FOREST SCIENCES

THE CHARACTERISTIC OF BIRCH NATURAL WOODLAND HABITATS IN LATVIA

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Abstract

The role of birch natural (NWH) and potential natural (PNWH) woodland habitats for maintaining of biodiversity in Latvia is described and evaluated. The analysis of the proportion of area of birch stands and natural and potential natural woodland habitats by regions, by age structure, and by growing conditions has been done. The distribution of birch natural and potential natural woodland habitats by habitat groups, as well as most often recognized habitat specialists and indicator species is described.
Key words: birch, natural and potential natural woodland habitats.

Introduction

Natural woodlands, which once covered practically all the territory of Latvia, now are changing and at the same time are maintaining the history of thousands of years' long interaction between nature and civilization. A lot of structures, processes and species have disappeared nevertheless many of them still remain. A considerable diversity of plants and animals is found in Latvia, and the ecological values of forests are acknowledged not only on national but also on an international scale. Because of increasing intensity of forest multiple use, more and more attention is being paid to maintaining of forests and its biodiversity values. Latvia also has threat of disappearing of typical for particular region natural woodlands, and the number of plant and animal species depending on them has decreased. For maintaining biological values in forests, certain territories are excluded or have restricted forest management. The fundamental process in recognizing the biodiversity in Latvia is the inventory of natural woodland habitats (woodland key habitats) in state forests, which was carried out from 1997 to 2002 (Bērmanis, Ek, 2003). Recently discussions about the forest management impact on nature values in forests as well as the changes of biodiversity in intensively managed forests have taken place. The viewpoints are conflicting, which proves the lack of understanding of biodiversity and its processes as well as lack of data and analysis of the current situation.

The birch, a tree of the northern hemisphere, as well as Scotch pine is the oldest tree in the territory of Latvia in the postglacial period. The birch stands in Latvia are formed by two species *Betula pendula* Roth. (sin. *B.verrucosa* Ehrh.) and *Betula pubescens* Ehrh. The birch stands are widespread in unmixed and mixed forests, in bogs and mires and in abandoned agricultural lands. They occupy ~ 28.4% of the forests in Latvia. In the temperate climate zone, a birch is universal pioneer species, which spreads in any site (Strods et al., 1999). Rapid development, abundant seed production, ability to occupy vacant dry and wet sites is characteristics of light-demanding birch. Such features reflect the biology of species creating the stages of premature and variable vegetation and make room in the further development for other – more demanding species. *Betula pendula* grows only in soils rich in nutrients, forming small birch stands/groups in a cultural landscape. *Betula pubescens* forms prime plant societies in wet forests, in soils medium rich in nutrients or poor soils (Lange et al., 1978; Priedītis, 1999). Latvia is located in the transition zone of northern coniferous and southern deciduous forests combining their qualities. During successions in northern forests, the structure of forest tree species is changing. The mature coniferous forests replace the birch forests characteristic of initial stages in the forests. Natural forests provide a great diversity of ecological niches due to gradual continuous changes. Consequently, the natural forests are the mosaic of different habitats where the size and shape of each fragment are affected by such factors as qualities of soil, relief, microclimate, and local history of fire and storm impact (Hallanaro et al., 2001). The natural conditions of widespread wet forests are prescribed by the location of Latvia in the lowland (predominate 40–200 m over the sea level) and the features of water flows (inter alia a lot of underground waters). The migration of species characteristic of deciduous forest goes in two main directions – by coastal and valleys of rivers (Priedītis, 1999).

The biological age of birch is reached in just 150 years. Though overgrown birch stands and structural elements there are such elements as snags and decaying trees that exist as habitats for many lichens, mosses, polypores, insects as well as birds and mammals (Ek et al., 2001). Rare and protected species are connected with birch (Lārmanis, 1999; Padomi meža saimniekam, 2000; Kabucis, 2000).

The aim of the research work is to describe and evaluate the role of birch natural and potential natural woodland habitats in maintaining the biodiversity in Latvia.

Methods

"The methodology of inventory of woodland key habitats" is used in the inventory of birch natural and potential natural woodland habitats (Lārmanis et al., 2000; Ek et al., 2001).

The natural woodland habitat (further NWH) is a habitat where the habitat specialists are found or at present possible and which disappear in economically managed forests. The potential natural woodland habitat (further PNWH) is a habitat, which is managed by maintaining biodiversity for example in birch stands in the span of 10 years could become the NWH.

