport for fieldwork tents, sleeping bags, overalls are available.

Participation in scientific conferences and meetings

Members of «Lena Pillars»" Nature Park collective constantly participate in meetings of various levels. Experts of the Park have participated in school research-and-applied conference "A Step Towards the Future"; besides, director Kipriyanova L. D. has reported at the Conference on Preservation of Cultural and Historical Heritage of Sakha Republic (Yakutia) in Yakutsk. This year the Park acts as co-organizer of two international conferences where lecturers Rozhin V. I., senior state inspector and Kipriyanova L. D., director of the Park participated:

- 13th International Conference on Cambrian Bottom, July 2008;
- International Conference on Elk, August 2008.

Training in postgraduate and doctoral studies, preparation to defend theses

- the Park has no scientific department; all scientific work in the territory of the Park is conducted under arrangement with various scientific institutions

Organization of environmental monitoring

Drawing up the program of environmental monitoring for the perspective period

Directions of monitoring:

Over 10 years in the Park monitoring observation has been made on changes in the level of biological diversity and qualitative structure of biota, over conditions of populations, of ecosystems, forest restoration after fires. Parameters of measurement are the number of animals, sample places for definition of vegetation etc.

Frequency of information gathering — annually.

Spatial organization of monitoring — annual winter routing: quantity of routes – 30 km, length of routes not less than 35 km, overall - 150 km. Labor expenditures — 35 to 20 people per days, material needs – 53,500 rubles.

Also available is a permanent platform 25 km^2 in Buotama River mouth.

2.1.6. Financial plan of the Park development

Information about Fund distribution for period 2012-2016 (thousand rub)

	2012	2013	2014	2015	2016
Salary Fund	5 847,21	6 227,28	6 632,05	7 063,13	7 522,23
	120,00	120,00	120,00	120,00	120,00
	1 765,86	1 880,64	2 268,16	2415,59	2 592,60
Communication	64,95	64,95	64,95	64,95	64,95
Transport services (helicopter, fire-protection works etc)	2 592,00	2 592,00	2 592,00	2 592,00	2 592,00
Communal services	1 100,97	1299,14	1439,45	1571,88	1710,21
Insurance	241,72	241,72	241,72	241,72	241,72
Other services	700,00	700,00	700,00	700,00	700,00
	59,00	59,00	59,00	59,00	59,00
Purchase of the fixed capital	200,00	200,00	200,00	200,00	200,00
Oil and gas, material supply	1311,44	1315,93	1320,12	1324,44	1328,89
"Lena Pillars" NP Budgetary funds	**14 003,14**	**14 700,65**	**15 637,45**	**16 352,71**	**17 11,60**
Out of budgetary incomes	**2500**	**3000**	**3500**	**4000**	**4500**

Financial and Economic activities

Formation and servicing the fixed capital

Capital construction:

Construction of the visit-center in Yakutsk - 72 million rubles, 2012 – 2016.

Construction of objects of tourism - 120 million rub. 2012 – 2016.

Purchase of a fixed capital.

In 2008 the Park has bought boats Yamaha – 1500 thousand rbls., KC-102 - 1500 thousand rbls., tents, rubber boats, the car UAZ-minivan. The vehicles were bought with support of the state target program "Preservation of the environment". With support of, earned the Park gets tents, rubber boats, pendant motors "Johnson-4" and "Johnson-10". Purchase of two motor boats with outboard motors of a class is planned - "Yamaha", a minibus, a motor vehicle of high Passability.

Attraction of financing:

- Federal budget - 140 million rbl.
- Regional budget - 48 140 thousand rbl.
- Incomes of own activity - 2 million rbl. annually
- Payment for visiting the territory - 130 rbl.
- Payment for commercial videos and photofilming - 2800 rbl. for a day
- Payment for services of conductors, guides – 280 rbl for 1 persons
- Transport services: boat KC-102 - 21-rbl x 1 km x 1 person

Boat "Buotama" - 25-rbl x 1 km x 1 person

– Incomes of sale of souvenirs, badges and polygraphic production. 50 000 rbl.

Savings of financial assets

For economy of financial resources are used:

Reduction of motor vehicles by realization through the Ministry for Property Relations individuals, closing of not used garage, transition to the simplified system of the taxation, use of the stipulated privileges and clearings (clearing of the tax to the land, on property).

Plan of activity

Administrative task	Activity	Terms of realization		Executors	Value, thousand rbl.
1. Forming and service of basic funds.		2012	2015	Park administration.	8750
2. Construction of Visitors Centre in Yakutsk.	Identification of financing sources (participation in investment projects) and building	2012	2015	Park administration, YIB SB RAS.	72 000
3. Construction on the «Lena Pillars».	Construction of visit – centre on «Lena Pillars».	2012	2012	Park administration, MEP RS (YA), Ministry of constriction RS (YA).	500
4. Organization of the equipment purchase.	Forming of interior technological equipment in Diring-Iuryakh	2012	2015	Park administration, MEP RS (YA), Ministry of constriction RS (YA).	640
5. Construction of tourist properties.	Participation in tender organized by Rosturizm, in order to gain investments for construction.	2012	2016	Park administration, Ministry of business and tourism RS (YA).	120 000
6. Organization of capital repairs, reconstruction and supporting of basic funds.		2012	2016	Park administration.	300
7. Basic funds purchasing.	Purchase of boat «Yamaha», boat «KC-102», tents, motoboats, car «UAZ-minivan», minivan.	2012	2016	Park administration, MEP RS (YA).	10 000

TOTAL: 212 190

RESUME

The main features

Each specially protected natural territory has the features distinguishing it from the others. These features, both positive and negative, certainly influence development of particular territory and its management. The following are among main features of "Lena Pillars" Nature Park:

- Valley character of the territory, located along the axes of Lena, Buotama and Siniaia rivers.
- Significant (220 km) extension of the Park along the right coast of Lena River.
- Cluster character of the territory including two isolated locations not incorporated into a uniform security (buffer) zone.
- Location of the Park on ownerless land excluded from economic operations.
- Presence of Amur-Yakut highway along the buffer zone and of a winter road, and shipping operations along Lena River that, on the one hand, secures accessibility of the Park any time of year, and, on the other hand, complicates regularity of visiting.
- Large settlements, including the city of Yakutsk in close vicinities of the Park.
- Various landscape provinces overlapping in the territory of the Park, mosaic physical and geographical conditions and natural territorial complexes.

These and other features of "Lena Pillars" Nature Park, on the one hand, impart special appeal and originality to its territory, and, on the other hand, presume special approach to management of the Park and planning of its activity in prospect.

Key problems of the Park, negative effects and threats to its protected natural, historical, and cultural complexes and objects

The basic infringements are:

- infringements of the Park regime (visiting without permission, violation of terms of gathering wild-growing berries and plants, of rules of fishing and hunting);

- sharp increase in visitors of the Park during summer leads to higher recreational pressure on natural complexes of the Park. Pollution by garbage, violation of fire safety rules, gathering wild-growing berries and mushrooms result in depletion of flora of the Park.

The most visited places experiencing anthropogenic influence are:

- Water system in lower reaches of Buotama River.
- Water system in lower reaches of Siniaia River.
- Water system of Lena River within Buotama – "Lena Pillars" area.
- A mouth of the river Buotama.

- A mouth of the river Labyja around «Lena Pillars».
- Diring-Iuryakh area.

The greatest loss to natural complexes, historical and cultural objects of the Park is tied up with such disasters as floods, river jams, forest fires, reproduction and propagation of woodworms. For example, 1998 flood damaged the Park greatly: all cordons and campsites were under water. 2007 jam has completely erased visitors centre on Lena Pillars. Occasional forest fires and Siberian silkworm have caused an irreplaceable damage to wood resources of the Park in 2001-2002.

Basic directions of activity and the most important actions for preservation natural, historical and cultural complexes and objects

The basic directions of activity:

- Protection of vested territories as well as natural and cultural historical objects.
- Creation of conditions for all kinds of regulated tourism, excursion services and recreation facilities, acquaintance with the Park nature, its cultural and historical sites.
- Preservation and restoration of natural complexes as places of traditional economic activities of local population.
- Information and advertising campaigns, publication of scientific and popular literature on all aspects of activity of the Park (proceedings, guidebooks, information materials, reference books, pamphlets, booklets on excursions, lectures, instructions, maps, posters, picture albums etc.).
- Reproduction of the nature in the territories involved in economic circulation, of valuable kinds of plants and animals; participation in the system of regional monitoring and support of the general environmental optimum in the region.
- Maintenance and cultivation of wild animals within the zone of artificial cultivation of rare and vanishing species of animals.
- Realization of environmental education, organization of museums and open air expositions; creation and arrangement of excursion tracks and routes; organization of environmental associations and centers; practical work of students of higher and specialized secondary educational institutions of corresponding specializations, educating schoolchildren; coverage of the Nature Park activities in mass media; other forms and methods of social environmental education, formation and propagation of environmental knowledge.

Prospective nature protection, economic and social effects of the planned actions

The present management plan is created for strengthening of financial, technical base of the Park that will improve quality of protection of natural objects, will promote preservation of historical and cultural objects, and will give renewed impetus to development of environmental education and environmental tourism. Besides, the plan presumes expansion of scientific knowledge of flora, fauna, natural communities, and Park complexes that will allow more validly protect and operate the territory. It is important that the present plan envisages cooperation with local population of the region, when they do not only visit the Park as tourists, but take part in the territory protection (as public inspectors), environmental education and scientific research (summer environmental camps, study groups and societies, participation in various actions), work with personnel (increase in staff or attraction of businessmen to work in the field of tourism).

