Additional information

General ecological features:

The ridge-hollow complexes, located in the central part of the slopes, occupy significant area of mire. Hollows can be also found on the top of the bog, they form a complex with a pine-dwarf shrub-sphagnum and pine-dwarf shrub- cotton grass-sphagnum communities, which cover the ridges and spaces between hollows. Cotton grass-, beak rush-, scheuchzeria- and mud sedge-sphagnum communities (with *Sphagnum cuspidatum*) are typical for hollows. Plant commu- nities of ridges and top of the bog are represented by *Pinus sylvestris* f. *litwinowii*. Pine-dwarf shrub-sphagnum communi- ties with *Pinus sylvestris* f. *uliginosa* are widely distributed, and occur on the periphery of the central part, as well as on well-drained areas of the wetland. Shrubs are dominated by *Calluna vulgaris*, and *Ledum palustre*. The broad and strongly waterlogged band of eutrophic communities edges the bog. This band is covered by mire forests and grass communities formed by *Alnus glutinosa, Betula pubescens*, different *Salix* and *Carex* species, and mire herbs: *Comarum palustre, Calla palus- tris, Phragmites australis, Carex lasiocarpa, C. rostrata, C. cespitosa, C. vesicaria* and many others. Area between oligotrophic bog part and lagg covered by mesotrophic (often heavily flooded) sphagnum communities with *Sphagnum centrale, Sphag- num obtusum, Sphagnum fallax, Carex lasiocarpa, Carex rostrata, sometimes with a sparse stand of Betula pubescens and Pinus sylvestris.*

Mire-, swamp- and upland forests are located on the periphery and in the islands of the wetland. Forests act as a buffer for the wetland core (sphagnum bog). Formational-typological structure of the territory is determined by a complex of natural and anthropogenic factors. Limited accessibility of the territory and, therefore, limited forestry activities, in spite of the reclamation activity, conduced to preserve the forest ecosystems with their particular structure, floristic composi- tion, age, and scientific significance.

In general, forests cover 57% of the investigated site; the typological scheme of forest vegetation consists of 3 groups of formations, 7 formations, 12 series, and 28 types of forest. The Pineta sylvestriae formation (84.7%) dominates in the forests composition. Another forest formations are not so abundant on the wetland: Betuleta (10.4%), Querceta (3.0%). Only fragments of Alneta glutinosae (0.7%), Piceeta abiestiae (0.7%), Carpineta betulusiae (0.5%), Tremuleta populusiae (2.7%) can be found here. According to the typological diversity the most widespread forest types are cari- coso-sphagnosum (44.2%), ledosum (15.3%) and myrtillosum (14.4%).

As a result of peat extraction on adjacent territories and fires of recent years communities with rather simple structure are spread within the wetland. In a sparse (with top density 0.1-0.2) upper forest layer is composed of Betula pubescens, B.pendula, Populus tremula, Pinus sylvestris of 0.5-2.5 m height. Understory layer is abundant with forest tree species. Grass- dwarf shrubs cover is 50-90%, dominated by Calluna vulgaris, Polytrichum strictum. Secondary communities are unstable and exist only temporally. Currently, due to the influence of the secondary waterlogging the active regenerative proc- esses occur in these phytocenosis, but their full rehabilitation can lasts 25-30 years.

Flora of higher vascular plants is quite diverse and species rich. This determined by the habitats and plant communities diversity (forest, mire, aquatic and semi-aquatic). According to the floristic studies data, 549 species of vascular plants belonging to 299 genera and 83 families are recorded within the wetland area. In general, total specie amount of flora of Belarus is 1700 species, 128 families and 600 genera.

5 lycopodium species, 6 - horsetails, 8 - ferns, 3 - gymnosperms, and 527 species of angiosperms (130 monocotyledons and 397 dicotyledons) are identified in the wetland flora. The most rich in species families are: Asteraceae – 60, Gramineae

– 55, Cyperaceae – 38, Caryophyllaceae – 34, Fabaceae – 27, Scrophulariaceae - 24, Rosaceae - 23, Cruciferae - 22, Lamiaceae – 18, Polygonaceae – 16, Ranunculaceae - 15, Salicaceae – 14, Umbelliferae - 14, Juncaceae - 12, and Violaceae - 10. Other families in- clude 9 or less species. The richest in species diversity are the following genera: Carex - 33 species, Salix – 13, Viola - 10, Veronica - 9, Potentilla – 8, Rumex – 8, Trifolium – 8, Galium – 8, Juncus – 8, Ranunculus – 7, Polygonum – 7, Festuca – 7, Geranium – 6, Poa – 6, Stellaria – 5, Rubus – 5, Verbascum – 5, Campanula – 5, Artemisia – 5, Agrostis – 5. All another genera consist of at least 5 species.

