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Great Forest:

prospects for creating a National Park

(Southwestern Belarus)

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About

Yury Bakur, biologist from Belarus

A member of Birdlife Belarus since 2002

I've participated in various conservation projects in Belarus.

I've helped conserve nature in Cyprus, the Seychelles, Morocco, and deserts of Central Asia.

Nowadays doing research the nature of my homeland, and planning to unite the unique forest and mires areas into one National Park

Abstract

In this article, you will learn why the Zwanec, Dywin-Vialiki Les, and Radastauski nature reserves should be considered a single Great Forest natural complex, which has experienced large-scale drainage but retained its high conservation value.

Here you will learn about the prospects for creating a National Park in this area and its potential boundaries. You will learn whether the Great Forest meets the criteria for establishing a National Park.

You will also learn about the species composition of protected flora and fauna, noted by various scientists, the current conservation status of these species, and the distribution of rare and typical landscapes and biotopes. You will learn about the status of umbrella species within the proposed National Park.

You will learn about the problems that have recently plagued the forest-peatland complex, as well as my modest proposals for addressing them.

You will learn about the untapped tourism potential of the "Great Forest" and the prospects for creating a developed and interesting tourism infrastructure here.

Keywords: [Great Forest, peatland, fen, Dubawoje mire, Dubavoe, Dywin Vialiki Les, Zwanec, Zvanets, Radostovskiy, National Park, Aquatic Wabler, Acrocephalus paludicola, Greater Spotted Eagle, Clanga clanga, Lady's Slipper, Cypripedium calceolus]

Оглавление

Abbreviations

BRI	Biosphere Reserves Institute
BSSR	Byelorussian Soviet Socialist Republic
DD	Data Deficient
DVL	Dywin Vialiki Les
EN	Endangered
EU	European protection status
GL	Global protection status
GMC	Greifswald Moor Center
Ha	Hectare
IBA	Important Bird Area
IUCN	International Union for Conservation of Nature
LC	Least Concern
MP	Management Plan
NASA	The National Aeronautics and Space Administration
NT	Near Threatened
RB	Republic of Belarus
VU	Vulnerable

1. INTRODUCTION

1.1. Great Forest lands

1.1.1. Location of the study area

The Great Forest Area is in the southwestern part of the Republic of Belarus, in the Drahichyn and Kobryn districts.
Today, it comprises an ensemble of forest and peatland ecosystems, part of a single forest-mire complex, located on a flat plateau with low elevation variations. Three nature reserves are located within the study area: Zwanec and Radastauski, which are states reserves, and Dywin-Vialiki Les, which has local reserve status (Figure 1).

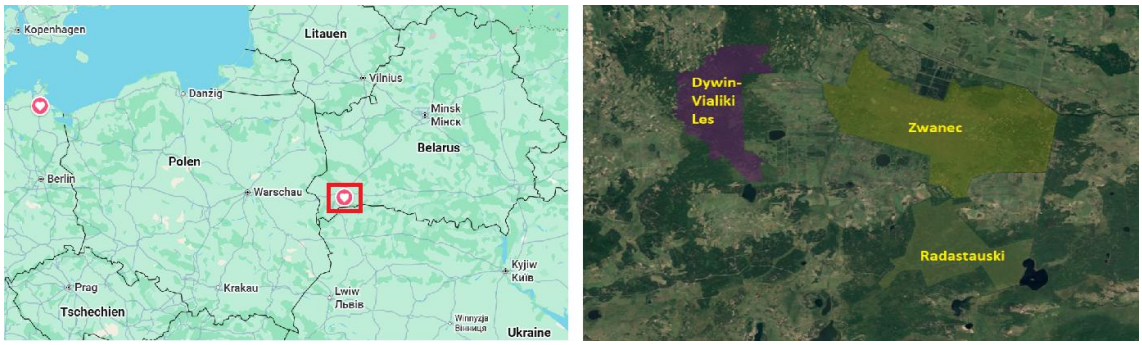

Figure 1. Location of the study area

Resurce: https://earth.google.com/

The western part of the area, which includes the Dywin-Vialiki Les local nature reserve, is forested. The forests here are often Oak *Quercus robur* and Hornbeam *Carpinus betulus*, with occasional dominant trees such as *Acer platanoides, Tilia cordata, Pinus sylvestris*. These forests grow on mosaic elevations arranged as numerous islands rising above the mires. Along the borders of these elevations, swampy alder forests are common and are widespread too. Pine stands and rare spruce stands are also occasionally found. Pine plantations are predominantly present in the northwest of the Great Forest, near the villages of Bolota and Girsk. The peatlands are located between a mosaic of wooded islands — sometimes sedge fens, sometimes sedge-reed mires, and most often partially overgrown with willow and birch groves. Sometimes the islands are deforested — in most cases by recent use of these areas for hayfields and agriculture. In the southeast, there was an unsuccessful attempt at drainage and peat harvesting; these areas are now covered with reeds and cattails.
The Dywin-Vialiki Les nature reserve was established in accordance with Resolution No. 504 of the Kobrin District Executive Committee dated December 17, 1997. Today, the total area of the reserve is 6,769.94 hectares (Decision of the Kobrin District Executive Committee of July 6, 2020, No. 1486).

The central part of the natural complex was drained in the 1980s, and it is agricultural land now, distinguished by the remaining forest islands between the fields and meadows. These agricultural lands are not fully cultivated. Some are used for hayfields, while the most humid areas remain unused and are overgrown with shrubs and sometimes sedges. The central part of the complex is crossed by the Ariekhausky Canal, to the east of which is the Zwanec Nature Reserve. The Zwanec Nature Reserve was established in accordance with Resolution No. 257 of the Council of Ministers of the Republic of Belarus dated April 11, 1996, and currently covers an area of 16,227.42 hectares.
The main part of the reserve is occupied by the Dubavoe Mire. The western part consists of a mosaic of islands like those described above, only they are more widely spaced and have less forest ecosystems due to past human activity. In the south, the Dubavoe Mire is drained and consists of agricultural land, much of which is actively used. The areas adjacent to the mire are overgrown with forests and willow thickets, while some agricultural lands are unused and overgrown. On the outskirts of the mire, within its current boundaries, there are also mosaic island forests, or open islands covered with forbs. A similar island mosaic occupies almost the entire eastern part of the Zwanec Nature Reserve, half of which are covered with young forests. The Batyewo mire is located in the north-eastern part of the reserve. The Zwanec Island is located west of Batyewo and north of Dubavoe mires. It is the largest island in the reserve, which gives the reserve its name. The islands are mostly covered with young forests (birch and alder), although oak-hornbeam forests with Ash *Fraxinus excelsior*, Linden *Tilia cordata*, Elm *Ulmus laevis*, and Maple *Acer platanoides* are occasionally encountered. Pine forests predonate on the Zwanec Island. The ponds of the Dneprobugsky fish farm is in the northern part of the Dubavoe Mire. The Dnieper-Bugsky Canal runs along the northern boundary of the research area. The Dubavoe Mire is completely drained north of this canal, and the land is used for agriculture.

Another state reserve is located to the south of the Zwanec Reserve. The Radastauski Reserve also features a mosaic forest-mires landscape but differs from the areas mentioned above. The islands here are large, separated by smaller peatlands, but elongated from a southwesterly to northeasterly direction. Pine forests predominate in the area, while Alder *Alnus glutinosa* stands grow in the marshy areas. The marshes between the islands are overgrown with birch forests and shrubs. The Radastauski Reserve was established by Resolution No. 252 of the Council of Ministers of the BSSR on August 22, 1978. It currently covers an area of 6,685.17 hectares.

The study area includes the natural lakes Luban and Beloye, the Dnieper-Bug and Pawicce reservoirs, large drainage canals Orekhovsky, Beloozersky, Dnieper-Bugsky, Kazatsky, five flooded peat extraction sites (Girskaya, Khabovichskaya, Dywinskaya, Povickaya and Aniskovichskaya), two fish farms (Povicky and Dneprobuhski), two degraded natural lakes and several small artificial reservoirs.

1.1.2. Great Forest: Origin of the Name

The study area is located on the Black and Baltic Seas watershed and represents a single, unique ecosystem, divided by recent land melioration. Despite anthropogenic intervention, this area has retained its integrity and the ecological connections between its natural complexes.
It is important to choose a well-deserved historical name for this area. In Belarusian field, geographical names are sometimes assigned spontaneously and without justification. For example, the creation of the Zwanec State Reserve, located in the study area, replaced the name of the large mesotrophic mire Dubavoe with Zwanec mire. On all the historical maps I studied before 1996, this mire was called Dubavoe (F. Schubert's maps in various editions from the 1840s to 1870s, the German map of 1915, Polish maps of 1925 and 1933, the Soviet map of 1940, the map prepared by the USA in 1954, the map of the USSR of 1985, the map of the USSR of 1990). So, only the historical name of the mire is used in this article.

The studied natural complex has had the following names in different places and over the years: "Dywinskie Marshes" (Shpilevsky, 1858), "Golovchitskie Marshes" (Zwanec MP, 2002), Dubavoe peatland (Kulczynski, 1940), "Great Forest" [https://www.peatlands.by/] and [https://www.arcgis.com/home/webmap/viewer.html?webmap=ebb3e44872004ddaa0a61a75dd790a0f&extent=24.5387,51.8929,25.2569,52.1241].
The toponyms "Dywinskie" and "Golovchitskie" marshes derived from the villages beyond which stretch tens of kilometers of impassable marshes, and are local in nature.
Stanislaw Kulczynski named the entire area "Dubavoe Peatland," which includes the Dubavoe Mire itself, as well as the Galya, Gol, Zagorskie, Stavki, Pristan, Barance, Kutskovo, Batuyevo, and other mires, most of which have already been drained and used for agriculture. Despite its large area, the Dubavoe Mire occupies only one-fifth of the natural complex of peatlands.

The name "Great Forest" was given to this peatland by Soviet land reclamation scientists when describing and developing the area.
This area is also listed under this name in the Belarusian peatlands database [https://www.peatlands.by/frontend/web/map/index#10/51.8349/24.8167]
On the maps, the toponym "Great Forest" appears more frequently in the study area than any other - to the east is the village of Vialiki Les, adjacent to the Vialiki Les tract (Schubert, 1860s). The Vialiki Les tract is also northeast of Svaryn village (Polish map, 1925). The Vialiki Les tract is also north of Radastawa village (Polish map, 1925). The Vialiki Les tract and farmstead are on the now-unused road between Yahminovo and the farmstead of Dobroe (Polish map, 1925). One of the nature reserves was also named "Dywin-Vialiki Les," denoting the part of the peatland closest to Dywin.

Before active human development, the peatlands were surrounded by mature broadleaf forests and extended to the Belovezhskaya Pushcha and the Pripyat River. Unfortunately, with the development of agriculture and forestry, these

areas have significantly altered the natural complex. The Great Forest has survived large-scale drainage, fires, and centuries-long uncontrolled logging. Despite these challenges, this natural complex has preserved unique ecosystems and conservation importance. It is home to some of the largest habitats of the Aquatic Warbler *Acrocephalus poludicola (I)* and the Lady's Slipper *Cypripedium calceolus (II)*, as well as numerous other rare plants and animals, such as the *Cardamine bulbifera (IV)*, *Corydalis cava (IV)*, *Neottia ovata (IV)*, *Orchis mascula (II)*, the Greater Spotted Eagle *Clanga clanga (I)*, the Lesser Spotted Eagle *Clanga pomarina (III)*, the Black Stork *Ciconia nigra (III)*, the Corncrake *Crex crex (IV)*, the Hazel Dormouse *Muscardinus avellanarius (IV)*, the Badger *Meles meles (IV)*, and other species.

Considering the above, I think the name "Great Forest" is appropriately applied to this area.

1.1.3. Physical and geological characteristics

The Great Forest Natural Complex is in the eastern part of Western Polesie, within the Polesia saddle of the East European Platform (Kukharik, 2020). It is a lacustrine-alluvial plain. The southern part is bordered by eolian ridges formed by the Dywin Fault and further shaped by wind-blown fine sand. These ridges are currently overgrown primarily with mossy-bilberries and uncovered pine forests. The eolian ridges sometimes reach a height of 5 meters, a length of 800-2000 meters, and a width of 200-500 meters.
To the southeast, the lacustrine-alluvial plain transitions into the first floodplain terrace of the Pripyat River. Remnants of the fluvioglacial plain are present near the village of Radastawa. (Zwanec MP, 2009)

Before draining part of the complex, detailed geological surveys were conducted in 1982-84 (Danilevich and Dvoretsky, 1983; Danilevich, 1984; Mostek et al., 1987). Boreholes of varying sizes and depths were drilled, and pits dug in certain parts of the complex. For example, in an area of 115 square kilometers north and east of Orekhovsky village and north and south of Pavicce village, surveys were conducted using 74 boreholes with a total length of 712 meters and 19 pits with a cross-section of 1.25 square meters and a depth of 1.5 meters. In the northern part of the natural complex, near Velichkovichi-Melenkovo villages, 91 boreholes were drilled and 43 pits dug, and in the area north of Razhnoye village (the southern part of the Zwanec Nature Reserve), 26 boreholes and 4 pits were dug. The study data revealed that, geomorphologically, the area is a gently rolling lacustrine-alluvial plain with a slight slope from southwest to northeast. Absolute surface elevations in the central and southern parts (between the Dywin-Vialiki Les and Zwanec nature reserves) range from 145.2 to 147.9 meters, while in the north-central part, they range from 144.2 to 145.8 meters.
No large boulder accumulations, water hollows, or springs were identified within the study area, except for the dying Lake Zalowicze, where two boreholes were also drilled, and measurements were taken.

The geological structure of the upper crust in the three different study areas is virtually identical and consists of the following layers.

Modern sediments—lacustrine and fen deposits—start at the surface and have a thickness of 0.3 to 3 meters. Peat predominates in the sediments, sometimes containing sand mixed with peat, sandy loam, and thin sapropel layers. The peat is primarily sedge, reed-sedge, and rarely reed-hypnum, with moderate decomposition (25-35%).
Lake Zalovicze, covering an area of 9 hectares, contains a floating vegetation layer overgrown with shrubs, beneath which lie 6 meters of peat and 4 meters of sapropel.

The modern sediments are followed by Upper Quaternary sediments (Valdai Superhorizon). These sediments are represented throughout by lacustrine-alluvial deposits. They begin at depths of 0.3 to 3 meters, and the layers range in thickness from 17.1 to 30.1 meters. They are underlain by an undifferentiated complex of fluvioglacial, alluvial, lacustrine, and bog deposits of the Berezina-Dnieper glaciation, and where the deposits are eroded, they are underlain by deposits of the Paleogene and Neogene systems. These deposits are dominated by fine-to-medium silty sands, with thin interlayers of sandy loam and loam, and interlayers of silt and buried peat are also encountered. In the southern part, especially near the Pavicce village, eolian deposits are common.

Lower-middle Quaternary deposits are represented by an undifferentiated complex of fluvioglacial, alluvial, lacustrine, and bog deposits, distributed in the central and southern parts. The depth of occurrence, in the form of remnants, ranges from 17.1 to 20.9 meters, with layer thicknesses ranging from 5.1 to 8.3 meters, and are underlain by deposits of the Paleogene-Neogene system. The sediment composition is dominated by fine- and medium-grained silty sand.

Pre-Quaternary deposits: The Paleogene-Neogene system is present everywhere at depths of 18 to 30 meters, with a thickness of 2.2 to 17.8 meters. Sands predominate, with clays and silts being less common.

Paleogene layers are insignificant, occurring as isolated patches, no more than 2.5 meters thick. They comprise sands and sandstones interbedded with clay. Cretaceous deposits are found everywhere at the roof depth of 33.8 to 42.7 meters, and are represented by chalk interbedded with marl, with an exposed thickness of up to 17.2 meters.

It should be noted that these studies did not reveal chalk and marl deposits directly below the surface. However, during agricultural cultivation of the drained areas, it became apparent that chalk and marl deposits are widespread on the surface, significantly reducing the yield of these agricultural lands and limiting the diversity of crops grown there. Such deposits could have formed because of oxidation during the interaction of carbonate-rich water with oxygen after drainage.

Groundwater is represented by three horizons:
Groundwater in bog and lake deposits is found at a depth of 0.1 to 0.7 meters above ground level, with a thickness of 0.3 to 2.6 meters, and is provided by the good absorption properties of peat deposits. Groundwater in bog and lake deposits is recharged by precipitation, meltwater, and groundwater inflow from adjacent areas occupying a higher hypsometric position. The water's chemical composition includes calcium bicarbonate and calcium bicarbonate-sodium.

Groundwater in lacustrine-alluvial deposits is ubiquitous and classified as free water. Its depth ranges from 0.3 to 3 meters. Layer thicknesses range from 14 to 24 meters. Recharge occurs through infiltration of precipitation and meltwater. The water's chemical composition includes calcium bicarbonate, calcium bicarbonate-sodium, and sodium bicarbonate-chloride.

The aquifer complex of fluvioglacial, alluvial, lacustrine, and fen deposits of the Berezina-Dnieper glaciation is located in the northern, north-central, and southern parts of the massif. The roof depth of this aquifer ranges from 17 to 20.9 meters. The layer's thickness is 5-8 meters. It is connected to the upper aquifers. The water's chemical composition is bicarbonate-calcium-sodium.

Research conducted in 1984 in the northern part of the natural complex also revealed bicarbonate-calcium-magnesium and bicarbonate-sulfate-calcium waters.

It should be noted that the research was conducted in September–October 1982, during the early autumn low water period, before large-scale land reclamation in the central part of the natural complex. Groundwater levels and their chemical composition may have changed during the period of active land use, but these studies are important because they demonstrate the state of the hydrological regime prior to full-scale drainage.

1.2. The history of drainage and degradation of the Great Forest complex

Following massive drainage, the Zwanec and Dywin-Vialiki Les nature reserves are rapidly becoming overgrown and losing their open sedge mires. To better understand why this is happening and what the study area looked like before human settlement, it's important to study old maps. Since the Dnieper-Bug Canal was built long ago, between 1775 and 1783, and the Kazacki Canal apparently even earlier, it's necessary to delve deeper into the past.
About two hundred maps, dating back to the 16th century, were studied using the online resources [https://www.peatlands.by/], [https://retromap.ru/] and [https://karty.by/].

The first artificial canal built in Belarus is considered to be the Bona Canal, named after Queen Bona Sforza. In the 16th century, the queen owned the Kobryn Principality, and on her orders, the canal was constructed to improve land

management. It is believed that the canal was dug from the Mukhavets River near Kobryn to the Khidry village. The Bona Canal, along with Lake Luban, was first shown on studied maps only in 1796. The Bona Canal and the Kazatsky Canal, flowing from Lake Luban, were already a single entity at that time and were possibly built around the same time. This theory was suggested by P.M. Shpilevsky's in 1858 statement: "Kobryn is located above the Mukhavets River and is cut almost in the very center by the Kobrinka River, which originates from the Dywin Marshes, near which, according to local legend, there was once an ancient town, or fortress and castle, where Kobryn elders later lived in the 15th and 16th centuries…" (Shpilevsky, 1858). He also clarified that the remains of ramparts and a palace with a garden, part of which has been neglected, remain at the site. Based on this information, it can be assumed that the Bona Canal was built not only to drain the queen's estates, but also to connect Kobryn with the castle described by waterway and timber rafting. Since all maps, starting from the late 18th century—the first appearance of Lake Luban and the Bona and Kazatsky Canals—represent these waterways as a single system flowing from Lake Luban, it can be assumed that they were built around the same time.
It should also be noted that contemporary sources claim that the castle was located northeast of Kobryn, near the Zaprudy village [https://ikobrin.ru/kobtur-zaprudi2.php].

The construction history of the Dnieper-Bug Canal appears more convoluted. The fact is that maps in the 16th century were quite primitive. Thus, on the first more or less detailed map by Sebastian Münster from 1540, the research area is represented by the interfluve of the Pripyat, Bug, and Mukhavets rivers, with Lake Tur to the south and the vast Sarmatskoye Lake to the north. The Narev, Lesnaya, Mukhavets, and Yaselda rivers originate from this lake (Figure 2).

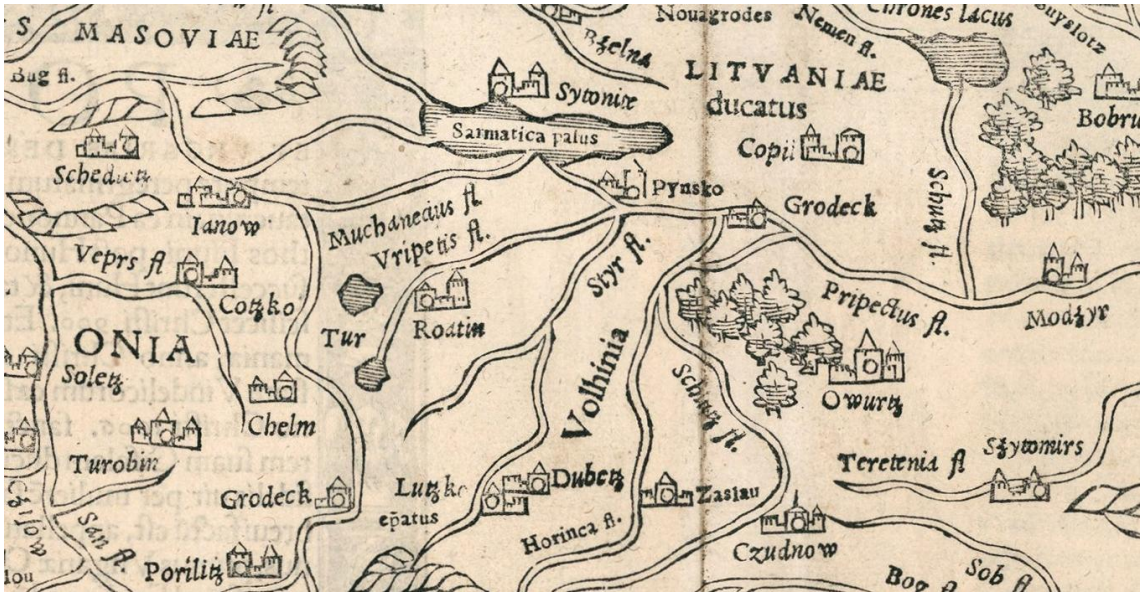

Figure 2. Great Forest on the map by Sebastian Münster, 1540

It's worth noting that at that time, maps were redrawn by cartographers, altered by mountain relief, forests drawn, and only occasionally new geographical names added. Furthermore, maps were often rewritten with errors in names, or cities; lakes, and rivers were placed in places other than where they should have been. Münster's map was very popular in the 16th century and was copied by cartographers in a wide variety of variations. Relying on the map, travelers wishing to travel from the Baltic to the Black Sea via Sarmatskoe Lake encountered the reality that Sarmatskoe Lake consisted of peatlands areas between Sporovskoe and Vygonoshchanskoe Lakes, which were full flowing only in the spring. The Narev and Lesnaya rivers did not connect with them but originated from the Dikij Nikor and Dikoe mires. Cartographer Egnacio Danti already tried to point out this discrepancy in 1565 (Figure 3) and also added the Shchara River to the map.