Staff table
of the "Lena Pillars" Nature Park

№ п/п	Position	Surname, name,	Year of birth	Nationality	Education, Name of educating establishment and the year of graduation	Speciality	Second higher education	
							Name of educating establishment and the year of graduation	Speciality
1	2	3	4	5	6	7	8	9
1	Director	Kipriyanova Lubov Danilovna	1948	yakut	Higher Yakut State University, Biology and Geography Branch 1972	Geographer	Moscow State University 1994	Ecologist - expert
2	Vice-director	Platonov Ruslan Nikolaevich	1945	yakut	Higher Tomsk pedagogical institute 1968	Physician		
3	Vice-Director on traditional environmental using affairs	Kalitin Vasilyi Nikolaevich	1966	evenk	Higher East-Siberian culture and art academy 2007г	Manager		
4	Senior accountant	Arkhipova Avgusta Petrovna	1954	yakut	Yakut agricultural college 1981	Accountant of agricultural establishments	Higher Yakut State University, Phisics and mathematics branch, 1989	Mathematician
5	Senior state inspector	Timofeev Stepan Petrovich	1953	evenk	Higher Yakut agricultural institute 1980	Zoo engineer		
6	Senior state inspector	Asekritov Valentin Danilovich	1950	yakut	Yakut pedagogical college- 1975	Sport and physical training specialist	Yakut state University 2005	Sport and physical training specialist
7	Senior state inspector	Savvinov Maksim Nikolaevich	1982	Yakut	Highere Juridical Institute of MVD of Russia; 2001г.	Lawyer	Baikal State University of economics and law; 2006г	lawyer

8	Senior state inspector	Pavlov Aleksei Anatoljevich	1965	yakut	Higher Siberian Technological Institute. Krasnoyarsk-1991	Forest engineer		
9	District state inspector	Vladimirov Valentin Afanasjevich	1956	yakut	Special technological Irkutsk Forest technical college 1983	Forest technologist		
10	District state inspector	Gerasimov Stepan Afanasjevich	1963	evenk	Special technological Olekminsk technical college of mechanization and electrification of agriculture 1987	Technologist-mechanic		
11	District state inspector	Ivanov Gennadyi Nikolaevich	1967	yakut	Graduated school			
12	District state inspector	Alekseev Vladimir Nikitich	1949	russian	Higher Irkutsk agricultural Institute 1976r	Biologist – hunting specialist		
13	District state inspector	Adamov Sergey Nikolaevich	1962	Yakut	Higher Yakut state University 1985	Teacher of Russian and Literature		
14	District state inspector	Iljin Dmitryi Ivanovich	1987	Yakut	Special education Yakut Agricultural technological college 2008r	Fish technologist		
15	District state inspector	Ivanov Egor Nikolaevich	1986	Yakut	Yakut Agricultural technological college 2004	Zoo and hunting technologist		
16	Senior specialist	Fedorova Anastasiya Vasiljevna	1978	Yakut	Higher Yakut State University, Foreign Languages Branch-2004	Teacher of English and Literature		
17	Senior specialist	Davydova Veronika Vasiljevna	1989	Yakut	Higher Northern East Federal University 2011r	Ecologist		
18	Senior specialist	Efremova Tatyana Gennadievna	1979	Yakut	Higher Yakut state Universiiy Philology branch 2004	Philologist, psychologist.		
19	Office manager	Savvinova Ljudmila Viktorovna	1957	Yakut	Higher Yakut state University Biology and geography branch 1983	Biologist	Labour and social academy 2001r	Lawyer
20	Captain of boat	Ignatiev Aleksandr Yakovlevich	1952	Russian	Special technical	Technical - shipdriver		

					Yakut River college 1974			
21	Mechanic	KryizoAnatolyi Rudolfovich	1973	russian	Peledui professional college - 6 1991	Shipdriver		
22	Rudder –motor worker	Sokolov Mikhail Ignatjevich	1969	russian	Special education Driving school 2000	Driver cat. A.B. locksmith.		
23	Rudder –motor worker	Ivanov Vitalyi Vladimirovich	1992	Russian	Graduated school	-	-	-
24	Charwoman	Nikiforova Nikolina Nikolaevna	1974	Yakut				
25	Charwoman	Sysoeva Nina Petrovna	1951	yakut	Special technical Yakut cooperative technology collge 1976			
26	Guard	Osipov afanasyi Afanasjevich	1984	even	Graduated school	-		
27	Guard	Gerasimov Nikolai Onvriljevich	1991	yakut	Graduated school	-		
28	Guard	Nikiforov Nikolai Semenovich	1945	yakut	Special technical education Yakut technical college of communication 1972	Communication mechanic		
29	Guard	Alekseeva Valentina Afanasjevna	1957	yakut	Special education professional college-2 1979	Agriculturer		
30	Guard	Sevastyanov Vasilyi Davydovich	1951	yakut	Special technological Olekminsk technical college of mechanization and electrification of agricolture 1987	Technologist-mechanic		
31	Guard	Golyshevskyi Vladimir Ivanovich	1957	russian	Special education	-		
32	Driver	Danilov Stepan Nikitich	1972	yakut	Special education Driving school 2004	Driver cat. A.B.		
33	Driver	Kannanilov Lev	1967	yakut	Special education	Driver cat. A.B.C.		

		Alekseevitch			Driving school			

PLAN OF
The water using, the water objects protection arrangements
and the water biodiversity protection and reservation for 2012

N-R	Arrangements	Term of execution	Expendimures in thousand rubles	Executors at branches	Comments
1.	Make the chemical analysis of the oil containing waters after purification on the boat sewage purifying plants	For the period of the navigation	20	Laboratories, contractors	
2.	Make the chemical and bacteriological analysis of the sewage after purification on the boat sewage purifying plants	For the period of the navigation	40	Laboratories, contractors	
3.	Purchase the chemical reagents and renewing of the chemical laboratories instruments	First quarter	60	Senior engineer	
4.	While license issuing to commander's staff pay attention to knowledge of the sanitary rules, the arrangement and the exploitation of the water delivering system, the oil containing waters and the sewage, the normative documents on the water objects protection	While issuing		Commission	
5.	Filling and pumping of the oil, bunkering of the fuel and pumping of the sewage should be made only in a close method	For the period of the navigation		Captains, mechanics of the boats	
6.	While inspecting the fleet noting in the acts the condition of the water protection means	For the period of the navigation		Commission	
7.	While filling and pumping out of the oil keep strictly order of the receiving, keeping and supplying of the oil products	All the time		Fleet Vice - director	
8.	Provide of the chemical reagents and purifying materials to the boat sewage purifying plants	Before the navigation	180	Environment protection engineer	
9.	The pollution and choking up of water and	All the time		Caprains of the	

	ice surface while repairing, standing and exploitation of the boats do not allowed			boats, environment protection engineers, shop mans	
10.	Provide in proper time to the statistic controllers information about water using payments (2-TP, 2-OC,4-OC)	In the fixed terms		Vice –senior engineer	
11.	Pumping of the sewage by the forms CD-36, POD-11, POD-12	For the period of the navigation		Captains of the boats	
12.	Work out measurements at the safe spring flood	First – second quarters of the year		Senior engineer	
13.	Work out and approve with the Central Laboratory the schedule of the water selection at the areas of water and boats	First quarter		Environment protection engineer	
14.	Before passing boats to the exploitation the commission should check the documentation on environment protection, if they are absent it must be completed	Before the navigation	50	Environment protection engineer	
15.	Provide permanent readiness of the harbour booms on the nature protection fleet	For the period of the navigation		Fleet vice – director, Environment protection engineer, Captains of the boats	
16.	Conduct complex exercises on liquidation of the accidental pouring out of oil products	For the period of the navigation	60	Senior engineer, Fleet vice – director, Environment protection engineer	
		TOTAL:	410		

Lena Pillars Nature Park

The Program of environmental tourism development in the Lena Pillars NP for the period 2012 - 2016

Pokrovsk 2012

The Program preconditions

One of the main spheres of the Nature Park activities is development of environmental tourism.

The Nature Park has great tourism, nature, recreational, historical, and cultural potential.

The territory of the Park is 485 thousand hectares; its main part is the Lena-Bootamskaya area between the two rivers with its unique nature complex. There are many nature monuments here: «Lena Pillars», Bootama and Sinskiye Pillars, Tukulans, places with rare kinds of plants, pure and fast Lena, Bnotama and Siniaia rivers.

The "Lena Pillars" are the nature monument of the geological origin; the age of the Pillars is 530 million years. The Pillars have witnessed geological past of the Earth of the ancient Cambrian Sea. Here on limy layers it is possible to find remains of *trilobites* and *urchaeocyatha*. The Pillars are relics of weathering in form of towers, castles; they extend along Lena River for 40 km.

The Pillars are among the most significant natural objects in Russia for their high aesthetical value.

There are many monuments of culture in the Park — the primitive humans archaeological site in Diring-Iuriakh, rock drawings, iron-smelting stoves, etc.

There are many objects of scientific interest in the Nature Park: karstic relief forms, thermokarst, eolian formations, relic forests, endemic species of animals and plants, paleontologic sites of mammoth fauna.

All mentioned makes tourist potential rather big.

Realization of the Program assumes fund raising from federal and republican budgets and off-budget sources.

Off-budget funds come from the Park own means from its commercial activities, grant projects, credit receipts.

Realization of the Program requires creation of the tourist complex for the organization of recreation for population of the Republic, mainly children and youth; it will help to solve a problem of employment of the ulus population, and attract financial resources to the ulus.

At full realization of the Program, the Park can accept up to 20 thousand tourists per year, while now it accepts 6 to 10 thousand tourists per year.

Development of tourism will enable significant tributary of funds to the municipal budget and to the park budget.

Environmental tourism in the Park is carried out in following directions:

Buotama

This direction includes accommodation of tourists and camping in the Ust-Buotama and Verkhny-Bestyakh tourist centers, rafting down the Buotama River, «Fisherman House» in Kuonan, and excursions to site of primitive humans in Diring-Iuriakh.

This direction includes environmental tracks "Feathery World of Buotama", "Unique landscape of Buotama", "Tukulan", "Forest Bison Nursery", in the future — "Iron-Smelting Stoves of Buotama", and educational programs in environmental camps for schoolchildren and pupils of Buotama environmental school.

The environmental routes should be richer and include the historical and ethnographic objects, in this view a concept of an open-air museum «Site of Ancient Hunters of the Stone Age» and «Concept of a Complex of Historical-Ethnographic Museums in Open Air» have been developed.

"Lena Pillars"

The following environmental routes have been developed in "«Lena Pillars»" Nature Park: «Lena Pillars», «Dry Channel of Labydya», and «Kurunnakh".

There are guesthouse in Pillars and a small tourist center on Kurunakh River.

It requires a lot of scientific and research work; unfortunately, lack of financing constrains this work. It is planned to construct an all- year-round Visitors Center, a viewing platform, rising ladder, a gallery of rock drawings.

It is necessary to provide neighboring territories with facilities necessary to develop an entertaining infrastructure.

Numerous actions are carried out in «Lena Pillars», such as «Gold of «Lena Pillars» open-air folklore festivals and author's songs «Lena Pillars» in Winter».

The visitors come to the Lena Pillars by river ships - "Demyan Bednyi", "Mikhail Svetlov" and "Mechanic Kulibin" from Yakutsk.

Batamai

The place is on the left coast of Lena River opposite «Lena Pillars».

It is planned to develop a route alternative to the river route.

Because of costly oil products, tickets for river ships became very expensive and it is necessary to have such an alternative as an automobile route.

It is possible to fish, pick herries, etc during the rest. The Park has already accepted some groups of visitors along this route.

Here a part of "Winter «Lena Pillars»" festival takes place.

Churan-Baza

The route has not yet been well developed; in the long term, it can be of great interest as an "extreme tourism route". Tourists reach Churan-Baza by river. Then they get to know history of Churan-Baza as a storage terminal for gold mining development in Aldan; then they reach Buotama by Tommot road and rift down Buotama (another option is rafting on Lena River).

The route is approved and promises to be quite competitive.

Rafting on the Siniaia River

The route will draw fans of extreme outdoor rest. Rafting starts with the river Matta, to Sinsk settlement, with 100 km distance in five days. It has the fourth complexity degree. Rafting is possible on kayaks and rubber boats. It is organized in June-July.

Development of the tourist rout visiting for 5 years.

