

IMPORTANT FOREST AREAS OF THE OREL REGION

© 2023 L. L. Kiseleva^a, E. A. Parakhina^b, *, and Zh. G. Silaeva^c

^aOrel State University named after I.S. Turgenev, 95 Komsomolskaya St., Orel, 302026 Russia

^bPeoples' Friendship University of Russia (RUDN University), 6 Miklukho-Maklaya St, Moscow, 117198 Russia

^cOrel State Agrarian University named after N.V. Parakhin, 69 General Rodina St., Orel, 302019 Russia

*E-mail: parakhina-ea@rudn.ru

Received April 7, 2022;

Revised June 26, 2022;

Accepted October 18, 2022

Important Forest Areas are core areas where natural complexes and their biodiversity are preserved. Forests in Orel Oblast are unevenly located. The forest cover is 8%. The following region's districts, Dmitrovsky, Znamensky, Khotynetsky, and Mtsensky, are the most wooded ones with the forest cover making up 20 to 25%, whereas the lowest forest cover is found in the south-eastern districts Dolzhansky, Kolpnyansky, Livensky, and Pokrovsky, where this indicator barely exceeds 2.5%. The largest forest area has been preserved in the north-western part of the region under study. It belongs to the Orlovskoye Polesye National Park. Broad-leaved forests account for 19243.42 ha (19.5%), and coniferous/broad-leaved forests account for 79,459.17 ha (80.5%). This study uses the route method, the method of geobotanical descriptions, and grid mapping. Having studied the Orel Oblast areas, we identified 34 Important Forest Areas with the highest diversity of rare and protected plants. There were 8 species listed in the Red Data Book of the Russian Federation, and 58 species listed in the Red Data Book of Orel Oblast.

Keywords: Orel Oblast, Important Forest Areas, natural monuments, rare and protected plants.

DOI: 10.31857/S0024114823030051, **EDN:** PTFWTM

Forests are an important link in the functioning of the entire planet's ecological system. They perform a number of functions like saturating the air with oxygen, protecting the environment from dust, dirt, and noise, and serving as elements of environmental design. Forests also are the habitat of many rare species of living organisms. Therefore, forest conservation is a pressing global issue.

Over a long period of human life in the Eastern Europe whose territory is occupied by broad-leaved forests, their area has sharply decreased, and the structure has undergone significant changes. The remnants of old broad-leaved forests are now extremely unevenly distributed and often divided by urban areas, agricultural lands, and other anthropogenically altered landscapes. Reduced broad-leaved forest areas have resulted in significant changes in the environment like loss of soil fertility, erosions, development of ravines, shallowing, changes in flood regime of rivers, especially small and medium-sized ones, reduced biological productivity, reduced species diversity, etc. (Vostochnoevropejskie shirokolistvennye lesa, 1994; Vostochno-evropejskie lesa, 2004; Arhipova, 2014).

Reduced areas of forest biocenoses due to anthropogenic activities in Russia began in the 16th century but became the most impressive in the late 20th century (Cvetkov, 1957, Hitrov et al., 2013). Similar situ-

ation is observed in Orel Oblast. According to the plans of the General Surveying (1778–1790), forests used to occupy over 50% of the region under study (Ogureeva et al., 2006). According to statistical data, forests in Orel Oblast accounted for 23.1% in 1868, and 17.2% in 1914 (Arhipova, 2014). Currently, most of the region is occupied by agricultural lands and only about 12% of the area is covered by natural vegetation (Doklad, 2021). Orel Oblast is now 8% wooded. Districts like Dmitrovsky, Znamensky, Khotynetsky and Mtsensky are the most wooded with 20 to 25% forest lands, while south-eastern districts, Dolzhansky, Kolpnyansky, Livensky and Pokrovsky, are the least wooded with this indicator barely exceeding 2.5% (Kiseleva et al., 2016, 2018).

The main cause for forest reduction was an increase in population due to a growing need for agricultural lands. At the same time, the farmery method had not changed for a long time (Arhipova, 2014; Hitrov et al., 2013). Furthermore, historical events of the first half of the 20th century and, first and foremost, the wars, had greatly impacted the Important Forest Areas.

Among the forests of Orel Oblast, broad-leaved forests of pollard oak (*Quercus robur* L.) predominate with 32.6% of the forest area. They can be pure and mixed with Norway maple (*Acer platanoides* L.), common ash (*Fraxinus excelsior* L.), small-leaved linden

(*Tilia cordata* Mill.), and elm (*Ulmus* L.). Birch and aspen forests account for 22.2 and 18.5% of the area covered by forest vegetation, pine and spruce forests, respectively, amount to 17.2% and 4.1%, and other tree species make 5.4% (Doklad, 2021).

Important Plant Areas are areas of great value for endangered species, their habitats, and plant diversity in general, which can be identified, preserved, and managed as territories (Kiseleva et al., 2016, Stishkov, Dadli, 2018, Anderson, 2002).

Creating the forest Important Plant Areas and including them in the general system of the ecological framework will contribute to the conservation of forest lands and biological diversity.

The purpose of this study was to identify Important Forest Areas for subsequent monitoring and including them in the general system of the ecological framework in Orel Oblast.

RESEARCH METHODS

Various methods like routing, geobotanical descriptions, and grid mapping were used during the field studies.

