

Distribution of priority species and habitats from the Rodna Mountains (Natura 2000 site, ROSCI0125)

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Abstract

The Rodna Mountains National Park and Natura 2000 site is placed in Northern part of Romania, Eastern Carpathians and is having a surface of 48.062 ha. The site is sheltering 6 priority species (*Ursus arctos*, *Canis lupus*, *Rosalia alpina*, *Campanula seratta*, *Pseudogaurotina excellens*, *Callimorpha quadripunctaria*) and 6 priority habitats (Bushes with *Pinus mugo* and *Rhododendron sp.*, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnus incanae*, *Salix albae*), Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas, Active raised bogs, Petrifying springs with tufa formation (*Cratoneurion*), Alpine pioneer formations of the *Caricion bicoloris-atrofuscae*). For these very important species and habitats from a communitarian point of view, there were realized the distribution map at the Rodna Mountains level during the period 2014-2017.

Introducere

The Rodna Mountains (ROSCI0125 code of Natura 2000 site) is located in the alpine biogeographic region of Rodna Mountains. The site's surface is 48.062 ha, with an altitude ranging from 595 to 2.303 m (Standard Form of the Natura 2000 site), with a medium altitude of 1.424 meters. Administratively, 20% of the site is located in Maramureş County and 80% in Bistriţa-Năsăud County (<http://biodiversitate.mmediu.ro/rio/natura2000>).

Priority species are species of Community importance for the preservation of which, the European Community has a special responsibility because of the low proportion of their area within the European Union. These species are indicated by an asterisk (*) in Annex II of the Habitats Directive 92/43/EEC, Annex no. 3 of OUG no. 57/2007, approved with amendments and completions by Law no. 49/2011, as amended.

Priority natural habitats are the natural habitats threatened with extinction present in the European Union and whose preservation has become a prime responsibility for the European Community, given the percentage of their natural disintegration. These types of priority natural habitats are highlighted by an asterisk (*) in Annex I of the Habitats Directive 92/43/EEC.

Any plan or project not directly connected with or not necessary for the management of the site containing priority species and habitats but likely to

significantly affect the area, "*per se*" or in combination with other plans or projects, shall be subject to an appropriate assessment of the potential effects on the site, depending on the conservation objectives of the site. Depending on the conclusions of that assessment, the site administration approves the plan or project only after it has determined that it has no adverse effects on the integrity of the site and, if appropriate, after consulting the public opinion. In sites with habitats and priority species, the only considerations that may be invoked are those related to public health or safety, certain beneficial consequences of major importance for the environment or, following the European Commission's opinion, other crucial reasons of major public interest Habitats Directive 92/43/EEC).

In the Natura 2000 Rodna Mountains there are 6 species and 6 priority habitats (Table 1).

Table 1. Priority species and habitats in the Natura 2000 Rodna Mountains (ROSCI0125), (Iuşan C., 2013)

No.	Name of species and habitats	Code*
1	<i>Ursus arctos</i> (brown bear)	1354
2	<i>Canis lupus</i> (wolf)	1352
3	<i>Callimorpha quadripunctaria</i> (Jersey tiger butterfly)	1087
4	<i>Rosalia alpina</i> (<i>Rosalia longicorn</i>)	1078
5	<i>Campanula serrata</i> (bellflower)	4070
6	<i>Pseudogurotina excellens</i> (beetle)	4024
7	Bushes with <i>Pinus mugo</i> and <i>Rhododendron sp.</i>	4070*
8	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)	91EO*
9	Species-rich <i>Nardus</i> grasslands, on silicious substrates in mountain areas	6230*
10	Active raised bogs	7110*
11	Petrifying springs with tufa formation (<i>Cratoneurion</i>)	7220*
12	Alpine pioneer formations of the <i>Caricion bicoloris-atrofuscae</i>	7240*

*Code according the Directive 92/43/CEE

Materials and methods

The analysis of the distribution of priority species and habitats in the Natura 2000 site The Rodna Mountains were made through direct observations and using various methods, specific to each species or habitat (Table 2).