	Tourist rout	2012	2013	2014	2015	2016	Total
1	Lena Pillars	10 000	11000	12000	13000	14000	60 000
2	Buotama mouth	1000	1010	1010	1020	1020	5060
3	Verhnii Bestyakh	1000	1010	1010	1020	1020	5060
4	Diring Uryakh	500	500	510	510	520	2540
5	Rafting on the r. Buotama	1000	1000	1010	1010	1020	5040
	Total	**13500**	**14520**	**15540**	**16560**	**17580**	77700

Russian Academy of Sciences

**BORISSIAK PALEONTOLOGICAL INSTITUTE
(PIN RAS)**

Profsoyuznaya str. 123, 117997 Moscow, Russia
Phone: +7 (495) 339-10-44; Fax: +7 (495) 339-12-66; e-mail: admin@paleo.ru; http://www.paleo.ru

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To IUCN Director General
Julia Marton-Lefèvre

Dear madame Julia Marton-Lefèvre,

I got acquainted with the IUCN letter written by Tim Badman, the Director – World Heritage Program to Mrs. Eleonora Mitrofanova, Ambassador of Permanent Delegation of the Russian Federation to UNESCO. The letter contains IUCN Evaluation of the "Lena Pillars Nature Park" (Russian Federation) nominated for IUCN World Heritage List. Mr. Badman wrote that "nomination as presently put forward does not convey Outstanding Universal Value". In addition, he asked to clarify a number of issues regarding the nomination of the Lena Pillars Nature Park and emphasized that these issues can not be resolved in a short time and should be considered through a new nomination. In support of these words Mr. Badman attaches two letters by IUCN advisers, Tilman Jaeger from 2010 and Paul Williams from 2009. These older recommendation for current nomination contains several issues, which in major part have been considered in the final version of nomination of Lena Pillars Nature Park (LPNP). So, I am greatly surprised, that Mrs. Badman returned a negative verdict on nomination.
I should remind the following facts. The territory of LPNP contains the most complete and uninterrupted sequence of Early Cambrian sedimentary deposits with the richest and most diverse faunal content of all stages and zones without any exception embracing rather prolonged period of time, i.e. more than 30 million years. As a specialist who studies the Lower Cambrian deposits and its fossils for more than 50 years, being 30 years a member of International Subcommission on Cambrian Stratigraphy, and 8 years its chairman, I visited all significant Cambrian localities on all of the continents. So I take all responsibility to affirm, that there is no other geological section in the world that can even approach to the area under discussion by its stratigraphical completeness and / or the biodiversity of fossil remains. Only in this place, Lena Pillars, one can observe the undisturbed and complete sequence of strata aged from the Late Precambrian to mid of Middle Cambrian with engraved picture of origin and early development of the ancient skeletal organisms. In this sense the area is undoubtedly unique. The outstanding nature of Lena Pillars area was emphasized by famous paleontologists, with John Cowie, Stephan Bengtson, and Alison Palmer among them.
Including of the LPNP in the World Heritage List will significantly enrich the natural side of the World Heritage, representing major addition to the story of life development on the Earth. Obviously that Humanity will be considerably enriched when more various natural sites are included in the List and the wider their geographic coverage is. Because of that, paying attention to the minor and obviously secondary issues of the nomination and ignoring the general idea and primary significance of LPNP seems completely striking and incomprehensible. One can suppose that evaluation, like that presented by Mr. Badman, is a result of preconceived attitude towards Yakutian Republic, or a result of lack of expert professionalism. To my mind, both cases are unacceptable for UNESCO and contradicts the main idea of conservation and support of outstanding territories.
I hope that you will consider my opinion and will continue the work on evaluation of the Lena Pillars Nature Park as a nominee to the World Heritage List.

Academician of the Russian Academy of Sciences — Alexei Yu. Rozanov

GEOLOGICAL INSTITUTE, RUSSIAN ACADEMY OF SCIENCES
17.02.2012 № 13102-01-4402/1

Mrs. Julia Marton-Lefèvre
Director General
International Union for Conservation of Nature
Rue Mauverney 28
1196, Gland, Switzeland

Dear Madame Marton-Lefèvre,

The Lena Pillars Nature Park possesses an outstanding universal value being the most significant natural monument of the "Cambrian Explosion" itself. Due to the platform type of carbonate sedimentation within tropical belt without a subsequent metamorphic and tectonic reworking, the Lena Pillars preserve the most continuous and richest record of the diversification of many groups of skeletal and soft-bodied fossil animals and algae from their first appearance until the first mass extinction event and subsequent recovery interval during c. 35 m.y. (542–506 m.y. ago).

This is Siberia only where this interval is represented by marine carbonates while carbonates are the best sediments for the skeletal fossil preservation. As a result, the Lena Pillars house the earliest and the largest, in both temporal and spatial senses, fossil metazoan reef massif. This massif being a site of Cambrian diversification is comparable in its significance to the Great Barrier Reef in modern world: both are the sites of the highest faunal diversity of the world, of the early Cambrian and of the modern times, respectively.

This area is studied over a hundred years by leading specialists from entire the world and thousands of papers are published in top scientific magazines which are based on these studied of various biological and geological aspects of the Earth history. The Lena Pillars National Park deserves to be nominated as a site housing a complete succession of carbonate Cambrian strata recording the entire "Cambrian Explosion" from its very beginning to the final stages while other (Chengjiang, China and Burgess Shale, Canada) contain local soft-bodied biotas representing aftermath of this event and are restricted to siliciclastic rocks accumulated during 2–3 m.y. only that lack both the earliest Cambrian strata, reef-building and other skeletal fauna.

Sincerely,

Mikhail A. Fedonkin,
Academician, Russian Academy of Science
Director of the Geological Institute of the Russian Academy of Sciences
Vice-President of the National Committee of Geologists

prof. dr hab. Jerzy Dzik, czł. koresp. PAN
INSTYTUT PALEOBIOLOGII PAN
ul. Twarda 51-55
00-818 Warszawa, POLAND

fax: (48-22) 620-6225, e-mail: dzik@twarda.pan.pl

October 4th, 2010

To Whom It May Concern

Subject: Lena Pillars on UNESCO World Heritage List

Dear Sir/Madam,

I strongly support the proposal to enter the Nature Park „Lena Pillars," together with its classic Cambrian exposures, on the UNESCO World Heritage List. This is the place, where almost half a century ago the idea of the "Cambrian Explosion" was born. It received a strong support from discoveries of unexpectedly diverse earliest Cambrian fossils by the team of Russian palaeontologists led by Aleksei Yu. Rozanov. The Lena River rock section, being the main source of information on the early history of animal life on our planet, is similar to the famous Canadian Burgess Shale and the Chinese Chengjiang and Meishucun localities. Moreover, unlike those well known geological sites, in the area of "Lena Pillars" abundant fossils documenting the origin of animals with mineral skeletons near the beginning of the Cambrian (like the Chinese Meishucun „fauna") can be collected in close proximity to exquisite fossils showing preserved soft internal organs (like in the Canadian Burgess Shale). The oldest trilobites in the world occur there.

It has to be stressed that Siberia is greatly undervalued as a tourist destination. It is not only a matter of picturesque pristine nature. The region played crucial role in the history of all nations of the former Russian Empire and the Soviet Union and has a great potential for both mass and qualified tourism, not only from there. Along with its scientific values, the Siberian „Lena Pillars" site may compete with the Canadian Rocky Mountains exposures in its beauty as a tourist attraction, showing a completely different context of tectonically undisturbed strata deeply cut by one of the largest rivers in the world. Although located in the centre of Siberia, the site is easily accessible, with a regular public ship communication between the international Yakutsk airport and the large villages Sinsk and Isyt' located on the other side of the river near the area of the proposed World Heritage Site. These settlements may provide base for visitors of the site. Entering it on the UNESCO list would offer a significant stimulus to the local economy and support the nature protection sensitivity among people of Siberia.

Yours sincerely,

Jerzy Dzik
Director of the Institute
corresponding member of the Polish Academy of Sciences

MONASH University

1 October 2010

School of Geosciences
Faculty of Science

"Lena Pillars" Nature Park Administration
nppls@mail.ru

Dear Nature Park Administration:

I would like to lodge my strong support for setting aside and protecting the area now part of the "Lena Pillars" Nature Park as a UNESCO World Heritage treasure. I would be wonderful if this beautiful and significant part of our Earth could be placed on the World Heritage list.

The rock sequences in this area are of utmost importance for recording the global events that occurred here during the late Precambrian and Cambrian times. It is clearly a global standard for the Lower Cambrian and the 4 stages that we geologists used globally. The sequence here is what we all refer to as the standard "book" when discussing and carrying out our research on global climate and major evolutionary steps that occurred during this ancient time past. What is most amazing about this section is that it is so very old, yet not greatly deformed, and contains an abundance of past life and records of the chemical nature of the seas and atmosphere of this ancient past – far better than most other places on the planet. The rock sequence here is also nearly continuous and complete, which is not often the case in other sections elsewhere on Earth.

It is critical that this area is preserved, protected and cared for and made accessible to researchers who are documenting this part of Earth's history – in a state as close to the original as possible so that the knowledge gained from in depth studies can guide us in the future.

I strongly support heritage listing and rigorous protection of this unique part of our geological record.

Regards

Patricia Vickers-Rich

Prof. Patricia Vickers- Rich
Personal Chair, Palaeontology
School of Geosciences
and
Head, IGCP 587 (UNESCO)
www.geosci.monash.edu.au/precsite
pat.rich@monash.edu
(t) +61 3 9905-4889
(FAX) +61 3 9905-4903

IGU
UGI

H.E. Mrs. Mai Bint Muhammad Al Khalifa
The World Heritage Centre, 7, place de Fontenoy
F - 75352 Paris 07 SP, France

Matter: Nature Park Lena Pillars

Dear Mrs. Mai Bint Muhammad Al Khalifa,

Commission Karst (C08-23) of the International Geographical Union would like to support the nomination of the "Nature Park Lena Pillars" to the List of World Natural Heritage. NP Lena Pillars fully correspond to the UNESCO Natural Criteria VII – VIII.

NP Lena Pillars includes the natural objects of the exceptional beauty and aesthetic value. Fantastic beauty of the famous natural statues – Lena Pillars, were described by the numerous Russian and foreign travellers and poets (M. Zlobin, A.L. Chekanovsky, E. Toll, etc.).

Frozen ground karst of NP Lena Pillars is the only and unique example in the world of the recent development of the karst in Sub-aretic extreme continental and dry climate and in the area of perennially cryotic rocks to 300-400 m thick. Lower Cambrian limestones and dolomites with a thickness 400-500 m outcrop here. Karst sinkholes, ponors, dry channels, disappearances of the rivers, karren, karst pillars, etc. represent classic superficial and underground karst.

The inscription on the World Heritage List will be foundation for the conservation of this exotic natural corner for the future generations.