Grid mapping is one of the most common methods of studying flora and fauna, presenting research results and constituting the basis for subsequent data analysis. This method is mainly used in countries and regions with a high density of flora data, but this very density was largely achieved precisely as a result of continuous grid mapping (Seregin, 2013).

During grid mapping, the basis for the grid of squares we used was the degree grid (Longitude/Latitude Datum WGS84). The lands of Orel Oblast, whose area is 24.7 thousand sq. km, were divided into 290 cells. The cell area increased slightly to the south and ranged from 101 sq. km to the north of Bolkhovsky district to 108.2 sq. km to the south of Dolzhansky district. At the stage of route preparation during field research, the cell grid method was combined with thematic layers of MapInfo GIS Natural Resources of Orel Oblast.

With the route method, different types of, both zonal and intrazonal, phytocenoses were selected in each grid cell, the species composition of which was entered into a flora description form. The routes were selected taking into account the maximum coverage of various phytocenoses. During geobotanical studies, standard test sites with an area of 100 sq. m were designed in the phytocenoses under study, serving to evaluate the projective coverage of species according to the Brown-Blank scale (Rabotnov, 1983). GPS navigator Garmin III+ was used to determine the coordinates of rare and protected plants (Kiseleva et al., 2018).

The use of three research methods made it possible to study all the diversity of forest phytocenoses in a short time, identify new locations of rare and protected vascular plants, and find key forest lands.

The plants were identified using the determinants by P.F. Maevskij and *Flora Vostochnoj Evropy* (Maevskij, 2014; Flora Vostochnoj Evropy, 2001).

RESULTS AND DISCUSSION

In terms of botany and geography, Orel Oblast is located in three zones (see Fig. 1): the north-western part of the region is in the southern subzone of taiga, whereas the zone of broad-leaved forests extends from the south-western to the north-eastern part, and the zone of forest-steppe is found in the south-eastern part (Karta Zony i tipy, 1996). Forests are unevenly distributed throughout the region. In the north-western area (Znamensky and Khotynetsky district), there is Orlovskoye Polesye National Park with an area of about 79 thousand ha. The largest forest land of the region with an area of about 33 thousand ha has been preserved here, which represents the only key botanical territory allocated by us that is found in a southern subzone of taiga.

Mixed forests prevail in Orlovskoye Polesye, which, in various combinations, include *Picea abies* (L.) Karst., *Pinus sylvestris* L., *Betula pendula* Roth, *B. pubescens* Ehrh., *Quercus robur* L., *Populus tremula* L. and others. Depending on the predominance of certain tree species, the composition of forest cenoses includes representatives of boreal, non-moral, and forest-steppe elements of flora.

Pine forests are the most common among coniferous forests, whereas spruce and spruce-pine forests are less common. Pine-mosses are the most common. The grass-shrub layer of these pine forests is characterised by *Pteridium pinetorum* C.N. Page et R.R. Mill, *Calamagrostis arundinacea* (L.) Roth, *Vaccinium myrtillus* L., *V. vitis-idaea* L. and others. On sandy soils, there are heather pine forests (*Calluna vulgaris* (L.) Hill), pine forests with *Nardus stricta* L., pine forests with *Festuca ovina* L., and pine forests with *Koeleria glauca* (Spreng.) DC. The highest relief elements on sandy manes are characterised by belomoshniki (reindeer lichen) pine forests, in whose moss-lichen layer representatives of the genus *Cladonia* P. Browne dominate. Of the flowering plants, *Calamagrostis epigeios* (L.) Roth, *Koeleria glauca* (Spreng.) DC, and *Peucedanum oreoselinum* (L.) Moench are noted in this case.

In the lowered relief elements with a close occurrence of groundwater, sphagnum pine forests are found. *Betula pubescens* Ehrh. often grow here with pine. The moss cover is dominated by various species of sphagnum, among which *Sphagnum apiculatum* H. Lindb. and *S. girgensohnii* Russow predominate. Such forests are characterised by *Vaccinium myrtillus* L., *V. vitis-idaea* L. and others.

Among the spruce forests, spruce-mosses are most often found in the park, although their typical formation (only with taiga elements of flora) is quite rare and is mainly confined to the north part of the national park. The shrubby tier of such spruce forests is domi-