Table 2. Methods used to analyze the distribution of priority species and habitats

No.	Name of species and habitats	Methods used	Materials used
1	<i>Ursus arctos</i> (brown bear)	Footprints on snow	GPS Forest landscaping maps Binocular Topographic maps Species guides Lighting traps Entomological nets Camera with infrared sensors Field car Drone Satellite images Metric frames Herbarium Power generator Butterfly binoculars Digital camera Roulette Field microscope Camouflage tents for photography Clinometer Dendrometer Laser spacer
		Video cameras with infrared motion sensors	
		Excrements observations	
		Killed pray	
2	<i>Canis lupus</i> (wolf)	Footprints on snow	
		Video cameras with infrared motion sensors	
		Excrements observations	
		Killed pray	
3	<i>Callimorpha quadripunctaria</i> (Jersey Tiger butterfly)	Lighting traps	
		Entomological nets	
4	<i>Rosalia alpina</i> (<i>Rosalia longicorn</i>)	Entomological nets	
		Direct observation	
5	<i>Campanula serrata</i> (flowerbell)	Square frame	
		Direct observation	
6	<i>Pseudogaurotina excellens</i> (beetle)	Lighting traps	
		Entomological nets	
7	Bushes with <i>Pinus mugo</i> and <i>Rhododendron sp.</i>	Direct observation	
8	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)	Direct observation	
9	Species-rich <i>Nardus</i> grasslands, on silicious substrates in mountain areas	Direct observation	

No.	Name of species and habitats	Methods used	Materials used
10	Active raised bogs	Direct observation	
11	Petrifying springs with tufa formation (<i>Cratoneurion</i>)	Direct observation	
12	Alpine pioneer formations of the <i>Caricion bicoloris-atrofuscae</i>	Direct observation	

The distribution analysis period ranges between 2014-2017 and was carried out by the Rodna Mountains National Park Administration.

Results and discussions

The distribution of the brown bear (*Ursus arctos*) and the wolf (*Canis lupus*) was done by observing traces left in mud and snow, excrements, killed pray, shepherd alerts as a result of the damages caused by killing sheep, movies captured with infrared cameras with motion sensors (Figures 1, 2), (Vogel et al., 2009, Ionescu, 2002).

Tiger butterfly (*Callimorpha quadripunctaria*) is an active species at night, being attracted by bright lights. Thus, monitoring of this species (starting from the certification of its presence) was achieved by the use of light traps (Fig.3) (Mihuț, 2010, Rakosy et al., 2003).

The presence of the alpine longicorn (*Rosalia alpina*) shows a good conservation status of the beech forests, especially of the secular forests, because this species survives and proliferates only in mature forests. From an economic point of view, the alpine longicorn is a very important factor, being an indicator of healthy beech forests. The evaluation of the distribution of this species was made by direct observations along the transects in the mature beech forests (Figure 4), and the specimens in flight were captured for observation and identification by entomological nets. It is a species that can move on relatively large distances, having a good flying ability. It is an active species the day that remains active on the twilight, when it also performs flying in the high coronations, looking for thick, dry branches (Nițu, 2010, Săvulescu et al., 1961).

Campanula serrata or bellflower is a frequent species found in meadows, meadows, rocks and groves, among the alpine and subalpine hedges, from the alpine, subalpine floors up to the mountainous level of spruce and beech. In the Rodna Mountains, it is mentioned in most of the alpine area - Pietrosu Mare, Valea Vinului, at the Gate, Mihăiasa, Valea Anieșului, Măgura Teiului, Izvorul Mare Valley, Rotunda, Crăciunel, Ineu, Corongiș etc. The

presence of the species was achieved by direct observations in the habitats that offer optimal conditions to the species (Fig.5). (Ciocârlan, 2000, Cristea et al., 2004).

The beetle (*Pseudogaurotina excellens*) is a xylophagous, monophagous species (*Lonicera nigra/rubra*), endemic to the Carpathian Mountains, with a fragmentary area, in continuous regression, due to the continuous alteration of the characteristic habitat. The populations were monitored by the technique of observing and direct counting of specimens (especially from June to July) from umbelliferous inflorescences and monitoring of catches in light traps mounted in mountain poles. The grasslands close to which the host plant (*Lonicera nigra*) was identified, Fig. 6, (Nitzu, 2010; Nitzu et al., 2008).