Vice-President of Karst Commission (C08-23) IGU
Dr Nataša Ravbar

Ljubljana, May 19, 2011

LIST OF MAPS and SCHEMES

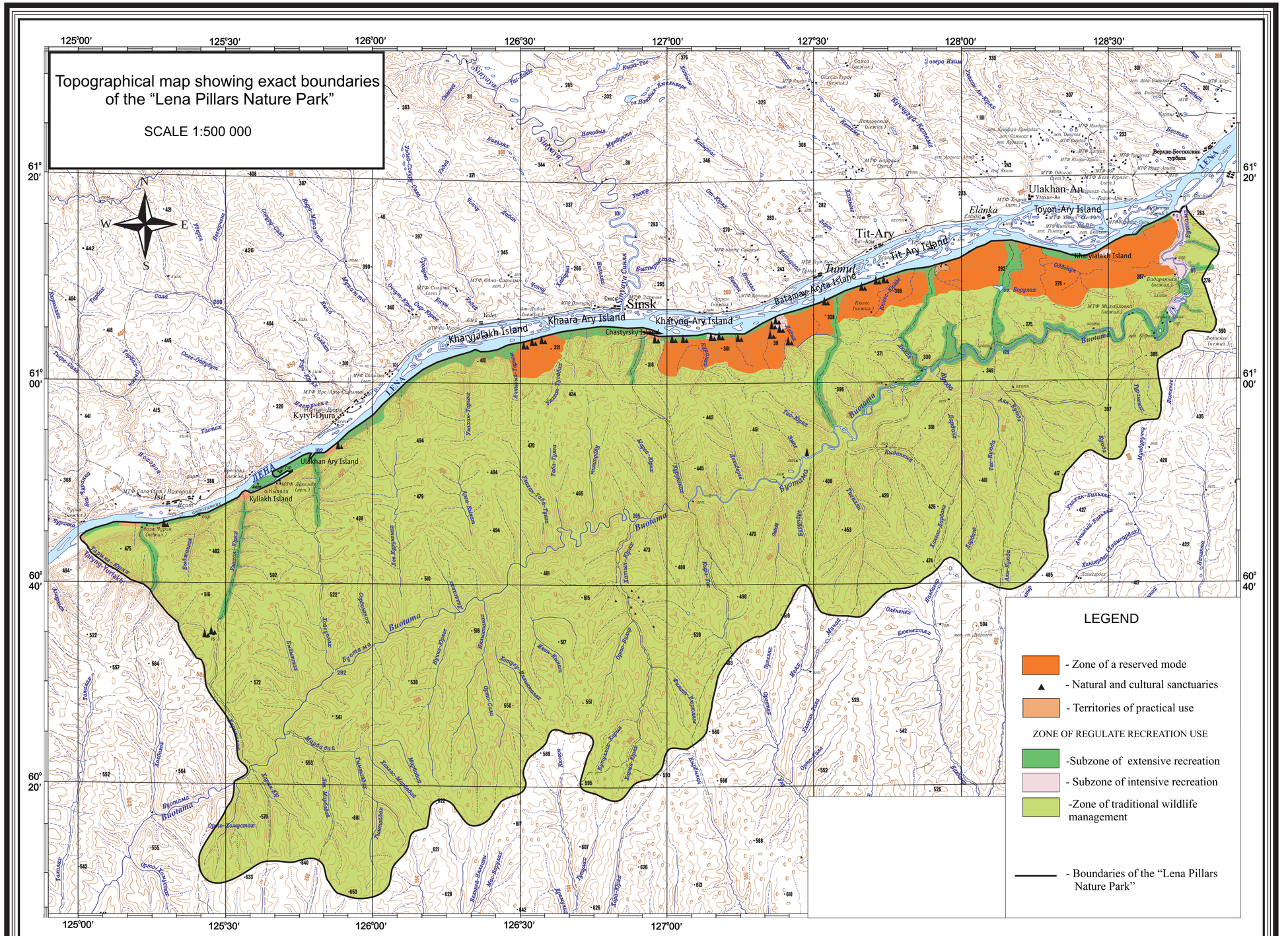
Location of the "Lena Pillars Nature Park" on the map of Russia

REPUBLIC OF SAKHA (YAKUTIA)

Location of the "Lena Pillars Nature Park" on the map of Yakutia.

Topographical map showing exact boundaries of the “Lena Pillars Nature Park”

SCALE 1:500 000



ПП “ Ленские столбы”

1:500 000
в 1 сантиметре 5 километров

10 км 5 0 10 20 30

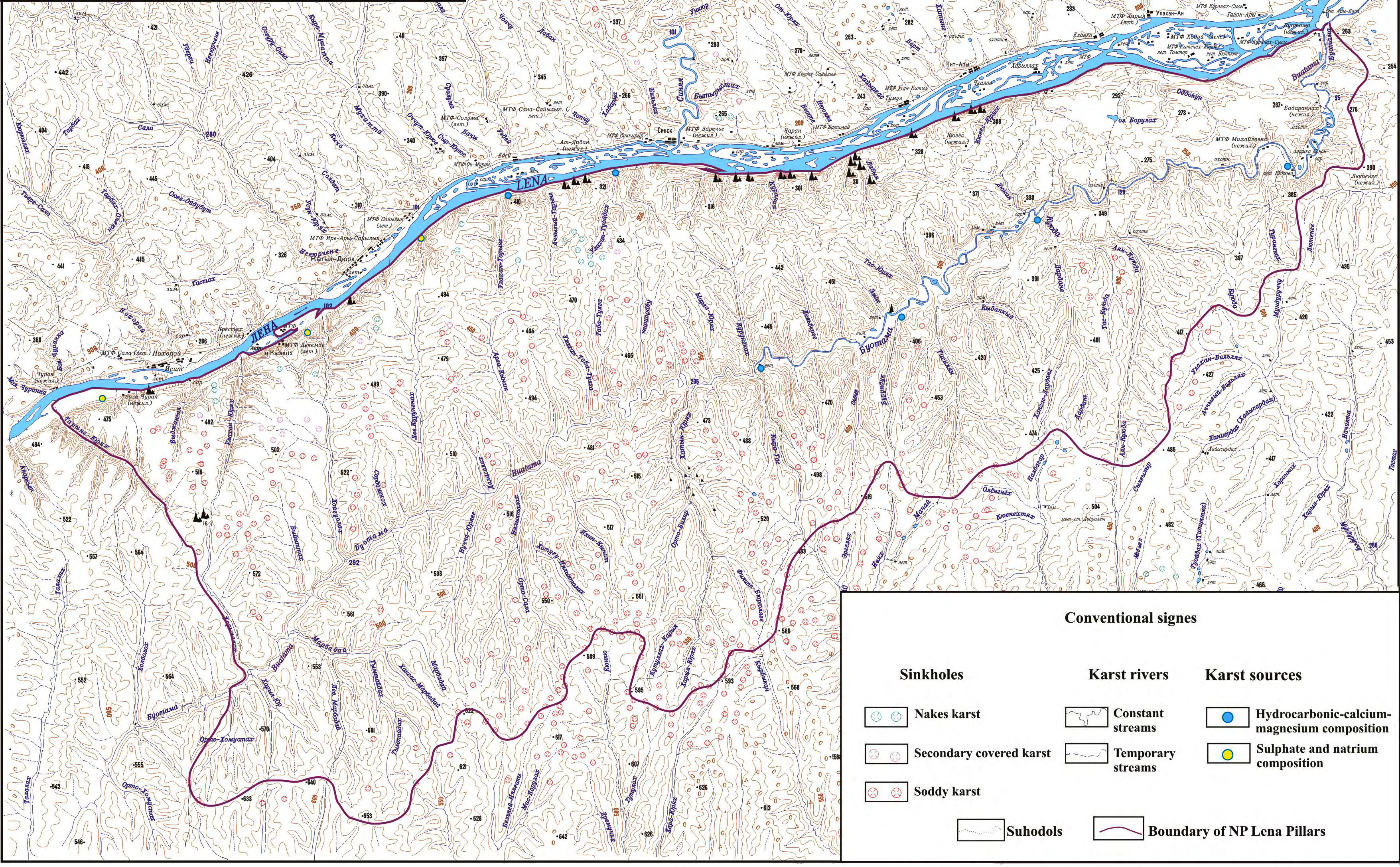
ЯКУТСК
ФГУП “Якутское
аэрогеодезическое предприятие”
2007 г.

Geological scheme of the Lena-Aldan region.

- Neogene-Lower Quaternary
- Mesozoic
- Upper Cambrian
- Middle Cambrian
- Lower-Middle Cambrian
- Lower Cambrian
- Botomian/Toyonian
- Tomotian/Atdbanian
- Vendian
- Archean-Lower Proterozoic

Sangar
Lena
YAKUTSK
Pokrovsk
Bestyakh
Kerbi
Ust'-Maya
Amga
Aldan
Maya
Yudoma
Ust'-Yudoma
Sinyaya
Siskoyo
Bilir
Martha
Chagda
Uchur
Timpton

Karst phenomena of “Lena Pillars Nature Park”



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ФГУП “Якутское
аэрогеодезическое предприятие”
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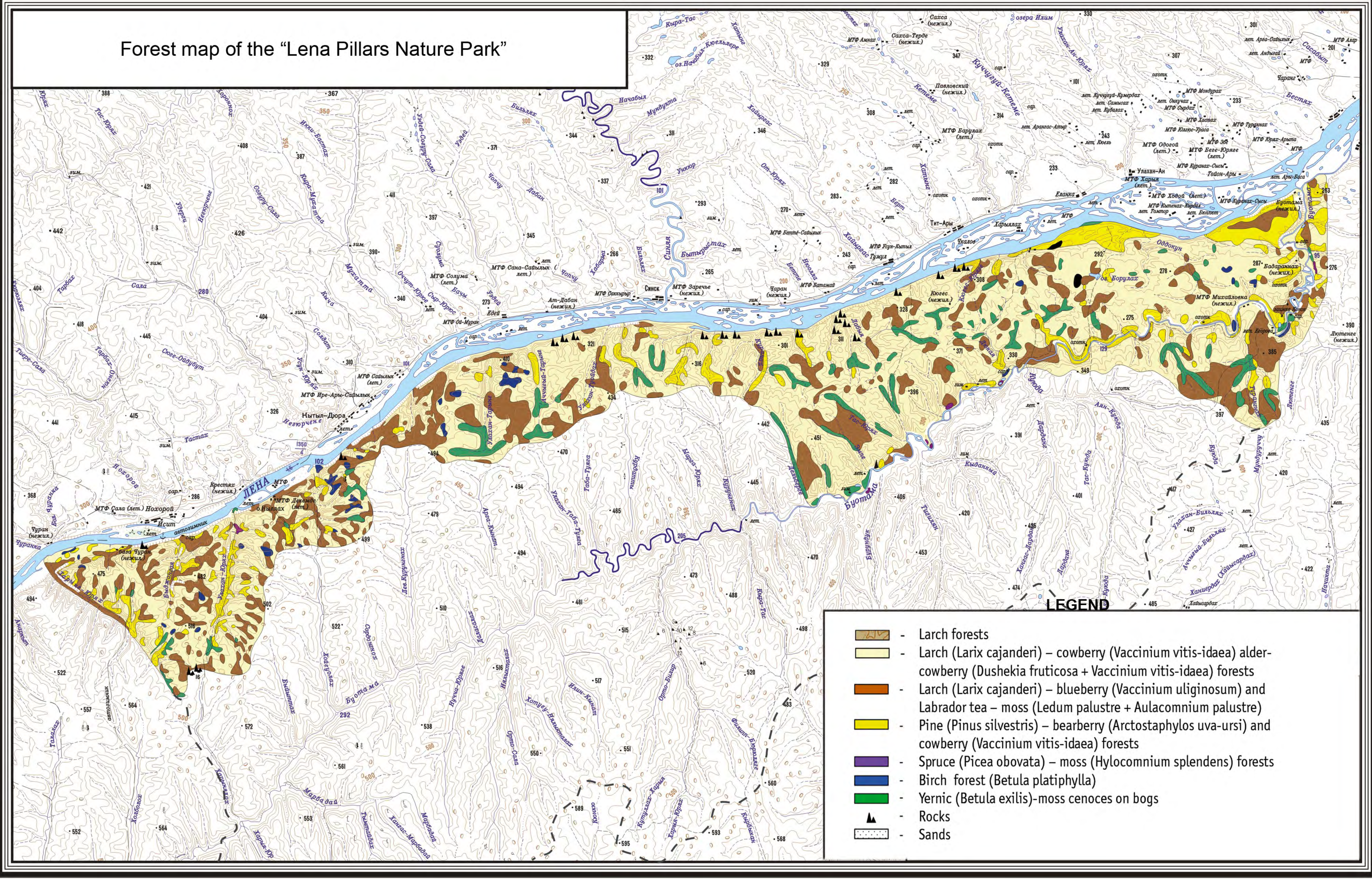