The criteria of natural woodland habitats are:

- tree species, their age and stand structure (dominant species – birch, age – from 81 years, the proportion in stand - 50%). The registers of forest stands to fulfill the criterion are obtained from database " Meža fonds" ("Forest Fund");
- indicator species (further IS – ecological specialized species with high demands of environment and their presence indicates specific features in forest);
- habitat specialists (further HS – species, whose existence depends on a definite habitat and which will disappear in the case of unsuitable management of habitats);
- structural elements (structures in forests important for species, for example, old trees, snags, decaying trees).

The analysis of birch stands is carried out using the forest statistics of the State Forest Service. The selection of birch NWH and PNWH in the territory of Latvia is carried out using a database VATSLBIO containing the information of each NWH and PNWH – figures of inventory, the history of stand management, found IS and HS, structure elements, and appropriate activities for maintaining biodiversity are noted there.

Microsoft Excel is used for computerized data processing and the illustration of results.

Results

The proportion of birch NWH and PNWH areas

The total area of birch stands (birch as the dominant species) in Latvia is 573338.1 ha. The biggest areas of birch stands are in the following regions: Liepāja (53691.8 ha or 9.4% of the total area of birch stands), Limbaži (51223.1 ha or 8.9%), Madona (49972.0 ha or 8.7%), Aizkraukle (45344.3 ha or 7.9%), Jēkabpils (44882.8 ha or 7.8%), and Cēsis region (41029.1 ha or 7.1%). The birch natural woodland habitats make up 23.5% of the total area of all recognized NWH and PNWH in Latvia (the total area of NWH and PNWH is 48848.0 ha, but of birch NWH and PNWH is 11463.9 ha: accordingly NWH – 8739.8 ha un PNWH – 2724.1 ha). The biggest proportion of birch NWH and PNWH area is in Gulbene (2.7%), Daugavpils (2.5%), Dobele (1.9%), Jelgava (1.8%), and Ogre regions (1.5%) (Figure 1). The proportion of birch NWH and PNWH area to birch stands in Latvia is 20%.

The proportion of birch NWH and PNWH age structure

The areas of birch stands dominate at the age of 31–80 years, but the biggest areas are at the age of 51–60 years (189408.3 ha). The area of birch stands decreases after 81 years, which is explained by active logging.

The birch NWH and PNWH is dominant at the age of 81–100 years (5451.1 ha). Though appearance of birch NWH and PNWH areas are at the age of up to 10 years (147.5 ha),