Types of habitat „Bushes with *Pinus mugo* and *Rhododendron myrthifolium*” (4070*) are habitats of Community interest and priority (Habitats Directive, Annex 1) and are represented on the site by edible climbing communities (*Pinus mugo*), usually accompanied by broadleaf evergreen shrub (*Rhododendron myrtifolium*), blueberry (*Vaccinium myrtillus*) and cranberry (*Vaccinium vitis-idaea*), located on the subalpine area. The need to ensure a favorable conservation status of this type of habitat is given by the particular conservative value (eg large number of taxa, including rare taxa); environmental role (anti-erosion, hydrological); the peculiar landscape role; the degradation suffered in the past as a result of grubbing up of these hedges in order to extend the alpine pastures. The habitat 4070* is a habitat that occupies a large area in compact, discontinuous polygons in the central part of the massif in almost all the ridges of the valleys included in the park, on the heights and slopes of the park, spread on the subalpine floor, a considerable effort to monitor its conservation status (Figure 7), (Candrea et al, 2009, Coldea, 1990, Donita et al., 2005, Gafta et al., 2008).

The 91EO* habitat of alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicicon albae*) is made up of *Alnus incana* arboreal phytocoenoses, installed on alluvial soils, effluent cones of valleys, flooded periodically, for short periods, located in the major bed of the main watercourses in the site (Aniesul Mare, Aniesul Mic, Rebra, Bistrita Aurie etc.). The need to ensure a favorable conservation status of this type of habitat is given by: conservative value; the ecological role (anti-erosion, alluvial deposits, bank consolidation, hydrological); the degradation suffered in the past as a result of actions to regulate riverbeds, the exploitation of mineral aggregates and the construction of dams and forest roads along the valleys included in the site; high landscaping value.

The habitat 91EO* has a distribution in the form of longitudinal strips located either on both sides of the minor bed or only one of them, depending on the terrain configuration, with varying width, ranging from 1-2 rows of trees to

a few tens of meters, interrupted instead of grassland/high grass communities, or forest zoning habitats that run on the slopes of the watercourse to contact with it where the major bed is missing (Figure 8), (Candrea et al, 2009, Coldea, 1990; Donita et al., 2005; Gafta et al., 2008).

The 6230* habitat of the *Nardus*-rich mountain meadows of the *Nardus* species on silicious substrates is represented in the Rodna Mountains by closed, mesophilic, *Nardus stricta* cenoses, installed on low slopes, more sheltered, on podzolian soils and humosiosols, with a strong acid reaction the subalpine and alpine levels. The meadows are composed by *Nardus stricta* and *Festuca nigrescens*. Their distribution was analyzed by direct observations in potential habitats (Figure 9). Habitat 6230* appears on rather stretched surfaces, installed on slopes slightly inclined, more sheltered, on podzolic soils and humosiosols, with a strong acid reaction, from subalpine and alpine floors (Candrea et al., 2009, Coldea, 1990, Donita et al., 2005, Gafta et al., 2008).

The active raised bogs habitat (7110*) is represented in the site by census of oligotrophic swamps/acid peat, poor in mineral nutrients, hydrologically maintained mainly by the intake of rainfall, with a water level generally higher than the surrounding groundwater vegetation perennial dominated by pillows (varieties) vividly colored by *Sphagnum spp.*, which allow creeping the marsh in its central part. The need to ensure a favorable conservation status of this type of habitat is given by: special conservative value (eg rare taxa, glacial relics); ecological (hydrological) role; the peculiar landscape role; the degradation suffered in the past as a result of operations to exploit and drain these peatlands. The habitat 7110* appears on quite small areas (tens, maximum hundreds of m²), isolated, formed by the clogging of some alpine lakes or the extension of some marvels around the springs located on the plateau and the boilers in the central part of the massif, on the subalpine floor (Figure 10), (Candrea et al, 2009, Coldea, 1990, Donita et al., 2005, Gafta et al., 2008, Pop, 1960).

