

Mapping out the habitats of conservation importance in the subalpine and alpine northern marble divide of the Pirin National Park (Bulgaria)

Todor S. Karakiev¹, Nadezhda G. Georgieva² & Rossen T. Tzonev¹

¹ Department of Ecology and Environmental Protection, St. Kliment Ohridski Sofia University, Faculty of Biology, 8 Dragan Tsankov Blvd., Sofia 1164; e-mails: karakiev@abv.bg, rossentzonev@abv.bg

² Botanical Garden of Sofia University „St. Kliment Ohridski”, Ecopark Varna, St. Konstantin and Elena Resort, Varna 9006; e-mail: g.nadezhda@yahoo.com

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Abstract. The article deals with mapping out of the habitats in the alpine and subalpine marble divide of the Pirin Mts (Bulgaria). The investigated area is the most important territory in the Pirin National Park and also in NATURA 2000 network. It is very rich in plant species, communities and habitats of conservation importance. This study is part of the study into alpine and subalpine vegetation of the Pirin Mts resulting from more than three years of field work in the area. EUNIS habitat classification was applied for the mapping units as official and widespread at the EU level. Thirteen habitats were identified in the area during the study. A concise characteristic of each habitat includes the habitat area (ha), its altitudinal range of distribution, category according to the *Red Data Book of Bulgaria*, NATURA 2000 code, Palaeartic classification code, as well as the most typical species. The map will be useful for different activities in the area, such as research work, management, etc.

Key words: EUNIS habitat classification, conservation importance, characteristic species

Introduction

The Pirin Mts (2914 m) are the second highest mountain range in Bulgaria after Rila (2925 m) and the eighth highest in Europe. It covers an area of 2585 km² at an average altitude of 1033 m. The Pirin Mts are located in the southwest of Bulgaria, between the Struma and Mesta rivers, bordering Rila Mountain to the north at the Predel Saddle (1142 m) and Slavyanka Mountain to the south at the Parilaska Saddle (1170 m) (Fig. 1) (Koprlev 2002). Pirin Mts were declared a National Park and also a UNESCO Heritage Site. The Park area comprises two natural reserves: Bayuvi Dupki – Dzhindziritza (2873 ha)

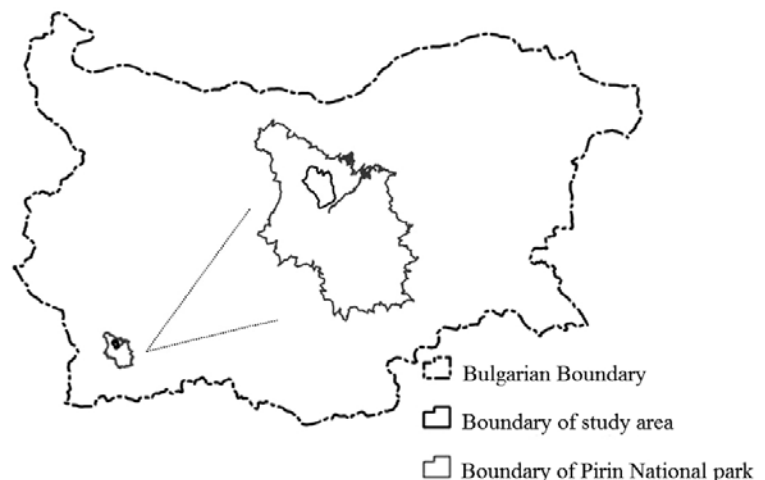


Fig. 1. The mapped area and its location in Bulgaria and in the Pirin National Park.

(a biosphere reserve) and Yulen (3156.2 ha). The National Park also falls into two NATURA 2000 sites (BG0002056 and BG0000209), designated according to the Birds and Habitats Directive.

The Pirin Mts are very rich in local neoendemic plants (Petrova 2006), endangered plants and glacial relicts. The flora of the mountains has been analysed in several important papers and books (Stoyanov & Stefanov 1922; Andreev 1989; Kitanov & Kitanov 1990; Dimitrov 1990; Dimova & al. 2002; etc). Vegetation and plant diversity, however, have not been object of special research. Some alpine grasslands and vegetation of the snow beds, rock fissures and screes were investigated according to the Braun-Blanquet's methodology (Mucina & al. 1990, Simon 1958, etc.). There is also information about the vegetation in Pirin in the works of Horvat & al. (1974), Bondev (1991), Velchev & Tonkov (1986), and Velchev & al. (1989).

