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Current state of the specially protected natural area "Novosurinsky" in Mozhaisk District of Moscow Region

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Abstract. This article is devoted to the description of the status of the specially protected natural area "Novosurinsky" in Mozhaisk district of Moscow region. The study of the reserve requires constant monitoring of its territory. Despite the strict requirements for the protection of the ecosystem, its preservation and maintenance of the ecological balance, there are negative impacts in the form of littering in the studied reserve. The arrival of vehicles and their unhindered movement lead to violations of soil and vegetation. In connection with careless handling of fire, arson of dry grass and forest litter, fires occur.

1. Introduction

As it is specified in the decision of the Executive authority of Moscow region "On the territory of the state wildlife area, plowing of lands, cutting woods of the main use, haying, grazing of cattle, collecting nuts, mushrooms, berries, seeds, medicinal and other plants are forbidden". In addition, the law prohibits fishing and sport hunting, fishing, catching non-commercial animals, collecting botanical and zoological collections. This also includes the provision of land for development, collective gardening, suburban areas, geological and other research, mining, roads, construction of buildings and structures, pipelines, power lines, the use of pesticides, plant protection chemicals, mineral fertilizers, timber rafting, blasting. There are also the device halts, travel and parking of vehicles, tourist parking, recreation and other types of nature that harm the environment.

The reserve "Novosurinsky" is regarded as a complex of biological reserves. Such reserves are designed to protect and restore the number of rare and endangered species of plants, animals, phytocenoses and zoocenoses. According to encyclopedias, the complex of biological reserves can include areas with valuable rare species of trees, shrubs, forest grass plants, forest associations - botanical reserves, as well as areas including rich meadows that have preserved relict and endemic plant species - forest reserves. The same group includes zoological reserves with rare or very rare and valuable faunistic representatives of endangered species of animals. Such types of animals have survived only due to the special natural conditions of the reserve.

The reserve "Novosurinsky" has a total area of 717.1 hectares. The tasks include the preservation of the territory of a specially protected area. The preservation of the habitat of rare plant covers species and wildlife. Geographically the study area is delineated within the urban settlement Mozhaisk and rural



settlement Borikovskiy, south of the highway (A-100) to the west and south-west of the village of Kukarino. The reserve includes 2 sections, which are separated by a strip of the Moscow railway (Smolensk direction). Clustering the territory includes area №1 (South) with a total area of 496 hectares and area №2 (North) with a total area of 221.1 hectares [1, 2].

2. Methods and materials

The assessment of the geosystem of the reserve "Novosurinsky" was carried out on the basis of the long-term studies of protected species of plants and animals. The studies included data of the key ornithological areas, forest genetic reserves and valuable soil objects. There are also data of the Ministry of ecology and nature management of Moscow region, data of the Union of bird protection of Russia and data of the Ministry of forestry included in the Red book of the Russian Federation.

3. Results and discussion

The reserve "Novosurinsky" is located on an elevated plot moraine-glacial plain. Through the reserve there is the watershed of the rivers Moscow and Protva. The area is composed of boulder loam moraine of Moscow glaciations. Moraine deposits are directly on the Carboniferous limestone. Everywhere the plain is composed of heavy cover loam. The nature of the relief of the territory characterizes the alternation of flat-topped hills, as well as wetlands with a slight elevation difference. The absolute height of the highest point of site № 1 is on a flat top of the hill. This is a plot of Mozhaishk forestry, which is 225 m above sea level. The height of the lowest point is located in the southeast of the same area №1. It is 195 m above sea level.

The highest point on site №2 is located on the southern border of the slope of the hill from the moraine and is 216 m above sea level. The lowest point of its Northern border on the bottom of the erosion valley equals 196 m above sea level. The total height difference does not exceed thirty meters. The slopes are on average from 1 to 30 degrees.

The erosion network on the territory of the reserve is poorly developed. In relief there is one expressed erosion valley, crossing the second section from South to North. Other depressions in the relief have the form of shallow ravines with damp beams, sometimes swampy. Temporary watercourses form erosion incisions with a width of up to 2 meters and a depth of up to 1 meter exclusively along the bottom of the beams [3, 4].

