

# Research Journal of Pharmaceutical, Biological and Chemical Sciences

## Principles and experience of justification of ecological representativeness of Emerald network potential sites.

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### ABSTRACT

The article presents the results of the multi-method research to provide justification of Emerald network potential site, which meets the requirements of environmental representativeness. Flora and vegetation of the core natural habitat, species composition and prevalence of the species of European importance and from the Red books of the country and region, as well as the habitats of European importance were systematized with the use of methods of botanical and geobotanical studies. The approach represented in this article can be applied to expand the list of nominated Areas of Special Conservation Interest for representation of biological and landscape diversity of a country on Emerald sites.

**Keywords:** Emerald network, species of European importance, territory of special nature conservation, priority habitats.

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## INTRODUCTION

Recently, the concept of "functional biodiversity" defined the leading role of bio-diversity in performing regulatory functions in ecosystems [1].

Emerald Network – a network of Areas of Special Conservation Interest (ASCI's), which is formed within the Berne Convention on the Conservation of European Wildlife and Natural Habitats.

In 1979, after signing the Bern Convention, it was decided to identify and nominate ASCI's – the most valuable natural areas for the purpose of their further conservation [2, 3]. The totality of ASCI's as core areas within pan-European Biological and Landscape Diversity Strategy was called Emerald network. In 1996 it was formally established by Resolution № 3 of the Standing Committee of the Bern Convention.

Resolution No. 4 (1996) of the Convention determines the list of the types of endangered habitats (priority habitats) that require special conservation measures (habitat classification provided by UINIS) [4]. Resolution No. 6 (1998) of the Convention determines the list of species (priority species – species of European importance), which require special measures to protect their habitats [5].

In 1999 the formation of the Emerald network started in Russia. The Council of Europe introduced the status of potential ASCI's, which is prescribed before the end of the formal evaluation. Resolution No. 8 (2012) of the Standing Committee on the national designation of adopted Emerald sites, that was passed on November 30, 2012, identified further steps as foreseen in the Calendar for the implementation of the Emerald Network of Areas of Special Conservation Interest (2011–2020).

In 2009–2011. St. Petersburg charitable public organization "Biologists for Nature Conservation" completed the project on the identification of potential areas of Emerald network ASCI's in European Russia. In 2012, the Standing Committee of the Bern Convention fixed the status of candidate Emerald sites for 740 Russian ASCI's [6].

Species included in the Red book of the Russian Federation or the Red book of the federal subject of the Russian Federation are also indicators of the importance of the area to conserve the habitats of the wild flora and fauna species and can characterize its representativeness in the national context. In Belgorod region 9 of candidate Emerald sites received such status (Table 1) [3].

**Table 1: List of candidate Emerald sites on the territory of Belgorod region [7].**

| Sitecode  | Site Name                 | Area, ha |
|-----------|---------------------------|----------|
| RU3100012 | Belgor'e                  | 2131.00  |
| RU3100215 | Hotmigskiy                | 10662.00 |
| RU3100216 | Rovenskiy                 | 1328.06  |
| RU3100217 | Lis'a gora                | 126.10   |
| RU3100218 | Petrovskie Borki          | 173.90   |
| RU3100219 | Urocihshche Gniloe i Yary | 220.20   |
| RU3100220 | Khmelevoe                 | 300.00   |
| RU3100221 | Bo'lshoy Log              | 70.00    |
| RU3100222 | Bekariukovskiy Bor        | 315.20   |

According to Table 1 the average area of sites is 17 km<sup>2</sup> in the span values from 0.70 to 107 km<sup>2</sup>. Site Bo'lshoy Log (RU3100221) has the smallest area, which defines this natural habitat as being under threat a priori.

Brief descriptions (profiles) of candidate Emerald sites on the territory of Belgorod region contain information about the types of habitats of European importance represented on the sites, as well as vascular plant species of European importance, from the Red book of the Russian Federation and Belgorod region. However, this "prior" information is incomplete and in some cases it is incorrect. One of the reasons is poor state of knowledge about these natural systems due to occasional and short-term field researches. The applied