Flora of the investigated area also contains a lot of economically useful plant species - officinal, food, pabular, mellifer- ous, ornamental and technical.

Fauna of the wetland representatively reflects the fauna of southern Belarus (Treasures, 2005).
The list of amphibians and reptiles is represented by 17 species; the most abundant species are Rana arvalis, Rana ridibunda and Zootoca vivipara. Bombina bombina and Natrix natrix can be found on the banks of canals. Along the margins of the wetland Vipera berus was recorded.

Within the wetland and on its periphery almost all native animals were recorded: Alces alces, Sus scrofa, Capreolus capreolus. Castor fiber can be observed on the canals of the wetland; such game species as Sciurus vulgaris, Lepus europaeus are com- mon here. Rare for the Polesie region Lepus timidus was recorded on the margins of the mire. Common predators of the wetland forests are: Martes martes, Mustela putorius, Mustela erminea, Mustela nivalis. Mire ridges and edge dunes are inhab- ited by Vulpes vulpes, Nyctereutes procyonoides, Meles meles. On mineral islands Canis lupus sometimes can be met. Mustela vison inhabits the banks of drainage canals.

In the avifauna of the wetland counts 112 species of birds: 100 species of nesting birds and 12 migrant species.

The most important habitats. Six categories of ecosystems protected in accordance with EEC Habitat Directive are allocated within the wetland (58 ha; 78.4% of the total area).

Natura 2000 code	EUNIS h
7110 Active raised bogs	
–«–	G5.6 Early-stage natural and semi-natural woodlands and regrowth
–«–	G5.64 Ra
7120 Degraded raised bogs still capable of natural regeneration	
7140 Transition mires and quaking bogs	D2.3 Transition mires and quaking bogs
–«–	D2.31 [*Carex lasiocarpa*] swards
–«–	D2.33 [*Carex rostrata*] quaking mires
–«–	D2.34 [*Carex limosa*] swards
–«–	D2.35 [*C*
–«–	D2.37 [*Rhynchospora alba*] quaking bogs
–«–	D2.38 [*Sphagnum*] and [*Eriophorum*] rafts
–«–	D2.39 [*M*
–«–	D2.3A [*C*
–«–	D2.3B Br
–«–	D2.3C [*E*
–«–	D2.3D [*Molinia caerulea*] quaking bogs
7230 Alkaline fens	D4.1C [*C*
9080 Fennoscandian deciduous swamp woods	G1.51 Sp
–«–	G1.52 [*A*
91D0 Bog woodland	G1.51 Sp
–«–	G3.D1 Boreal [*Pinus sylvestris*] bog woods

The wetland ecosystem functions. Ecosystems of the wetland have a number of important socio-economic and en- vironmental functions:

- regulation of outflow
- gases exchange control (release of oxygen and carbon sequestration)
- raw materials (supplies of berries, medicinal and technical raw materials, hunting species)
- climate
- filtration (for groundwater)
- peat formation (wetland is the part of the largest in southern Belarus peatland)
- accumulation of water
- pioneer(in areas destroyed by peat extraction)

Physical features of the site

Geomorphology. According to geomorphological zoning wetland is located on the Stolin fluvioglacial plain. This geomorphological zone is located in the southern part of Belarusian Polesie between the Pripyat River and right tribu- taries of Horyn and Styr rivers. In point of geological structure, the territory is confined to the south-eastern slope of the Polesie saddle and to the territory adjacent to Pripyat camber deflection.

Wetland is a large watershed peatland of Polesie outwash plains with peat deposits of bog type predominance. It in- cludes four comparatively large areas, separated by the remained fragment of the partly eroded finite-moraine ridge. These areas are of interconnected by system of depressions with the lowest absolute values (137-143 m) between the morainic hills and small fragments of fluvioglacial plain. Wetland has a convex shape with an asymmetric surface struc- ture. Mire is slightly convex, the relative height is 0.5 - 2.0 m in average.