ПП "Ленские столбы"

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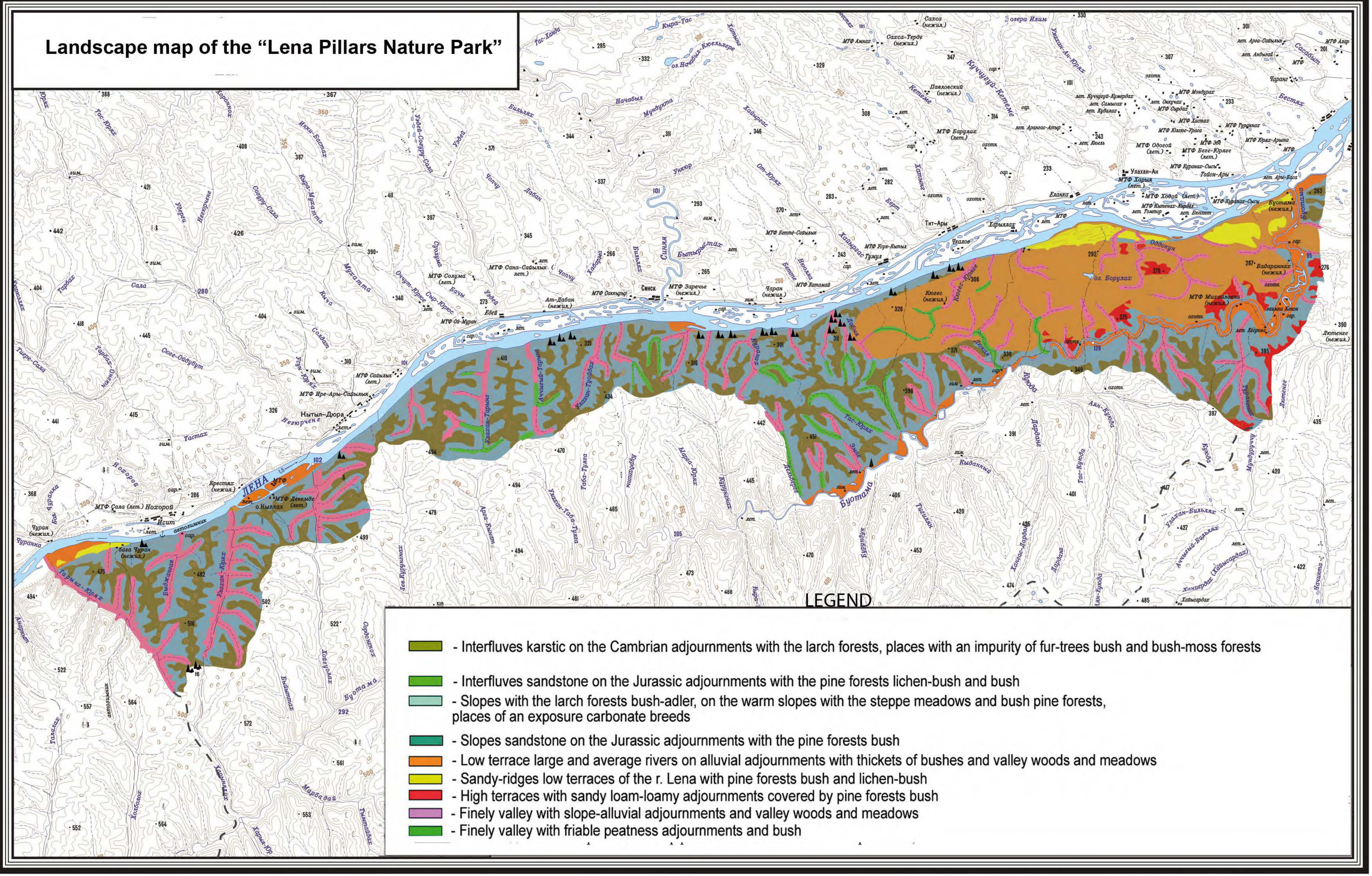
ФГУП "Якутское аэрогеодезическое предприятие"
2007 г.



ПП “Ленские столбы”

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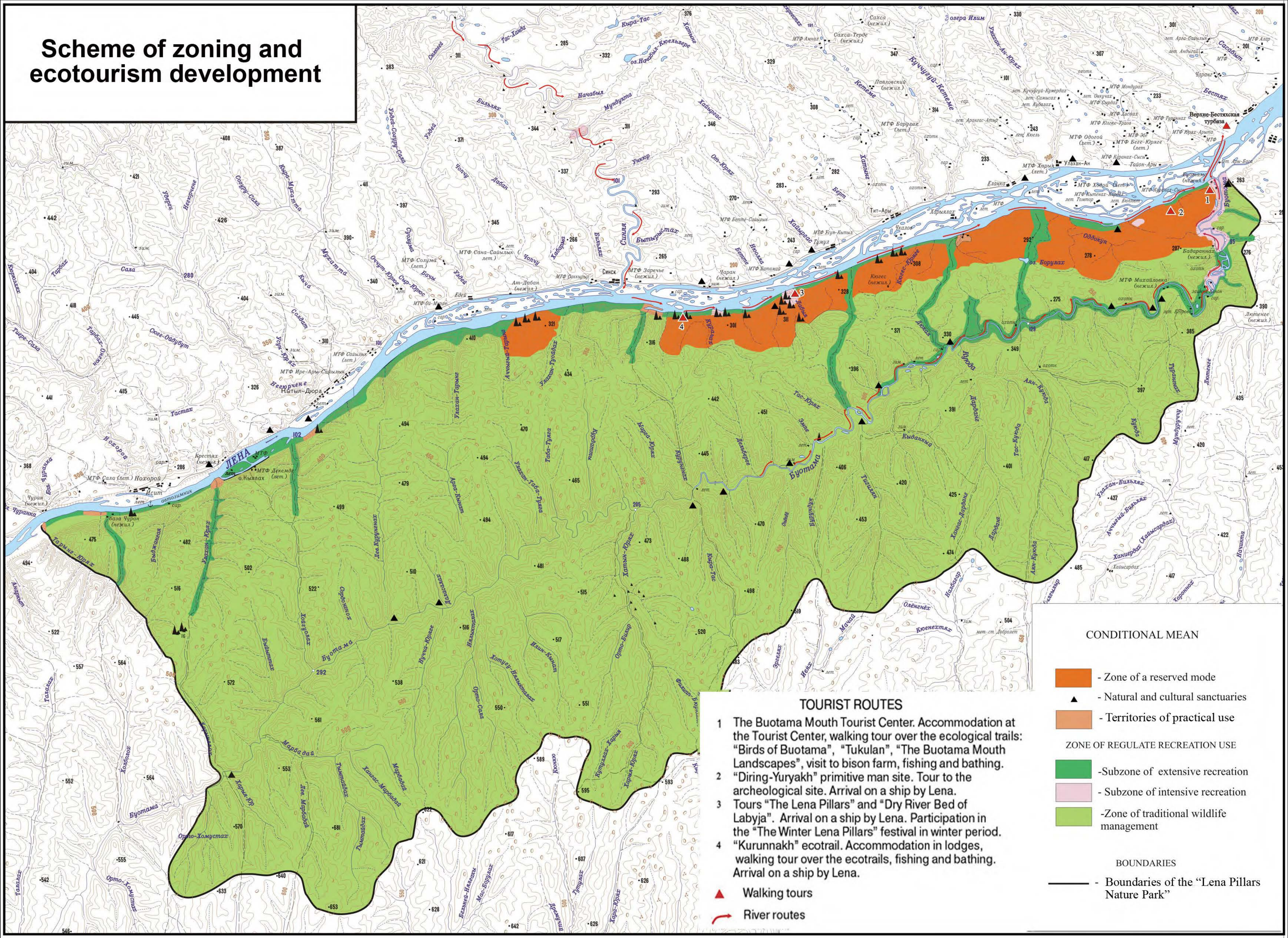
ФГУП “Якутское аэрогеодезическое предприятие”
2007 г.