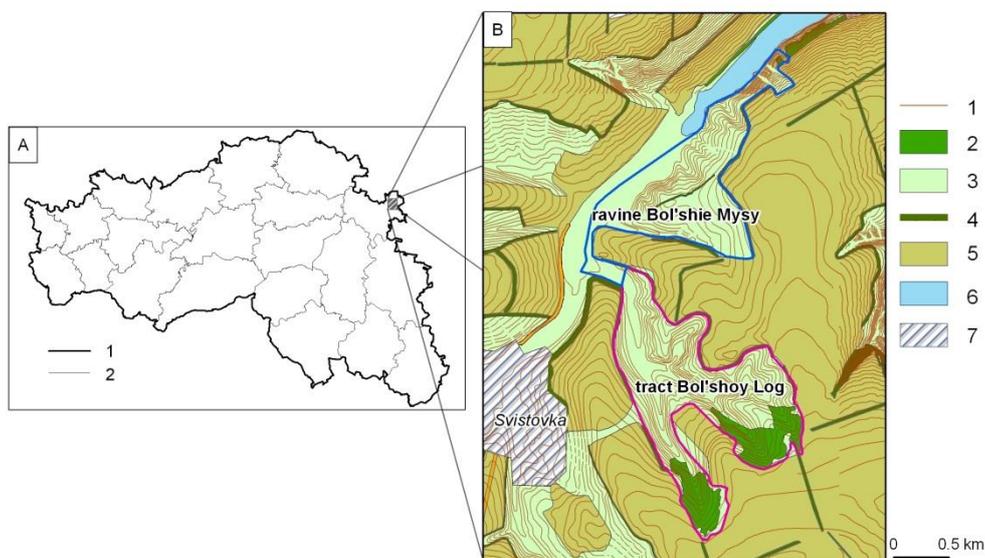
classification of habitats provided by EUNIR does not contain all variety of habitat types that are common in European Russia, which results in the need to expand the national list of candidate Emerald sites.

According to the recommendations of EUROSITE, Toolkit Management Planning [8] in the areas of conservation planning should be carried out as active management to maintain biotopes and biodiversity, as well as full control of biotopes reproduction. While it is undoubtedly essential to conserve biodiversity of large in terms of area natural reserves, we cannot ignore the large restorative capacity of local habitats that are favorable for this species or environmentally close association [9]. Such habitats in terms of restoration ecology should be considered as a source habitat [10]. Thus, the study of the flora of local habitats (mounds) showed [11] that such habitats of high nature value are comparable with the floras of steppe protected areas: sozophytes (species that are protected, rare, endangered, or included in the "Red books" of different ranks) include 69 species (9.6% of steppe zone species). As some species are included into several environmental lists sozophytes occupy 96 positions in such lists.

The purpose of the study performed is to justify the principles of determining the representativeness of potential areas of Emerald sites and to apply the developed approach in order to justify the area of the ecologically integral potential site of European importance at the local level.

### MATERIALS AND RESEARCH METHODS

The object of the study was a nominated site, one of Emerald sites of ASCI, – Bol’shoi Log (Belgorod region, Russia) and its neighborhood (Figure), the subject their priority habitats (habitats of European importance), species of vascular plants of European importance, the Red book of the Russian Federation and Belgorod region, which allowed to use the obtained systemization to justify ASCI's and assess their representativeness.



**Figure: One of candidate Emerald sites on the territory of Belgorod region (A) – Site Bo'ishoy Log (B): 1 – horizontals; 2 – ravine forests; 3 – floodplain of River Potudan; 4 – forest strips; 5 – arable land; 6 – pond; 7 – locality**

The results of field studies were used as materials for the research. Traditional methods of botanical and geobotanical studies were used to explore the flora and vegetation of the core natural habitat, species composition and prevalence of species of European importance from the Red books of the Russian Federation and Belgorod region [12, 13]. Registration of species on the route, collection of herbarium material in the course of fixed-route expeditions were carried out from April to September with an interval of one month in 2014–2015. Species identification was carried out in the field and laboratory conditions, updating taxonomically complex species – in funds of BSU, LE, VOR, VORG. About 100 herbarium sheets were collected and processed. Latin names of vascular plants are summarized according to S.K. Cherepanov and P.F. Maevskij.

## THE MAIN PART

### *Landscape structure of the core candidate Emerald site:*

The variety of species composition including the presence of rare and endangered plant species on a particular site is determined by the landscape structure, which can be divided into at least three hierarchical levels of topological differentiation (from facies to regional). According to the scheme of landscape areas of Central Chernozem provided by F.N. Milkov [16] the territory of Krasnensky District of Belgorod region (900 km<sup>2</sup>) belongs to the wooded steppe province of Central Russian Upland, typical wooded steppe subzone. This area is located within the Don Cretaceous region of typical wooded steppe. The landscape is presented by upland, sloping, terraced-floodplain and floodplain terrain types.

Currently upland areas are plowed everywhere.

Sloping terrain type fragments are distributed throughout the area. This area includes the surfaces with the slope above 3° – these are ravine slopes and the valley of the River Potudan. This type is characterized by high ruggedness of terrain, bedrock exposures, increased erosion of soil, sparse vegetation. Slope type of terrain is characterized by deep (more than 30 m) erosional pattern. Landscape structure of the slope type of terrain is predetermined by natural-territorial complexes in the form of slopes of river valleys and ravines. The dominant tract of the slope type terrains are ravines of tree form. The presence of ravines that are cut into thick carbonate rocks (chalk and marl) is characteristic. Most beams slopes are covered with meadow steppes, which have partially lost their species diversity [17–19].