Pirin habitats have not been investigated or completely mapped out. There exists only a map of habitats in the National Park for the First Management Plan (Dimitrova 2004). Information about habitats as part of biodiversity in the Park for this Plan was summarized by Popov & al. (2005).

Complete mapping out of the area is of great importance for proper management of the Park. Such map will be useful for different activities, such as livestock grazing, regeneration of some habitats, monitoring, etc. Therefore, it is necessary to map out the

habitats on the basis of new approaches in mapping practices.

All natural habitats in the studied area are conservation important. They are included in the *Red Data Book of Bulgaria*, vol. 3 (Biserkov & al. in press) and fall under Annex I of the Biodiversity Act. The basic classification in the *Red Data Book* is EUNIS (European Union Nature Information System) classification. It was considered the most applicable for the recent mapping out. EUNIS classification is regarded as a new classification (Davies & al. 2004) based on the hierarchical principles of Palearctic Classification, but in a corrected and updated form. This classification is linked to CORINE Land Cover (<http://www.eea.europa.eu/publications/COR0-landcover>) and phytosociological alliances of European vegetation (Rodwell & al. 2002). Therefore, the identified mapping units are comparable with other classification systems, such as in Annex I of the Habitats Directive and could be used for management practices.

Material and methods

The studied area (1631.9 ha) (Figs 1, 2) covers the highest part of the mountain, which consists of marble rocks on the altitudinal belt between 2914 m and 1900 m high. This is one of the three highest (subalpine and alpine) marble divides of the mountain. It is



Fig. 2. Photograph of the studied area: Vihren marble divide of the Pirin Mountains.

named after Pirin's highest peak Vihren: Vihren divide. The marble rocks and karst processes prevail in this area (Popov 1979, 2002).

The field studies were carried out in the period 2011–2013. The vegetation study is based on more than 50 phytocoenological relevés using the floristic (sigmatic) method (Braun-Blanquet 1964). The studies were conducted in different habitats and during different vegetation seasons, depending of the vegetation types and altitudinal distribution. The registered phytocoenoses and polygons of habitats are localized by their UTM coordinates taken by hand-held GPS receiver (accuracy ± 5 m, Garmin, Olathe, Kansas). The characteristic points of the habitats were collected during several field visits and by measuring the GPS coordinates. The maps were prepared with the help of a free Q-GIS mapping program (<http://www.qgis.org/en/site/>).

Classification of the habitats follows the EU Nature Information System – EUNIS (Davies & al. 2004). Information about each habitat type includes its altitudinal range, projection cover of the plant communities, Red Data Book categories, Palearctic code, Annex I code, and the typical (dominant, endemic, rare) plant

species. The dominant species were identified from the phytocoenological relevés. However, the characteristic species are the same as the characteristic species according to Tzonev & al. (in press) in the conception accepted by the *Red Data Book of Bulgaria*, vol. 3 (Bisserkov & al., in press).

The names of the vascular plants are given according to Delipavlov & Cheshmedzhiev (2003), the mosses according to Natcheva & Ganeva (2005), and the lichens according to Mayrhofer & al. (2005).

Results

As a result of that study, a map of habitats (Fig. 3) was made for the northern marble divide of the Pirin Mts. The percentage coverage of each habitat in respect to the others is graphically compared (Fig. 4). All identified habitats are included in the *Red Data Book of Bulgaria* with different categories of conservation importance. They are also target habitats within the NATURA 2000 site BG0000209, being included in Annex I of the Biodiversity Act and Habitat Directive, as well as in the Standard Data Form for NATURA 2000 site.