Figure 3. Great Forest on the map by Egnacio Danti, 1565

On the well-shaped maps from 1570, local cartographers Waclaw Hradecki and Andrey Pohrabski, on the contrary, place Sarmatskoe Lake at the source of the Narev, while Yaselda, Mukhavets, and Lesnaya are cleared of this lake (Figure 4). These maps show the left and right branches of the Mukhavets river, as well as Kobryn city, south of which lies a lake - possibly the Dubavoe mire. Lake Tur, already indicated on other maps, is located even further south. Kobryn is shown here not on the Mukhavets bank, but on the edge of the "Dywin Mires," which may indicate either a geographical inaccuracy or that the castle was indeed located south of the Mukhavets River at that time.

Figure 4. Great Forest on the maps by W.Hradecki (left) and A.Pohrabski (right), 1570

In 1613, Hessel Gerritsz and Willem Blaeu created a map that provides a detailed description of Palesie (Figure 5). In this description, the cartographers indicate that the region is forested and marshy, renowned for its abundant honey, and that the marshes are so large that sometimes looks as lakes. The distinctions between lakes and mires can be obscured, so they are indicated on the map by dots and curves around them. One of the notes is located at the place previously shown as Sarmatskoe Lake. The Pina River and the settlements of Gorodets, Radastaw, Popina, and Lyakhovichi appear on the map for the first time, while Kobryn is designated as the Kobryn Principality, located already on the banks of the Mukhovets River. Here, the settlements of Lyakhovichi and Popina deserve special attention. They were likely never large or notable but appeared on the map because the Lyakhovichi village was the last settlement on the bank of the Pina River, whose beginning was lost in the watershed peatlands. Perhaps the travelers interviewed local residents there, who described Popina and Radastaw as large villages nearby, why these settlements would long appear on all maps of the Polish Lithuanian Commonwealth.

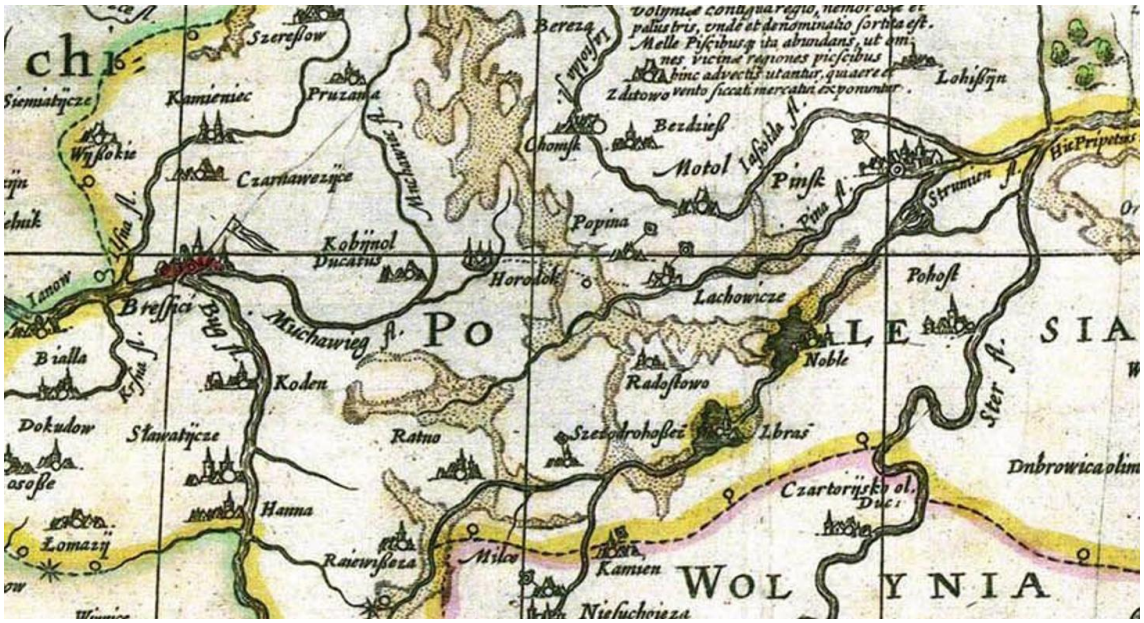

Figure 5. Great Forest on the map by Hessel Gerritsz and Willem Blaeu, 1613

In a 1636 map, the Dutch cartographer Hondius repeated Geritsz and Blaeu description of Polesia and more clearly highlighted the peatlands areas, but the

map itself was rewritten (Figure 6). This map clearly shows the watershed between the Baltic and Black Seas, accompanied by a wide strip of peatlands.

Figure 6. Great Forest on the map by Hondius, 1636

In 1703, a canal between Mukhavets and Pina rivers first appeared on the maps studied. The English cartographer Robert Morden clarified that this was a canal project (Figure 7).

Figure 7. Great Forest on the map by Robert Morden, 1703

The construction of the canal was first conceived by the King of the Polish Lithuanian Commonwealth, Jan II Casimir Vasa (1648-1668) (Malykhina). Apparently, the canal was a significant event in Europe, so in subsequent years many cartographers began to highlight it, and in 1717, Nicolas de Fer provided a more detailed description of the future canal, "Project for a Canal Connecting the Vistula and Borysthenes for Communication Between the Baltic and Black Seas" (Figure 8).

Figure 8. Great Forest on the map by Nicolas De Fer, 1717

Subsequent cartographers, when rewriting maps, didn't always indicate that the canal was being planned, but instead showed it as existing, leading to the belief that the canal was constructed earlier than contemporary sources of claim (1775-1783) (L.Yu. Malykhina). For example, on the detailed 1772 map by Rizzi Zannoni, the canal is shown as a line connecting the Mukhavets and Pripyat rivers west of Radastawa (Figure 9), which is more consistent with the Orekhovsky Canal.

Figure 9. Great Forest on the map by Rizzi Zannoni, 1772

In 1772, Theodor Philipp von Pfau and Christian Benjamin Glassbach published a detailed map of the Polish Lithuanian Commonwealth on 24 sheets. These

maps first featured the Dywin village and the Trostyanitsa River. The map also indicated that the Pina River originated from streams in the Dubavoe peatland (Figure 10).

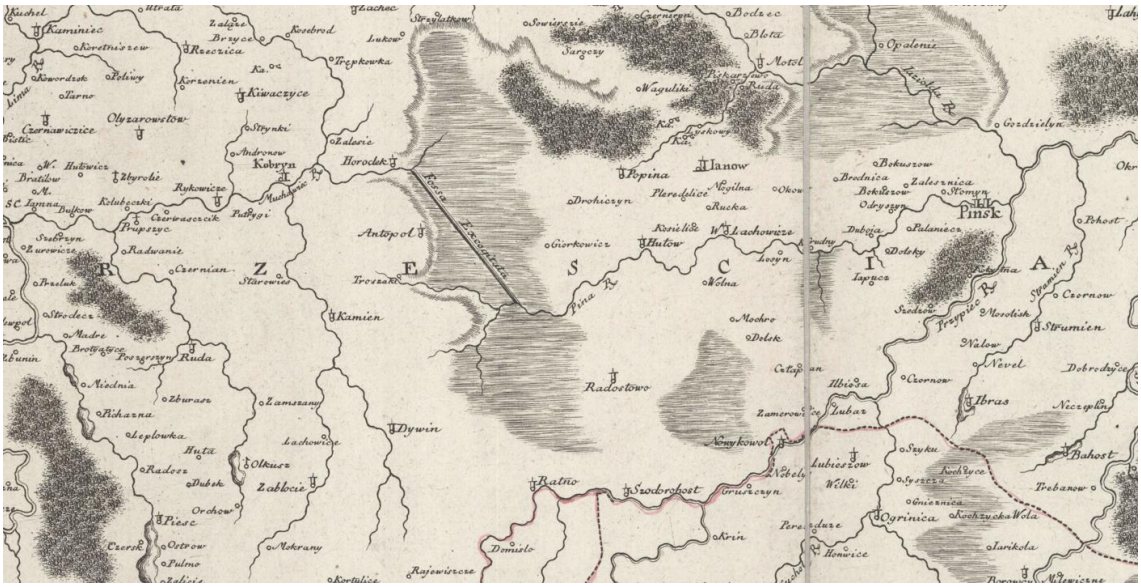

Figure 10. Great Forest on the map by Th.Pfau and Ch.Glassbach, 1772

At this time, new settlements began to be added to the study area. These locations were created by cartographers Bartolomeo de Folino and Michael Gröll, who published a working version of the map, apparently after surveying the area of the future canal (Figure 11). Literary sources indicate that the final design of the canal was handled by cartographer Franciszek Chaki (Strzhelecki, 2008). The name of the Mukhovets tributary, the Voloka River, first appears in the draft. I was unable to find the draft itself.

Figure 11. Great Forest on the map by B.Folino and M.Gröll, 1770

Simon Schropp's 1796 map places particular emphasis on the canal and riverbeds. The name of the Mukhavets tributary Voloka appears here (Figure 12).

Figure 12. Great Forest on the map by Simon Schropp, 1796

In 1796, a map of the Slonim Viceroyalty was also published, featuring for the first time Lakes Luban and Belaye, the Kazacki, Bona, Trostyanetski, Arekhovski, and Korolevski Canals, the settlements of Lelikovo and Pawicce, the Koloda River flowing into Lake Luban, and the left branch of the Mukhovets River, which is called Voloka. The settlements of Lyakhovichi and Popina disappear from the map (Figure 13).

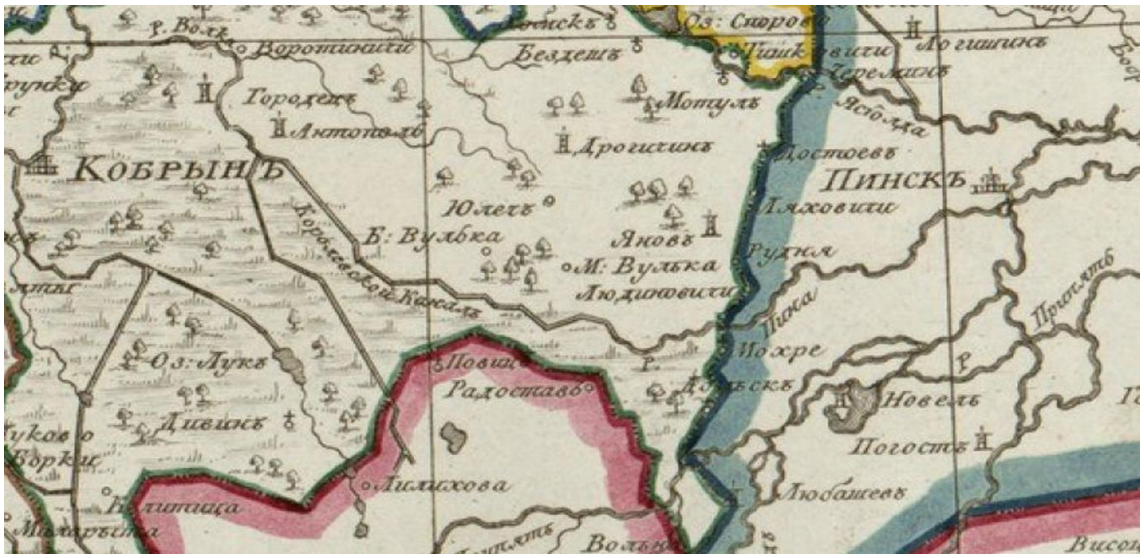

Figure 13. Great forest on the map of the Slonim Viceroyalty, 1796

The 1821 map of the Grodno Governorate shows only the Ariekhauski Canal. By that time, the Korolevski (Gorodetski) Canal was already performing poorly,

quickly becoming shallow and silted up, and wooden locks allowed water to pass through (Malykhina, 2010). Perhaps the Ariekhauski Canal, which received a constant influx of water from the Pripyat River floodplain, was more important at this time (Figure 14).

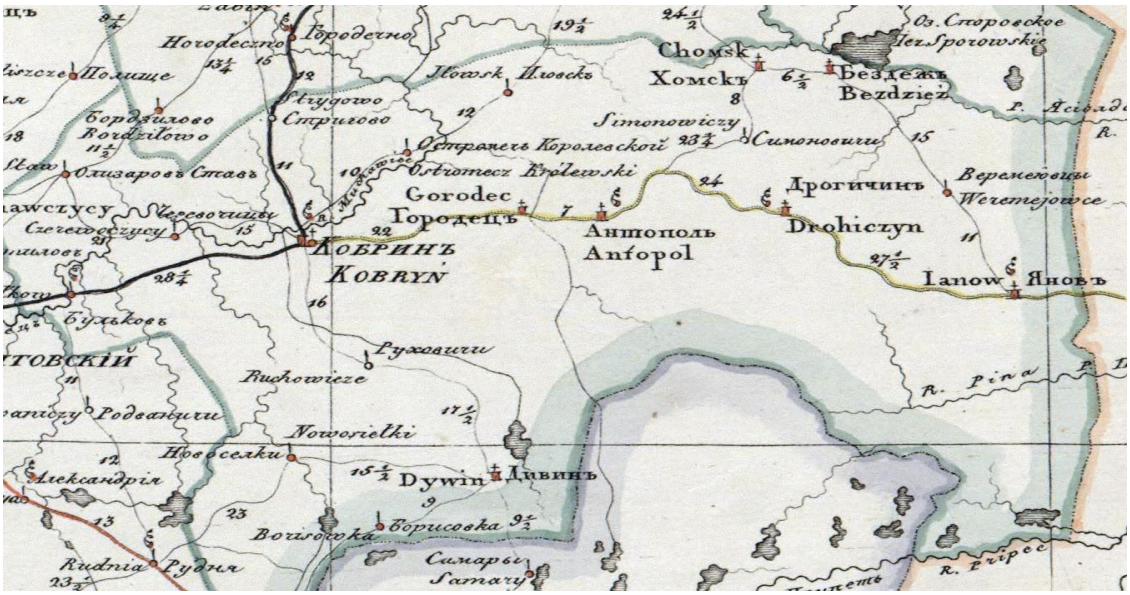

Figure 14. Great Forest on the map of Grodno Governorate, 1821

From 1837 to 1848, the Royal Canal underwent major reconstruction. The Beloozersky Canal was built during this time, and the canal itself became known as the Dnieper-Bug Canal (Malykhina, 2010). It's possible that during this time, the Dywin Marshes and Dubavoe Mirelost a significant amount of water. According to Marina Abramchuk's conversation (personal conversation, dated Oct.2025), the islands she and her colleagues examined in the southern part of the mire are composed of peat, not mineral-based, as previously believed. It can be assumed that the construction of the canal partially drained the peatland, exposing some areas, some of which became overgrown with forest, while others remained grassy and were used by residents for hayfields, fields, and pastures.

A detailed map of the area was published in 1859 by the Polish scientist Wojciech Czarnowski. It shows two no longer existing rivers: Sista and Wizenica. The Beloozerski Canal is not shown on the map, and the Arekhauski Canal is only partially shown. The map also shows Lake Luban as a double body of water. Apparently, during the spring flood, the Kazachi tract north of the lake was heavily flooded, creating another large body of water (**Fehler! Verweisquelle konnte nicht gefunden werden.**).

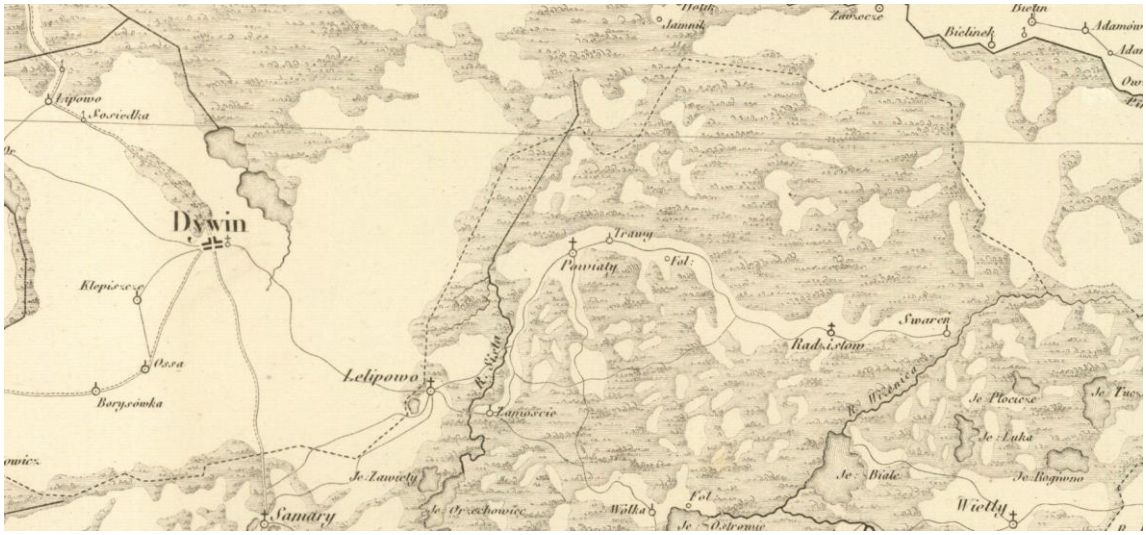

Figure 15. Great Forest on the map by W.Czarnowski, 1859

A little later, in the 1860s, Fyodor Schubert compiled the most detailed three-verst map of the area at that time, indicating both natural features and natural areas. On this map, the section of the Kazacki-Bona Canal north of the village of Khabovichi is called the Kobrinsky Canal. Near the now-vanished Slavki village, it joins the Bona Canal, and not far from there, it joins the Kobrinka River. The map also shows the Trostyanitski Canal and a ditch in the Yahminava Forest. Furthermore, at the source of the Kazacki Canal from Lake Luban, there is another small river, the Malevka, and the Dywinski Canal, which, passing through a forested marshland, connects to the Arekhauski Canal. The river that flows into Lake Luban to the south is called Koloda (now the canalized Litkovo River). The Voloka River, canalized from the village of Vorotynichy connected with the Dnieper-Bug Canal (on the map, it shares its name with the Korolevski (Royal) Canal). The Beloozerski Canal was built and connects the Pripyat River with the Dnieper-Bug Canal through a network of canals and lakes. It's worth noting that the first versions of Schubert's map (1840s) show the Beloozersky Canal as a planned structure.

The small Komora River is shown in the central part of the Arekhauski Canal; it also appears under the same name on Streblitsky's 1868 map as a tributary of Mukhovets. The estates of Podkomorye and Zakomorye are located nearby, possibly indicating the river's considerable importance at that time. A canal was dug between the villages of Travy and Razhnoye to the center of the Dubavoe peatland. The Tursky Canal connects Lake Tur with the Arekhauski Canal. The Terebovichski Canal was dug from Lake Terebovichi to the Arekhauski water line. The Sista and Vizenitsa Rivers are no longer shown on the map. Lake Luban has its present-day outline. The map shows Lake Zaloviche for the first time. It is now in a degraded state, almost completely devoid of water. Unfortunately, the map's high level of detail makes it difficult to display as a single image. It can be viewed and compared with modern satellite images, for example, at [https://retromap.ru/14186010_51.974624,24.855880].

Over the next half-century, canals were dug from Lake Svinoreika to the Orekhovsky Canal, and the Main Canal was dug from Lake Belae, partly along

the Vezenitsa River, connecting with the Korolevski (Dnieper-Bug) Canal in the eastern outskirts of the Belin village.

At the beginning of the 20th century, the Dnieper-Bug system again fell into disrepair; the canal silted up and was used primarily for floating timber. Reconstruction was undertaken only in 1940, with a straight section of the canal dug from Vygoda to Kobryn, and the Vygoda-Gorodets-left arm of the Mukhovets Canal section regaining its former name Royal Canal. During World War II, the canal's locks were destroyed and only restored in 1945-1946. The number of locks was reduced to 10, the navigation depth was 1.6 meters, and the width was 22-28 meters. During the Soviet era, the canal was actively used for transshipment of cargo to the GDR. Now, however, it is used only for the transshipment of sand and gravel between the cities of Brest, Pinsk, Mikashevichi, and Mozyr. In 1997, another reconstruction of the locks was completed.

The 1954 USSR map showed no significant changes in the drainage systems of the study area, but a detailed 1985 map shows all the lands near the town of Kobryn (Khidry, Kiselevtsy, Bolota, Girsk, Korczycy) drained, as well as lands in the southern Melenkovo-Onikovichi-Starodubtsy area, north of Radastawa, and south of Pawicce, in the vicinity of Dywin. The Koloda (Litkovo) River has been canalized, and its course has been changed. The Krasnye Brody mire, where the Koloda River originates, has been drained. The large Galya peatland, where the Trostyanitsa River originated, has also been drained. Development of the central part of the Great Forest complex began. The landscape changed beyond recognition and continued to change until 1995. By this time, the central part of the Great Forest complex and the southern part of the Dubavoe Mire had been drained, the Povitski and Batyevski canals had been dug, and the Dneprobugsky fish farm had been established in the northern part of the peatland. The entire section of the peatland north of the Dnieper-Bug Canal was also totally drained. In the 1990s, areas of abundant Lady's Slipper *Cypripedium calceolus (II)* growth (Dywin-Vieliki Les) and nesting sites for Aquatic Warbler *Acrocephalus paludicola (I)* (Zwanec Nature Reserve) were identified. As a result, further drainage of the study areas ceased, and the remaining untouched areas were transformed into nature reserves.

Analysis of old maps and their comparison with satellite images allows us to draw the following conclusions. The waters of the mesotrophic Dubavoe Mire gave rise to the Voloka River, later the Komora (the left branch of the Mukhovets River), and the Pina River. During flood seasons, the Pripyat River filled Lakes Orekhovo and Orekhovets, and via the Sista River, fed the southern part of the Dubavoe peatlands. The Vizenica River collected water from the peatlands located northeast of Lake Belae and fed the lake itself. Thus, the Voloka (Komora) River belonged to the Baltic Sea basin, and the Pina and Vizenica rivers belonged to the Black Sea basin.

Due to human activity, neither of these rivers remains in the study area; even their names have been forgotten, and their hydrological regimes have been altered beyond recognition (Figure 16).