Above flood-plain terrace terrain was formed within the above flood-plain river terraces on the territory of the area under study.

Flood-plain of the River Potudan is at altitudes of 100–125 m. The thickness of alluvial deposits within it is 4–6 m. Major groups of facies are defined in them: a river bed, a flood-plain and an oxbow.

According to the Decision of the Executive Committee of Belgorod Regional Council of People's Deputies from 07.27.1978, № 393 and from 30.08.1991 № 267 natural habitat Bo'Ishoy Log received the status of specially protected area (PA) of regional importance. It is located on the right bank of the River Potudan, 1 km north-west from village Svistovka of Krasnensky District of Belgorod region. The territory of a potential Emerald site ASCI's, Bo'Ishoy Log, coincides with the existing Special Protected Natural Area Bo'Ishoy Log. Its total area is 0.7 km<sup>2</sup>.

In the description of ASCI's Bo'Ishoy Log contained in the Emerald network book of the Russian Federation [3] there is no list of habitats of European importance. We have identified priority habitat types on the territory of the natural habitat.

These include:

X18. Wooded steppes.

E1.2. Perennial calcareous grassland and basic steppes.

G1.A4. Mixed ravine and slope forests.

Landscape tracts of the natural habitat Bo'Ishoy Log are represented by meadow, forb-grass, shrub, pteridophytic, sandy steppes, outcrops of Cretaceous rocks on the steeps, ravine forest. The species composition of vascular plants of these habitats fill the local flora with taxa that are characteristic for wooded steppes (X18.) [20, 21].

### *Calciphilic perennial grasslands and steppes (E 1.2.).*

In herb bunchgrass steppes the following species dominate: *Adonis vernalis* L., *Agrimonia eupatoria* L., *Bupleurum falcatum* L., *Carex humilis* Leyss., *Euphorbia stepposa* Zoz ex Prokh., *Festuca valesiaca* ssp. *valesiaca* Gaud., *Filipendula vulgaris* Moench, *Fragaria viridis* (Duch.) Weston, *Galium verum* L., *Salvia nutans* L., *Stipa capillata* L., *S. pennata* L. s. str. These species create the background during flowering.

Steppe communities are enlarged by: *Arenaria micradenia* P. Smirn., *Campanula altaica* Ledeb., *Campanula bononiensis* L., *Cuscuta approximata* Babingt., *Elisanthe viscosa* (L.) Rupr., *Knautia arvensis* (L.) Coult., *Nonea pulla* DC., *Phleum phleoides* (L.) Karst., *Phlomis pungens* Willd., *Plantago media* L., *Potentilla heptaphylla* L., *Scorzonera purpurea* L., *Senecio jacobaea* L., *Serratula radiata* (Waldst. et Kit.) Bieb., *Silene chlorantha* (Willd.) Ehrh., *S. nutans* L., *Thalictrum minus* L., *Trifolium montanum* L., *Jurinea arachnoidea* Bunge., *Verbascum lychnitis* L., *V. orientale* Bieb., *Veronica incana* L., *V. prostrata* L., *Vincetoxicum stepposum* Pobed., *Viola rupestris* F. Schmidt.

Among steppe herbs we can find: *Helictotrichon desertorum* (Less.) Nevski, *H. schellianum* (Hack.) Kitagawa, and on the southern slope of one of the ridges – *Stipa tirsia* Stev.

Wetterified lower slopes are occupied by: *Astragalus danicus* Rotz., *Ajuga genevensis* L., *Betonica officinalis* L., *Carex contigua* Hoppe, *Euphorbia virgata* Waldst. et Kit., *Medicago falcata* L., *Prunella grandiflora* (L.) Scholl., *Ranunculus polyanthemos* L., *Salvia stepposa* Shost., *Thymus marschallianus* Willd., *Veronica austriaca* L., *V. chamaedrys* L.

The list of habitat types, which are under threat (priority habitats) and require special conservation measures (classification of UINIS), does not include such habitat types as “Outcrops of writing chalk, limestone and malmstone, perthophyte steppe” and “Steppe shrubs”, which are characteristic of the wooded steppe and steppe zones of the European part of Russia. In our opinion, these habitats essentially complement the picture of landscape and floristic diversity of central Russia and it is suggested to include them into the list of habitats of European importance. The arguments in favor of this suggestion can be the following descriptions of these habitats.