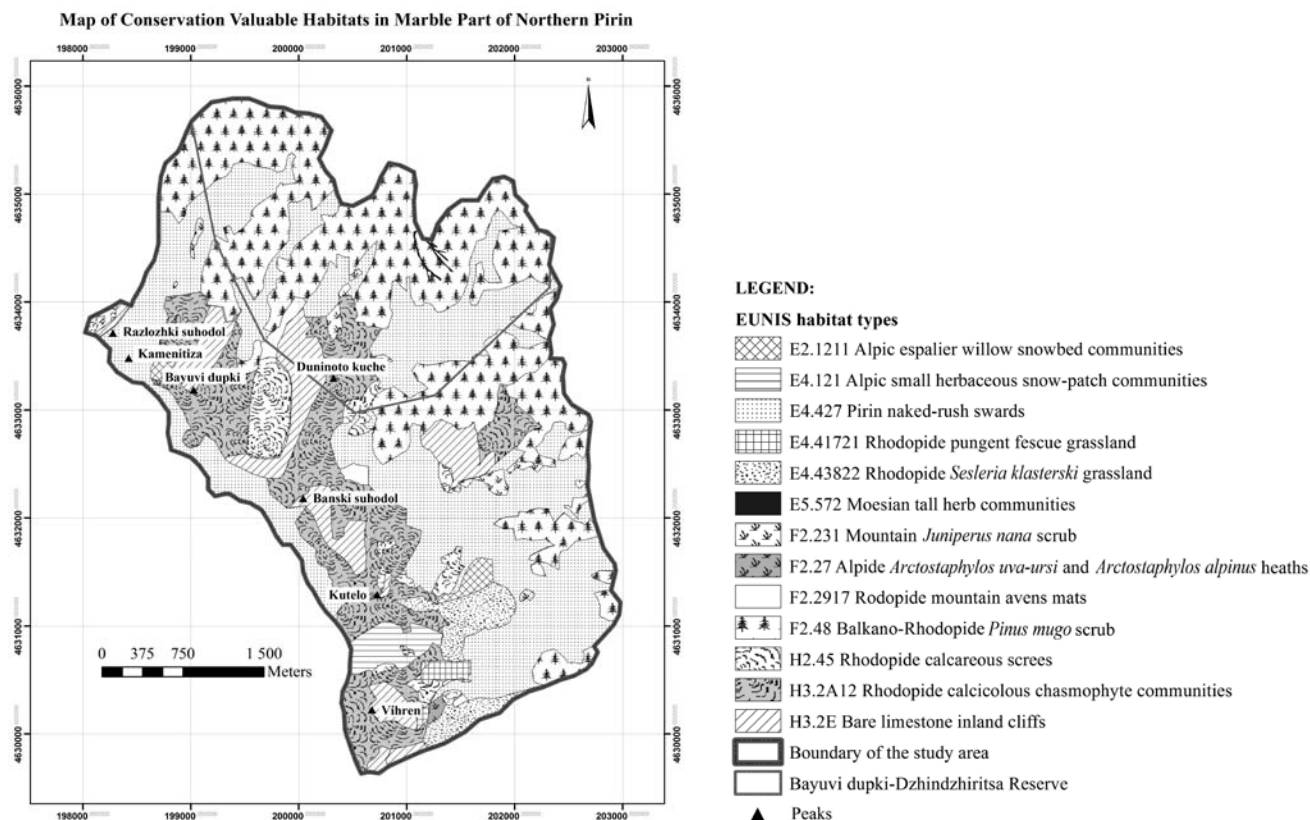


Fig. 3. Map of the habitats, with legend.

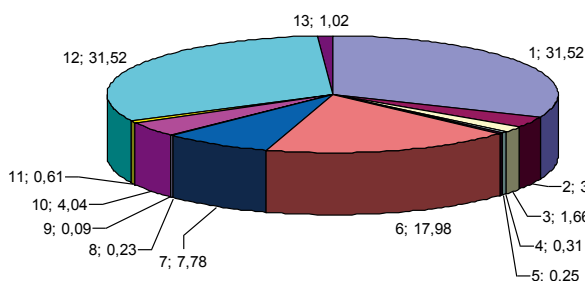


Fig. 4. Proportions (in %) of the habitats.

Number	Habitat	Rate
1	E4.41721 Rhodopide pungent fescue grasslands	31.52
2	E4.43822 Rhodopide Sesleria klasteriski grasslands	3.00
3	E4.121 Alpic small herbaceous snow-patch communities	1.66
4	F2.1211 Alpic espalier willow snowbed communities	0.31
5	E4.427 Pirin naked-rush swards	0.25
6	H3.2A12 Rhodopide calcicolous chasmophyte communities	17.98
7	H3.2E Bare limestone inland cliffs	7.78
8	F2.27 Alpic <i>Arctostaphylos uva-ursi</i> and <i>Arctostaphylos alpinus</i> heaths	0.23
9	E5.572 Moesian tall herb communities	0.09
10	H2.45 Rhodopide calcareous screes	4.04
11	F2.2915 Rhodopide mountain avens mats	0.61
12	F2.48 Balkano-Rhodopide <i>Pinus mugo</i> shrub	31.52
13	F2.231 Mountain <i>Juniperus nana</i> shrub	1.02

E2.121 Alpic small herbaceous snow-patch communities

This habitat type occurs mainly on the bottom of the glacial cirques, but other shapes of the mesorelief are also occupied by such typical phytocoenoses. The herbaceous communities are developed near snow patches on limestone, but on very limited areas. They are distributed on schist and marble stones. The typical snow-bed associations *Omalotheco-Alopecuretum gerardii* Mucina & al. 1990 and *Gentiano-Plantagineum atratae* Mucina & al. 1990 have been described from the circuses in the Pirin Mts (Mucina & al. 1990). They belong to this habitat. Under such relatively favourable conditions the projection cover of the vegetation varies between 70 % and 90 %. The species composition of plant communities includes a high number of rare species. Some of them are also local endemics.