Figure 16. Great Forest on the map by Yandex, 2025

1.3. Great Forest: determining the boundaries of the nature complex

Determining the exact modern boundaries of Great Forest natural complex is difficult, as land cultivation has fragmented it, particularly along the edges of the remaining array. For example, on Stanislaw Kulczynski's map of the Dubavoe peatland (Kulczynski, 1940), the massif, with some discontinuities, extends to the Kobryn city on the northwest, the Zhabinka district on the west, Pruzhany district on the north, and Ivanovo district on the east, but does not touch an area of the Radastauski Nature Reserve (Figure 17).

Figure 17. Dubavoe peatland by S.Kulczynski, 1939

Today, the wetlands in the West, North, East, and South have been drained and used for agriculture. Of the 40 sites where Kulchinsky's team monitored the peatlands, where open sedge areas dominated, only 12 remain peatlands with varying degrees of degradation. Two more sites are flooded, one is now a water reservoir, and another is a used, flooded peat deposit (Table 1).

#	place	location today	coordinates	dominant species
1	**Kit**	Pawicce water reservoir	52°1'N 24°47'E	Carex stricta
2	**Koloda**	South of Dubavoe Mire	52°2'N 24°49'E	Carex paradoxa
3	**Koloda**	South of Dubavoe Mire	52°2'N 24°50'E	Carex stricta
4	**Wielkie Hole**	agricultural lands close to the tarmac	52°2'N 24°30'E	Carex rostrata
5	**Chodynicze**	agricultural fields	52°5'N 24°21'E	Carex stricta
6	**Chodynicze**	agricultural fields	52°4'N 24°22'E	Carex vesicaria
7	**Slawki**	agricultural fields	52°7'N 24°24'E	Carex stricta
8	**Hala**	agricultural fields	52°3'N 24°26'E	Calamagrostis neglecta
9	**kanal Orechowski**	flooded agricultural fields	52°2'N 24°43'E	Carex stricta
10	**Pohorelce**	agricultural fields	52°5'N 24°41'E	Calamagrostis lanceolata, Carex chordorrhiza
11	**Hnilice**	marsh and forest, Dywin Vialiki Les	52°4'N 24°34'E	Carex stricta
12	**Bobryje lula**	mire, Dywin Vialik Les	52°9'N 24°38'E	Carex stricta
13	**Lipowo**	marsh area north of Dniepro-Bug Canal	52°11'N 24°36'E	Carex rostrata
14	**Lipowo**	agricultural fields	52°12'N 24°36'E	Carex stricta
15	**Nowosiolki**	agricultural fields	52°2'N 24°21'E	Carex stricta
16	**Hala**	agricultural fields	52°3'N 24°23'E	Carex sp.
17	**Hol**	peatland near Zhuki village	52°8'N 24°41'E	Carex stricta
18	**Malyszkowce**	peatland near Bolota village	52°6'N 24°32'E	Carex paradoxa
19	**Mazgowiec**	agricultural fields s	52°7'N 24°32'E	Carex vesicaria
20	**Ozeryszcze**	agricultural fields	52°6'N 24°44'E	Carex rostrata
21	**Bogacze**	flooded agricultural fields	52°10'N 24°20'E	Carex rostrata, Calamagrostis neglecta
22	**bloto Zahorskie**	agricultural fields	52°12'N 24°31'E	
23	**Zamoscie**	agricultural fields	52°9'N 24°27'E	Carex paradoxa
24	**Trawy**	agricultural fields	52°0'N 24°49'E	Carex stricta, Carex rostrata

25	**Jezioro Luban**	flooded peat deposit	52°0'N 24°38'E	Carex sp.
26	**Zakomorze**	agricultural fields	51°59'N 24°42'E	Carex sp.
27	**Wolczy Jar**	agricultural fields	51°57'N 24°42'E	Carex sp.
28	**bloto Hrudy**	farm, agricultural fields	51°58'N 24°35'E	Carex stricta
29	**Hlyd**	agricultural fields	52°0'N 24°55'E	Carex rostrata?
30	**Sucharyce**	small peatland between agricultural fields	51°59'N 24°53'E	Carex stricta, Carex rostrata
31	**bloto Stawki**	Radastava village	51°58'N 24°55'E	Carex rostrata?
32	**bloto Pristan**	Radastava village	51°58'N 24°56'E	
33	**bloto Dubowoje**	center of the Dubavoe Mire	52°2'N 24°52'E	Carex rostrata?
34	**bloto Barance**	East of the Dubavoe Mire	52°2'N 24°56'E	Calamagrostis neglecta?
35	**bloto Kuckowo**	North of Dniepro-Bug Canal, fields	52°5'N 25°1'E	
36	**bloto Batyjewo**	Batyeva mire	52°4'N 24°59'E	Carex rostrata?
37	**Jalowec**	North of Dubavoe Mire	52°3'N 24°54'E	
38	**Halik**	agricultural fields near Halik village	52°6'N 24°57'E	
39	**Halik**	agricultural fields near Zakazel village	52°7'N 24°58'E	
40	**Zalozje**	agricultural fields near Diatlaviczy village	52°7'N 24°57'E	Carex stricta, Carex vesicaria

Table 1. The current state of S.Kulczynski monitoring spots in the Dubavoe peatland

Therefore, it's logical to form the boundaries along the forest edges around the Great Forest Natural Complex. However, as research shows, nearby drained lands may still play an important role in maintaining ecosystems and protecting rare species, for example, as foraging grounds for the vulnerable Greater Spotted Eagle *Clanga clanga*.

The territories of existing nature reserves, although they play an important role in preserving biotopes and biodiversity, are insufficiently representative in some cases. For example, the most important locations of rare, protected plant and animal species are located near the Dywin-Vialiki Les Nature Reserve, but are not included within it, although the density of endangered plants and animals within the reserve itself remains quite high (Figure 18):

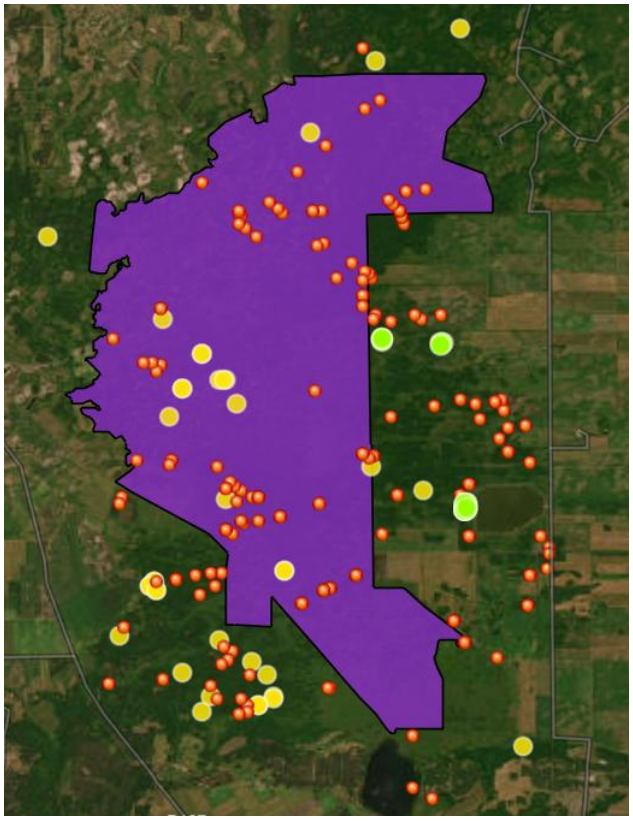

Figure 18. Location of protected species in the Dywin-Vialiki Les Nature Reserve

Resource: [https://naturedatabelarus.botanik.uni-greifswald.de/ru/maps]

On the map developed by Andrey Abramchuk with the assistance of the Michael Succow Foundation [https://naturedatabelarus.botanik.uni-greifswald.de/ru/maps], known locations of protected plant and animal species are marked with round dots. While these dots don't fully cover all known protected species locations, it generally accurately depicts the most important areas for biodiversity conservation. For example, four known Greater Spotted Eagle *Clanga clanga* nesting territories and four known Eurasian Eagle Owl *Bubo bubo* nesting territories, as well as approximately half of all known Lady's Slipper *Cypripedium calceolus (II)* habitats, are located outside the reserve's area, but directly adjacent to it.
The Zwanec and Radastauski nature reserves are more representative in this regard.

For effective habitat conservation, it is important to consider these territories as a single entity. Drained areas continue to play a vital role in feeding peatland complexes, serving as hunting grounds for the rare inhabitants of these reserves, and as important spots for migratory birds and mammals too. This importance is well reflected in the maps of Important Bird Areas (IBAs) and Emerald Network sites (Figure 19):

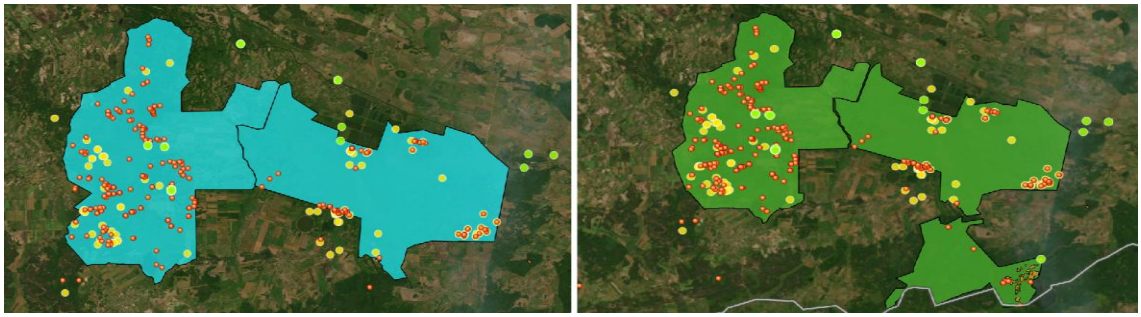

Figure 19. Important Bird Areas (left) and Emerald Network sites (right) in the Great Forest complex

Resource: [https://naturedatabelarus.botanik.uni-greifswald.de/ru/maps]

Even in this combination, the IBAs and Emerald Network sites include dead-cover pine forests frequently used by locals for recreation, which have little conservation value, while still leaving some important areas outside their boundaries. For example, the Eagle Owl's breeding site and the Greater Spotted Eagle's breeding site, discovered this year, are located near the boundaries but outside.

It's important to note that this natural complex also serves as the region's only corridor for seasonal migrations of mammals (elk and wolf) from the southwestern to the central and western parts of the republic. Active land use (by the cities of Brest, Zhabinka, and Kobrin, as well as the agricultural and industrial areas surrounding them) has separated the forested area of southwestern Belarus (the southern part of the Brest, Drahichyn, Kobryn, and Malaryta districts) from Belovezhskaya Pushcha and the central forested part of Belarus. The only narrow corridor that animals can still use relatively safely for seasonal migrations is in the northern part of the Dywin-Vialiki Les Nature Reserve, as well as between the Dywin-Vialiki Les and Zwanec Nature Reserves.

Seasonal animal migrations are crucial, primarily for the genetic diversity of species and the stability of populations. Unfortunately, such migrations are currently very dangerous for terrestrial animals due to various anthropogenic barriers. Migration routes established over centuries have been destroyed. For example, before the active reclamation and drainage of Dubavoe peatland, it was home to a large many elks, whose population closely interacted with Belovezhskaya Pushcha. From the Pushcha, elk would come to Dubavoe to spend the summer months (Zwanec MP, 2009). Local people also reported that before the melioration, a single herd of fifty elk could be found in the forested marshland. This sounds unrealistic in today's reality, as elk in the Zwanec Nature Reserve were virtually wiped out in the 1990s due to poaching and are now slowly recovering. Preserving and restoring the ecological corridor is crucial to ensure safe migrations.

Possible migration routes for terrestrial animals along this corridor requires detailed research. Currently, the most optimal routes seem to be the areas near the village of Kamen (the maximum gap between forests is 1700-2500 m), the floodplain of the Royal Canal (passes through the relatively large Haradzec town), near the Asipovichy village (the gap is only 700 meters, but the migration route

passes through the sparsely populated village of Tatarnovichy) (**Fehler! Verweisquelle konnte nicht gefunden werden.**):

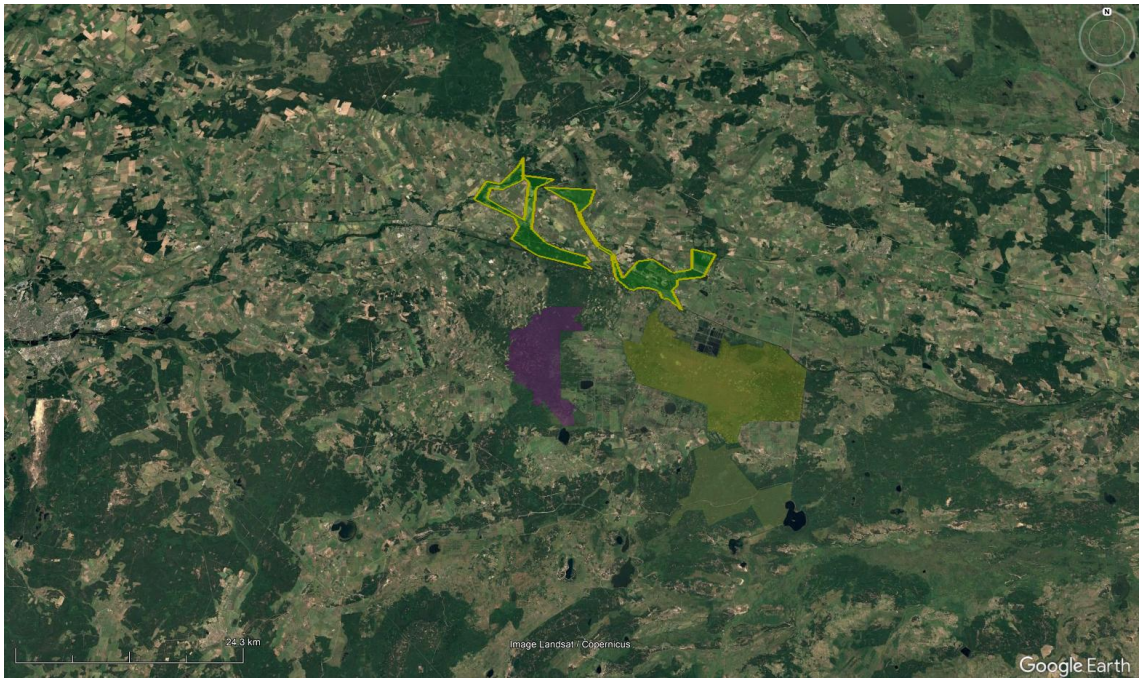

Figure 20. Possible migration routes of mammals between Southwest and Central Belarus

It is also worth noting the importance of the Dneprabugski fish farm, which is a nesting and stopping place for a large number of migratory waterfowl and near-water birds, including rare species.

2. METHODS

This article is based on a thorough analysis of scientific publications and literary sources. Own research and observations only partially contribute to the unified structure of the study area and the prospects for establishing a National Park there.
Scientific publications related to the study area were analyzed, and data on flora and fauna from these articles was recorded in a special database with names of authors. This database will help in the future to compile a more complete list of species and compare it with the species I personally record.

A route survey method was used to study rare, protected animal and plant species. The most valuable forests (broadleaf forests and old-growth alder forests) were selected on forestry maps, and a route was plotted. Badger *Meles meles* burrows, large bird nests, and areas with protected plants were recorded along the route. During the nesting season, the nests found were inspected. Subsequently, areas with identified protected animals and plants were issued conservation passports and transferred to protection.

Eagle Owl territories were determined using point counts. In the evening (during two hours after sunset), Eagle Owl *Bubo bubo* calls were listened for from a vantage point. If an Eagle Owl was within the count zone, the observers carefully approached the vocalization to accurately record its location. These counts were conducted from mid-February to mid-March. Subsequently, when the exact location of the nesting site was determined, nests were searched during the chick-rearing period (late April - early May). The chicks were measured and ringed, and camera traps were installed at some nests to check for rings on adult birds.

A count of migrating Common Cranes *Grus grus* was also conducted using point counts. Volunteers were distributed among predetermined points between the cranes' daytime feeding areas and their overnight roosting sites. Counts were conducted from 6:00 PM to 8:00 PM (one hour before sunset to one hour after).

Route counts of Aquatic Warbler *Acrocephalus paludicola* were conducted in previously breeding areas in the Dywin-Vialiki Les Nature Reserve. Potential nesting sites were identified in sedge and sedge-reed marshes in February and March, and in early June, these sites were monitored at sunset and for one hour after sunset.

Spot counts of diurnal birds of prey and Black Storks *Ciconia nigra* were conducted. Points were identified in open spaces, at least 500 meters from forests, for better visibility. Counts were conducted in sunny, windless weather in July (when the chicks are large enough to be fed more frequently by the adult birds) from 10:00 AM to 2:00 PM (the peak activity time for diurnal birds of prey—a time when daytime temperatures rise, creating updrafts that facilitate flight for large birds). When the birds were detected, their bearings and distances were recorded. The most frequent locations were subsequently plotted on a map.

3. RESULTS

3.1. Results of own research in study area

Over the course of 20 years, irregular observations were periodically carried out in different parts of the study area, recording points with protected species of flora and fauna. Beginning in 2021, the research became more systematic.
In the spring of 2021, together with Yury Yankevich and other volunteers, a detailed study of the Divin-Vialiki-le nature reserve and adjacent forest areas was carried out. Habitats and growth sites of protected species of plants, fungi and animals were identified. Yury Yankevich subsequently compiled conservation passports and submitted them to the relevant authorities. In total, approximately 200 habitats and growth sites of protected species were transferred under protection (Kobryn District Executive Committee Decisions Nos. 1412 and 2231 of August 1, 2022, and December 23, 2024).

In June 2021, together with Yury Yankevich, monitoring of the Aquatic Warbler's habitats was also carried out in the territory of the Dyvin-Velikiy Les nature reserve and its surroundings. No singing male Aquatic Warbler *Acrocephalus poludicola* were detected in previously known nesting sites. Some areas of peatlands became overgrown with shrubs after haymaking ceased (northern and southeastern areas around Lake Luban); some areas were partially dehydrated, with grasses becoming dominant (near the Khabovichy village); some open sedge fens remained virtually unchanged (near the Rudec village).

Since 2021, A total of 4 nesting pairs of Eagle Owl *Bubo bubo* have been found in the western part of the Great Forest. Unfortunately, in 2025, two of them abandoned their nesting sites: the first due to clear-cutting of a black alder grove, and the second due to the construction of a logging road 500 meters from the nest (the Eagle Owl did not visit the nest, but may have moved to another location within the nesting territory). This monitoring revealed that Eagle Owl readily occupy the nests of diurnal raptors and also occupy artificial platforms. Nesting success is generally significantly higher in such nests.

On March 22, 2025, together with volunteers, the first attempt was made to count the Common cranes *Grus grus*, which stop here in large numbers during their seasonal migrations. Observations were conducted at five pre-selected sites simultaneously. Unfortunately, due to persistent warm weather, most of the cranes departed for further migration. A total of 439 Common cranes were counted at five points, although a week earlier, during Eagle Owl monitoring, such a number of cranes were counted only at one point.

In June 2025, a census of the Aquatic Warbler *Acrocephalus polidicula* was conducted in the Kazachi tract, the southern part of the Dywin-Vialiki Les reserve, and also in three places in the south and southeast of the Dubavoe Mire. Aquatic Warblers were found at two previously known nesting sites in Dubavoe Mire.

Thirty singing males of *Acrocephalus polidicula* were counted along a five-kilometer route (52.031985 24.832821) in the evening and morning. Eighteen singing males were counted along a 2,200-meter evening route (52.017117 24.903696). The primary objective of these counts was to assess the current condition of the peatland and the effects of gradual overgrowth and a major fire in February-March 2025.

In July 2025, censuses of diurnal birds of prey and the Black Stork *Ciconia nigra* were carried out in the western part of the natural complex (the Dywin-Vialiki Les nature reserve and its environs). During the month, observations were conducted at 11 locations with good visibility.

During the observations, 11 Black Stork nesting territories were identified. It's worth noting that the observations were conducted along the edges of the forested area and did not cover the entire reserve. Of the eight previously known Black Stork nests, only three were included in the census area. One of these nests was destroyed at the time of the observations, and no Black Storks were found in the nesting area. Considering other suitable nesting sites not included in the census area, I estimate the Black Stork *Ciconia nigra* population in this area at 20-25 pairs.

During the census, 11 Spotted Eagles *Clanga sp* nesting territories were identified. Unfortunately, no evidence of food being brought to the chicks was recorded, so it was not possible to determine the exact locations of the nesting sites. Due to the difficulty of identifying Spotted Eagles to the species level, the counted birds were recorded as *Clanga pomarina* or *Clanga sp.*
Also recorded were 14 Honey Buzzard *Pernis apivorus* territories, one Short-toed Eagle *Circaetus gallicus*, one Kestrel *Falco tinnunculus*, and one young White-tailed Eagle *Haliaeetus albicilla*.

Later, in the second half of August 2025, together with raptor specialist Valery Dambrouski, Spotted Eagle territories were re-checked. During the four-day survey, one Lesser Spotted Eagle *Clanga pomarina* nest with one chick was discovered, a Greater Spotted Eagle *Clanga clanga* nest with two chicks was checked, and three more *Clanga clanga* nesting territories with adult chicks were identified. Additionally, four Lesser Spotted Eagles and eight Greater Spotted Eagles were counted in hunting areas (interspecific hybrids are considered here as Greater Spotted Eagles), both on the side of the Dywin-Vialiki Les Nature Reserve and on the side of the Zwanec Nature Reserve.
These counts revealed a high nesting density of Greater Spotted Eagles *Clanga clanga* in the Great Forest area and the need for a more detailed study of the raptors in the future.

In addition to identifying rare species, attention was also paid to areas of interest for ecotourism, where ecotourism trails could be developed in the future. In May 2025, one potential nature trail, 12 kilometers long, was identified and thoroughly studied. The route includes a birch grove, a Greater Spotted Eagle *Clanga clanga* hunting area, a middle-aged oak-hornbeam and oak-pine forest, an old-growth

oak grove, an artificial pond in the forest, areas with protected plant species (*Cypripedium calceolus (II), Neottia ovata (IV), Corydalis cava (IV), Cardamine bulbifera (IV),* and *Polypodium vulgare (IV)*), and two small authentic forest villages. The Elk *Alces alces*, Wild Boar *Sus scrofa*, Red Fox *Vulpes vulpes*, and Roe Deer *Capreolus capreolus* were also observed along the route. A comfortable time for completing the route is 4 hours (Figure 21).