The habitat type 7220* of *Cratoneurion* petrified springs is represented in the site by hygrophilous censuses that develop at the edges of the springs in the mountain and subalpine floors of the limestone massifs of the Rodna Mountains. The edifying species for this type of habitat are *Cratoneuron commutatum*, *Cratoneuron filicinum*, along with *Silene pusilla*, *Saxifraga aizoides*, *Pinguicula vulgaris*, *Doronicum carpaticum*. The need to ensure a favorable conservation status of this type of habitat is given by: the particular conservative value; environmental role (anti-erosion, hydrological); the peculiar landscape role; the high vulnerability of this type of habitat to fluctuations in the water regime. The habitat 7220* appears on quite small areas (tens, maximum hundreds of m²), isolated, located at the edges of the springs in the mountain and subalpine floors

of the limestone massifs of the Rodna Mountains (Fig. 11), (Candrea et al, 2009, Coldea, 1990, Donita et al., 2005, Gafta et al., 2008).

The habitat 7240* of alpine pioneer formations of *Caricion bicoloris-atrofuscae* is represented by alpine communities that colonize neutral to slightly acidic, stony, sandy, sometimes slightly clayey or turbulent, saturated in cold water on the moors and on the edges of the springs, streams, the glacial torrents of the alpine area. For the existence of this type of habitat, the permanent or continuous freezing of the soil is essential for a long time. The vegetation is short, consisting mainly of *Carex* and *Juncus* (*Caricion bicoloris-atrofuscae*). The habitat 7240* appears on quite small surfaces (tens, maximum hundreds of m²), isolated, located at the edges of the springs in mountain and subalpine floors of the limestone limestone (Figure 12), (Candrea et al, 2009, Coldea, 1990, Donita et al., 2005, Gafta et al., 2008).

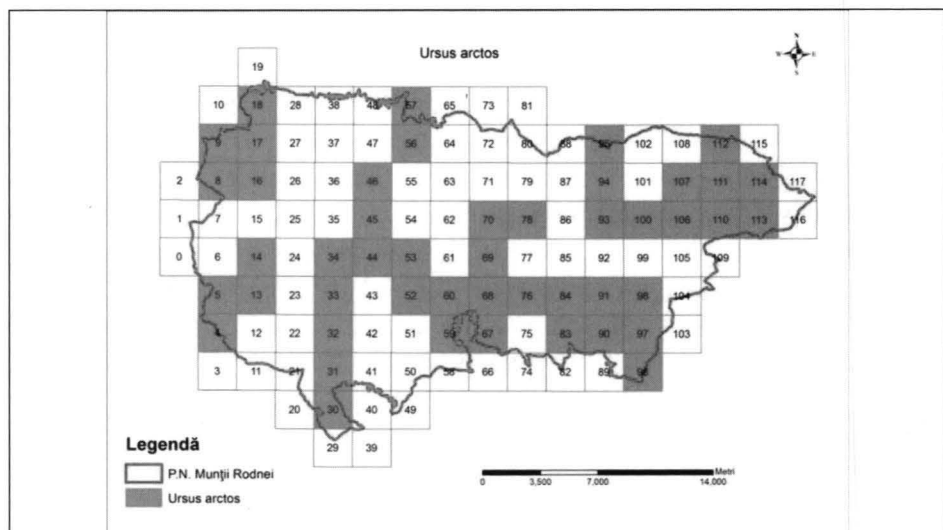
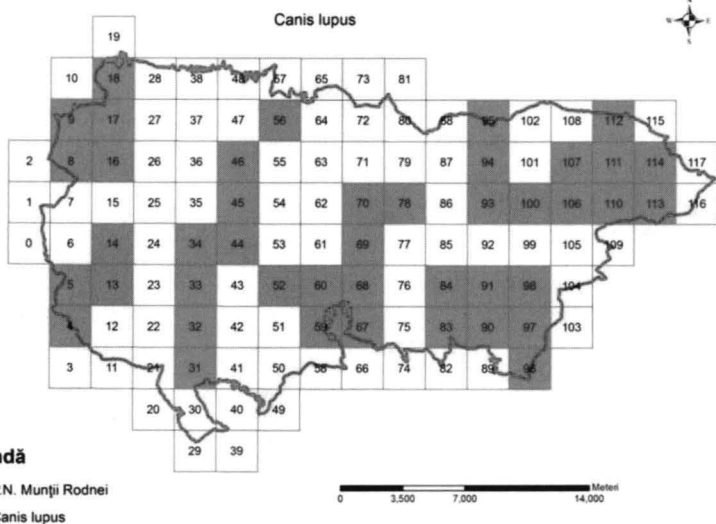
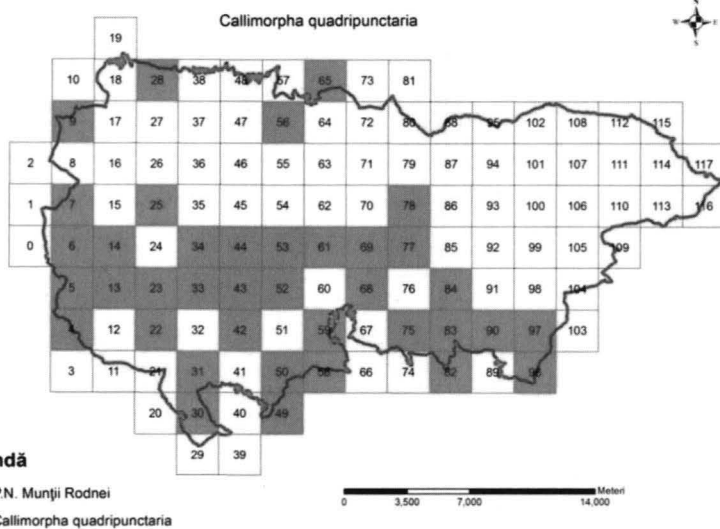