Altitude in Pirin: 2300–2600 m.

Category according to the *Red Data Book of Bulgaria*: Critically Endangered (Roussakova in press).

NATURA 2000 code and habitat name: 6170 Alpine and subalpine calcareous grasslands.

Palaearctic classification code: 36.121.

Characteristic species: *Alopecurus gerardii*, *Arenaria biflora*, *Campanula alpina* subsp. *orbelica*, *Carex kitaibeliana*, *Dianthus microlepis*, *Draba scardica*, *Euphrasia minima*, *Galium demisum* subsp. *stojanovii*, *Gentiana verna*, *Gnaphalium supinum*, *Oxytropis urumovii*, *Plantago atrata*, *Poa pirinica*, *Potentilla crantzii*, *P. ternata*, *Ranunculus carinthiacus*, *Sedum atratum*, *Sesleria coerulans*, *Trifolium repens* subsp. *orbelicum*, etc.

Dominant species: *Alopecurus gerardii*, *Poa pirinica*, *Dianthus microlepis*, *Campanula alpina* subsp. *orbelica*.

Total area: 27.1 ha.

E4.41721 Rhodopide pungent fescue grasslands

The alpine and sub-alpine closed calcicolous grasslands occur in the Pirin Mts, especially in the subalpine belt. They are represented by nearly closed communities dominated mainly by medium-high to high caespitose perennial grasses that cover rather large areas. The projection cover of the phytocoenoses varies between 70 % and 90 %.

Altitude in Pirin: 1900–2500 m.

Category according to the *Red Data Book of Bulgaria*: Vulnerable (Roussakova in press)

NATURA 2000 code and habitat name: 6170 Alpine and subalpine calcareous grasslands.

Palaearctic classification code: 36.41

Characteristic species in Pirin: *Allysum cuneifolium* subsp. *pirinicum*, *Bellardiochloa variegata*, *Bromus lacmonicus*, *Carex kitaibeliana*, *Onobrychis pindicola* subsp. *urumovii*, etc.

Dominant species: *Festuca penzesii* and *F. pirinensis* (*F. bosniaca* subsp. *pirinensis*).

Total area: 514.3 ha.

E4.427 Pirin naked-rush swards

This habitat has a very limited distribution only in the Pirin Mts. The main ecological factors that play a significant role for the formation of such habitats and the floristic composition of their coenoses are the very high altitude, strong winds and bedrock – calcareous schists and marbles. Vegetation is represented by the association *Elynetum pirinicum* Simon 1957 (Simon 1958).

Altitude in Pirin: 2300–2800 m.

Category according to *Red Data Book of Bulgaria*: Endangered (Roussakova in press).

NATURA 2000 code and habitat name: 6170 Alpine and subalpine calcareous grasslands.

Palaearctic classification code: 36.42.

Characteristic species: *Androsace villosa*, *Armeria alpina*, *Aster alpinus*, *Campanula cochlearifolia*, *Carex kitaibeliana*, *C. rupestris*, *Dianthus microlepis*, *Erigeron alpinus*, *Festuca pirinensis*, *F. pirinica*, *Galium anisophyllum*, *Gentiana verna*, *Gentianella bulgarica*, *Hieracium alpicola*, *Kobresia myosuroides*, *Luzula pindica*, *Oxytropis campestris*, *Poa macedonica*, *P. media*, *Primula minima*, *Saxifraga ferdinandi-coburgi*, *S. luteoviridis*, *S. oppositifolia*, *Scutellaria alpina*, *Sesleria coerulans*, *S. korabensis*, *Silene acaulis*, *Thymus perinicus*, etc.

Dominant species: *Carex kitaibeliana* and *C. rupestris*, *Kobresia myosuroides*

Total area: 4 ha.

E4.43822 Rhodopide *Sesleria klasterski* grasslands

This habitat has limited distribution in the Bulgarian mountains. It is spread on calcareous bedrocks, calcareous schists and marbles, mostly in the Pirin Mts. The phytocoenoses are mainly open and their projection cover is very small, about 20–30 %, seldom reaching 60 %. The association *Festuco pirinensis* – *Seslerietum klasterskyi* Simon 1957 was described from the study area (Simon 1958). It belongs to this habitat type.