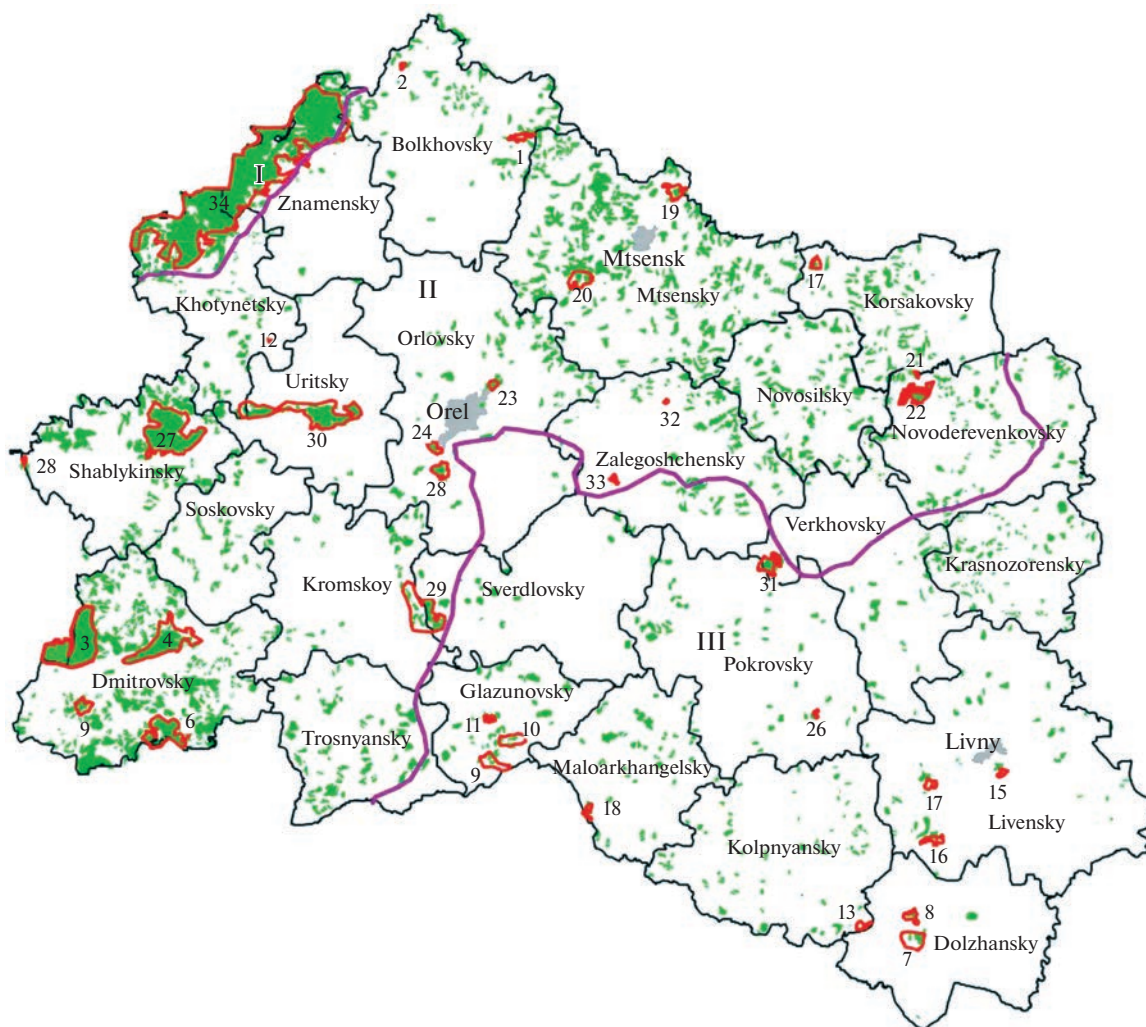


Fig. 1. Maps of the Important Forest Areas in Orel Oblast (the numbers correspond to the numbers indicated in the study): I – southern subzone of taiga, II – zone of broad-leaved forests, III – zone of forest-steppe.

nated by *Oxalis acetosella* L., *Vaccinium myrtillus* L., *V. vitis-idaea* L., and, less often, *Pteridium pinetorum* C.N. Page et R.R. Mill, *Lycopodium annotinum* L., and *Linnaea borealis* L.

Most often, spruce in the park is found in mixed stands: birch-spruce, pine-spruce, and oak-spruce. Depending on accompanying rocks, those are *Calamagrostis epigeios* (L.) Roth, *Molinia caerulea* (L.) Moench, *Melica nutans* L., *Carex brizoides* L., *C. pilosa* Scop., *Stellaria holostea* L., and other types. In the lowered elements of the relief, there are small areas of spruce forests – dolgomoshniki and sphagnum spruce forests.

In the zone of broad-leaved forests, 22 forest key botanical territories have been allocated, whose area is 35976.6 ha. Broad-leaved forests predominate there, mainly oak, lime, and ash forests are found in small portions, alder forests are less common, as well as mixed forests like oak-lime, oak-ash, lime-oak-ash, etc. Old-age oak forests are found in this area. Among

the oak forests, the most common are mixed-grass oak forests, oak forests with *Carex pilosa* Scop., oak forests with *Aegopodium podagraria* L., oak forests with *Stellaria holostea* L., oak forests with *Galeobdolon luteum* Huds. are less common. In sparse oak forests in areas of overgrown cuttings, meadow-steppe species are also found besides meadow: *Anemone sylvestris* L., *Trifolium montanum* L., *Prunella grandiflora* (L.) Scholl., *Geranium sanguineum* L., etc. Significant areas are also occupied by derived aspen-birch forests that have grown in place of broad-leaved forests. In the grassy cover, both non-moral-meadow and meadow-steppe species grow there.

In the forest-steppe zone, 11 key forest territories have been allocated, whose area is 4675 ha. These are broad-leaved forests represented mainly by various types of oak forests, rarely old-aged, and there also are linden and ash trees. Also, significant areas are occupied by derived aspen-birch forests. The grassy cover of forests in this zone is dominated by meadow and

even meadow-steppe species: *Leucanthemum vulgare* Lam., *Fragaria viridis* Duch., *Galium boreale* L., *G. mollugo* L. and others. Sometimes rare and protected plants are found on the edges (*Adonis vernalis* L., *Iris aphylla* L., *Scorzonera purpurea* L., *Stipa pennata* L.).