Fig. 1 The distribution map of brown bear (*Ursus arctos*) in Rodna Mountains National Park and Natura 2000 site



*Fig. 2 The distribution map of wolf (*Canis lupus*) in Rodna Mountains National Park and Natura 2000 site*



*Fig. 3 The distribution map of Jersey tiger butterfly (*Callimorpha quadripunctaria*) in Rodna Mountains National Park and Natura 2000 site*

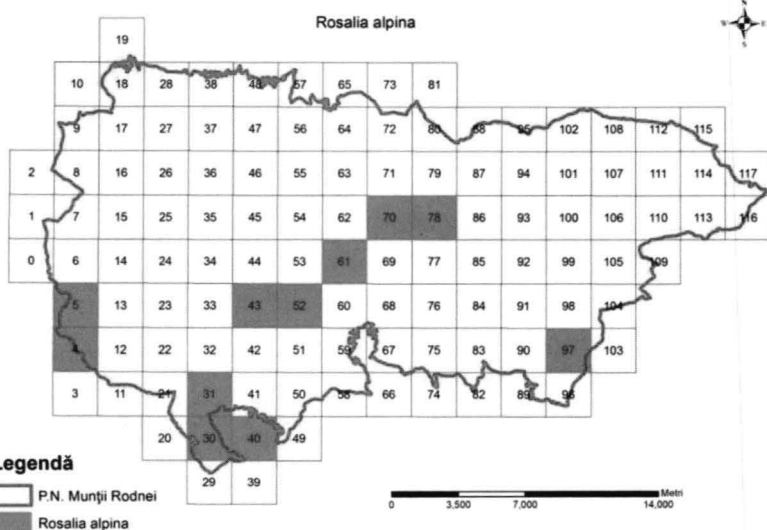


Fig. 4 The distribution map of alpine longicorn (Rosalia alpina) in Rodna Mountains National Park and Natura 2000 site