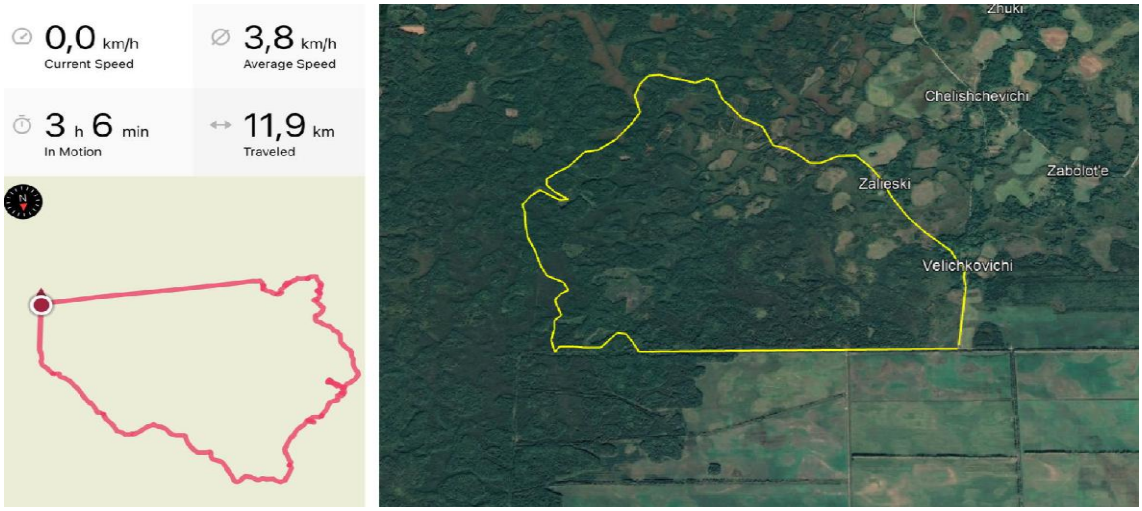

Figure 21. A promising nature trail in the Dywin-Vialiki Les Nature Reserve

3.2. Great Forest: The status of umbrella species

Umbrella species are those plant and animal species whose conservation contributes to the protection of other species in their habitat. Three umbrella species can be identified within the Great Forest Natural Complex: The Aquatic Warbler *Acrocephalus polidicula (I)*, the Lady's Slipper *Cypripedium calceolus (II)*, and the Greater Spotted Eagle *Clanga clanga (I)*. It is these species that scientists pay the most attention to.

The Aquatic Warbler is a vulnerable bird species, rapidly declining in numbers due to habitat transformation—open sedge fens. The study area hosted the largest nesting population of this species.

The Lady's Slipper is a rare orchid, classified as Near Threatened in Europe, but its global status is least concern. The species is listed in the Red Data Books of all European countries. The Great Forest is home to a large metapopulation of this orchid, which plays an important role in the conservation of this species in Eastern Europe.

The Greater Spotted Eagle is a vulnerable species confined to inaccessible marshes. Due to habitat loss, its numbers have declined by 30% over the past 28 years [https://www.iucnredlist.org/species/22696027/203868747].

Aquatic warbler *Acrocephalus polidicula* (VU)

Within the Great Forest Nature Complex, the Aquatic Warbler was recorded at Dubavoe Mire and smaller fens in the Dywin-Vialiki Les Nature Reserve. The

number of singing males at Dubavoe Mire was estimated at 2,254-5,607, while in the Dywin-Vialiki Les Nature Reserve and adjacent areas, it was 20 (Malashevich, 2011).
The 2024 counts at Dubavoe Mire revealed a decline in the population, with the average number estimated at 1,750 singing males (Zwanec MP, 2025). Monitoring of Aquatic Warbler habitats in the Dywin-Vialiki Les Important Bird Area in 2021 revealed no singing males. The gradual decline in Aquatic Warbler numbers is concerning, and the breeding territory at Dubavoe Mire is no longer the largest. For example, in the Biebrza National Park, the Aquatic Warbler population is maintained at a stable level of 2400-2500 males thanks to regular haymaking (Stasiak&Szczech, 2024).

Lady's Slipper *Cypripedium calceolus* (NT)
The main population of Lady's Slipper orchids is concentrated in the western part of the complex but is also present on the islands of the Zwanec and Radastauski Nature Reserves. The national population of Lady's Slipper orchids is estimated at 26,000 shoots, while the population in the Dywin-Vialiki Les Nature Reserve and adjacent territories accounts for up to 35% of the national population, or approximately 9,000 individuals (Mikhalchuk, 2015). Nonsystematic observations and registrations of Lady's Slipper orchids in this area indicate that the population of this rare species can be higher. Further studies are needed for a more detailed assessment of the population status of this rare orchid.
Research by N.V. Mikhalchuk (Mikhalchuk, 1997) revealed an interesting fact: the number of reproductive individuals in drained areas is significantly lower than on the islands between peatlands. The number of flowering plants here did not exceed 25%, and most often amounted to 10-15%, of the total number of plants, while in peatlands they constituted from 40 to 65%. The author attributes this to the disruption of established phytocoenotic relationships under the influence of anthropogenic influences and the subsequent weakening of competition from other species. However, in his 2010 article, N.V. Mikhalchuk does not confirm this correlation (Mikhalchuk, 2010). At the same time, the above data are interesting and require further research.
In the Radastauski Nature Reserve, one group of plants with an estimated population of 50 shoots was identified (Radastauski MP, 2025). In the Zwanec Nature Reserve, there are 17 habitats, the quantity of which is not specified (Zwanec MP, 2015).

Greater Spotted Eagle *Clanga clanga* (VU)
Greater Spotted Eagles primarily nest in island forests among peatlands.
One Greater Spotted Eagle nest was found in the Radastauski Nature Reserve in 2004 (V.Dambrouski, personal message, 2010), and two nests are known in the Zwanec Nature Reserve, which were monitored and inspected between 2002 and 2006. The average nesting success was 0.8 fledglings per nest (Zwanec MP 2015). Also in 2025, one pair was observed in the area north of the village of Razhnoe, far from other known nests (V.Dambrouski, personal message, Aug, 2025).
Following field surveys in 2025 in the Dywin-Vialiki Les IBA, the Greater Spotted Eagle population can be estimated at a minimum of five pairs.

Thus, the preliminary estimate of the Greater Spotted Eagle population in the study area is nine pairs, demonstrating the importance of the Great Forest complex for the conservation of this species. At the same time, more research on the Greater Spotted Eagle in this nature complex is required.

4. DISCUSSION

Despite significant anthropogenic impact, the Great Forest has retained its conservation value. To effectively conserve biodiversity in this natural area, it is necessary to consider the Great Forest as a whole, rather than divide it into three separate reserves. Combining the three reserves into a single protected area will allow for more effective conservation efforts and make the region a tourist attraction.
This section examines the main challenges currently facing the natural complex and proposes solutions to these problems.

The option of creating a National Park in the study area is considered, and whether the Great Forest meets the criteria necessary for establishing such a protected area is discussed. Arguments are also presented as to why a National Park is the most effective conservation measure for this area.

It is also discussed why this natural complex currently has low tourist appeal yet has great tourism potential if managed as a unified whole, rather than as separate reserves.

4.1. Current problems of the Great Forest and proposals for their solution

4.1.1. Violation of the natural hydrological regime

Large-scale land reclamation in the 1970s and 1990s drained much of the Great Forest peatland complex and could have continued to drain the remainder, but the discovery by biologists in the late 1980s of extensive Lady's Slipper *Cypripedium calceolus (II)* cenopopulations on forest islands halted active drainage of the peatlands in the western part of the Great Forest. On several island forests that had been located between the mires and now located between fields, the Klishcha local nature reserve was established on September 26, 1990, covering an area of 12 hectares (Decision of the Brest Regional Executive Committee of September 26, 1990, No. 286). It was later transformed into a nature monument and today occupies an area of 18.1 hectares (Decision of the Kobryn Regional Executive Committee of April 21, 2009, No. 538). Scientists continued to explore the area in more detail, leading to the establishment of the Dywin-Vialiki Les local nature reserve in 1997 (Kobryn District Executive Committee Decision No. 504 of December 17, 1997). Research continued, and the reserve expanded in size (Kobryn District Executive Committee Decision No. 1486 of July 6, 2020). Nikolai Vasilyevich Mikhalchuk and his team made a significant contribution to the conservation of this natural complex.

Around the same time, in 1995, an expedition led by German biologist Martin Flade discovered the Aquatic Warbler *Acrocephalus paludicola*, a species that was rapidly disappearing throughout Europe, in the remaining undrained portion of the Dubavoe Mire. Credit must be given to the Belarusian side's commitment to preserving this species and the prompt decision to establish the Zwanec

Nature Reserve as early as 1996 (Resolution No. 257 of the Council of Ministers of the Republic of Belarus dated April 11, 1996), which saved the once widespread, but now rare, open sedge fen biotope from possible extinction.

It soon became increasingly clear that the creation of specially protected natural areas, while very important, was insufficient to save the Dubavoe Mire ecosystems from being overgrown with reeds and shrubs. The hydrological regime of Dubavoe Mire, as well as that of the Dywin-Vialiki Les Nature Reserve, had been severely disrupted by large-scale drainage of the surrounding lands. The Dubavoe Mire is located on the watershed between the Baltic and Black Seas and, within its current boundaries, is higher (on average 144-145 meters above sea level) than the surrounding drained peatlands (141-143 meters). This significantly reduces groundwater pressure, which immediately flows through drainage canals along the canal beds, reaching the undrained part of the mire in significantly smaller quantities than in the 1950s. The mire water level has become more dependent on precipitation and meltwater, as well as runoff from drainage systems. As a result, the lowland mire has gradually transformed from a mesotrophic state to a eutrophic state. The waters entering the mire are rich in mineral impurities, which facilitates the rapid spread of reeds and shrubs.

Since the late 1990s, international funding has been used to attempt to halt the overgrowth of the peatland and maintain a stable Aquatic Warbler *Acrocephalus paludicola* population. Alexander Vasilyevich Kozulin has played a key role in implementing these projects from Belarus site.

Over the following years, some hydraulic structures have been constructed to block water outflow from the Dubavoe Mire, and the following measures have been implemented (Zwanec MP, 2009; Zwanec MP, 2015; Zwanec MP, 2025, Wetlands, 2022):
- Cofferdams and dams have been constructed on the bypass canals to restore the optimal water level;
- A water pipeline with a regulating sluice gate has been constructed to supply water from the Orekhovsky canal to the bypass canals;
- Groundwater level monitoring columns have been installed;
- The Povicki Canal has been connected to the bypass canal in the south to discharge water into the center of the peatland, and the canal mouth in the north, 160 meters long, has been reconstructed to control water outflow;
– Several cofferdams were reconstructed and reinforced with crushed stone and concrete;
– Several tubular regulators (some with sluice gates) were built on the bypass canals and at the mouth of the Batyevsky Canal;
– The discharge canal north of the Radastawa village was cleared of silt, trees and shrubs, and beaver dams;
– The Razhnoe drainage system was decommissioned;
– Equipment and machinery for mowing and processing plant biomass were purchased in the Zwanec and Sporovski nature reserves (two tractors, two balers, trailers, etc.);

– Haymaking and clearing of trees and shrubs in Aquatic Warbler nesting areas was carried out;
– Controlled burning of last year's vegetation in Aquatic Warbler nesting areas was carried out;
– The impact of burning on certain groups of invertebrates was studied.
Overall, many extensive and important measures were taken to prevent the mire from becoming overgrown with reeds and shrubs, but the problem persisted, and the population of the Aquatic Warbler *Acrocephalus paludicola (I)*, the species targeted by these measures, is gradually declining in Dubavoe Mire (Table 2).

1995-2005	2006	2009	2010	2011	2013	2014-2020	2024
3000-5000 singing males	***4223-5159*** singing males	***2896-5798*** singing males	***2254-4428*** singing males	***2033-6974*** singing males	***2,149-4,459*** singing males	***2063–2379*** singing males	***1750*** singing males

Table 2. Estimation of the Aquatic Warbler *Acrocephalus paludicola (I)* population in the Zwanec Nature Reserve in different years (Malashevich, 2011; Malashevich, 2013; Zhuravlev et al., 2020; Zwanec MP, 2025)

Aquatic warblers have also been observed in the Dywin-Vialiki Les IBA, but hydrological maintenance and mowing to prevent overgrowth of suitable ecosystems have not been implemented. As a result, 20 male Aquatic Warblers were observed in various locations in this area between 2004 and 2006, 12 males in 2013 (Malashevich, 2013), and no Aquatic Warblers were found in 2021.
It should be noted that some isolated mires (near the Rudec and Khabovichi villages) remain unaltered and suitable for nesting Aquatic Warblers, while others are gradually becoming overgrown with shrubs (near Lake Luban), as a result of local populations abandoning livestock farming (mowing and grazing) and disrupting the hydrological regime (the canals). Historically, the peatlands in the study area were primarily fed by groundwater, which seeped to the surface under pressure. This groundwater, in turn, was formed by rain and meltwater flowing along the upper horizons from the uplands from the north and south and accumulating in the lowlands of the Great Forest complex. The peatland was also slightly fed by the Pripyat River during floods, via the Sista River, which connects Lake Orekhovec with the Dubavoe Mire (this river may have varied its course seasonally), as well as by the Koloda River (now Litkovo), which originates from the now-drained Krivye Brody peatland in the south of the Dywin and, via Lake Luban, feeds the western part of the Dywin-Vialiki Les Reserve.

Today, however, due to the elevation of the Dubavoe Mire above the surrounding melioration areas, as well as the large number of canals, the influence of groundwater has weakened. The construction of the Dnieper-Bug Canal and the drainage of the peatlands north of it likely completely cut off the groundwater supply to the peat horizon from the uplands of the Pruzhany and Bereza districts. Currently, mineral-rich waters from the surrounding drainage systems play a major role in feeding the mire. The Pripyat River, which waters seep through the Orekhovsky Canal on the western side, also has a greater influence than before. The Koloda River's course was altered and channeled, and the peatland at its source was drained. Today, the inflow through it is extremely weak, increasing

mainly during the spring floods. The western part of the complex is also fed by mineral-rich waters from the drainage system north of the Dywin, causing the shores of Lake Luban to become heavily overgrown with reeds. Drainage of the central part of the Great Forest, as well as the Galo and Galya peatlands near the Khabovichi village, reduces water inflow into the Dywin-Vialiki Les Nature Reserve from the eastern and western boundaries.

Prompt construction of water-retaining structures on the bypass canals around the Dubavoe Mire has raised surface water levels and stabilized the water regime to some extent. For example, in July of the drought-stricken 2025, surface water levels remained 20-25 cm above the ground surface 500 meters from the bypass canals (up to the first mineral islands), whereas throughout the entire Great Forest, water levels were below the ground surface almost everywhere.

Despite this, the work carried out to connect the Povitski Canal with the bypass canals raises concerns. This results in the flow of mineral-rich water from drainage systems directly into the center of the mire: "...the Povedsky Canal has been connected to Discharge Canal No. 2 to allow water to pass into the mire" (Zwanec MP, 2009). In this case, it would be prudent to completely block the Povitski Canal and concentrate surface water only at the edges of the Zwanec Nature Reserve, thereby ensuring slow and uniform infiltration of groundwater through the upper peat horizon throughout most of the peatland. In this case, minerals will be fixed by vegetation along the edges of the Dubavoe Mire, which in turn will reduce the likelihood of overgrowing the main sedge ecosystems, normalize groundwater pressure, and reduce dependence on surrounding drainage systems.
The Povitski Canal runs along the watershed itself. There were never any natural watercourses in this area—the Pina River in the northeast and the Voloka River in the northwest originated in the peatland. The central part of the peatland had no streams and was fed only by groundwater and sediment. Because of this, the water here was practically devoid of nutrients, which naturally protected the central part of the mire from reed overgrowth. In our case, the Povitski Canal is the main supplier of mineralized water to the nesting sites of the Aquatic Warbler *Acrocephalus paludicola (I)*. Even when the watercourse is silted up and blocked by beaver dams, it harms the peatland ecosystems, which is noticeable by its overgrown banks. The best solution here would be to completely clear the canal banks of established reeds and trees, removing the trees and shrubs, and fill the canal with the surrounding peat soils, as is practiced in neighboring countries (Priede, 2017). In turn, a regulated outflow into the Dnieper-Bug Canal would be created on the bypass canal at point 52.123120 24.757926.

It would be justified to build an impermeable dam on the Orekhovsky Canal north of the Zwanec Nature Reserve. It would stabilize the water level in the canal and ensure water infiltration into the western part of the peatland. This is especially important during the summer low water period, when the water level in the Orekhovsky Canal drops significantly. This is indirectly confirmed in the 2009 Management Plan: "The water level in the Orekhovsky Canal must be maintained

at 144.80 m. This level corresponds to the thresholds of the spillway structures constructed within the reserve. According to calculations, raising the water level in the Orekhovsky Canal by closing the gates of the sluice-regulator will not have a negative impact on the water regime of the adjacent Dnepro-Bugski and Orekhovski reclamation facilities."

Regarding the stabilization of the water regime in the Dywin-Vialiki Les Nature Reserve, an important step to restore the natural bed of the Koloda River (Litkovo). In order to provide the nature reserve with water, the water flow of the border canal should be redirected from point 51.90139 24.605105 to the peatland, which is the source of the Koloda River (51.919653 24.610544). These actions will practically not reduce the area of agricultural land, but will increase the inflow of water through Lake Luban into the peatland of the nature reserve and will slowly seep through the Kazatski Canal into the Dnieper-Bug system, maintaining a stable level of surface and groundwater in the southern and west parts of the nature reserve.
These actions will likely not affect water levels in the northern part of the reserve, but it is possible to stabilize the hydrological regime of this part without reducing agricultural land use by rewetting reclaimed but still waterlogged and unused areas. These areas collectively cover approximately 6,500 hectares (Figure 22), equivalent in size to the Dywin-Vialiki Les or Radastauski reserves. It should be noted that some of these lands, which are part of the Zwanec reserve, have already been rewetted, while others are managed by forestry enterprises. The creation of natural biocenoses for each specific area will not only improve the hydrological regime of the natural complex but also increase the population of typical wetland inhabitants, which have been declining in numbers, and will also support the stability of forest ecosystems, which have also recently suffered from water shortages.

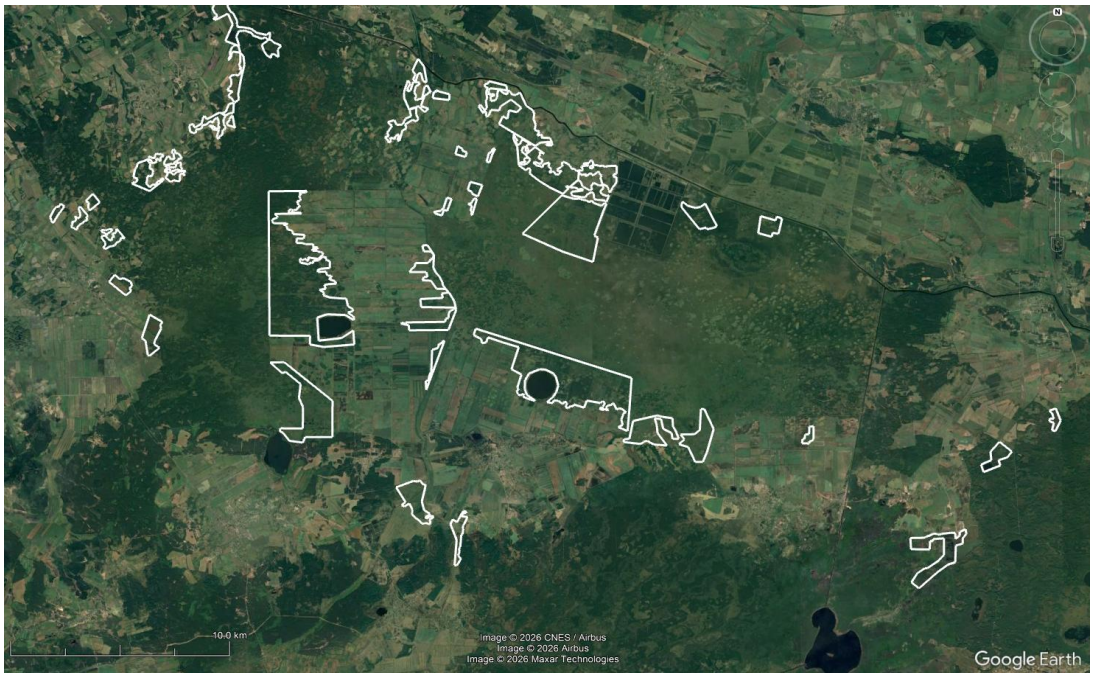

Figure 22. Drained but unused agricultural lands within the Great Forest

4.1.2. Regulated and unregulated fires and burns

Another problem, particularly affecting the Zwanec Nature Reserve, is controlled and uncontrolled burning and fires. To maintain a stable Aquatic Warbler *Acrocephalus poludicola* population, A.V. Kozulin initiated controlled burns of last year's vegetation in the bird's habitat. These burns are organized by specialists, with the support of the Ministry of Emergency Situations, in mires during the period of ice and snow cover and are aimed at burning off the upper parts of vegetation. Observations after the first burns showed that Aquatic Warbler populations in the same area were higher in years after burning dry vegetation, leading to recommendations to conduct these measures regularly every three (Zwanec MP, 2009) or four years (Zwanec MP, 2025).
This method of maintaining sedge fens, although quite effective in the short term, has serious consequences.

Firstly, numerous invertebrates and small mammals perish during the fires. With constant burning, they will not be able to fully recover, and the populations in the area will slowly decline. Research on the impact of fires on populations of rare *Lepidoptera* (Kulak, Yakovlev, 2015) and ground beetle communities (A. Semenyak, 2020) was conducted in the Zwanec Nature Reserve. A.V. Kulak and R.V. Yakovlev concluded: "It has been established that large-scale burning of vegetation in the mire, affecting mineral islands, negatively impacts the population of species in this group. Small islands are particularly affected. In large, forested areas located along the periphery of the peatland and burned only fragmentarily, the *Lepidoptera* population recovers very quickly in areas where fires pass through due to dispersal from areas untouched by the fire..." In the case of ground beetles, on the contrary, they gravitate toward burned areas, where vegetation is sparse and food is more abundant—the remains of dead animals after the fire. A.A. Semenyak studied the impact of mowing and burning on the distribution of ground beetles and concluded: "The results of mowing vegetation show greater effectiveness in increasing species abundance compared to burning, which only results in an increase in numbers..." These studies indirectly confirmed the rather negative impact of even controlled burning on ecosystems.