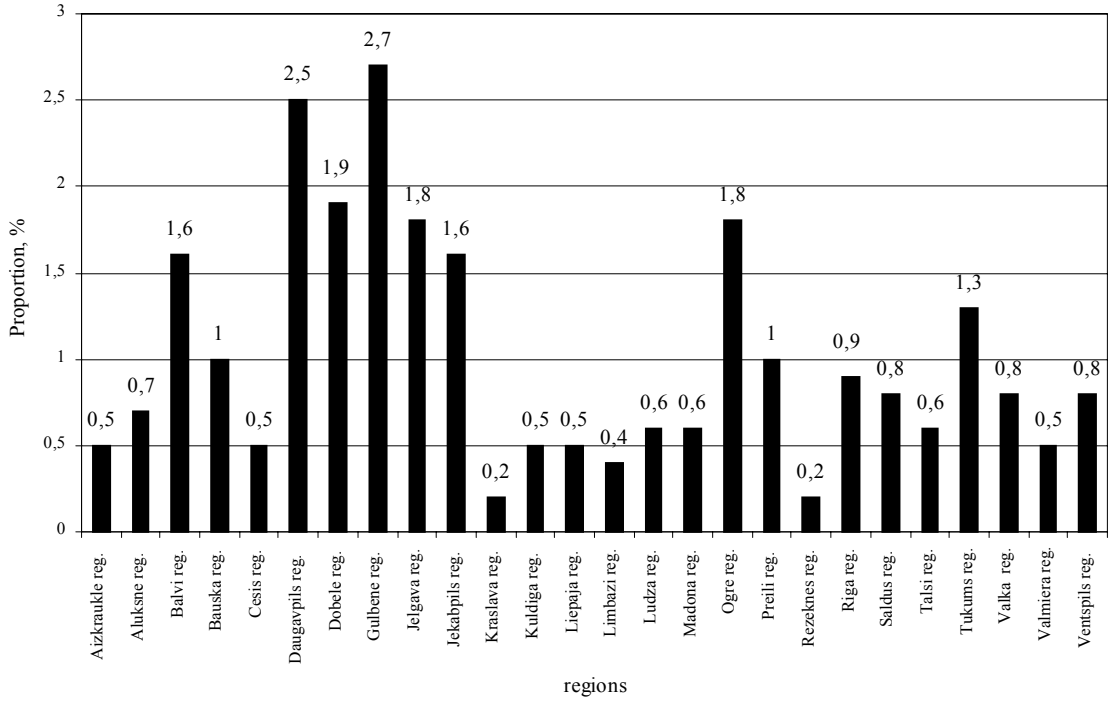

Fig. 1. The proportion of birch NWH/ PNWH areas in regions of Latvia.

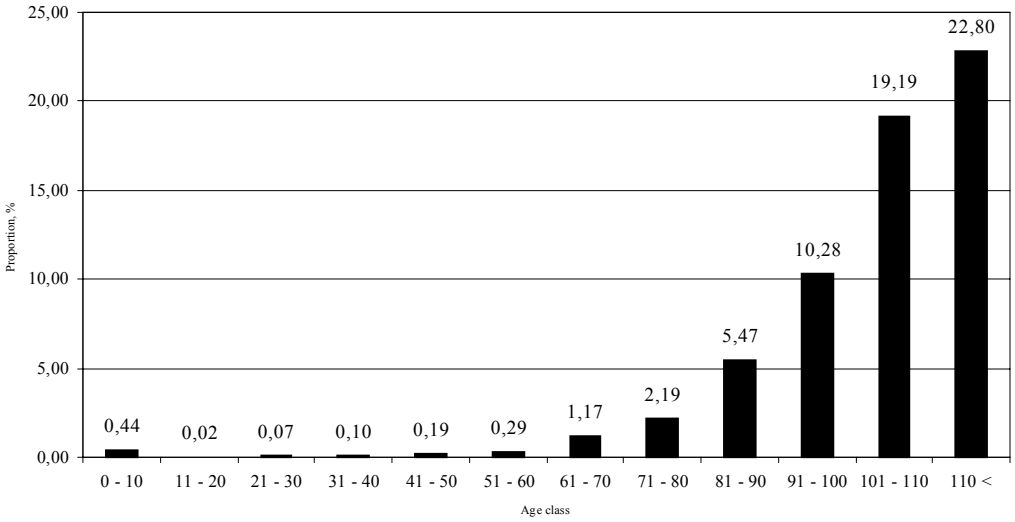

Fig. 2. The proportion of birch NWH/ PNWH age structure.

which is explained by the presence of old trees in young forest stands, important for biodiversity – the existence of IS and HS. The proportion of birch NWH and PNWH areas rapidly increases at the age of 81–110 years, and reaches 22.8% in a hundred year old and older stands (Figure 2). The increasing trend of proportions in old stands shows that the most important stands for maintaining biodiversity are from age 100 years and older.

The proportion of birch NWH and PNWH forest growing conditions

The birch stands are found in all types of forest growing conditions. The biggest proportion of birch stands distribution by edaphic rows (Figure 3) is in dry forests 41.0%, then follows swamp forests (18.0%) and forests on drained peat soils (15.3%). Moist forests and forests on drained mineral soils take up similar areas (accordingly 13.2% and 12.5%).

The birch stands take up small places disturbed by environmental and anthropogenic factors in long-lasting forests – very typical for today's landscape of Latvia especially in agricultural regions. The birch stands in wet soils form long-lasting forests. The birch stands in the richest types of forest conditions – Oxalidosa, Hylocomiosa and Aegopodiosa – have the best quality. The birch stands dominate in Oxalidosa (172295.7 ha or 30.1% of the total area of birch stands), Hylocomiosa (131151.4 ha or 22.9%), Caricosophragmitosa (74907.4 ha or 13.1%), Dryopterioso-caricosa (66399.2 ha or 11.6%), and Oxalidosa turf.mel. (60737.7 ha or 10.6%).