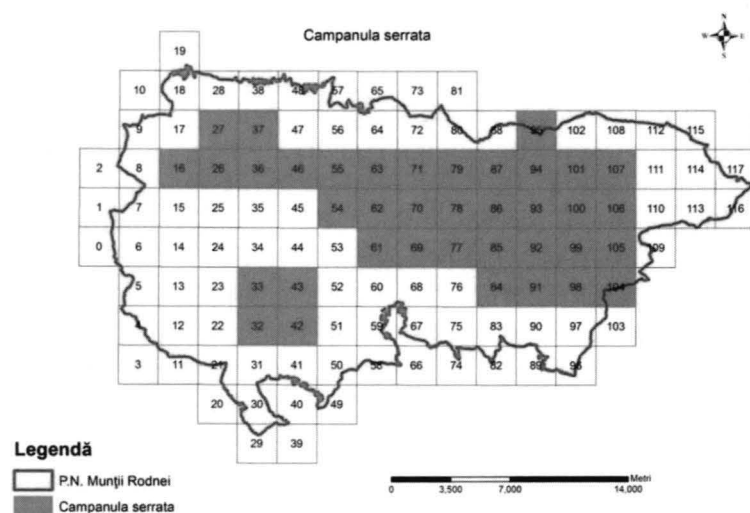


Fig. 5 The distribution map of bellflower (Campanula serrata) in Rodna Mountains National Park and Natura 2000 site

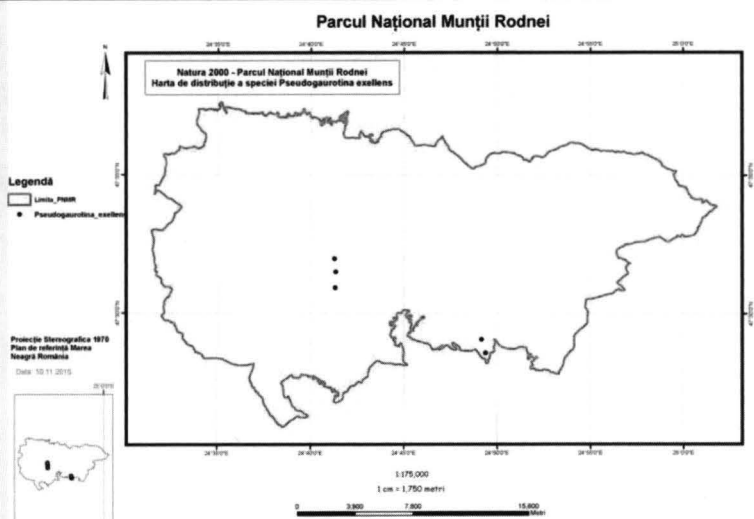


Fig. 6 The distribution map of beetle (*Pseudogaurina excellens*) in Rodna Mountains National Park and Natura 2000 site

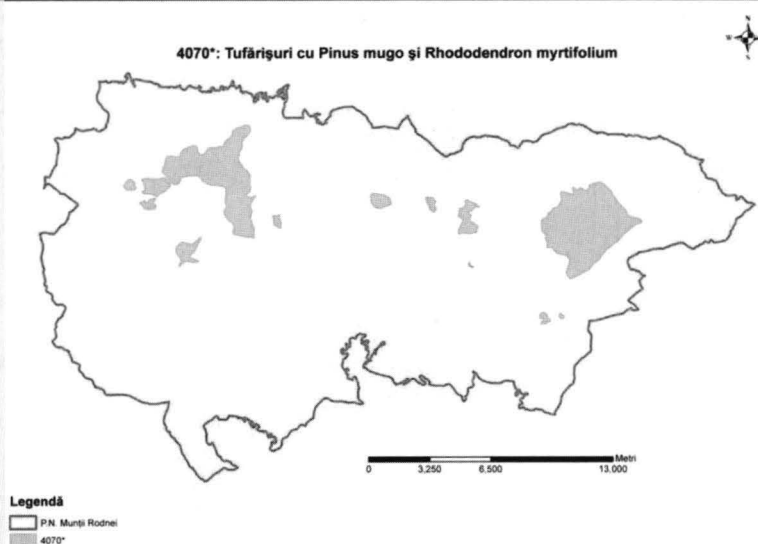


Fig. 7 The distribution map of 4070* habitat (Bushes with *Pinus mugo* and *Rhododendron* sp.) in Rodna Mountains National Park and Natura 2000 site



Fig. 8 The distribution map of 91E0 habitat (Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)) in Rodna Mountains National Park and Natura 2000 site*