At the same time, alarming news is coming in that the Water Vole *Arvicola amphibius*, which was widespread in the reserve quite recently, may have completely disappeared from the protected area. Problems with the decline in the Water Vole population in Dubavoe Mire have been known since the early 2000s. The 2009 Zwanec Management Plan describes the population status as follows: "Unfortunately, no special studies of the Water Vole *Arvicola amphibius* density dynamics have been conducted, however, visual assessments allow us to say that in the period 2000-2008, significant changes in the density of this species occurred in Zwanec mire, from extremely high (1999) to minimal (2001) density. It can be assumed that the main reason for changes in the Water Vole density is

annual fluctuations in the water level. The greatest negative impact on this species is caused by a prolonged complete lack of water in the peatland from May to September (2001, 2004) and the burning of grass in the mire during dry springs. Furthermore, a mass die-off of Water Voles was observed in 2001 for unknown reasons. It can also be argued that the decline in Water Vole numbers in Zwanec mire is not related to the activity of the American Mink *Neogale vison*, which has become naturalized in European wetland ecosystems.

Secondly, dry vegetation fires spread nutrients throughout the peatlands via wind, which also promotes the spread of reeds. If such regular burnings were stopped, the problem would quickly worsen, and the fen would continue to rapidly overgrow.

Thirdly, Dubavoe Mire is impassable, and fire control is only possible by time (during the wet and snowy seasons of the year), not by location. For example, a controlled fire in 2015 affected almost half of the reserve territory, and the burned area is clearly visible on satellite images (Figure 23).

Figure 23. Controlled fires in the Zwanec nature reserve are clearly visible from space, 2015

Fourth, a controlled fire of dry vegetation in a given year does not guarantee the absence of uncontrolled fires the following year.
For example, in 2024-2025, the winter was dry and warm, which affected surface water levels in all the Western Polesie peatlands. Even in areas where surface water levels were 20 cm above the soil surface year-round, they did not rise above the ground during this period. In February-March 2025, the Dubavoe Mire burned extensively and for a long time. Due to the complete absence of surface water and snow cover, this fire could have had very serious negative

consequences for the reserve's biodiversity. As stated in the 2025 Management Plan for the Reserve, this fire was not planned and, therefore, not controlled: "...according to the NASA database, fires occurred in the reserve... on February 27, 2025, March 10, 2025, March 6, 2025, March 7, 2025, and February 13, 2025, and covered a total of several thousand hectares of the protected area." In reality, the glow from the fires was visible for longer periods, both in February and March. During my Aquatic Warbler *Acrocephalus paludicola (I)* survey in July 2025, was noted that the burnt willow bushes and reeds in the dried-up peatland were producing more new shoots than it had before the fire. This fact negates the effectiveness of fires in controlling overgrowth.
It's also worth noting that in areas covered with young reed shoots, free of last year's dry stems, the concentration of Aquatic Warblers was higher than in open sedge fens without reeds. Small amounts of reeds and/or sparse willow bushes are important for Aquatic Warblers, providing cover and marking the male's mating territory.

Unlike the Zwanec Nature Reserve, fires in the Dywin-Vialiki Les and Radastauski Nature Reserves are rare and localized (Radastauski MP, 2025; personal observations), causing little harm to the environment, although they also have extensive reed beds frequently visited by people. The conclusions can be summarized by the research data from studies in the Zwanec and Sporauski nature reserves, cited in the first management plan for the reserve (Zwanec MP, 2002): "In areas of the mires where vegetation was burned in the spring, the density of the Aquatic Warbler *Acrocephalus paludicola (I)* decreases to minimum values and recovers gradually. In the year of the fire, it is minimal, reaches 50% of its potential a year later, and only fully recovers two years after the fire.
The degree of influence of vegetation burning on the density of the Aquatic warbler is determined by the water level in the peatland during the fire season. ...Fires with groundwater levels below the soil surface (Peschanka 1997, 2001, Kostyuki 1998, 2001) cause a two- to three-fold decrease in the species' density. Burning vegetation at water levels 10-30 cm above the marsh surface does not have a significant effect on the density of the Aquatic warbler (Zwanec monitoring site, 2001).
However, such burning significantly affects the abundance and diversity of invertebrates, especially small vertebrates, and those that feed them.

4.1.3. Overgrowing of fens with reeds and shrubs

A.V. Kozulin believes the local population's abandonment of traditional mowing is the main reason for the overgrowth of reeds and shrubs in the peatlands: "The main reason for the overgrowth of mires with reeds and trees and shrubs is the cessation of traditional human use of these biotopes for manual haymaking and grazing. Draining the peatlands and creating drainage systems opened vast areas for mechanized haymaking. Haymaking in the mires began to decline rapidly and had almost completely ceased by 2012. As a result, the area of open fens has decreased by more than 20% over the past decade." (Kozulin, 2016)
The abandonment of traditional haymaking, while a significant factor, is secondary. The primary cause may be soil compaction and oxidation of surface

peat on already reclaimed lands around the mires, resulting in the surface of these areas being 1-2 meters below the mire level. This can also include the diversion of water from drainage systems into the mires, which promotes the replacement of nutrient-poor groundwater with highly saturated water from outside, which, in turn, leads to the widespread growth of reeds. At the same time, the overgrowth of shrubs in higher elevations near the islands is a natural successional process associated with the cessation of human activity in these areas.

The cessation of haymaking primarily has a significant impact on the overgrowth of natural areas modified by humans. For example, open pastures in the south and southeast of Lake Luban became overgrown with forest after cow grazing ceased, completely transforming the ecotope within 20 years. The mosaic wetland area of the northern part of the Dywin-Vialiki Les IBA has also changed beyond recognition with the departure of humans. Aerial photographs from the 1940s show that most of the islands here are deforested—either plowed into fields or used for haymaking, creating an open mire biotope that attracted the aquatic warbler and several species of waders to nesting (Figure 24).

Today, the area looks different: almost all the fields surrounding the peatlands, as well as the open islands with hayfields, are overgrown with forests, while the lower, wetter islands are overgrown with shrubs. Meanwhile, the fens itself unchanged sedge, with sparse reed beds along its edges. It's possible that the mature trees along the perimeter, as well as the dominant species that settled there, have displaced the Aquatic warbler from this area. During a 2025 study of the Aquatic Warbler in Dubovoye mire, it was noted that the Aquatic warbler gravitates toward open sedge fens located at a considerable distance from forest islands. Aquatic Warblers were not observed in suitable, large biotopes surrounded by forests. A possible reason for this may be the loud song of various passerines in the forested and shrubby parts of the ecosystem, which drowns out the quiet song of male Aquatic Warblers, negatively affecting reproduction.

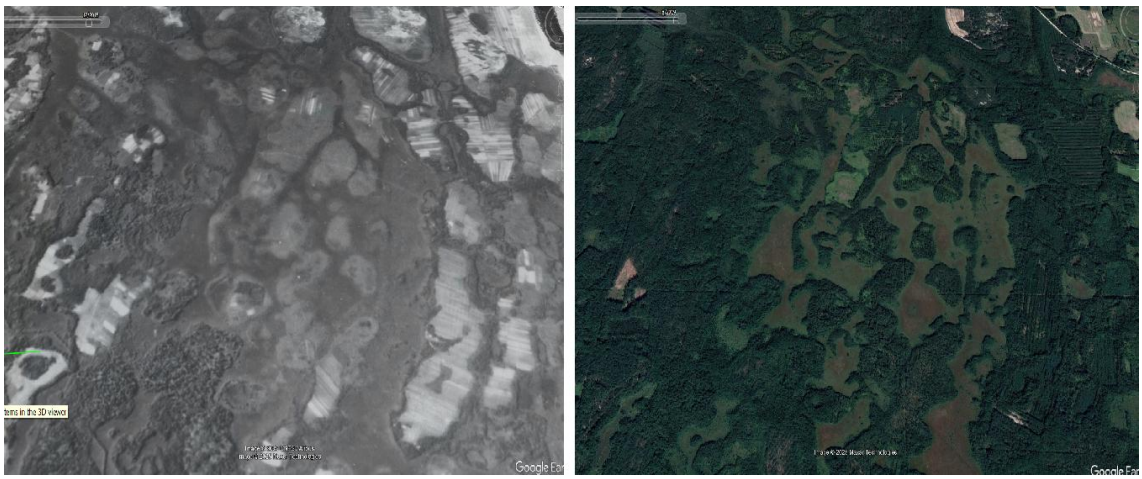

Figure 24. Comparison of an aerial photograph (left, 1944) of the northern part of the Dywin-Vialiki Les IBA with a satellite image (right, 2019)

Resurce: https://www.google.com/maps/d/u/0/viewer?mid=1MKCYd-NmWAZVO0bbtutYNVwlSJ-Dqzw&ll=52.13220812057757%2C24.3717275417698 96&z=14

The view is slightly different in the northern part of Dubavoe Mire. Human activity here also primarily occurred on the islands, but after humans left, the islands were not overgrown with forest, only with shrubs along the marshy land edge. The photographs of the north part also show that the sedge fens were practically never mown.

To prevent the overgrowth of sedge biotopes in the Zwanec Nature Reserve, the following steps were taken: specialized low-density mowing machines was purchased for waterlogged areas, controlled burning of dry vegetation was carried out, reeds were mown, and willow and young downy birch shrubs were removed, with and without mulching. Reed mowing and brush clearance were carried out in the northern and southern parts of the reserve for several years but subsequently ceased.

Over the next five years, the following measures are planned to "reduce the risk of peatland ecosystem degradation": "ensure sustainable mowing of grasses on restored meadowlands over an area of at least 100 hectares. Remove trees, shrubs, and reeds in key areas of the Zwanec mire over an area of 20 hectares annually. Conduct controlled burning of dry vegetation to prevent uncontrolled fires, maintain the productivity of peatland ecosystems, and prevent the overgrowth of shrubs." (Zwanec MP, 2025)
It should be noted that regular mowing and shrub removal in wetland ecosystems, while having a positive effect, is only temporary. Furthermore, this process is labor-intensive and costly. What will happen after mowing ceases for one reason or another?
The use of heavy machinery in peatlands leads to compaction of peat soils. Because of this, after active mowing ceases are finished, this area will be susceptible to the rapid spread of birch and alder forests. Shrub removal also only provides a temporary effect.

Most likely, shrub overgrowth will occur in the higher areas of the Dubavoe Mire and will cease if the groundwater level remains stable and the mire does not dry out.
Removing just 20 hectares of trees, shrubs, and reeds per year over an area of several thousand hectares is an ineffective measure, but this process depends on the scale of funding, and it may be better to do so than to do nothing. At the same time, there is a cheaper, more effective, and more sustainable method for combating the overgrowth of mires.

In some European countries, cows are used to maintain open areas of floodplains, and water buffalo are used in wetlands, as they are the animals most adaptable to flooded areas. In the case of the Great Forest natural complex, Elk *Alces alces* should be considered. Elk often live in wetlands, and a large part of their diet consists of young willow shoots, reeds, and cattails. More than 200 Elk once inhabited the Zwanec Nature Reserve. Due to poaching in the 1990s, the Elk were almost completely exterminated. Thanks to active conservation efforts, poaching in the reserve has become rare, and the Elks are slowly recovering.

Unfortunately, their numbers remain too low. "According to route surveys of game species conducted in recent years, the Elk population is stable and has increased in recent years from 15 to 25 individuals in the reserve" (Zwanec MP, 2015). It is planned to increase the Elk population by 20% over the next five years (Zwanec MP, 2025). To effectively restore the Elk population, hunting should be completely banned throughout the Great Forest nature complex, and the population should be increased to 150-200 animals as fast as possible. Artificial breeding followed by reintroduction may be considered (Minaev, 2004). High Elk densities will help effectively prevent peatland ecosystems from becoming overgrown, provided the reserve's proper water management regime is maintained (Figure 25). Once the Elk population has been restored, overgrown trees and shrubs should be cleared in the most critical areas.

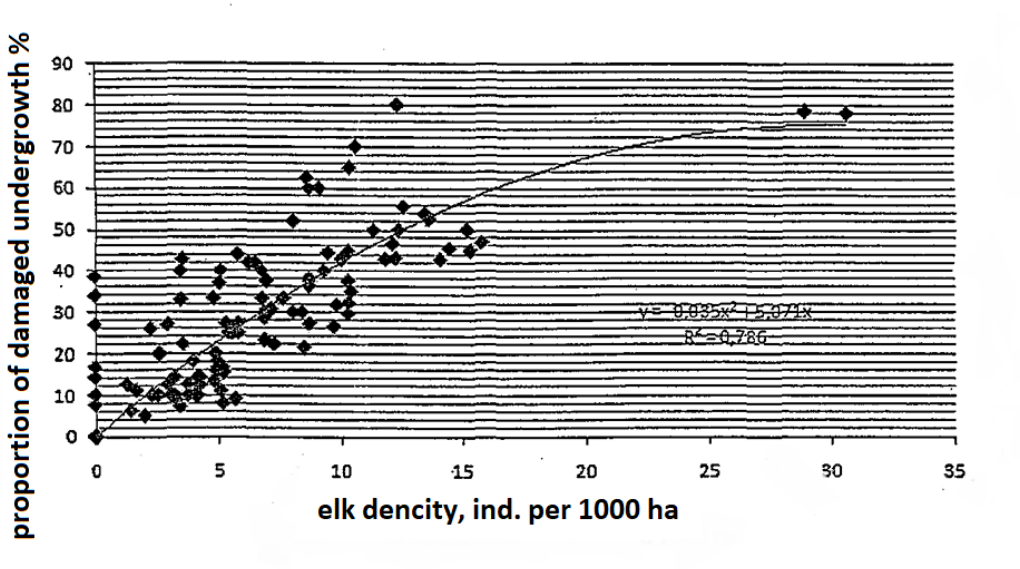

Figure 25. Damage to undergrowth depending on the Elk *Alces alces* density (Smirnov, 2003)

4.1.4. Others' problems of Great Forest

Spread of invasive plants and animal species

Nowadays, all three nature reserves in the Great Forest are rarely visited by people, but as recently as the early 2000s, the islands were actively used by local residents as farmland and even as grazing grounds for animals. Moonshiners were active in the swampy island forests, and moonshine from the Dywin Forests was known throughout Belarus. This illegal industry ceased to exist in the early 2000s. Tons of scrap metal remain on the hard-to-reach forest islands as a reminder of a bygone era.

The main berry and mushroom picking areas are also located in the recreational areas around the villages, as well as in the northern part of the Dywin-Vialiki Les IBA. The Radastauski Nature Reserve is also rich in blueberries, attracting local berry pickers.

Due to the rare human visitation, the study area is not saturated with invasive species. Literary sources indicate the planting of Red Oak *Quercus rubra* in quarter 48 of the Antopol Forestry (Zwanec MP, 2002), which is causing serious concern among scientists. In addition to Red Oak *Quercus rubra*, were identified places of Canadian Goldenrod *Solidago canadensis* infestations in three locations in the south and north of the Dywin-Vialiki Les IBA. This is also a concern, as these species spread very quickly, displacing native flora. Prompt action to prevent the spread of Goldenrod is essential, as the plants nearly double their coverage area each year, and their seeds often germinate several kilometers from their primary places.
As for fauna, the American Mink *Neogale vison* is of greatest concern, having completely displaced the native European Mink *Mustela lutreola*. The Raccoon Dog *Nyctereutes procyonoides* is also widespread. In recent years, an infestation of the Golden Jackal *Canis aureus* has been reported (Grichik, 2018).

Poaching
Poaching was widespread in the 1990s. With the development of environmental inspections, increased mobility, and the imposition of significant penalties, the problem has significantly decreased. Currently, poaching is rare and does not cause much concern. Poachers' favorite haunts are the seldom-visited banks of the Orekhovsky Canal along the border with the Zwanec Nature Reserve.

Entomological damage to trees and shrubs within the nature reserves is rare, but in the recreational area in the north of the Dywin village, a sharp and widespread dieback of *Pinus sylvestris* in monoculture plantations was observed in 2024-2025.

Plowing of land on the mineral islands, except for a few places in the Dywin-Vialiki Les and Zwanec Nature Reserves, has almost completely ceased, and the islands are overgrown with a variety of flowering plants, facilitating the spread of pollinating insects.

Unauthorized logging is rare and insignificant.

The construction of a logging road in 2024-2025 in the Yahmin Forest is causing concern. More than ten hectares of forest have been irreversibly cleared for the roadway. Three pairs of Black Storks *Ciconia nigra*, the Eurasian Eagle Owl *Bubo bubo*, a Greater Spotted Eagle *Clanga clanga*, a Great Grey Owl *Strix nebulosa*, and a Badger *Meles meles* inhabit the immediate vicinity of the road. Several rare species of plants have developed big populations nearby. The forest itself is an old-growth hornbeam-oak grove surrounded by alder forests. In the south, along with small marshes, almost all of which harbor Common Cranes *Grus grus*, the forest forms a dense mosaic structure, distinct from that of the protected areas. Due to the area's special importance for maintaining a diverse range of rare flora and fauna, various scientists proposed incorporating the Yahmin Forest area into the Dywin-Vialiki Les Nature Reserve and upgrading the reserve's status to a national one (A. Abramchuk, Yu. Yankevich, A. Myalik).

However, this proposal was rejected by a commission established by the Ministry of Natural Resources on July 19, 2024: "The creation of national nature reserves... Dywin-Vialiki Les... was also considered during the development of the draft scheme (ecological network), however, no consent was received from interested parties for declaring these areas as protected areas of national significance, and therefore this proposal was rejected by the National Academy of Sciences of Belarus." The interested party in this case was the Kobrin District Executive Committee.
Returning to the logging road, it should be noted that, since its construction was carried out during the nesting season, it has already negatively impacted the nesting of three pairs of Black Storks and one pair of Eagle Owls closest to the road.

4.2. Great Forest: The territory of the proposed National Park

4.2.1. Great Forest: area and boundaries

To objectively assess whether the Great Forest natural complex meets the criteria for establishing a National Park, we must first establish the boundaries of the future protected area. As previously mentioned, large areas of the Great Forest are currently drained and used for agricultural purposes. When designing the National Park's boundaries, agricultural lands and settlements were excluded from its territory whenever possible. However, some locations have key conservation value and were therefore included within the National Park. Flooded, abandoned agricultural lands along the edges of the nature complex were also included within the potential National Park's boundaries, with the goal of restoring natural ecosystems and reducing the overall unused land.

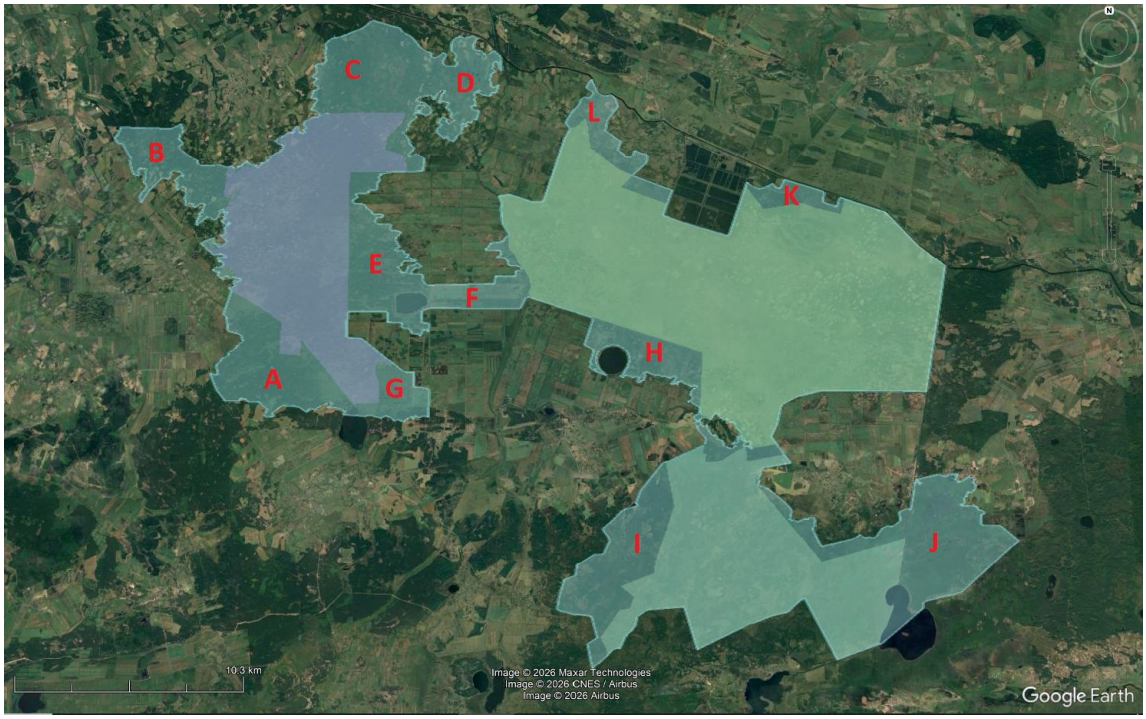

Figure 26. Proposed area for the creation of the National Park

The proposed area of the future Great Forest National Park is 45,714 hectares and includes the territories of three nature reserves – Dywin-Vialiki Les, Zwanec, Radastauski (shown darker in the figure), as well as new territories, which are marked with the corresponding letters on the proposed map (Figure 26):

A. This territory includes the previously mentioned Yahminov Les tract. It is home to mature broadleaf forests, some intact tracts of which exceed 100 hectares, interspersed with small, narrow, peatlands, some of which are typical swampy Black Alder *Alnus glutinosa* forests. Closer to the Kazatski Canal, the mosaic pattern changes, with forested areas becoming smaller and the area of peatland, mostly reed-filled mires increasing. Here, birch forests often form in the marsh areas. North of Lake Luban lies a large open sedge-reed mire (Kazachi tract), approximately 115 hectares of which, on the western side of the Kazatski Canal, are not included in the Dywin-Vialiki Les Nature Reserve. The broadleaf forests are primarily represented by hornbeam-oak groves, with small areas dominated by Linden and Maple. Spruce stands are also present. In the western part of the forest, Pine stands are present on former farmland. Occasionally, mixed forest areas with Pine as the dominant species are found.
Due to its largely unaltered biotopes, this section of the swamp-forest is of high conservation value. At least three pairs of Black Storks *Ciconia nigra (III)*, one pair of Eagle Owls *Bubo bubo (II)*, one pair of Greater Spotted Eagles *Clanga clanga (I)*, Great Grey Owls *Strix nebulosa (II)*, Green Woodpeckers *Picus viridis (III)*, Badgers *Meles meles (IV)*, and Hazel Dormice *Muscardinus avellanarius (IV)* inhabit the area. Common Cranes *Grus grus (III)* nest in many of the small marshes, and until recently, the Aquatic Warbler *Acrocephalus paludicola (I)* nested in the mires of the Kazachi tract. Rare plants include *Cypripedium calceolus (II), Corydalis cava (III)*, *Cardamine bulbifera (IV)*, and *Neottia ovata (IV)*. Also growing here are *Veratrum lobelianum (III)*, *Cephalanthera rubra (III)*, *Iris sibirica (IV)*, and the mushrooms *Ganoderma lucidum (III)* and *Grifola frondosa (III)*. Despite the high conservation value of this area, when the boundaries of the Dywin-Vialiki Les Nature Reserve were redefined in 2020, three sections of mature oak-hornbeam forests with large localities of *Corydalis cava (IV)*, *Cypripedium calceolus (II)*, *Neottia ovata (IV)*, and typical old-growth alder and oak forests, totaling 310 hectares, were excluded from the reserve. This sections were replaced by section #23, which is half lowland reed peatland, the other half shrubland.