“Outcrops of writing chalk, limestone and malmstone, perthophyte steppe” – communities with sparse vegetation, obligate and facultative calciphytes. Specific species are: *Alyssum lenense* Adams., *A. tortuosum* Waldst. et Kit. ex Willd. s. l., *Androsace koso-poljanskii* Ovcz., *Artemisia hololeuca* Bieb. ex Bess., *A. salsoloides*, *Asperula tephrocarpa* Czern. ex Pop. M. et Chrshan., *Astragalus albicaulis* DC., *Carex humilis* Leyss., *Cephalaria uralensis* (Murr.) Schrad. ex Roem. et Schult., *Crambe tataria* Sebeok, *Diplotaxis cretacea* Kotov, *Erysimum canescens* Roth, *Erucastrium cretaceum* Kotov, *Euphorbia seguierana* Neck., *Euphrasia pectinata* Ten., *Genista tanaïtica* P.A. Smirn., *Gypsophila altissima* L., *Hedysarum grandiflorum* Pall., *Helianthemum canum* (L.) Hornem., *H. rupifragum* Kern., *Hyssopus cretaceus* Dubjan., *Koeleria talievii* Lavr., *Onosma tanaïtica* Klok., *Pimpinella tragium* Vill., *Polygala sibirica* L., *Schivereckia podolica* (Bess.) Andr. ex DC., *Serratula tanaïtica* P. Smirnov, *Teucrium polium* L., *Thymus cretaceus* Klok. et Shost. and others. Relict plant communities: “dealpine”, nicky thyme, hyssop nicks.

“Steppe shrubs” – communities that form *Amygdalus nana* L., *Caragana frutex* (L.) C. Koch, *Chamaecytisus austriacus* (L.) Link, *Ch. ruthenicus* (Fisch. ex Woloszcz.) A. Klaskova, *Rosa* sp., *Euphorbia subtilis* Prokh., *Iris aphylla* L., *Lathyrus lacteus* (Bieb.) Wissjul., *Spiraea crenata* L., *S. litwinowii* Dobrocz. with the presence of hygrophilous meadow-steppe herbs and grasses (*Allium paczoskianum* Tuzson, *Clematis pseudoflammula* Schmalh. ex Lipsky, *Melica transsilvanica* Schur, *Phlomis tuberosa* L., *Ornithogalum kochii* Parl., *Vinca herbacea* Waldst. et Kit. and others).

We studied the species composition of these habitats within the natural complex Bo’Ishoy Log.

*Outcrops of writing chalk, limestone and malmstone, perthophyte steppe.*

Some areas of the perthophyte steppe are overgrown by the species which are characteristic for these habitats. On the erudite calcareous chernozem soil and chalk rubble the communities form: *Ajuga chia* Schreb., *Allium flavescens* Bess., *Alyssum calycinum* L., *Anthyllis vulneraria* L., *Arenaria procera* Spreng., *Asperula cynanchica* L., *Astragalus dasyanthus* Pall., *Campanula sibirica* L., *Centaurea marschalliana* Spreng., *C. ruthenica* Lam., *Ephedra distachya* L., *Eryngium campestre* L., *Galatella linosyris* (L.) Reichenb. fil., *Galium octonarum* (Klok.) Soo, *G. inctorium* (L.) Scop., *Echinops ruthenicus* Bieb., *Hypericum elegans* Steph., *Inula hirta* L., *Meniocus linifolius* (Steph.) DC., *Onobrychis arenaria* (Kit.) DC., *Oxytropis pilosa* (L.) DC., *Plantago lanceolata* L., *Polygala hybrida* DC., *Polygonatum odoratum* (Mill.) Druce, *Scabiosa ochroleuca* L., *Seseli annuum* L., *Taraxacum proximum* (Dahlst.) Dahlst., *Viola ambigua* Waldst. et Kit.

On the southern slopes in the zones B and C [16] the perthophyte steppe is replaced by outcrops of Cretaceous rocks. Along with the typical inhabitants of these landscape tracts such as: *Arabis sagittata* (Bertol.) DC., *Asperula tephrocarpa*, *Astragalus albicaulis*, *Cephalaria uralensis*, *Crambe tataria*, *Diplotaxis cretacea*, *Erysimum canescens*, *Euphorbia seguierana*, *Euphrasia pectinata.*, *Gypsophila altissima*, *Helianthemum nummularium* (L.) Mill., *Pedicularis kaufmannii* Pinzger, *Pimpinella tragium*, *Polygala sibirica*, *Stachys recta* L. sparse vegetation is formed by representatives of relict plant communities – "dealpine", nicky thyme, hyssop nicks.

#### Steppe shrubs.

Overgrown shrub steppes are considered to represent top slope micro zones. Here we often find *Spiraea litwinowii* Dobroc., more rarely – *Amygdalus nana*, *Chamaecytisus ruthenicus*. We rarely find in their composition or separately on the slopes – *Rhamnus cathartica* L.