Origin. The wetland has a natural origin. Stratigraphy of peat and lake sediments, sediments demonstrates the existence of the shallow lake in a wetland territory before the beginning of postglacial period. As a result of subsequent global warming, and obstruction of outflow from Polesie outwash plain the swamping of some relief lowerings took place. The next stage of peatland formation is associated with the "encroachment" of mire to adjacent area, boundaries exten- sion of some its parts, and integration them into the entire wetland Morochno.

Hydrology and hydrography. The wetland - a typical bog, located in the watershed of two rivers: Goryn and Styr (Pripyat tributaries). Any river flows in the wetland. Mire is predominantly fed by precipitation, and partly by ground- water from the surrounding catchment area. The territory is jagged by a numerous of inland uplands, formed by coarse- grained sands and sandy loams, and sandy clays. Peat deposits underlain by the sandy soils and sandy loam as well. Hence, the territory is mainly dominated by sandy soils with a large coefficient of filtration, resulting in small ditches and streams in the area are prone to drying out.

Hydrographic objects, first of all reclamation canals, appeared on this territory in the early 20th century. That time two main canals were dug through the mire from the north to south and from the east to west: Mogilniy canal (6.3 km; now almost not functioning) and Duboyskoy canal (4 km).

In Ukraine, beyond the Morochno mire, canal Mogilniy joins the river Syrets, left tributary of the Horyn river. In the southwestern part of the wetland canal maintains functional properties, although its edges are heavily overgrown by shrubs. Relative height is about 1 m for 1 km of canal, which determines the intensive rate of water flow in the spring (March-May). In May, the water level in the canal was more than 1.0 m, in July - about 20-30 cm, in August the canal was almost dry. At a distance of 1-2 km from the border of Belarus canal is covered by numerous beaver dams and the water level here raises to the banks. In the north-eastern part of the wetland canal operates as well. The canal width in this area is about 4.0 m, depth - 1.0-1.5 m. In the peripheral part of the wetland series of smaller canals flow into canal Mogilniy, their width is 2.5-3.0 m, and depth is about 1.0 m. At their mouths they generally function, on the beds lo- cated higher are overgrown by riverside and mire vegetation and have practically lost their functional properties.

The length of all canals on the wetland Morochno built from beginning of 20s of last century is about 25 km.

In 70s of the last century peat extraction was started in the northern part of wetland. This resulted in a significant change of the hydrological regime. To provide appropriate conditions for peat extraction, water level was lowered for 1.5-2.0 m by creation of drainage system. In addition, extraction site was surrounded by functioning bypass canal, which also drains the adjacent part of the undisturbed mire. The rate of water release from natural mire has increased significantly due to the connection of the old drainage system (canal Duboysky) in the northern part of wetland with a canals network of extraction site. The depth of the bypass canal is 3.0-3.5 m, its width – 4.0-6.0 m. Outflow in the ca- nals is intensive during spring time (late April-May), water level in canal is 2.5 m below the surface of the wetland.
As a result of the extraction site drainage system functioning, the groundwater level was significantly reduced in a radius of 1-2 km leading to degradation of the natural mire vegetation and to increasing the frequency of fires.

The groundwater level in undisturbed parts of wetland, beyond the zone of drainage influence, was near the soil surface during the years with moderate waterlogging conditions. Water level fluctuations were -20 ÷ +20 cm. On the marginal zone of wetlands, as well as on the periphery of the islands, water covers the soil surface during the whole vegetation period, and in some areas in western part of wetland large hollows are remained throughout the season.

Hydrochemical parameters of water. In general, are typical for all of Polesie bogs, and indicate close to natural con- ditions there. pH value is 4.5 ± 0.1 (with limits 3.70-6.50), electrical conductivity - 69 ± 4 (33-276) μS/cm.

Soils. The structure of the soil cover is dominated by peat soils. The bog peat deposits are the most abundant. Magel- lanicum peat prevails; in the central part of the bog the upper layer of deposits forms a complex peat. Layers of highly decomposed cotton grass-sphagnum and sphagnum-cotton grass peat are well defined. In the deepest points of peat deposits, at the mineral bottom, sapropel or sedge-hypnum peat can be found. The average thickness of peat deposition is 2.5 m and maximal - 5.7 m. Under the turf often occurs Thick layer of sapropel (0.1-1.0 m) is often occurs under the peat deposition. Presence of saproel is evidence of the mires formation on the place of overgrown ponds and adjacent waterlogged dry valleys.