B. This section of the forest-swamp complex represents an ecosystem that has been self-healing since the abandonment of farmstead farming by humans. It consists of numerous mosaic-like small peatlands, as well as abandoned fields and old-growth forests. Before reclamation, this area was part of the large Vytyanets mire, and only a small area (30 hectares) was forested, which has now been cleared and restored. The area also includes some abandoned and flooded agricultural land. Lesser Spotted Eagle *Clanga pomarina (III)* and a pair of Black Stork *Ciconia nigra (III)* are nesting here. This area was annexed to the potential

National Park with the aim of preserving the remnants of the peatland and subsequently restoring it.

C. This area is located in the northern part of the Dywin-Vialiki Les IBA. It consists of mixed forests, alternating with Pine *Pinus sylvestris* stands of varying ages in the western and northern parts. The eastern part consists of young forests that emerged after people abandoned the farmstead structure. The central part of the area is occupied by sedge fens, interspersed with island forests. Aquatic Warbler *Acrocephalus paludicola (I)* nested in these areas of the fen, and there is a small possibility that they may nest here again. To the north, this peatland complex is bordered by sandy aeolian dunes. Common Crane *Grus grus (III)* and white-throated flycatchers *Ficedula albicollis* (IV) nest in this area, *Neottia ovata (IV)* and *Corydalis cava* (IV) grow there. This area, and especially its central mires, requires protection and more detailed research.

D. This peatland area was included in the proposed National Park for the purpose of restoring the ecosystem of the degraded Gol Mire, whose central part was subject to peat extraction, and Zastrożnia Mire, located in the northeast, near the Vyhoda village. No targeted research has been conducted on this site, but it has high potential for restoring typical biotopes.

E. The central part of the Great Forest is represented by mosaic island forests of high conservation value. This area was drained during land reclamation in the 1980s, yet it has remained virtually untouched and retained its value. The area is primarily composed of broadleaf forests, dominated by Oak *Quercus robur*, Hornbeam *Carpinus betulus*, and Linden *Tilia cordata*. Alder *Alnus glutinosa*, Aspen *Populus tremula*, and Birch *Betula sp.* groves have formed in the lower elevations, and some of the drained peatlands are now overgrown with dense willow stands. Almost every such forest island is home to rare, protected plant species, whose populations sometimes occupy hectares of forest biotopes. Protected plant species such as the Lady's Slipper *Cypripedium calceolus (II)*, *Cardamine bulbifera (IV)*, and *Corydalis cava (IV)* are abundant here. Other protected species include the *Orchis mascula (II)*, *Cephalanthera rubra (III)*, *Gentiana cruciata (III)*, *Cucubalus baccifer (IV)*, *Prunella grandiflora (III)*, and *Epipactis atrorubens (III)*. At least one pair of the Greater Spotted Eagle *Clanga clanga (I)* also nests here, and three pairs of Black Stork *Ciconia nigra (III)* inhabit it. This area is valuable because the forests within are practically free of agricultural fields; all areas around the island's forests are flooded, overgrown with shrubs, birch forests, black alder groves, and sedge-reed mires. Dry meadows with a variety of medicinal herbs have formed in small, abandoned fields on elevated areas among the forests. The Klishcha local natural monument is also located within this area.

F. This area includes agricultural land and a drainage canal from the Dneprobuhski Reservoir. It was added to the area of the future National Park to create a safe migration route between the western and eastern parts of the natural complex. Within this area, it is proposed to plant broadleaf and black alder forests in the less fertile areas, and raise the level of the drainage canal, thereby

creating a settling basin to purify the discharge water from mineral impurities and then transfer it to the bypass canals of the Zwanec Nature Reserve.

G. The site consists of reclamation-disturbed and re-wetted areas, where reed, cattail, sedge, and willow biocenoses have formed. Small ponds have formed in areas where peat was extracted. This part of the potential National Park is important as a roosting site for large flocks of Common Cranes *Grus grus (III)* during migratory stopovers. The shrubby and waterlogged area attracts Great Egrets *Ardea alba*, Grey Geese *Anser anser*, and other waterbirds for nesting. Eagle Owls *Bubo bubo (II)* and Greater Spotted Eagles *Clanga clanga (II)* nest in the typical marshy black alder forest in the southern part of the site. White-backed Woodpeckers *Dendrocopos leucotos (IV)* are also present. Aquatic Warblers *Acrocephalus poludicola (I)* previously nested in the sedge fen bordering Lake Luban. Two polders with cultivated fields are also included within the National Park. Large flocks of Common Cranes *Grus grus (III)* are observed here throughout the season. They use these fields both during migration and for the summering of non-breeding birds (approximately 150 individuals). In addition to Cranes, Geese and other wetland bird species also stop here during migration. This attachment to this particular part of the natural complex likely developed historically, before the widespread drainage of the wetlands. Unfortunately, these bird concentrations also attract hunters. For example, hunters meet in these fields on the opening day of the spring hunting season. This mass hunting stresses the migratory protected birds.
In this area, the cultivation of perennial grasses and the occasional plowing of only the eastern polder (closest to the tarmac road) are recommended, as well as a complete ban on hunting.
This area also includes the northern shoreline of Lake Luban. This area is an important nesting site for many waterbird species, including the *Rallus aquaticus*, *Zapornia parva (IV), Panurus biarmicus (IV), Locustella luscinioides, Acrocephalus scirpaceus, Chlidonias leucopterus, Chlidonias niger* and *Ardea alba*. During spring and autumn migration, large gatherings of waterfowl are regularly recorded here, including rare and protected species such as the *Mergellus albellus (I), Mergus merganser (III), Gavia arctica (II), Cygnus columbianus,* and *Bucephala clangula*. The lake is home to the protected algae species *Najas minor (III)* and *Najas marina (IV)*.

H. Currently, this area is heavily waterlogged, consists of depleted soil, is not used for agriculture, and is overgrown with young forests (alder and birch groves). It serves as a buffer zone for the Dubavoe Mire. The emerging forests and reeds bind some of the minerals entering the peatland through the bypass channels. Despite the completely transformed ecosystems, the following protected species have been recorded here: Eurasian Bittern *Botaurus stellaris (III)*, Little Bittern *Ixobrychus minutus (III)*, Whiskered Tit *Panurus biarmicus (IV)*, Short-eared Owl *Asio flammeus (IV)*, Common Crane *Grus grus (III)*, *Euphydryas maturna (IV)*, *Bombus muscorum (III)*, *Dytiscus latissimus (III)*, *Carex umbrosa (IV)*, and *Gentiana cruciata (III)*.

I. This site is primarily composed of mixed-age pine stands, as well as swampy black alder forests and open lowland mires, all small in area. Of particular interest is the lowland that runs from northeast to southwest along the western edge of the site. This lowland may be the valley and bed of a now-disappeared river that carried water to Lake Orekhovets. It is along the edge of this valley that it is proposed to form the boundary of the national park in this place. There is no survey data available for this site.

J. The site is located on the eastern bank of the Beloozersky Canal, and most of it is within the border protected line. The site forms a single forest-swamp complex with the Radastauski Nature Reserve, with limited economic activity. It features typical broadleaf and narrowleaf partially swampy forests, as well as pine forests in the northern part of the site. There are no records of rare protected animal and plant species. Detailed study is required.

K. The site consists largely of land abandoned for agricultural use due to its inaccessibility and sparse population. Nowadays, it represents the reclaimed northern part of the Dubavoe Mire, overgrown with willows. This area requires rewetting.

L. The site is abandoned for agricultural use due to sparse population, low fertility, high water content, and a closed pumping station. Currently, reindeers *Cervus elaphus* are released here for subsequent adaptation. The land is gradually becoming overgrown with birch forests and shrubs. It is designated as part of a planned National Park for the purpose of creating natural biotopes. Furthermore, the area serves as the shortest corridor for mammal migration between the Great Forest, Belovezhskaya Pushcha, Sporauskie Mires, and Vygonoshchansky natural complexes.

Some data of rare species in the above-mentioned areas are taken from the iNaturalist database.

4.2.2. Great Forest: buffer zones of the proposed National Park

To more effectively protect the biodiversity of the proposed national park, buffer zones were additionally allocated to ensure the safe coexistence of rare animals and humans. Most of these buffer zones are agricultural landscapes. Coordination and communication with local agricultural enterprises will help more effectively protect the rare animal species that use these areas as migration sites or hunting grounds. On the map (Figure 27), the buffer zones are highlighted in red and numbered:

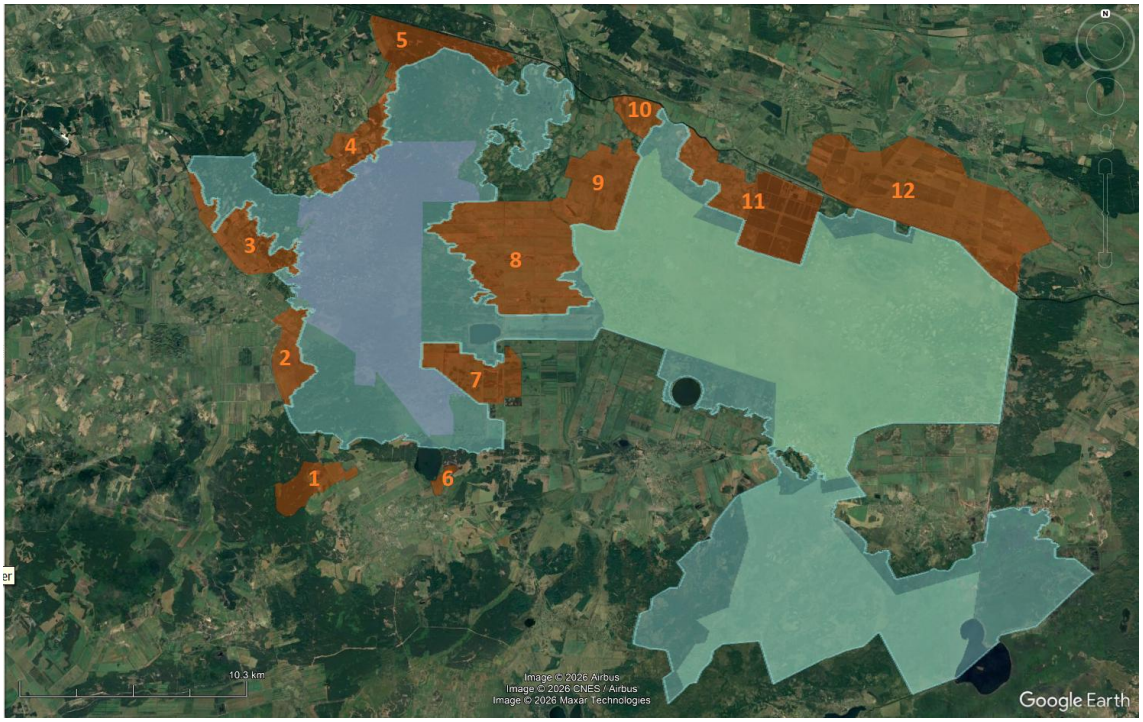

Figure 27. Buffer zones of the proposed Great Forest National Park

1. This is the nesting area of the Greater Spotted Eagle *Clanga clanga (I)* (west of the Dywin-Kobryn highway). A pair of Black Stork *Ciconia nigra (III)* also nest in the forested area to the west of the site, and a Green Woodpecker *Picus viridis (III)* has been observed during the nesting season. The agricultural lands east of the Dywin-Kobryn highway are flooded in the spring and serve as a resting place for numerous migrating Common Cranes *Grus grus (III)*, Swans (all three species stop here), and Geese. Moreover, this area is actively used by migrants for almost the entire spring season. Recommendations and consultations with land users (the Luban Agricultural Cooperative and the Dywin Forestry of the Kobrin Forestry Enterprise) will help effectively protect this valuable area of agricultural landscapes and forests.

2. This area consists of agricultural landscapes with varying degrees of cultivation. These lands are hunting grounds for protected raptor species (Greater Spotted Eagle *Clanga clanga (I)*, Lesser Spotted Eagle *Clanga pomarina (III)*, and Short-toed Eagle *Circaetus gallicus (II)*). Dozens of Cranes *Grus grus (III)* also stop here during migration, and at least three pairs of Cranes may nest here (observed in pairs or as individuals throughout the nesting season). Furthermore, this area serves as a gathering place for a large number of diurnal raptors during migration.
Clear coordination and consultation with land users will help ensure the efficient use of the land for agriculture and strengthen the spotted eagle population.

3. This agrocenosis area is a hunting ground for a pair of Lesser Spotted Eagles *Clanga pomarina (III)* and two (three) pairs of Black Stork *Ciconia nigra (III)*.

4. These agricultural lands serve as stopover and feeding sites during migration for Common Cranes *Grus grus (III)*, nesting sites for reducing the number of waders, and hunting grounds for a pair of Black Stork *Ciconia nigra (III)*. It should be noted that, thanks to the local Studinka farm, which specializes in cattle breeding, pastures have been formed in this area – biotopes that have recently become rare due to the transition to stall-based farming.

5. The buffer zone consists of mixed-age plantings in the water protection zone of the Dnieper-Bug Canal, a small reservoir on the site of a former peat mine, and agricultural land (including some not used for agriculture). The buffer zone is part of a proposed migration corridor for mammals between the Great Forest, Belovezhskaya Pushcha, and Sporauskia Mires natural complexes (the shortest distance to the Mukhavets River valley).

6. The site consists of a floodplain meadow in the north and a floodplain mire in the south, located on the southeastern shore of Lake Luban. The area is a water protection zone. Little Crake *Zapornia parva (IV)*, Corncrakes *Crex crex (IV)*, Common Redshank *Tringa totanus*, and Common Snipe *Gallinago gallinago* nest here, along with Northen Lapwing *Vanellus vanellus*, which are rapidly declining in numbers. Occasional colonial nesting of terns (black, white-winged, and whiskered tern) has been recorded. Aquatic Warbler *Acrocephalus poludicola (I)* have been recorded nesting in the floodplain mire. This area is now heavily overgrown with willows.
A typical, old-growth, swampy black alder forest is located in the northern part of the zone. Eagle Owls *Bubo bubo (II)* have been observed here, and a large colony of Grey Heron *Ardea cinerea* (120 nests) was also located here.

7. These agricultural landscapes, along with the island forests, are of great conservation value as hunting grounds for Lesser *Clanga pomarina (III)* and Greater Spotted Eagles *Clanga clanga (I)*. A pair of Greater Spotted Eagle may nest on one of the forest islands in the buffer zone. Protected orchids, such as the *Neottia ovata (IV)* and the *Cypripedium calceolus (II)*, also grow in the forests. The buffer zone includes a fenced deer nursery, where a pair of Eagle Owls *Bubo bubo (II)* nest.

8. The buffer zone consists of agricultural landscapes that serve as hunting grounds for at least three pairs of Greater Spotted Eagles *Clanga clanga (I)*, nesting both to the west and to the east of the site. In addition to Greater Spotted Eagles, a pair of *Falco tinnunculus (III)* breed and hunt here. Merlin *Falco columbarius (III)* and Red-footed Falcon *Falco vespertinus (I)* regularly stop here during migration. The northern part of the buffer zone serves as a stopover for Common Cranes *Grus grus (III)*, Swans, and Geese on their spring and autumn migrations.

9. The buffer zone serves as a resting and feeding area for various species of waterbirds during migration.

10. This buffer zone consists of scattered fields located on elevated areas. The lowlands are flooded and overgrown with forests and shrubs. A mammal migration corridor may also pass through this area, linking the southern protected areas with those further north.

11. This site is located north of the Zwanec Nature Reserve. Its western part consists of underutilized agricultural lands that are gradually becoming irrigated and overgrown with shrubs and young forests. The eastern part of the site is represented by the Dneprobugski fish farm. The western part contains Black Grouse *Lyrurus tetrix* leks, and the fish farm serves as a stopover site for large flocks of waterfowl and shorebirds during spring and autumn migration. Rare species such as the Ferruginous Duck *Aythya nyroca (I)*, the Red-necked Grebe *Podiceps grisegena (IV)*, and the Grey Goose *Anser anser* may also nest here.

12. This site is the drained northern part of the Dubavoe peatland. It may also be an important resting and feeding area for rare migratory birds. Further observation and research are required.

No studies have been conducted on the lands east and southeast of the Beloozersky Canal, so no buffer zones have been allocated there.

4.3. Great Forest: The Rationale for Establishing a National Park

The Great Forest nature complex, fragmented by land reclamation at the end of the last century, must be protected and developed as a unified whole. The best form of protection for this area would be the establishment of a National Park

In Belarus, there are currently only four National Parks: Belovezhskaya Pushcha, Pripyatsky, Narochansky, and Braslav Lakes. All were established in the 1990s. The most recent National Park, Narochansky, was established on July 28, 1999. Neighboring countries have significantly more National Parks. In Poland (an area 1.5 times larger than Belarus), 23 protected areas have this status, the most recent of which was also established long ago, in 2001. However, a decision has been made to establish one more National Park in 2025. Lithuania (a country three times smaller than Belarus) has only five National Parks, the most recent being established in 1991. Latvia (a country also three times smaller than Belarus) has four such protected nature areas. Ukraine, which is 2.9 times larger than Belarus, has 56 National Parks. Belarus lags significantly behind its neighbors in this form of natural area protection.

A National Park in the Republic of Belarus is a specially protected natural area declared for the purposes of preserving, restoring (reproducing) valuable natural complexes and objects, and their rational (sustainable) use in the process of

environmental, scientific, educational, tourist, and recreational activities (Law on Protected Natural Areas No. 150-3, 2018).
According to the Law on Protected Natural Areas, to establish a National Park, a natural area must meet a number of strict criteria.
There are general criteria for all protected natural areas, as well as specific ones for declaring an area a National Park.

The general criteria include:
1. The presence of typical and/or rare natural landscapes and/or biotopes;
2. Availability of habitats for wild animals and/or wild plant growth sites belonging to species included in the Red Data Book of the Republic of Belarus and/or species covered by international treaties of the Republic of Belarus;
3. Availability of regular nesting, wintering, or stopover sites during migration of wetland and other migratory bird species in numbers exceeding one percent of the national or European population of the species;
4. Availability of sites of annual concentration during seasonal migrations of at least 10,000 migratory waterbirds (waders, ducks, geese), and at least 500 common cranes;
5. Availability of spawning, feeding, and migration sites for fish belonging to species included in the Red Data Book of the Republic of Belarus and/or species covered by international treaties of the Republic of Belarus;
6. Availability of natural areas included in the national ecological network;
7. The presence of natural water bodies and landforms that are unique or rare in their origin, morphometric, and/or other characteristics.

Special criteria include:
1. A significant portion of the natural area has been virtually undisturbed by human activity for the past 50 years or more;
2. Typical and rare natural landscapes and biotopes make up at least 50 percent of the natural area;
3. The natural area is home to at least 30 species of wild animals and/or at least 30 species of wild plants, listed in the Red Data Book of the Republic of Belarus and/or species covered by international treaties of the Republic of Belarus;
4. The natural area contains natural complexes and sites with high tourism and recreational potential.

A natural area can be designated as a National Park if it meets at least three general and three specific criteria.
Next, let's check whether the Great Forest nature complex meets the above criteria.

4.3.1. Great Forest: compliance of the proposed National Park with the general criteria for a protected area

Knowing the boundaries of the proposed protected area, it is possible to assess its compliance with the key criteria of the law on specially protected natural areas.

Presence of typical and/or rare natural landscapes and/or biotopes
All three nature reserves—Dywin-Vialiki Les, Zwanec, and Radastauski—located in the study area contain typical and rare biotopes and typical natural landscapes.

Dywin-Vialiki Les Nature Reserve
Research conducted within the 1997 boundaries of the reserve (3,851 hectares) from 1997 to 2007 revealed the presence of the following rare biotopes: rare forest communities covering an area of 74.2 hectares, communities with complex composition and structure covering 109.6 hectares, and lowland sedge mires covering an area of 477 hectares (Mikhalchuk, 2007).
No further targeted research has been conducted here.

Most of the reserve is represented by typical landscapes - flat undulating with fragments of aquatic-glacial plain, broadleaf-pine and downy birch forests, non-floodplain meadows, mires, as well as flat lake-mire landscapes with open and mires on peatlands soils.

Zwanec Nature Reserve
Various rare and unique ecocenoses have formed within the reserve, including those subject to international protection (EEC Habitat Directive). These include:
- inland dunes with meadows abundantly covered with *Corynephorus canescens* and *Agrostis sp.*;
- meadows dominated by Nardus on siliceous substrates, in Belarus on podzolic soils;
- molinia meadows (*Molinia*) on carbonate, peat, and silt-clay soils;
- calcareous lowland mires with *Cladium mariscus* and *Caricion davallianae* species;
- molinia meadows (*Molinia*) on carbonate, peat, and silt-clay soils.
Typical Belarusian communities make up the majority of the reserve and include lowland and transitional mires, open meadows, shrub communities, and forest communities. The latter, within the state forest fund, are represented by formations of Pine *Pinus sylvestris*, oak *Quercus robur*, Ash *Fraxinus excelsior*, Hornbeam *Carpinus betulus*, Birch *Betula sp.*, Black Alder *Alnus glutinosa*, and Willow *Salix sp.*, with a predominance of birch forests (3,685.2 hectares, or 60.2%) and willow forests (1,257.2 hectares, or 20.5%). Pine forests occupy 562.6 hectares, or 9.2%, of the reserve's forested lands. The share of broad-leaved forests is only 1.3% of the forested land, or 78.2 hectares, of which one section each is dominated by hornbeam and ash (0.7 hectares each), the rest are upland oak groves (76.8 hectares). Black alder forests account for 8.7%, or 531.1 hectares, while aspen forests account for only 0.1%, or 5.6 hectares (Zwanec MP, 2015).
Typical biotopes account for approximately 40% of the reserve. The entire reserve is a typical flat lake-mire landscape with open mires on peatlands soils.

Radastauski Reserve
Rare and typical communities cover a total area of 2,006 hectares (Radastauski MP, 2025):

- tall and uneven-aged pine forests on highly preserved mineral soils;
- tall oak groves;
- native mature pubescent birch and black alder swampy forests;
- sedge and wild rosemary pine forests;
- forest patches along the banks of lakes and streams;
- large systems of lowland and transitional mires;
- habitats of protected flora species are not included in the above-mentioned biotopes.