The surface runoff from plot №1 is aimed into the Mgut river, whereas the surface runoff from plot № 2 of the left tributary of the Protva river drains to the catchment basin of the Moscow river. Seasonal waterlogging with waterlogging is observed in the hollows between the hills. On the territory of the reserve, you can find low-lying swamps. Sod - podzolic - gley soils are most widely represented on the territory. Sometimes on the largest slopes there are simply sod-podzolic soils, and peat and eutrophic soils are formed on swamp sites [3, 4].

Among the vegetation covers there is an old age, oak-aspen, aspen - oak hazel forests with birches. Forests include birches and grass with participation in the grass-shrub layer of species of different ecological-coenotic groups (taiga, weed-forest, and meadow-forest). In addition, forests predominate in the Northern and North-Eastern parts of site №1; they are widely represented in the eastern half of site №2.

Birches and aspens in such forests characterize an average age (up to 80 - 100 years). Trunks with a diameter of that of the oak tree can be equal to 60-70 cm. Some oak trees are with large trunk diameters, which reach 70-80 cm. Tier shrubs are closed, represented by hazel and honeysuckle. The herbal layer is associated with the types of forest herbs: *Mercurialis perennis*, *Galeobdolon luteum*, *Pulmonaria obscura*, *Asarum europaeum*, *Viola mirabilis*, *Ranunculus cassubicus*, *Stellaria holostea*, *Aegopodium podagraria*, *Campánula latifolia*. This is a rare, vulnerable species (not included in the Red Book of Moscow region, but they need control and surveillance).

In the depressions and lower parts of the slopes, oak-aspen hazel and horsetail-greenfinch

communities with ferns (Polypodiophyta) are widespread. This motley grass presents *Fragária moschata* and *Trólius europaëus* - rare and vulnerable species (not included in the Red Book of Moscow region, but in need of control and supervision). In addition to the above, there is *Crepis paludosa*, *Geum rivale*, *Stáchys sylvatica*, *Equisetum sylvaticum*, Polypodiophyta and *Carex sylvatica*. *Bromopsis benekenii*, *Brachypodium silvaticum*, *Chaerophyllum aromaticum*, *Páris*, *Ranunculus cassubicus*. *Deschampsia cespitosa* and *Filipéndula ulmária* are widespread in the territory and grow in the lowlands and in the depressions.

In aspen forests of old age and sparse hazel forests with motley grasses the following can be found: *Filipéndula ulmária*, *Trólius europaëus*, *Calamagrostis canescens*, *Vukvitsa medical*, *Chaerophyllum aromaticum*, *Geranium Marsh*, giant Fescue, *Valeriana officinális*, *Bistorta officinalis*, *lysimachia Vulgaris*.

Rare vulnerable species are *Aconitum lasiostomum*, *Polemonium caeruleum*, *Orchid-dactylorhiza fuchsii* and *Dáphne mezereum*. These species are not included in the Red Book of Moscow region, but need control and monitoring. On the western half of site № 2, among the old-growth forests of aspen, you can find separate areas of aspen-oak and spruce-oak forests with hazel and grasses. There are plants such as Polypodiophyta and *Óxalis*, and in the groups of spruce forests, you can find taiga species: *Pýrola*, *Trientális europaëa*, *Orthília secúnda* and *Vaccínium myrtillus*.

In the depressions between the hills, as well as in the erosion valleys, aspen - oak and honeysuckle - hazel forests with grasses are widely represented. Among these forests, maples and elm bare sometimes grow, interspersed with spruce and birch. The grass layer of this forest is dominated by species typical of forest herbs: *Galeóbdolon lúteum*, *Carex pilosa*, *Mercurialis perennis*, *Anemóne ranunculoídes*. The following dominate in the lower areas of the slopes: *Lamium maculatum*, *Milium effusum*, *Stáchys sylvatica*, *Mercurialis perennis*, ferns (Polypodiophyta) and *Campánula latifólia* (rare and vulnerable) (not included in the Red Book of Moscow region, but in need of control and surveillance). High *Aconítum*, *Actaëa spicáta* and *Mercuriális* (species listed in the Red Book of Moscow region and in need of control and supervision) can be sometimes found. They grow in areas №2 and №1.