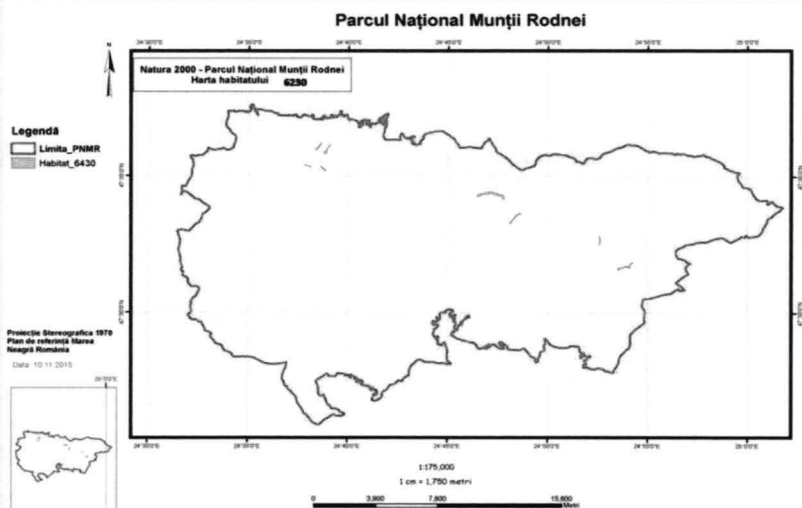


Fig. 9 The distribution map of 6230 habitat (Species-rich *Nardus* grasslands, on silicious substrates in mountain areas) in Rodna Mountains National Park and Natura 2000 site*

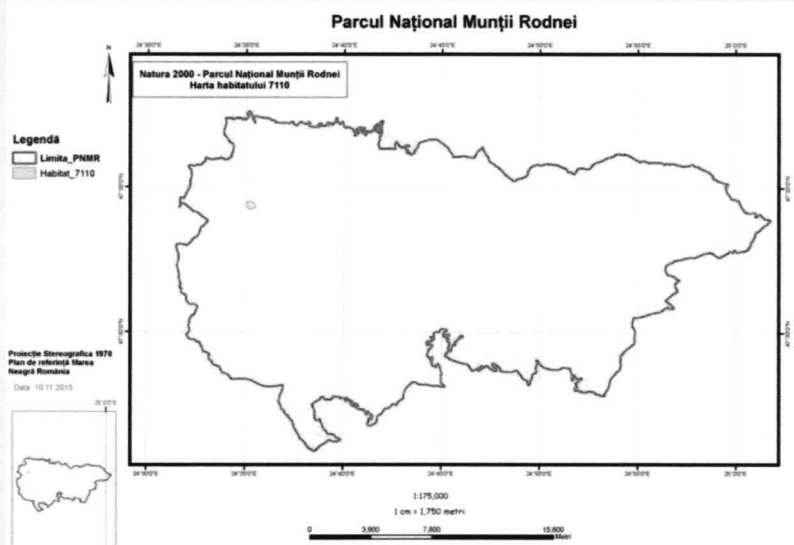


Fig. 10 The distribution map of 7110 habitat (Active raised bogs) in Rodna Mountains National Park and Natura 2000 site*