Climat. The meam annual long-term (1966-2011) air temperature is +6.9 ± 0.1°C, varies in different years from +4.5 (1987) to +8.7°C (1989, 2008). The warmest month is July (+18.8°C), coldest is January (-5.4°C). The duration of the period with average daily temperatures above 0°C is 256 days, the growing season is 207 days, frost-free period is 148 days. The latest frost in the air is recorded on 2d of May, the first - on 28th of September. The mean monthly tempera- ture in January ranges from 0.5°C (1989) to -15.6°C (1987), in July - from +14.2°C (1979) to +22.9°C (2010). The mean monthly temperature of the soil surface is to -7°C in winter and up to 22°C in July.

The mean annual precipitation in the study area is 658 mm. Number of days with precipitation - 160-165. Precipitation for the cold period ranges from 175 to 200 mm, in a warm period - from 400 to 450 mm. The average thickness of snow cover in winter is 20 cm. Number of days with snow cover doesn’t exceed 85-90.

Physical features of the catchment area:

Due to the fact that any river falls into the wetland, its borders coincide with the boundary of the catchment area. Therefore physical and geographical characteristics of the catchment area are the same as for wetland and explained above in paragraph 16.

Ecosystem services

Current scientific research and facilities

Case studies of landscape and biological diversity in the reserve were carried out to prepare the scientific justification for the specially protected territory establishment. Flora and fauna of the wetland were studied in details, the systematic list of major groups of vertebrates was also prepared; rare and endangered species were identified, and the current con- dition of the wetland was assessed in 2003. These works were carried out by various specialists of the Scientific and Practical Center for Bioresources of the National Academy of Sciences, and of the Institute of Experimental Botany of the National Academy of Sciences.

In 2007-2009 within the framework of the UNDP-GEF project "Renaturalization and Sustainable Management of Peatlands to Combat Land Degradation, Climate Change and the conservation of globally significant biological diver- sity", the scientific justification for peatland rewetting located within the wetland was prepared. A system of the com- plex monitoring of wetland ecosystems and theirs dynamics after rewetting is created. The first series of observations have already conducted (Scientific and Practical

Center for Bioresources of the National Academy of Sciences, Institute of Experimental Botany of the National Academy of Sciences).

The influence of peat extraction sites on adjacent territories was investigated in the framework of the state programme "Peat" in 2009-2011. A system of stationary observation points (17 in total) for vegetation and hydrology monitoring was placed here (Institute of Experimental Botany of the National Academy of Sciences).

The large-scaled map of vegetation of the wetland was created in the framework of the state programme "Space explo- ration" in 2008-2010 (Institute of Experimental Botany of the National Academy of Sciences).

Forestry management, grading of hunting areas, counts of hunting and rare species are periodically carried out on this territory. The obtained data have the great scientific importance (Scientific and Practical Center for Bioresources of the National Academy of Sciences, RUE "Belgosohota", RUE "Belgosles").

Social and cultural values

Historical and cultural importance.
A wetland is swampy, difficult of access area. Within the wetland settlements are absent. Any archaeological, cultural, historical monuments are not allocated within the territory.

Socio-economic potential.

Population. On the territory of the wetland settlements are absent. Surrounding areas historically were densely popu- lated. From the west at a distance of 2.4 km from the wetland border villages Gordnaya and Derevnaya are located. Directly at the borders of the wetland villages Rovchak and Luchitsa can be found. In the north, at a distance of 2-4 km villages Luka and Glinka are located. The eastern borders of the wetland adjacent to the village Verhniy Terebezhov. The wetland area is heavily swampy and difficult of access for the population. There is only one way - v. Verhniy Tere- bezhov - v.Derevnaya, runs along the southern boundary of the wetland.

Industrial production and mineral resources. The investigated area is one of the largest peatland in southern part of Belarus. According to the "Resolution..., 1991" actual peat resources in 1988 were: 11,657 ha, industrial resources – 33,861 thousand tons (40% peat humidity). From the north, right at the boundaries of wetland, peat extraction site "Zubkovo" of the peat enterprise "Glinka" is located. There are three exploitable peat extraction sites here.