Also the birch NWH and PNWH are found in all types of forest conditions. The biggest proportion of the birch NWH and PNWH is in Dryopteriosa (5.01%), Aegopodiosa (4.75%), Filipendulosa (4.07%), Callunoso-sphagnosa (3.53%), and Dryopterioso-caricosa (3.11%) (Figure 4), which

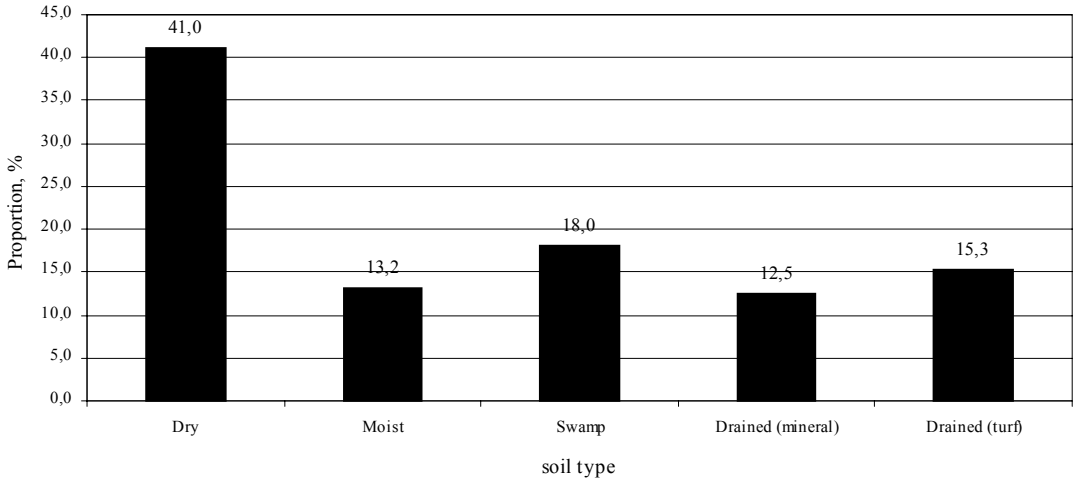

Fig. 3. The distribution of birch stands by edaphic rows.