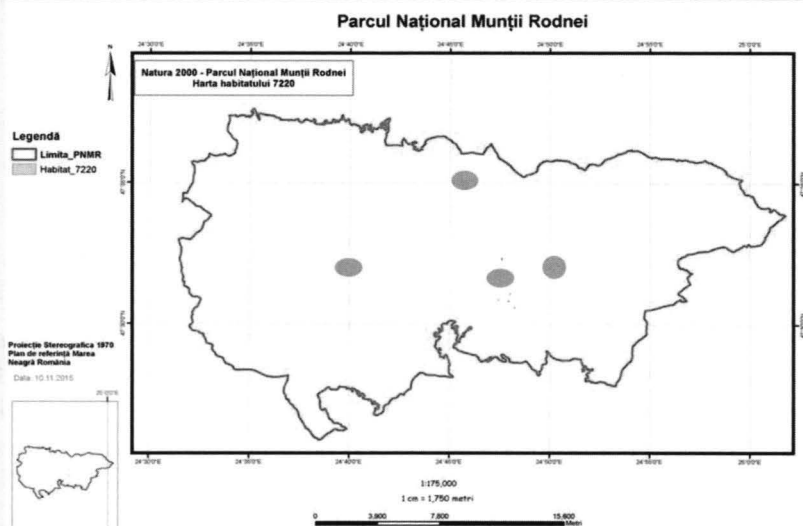
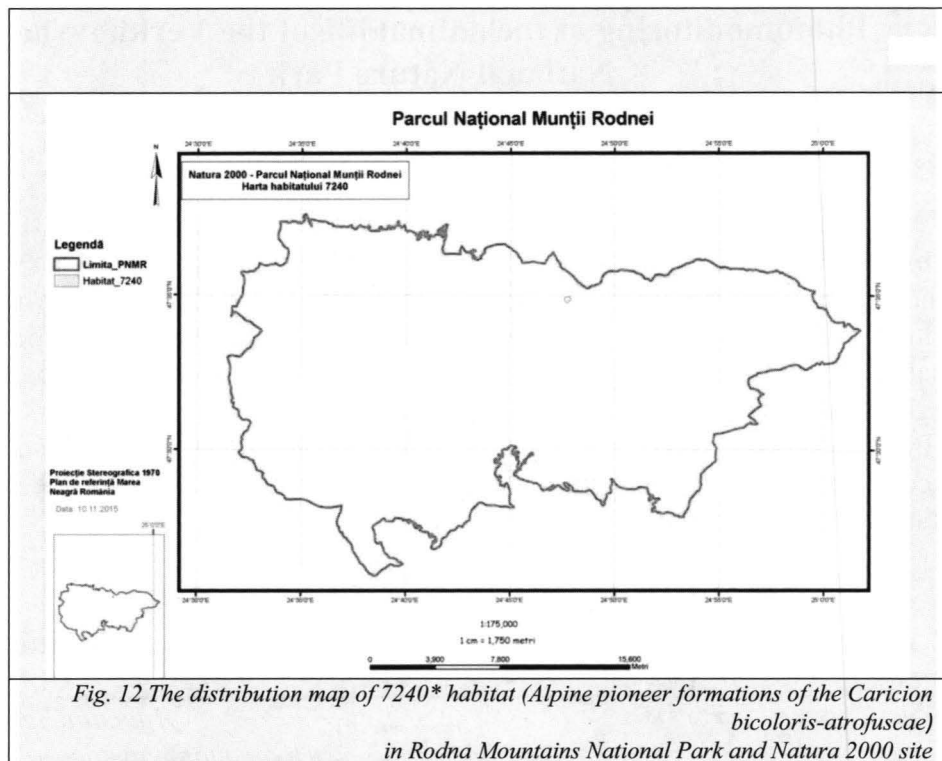


Fig. 11 The distribution map of 7220 habitat (Petrifying springs with tufa formation (Cratoneurion)) in Rodna Mountains National Park and Natura 2000 site*



Conclusions

The Natura 2000 Rodna Mountains (ROSCI0125) site comprises 12 priority species and habitats for conservation at European level, thus constituting a protected area representative of European biodiversity.

Elaboration of distribution maps of the 6 species (*Ursus arctos*, *Canis lupus*, *Rosalia alpina*, *Campanula seratta*, *Pseudogaurotina excellens*, *Callimorpha quadripunctaria*) and 6 priority habitats (*Pinus mugo* and *Rhododendron myrthifolium* bushes, alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*-Alno-Padion, *Alnion incanae*, *Salicicon albae*, *Nardus* mountain meadows rich in siliceous substrates, Active raised bogs, *Croutoneurion*-shaped petrified springs, alpine pioneer formations with *Caricion bicoloris-atrofuscae*) represent a first step towards ensuring a permanent monitoring and a favorable conservation status.

Among the priority species, Rodna Mountains host a few rare species at national level, such as *Pseudogaurotina excellens*, and among the priority habitats are the alpine pioneer formations of *Caricion bicoloris-atrofuscae* as having a limited distribution only at the Rodna Mountains.

Of the total area of Romania, Natura 2000 sites represent approximately 22.68% (5.406.000 ha), and among them, the Natura 2000 Rodna Mountains play an important role in preserving representative populations of priority species of community interest.

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