Hygrophilous grasses and herbs tend to grow on such wetter (especially in spring time – during snowmelt) habitats: *Allium paczoskianum*, *Anemone sylvestris* L., *Clematis integrifolia* L., *C. pseudoflammula*, *Euphorbia subtilis* Prokh., *Iris aphylla* L., *Lathyrus lacteus* (Bieb.) Wissjul., *Melica transsilvanica*, *Phlomis tuberosa*, *Sisymbrium polymorphum* (Murr.) Roth, *Valeriana rossica* P. Smirn., *Vinca herbacea*, *Viola accrescens* Klok.

Relatively gentle areas of slopes and the bottom of one of the beam spurs were plowed under crops last century. For the last twenty years forb-grass steppe has recovered on the deposits, with participation of: *Stipa capillata* L., *Elytrigia intermedia* (Host) Nevski, *Calamagrostis epigeios* (L.) Roth, *Salvia pratensis* L., *Lotus corniculatus* L. s. l., *Nepeta pannonica* L., *Rumex crispus* L. and others with domination of (especially at the beam bottom) *Stipa pulcherrima* C. Koch.

Flattened upper areas of the steep slopes of southern exposure are represented by a sandy steppe with its distinctive species: *Artemisia austriaca* Jacq., *Agropyron cristatum* (L.) P. Beauv., *Iris pineticola* Klok., *Potentilla arenaria* Borkh., *Ranunculus illyricus* L., *Rumex acetosa* L., *Sedum maximum* (L.) Hoffm. s. l.. Their neighbors are: *Achillea nobilis* L., *Dianthus andrzejowskianus* (Zapal.) Kulcz., *Echium russicum* J.F. Gmel., *Gagea erubescens* (Bess.) Schult. et Schult. fil., *Hyacinthella leucophaea* (C. Koch) Schur, *Lathyrus tuberosus* L.

Salted sands vegetation stands out against the background of a forb-grass steppe. In such habitats the dominating ones are: *Galatella villosa* (L.) Reichenb. fil.; the following ones are of secondary importance: *Astragalus dasyanthus* Pall., *Scorzonera taurica* M.B. The community is varied by: *Allium sphaerocephalon* L., *Asparagus polyphyllus* Stev., *Astragalus onobrychis* L., *Coronilla varia* L., *Dianthus campestris* Bieb., *Echinops ruthenicus* J.F. Gmel., *Erigeron acris* L., *Falcaria vulgaris* Bernh., *Festuca valesiaca* ssp. *valesiaca*, *Koeleria glauca* (Spreng.) DC., *Polygala comosa* Schkuhr, *Salvia nutans* L., *Senecio jacobaea* L., *Trinia multicaulis* (Poir.) Schischk., *Verbascum phoeniceum* L., *Veronica prostrata* L.

#### Mixed ravine and slope forests (G1.A4.).

In the eastern part of the natural complex there are two sparse coppice ravine oak forests with traces of intensive logging in the past – Romashkino (23.3 hectares) and Nikitino (18.1 ha). Their tree layers are formed by: *Quercus robur* L., *Fraxinus excelsior* L., *Acer platanoides* L., *Betula pendula* Roth, *Tilia cordata* Mill., in the most humid places – *Populus tremula* L.

The undergrowth consists of *Acer campestre* L., *Padus avium* Mill., *Corylus avellana* L., *Euonymus verrucosus* Scop., *Rubus caesius* L.

The grass cover under the forest canopy is composed by *Adoxa moschatellina* L., *Aegopodium padagraria* L., *Anemone ranunculoides* L., *Asarum europaeum* L., *Carex pilosa* Scop., *Corydalis marchalliana* (Pall. ex Willd.) Pers., *C. solida* (L.) Clairv., *Ficaria verna* Huds., *Gagea lutea* (L.) Ker-Gawl., *G. minima* (L.) Ker-Gawl., *Lathyrus vernus* (L.) Bernh., *Mercurialis perennis* L., *Polygonatum multiflorum* (L.) All., *Pulmonaria obscura* Dumort., *Scilla sibirica* Haw., *Stellaria holostea* L., *Veratrum nigrum* L., *Viola mirabilis* L.

Shrub and grass layers of forest rings are formed by forest, forest ring, meadow, steppe and weed species *Cerasus fruticosa* Pall., *Rosa* sp., *Arctium minus* (Hill) Bernh., *Artemisia vulgaris* L., *Betonica officinalis* (L.) Trev., *Campanula glomerata* L., *C. persicifolia* L., *Carex michelii* Host, *Euphorbia semivillosa* Prokh., *Geranium pratense* L., *G. sanguineum* L., *Heracleum sibiricum* L., *Hypericum hirsutum* L., *Linum nervosum* Waldst. et Kit., *Pyrethrum corymbosum* (L.) Scop., *Sanguisorba officinalis* L., *Serratula lycopifolia* A. Kerner, *S. tinctoria* L., *Solidago virgaurea* L., *Trifolium alpestre* L., *Urtica dioica* L.