On the large acreage parcel there is the wetland fuzzy - birch forest with grey alder, with an undergrowth of spruce and shrubby willows. For such forests, the pronounced representatives are *Equisetum sylvaticum*, *Juncus effusus*, *Calamagrostis canescens*, *Lysimachia vulgaris*, *Carex vesicaria* and *Carex canescens*, *Pyrola rotundifolia* and *Viola*. These communities are bound by the terms of drained forests in the past. In this regard, small drainage ditches were preserved.

In the marshy lowlands there are aspens, oaks and birches. Ferns, nettles and meadowsweet flourish in the lower tier. The usual representatives in the area are *Myosóton*, *Ficaria verna*, *Geum rivale*, Polypodiophyta, *Cirsium oleraceum*, *Aegopódium podagraria*, *Chrysosplenium ovalifolium*.

On the territory of site №1 there are mostly meadows. They are located on the wet forest glades and lawn. It is noted here that: *Filipéndula ulmária*, *Lysimáchia vulgáris*, *Lysimachia nummularia*, *Crépis paludósa*, *Ranunculus repens*, *Angélica sylvestris*, *Deschampsia cespitosa*, *Anthoxáanthum*, *Festuca pratensis*, *Círsium palústre*, *Juncus tenuis* and *Juncus filifórmis*, *otentilla erécta*, *Géum rivále*, *Prunélla vulgáris*, *Carex lasiocarpa*, *Lysimáchia vulgáris*, *Betonica officinalis*, *Succisa Pratensis*, *Coccyganthe*, *Geránium palústre*.

In the lowlands of wetlands in the meadows, the following plants are added to the above species: *Alopecurus pratensis*, *Juncus conglomeratus* and *Juncus effus*, *Carex pallescens*, *Carex flava*, *Carex leporina*, *Galium uliginósum*, *Cirsium heterophyllum*, *Equisetum sylvaticum* L.

A series of large meadows among oak-aspen forests on site №1 occupies meadows grass with the highest floristic wealth. The herbs can usually be found: *Calamagróstis epigéjos*, *Agróstis capilláris*, *Dáctylis glomeráta*, *Deschampsia cespitosa*, *Geranium magnificum*, *Betonica officinális*, *Melampýrum nemorósum*, *Hypericum maculatum*, *Lysimáchia vulgáris*, *Crépis paludósa*, *Succisa pratensis*, *Succisa pratensis*, *Equisetum sylvaticum*, *Thalíctrum lúcidum*, *centaur é phrýgia*, *Selinum Carvifolia*, *Anthriscus sylvestris*, *Potentilla erécta*.

Rare and protected plant species also grow: *Gladiolus imbricatus* (plant species listed in the Red Book of Moscow region). In addition to the above, there are *Trollius europaeus*, *Dactylorhiza fuchsii* and *Platanthera bifolia* (not included in the Red Book of Moscow region, but they need control and supervision). The plant "*Gladiolus*" is widely developed in these areas of site №1, blooms and bears fruit [5, 6].

On a large grassy, swampy glade with shrubby willows and birch undergrowth, besides the "*Gladiolus*", there are such plants as: *Iris* or *Iris sibirica*, *Dactylorhiza*, *Dactylorhiza incarnata*, *Listera ovata* (not included in the Red Book of Moscow region, but they need control and surveillance), *Dactylorhiza fuchsii*, *Trollius europaeus*, *Polemonium caeruleum*. In such glades there are: *Deschampsia cespitosa*, *Alopecurus pratensis*, *Poa trivialis*, *Agrostis capillaris*, *Briza media*. Growing sedge: *Carex pallescens*, *panicea*, *flava*, *vulpina*, *pilosa*. Grow: *Juncus*, *Succisa pratensis*, *Geranium palustre*, *centaur é phrygia*, *Filipendula ulmaria*, *Melampyrum nemorosum*, *Potentilla*, *Lysimachia nummularia*, *Coccyganthe*, *Thalictrum lucidum*, *Valeriana officinalis*, *Géum rivale*, *Cirsium palustre*, *Cirsium oleraceum*, *Selinum carvifolia*, *Hypericum maculatum*, *Equisetum palustre*, *Angélica sylvestris*, *ranú nculus ácris*, *Rumex acetosa*, *Myosotis scorpioides*, *Bistorta officinalis* [2, 6, 7].