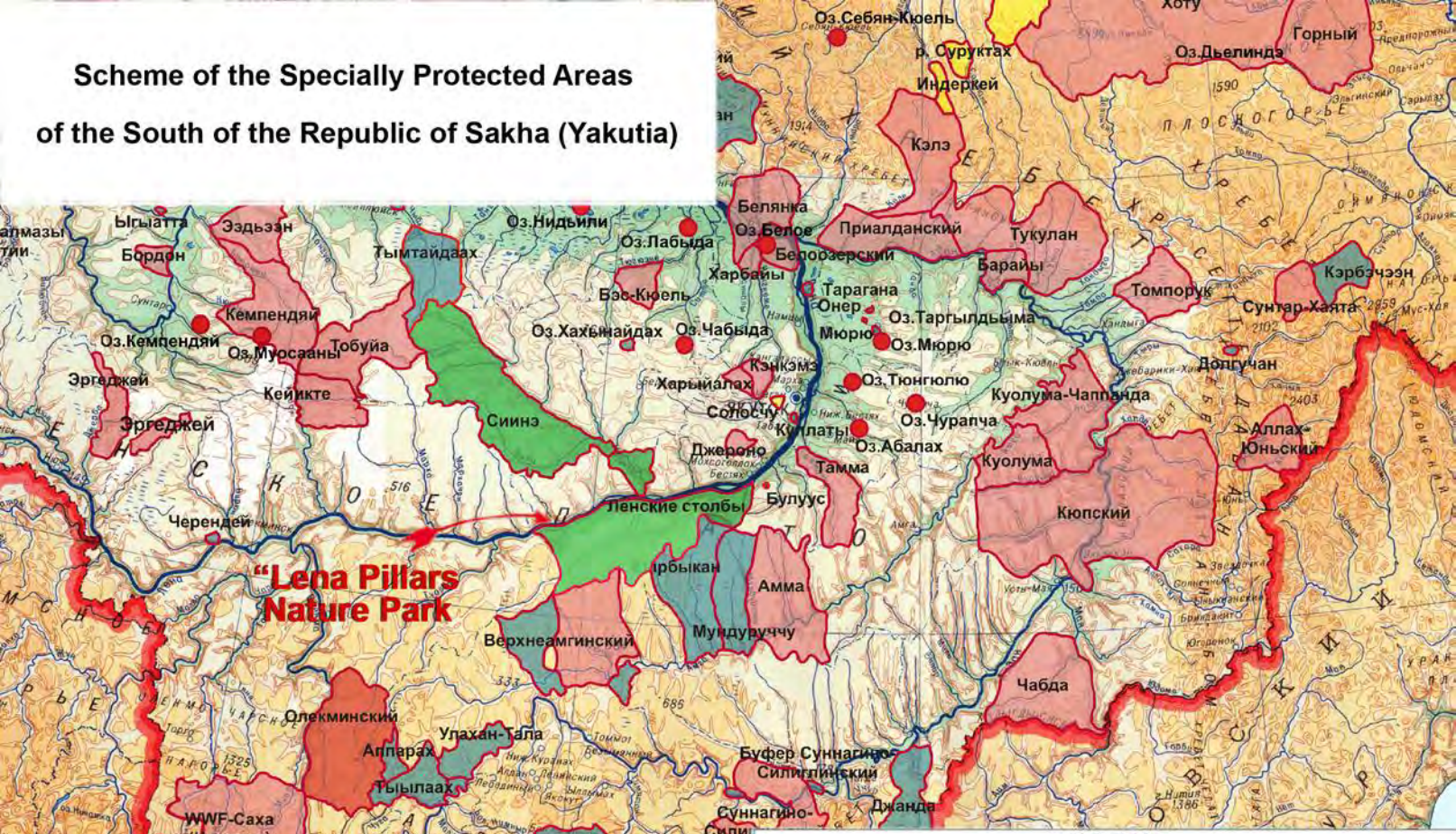


ПП " Ленские столбы"

10 км 5 0 10 20 30

ЯКУТСК
ФГУП "Якутское аэрогеодезическое предприятие"
2007 г.

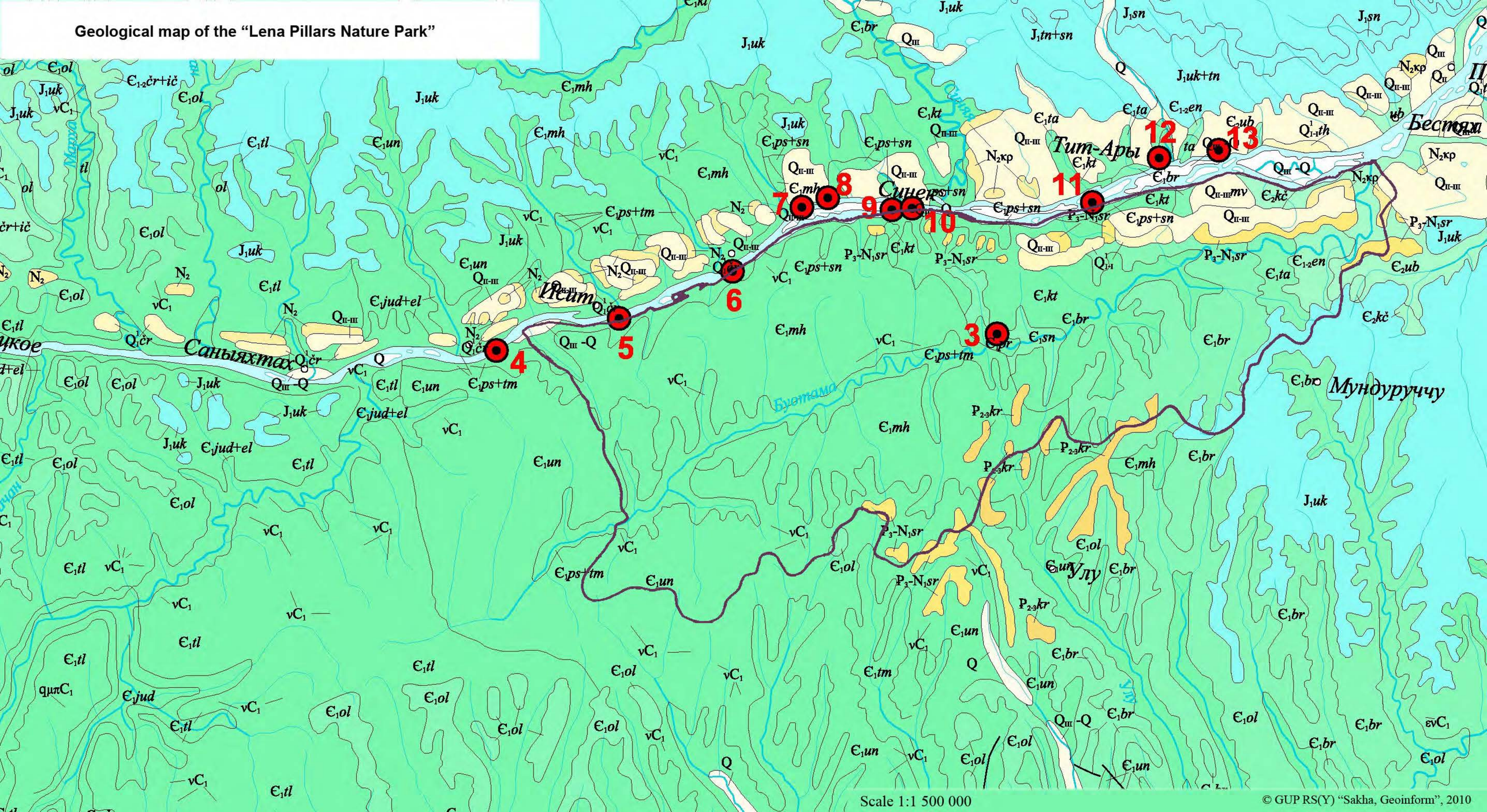
Scheme of the Specially Protected Areas of the South of the Republic of Sakha (Yakutia)



LEGEND

- State Nature Reserves
- Nature Parks
- Republic Resource Preserves
- Local Resource Preserves
- Quiet Zones
- Unique Lakes

Geological map of the “Lena Pillars Nature Park”



Scale 1:1 500 000

ANNEX A10

Legend:

Phanerozoic Eonothem

Cenozoic Erathem

Quarternary System

Q – Holocene: alluvial, lacustrine, bog, and eolian deposits, including sandy dunes – tukulans;

Q_{II-III} – Neopleistocene: alluvial deposits;

Q_{II-III}*mv* – Mavra Formation of Neopleistocene: lacustrine-alluvial deposits;

Q_{I-I} – Eopleistocene: polygenetic deposits.

Neogene System

N_2*kp* – Red Sandstone Unit of Pliocene: sandstone, pebblestone.

Paleogene and Neogene systems

Þ$_{2-}$ N_1*sr* – Syrsary Unit of Oligocene-Miocene: sand, gravelstone, kaolinized siltstone, brown iron ore.

Paleogene System

Þ$_{2-3}$*kr* – Karbykan Unit of Eocene-Oligocene: sand, kaolinized clay, brown iron ore.

Mesozoic Erathem

Jurassic System

J_1*uk* – Ukugut Formation of Hettangian-Pliensbachian: conglomerate, pebblestone, sand, sandstone, siltstone, clay, coal.

Paleozoic Erathem

Cambrian System

Є$_2$*ub* – Ust'-Botoma Formation of Cambrian Stage 5: mudstone, argillaceous mudstone;

Є$_2$*kč* – Kychik Formation of Cambrian Stage 5: back-reef tempestite, flat-pebble conglomerate, gravelstone;

Є$_{1-2}$*el* – Elanka Formation of Cambrian stages 4 and 5: reefal gravelstone, wackestone, packstone, and mudstone;

Є$_1$*ta* – Titary Formation of Cambrian Stage 4: dolostone with bird-eye structures;

Є$_1$*kt* – Keteme Formation of Cambrian Stage 4: mudstone, wackstone, packstone;

Є$_1$*br* – Barylay Formation of Cambrian Stage 4: dolostone with bird-eye structures;

Є$_1$*ol* – Olekma Formation of Cambrian Stage 4: mudstone, gravelstone, dolostone;

ANNEX A10

$Є_1$***sn*** – Sinsk Formation of Cambrian Stage 4: black mudstone, chert;

$Є_1$***ps+sn*** – Pestrotsvet and Sinsk formations of Cambrian stages 3 and 4;

$Є_1$***mh*** – Mukhatta Unit of Cambrian Stage 3: back-reef conglomerate, gravelstone, ooid packstone;

$Є_1$***un*** – Yungele Formation of Cambrian Stage 2: mudstone, dolostone;

$Є_1$***tl*** – Tolbachan Formation of Cambrian Stage 2: argillaceous mudstone, anhydrite, gypsum;

$Є_1$***ps+tm*** – Pestrotsvet and Tumuldur formations of Cambrian stages 1 and 2: argillaceous mudstone, ooid packstone, dolostone;