Agricultural production. There are no any agricultural lands directly on the territory of the wetland. One hectare of hay- fields is located here for the purposes of forest protection. Grazing is not performed within the wetland.

Forestry. The wetland includes productive lands, which are used for forestry. Total resource (according to forest regula- tion, 2008) is 285.4 thousand m3. Large area (85.6%) covered by forest belongs to the category of commercial forests. Biological resources. Berries (cranberries) collection is an important source of income for more than 5000 families of local population from adjacent areas (Treasures, 2005). According to expert estimates the annual harvest of cranberry is about 0.15-0.4 million USD. Generally this type of activity is carried out by residents of settlements located around the wetland.

Current recreation and tourism

The wetland is located quite far from the large settlements. It is afforested and highly waterlogged. That's why there is no necessary infrastructure for recreational activities. There are no rivers and lakes here, which usually attract vacationists. Recreation potential of the wetland is low, and the main recreational uses are hunting and picking mushrooms and berries by people from adjacent settlements. The wetland is located in the border area with Ukraine, therefore, it is ac- cessible only for local population.

Open areas and woodlands of the wetland are the most intensely affected by recreational pressure (used for picking berries and mushrooms). In general, levels of recreational pressure are significant, but don't exceed the critical values.

Thus, during the cranberry-picking period (September-October) about 150-250 people visit the wetland per day (maxi- mum permissible - 40 people/day). The main reasons for visiting the wetland are gathering of berries, mushrooms, fish- ing and hunting. In this regard, the long-term path network, permanent entrances to the wetland, and parking places were formed there. However, this form of activities is seasonal and do not have a significant impact on the functioning of natural complexes.

Current land (including water) use

The wetland is state property (land of the Stolin district executive committees) and transferred for the long-term use by State Forestry Institution "Stolin Forestry".
Major land uses:

- forestry
- logging,
- reforestation
- secondary forest use (berries, mushrooms, officinal and technical raw collecting)
- recreation
- hunting

Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects

within the Ramsar site:

Drainage reclamation. The oldest canals draining the western and central part of the wetland were dug in the 20s of last century. At the present time, their drainage function is reduced due to overgrowing by vegetation. The most important hydrological network is those of peat enterprise "Glinka". Gross canals 3-3.5 m deep, and 4.0-5.0 m wide. Spring out- flow (late April - May) is intense, the water level is 2.5 m below the soil surface. The total extension of the canals within the wetland area is about 25 km. Currently, 10.8% of the area show a significant degradation processes related to the drainage reclamation.

Fires. Lowering of the water level substantially increased frequency of fires. Implemented researches (scientific justifica- tion, 2003) showed that over the last decade the wetland was affected by fires quite regularly. Fire covered several hun- dred hectares in the northern and southern part of the wetland. The fires led to drying up of pine, in some places to soil destruction, and consequently to biological diversity decreasing.

Peat extraction. The northern part of the wetland is substantially violated by the peat extraction. In addition to the complete destruction of vegetation within the extraction site, this area has a significant negative impact on the sur- rounding area ecosystems.
Special studies show that the zone of influence on the vegetation of the peat extraction enterprise is 1,000 m. This zone is divided into two sub-zones: 1) near (of severe exposure) - 0-250 m from the peat extraction sites; 2) distant (of mod- erate and low impact) - 250-1000 m. The total area damaged by peat extraction is

about 1000 ha, including 62 ha of the area with highly damaged ecosystems. Worked-out peat extraction sites pose a significant hazard to environment. The secondary waste vegetation was formed within these areas. Such vegetation has a low fire resistance.
By the decision of the Council of Ministers of Belarus (№ 794 from 17.06.2011) it is planned to transfer part of the wetland under the peat extraction in 2012-2015.

Logging. The negative factor is local. Forests destined for cutting are located on the periphery or on the mineral islands of the wetland.

Poaching. As a result of poaching, the number of major economically valuable animals is significantly lower than the biological capacity of the wetland. Populations of moose, wild boar, capercailye and grouse are particularly endangered. Populations of protected species in Belarus (lynx and badger) are also threatened.
Survey results, the materials of the last forest inventory and analysis of research materials from previous years show that the total area of more or less damaged natural ecosystems within the wetland is 25.6%.

in the surrounding area:

All negative factors listed for the wetland also occur on the adjacent territory.