Based on the conducted research, 34 Important Forest Areas were identified in 19 districts of Orel Oblast. These areas are characterised by a great diversity of species. They have preserved populations of rare and protected plants.

There is a list of them below that contains indications of rare and protected plants. The species listed in the Red Data Book of the Russian Federation (Krasnaya kniga Rossijskoj Federacii, 2008) are marked with an asterisk *, whereas those found in the Red Data Book of the Orel Oblast (Krasnaya kniga Orl'ovskoj oblasti, 2021) are marked with two asterisks **.

Bolkhovskiy district:

1. Oak-maple-ash forest 0.1 km northwest of the village of Lazny (415.3 ha). Rare species such as *Blitum polyspermum* (L.) T.A. Theodorova comb. nov., *Matteuccia struthiopteris* (L.) Todaro and *Urtica galeopsifolia* Wierzb. ex Opiz grow there.

2. Broad-leaved forest and meadow in the floodplain of the Mashok river (105 ha), 1 km south of the village of Seredechi. Rare and protected plant species ***Circaea lutetiana* L., ***Campanula latifolia* L., *Parnassia palustris* L., *Cuscuta epithymum* (L.) L. are found there.

Dmitrovskiy district:

3. Coniferous-deciduous forest between the village of Ostrovsk and the village of Voronino (6500 ha) with the following rare and protected plant species: *Dianthus borbasii* Vandas, *Geranium robertianum* L., ***Pedicularis sceptrum-carolinum* L., *Symphytum officinale* L., *Thymus pulegioides* L., *Veronica incana* L.

4. Coniferous-deciduous forest northeast of Dmitrovsk (4470 ha) with the following rare and protected plant species: *Carex echinata* Murr., *Chimaphila umbellata* (L.) W.P.C. Barton, *Crepis paludosa* (L.) Moench, ***Digitalis grandiflora* Mill., *Epipactis helleborine* (L.) Grantz, ***Moneses uniflora* (L.) A. Gray, *Mycelis muralis* (L.) Dumort., *Parnassia palustris* L., *Pyrola chlorantha* Swartz, *Serratula coronata* L., *Thelypteris palustris* Schott.

5. The Dacha Vizhonskaya tract with preserved plots of old-age oak forests (1050 ha), 1 km from the village of Vizhenka. Rare plants: *Aconitum lasiostomum* Reichb. ex Bess., ***Campanula latifolia* L., *Cirsium heterophyllum* (L.) Hill., ***Digitalis grandiflora* Mill., *Verbascum thapsus* L.

6. Broad-leaved forest (2870 ha) between the village of Mogol and the village of Dolbenkino with the following rare forest plant species: *Allium ursinum* L., *Bromopsis benekenii* (Huds.) Holub, ***Corydalis intermedia* (L.) Merat, ***C. marschalliana* (Pallas ex Willd.) Pers., ***Dentaria bulbifera* L., ***D. quinquefo-*

lia Bieb., *Geranium robertianum* L., *Mycelis muralis* (L.) Dumort.

Dolzhangskiy district:

7. Broad-leaved forest (376 ha), located to the north of the village of Rusanovka 1st. There are preserved areas of old-age oak forests with a set of rare species like ***Adenophora liliifolia* (L.) A.DC., ***Carex michelii* Host, ***Dianthus superbus* L., *Laserpitium latifolium* L., ***Scilla siberica* Haw., and, along the forest edge, *Cerasus fruticosa* Pallas.

8. Upland oak grove (362 ha) on the right limestone bank of the Tim River to the south-west of the village of Kudinovno, with the following rare and protected plants of the Orel flora: ***Circaea lutetiana* L., ***Corydalis intermedia* (L.) Merat, *Viola suavis* Bieb.

Glazunovskiy district:

9. The source of the Oka River, 0.5 km northeast of the village of Aleksandrovka with adjacent broad-leaved forests (869.9 ha): *Aconitum lasiostomum* Reichb. ex Bess., ***Adenophora liliifolia* (L.) A.DC., *Brachypodium sylvaticum* (Huds.) Beauv., ***Campanula latifolia* L., *Epipactis helleborine* (L.) Grantz, ***Iris aphylla* L., *Laserpitium latifolium* L., ***Lilium martagon* L., *Rosa villosa* L., ***Trollius europaeus* L., *Xanthoxylum alsaticum* (L.) Schur.

10. The source of the Neruch river, 1 km east of the village of Ilyinskoye with adjacent broad-leaved forests (898.5 ha): *Brachypodium pinnatum* (L.) Beauv., *Cerasus fruticosa* Pallas, *Conioselinum tataricum* Fisch., *Epipactis helleborine* (L.) Grantz, *Eupatorium cannabinum* L., ***Iris aphylla* L., *Laserpitium prutenicum* L., *Lithospermum officinale* L., *Lycopus exaltatus* L., ***Prunella grandiflora* (L.) Jacq., *Veronica spuria* L.

11. The Chermoshnoye tract to the north of the village of Chermoshnoye (179.4 ha). Broad-leaved forest with the following rare non-moral species: *Allium ursinum* L., *Brachypodium sylvaticum* (Huds.) Beauv., ***Campanula latifolia* L., ***Festuca altissima* All.