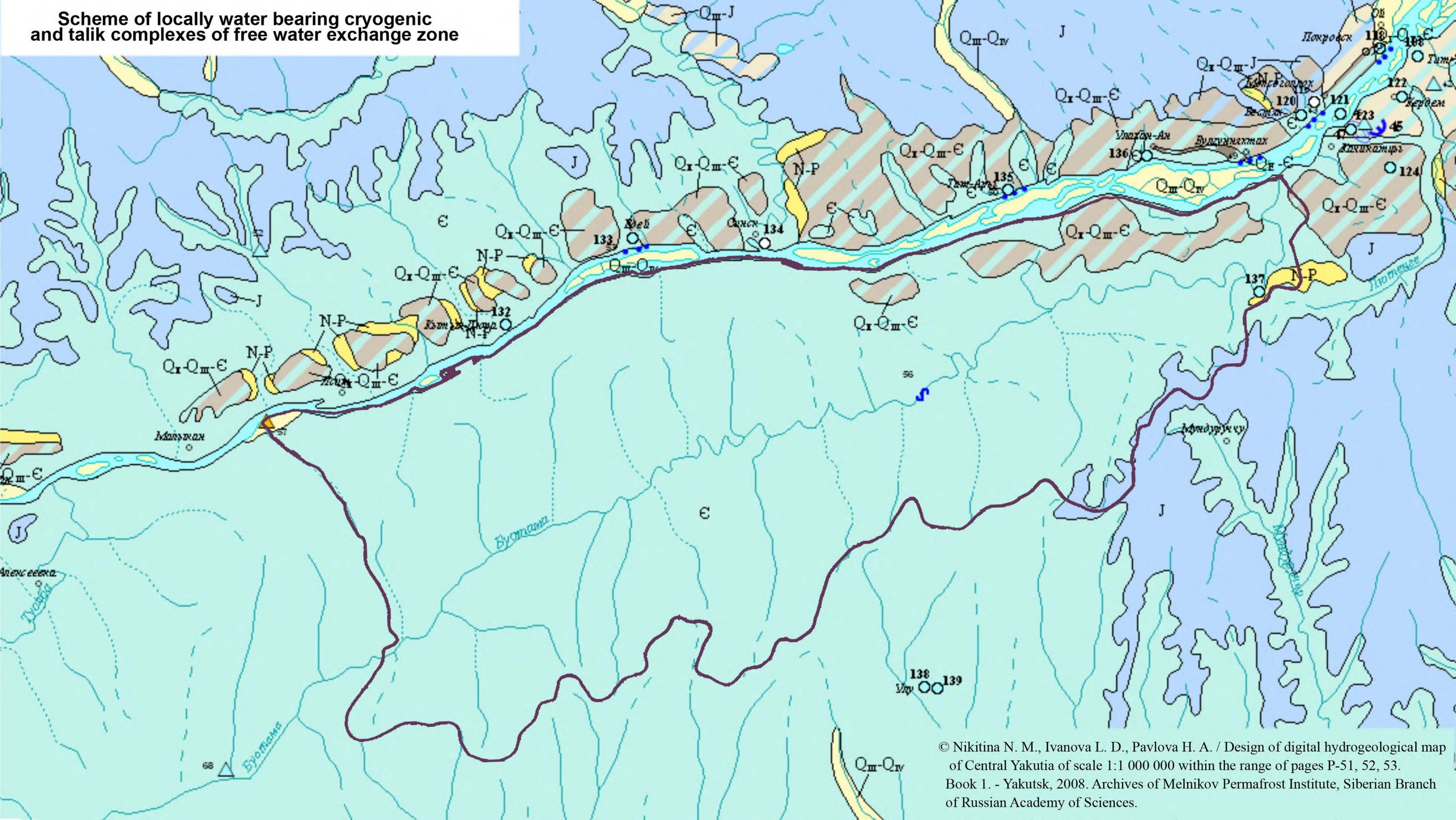
$Є_1$***ps*** – Pestrotsvet Formation of Cambrian stages 1 to 3: red argillaceous mudstone, reefal wackstone, packstone, boundstone, and cementstone.

$Є_1$***jud+el*** – Yuedey and El'gyan formations of Cambrian stages 1 and 2: argillaceous mudstone, dolostone, gypsum;

v$Є_1$ – transitional Ediacaran-Cambrian strata: argillaceous mudstone, dolostone.

Scheme of subcryogenic water bearing complexes of difficult water exchange zone

Scheme of locally water bearing cryogenic and talik complexes of free water exchange zone



ANNEX A11, 12

Legend

Local water-carrying cryogenic subgelisol formations of free water exchange zone

Q9-Q0 — Water-carrying cryogenic subgelisol formation of Holocoen-Upper Pleistocene limnetic, lacustrine-boggy and eolian deposits of channel, flood plain and low terraces. Clay loams, sand clays, sands, gravels, peat, silts.

Q9 — Water-carrying cryogenic subgelisol formation of Upper Pleistocene deposits of glacial plane. Stony clay loams.

Q9-J — Water-carrying cryogenic subgelisol formation of Upper Pleistocene-Jurassic alluvial cryogenic-eolian and limnetic deposits of middle terraces. Sands, gravels, sand clays, clay loams, silts, peat, sandstones, siltstones, aleurolits, argillites, coals.

Q8-Q9-J — Water-carrying cryogenic subgelisol formation of Upper-Middle-Pleistocene-Jurassic covering limnetic-alluvial and polygenetic deposits of middle terraces. Sands, clays, gravels, clay loams, sand clays, sandstones, aleurolits, argillites, coals.

Q8-Q9-Є — Water-carrying cryogenic subgelisol formation of Upper-Middle-Pleistocene-Cambrian covering limnetic-alluvial and polygenetic deposits of middle terraces. Sands, clays, gravels, clay loams, sand clays, marlstones, limestones, dolomites.

Q_{E}-J — Water-carrying cryogenic subgelisol formation of Eo-pleistocene-Jurassic limnetic-alluvial and alluvial deposits of upper terraces, plains and plateaus. Sands, gravels, sandstones, siltstones, aleurolits, argillites, coals.

Q_{E}-Є — Water-carrying cryogenic subgelisol formation of Eo-pleistocene-Cambrian limnetic-alluvial and alluvial deposits of upper terraces, plains and plateaus. Sands, gravels, marlstones, limestones, dolomites.

N-P — Water-carrying cryogenic subgelisol formation of Neogene-paleogene terrigenous deposits of plains and plateaus. Sands, gravels, clays, siltstones, lignites.

J — Water-carrying cryogenic subgelisol formation of Jurassic terrigenous deposits of plains and plateaus. Sands, sandstones, siltstones, aleurolits, argillites, coals.

Є — Water-carrying cryogenic subgelisol formation of Cambrian carbonate-terrigenous deposits of plateaus. Marlstones, limestones, dolomites, argillites, aleurolits.

Q9-J — *Water-carrying formation is represented by two stratigraphic frameworks. Wide bars show the colour of first after surface stratigraphic framework, narrow bars show the colour of second one.

Subcryogenic water-carrying formations of the impeded water exchange zone

J — Subcryogenic water-carrying complex of terrigenous Lower-Jurassic deposits. Sands, sandstones, gravels, conglomerates, gravelites, coals, aleurolits, argillites, clays.

$Є_2$ — Subcryogenic water-carrying complex of carbonate Middle-Cambrian deposits. Algal limestones, organogenic limestones, arenaceous limestones, clayey limestones, dolomites, limestone aleurolits, marlstones, gypsum.

$Є_1$ — Subcryogenic water-carrying complex of carbonate Lower-Cambrian deposits. Dolomites, arenaceous dolomites, bituminous dolomites, clayey dolomites, oolitic and algal dolomites, brecciated dolomites with anhydrite, breccia of anhydrite rocks, limestones, brecciated limestones, organogenic limestones, clayey limestones, dolomitic limestones, bituminous limestones, marlstones, anhydrite, gypsum, rocksalt

V — Subcryogenic water-carrying complex of terrigenous-carbonate Sorbian deposits. Dolomites, gypsified dolomites, clayey dolomites, bituminous limestones, sandstones, calcareous sandstones, quartzitic sandstones, marlstones, breccia.

ANNEX A11, 12

Natural and anthropogenic water ingresses

55 / 8 Wells*, revealed water-carrying cryogenic subgelisol formations and continuous thaw zone waters. Well number see on top.

10 / S Wells*, revealed water-carrying subcryogenic formations and complexes. Well number see on top.

3 / 8 Wells*, not revelaed water-carrying subcryogenic formations and complexes beneath the bottom of permafrost rocks. Well number see on top.

T The ground waters source with 10 l/s discharge.

Underchannel continuous thaw zone

Interpermafrost water-carrying formations

Ice crust

Ice-hole

* The filling colour is relevant to the water anionic composition:

8 - hydrocarbonate S - sulphate S - chloride S - no data

Other data

A Lithologic aquiclude of the Archean metamorphic rocks

Isolines of the bottom of permafrost rocks, via 100 m:

a) 300 a) fixed

b) 200 b) supposed

Rivers:

a) a) surface

b) b) nonperennial

c) c) underground

Lakes

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للتربية والعلم والثقافة

联合国教育、
科学及文化组织

The Culture Sector
World Heritage Centre

H. E. Mrs Eleonora Mitrofanova
Ambassador
Permanent Delegate of the
Russian Federation to UNESCO
UNESCO House

Ref: CLT/WHC/PSM/12/LJ/EUR/246 16 August 2012

Subject: **Inscription of *Lena Pillars Nature Park* (N 1299), Russian Federation, on the World Heritage List**

Dear Ambassador,

I have the pleasure to inform you that the World Heritage Committee, at its 36th session (Saint Petersburg, Russian Federation, 24 June – 6 July 2012), examined the nomination of the ***Lena Pillars Nature Park*** and decided to **inscribe** the property on the World Heritage List. The decision of the Committee concerning the inscription is attached.

I am confident that your Government will take the necessary measures for the effective conservation of this new World Heritage property. The World Heritage Committee and its Secretariat, the World Heritage Centre, will do everything possible to collaborate with you in these efforts.

The *Operational Guidelines for the Implementation of the World Heritage Convention* (paragraph 168), request the Secretariat to send to each State Party with a newly inscribed property a map of the area(s) inscribed. Please examine the attached map and inform us of any discrepancies in the information by **1 December 2012.**

The inscription of the property on the World Heritage List is an excellent opportunity to draw the attention of visitors to, and remind local residents of, the *World Heritage Convention* and the outstanding universal value of the property. To this effect, you may wish to place a plaque displaying the World Heritage emblem and the UNESCO logo at the property. You will find suggestions on this subject in the *Operational Guidelines for the Implementation of the World Heritage Convention.*

In many cases States Parties decide to hold a ceremony to commemorate the inscription of a property on the World Heritage List. Upon request to the World Heritage Centre by the State Party, a World Heritage Certificate can be prepared for such an occasion.

I would be grateful if you could provide me with the name, address, telephone and fax numbers and e-mail address of the person or institution responsible for the management of the property so that we may send them World Heritage publications.

Please find attached the brief descriptions of the property, prepared by IUCN and the World Heritage Centre, in both English and French. As these brief descriptions will be used in later publications, as well as on the World Heritage

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website, we would like to have your full concurrence with their wording. Please examine these descriptions and inform us, by **1 December 2012** at the latest, if there are changes that should be made. If we do not hear from you by this date, we will assume that you are in agreement with the text as prepared.

Furthermore, as you may know, the World Heritage Centre maintains a website at http://whc.unesco.org/, where standard information about each property on the World Heritage List can be found. Since we can only provide a limited amount of information about each property, we try to link our pages to those maintained by your World Heritage property or office, so as to provide the public with the most reliable and up-to-date information. If there is a website for the newly inscribed property, please send us its web address.

All the Decisions adopted by the 36th session of the World Heritage Committee are available at the following web address of the World Heritage Centre: http://whc.unesco.org/archive/2012/whc12-36com-19e.pdf.

As you know, according to paragraph 172 of the *Operational Guidelines for the Implementation of the World Heritage Convention*, the World Heritage Committee invites the States Parties to the *Convention* to inform the Committee, through the World Heritage Centre, of their intention to undertake or to authorize in the area protected under the *Convention* major restorations or new constructions which may affect the outstanding universal value of the property.

May I take this opportunity to thank you for your co-operation and for your support in the implementation of the *World Heritage Convention*.

Please accept, dear Ambassador, the assurances of my highest consideration.

Kishore Rao
Director

cc: National Commission of the Russian Federation for UNESCO
IUCN
UNESCO Moscow Office

Extract of the Decisions adopted by the 36th session of the World Heritage Committee (Saint Petersburg, 2012)

Decision: 36 COM 8B.11

The World Heritage Committee,

1. Having examined Documents WHC-12/36.COM/8B and WHC-12/36.COM/INF.8B2,

2. Inscribes the **Lena Pillars Nature Park, Russian Federation**, on the World Heritage List, on the basis of **criterion (viii)**;

3. Adopts the following provisional Statement of Outstanding Universal Value:

Brief synthesis

The property of the Lena Pillars Nature Park describes key stories about our planet and the early evolution of life, namely a record of the Cambrian Explosion and the story of the emergence of the frozen ground karst phenomenon.