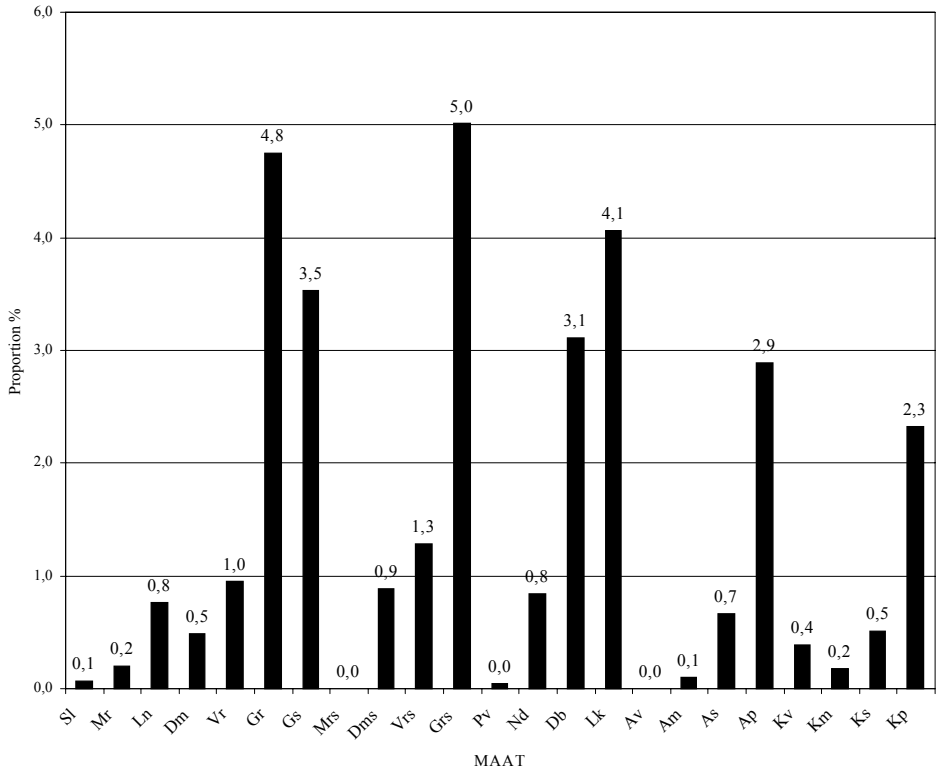

Fig. 4. The proportion of birch NWH/PNWH by types of forest conditions (MAAT:
Sl. – Cladinoso-callunosa; Mr – Vacciniosa; Ln – Myrtillosa; Dm – Hylocomiosa; Vr – Oxalidosa; Gr – Aegopodiosa; Gs – Callunoso-sphagnosa; Mrs – Vaccinioso-sphagnosa; Dms – Myrtilloso-sphagnosa; Vrs – Myrtilloso-polytrichosa; Grs – Dryopteriosa; Pv – Sphagnosa; Nd – Caricoso-phragmitosa; Db – Dryopterioso- phragmitosa; Lk – Filipendulosa; Av – Callunosa mel.; Am – Vacciniosa mel.; As – Myrtillosa mel.; Ap – Mercuraliosa mel.; Kv – Callunosa turf. mel.; Km – Vacciniosa turf. mel.; Vs – Myrtillosa turf. mel.; Kp – Oxalidosa turf. mel.).

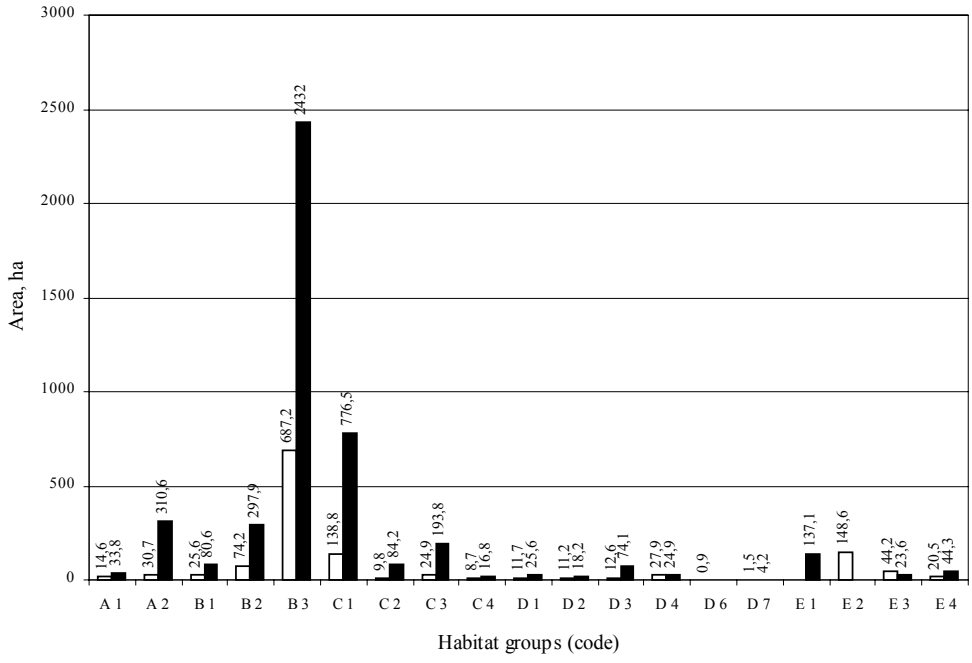

Fig. 5. The distribution of birch NWH and PNWH by habitat groups (habitat groups:
A1– coniferous forest; A2 – mixed coniferous-deciduous forest; B1 – broad-leaved forest; B2 – aspen forest; B3 – other deciduous forest; C1 – wet black alder forest; C2 – wet spruce forest; C3 – wet pine and birch forest; C4 – wet broad-leaved forest; D1 – ravine forest; D2 – slope forest; D3 – riparian forest; D4 – spring forest; D6 – calcareous fen or meadow; D7 – bog-forest mosaic; E1 – fire-scarred forest; E2 – biologically valuable places for beavers; E3 – single giant tree; E4 – wind-fallen forest).

is explained by the lack of economical management of wet forests. The important areas of birch NWH and PNWH in such types of forest conditions as Mercuraliosa mel. and Oxalidosa turf.mel. show the significance of birch in maintaining the biodiversity in anthropogenic reformed forest ecosystems.