Khotynetskiy district:

12. Broad-leaved forest (64.6 ha) east of the village of Nikolskoye with the following rare forest plants: *Allium ursinum* L., ***Campanula latifolia* L., *Cynosurus cristatus* L., ***Listera ovata* (L.) R. Br.

Kolpnyanskiy district:

13. Broad-leaved forest (232.7 ha) south of the village of Yakovka with the remains of old-age oak forests and rare plant species: *Aristolochia clematidis* L., ***Lilium martagon* L., *Omphalodes scorpioides* (Haenke) Schrank, ***Scilla siberica* Haw.

Korsakovskiy district:

14. The Grineva Dubrava tract (253.4 ha), 1.2 km west of the village of Grinev, is represented by a broad-leaved forest with the following rare non-moral species: ***Campanula latifolia* L., *Carex sylvatica* Huds., *Chaerophyllum aromaticum* L., *Epipactis helleborine* (L.) Grantz.

Livensky district:

15. Forest tract Lipovchik (163.6 ha) with preserved old-age areas of linden and oak forests with rare plant species like *Corydalis intermedia* (L.) Merat, *Scilla siberica* Haw., *Viola epipsila* Ledeb.

16. Broad-leaved forest (396 ha) to the south of the village of Vakhnovo with preserved old-age areas of oak forests with the following rare plant species: *Brachypodium pinnatum* (L.) Beauv., *Campanula cervicaria* L., *Epipactis helleborine* (L.) Grantz, *Gentiana cruciata* L.

17. Upland oak grove (78.5 ha) on the right high limestone bank of the Sosna River with the following rare and protected plant species: *Aconitum anthora* L., *Delphinium cuneatum* Stevenex DC., *Dianthus superbus* L., *Epipactis helleborine* (L.) Grantz, *Lithospermum officinale* L., *Serratula coronata* L., *Veratrum nigrum* L.

Maloarkhangelsky district:

18. Kostinsky forest (200.4 ha) to the west of the village of Kostino. The only location in the area having *Polystichum aculeatum* (L.) Roth is noted there, as well as such rare plant species as *Carex michelii* Host, *Rosa corymbifera* Borkh. and *Trollius europaeus* L.

Mtsensky district:

19. Small forest in steppe ravines oak grove (562.4 ha) on the slopes of the beam to the east of the village of Spasskoye-Lutovinovo: *Anemone nemorosa* L., *Brachypodium sylvaticum* (Huds.) Beauv., *Bromopsis benekenii* (Huds.) Holub, *Carex polyphylla* Kar. et Kir., *Listera ovata* (L.) R. Br.

20. Broad-leaved forest (998 ha) in the vicinity of Zheleznitsa station and Dumchino station: *Brachypodium sylvaticum* (Huds.) Beauv., *Dactylorhiza fuchsii* (Druce) Soo, *D. maculata* (L.) Soo, *Dianthus fischeri* Sprengel, *Digitalis grandiflora* Mill., *Dracocephalum ruyschiana* L., *Gentiana cruciata* L., *Jovibarba globifera* (L.) J. Parnell, *Listera ovata* (L.) R. Br., *Platanthera chlorantha* (Cust.) Reichb., *Prunella grandiflora* (L.) Jacq., *Trollius europaeus* L.

Novoderevenkovsky district:

21. Forest tract "Bol'shoj zakaz" and the adjacent beam with meadow-steppe vegetation with the total area of 536 ha. In the forest tract, some areas of old-age broad-leaved forests with the following rare plant species have been preserved: *Crepis praemorsa* Tausch, *Epipactis helleborine* (L.) Grantz, *Trisetum sibiricum* Rupr. Rare meadow-steppe species are noted on the settled slopes of the south-eastern exposure of the beam: *Adonis vernalis* L., *Rosa villosa* L.

22. The forest tracts Kolok and Shchigry (total area 1156 ha), located to the south of the village of Mokhovoye, are preserved there by areas of old-age oak forests, with the following rare plant species noted: *Circaea lutetiana* L., *Geranium robertianum* L., *Lilium martagon* L., *Mycelis muralis* (L.) Dumort., *Vicia pisiformis* L.

Orlovsky district:

23. Medvedevskaya Dacha tract (175.5 ha) north of the city of Orel with the following rare and protected species: *Anemone nemorosa* L., *Brachypodium sylvaticum* (Huds.) Beauv., *Carex hartmanii* Cajand., *Digitalis grandiflora* Mill., *Galium intermedium* Schult., *Gladiolus imbricatus* L., *Laserpitium prutenicum* L., *Lilium martagon* L., *Lithospermum officinale* L., *Scorzonera purpurea* L.

24. Forest tracts "Pravoe Streleckoe" and "Levoe Streleckoe" and (total area 318.5 ha), located to the south of the city of Orel: *Adenophora liliifolia* (L.) A.DC., *Carex hartmanii* Cajand., *C. rhizina* Blytt.ex Lindbl., *Digitalis grandiflora* Mill., *Iris aphylla* L., *Laserpitium latifolium* L., *L. prutenicum* L., *Lilium martagon* L., *Listera ovata* (L.) R.Br., *Lycopus exaltatus* L. fil., *Potentilla reptans* L., *Trollius europaeus* L., *Veratrum nigrum* L.