As a part of forest ring vegetation on the slope of the north-eastern exposure of the forest tract Nikitino there are species, which are rare in the region: *Artemisia armeniaca* Lam., *Fritillaria ruthenica* Wikstr., *Pulmonaria angustifolia* L.

"Priority", protected and rare species of vascular plants representative for ASCI's.

On the territory of ASCI's Bo'Ishtoy Log we found:

- 5 types with the status of "Species of European importance" [20] (Table. 2);
- 6 species included in the Red book of Belgorod region [21]. One of these species has category 1 status (a decreasing species), 5 species – category 3 status (rare species) (Table. 2).

On the territory of ASCI's Bo'Ishtoy Log there are two species, which are listed in the Red book of the Russian Federation with the category II status (decreasing in numbers and prevalence), 36 species with different categories of status occupying different ecological niches (Table. 2). Eight species require enhanced security measures; they are candidates for inclusion into the Red book of the Belgorod region (*Allium paczoskianum*, *Artemisia armeniaca*, *Campanula persicifolia* L., *Echinops ruthenicus* Bieb., *Galatella linosyris* (L.) Reichenb. fil., *Helictotrichon desertorum* (Less.) Nevsk., *Oxytropis pilosa*, *Ranunculus illyricus* L.). 7 species of vascular plants are rare in the region (*Alyssum lenense*, *Astragalus danicus*, *Helictotrichon schellianum* (Hack.) Kitagawa, *Pulmonaria angustifolia* L., *Scorzonera taurica* M.B., *Spiraea litwinowii* Dobroc., *Stipa tirsia* Stev.).

The vegetation of the complex is composed of a variety of communities and groups. They include relict plant communities:

– «dealpine» with *Androsace koso-poljanskii*, *Carex humilis*, *Clausia aprica* (Steph.) Korn.–Tr., *Onosma tanaitica*, *Schivereckia podolica*, *Helictitrichon desertoram*, *Alyssum lenense*, *Campanula altaica*;

– timyanniki with *Thymus cretaceus*, *Linum ucrainicum* Czern.;

– issopniki with *Hyssopus cretaceus*, *Koeleria talievii*.

**Table 2: "Priority", protected and rare species of vascular plants, which determine the representativeness of ASCI's Bo'Ishtoy Log**

| The source of information   |                                  |
|---|----------------------------------|
| Emerald book of the Russian Federation [3]                                  | The authors' data                |
| <b>Vascular plants of European importance</b>                               |                                  |
| –   | <i>Crambe tataria</i>            |
| –   | <i>Echium russicum</i> ,         |
| –   | <i>Iris aphylla</i>              |
| <i>Schivereckia podolica</i>  | <i>Schivereckia podolica</i>     |
| –   | <i>Serratula lycopifolia</i> ,   |
| <i>Pulsatilla patens</i> (L.) Mill.   | –                                |
| <b>Species of vascular plants in the Red book of the Russian Federation</b> |                                  |
| Category 1 status – a decreasing species                                    |                                  |
| –   | <i>Iris aphylla</i>              |
| Category 3 status – a rare species  |                                  |
| <i>Androsace koso-poljanskii</i>  | <i>Androsace koso-poljanskii</i> |
| –   | <i>Fritillaria ruthenica</i>     |
| –   | <i>Hyssopus cretaceus</i>        |