The fauna on the sites of the "Novosurinsky" is well preserved and represented on the territories of other communities in Moscow region. The fauna of terrestrial vertebrates is based on species that are inherent in deciduous and mixed forests of other regions of the Russian Federation.

The territory is dominated by species that are environmentally related to tree and shrub vegetation. However, the proportion of inhabitants of meadow-field areas among vertebrates is not numerous. Within the reserve there are three too-complexes or zoopharmacy: zoopharmacy deciduous forests, moist forests zoopharmacy, zoopharmacy open habitats [8, 9].

Mixed and deciduous forests of different types in areas №1, №2 have retained their inherent complex of animal species. Among them are: *Lepus timidus*, *Cuculus canorus*, *Dendrocopos leucotos* (listed in the Red Book of Moscow region), *Turdus pilaris*, *Turdus merula*, *Turdus philomelos*, *Fringilla coelebs*, *Erithacus rubecula*, *Sylvia atricapilla*, *Phylloscopus sibilatrix* and *Phylloscopus trochilus*, *Aegithalos caudatus*, *Ficedula hypoleuca*, *Parus major*, here live *Rana temporaria* and *Rana arvalis*.

The edges of forests and grasslands on site №1 are widely presented by: *Microtus agrestis*, *Mustela* black, *Talpa europaea*, *Buteo buteo*, *Falco* is a rare and vulnerable species (not included in the Red Book of Moscow region, but they need control and surveillance), *Anthus trivialis*, *Motacilla alba*, *Apus Apus*, *Saxicola rubetra*, *Hirundo rustica*, *Emberiza citrinella*, *Carduelis cannabina*, *Coloeus monedula*, *Pica pica*, *Carduelis*, *Sylvia communis*.

Individual wetland depressions and swales, ditches and wet areas in the forest are habitat types that are related to wetlands. This information can be found on sites №1 and №2. It includes *Sus scrofa*. Here it reaches a high number [10, 11].

Acrocephalus palustris, *Locustella fluviatilis*, *Emberiza schoeniclus* nest in biotopes of the plots. You can find three types of frogs: *Rana arvalis*, *Rana temporaria* and *Pelophylax lessonae*. Throughout the reserve, hedgehog, Fox, Sparrowhawk, Goshawk, great spotted woodpeckers are widespread.

In areas №1 and №2 the following vertebrates live: *Columba oenas*, *Pernis apivorus*, *Nucifraga*, *Musccardinus avellanarius*, which are listed in the Red Book of Moscow region. On the territory of the site you can find bats. They are rare and vulnerable, but not included in the Red Book of Moscow region, their 2 species, and they need control and monitoring. Here you can meet *Nyctalus noctula* and *Pipistrellus nathusii*.

Due to the diversity and richness of grasses and grasses forest glades, among oak and aspen forests abundance of flowering plants, there are favorable conditions for the formation of a rich fauna of insects. *Neptis sappho*, *sappho* are species of butterflies listed in the Red Book of Moscow region; you can find *Colias palaeno*, *Euphydryas aurinia*, *Euphydryas maturna*, *Melitaea diamina*, *Melitaea phoebe*, *Argynnis laodice*, *Lycaena helle*, *Agriades optilete*, *Saturnia pavonia*, *Hyphoraia aulica*, *Callimorpha dominula*, *smerinthus Caecus*, *laothoe amurensis*.

8 rare vulnerable Lepidoptera species, not included in the Red Book of Moscow region, but which need to be controlled and monitored, were noted on the territory of plots №1 and №2. These include: *Thymelicus sylvestris* or *Ochlodes sylvanus*, *Aphantopus hyperantus*, *Lopinga achine*, *Erebia ligea*, *Brenthis ino*, *Maniola jurtina*, *Euchalcia variabilis* and *Pygaera timon* [10, 11].

4. Conclusion

Currently on the territory of the "Novosurinsky" reserve there are some negative impacts in the form of litter, intensive recreation, with the consequent disturbance of soil, vegetation and the destruction of the soil. In addition, due to careless handling of fire, arson of dry grass and forest litter, fires occur.

The arrival of vehicles and their unhindered movement lead to violations of soil and vegetation. In addition, the obvious threats to the studied area should include any construction, laying of roads and other communications, increased recreational impact and self-production of peat.

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