25. Forest tract Zarybinskaya Dacha (669.5 ha) to the south of the village of Gat': *Aconitum lasiostomum* Reichb. ex Bess., *Adenophora liliifolia* (L.) A.DC., *Campanula cervicaria* L., *Digitalis grandiflora* Mill., *Fritillaria meleagris* L., *Gladiolus imbricatus* L., *Helianthemum nummularium* (L.) Mill., *Iris sibirica* L., *Lilium martagon* L., *Scorzonera purpurea* L., *Succisa pratensis* Moench.

Pokrovsky district:

26. Forest tract "Setenevsky oreshnik" (76 ha) with preserved areas of old-age oak forests with typical non-moral plants (*Asarum europaeum* L., *Euonymus europaea* L., *Pulmanaria obscura* Dumort. and others) and rare species like *Scilla siberica* Haw., *Corydalis solida* (L.) Clairv., and, on the edge, *Gentiana cruciata* L.

Shablykinsky district:

27. The Khotkovskaya Dacha tract (6500 ha) to the village of Molodovoye to the north. There are preserved areas of old-age oak forests with the following rare forest species: *Carex disticha* Huds., *Cephalanthera longifolia* (Huds.) Fritsch, *Corallorrhiza trifida* Chatel., *Crepis paludosa* (L.) Moench, *Cypripedium calceolus* L., *C. macranthon* Swartz, *Dactylorhiza maculata* (L.) Soo, *Euphorbia palustris* L., *Listera ovata* (L.) R. Br., *Platanthera chlorantha* (Cust.) Reichb.

28. Coniferous-deciduous forest (88.2 ha), 1 km to the southwest of the village Glybochki with the following rare forest plant species: *Astragalus arenarius* L., *Eupatorium cannabinum* L., *Genista germanica* L., *Geranium robertianum* L., *Lilium martagon* L., *Listera ovata* (L.) R. Br., *Mycelis muralis* (L.) Dumort., *Thymus pulegioides* L.

Sverdlovsky district:

29. The "Zadnyaya Roshcha" tract on the border between Sverdlovsky and Kromskoy district (3670 ha) is represented by a broad-leaved forest with the following rare plant species: *Aconitum lasiostomum* Reichb. ex Bess., *Adenophora liliifolia* (L.) A.DC., *Brachy-*

podium pinnatum (L.) Beauv., *B. sylvaticum* (Huds.) Beauv., *Bromopsis benekenii* (Huds.) Holub, ***Campanula cervicaria* L., ***C. latifolia* L., ***Dianthus fischeri* Sprengel, ***Digitalis grandiflora* Mill., ***Iris aphylla* L., *Laserpitium latifolium* L., ***Lilium martagon* L., ***Platanthera chlorantha* (Cust.) Reichb., ***Trollius europaeus* L.

Uritsky district:

30. Naryshkinsky Natural Park (5,510 ha) is located near the village of Naryshkino between the rivers Orlica (tributary of Orlik) and Tson. The following species of the Red Data Book of the Russian Federation (Krasnaya kniga Rossijskoj Federacii, 2008) and the Red Data Book of Orel Oblast (Krasnaya kniga Orlovskoj oblasti, 2021) are found there: **Cephalanthera longifolia* (Huds.) Fritsch, **Cypripedium calceolus* L., **C. macranthon* Swartz, **Neottianthe cucullata* (L.) L.C. Rich (all these species have not been collected for more than 50 years); ***Circaea lutetiana* L., ***Cypripedium calceolus* L., ***Dactylorhiza fuchsii* (Druce) Soo, *Gentiana cruciata* L., ***Gladiolus imbricatus* L., ***Lilium martagon* L., ***Nymphaea candida* C. Presl, ***Pedicularis sceptrum-carolinum* L., ***Pulsatilla patens* (L.) Mill., ***Trollius europaeus* L.

Verkhovsky district:

31. "Korsun" forest tract and the settled slopes of adjacent beams (842 ha) is the largest forest area in Verkhovsky district with preserved sections of old-age oak forests. *Rare and protected plant species*: ***Adonis vernalis* L., *Brachypodium pinnatum* (L.) Beauv., ***Delphinium cuneatum* Stev. ex DC., ***Iris aphylla* L., *Salvia stepposa* Shost.

Zalegoshchensky district:

32. Oak-aspen forest (33.7 ha), 1 km south of the village of Pobednoye, with the following rare plant species: ***Campanula latifolia* L., *Carex sylvatica* Huds., *Glyceria lithuanica* (Gorski) Gorski.

33. A damp forested beam to the south-east of the village of Rzhavec (95.1 ha): *Carex appropinquata* Schum., ***C. atherodes* Spreng., ***C. dioica* L., *C. distans* L., *C. panicea* L., *Dactylorhiza incarnata* (L.) Soo, ***Festuca altissima* All., *Galium intermedium* Schult., *Gentiana amarella* L., ***Gladiolus imbricatus* L., *Laserpitium latifolium* L.