|   |                                  |
|---|----------------------------------|
| –   | <i>Stipa pennata</i>             |
| –   | <i>S. pulcherrima</i>            |
| <i>Hedysarum grandiflorum</i> Pall.   | –                                |
| <b>Species of vascular plants in the regional list of the Red book of Belgorod region</b> |                                  |
| Category II status – a species decreasing in numbers and prevalence                       |                                  |
| –   | <i>Amygdalus nana</i>            |
| –   | <i>Schiverekia podolica</i>      |
| Category 3 status – a rare species  |                                  |
| <i>Allium flavescens</i>  | <i>Allium flavescens</i>         |
| 1   | 2                                |
| –   | <i>Anemone sylvestris</i>        |
| <i>Astragalus dasyanthus</i>  | <i>Astragalus dasyanthus</i>     |
| –   | <i>Centaurea ruthenica</i>       |
| –   | <i>Clausia aprica</i>            |
| <i>Clematis pseudoflammula</i>  | <i>Clematis pseudoflammula</i>   |
| –   | <i>Dianthus andrzejowskianus</i> |
| –   | <i>Echium russicum</i>           |
| –   | <i>Ephedra distachya</i>         |
| –   | <i>Iris pineticola</i>           |
| –   | <i>Linum ucrainicum</i>          |
| <i>Polygala sibirica</i>  | <i>Polygala sibirica</i>         |
| –   | <i>Poterium sanguisorba</i> L.   |
| <i>Prunella grandiflora</i>   | <i>Prunella grandiflora</i>      |
| –   | <i>Spiraea crenata</i>           |
| <i>Gonolimon tataricum</i> (L.) Boiss.  | –                                |
| <i>Gentiana cruciata</i> L.   | –                                |
| <i>Gentiana pneumonanthe</i> L.   | –                                |
| Category IV status – an unexplored species (unidentified status)                          |                                  |
| –   | <i>Sedum maximum</i>             |
| <i>Astragalus pubifloris</i> (Pall.) DC.  | –                                |
| Category V status – a vulnerable species  |                                  |
| <i>Clematis integrifolia</i>  | <i>Clematis integrifolia</i>     |
| <i>Primula veris</i> L.   | –                                |
| <i>Corydalis marchalliana</i>   | <i>Corydalis marchalliana</i>    |
| –   | <i>Crambe tataria</i>            |
| <i>Galatella villosa</i>  | <i>Galatella villosa</i>         |
| –   | <i>Hyacinthella leucophaea</i>   |
| –   | <i>Scorzonera purpurea</i>       |
| –   | <i>Trinia multicaulis</i>        |
| –   | <i>Valeriana rossica</i>         |
| –   | <i>Veratrum nigrum</i>           |
| –   | <i>Verbascum phoeniceum</i>      |
| –   | <i>Vinca herbacea</i>            |
| <i>Pulsatilla patens</i> (L.) Mill.   | –                                |
| Category VI status – an especially valuable species                                       |                                  |
| <i>Adonis vernalis</i>  | <i>Adonis vernalis</i>           |
| –   | <i>Asperula tephrocarpa</i>      |
| –   | <i>Astragalus albicaulis</i>     |
| –   | <i>Carex humilis</i>             |
| <i>Cephalaria uralensis.</i>  | <i>Cephalaria uralensis</i>      |
| –   | <i>Diplotaxis cretacea</i>       |
| –   | <i>Helianthemum nummularium</i>  |
| <i>Onosma tanaitica</i>   | <i>Onosma tanaitica</i>          |
| –   | <i>Pedicularis kaufmannii</i>    |

|                           |                         |
|---------------------------|-------------------------|
| –                         | <i>Thymus cretaceus</i> |
| <i>Helianthemum canum</i> | –                       |
| <i>Linum flavum</i> L.    | –                       |
| <i>Teucrium polium</i> L. | –                       |

The study of ASCI's Bolshoy Log (local name for MalyeMysy) showed that the actual area of the natural habitat is 177 hectares. Increasing the area will increase the representativeness of ASCI's Bo'Ishoy Log due to the fullest extent possible inclusion of priority habitats, and thus increase the number of "priority" species of vascular plants (Figure).

Thus, the recommended increase in the area of ASCI's Bo'Ishoy Log is up to 177 hectares; the number of species of European importance increases from 2 to 6; the number of species of the Red book of the Russian Federation – from 2 to 7; of the list of the Red book of Belgorod region – from 20 to 48. Overall, the number of "priority" species on ASCI's Bo'Ishoy Log (MalyeMysy) increases from 23 to 56 (Table 2).

We have identified territorial and taxonomic resources of further increase of the territory of ASCI's Bo'Ishoy Log and the list of "priority" species of vascular plants due to joining the site MalyeMysy directly adjoining the natural habitat – Bo'Ishie Mysy. Its area is 126 hectares. It includes:

- Beam ravine tributary with shrub and sandy steppe, psammophytes dominate in its vegetation;
- Steep north-western exposures, on the right bank of the River. Potudan with outcrops of Cretaceous rocks, rockmat steppe (in the area of high denudation), shrubs, meadow steppe on northern exposure slopes, saline areas of the steppe;
- Damp meadow with springs in the floodplain; a pond.

On the territory of the natural complex we identified six priority habitat types. Four priority of these priority habitat types are found on the territory of MalyeMysy:

- X18. Wooded steppe.
- E1.2. Perennial calcareous grassland and basic steppes;
- Outcrops of writing chalk, limestone and malmstone, perthophyte steppe;
- Steppe shrubs,

as well as two new habitats:

- (C3.2) coastal and water basins bordering vegetation;
- D5.2. Beds of large sedges normally without free-standing water;

Within the local flora of natural habitat Bolshie Mysy we noted species of vascular plants, which are not found on the ASCI's Bo'Ishoy Log (RU3100221). These include:

- one species of European importance (*Serratula tanaitica* P. Smirnov);
  - three species from the Red book of the Russian Federation (*Bulbocodium versicolor* (Ker-Gawl., *Serratula tanaitica* P. Smirnov, *Orchis palustris* Jacq.);
  - one species from the Red book of Belgorod region (*Linum perenne* L.);
  - three species, which require increased security measures – candidates for inclusion into the Red book of Belgorod region (*Galatella angustissima* (Tausch) Novopokr., *Helictotrichon pubescens* (Huds.) Pilger, *Trinia kitaibelii* Bieb.);
  - three species that are rare in Belgorod region (*Alisma gramineum* Lej., *Artemisia sericea* Weber ex Stechm., *Galatella biflora* (L.) Moen).
- seven priority habitat types;

Increasing the area of ASCI's Bo'Ishoy Log due to coverage of the entire territory of MalyeMysy (177 ha) and attaching natural habitat Bolshie Mysy (126 hectare) to it (126 hectare) will increase the area of the potential site of Emerald network, Bo'Ishoy Log, from 70 hectares to 303 hectares.

All in all on the two sites (Malyeand Bolshie Mysy) the subjects for protection will be:

- seven priority habitat types;
- seven species of vascular plants of European importance,
- ten species from the Red book of the Russian Federation,
- forty nine species from the Red book of Belgorod region,
- eleven species of vascular plants requiring increased security measures – candidates for inclusion into the Red book of Belgorod region,

– ten species that are rare in the region.

Besides that extension of the area of ASCI's Bolshoy Log (MalyeMysy) due to attaching Bolshiie Mysy is necessary to preserve growing here rare endemic species of the south of the Russian Plain – *Serratula tanaitica* P. Smirn. For the first time on the territory of Belgorod region it was discovered on June 14, 2014, by A.V. Gusev and E.I. Ermakova. The importance of the discovery underlines the status of the taxon. The species is listed in the Red Book of the Russian Federation (category 1 – endangered species), Red Books of Volgograd, Rostov and Ulyanovsk regions. It is included into Annex I to Berne Convention (2002). In Russia it is found on the Don, in the north of Rostov, Volgograd, in the south of Ulyanovsk, in Samara and Saratov regions. Outside Russia it grows in the eastern part of Ukraine in Luhansk region. It grows on chalk, more or less grass-covered slopes, mixed grass steppes on the slopes of the northern and north-western exposure. Its populations are isolated and small. Approximate number of the national population of the species is quite small (over 5000 plants) [13].

In Belgorod region the species is found only in the neighborhood of village Svistovka, Krasnensky District, in the perthophyte steppe on the slopes of north-western exposure of the tract Mysy. The local population is sparse, about thirty flowering and fruit-bearing plants; there are also young ananthis plants.

The discovery of this rare endemic species, which is hundreds kilometers away from the main habitat, on the territory of the natural complex Bolshiie Mysy, which we recommend for expansion of the territory of the ASCI's Bo'Is hoy Log, shows the importance of environmental protection and increases the ecological representativeness of this Core Area.

#### CONCLUSION

The approach being applied – switching away from the center of high biodiversity fixed according to geobotanical researches to integral polystructural Core Area, the outer contour of which is justified on the landscape borders, allows providing the formation of representative areas of Emerald sites.

#### SUMMARY

As a result of regular field floristic studies the new borders of the integral conservation area Bo'Is hoy Log (MalyeMysy) are justified. That is a potential site of Emerald network, meeting the requirements of ecological representativeness:

- in terms of the territory dimensions (expansion of the area from 70 hectares to 177 hectares);
- in terms of composition of priority habitat types (three types of classification of UINIS);
- in terms of unique variety of flora:
  - six species of vascular plants of European importance;
  - seven species of vascular plants from the Red book of the Russian Federation;
  - forty eight species of vascular plants from the Red book of Belgorod region;
  - eight species of vascular plants requiring increased security measures – candidates for inclusion into the Red book of Belgorod region;
  - seven species that are rare in the region;
- in terms of the presence of such relict groups as "dealpine", thyme, hyssop nicks, among other plant communities.

The list of endangered habitats types (priority habitats) that require special conservation measures, that is established by UINIS classification, was proposed to expand due to the inclusion of such habitat types (common in Europe-Soviet Russia) as:

- "Outcrops of writing chalk, limestone and malmstone, perthophyte steppe"
- "Steppe shrubs".

Increasing the area of ASCI's Bo'Is hoy Log (MalyeMysy) up to 177 hectares due to inclusion of the additional natural complex Bolshiie Mysy, with the area of 126 hectares, into its composition allows for optimal representativeness of candidate Emerald site, which is determined by:

- the territory dimensions (total area – 303 hectares);

- seven types of priority habitats;
- seven species of vascular plants of European importance;
- ten species from the Red book of the Russian Federation;
- forty–nine species from the Red book of Belgorod region;
- eleven species of vascular plants requiring increased security measures – candidates for inclusion into the Red book of Belgorod region;
- ten species that are rare in the region.

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