The distribution of the birch NWH and PNWH areas by habitat groups

The birch NWH and PNWH areas are found in several habitat groups (Figure 5):

- other deciduous forest (habitat code B3; 5691.1 ha or 49.6% of the total area of birch habitats) – natural stands regenerated by pioneer species of deciduous trees in places of former deciduous or mixed coniferous–deciduous forests, harvested in the initial period of intensive forestry;
- wet black alder forest (habitat code C1; 2332.9 ha or 20.3%) – naturally regenerated stands, medium rich in species on wet peat soils, black alder and both birch species are in the tree storey;
- mixed coniferous–deciduous forest (habitat code A2; 691.4 ha or 6.0%) – naturally restored coniferous stands, where deciduous trees take up 20–50% of the wood volume;
- aspen forest (habitat code – B2; 596.4 ha or 5.2%) - naturally regenerated stands, followed by the succession of deciduous trees after natural or anthropogenic disturbances and the wood volume of aspen takes up at least 50%;
- wet pine and birch forest (habitat code C3; 559.0 ha or 4.9%),
- biologically valuable places for beavers (habitat code E2; 405.6 ha or 4.6%).

The distribution of birch NWH and PNWH in other habitat groups is more uniform – their areas range from 0.9 to 161.7 ha.

The indicator species and habitat specialists in the birch NWH and PNWH

The following species are most often found in birch natural woodland habitats: lichens *Graphis scripta* (4137.1 ha or 18.4% of birch NWH un PNWH area), *Lecanactis abietina* (1970.9 ha or 8.8%), *Lobaria pulmanaria* (1419.8 ha or 6.3%); mosses *Homalia trichomanoides* (4842.3 ha or 21.6%), *Jamesoniella autumnalis* (1332.0 ha or 5.9%), and *Neckera complanata* (1290.5 ha or 5.7%). The habitat specialists – *Cerychus chysomelinus* living in wet decays and *Saperda perforata* living in older birch trees – are most often species of insects in birch NWH and PNWH. The indicator species *Peltis grossa* lives in snags and decays, and *Necydalis major* lives in hard dead wood (Ek, 2001; Plīse, Bičevskis, 2001).

The diversity and occurrence of indicator species and habitat specialists related to different tree species in the birch NWH and PNWH are the result of a mixed structure of forests.

Conclusions

1. The total area of birch stands in Latvia is 573338.1 ha; the biggest areas of birch stands are in following regions: Liepāja (9.4% of total area), Limbaži (8.9%), Madona (8.7%), Aizkraukle (7.9%), Jēkabpils (7.8%), and Cēsis region (7.1%). The biggest proportion of birch NWH and PNWH area is in Gulbene (2.7%), Daugavpils (2.5%), Dobele (1.9%), Jelgava (1.8%), and Ogre regions (1.5%). The proportion of birch NWH and PNWH area to birch stands in Latvia is 20%.

2. The distribution of birch stands by age structure is irregular and shows that birch stands are much more restored than harvested. The birch NWH and PNWH dominate at the age of 81–100 years though birch NWH and PNWH areas are at the age up to 10 years, which is explained by the presence of old trees in young forest stands, important for biodiversity – the existence of IS and HS. The analysis of birch NWH and PNWH proportion shows that the most important birch stands for maintaining the biodiversity are from the age of 100 years and older.

3. The birch stands are in all types of forest growing conditions: the biggest proportion of birch stands is in dry forests (41.0%). The biggest proportion of the birch NWH and PNWH is in Dryopteriosa (5.01%), Aegopodiosa (4.75%), Filipendulosa (4.07%), Callunoso-sphagnosa (3.53%), and Dryopterioso-caricosa (3.11%), which is explained by the lack of economical management of wet forests. The important areas of birch NWH and PNWH in such types of forest conditions as Mercuraliosa mel. and Oxalidosa turf.mel. show the significance of birch in maintaining the biodiversity in the anthropogenic reformed forest ecosystems.

4. The birch NWH and PNWH areas dominate in the following habitat groups: other deciduous forest (5691.1 ha or 49.6%), wet black alder forest (2332.9 ha or 20.3%), mixed coniferous–deciduous forest (691.4 ha or 6.0%), aspen forest (596.4 ha or 5.2%), wet pine and birch forest (559.0 ha or 4.9%), and biologically valuable places for beavers (405.6 ha or 4.6%).

5. The occurrence of indicator species and habitat specialists in the birch NWH and PNWH is related to birch and other tree species as well as different structural elements located in the area.

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