Znamensky/Khotynetsky district:

34. Orlovskoye Polesye National Park (79.36 thousand ha). The largest number of species of the Red Data Book of the Russian Federation (Krasnaya kniga Rossijskoj Federacii, 2008) and the Red Data Book of Orel Oblast (Krasnaya kniga Orlovskoj oblasti, 2021) are found there: *Dactylorhiza baltica* (Klinge) Orlova, **Fritillaria meleagris* L., **Neottianthe cucullata* (L.) L.C. Rich.; ***Anemone nemorosa* L., ***Arabis pendula* L., ***Botrychium lunaria* (L.) Swartz, ***B. multifidum* (S. G. Gmel.) Rupr., ***Campanula latifolia* L., ***Circaea lutetiana* L., ***Corydalis cava* (L.) Schweeigg. et Körte, ***C. intermedia* (L.) Mérat, ***C. marschalliana*

(Pallas ex Willd.) Pers., ***Dactylorhiza fuchsii* (Druce) Soo, ***Daphne mezereum* L., ***Dentaria bulbifera* L., ***Digitalis grandiflora* Mill., ***Dracocephalum ruy-schiana* L., ***Elatine hydropiper* L., ***E. triandra* Schkuhr., ***Euphorbia palustris* L., ***Festuca altissima* All., ***Gentiana pneumonanthe* L., ***Gladiolus imbricatus* L., ***Hottonia palustris* L., ***Iris sibirica* L., ***Lilium martagon* L., ***Lunaria rediviva* L., ***Moneses uniflora* (L.) A. Gray, ***Nymphaea candida* C. Presl., ***Ophioglossum vulgatum* L., ***Pedicularis palustris* L., ***Platanthera chlorantha* (Cust.) Reichb., ***Pulsatilla patens* (L.) Mill., ***Sanicula europaea* L., ***Scheuchzeria palustris* L., ***Trollius europaeus* L., ***Viola persicifolia* Schreb., ***V. uliginosa* Bess., ***Sparganium minimum* Wallr., ***Epipactis palustris* (Mill.) Crantz, ***Listera ovata* (L.) R. Br., ***Dianthus fischeri* Spreng., ***D. superbus* L., ***Melandrium dioicum* (L.) Cosson et Germ., ***Saxifraga hirculus* L., ***Prunella grandiflora* (L.) Scholl.

Among the identified Important Forest Areas, the largest share falls on broad-leaved forests (88.2%), including old-growth oak forests. Only 11.8% are coniferous-deciduous forests; still, they occupy 80.5% of all allocated Important Forest Areas by the total area (79459.17 ha). This is due to the largest preserved array of natural coniferous-deciduous forests in the region represented in Orlovskoye Polesye National Park. Also, taking into account the type of soil, the non-moral land is the most plowed with broad-leaved forests preserved to a lesser extent.

CONCLUSIONS

This study has resulted in identifying 34 Important Forest Areas in Orel Oblast. Broad-leaved forests account for 19243.42 ha (19.5%), and coniferous/broad-leaved forests account for 79459.17 ha (80.5%). Among the allocated territories, the largest area is occupied by Orlovskoye Polesye National Park (79.36 thousand ha). There are 8 forest areas ranging from 1000 ha to 6500 ha: the coniferous-deciduous forest between the village of Ostrovsky and the village of Voronino, the coniferous-deciduous forest in the north-eastern part of Dmitrovsky district, Dacha Vizhonskaya tract with preserved areas of old-age oak forests, the broad-leaved forest between the village of Mogol and the village of Dolbenkino in Dmitrovsky district, forest tracts Kolok and Shchigry to the south of the village of Mokhovoye in Novoderevenkovsky district, the tract "Zadnyaya Roshcha" in Sverdlovsky district, Naryshkinsky Natural Park in Uritsky district, and Khotkovskaya Dacha tract to the north of the village of Molodovo in Shablykinsky district. The rest of the areas under study are less than 1000 ha.

In the forest areas under study, 8 species listed in the Red Data Book of the Russian Federation (Krasnaya kniga Rossijskoj Federacii, 2008) and 58 species listed in the Red Data Book of Orel Oblast (Krasnaya kniga Orlovskoj oblasti, 2021) were noted.