The entire territory of the reserve is a typical rolling-valley landscape with dunes, black alder forests, non-floodplain meadows, and mires.

The typical and rare biotopes and landscapes of this area are discussed in more detail in the next section.

Availability of wildlife habitats and/or wild plant habitats belonging to species listed in the Red Data Book of the Republic of Belarus and/or species covered by international treaties of the Republic of Belarus.

Almost all entire territory of the proposed National Park within its boundaries contains a high density of habitats for protected plants and animals.
A more detailed description of the distribution of protected plant and animal species is provided in the next section.

Availability of regular nesting, wintering, or stopover sites for wetland and other migratory bird species exceeding one percent of the national or European population.

A number of protected bird species nest within the proposed National Park, with numbers exceeding one percent of the national population.

<u>These include:</u>
- Aquatic Warbler *Acrocephalus poludicola (I)* (1,750 singing males, representing approximately 60% of the national population (Zwanec MP, 2025));
- Greater Spotted Eagle *Clanga clanga (I)* (seven known nesting sites, representing 4.4-5.8% of the national population, with an estimated population of 120-160 pairs (Dambrouski, 2013, APB release, 2019));
- Common Crane *Grus grus (III)* inhabits small marshy mosaics, large sedge-reed mires, and drained lands used for perennial agricultural grasses. The breeding population is estimated at 80–155 pairs (IBA 2015, Zwanec MP 2015, Radastauski MP 2025), which is 10% of the total number of Common Cranes in Belarus (Belarus Red Data List, 2015);
- Black Stork *Ciconia nigra (III)* (25–35 pairs (own counts, Zwanec MP, 2015, Radastauski MP, 2025), which is approximately 1% of the national population (Pakul, 2024));
- Euroasian Bittern *Botaurus stellaris (III)* (60–115 lekking males (IBA 2015, Zwanec MP, 2015, Radastauski MP, 2025), which is 6% of the national population (Belarus Red Data List, 2015)

Presence of sites where at least 10,000 migratory waterbirds (waders, ducks, geese) and at least 500 common cranes congregate annually during seasonal migrations.

During seasonal migrations, the majority of migratory waterfowl congregate in reservoirs (Lake Luban, Orekhovskoye Reservoir, Dneprobuhskoye Reservoir, Dneprobuhskij Fish Farm). Approximately 5,000 birds can congregate there at one time (according to personal counts).
The study area is highly valuable as a resting place for Common Cranes *Grus grus (III)* and three species of swans. During migrations, up to 5,000 Cranes can congregate at various locations within the natural complex at one time, sometimes with flocks various species of Geese (up to 1,000 individuals in a single flock), as well as approximately 400 swans, including 100-120 Bewick's swans *Cygnus columbianus* (personal observations, IBA 2015).

Spawning, feeding, and migration sites for fish species listed in the Red Data Book of the Republic of Belarus and/or species covered by international treaties to which the Republic of Belarus is a party.

Since the study area is primarily composed of peatlands and forests, spawning, feeding, and migration sites for protected fish species were not identified in this area.

The presence of natural water bodies and landforms unique or rare in their origin, morphometric, and/or other characteristics.

The natural complex includes one of Europe's largest mesotrophic fens, preserved in a relatively unaltered state.
The study area also comprises a depression-carbonate complex, which forms a rare flora biocenter (Mikhalchuk Regional Biosphere Reserve).
The eolian ridges located on the southern borders of the proposed National Park are also considered unique landscapes of Belarus (Martsinkevich, 2022).

From the above, it follows that the area of the proposed Great Forest National Park meets six of the seven general criteria for a protected area.

4.3.2. Great Forest: Compliance of the proposed National Park with the special criteria for a National Parks Republic of Belarus

A significant portion of the natural area has remained virtually undisturbed by human activity for the past 50 years or more.
Currently, there is virtually no human activity other than forestry within the designated area of the proposed National Park. Only small patches of agricultural fields are located in the western part—a total of approximately 300 hectares. In the central part, in areas of the ecological corridor and permanent residence of Common Cranes *Grus grus (III)*, there are 630 hectares of active agricultural

lands. The lands of the Zwanec Nature Reserve and its surrounding areas comprise approximately 150 hectares. No agricultural lands have been found within the Radastastauski Nature Reserve or its adjacent areas.
In the mid-20th century, the study area was populated by farmsteads, which means these areas were subject to relatively high anthropogenic pressures—primarily hayfields, localized deforestation, pastures, and small patches of fields on non-flooded islands. With the development of electrification, the expansion of agricultural land through the drainage of peatlands, and the urbanization of rural settlements, the population gradually abandoned farmsteads and moved to villages. The Dywin-Vialiki Les Nature Reserve ceased to be inhabited by the late 1970s, although about a dozen farmsteads still exist; most of them located near the villages of Khabovichi and Rukhovichi. Until the early 2000s, moonshine was actively practiced on the forest islands, and haymaking was carried out in the marshy areas near Lake Luban.

People ceased actively using the lands of the Zwanec Nature Reserve in the mid-1990s, and by the 2000s, they had almost completely abandoned the area. Only small plots of agricultural fields remained in active use until the 2020s on the southern, southeastern, and northern borders of the reserve.
There was virtually no farming in the Radastauski Nature Reserve and adjacent territories.

These conclusions were reached after analyzing detailed topographic maps from the 1860s, 1915, 1925, and 1933, aerial photographs from 1944, as well as satellite images of the Earth since 1984.
Over the past 30 years, logging has primarily occurred in the northwestern (near the Bolota and Girsk villages), northern (on the aeolian ridges between the Girsk and Rudec villages), and southwestern (near the Razhnoe village) parts of the study area. Clearcutting was also conducted in oak forests near the Velichkovichi village, on parts of some islands of reclaimed land belonging to the Dneprobugsky Agricultural Production Cooperative, and in black alder forests near the Dywin village. It's worth noting that peat mining was conducted in some areas (near Lake Luban, the villages of Girsk, Oniskovichi, Khabovichi, and Pawicce).

Considering the above-mentioned anthropogenic impacts, as well as the fact that the territory of the planned National Park includes flooded, shrubby lands unused for agriculture, the area virtually undisturbed by human activity over the past 50 years or more can be estimated at 27,800 hectares, which is 61% of the total area.

Typical and rare natural landscapes and biotopes make up at least 50 percent of the natural area.
The territory of the proposed Great Forest National Park consists of preserved standard areas of alluvial-lacustrine and alluvial-terraced peatland complexes. According to the Landscape Map of the Republic of Belarus (2015), the territory of the planned Great Forest National Park is formed by the following landscapes:

1. Lacustrine-alluvial with broadleaf-pine forests on sod-podzolic, often waterlogged soils, parvifoliate forests and mires on peatlands soils, partially plowed:
1.1. Flat with pine, broadleaf-pine, downy birch forests and mires;
1.2. Flat with aeolian ridges, pine, broadleaf-pine, downy birch and black alder forests, and mires;
1.3. Flat undulating with fragments of aquiglacial plain, broadleaf-pine, downy birch forests, non-floodplain meadows, and mires;
2. Lake-peatland with parvifoliate forests, meadows, and mires on peatland soils, partially plowed:
2.1. Flat with mineral remnants, pine and downy birch forests, non-floodplain meadows, and mires.
3. Alluvial-terraced with pine, broadleaf-pine, and oak forests on sod-podzolic, often waterlogged soils, parvifoliate forests, meadows, and swamps on peatland soils, with limited cultivation:
3.1. Rolling-hollow with dunes, black alder forests, non-floodplain meadows, and mires.

Typical landscapes include 1.3, located in the northern part of the Dywin-Vialiki Les Nature Reserve and adjacent territories (2.5.2, Rules for Identifying Typical/Rare Biotopes and Landscapes, 2021), and 1.2 for the all area of the Radastauski Nature Reserve and adjacent territories (2.5.1).
The Zwanec Nature Reserve and the central, southern, and eastern parts of the Dywin-Vialiki Les IBA fully correspond to a flat lake-peatland landscape with open mires on peatlands soils. This landscape type is also classified as typical (2.6.3); on the landscape map (2015), this territory is represented as 2.1.
Landscape 3.1 is located along the eastern boundary of the Radastauski Nature Reserve and extends eastward, including territories adjacent to the reserve, included in the potential National Park. This landscape is also classified as typical (2.4.2).
The western part of the Dywin-Vialiki Les Nature Reserve and adjacent territories are represented by landscapes of type 1.1, which do not correspond to rare and typical landscapes.

Thus, virtually the entire territory of the planned National Park is represented by intact typical landscapes subject to protection.

Rare and typical biotopes are described only for the Zwanec (Zwanec MP, 2025) and Radastauski (Radastauski MP, 2025) nature reserves. A description of rare biotopes in the Dywin-Vialiki Les Nature Reserve was prepared by N.V. Mikhalchuk's working group before 2007 (Mikhalchuk, 2007), but this data is outdated, as the identified types of rare/typical biotopes have changed, and the studies were conducted for a reserve with an area of 3,851 hectares, which is less than half of the proposed area. In addition, some areas of typical biotopes were described and designated for protection in the 2020s by Yury Yankevich (unpublished).

The 2025 Zwanec Nature Reserve Management Plan only provides a schematic map of rare and typical biotopes, without detailed descriptions. It shows that typical biotopes (sedge fens (5.9 Rules for Identifying Typical/Rare Biotopes and Landscapes, 2021)) and rare biotopes (molinia meadows (4.5)) make up approximately 40% of the entire reserve (Figure 28)

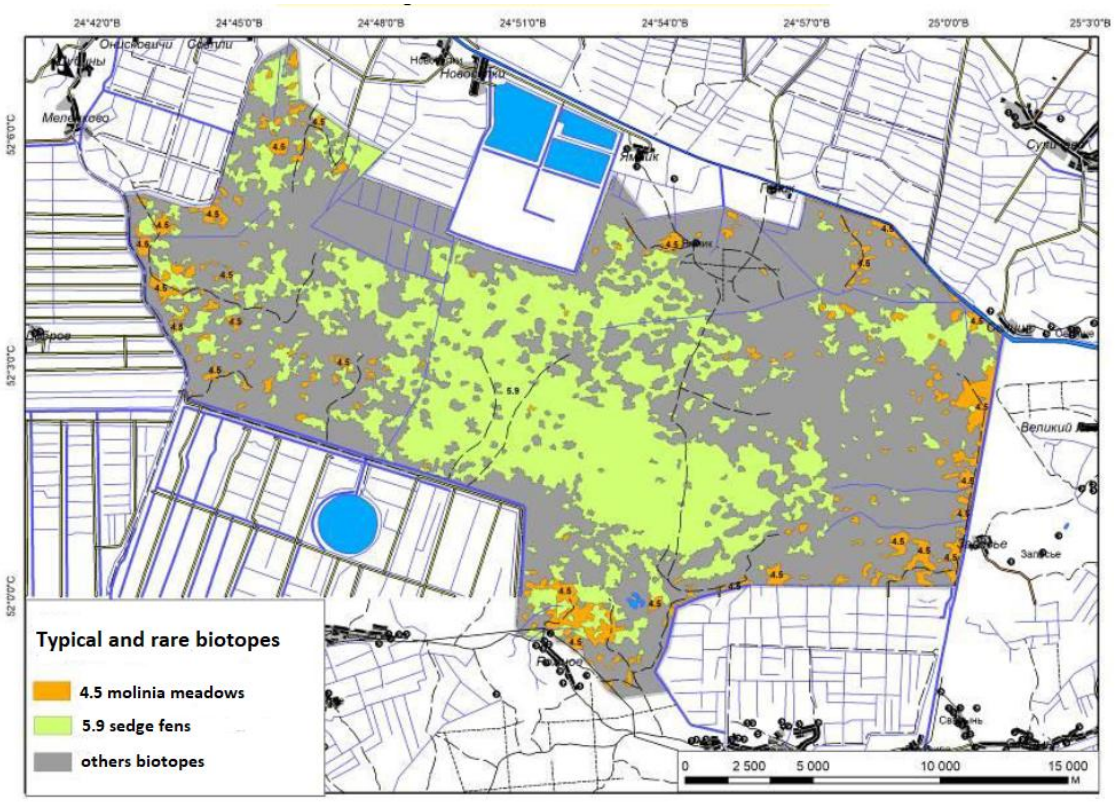

Figure 28. Zwanec: typical and rare biotops of the state natural reserve

Resurse: Zwanec Nature Reserve Management Plan, 2025

The Radastauski Nature Reserve Management Plan (2025) describes particularly valuable plant communities, including rare/typical biotopes. These particularly valuable plant communities are located over an area of 2,006 hectares, accounting for 29.6% of the reserve area (Figure 29). These include:

- Tall and uneven-aged pine forests on highly preserved mineral soils occupy 245.9 hectares (6.11B, Rules for identifying typical/rare biotopes and landscapes, 2021);
- Old-growth oak forests (6.6) – 2.9 hectares;
- Native old-growth pubescent birch and black alder swampy forests (6.5) – 1,473.2 hectares;
- Rare forest communities on raised bogs (6.7) – 12 hectares;
- Forest communities of complex composition and structure, not included in higher categories – 272 hectares;
- Forest areas along the banks of reservoirs and streams – no area data;
- Large ecosystems of lowland and transitional mires – 360.6 hectares;

- Habitats of protected plant species listed in the Red Data Book of the Republic of Belarus and not included in higher categories – no area data.

Of these, typical biotopes occupy an area of 1,734 hectares, which is 26% of the Radastauski Nature Reserve.

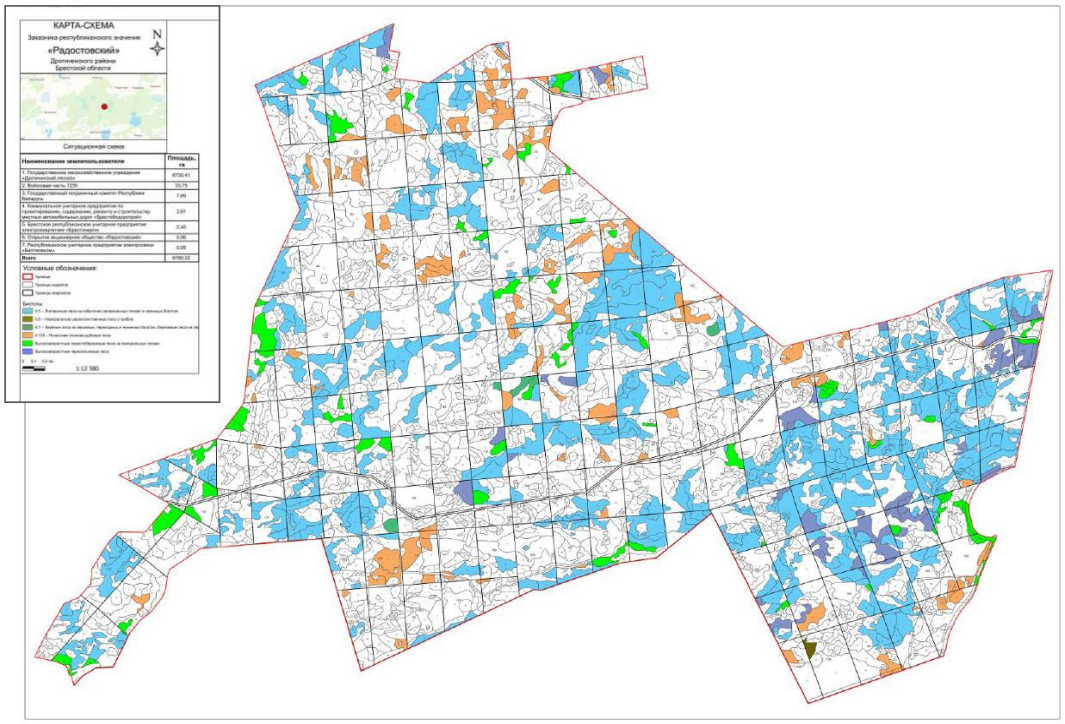

Figure 29. Radastauski Nature Reserve: Distribution of typical biotopes

Resurse Radastauski Nature Reserve Managment Plan, 2025

The adjacent territories located east of the Beloozerski Canal are biotopically similar to the eastern part of the Radastauski Nature Reserve and require detailed research.

Therefore, based on the data available as of 2025, it is difficult to accurately determine what proportion of the total area of the proposed National Park is occupied by rare and typical biotopes. Such research will be ongoing.

At the same time, the proportion of rare/typical biotopes, together with typical landscapes, constitutes at least 80% of the territory within the boundaries of the proposed National Park, which fully meets this criterion.

The natural area is home to at least 30 species of wild animals and/or at least 30 species of wild plants listed in the Red Data Book of the Republic of Belarus and/or species covered by international treaties of the Republic of Belarus.

Despite large-scale land reclamation and human economic activity, the Great Forest natural complex has not lost its value.
It was previously mentioned that three nature reserves are located within the Great Forest natural complex. All serve to preserve biodiversity and landscapes. The reserves are characterized by varying levels of study.

The Radastauski State Nature Reserve is one of the first established in what is now Belarus. It was established on August 22, 1976, with the aim of preserving medicinal plants, *Arctosaphylos uva-ursi, Convallaria majalis*, *Frangula alnus*, and *Valeriana officinalis*. Over time, the reserve was transformed into a landscape reserve (December 27, 2007) with the aim of preserving natural peatland-meadow and forest lands and stabilizing the hydrological regime.

Unfortunately, there are few publications on work conducted directly within the reserve, and botanists often combine the Zwanec and Radastauski reserves into a single floristic complex (A.N. Myalik, O.A. Galuts, 2020), while there are no precise indications of the flora growing within the reserve's boundaries. A management plan for the reserve was only published in 2025. It is quite detailed, describing the biotopes, rare species of flora and fauna, and measures taken to protect and attract tourists. Despite this, the reserve remains poorly studied. Having analyzed the reserve's management plan and other reports (information from iNaturalist, personal communications from Yury Yankevich (2021-2025) and Andrey Abramchuk (2025)), it can be noted that 12 protected flora species (Table 3) and 23 protected fauna species (Table 4) are currently known to grow in the reserve, three of which have only been recorded during migration. From the ornithological section, it follows that an Osprey *Pandion haliaetus (II)* was observed once during migration on April 1, 2004, outside its nesting range. The Lesser Spotted Eagle *Clanga pomarina (III)* population is estimated at minimum three pairs. A *Greater Spotted Eagle Clanga clanga (I)* nest was found near Lake Belae between 2004 and 2006 (personal communication from Valery Dambrouski, 2011). The Hobby *Falco subbuteo (IV)* was observed in the reserve once, on July 7, 2006. A Eurasian Curlew *Numenius arquata (II)* was observed migrating on April 1, 2004, and was determined to be a non-breeding species in the reserve. A Black Stork *Ciconia nigra (III)* nest was discovered in August 2021 by Yury Yankevich (personal information, Aug.2021). He also found habitats for *Salvinia natans (IV)* and *Veratrum lobelianum (III)*, and identified some typical biotopes. To protect these species and biotopes, conservation passports were issued and submitted to the Ministry of Natural Resources.
Of interest are the cases of Bears *Ursus arctos (IV)* entering the reserve from Ukraine in 2025, as well as the presence of Lynxes *Lynx lynx (IV)* within the reserve. This information was discovered thanks to the work of the border service.

The Zwanec national reserve is the most studied of the three. The great attention of scientists to this natural site is primarily due to international concern about the problem of the population decline of the Aquatic Warbler *Acrocephalus paludicola (I*) and long-term funding of projects to restore peatlands in the Republic of Belarus, including in the Zwanec Nature Reserve.

Based on the data what was found in literary sources, 36 species of rare protected plants and fungi have been recorded within the reserve in various years (Red Data Book of Belarus, 2025). The 2009 Management Plan provides a list of protected plant species from 23 species included in the Red Data Book of the Republic of Belarus (2005), the growth of which within the territory of the Zwanec Landscape Reserve has been reliably established and documented (the materials are stored in the Herbarium of the Institute of Experimental Botany of the National Academy of Sciences of Belarus). The presence of 23 species of protected plants is also confirmed by the latest Management Plan, dated September 30, 2025, while the 2015 Management Plan lists 27 species of protected plants. In this regard, it is worth noting that since 2009, the Red Data Book of the Republic of Belarus has been edited twice, and the list and conservation status of plants and animals in it have changed. Moreover, over the next fifteen years, research was conducted, and new protected species and new territories for known species were discovered. With the development of digital photography, the presence of herbarium material is, in most cases, not necessary for accurate identification. Furthermore, some biotopes have changed over time, which could have led to the extinction of populations of already known rare protected plants.
Despite the variable processes in the phytocenoses of the reserves, information on the presence of rare protected plants present in these territories in different years gives hope for their discovery in other locations, even if they disappear from existing ones.

The table of rare protected plant species includes data from published scientific articles and documents, as well as plants transferred and being transferred under protection, posted in the iNaturalist app.

The Dywin-Vialiki Les local reserve has also been studied in considerable detail for rare flora species. It should be clarified that the study area of this floral complex extends beyond the boundaries of the reserve and includes reclaimed island forests near the eastern boundary of the reserve, as well as Yahmin Forest near the western boundary of the reserve. A total of 39 flora species listed in the 2025 edition of the Red Data Book of the Republic of Belarus were identified. According to scientists, the information on *Cephalanthera longifolia (III)* is outdated and requires reconfirmation.