The property is an outstanding natural property providing an unmatched synthesis of Cambrian geological and paleontological data, which serves as the basis for our understanding of the distant past, the evolution of the Earth and of life on our planet during one of the most pivotal and dramatic points of its development.

The property includes valuable geological sites (lower to middle Cambrian strata), paleontological sites (exceptional, rich fossils and biocenoses, including the earliest metazoan reef belt) and unique geomorphological sites (frozen ground karst, thermokarst and sand dunes-tukulans).

Criterion (viii): The property represents the most significant natural monument of the Cambrian Explosion, which was one of the pivotal points in the evolution of life on Earth. Due to the platformal carbonate sedimentation which occurred in the tropical belt without subsequent metamorphic and tectonic transformation, the property preserves the most continuous, fully documented, and richest record of the diversification of skeletal animals and calcified algae from their first appearances until the first mass extinction event. This is documented in parallel by three types of sedimentary basins during the first 35 million years of the Cambrian evolution.

The property comprises the earliest, and the temporally and spatially largest, fossil metazoan reef of the Cambrian world. This reef, being a site of Cambrian diversification, is comparable to the Great Barrier Reef today. The high preservation quality of both skeletal and soft-bodied fossils being coupled with high resolution isotope and palaeomagnetic records, as well as with various well-preserved sedimentary fabrics allows researchers to better understand ecological and evolutionary problems with accuracy comparable to the study of today's biotas and communities.

The Cambrian carbonates situated within the property are a place of unique ongoing geological processes and the only model of recent frozen ground karst of karst plateaus. The entire rock massif is affected by karst processes of perennially cryotic rocks under extremely continental semi-humid climate conditions. The Lena and Buotama pillars are the only area on the globe where the processes of the fine disintegration of the rocks – cryohydration weathering – dominate the shaping of the relief of carbonate pillars. These karst phenomena are enriched by thermokarst processes developed in the area of a great permafrost thickness (up to 600 m) which led to appearances of alases, a thermokarst feature almost only found in Yakutia. The frozen ground karst in combination with thermokarst is a worldwide unique phenomenon of Eastern Siberia and is outstandingly documented in the property. It is quite different from other karst properties in the World Heritage List, which are located in humid areas. In turn, the semi-humid continental climate

conditions are expressed in a formation of tukulans which are eolian sand dunes being developed at almost polar latitudes.

Integrity

Lena Pillars Nature Park presents a single natural site and its main components are inseparably tied with each other by a common origin, history and the dynamics of natural development, and includes all the elements necessary to express its outstanding universal value.

By its size (1,272,150 ha) the property is large enough to support its geological and ecological processes and to ensure the complete representation of the features and processes which convey its significance. In addition local and Republican Resource Preserves adjacent to the Park's boundaries give additional integrity guarantees for the property.

The property presents an integral system. Natural ecosystems, numerous nature monuments, and also evidence of human activity from ancient times has been sustainably preserved with its boundaries over a long period of time.

The biophysical processes and landform features of the property are intact.

The property includes all the elements essential for maintaining its features. Firstly, a great variety of skerries relief forms: fancy pillars, spires, towers, columns, intertwined with grottos, passages, and caves, stretching along the riverbanks of the Lena and Buotama for dozens of kilometers. The area of the "Lena Pillars Nature Park" has gone through a long and complex period of geological development since Early Cambrian. The property reflects both significant geological processes of surface development and outstanding geomorphological relief features. All significant relief forms of the property are interrelated and interdependent elements in their natural relationships.

Protection and management requirements

The whole property is managed by the Park administration and the staff on the basis of laws and decrees of the Governments of the Russian Federation and of the Republic of Sakha.

Traditional nature management and licensed use of biological resources by local residents from eight communities of small nationalities of the North inhabiting the Park territory (and absolute absence of permanent settlements) present the main condition for conservation of the nature monuments and biological diversity of ecosystems of the property.

In 2011 the management plan for 2012-2016 was drawn up elaborated in conformity with the Order of the Federal Service for Supervision of Natural Resource Usage of the Russian Federation №491 of 03.12. 2007.

4. Requests the State Party to:
   a) Consider including the Sinyaya component of Lena Pillars Nature Park, and relevant areas of the Lena River that are necessary to strengthen the integrity within the property,
   b) Provide a clear demonstration that the legal regime supporting the property is effective,
   c) Provide a revised long-term management plan for the property which includes a strong programme of awareness devoted to the, geomorphological and geological features, and ensures the necessary scientific skills required to protect and manage these values are in place;

5. Expresses its appreciation to the State Party, the State Government of the Sakha Republic (Yakutia), and stakeholders, regarding the work that has been done to research, present and protect the values within the Lena Pillars region;

6. Welcomes the collaborative efforts of the State Party, stakeholders and IUCN during the evaluation of this nomination, and requests that lessons learned during this process are appropriately considered in the reflection on the Future of the *Convention*;

7. Further requests the State Party to provide a report to the World Heritage Centre by **1 February 2015** on the progress in implementing the above recommendations for consideration by the World Heritage Committee at its 39th session in 2015.

Surface and coordinates of the property inscribed on the World Heritage List by the 36th session of the World Heritage Committee (Saint Petersburg, 2012) in accordance with the *Operational Guidelines*.

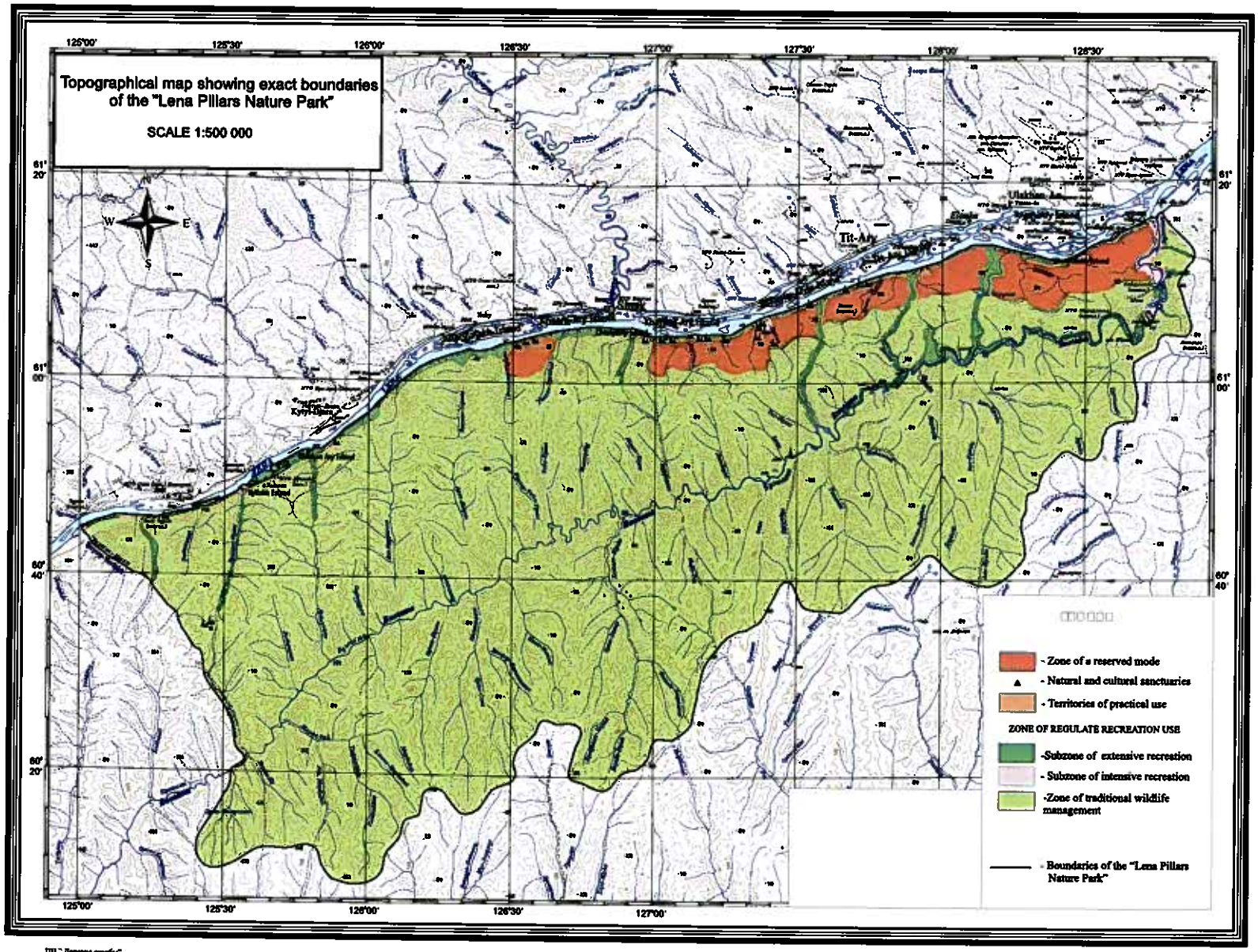
State Party	Property	ID N	Area	Buffer zone	Centre point coordinates
Russian Federation	Lena Pillars Nature Park	1299	1 272 150	--	N60 40 E127 00

Brief Description in English

Lena Pillars Nature Park is marked by spectacular rock pillars that reach a height of approximately 100 m along the banks of the Lena River in the central part of the Sakha Republic (Yakutia). They were produced by the region's extreme continental climate with an annual temperature range of almost 100 degrees Celsius (from –60 °C in winter to +40 °C in summer). The pillars form rocky buttresses isolated from each other by deep and steep gullies developed by frost shattering directed along intervening joints. Penetration of water from the surface has facilitated cryogenic processes (freeze-thaw action), which have widened gullies between pillars leading to their isolation. Fluvial processes are also critical to the pillars. The site also contains a wealth of Cambrian fossil remains of numerous species, some of them unique.

Brief Description in French

Le parc naturel des colonnes de la Lena est marqué par de spectaculaires colonnes de pierre d'une hauteur de près de 100 mètres qui longent les rives de la Lena, au centre de la République de Sakha (Yakoutie). Les colonnes sont nées du climat continental extrême de la région où l'amplitude annuelle des températures atteint presque 100° C, d'environ – 60° en hiver à + 40° en été. Les colonnes sont des contreforts rocheux isolés les uns des autres par des ravines profondes et abruptes issues de la gélifraction dirigée le long des joints intermédiaires. La pénétration de l'eau depuis la surface a facilité les processus cryogéniques (action du gel-dégel) qui ont élargi les ravines entre les colonnes, conduisant à l'isolement de celles-ci. Les processus fluviaux ont aussi une importance critique pour les colonnes. Le site se caractérise également par de nombreux fossiles de multiples espèces, pour certaines uniques, datant du Cambrien.



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ЯКУТСК
ФГУП "Якутское аэрогеодезическое предприятие"
2007 г.