REFERENCES

- Anderson S. Identifying Important Plant Areas. *Plantlife International*. 2002. 52 s.
- Arhipova M.V. Изменение плоshchadi лесов на Среднерусской возвышенности за последние 250 лет. *Лесоведение*. 2014. № 3. С. 23–30.
- Cvetkov M.A. Изменение лесистости Европейской России с конца XVII столетия по 1914 год. — М.: Изд-во Академии СССР, 1957. 212 с.
- Doklad ob ekologicheskoy situacii v Orlovskoj oblasti v 2019*. Pravitel'stvo Orlovskoj oblasti, Departament nadzornoj i kontrol'noj deyatel'nosti Orlovskoj oblasti. Orel, 2020. 158 s.
- Doklad ob ekologicheskoy situacii v Orlovskoj oblasti v 2020*. Pravitel'stvo Orlovskoj oblasti, Departament nadzornoj i kontrol'noj deyatel'nosti Orlovskoj oblasti. Orel, 2021. 187 s.
- Flora Vostochnoj Evropy*. SPb.: Mir i sem'ya; Izdatel'stvo SPHFA, 2001. Tom X. 670 s.
- Hitrov D.A., Golubinskij A.A., Chernenko D.A. Леса Центрального Черноземья в материалах General'nogo mezhevaniya. *Vestnik Voronezhskogo gosudarstvennogo universiteta*. Seriya: Istoriya. Politologiya. Sociologiya. 2013. № 1. С. 165–169.
- Karta Zony i tipy poyasnosti rastitel'nosti Rossii i sopredel'nyh territorij (1 : 8000000) v serii kart prirody dlya vysshej shkoly* / Pod red. G.N. Ogurevov. M.: TOO EKOR, 1996. 64 s.
- Kiseleva L.L., Parahina E.A., Silaeva ZH.G. Ключевые ботанические территории западной части Орловской области. *Trudy XIV Sezda Russkogo botanicheskogo obshchestva i konferencii Botanika v sovremennom mire (g. Mahachkala, 18–23 iyunya 2018 g.)*. T. 1: Sistematika vysshih rastenij. Floristika i geografiya rastenij. Ohrana rastitel'nogo mira. Paleobotanika. Botanicheskoe obrazovanie. Mahachkala: ALEF, 2018. С. 263–266.
- Kiseleva L.L., Prigoryanu O.M., Parahina E.A., Silaeva Zh.G. Ключевые ботанические территории юго-восточной части Орловской области. *Vestnik OrelGAU*. 2016. № 5(62). С. 37–46.
- Krasnaya kniga Orlovskoj oblasti*. Griby, rasteniya, zhivotnye. Orel: Papirus, 2021. 440 s.
- Krasnaya kniga Rossijskoj Federacii (rasteniya i griby)*. M.: Tovarishestvo nauchnyh izdanij KMK, 2008. 855 s.
- Maevskij P.F. Flora srednej polosy Evropejskoj chasti Rossii. Moskva: Tovarishestvo nauchnyh izdanij KMK, 2014. 635 s.
- Ob utverzhenii lesnogo plana Orlovskoj oblasti*: ukaz gubernatora Orlovskoj oblasti ot 29.12.2018 № 881 // SPS Konsul'tantplus
- Ogureeva G.N., Kiseleva L.L., Prigoryanu O.M. Долговременная динамика лесов центра Русской равнины // *Sbornik statej regional'noj konferencii Vtorye chteniya, posvyashchennye pamyati Efreмова Stepana Ivanovicha* / Pod red. Puzinoj T.I. — Orel, OGU, Poligraficheskaya firma Kartush, 2006. — С. 170–175.
- Rabotnov T.A. *Fitocenologiya*. 2-e izd. M.: Изд-во МГУ, 1983. 292 s.
- Seregin A.P. Setochnoe kartirovanie flory Vladimirskoj oblasti (Rossiya): ot rasprostraneniya vidov k rasprostraneniyu soobshchestv / *Rastitel'nost' Rossii*. SPb. 2013. 23. С. 36–56.
- Stishkov M.S., Dadli N. Ohranyaemye prirodnye territorii Rossijskoj Federacii i ih kategorii. M.: Vsemirnyj fond dikoj prirody (WWF), 2018. 248 s.
- Vostochno-evropejskie lesa: istoriya v golocene i sovremennost'*. Kollektivnaya monografiya / Pod red. O.V. Smirnovoj. M.: Nauka, 2004. V 2 t. V. 1. 479 s.; V. 2. 575 s.
- Vostochnoevropejskie shirokolistvennye lesa*. Kollektivnaya monografiya / Pod red. O.V. Smirnovoj. M.: Nauka, 1994. 364 s.

КЛЮЧЕВЫЕ ЛЕСНЫЕ ТЕРРИТОРИИ ОРЛОВСКОЙ ОБЛАСТИ

Л. Л. Киселева¹, Е. А. Парахина^{2, *}, Ж. Г. Силаева³¹Орловский государственный университет им. И.С. Тургенева, ул. Комсомольская, 95, Орел, 302026 Россия²Российский университет дружбы народов, ул. Миклухо-Маклая, 6, Москва, 117198 Россия³Орловский государственный аграрный университет им. Н.В. Парахина, ул. Генерала Родина, 69, Орел, 302019 Россия

*E-mail: parakhina-ea@rudn.ru

Ключевые лесные территории являются ядрами, где сохраняются природные комплексы и их биоразнообразие. Леса на территории Орловской области расположены неравномерно. Лесистость составляет 8%. Самыми лесистыми являются следующие административные районы области: Дмитровский, Знаменский, Хотынецкий и Мценский, где лесистость составляет 20–25%, а наименьшая лесистость отмечена в юго-восточных районах — Должанском, Колпнянском, Ливенском и Покровском, где ее показатель не превышает 2.5%. Самый крупный лесной массив сохранился на северо-западе исследуемого региона. Он относится к национальному парку “Орловское Полесье”. На широколиственные леса в них приходится 19243.42 га (19.5%), на хвойно-широколиственные 79459.17 га (80.5%). При проведении исследований использовались маршрутный метод, метод геоботанических описаний и сеточного картирования. В результате исследований территории Орловской области было выделено 34 ключевых лесных территорий с наиболее высоким разнообразием редких и охраняемых растений региона. На этих территориях было отмечено 8 видов, занесенных в Красную книгу Российской Федерации, и 58 видов, занесенных в Красную книгу Орловской области.

Ключевые слова: Орловская область, ключевые лесные территории, памятники природы, редкие и охраняемые растения.