Despite the roughly equal number of protected flora species in the Zwanec and Dywin-Vialiki Les reserves, their diversity differs. A total of 53 protected plant and fungi species have been identified in the flora of the proposed Great Forest National Park (Table 3).

id	Category	DVL	Zwanec	Radastauski
Salvinia natans	4(LC)	*	*	*
Corydalis cava	3	*	*	
Cardamine bulbifera	4	*	*	*
Allium ursinum	3(LC)	*	*	

Veratrum lobelianum	3	*	*	*
Neottia ovata	4(LC)	*	*	
Cypripedium calceolus	2(LC, NT-EU)	*	*	*
Cephalanthera rubra	3(LC-EU)	*	*	*
Fistulina hepatica	2	*		
Ganoderma lucidum	3	*		
Calvatia gigantea	4	*	*	
Grifola frondosa	3	*		
Polypodium vulgare	4(LC)	*		
Cucubalus baccifer	4	*	*	
Hypericum tetrapterum	1	*	*	
Hydrocotyle vulgaris	1(LC)	*		
Gentiana cruciata	3(LC)	*	*	
Pedicularis sceptrum-carolinum	2	*	*	
Melittis sarmatica	3	*		
Prunella grandiflora	3	*	*	
Crepis mollis	3	*	*	*
Lilium martagon	4(LC)	*		
Iris sibirica	4(NT)	*	*	*
Epipactis atrorubens	3(LC)	*		
Gymnadenia conopsea	3(LC)	*	*	
Platanthera chlorantha	4(LC)	*	*	*
Carex umbrosa	4(LC)	*	*	*
Bromopsis benekenii	2	*		
Orchis mascula	2(LC)	*		
Salix myrtilloides	3	*	*	
Campanula latifolia	4	*		
Parnassius mnemosyne	3(LC)	*		
Carex davalliana	1(LC)	*	*	
Cephalanthera longifolia	3(LC)	not confirmed		
Gentianella amarella	2		*	
Lithospermum officinale	2		*	
Arctium nemorosum	2		*	
Dactylorhiza majalis	3(LC)		*	
Carex heleonastes	1(DD)		*	
Eriophorum gracile	3(NT)		*	
Saxifraga hirculus	1(LC, DD-EU)		*	
Tofieldia calyculata	1		*	
Betula humilis	3(LC)		*	
Gladiolus imbricatus	4		*	
Salix lapponum	4		*	*
Drosera intermedia	3(NT)		*	
Pseudocalliergon lycopodioides	2(VU)	*	*	

Najas marina	4(LC)	*		
Najas minor	3(LC)	*		
Fomitopsis rosea	3	*		
Thesium ebracteatum	4(LC)		*	*
Campanula cervicaria	4	*		
Pulmonaria angustifolia	4		*	*

Table 3. Great Forest: flora protected species (Belarus Red Data Book, 2025)

The fauna of the Zwanec Nature Reserve has been studied in more detail than that of the Dywin-Vialiki Les Reserve. The latter study focused primarily on vertebrates. Despite this, both areas demonstrate their importance for the conservation of faunal diversity. It should be clarified that the Dywin-Vialiki Les Nature Reserve in this case falls within the boundaries of an Important Bird Area (IBA) (Figure 19), while Zwanec Nature Reserve includes the Dneprabuhski Fish Farm, as noted in the table.

Because many invertebrate groups have been studied in detail in the Zwanec Nature Reserve, the list of protected species includes 69 species, of which nine were temporarily present there, did not nest, or their nesting is questionable (*Falco vespertinus (I)*). At the same time, the Dywin-Vialik Les Nature Reserve is represented by 45 protected species, mainly vertebrates, 12 of which are most likely encountered only during migration, or temporarily visited the reserve (Table 4):

id	Category	DVL	Zwanec	Radastauski
Meles meles	4(LC)	*	*	*
Muscardinus avellanarius	4(LC)	*		
Clanga clanga	1(VU)	*	*	*
Haliaeetus albicilla	3	no nesting	*	*
Circaetus gallicus	2(LC)	*	*	
Bubo bubo	2(LC)	*	*	*
Circus cyaneus	3(LC)	possibly nesting	possibly nesting	
Ciconia nigra	3(LC)	*	*	*
Botaurus stellaris	3(LC)	*	*	*
Grus grus	3(LC)	*	*	*
Picus viridis	3(LC)	*		*
Crex crex	4(LC)	*	*	*
Clanga pomarina	3(LC)	*	*	
Dendrocopos leucotos	4(LC)	*		*
Carabus violaceus	4	*	*	
Falco subbuteo	4(LC)	*	*	*
Streptopelia turtur	4(VU)	*	*	
Acrocephalus paludicola	1	*	*	
Tringa nebularia	3(LC)	no nesting		
Numenius arquata	2(NT)	no nesting	*	no nesting
Liocola marmorata	2(LC)	*	*	*

Parnassius mnemosyne	2(LC)	*	*	
Euphydryas aurinia	2(LC)	*	*	
Euphydryas maturna	2(VU-EU)	*	*	
Coenonympha oedippus	2(NT)		*	
Chariaspilates formosaria	2		*	
Gagitodes sagittata	2		*	
Pericallia matronula	2		*	
Rhyparioides metelkana	2		*	
Arytrura musculus	2		*	
Diachrysia zosimi	3		*	
Carabus menetriesi	2	*	*	
Dolomedes plantarius	2(VU)		*	*
Gerris sphagnetorum	3		*	
Dytiscus latissimus	3(VU)		*	
Coenagrion armatum	2(LC)		*	
Nehalennia speciosa	2(VU)		*	*
Aeschna viridis	2(LC,NT-EU)		*	
Barbus barbus	2(LC)		*	
Vimba vimba	2(LC)		*	
Triturus cristatus	2(LC)	*	*	*
Emys orbicularis	2(NT)		*	*
Pandion haliaetus	2(LC)		no nesting	no nesting
Falco tinnunculus	2(LC)		*	*
Falco vespertinus	2(VU)		not defined	
Zapornia parva	2(LC)	*	*	
Gallinago media	2(NT-GL, LC-EU)		*	
Asio flammeus	2(LC)		*	
Alcedo atthis	2(LC)	*	*	
Lynx lynx	2(LC)		visited	*
Carabus nitens	2		*	
Bombus muscorum	2(VU)		*	
Bufo calamita	2(LC)		*	
Milvus migrans	2(LC)	no nesting	no nesting	
Cyanistes cyanus	2(LC-GL,NT-EU)	no nesting	no nesting	no nesting
Aythya nyroca	2(NT-GL,LC-EU)		Dnieprabuhski fishfarm	
Larus canus	2(LC)		Dnieprabuhski fishfarm	
Panurus biarmicus	2(LC)	*	*	
Nycticorax nycticorax	2(LC)		Dnieprabuhski fishfarm	
Miliaria calandra	2(LC)	*		
Coracias garrulus	2(LC)	*		
Strix nebulosa	2(LC)	*		*
Ursus arctos	4(LC)	visited		*

Mustela erminea	4(LC)	*	*	*
Carabus coriaceus	4			*
Protaetia speciosissima	4(LC)			*
Gnorimus nobilis	2(LC)			*
Ficedula albicollis	4(LC)	*	*	
Carabus clathratus	3		*	
Chlaenius costulatus	2		*	
Chlaenius quadrisulcatus	1		*	
Graphoderus bilineatus	3(VU)		*	
Ixobrychus minutus	3(LC)		*	
Limosa limosa	3(NT)	*	*	
Parnassius mnemosine	3(LC)	*	*	
Phengaris nausithous	2(NT)		*	
Emberiza hortulana	2(LC)	*		
Anas acuta	3(LC-GL,VU-EU)	no nesting	no nesting	
Mergellus albellus	1(LC)	no nesting		
Mergus merganser	3(LC)	no nesting		
Merops apiaster	4(LC)	no nesting		
Falco columbarius	3(LC-GL,VU-EU)	no nesting		
Galerida cristata	4(LC)		*	
Calidris pugnax	3(LC)		no nesting	
Charadrius hiaticula	2(LC)		no nesting	

Table 4. Great Forest: fauna protected species (Belarus Red Data Book, 2025)

To compile a list of protected plant and animal species, articles and reports were used and analyzed. Main authors of wich:

Yu. Pivovarova (Pivovarova and Ostrovsky, 2023; Pivovarova and Ostrovsky, 2023; Pivovarova and Ostrovsky, 2024), A. Myalik, Yu. Yankevich (Myalik and Yankevich, 2023), N. Mikhalchuk (Mikhalchuk et al., 1997; Mikhalchuk, 2007), A. Kulak, R. Yakovlev (Kulak&Yakovlev, 2015), A. Semenyak (Semenyak, 2020), A. Kaminskaya (Kaminskaya, 2014), M. Moroz, S. Chakhorovsky, K. Levandovsky, P. Buchinsky (Moroz et al., 2002), K. Makovetskaya (Makovetskaya, 2016), D. Dubovik, A. Skuratovich (Dubovik&Skuratovich, 2009), A.Sudnik, I.Stepanovich, I.Rudakovsky, R.Galushko (Sudnik et al., 2018), A.Yatsyna, S.Kondratyuk (Yatsyna&Kondratyuk, 2013), S.Kulczynski (1940), as well as information confirmed and published by the Belarusian Ornithofaunistic Commission (Subbuteo bulletins), from A.Abramchuk, D.Zhuravlev, O.Papeiko, M.Dmitryonok, Yu.Bakur, V.Prokopchuk, S.Levoy, S.Abramchuk, A.Serbun, D.Kitel, V.Fenchuk, S.Ostapuk, O.Kalchenko, D.Shamovich, M. Koloskova, as well as Management Plans for the Zwanec Nature Reserves 2009, 2015, 2025, and Radastauski 2025 (see List of Literature & References).

Based on the literature, it can be confidently stated that the proposed Great Forest National Park area is particularly valuable for preserving the biodiversity of a natural area. As of 2025, its fauna provided 85 protected animal species, and its flora 53 protected plant and fungi species, which fully complies with the third criterion for the creation of a National Park. However, it should be noted that some species on this list could have become extinct, such as *Aythya nyroca (I)* in the ponds of the Dneprabuhski fish farm, or *Carex davalliana (I)* in some places of Zwanec Reserve. The nesting of the Red-footed Falcon *Falco vespetinus (I)* is highly questionable, although it is regularly encountered during migration.

Most species listed in the Red Data Book of the Republic of Belarus have international protection status (UICN Red List, 2025-2). Twelve species of flora and fauna in the Great Forest are classified as Near Threatened (NT), while 13 species are classified as Vulnerable (VU). It should be noted that the tables provided do not represent all the flora and fauna of the study area, due to the complexity and labor-intensive nature of the comparison process. This article only compared species listed in the Red Book of the Republic of Belarus. Species without state responsibility may also have international protection. For example, *Prunella vulgaris*, a common species in Belarus, is listed as a species of Least Concern (LC), while *Prunella grandiflora (III)*, protected in Belarus, has no international protection. Similarly, the Nothern Lapwing *Vanellus vanelus*, wich rapidly declining in numbers across Europe and is currently listed as Near Threatened (NT), has no conservation impact in Belarus.
Despite this, the presence of 13 Vulnerable, 12 Near Threatened, and one Endangered species in the study area once again demonstrates national and international significance, as well as the need for a more detailed and comprehensive study of the natural area (Table 5).

data deficient	least concern (flora)	least concern (fauna)	near threatened	vulnerable	endangered
Carex heleonastes	Salvinia natans	Meles meles	Cypripedium calceolus(EU)	Pseudocalliergon lycopodioides	Agabus clypealis
	Allium ursinum	Muscardinus avellanarius	Iris sibirica	Clanga clanga	
	Neottia ovata	Circaetus gallicus	Eriophorum gracile	Streptopelia turtur	
	Cypripedium calceolus	Bubo bubo	Numenius arquata	Acrocephalus paludicola	
	Cephalanthera rubra(EU)	Circus cyaneus	Coenonympha oedippus	Euphydryas maturna(EU)	
	Polypodium vulgare	Ciconia nigra	Aeschna viridis(EU)	Dolomedes plantarius	
	Hydrocotyle vulgaris	Botaurus stellaris	Emys orbicularis	Dytiscus latissimus	
	Gentiana cruciata	Grus grus	Gallinago media	Nehalennia speciosa	
	Lilium martagon	Picus viridis	Cyanistes cyanus(EU)	Falco vespertinus	
	Epipactis atrorubens	Crex crex	Aythya nyroca	Bombus muscorum	
	Gymnadenia conopsea	Clanga pomarina	Limosa limosa	Graphoderus bilineatus	
	Platanthera chlorantha (EU)	Dendrocopos leucotos	Phengaris nausithous	Anas acuta(EU)	
	Carex umbrosa	Falco subbuteo		Falco columbarius(EU)	

	Orchis mascula	Tringa nebularia			
	Parnassius mnemosyne	Liocola marmorata			
	Carex davalliana	Parnassius mnemosyne			
	Cephalanthera longifolia	Euphydryas aurinia			
	Nymphaea alba	Coenagrion armatum			
	Dactylorhiza majalis	Aeschna viridis			
	Saxifraga hirculus	Barbus barbus			
	Betula humilis	Vimba vimba			
	Drosera intermedia	Triturus cristatus			
	Thesium ebracteatum	Pandion haliaetus			
	Najas marina	Falco tinnunculus			
	Najas minor	Zapornia parva			
		Gallinago media(EU)			
		Alcedo atthis			
		Asio flammeus			
		Lynx lynx			
		Bufo calamita			
		Milvus migrans			
		Cyanistes cyanus			
		Aythya nyroca(EU)			
		Larus canus			
		Panurus biarmicus			
		Nycticorax nycticorax			
		Miliaria calandra			
		Coracias garrulus			
		Strix nebulosa			
		Ursus arctos			
		Mustela erminea			
		Protaetia speciosissima			
		Gnorimus nobilis			
		Ficedula albicollis			
		Ixobrychus minutus			
		Parnassius mnemosine			
		Galerida cristata			
		Calidris pugnax			
		Charadrius hiaticula			
		Emberiza hortulana			
		Anas acuta			
		Mergellus albellus			
		Mergus merganser			

		Merops apiaster			
		Falco columbarius			

Table 5. Great Forest: international protected species (IUCN, 2025-2)

***EU – European protection status, if different from the global.**

The natural area contains natural complexes and sites with high tourism and recreational potential.

Tourist appeal is no less important for the creation of a National Park than the conservation value of the area. High demand for ecotourism helps National Parks become self-sufficient, which in turn offsets government expenditures on research and allows for increased staffing.

The proposed Great Forest National Park has high tourism and recreational potential, but unfortunately, it has been poorly realized. The study area includes a large mesotrophic sedge fen, known to naturalists not only in Belarus but throughout Europe. It consists of inaccessible, open green spaces, somewhat reminiscent of green seas. One of the main world nesting centers of the Aquatic Warbler *Acrocephalus paludicola (I)* is located here. Tourists may be attracted by both the encounter with this rare bird and the picturesque landscapes and the challenge of traversing the mire.
In addition to open sedge fens, the study area boasts beautiful broadleaf forests where tourists can relax in the quiet, away from the cities, discover rare plants and animals, and encounter wild mammals along the trails.
The open spaces of the drained areas are also attractive to nature lovers. A large variety of birds congregate here during migration, and groups of various animals leave the forests to feed. The open spaces allow for observing wildlife without disturbing them, and the abundance of main roads and the absence of traffic allow for slowly traveling through the area, stopping at interesting spots without creating accidents.
With the right infrastructure, the Dneprobugsky fish farm could also be attractive to tourists, as it is home to a large variety of waterfowls and other waterbirds that nest and stop here during migration.
Lake Luban, a natural lake with approximately ten recreation centers and a children's health camp, is also popular for camping and fishing.
There are no significant historical sites within the natural complex.

Of the three nature reserves in the study area, a state environmental institution was created only for the Zwanec State Nature Reserve, which is also responsible for the management of the Radastauski Nature Reserve. The Zwanec State Nature Reserve is responsible for the development of tourism and recreational activities in the reserves.
Since its establishment, two ecological trails, one observation tower, and an ecological center with a small hotel have been built in the Zwanec Nature Reserve. The Radastauski and Dywin-Vialiki Les Nature Reserves only have hunting facilities. Let's take a closer look at the existing tourist infrastructure.

The first two-kilometer-long nature trail, "Secrets of the Plant World," was built on the southern border of the Zvanets Nature Reserve near the Pawicce village [https://zvanec.by/ekologicheskie-tropy/ekotropa-tajny-mira-rastenij]. It consists of a small observation tower, wooden benches with a table, a simple restroom, and several information boards. The main route runs along the bypass canal, the bank of which on the Zwanec side is overgrown with reeds and shrubs. After 1,300 meters, the trail leads to a dam built to maintain the water level in the mire, blocking the bypass canal. After this, you can visit three small mineral islands where several species of protected plants grow (such as *Iris sibirica (IV)*, *Dactylorhiza majalis (III)*, and *Cypripedium calceolus (II)*). Unfortunately, the trailhead is quite unsafe to reach in a low-clearance vehicle (less than 15 cm) or in large buses. The distance to the nearest cities is 53 km (Kobryn) and 49 km (Drahiczyn).
A more sophisticated and interesting trail is the "Treasures of Zwanec mire", located in the northern part of the reserve, near the Dnepro-Bugsky fish farm [https://zvanec.by/ekologicheskie-tropy/ekotropa-sokrovishcha-bolota-zvanets].
Here, the trail is equipped with wooden boardwalks in some places, interactive and informational stands are installed along its entire length, and a large observation tower is located on the mineral island. The area around the trail is mown, preventing the spread of reeds. The 1,090-meter-long trail is quite representative – it allows you to get acquainted with the lowland sedge fen and its inhabitants. The trail is located 39 km from Drahiczyn and 40 km from Kobryn. To visit the trail, you must take a ferry across the Dnieper-Bug Canal and contact the director of the fish farm or the reserve administration in advance, as the entrance to the trail is located on the fish farm's property. Unfortunately, the trail has recently only been accessible on weekdays during business hours.
The Environmental Education Center is located in the State Nature Reserve building next to the Beloozerski Canal in the Horavica village. The Environmental Education Center offers the following services: tent and binocular rentals, tours of the ecocenter, a tour of the "Treasures of Zwanec Mire" nature trail, relaxation in gazebos, and accommodation at the Environmental Education Center [https://zvanec.by/uslugi]. The route from the State Nature Reserve building to the " Treasures of Zwanec Mire" trail is 55 km. The distance from Brest to the State Nature Reserve building is 113 km.
Thus, the Zwanec State Nature Reserve can offer only a limited range of tourist services within the reserve, primarily to organized group school excursions. Despite this, the Great Forest itself has every potential to attract large numbers of tourists if investment is made in ecotourism facilities and the area is considered as a whole.

Another ecological trail, built by the Kobryn Forestry, is located in the recreational area of Lake Luban. It passes through middle-aged pine forests and features several signs, two rest areas, and direction arrows. Unfortunately, the trail lacks information and is poorly maintained. In 2024-2025, two sections of the trail were subject to extensive logging and sand removal for the construction of a logging road.

Since the Great Forest is located quite far from major population centers, tourists are likely to visit it deliberately and purposefully, for a full day or a full weekend, rather than just for a quick stopover. To ensure their comfortable stay, it's necessary to consider recreational and environmental education options at several locations throughout the day, as well as comfortable overnight accommodations, rest areas, and dining options.

The Great Forest has high tourism potential, but unfortunately, there is little interest among tourists in visiting this natural complex. This is due to the underdeveloped tourist infrastructure, lack of advertising, and the area's remoteness from major cities.

To make the natural complex popular for tourists, it's necessary to create a network of several ecological trails in the most attractive locations. Such places are recorded during field research, such as the ecological route described above (Figure 21). Besides this route, other attractive spots include the oak groves in Yahmin Forest (an old-growth oak grove and isolated century-old trees), the "green tunnel" of trees near the Bolota village, and a small mire near the Rudec village, notable for its relief—tall hummocks reaching a meter in height, and the space between the hummocks transforming into a unique natural labyrinth during the summer and autumn low water periods. For those who enjoy longer hikes, a safe two-day route through the islands of the Dywin-Vialiki Les Nature Reserve can be organized. A second route involves traversing the Dubavoe Mire. This hike can begin in the southern part of the reserve near the Radastava village. Use the trail compacted by tractors during reed mowing, set up a campsite on one of the islands, and continue the next morning to the "Treasures of Zwanec Mire" nature trail. These hikes should only be conducted with trained guides, who will not only introduce the sights but also explain and enforce the rules of conduct in these protected areas.
Developing a network of nature trails is not enough to make a region popular; well-designed tourist attractions and places for overnight stays, rest, and meals are also necessary.
Such attractions could include, for example, European Bison *Bison bonasus (IV)* resettlement sites. To ensure road safety, prevent damage to agriculture and forests, and ensure the stability of the Bison population itself, Bison are often resettled in various suitable locations. There are currently 12 micropopulations in Belarus, but three of them significantly exceed the recommended population size (Kolosova, 2020). Within the Great Forest, there is a site ideal for the release of a small herd of European Bison (52.085717 24.612761). It is located away from heavily used highways, surrounded by a large tract of broadleaf forests and agricultural lands that are flooded during the high season and are used primarily for growing grass and mown only once a year. The presence of Bison increases tourist interest in their habitats. A good example of this is the Nalibokskaia Pushcha, where tourist interest to the place has increased significantly since the release of *Bison bonasus (IV)* and *Equus przewalskii (I)*.
Also within the Great Forest, a 110-hectare reindeer nursery, fenced with steel mesh, is located. From a nature tourism perspective, the nursery grounds could be converted into a small safari park, where animals could roam freely, and

tourists could observe them either through special fences or visit the nursery grounds in designated vehicles. Furthermore, the nursery could be used to increase the Elk *Alces alces* population in Dubavoe Mire, and a small mini-hotel of inexpensive prefabricated cabins could be built there. Guests of such a hotel would be able to observe the animals' lives firsthand, fall asleep to the animals' calls, and participate in feeding and other activities under the supervision of nursery staff.
A small mini-hotel could also be profitable on the grounds of the Dneprobugsky fish farm. With interesting excursions organized by biologists from the potential National Park and promotional efforts, the fish farm grounds could attract over 50 people per day during the season. Since there are no suitable cafes or restaurants in the immediate vicinity, a small seasonal cafe would also be needed.

Tourists can also stay at recreation centers, farmsteads, and daily rental houses located in the vicinity of the potential National Park. These recreation and overnight accommodations include the recreation centers on the shores of Lake Lubań, the farmsteads "Svidanochka," "Tikhy Kray," "Studinka," "Knyazhya Gora," "Buslyanka," "Solovyiny Ray," "Galaselische," "Yalinka", "Mestechko" café, and others.

Other interesting places to visit near the natural complex include the historic buildings and noble cemetery of Kobryn, the Ozheshko family tomb in Zakozel, the Visloukhov estate in Perkovichi, the Napoleon Orda family estate and museum, and the region's wooden churches.

Kayaking routes along the Lelikovo village–Kobryn and Goravitsa village–Zarechka routes could also be attractive.

All of the above is only possible through significant investment, the interest of all parties, including government and private businesses, and the coordination, support, self-organization, and active participation of the local population and tourism businesses.

5. CONCLUSION

While considering the Great Forest as separate nature reserves, scientists from the Academy of Sciences of Belarus focus their research primarily on the Zwanec Nature Reserve. Meanwhile, an equally valuable part of the natural complex, the Dywin-Vialiki Les Nature Reserve, suffers problems with its water regime, fens overgrowth, and deforestation, and remains unaddressed by academic researchers.

This study demonstrates that, in terms of conservation efforts, developing the region's tourism potential, and addressing water regime and overgrowth issues, consolidating the Great Forest natural complex into a single protected area, rather than dividing it into three separate nature reserves, is far more effective.

Research and analysis of scientific literature demonstrate that the Great Forest area is of significant conservation importance and meets all the criteria for establishing a National Park. This form of protected area will not only contribute to the effective protection of rare plant and animal species but also promote the economic development of the Kobryn and Drahichyn districts.

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