Altitude in Pirin: 2500–2900 m.

Category according to *Red Data Book of Bulgaria*: Endangered (Roussakova in press.).

NATURA 2000 code and habitat name: 6170 Alpine and subalpine calcareous grasslands.

Palaearctic classification code: 36.43.

Characteristic species: *Sesleria korabensis*, *S. coerulans*, *Carex rupestris*, *C. kitaibeliana*, *Festuca pirinica*, *Oxytropis urumovii*, *Poa pirinica*, *Thymus perinicus*, *Viola grisebachiana*, *Achillea ageratifolia*, etc.

Dominant species: *Sesleria coerulans*.

Total area: 49 ha

E5.572 Moesian tall herb communities

The habitat is very rare in the marble part of Pirin Mts because of the karst relief and practical lacking of surface running waters. Only some small temporary streams are suitable for limited as size tall herb communities. No layers can be distinguished in the tall-herb vegetation – plants with various heights cover the surface from the water level up to 1.5–2 m. The projective cover of the vegetation is almost always 100 %.

Altitude in Pirin – 950–2300 m alt.

Category according to RDB of Bulgaria – Endangered (Roussakova, in press).

NATURA 2000 code and habitat name: 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels.

Palaearctic classification code: 37.87.

Characteristic species *Achillea grandifolia*, *Aconitum lamarkii*, *A. variegatum* subsp. *judenbergense*, *Alchemilla glabra*, *A. glaucescens*, *Angelica pancicii*, *Anthriscus sylvestris*, *Bistorta major*, *Caltha palustris*, *Cardamine amara*, *C. impatiens*, *Carex hirta*, *C. pendula*, *C. vulpina*, *Cicerbita alpina*, *Cirsium appendiculatum*, *Geum coccineum*, *Heracleum verticillatum*, *Hypericum tetrapterum*, *Mentha longifolia*, *Moehringia trinervia*, *Myosotis scorpioides*, *Rumex alpinus*, *Senecio nemorensis*, and *Stellaria nemorum*.

Dominant species: *Cirsium appendiculatum*, *Heracleum verticillatum*, *Hypericum tetrapterum*, and *Aconitum lamarkii*.

Total area: 1.5 ha.

F2.1211 Alpic espalier willow snow-bed communities

This habitat is very specific and rare in the highest Bulgarian mountains. Snow melting there continues until the beginning of summer, and in some places the snow remains during the whole summer. Communities on some north-facing slopes inhabit the wetter places, not exactly snow-beds. The total projection cover of the communities is high: 80–100 %. Most plants are short, caespitose and adherent to the ground. All phytocoenoses belong to the association *Bartsio-Salicetum reticulatae* Mucina & al. 1990 described from the study area (Mucina & al. 1990) and belonging to this habitat.

Altitude: above 2500 m.

Category according to *Red Data Book of Bulgaria*: Critically Endangered (Roussakova in press).

NATURA 2000 code and habitat name: 8120 Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*).

Palaearctic classification code: 36.12.

Characteristic species: *Armeria alpina*, *Avenula versicolor*, *Bartsia alpina*, *Bistorta vivipara*, *Carex kitaibeliana*, *C. parviflora*, *Dianthus microlepis*, *Erigeron uniflorus* subsp. *vichrensis*, *Galium anisophyllum*, *Myosotis alpestris*, *Pedicularis verticillata*, *Poa media*, *P. pirinica*, *Primula halleri*, *P. minima*, *Salix reticulata*, *Saxifraga adscendens* subsp. *discolor*, *S. exarata*, *S. fer-*

dinandi-coburgi, *S. oppositifolia*, *S. androsacea*, *Sesleria coerulans*, *Silene acaulis*, *Veronica kellererii*, *Hymenostylium recurvirostrum*, *Mnium stellare*, *Polytrichum juniperinum*, and *Tortella tortuosa*.

Dominant species: *Primula halleri*, *P. minima* and *Salix reticulata*.

Total area: 5 ha.

F2.231 Mountain *Juniperus nana* shrub

The Siberian Juniper is a procumbent shrub with needle-like leaves common on all Bulgarian high mountains, including the Pirin Mts. It grows on silicate as well as on limestone base rock. In Bulgaria, the communities occupy areas mostly above 1500 m. Habitats with more or less alkaline soils have more restricted distribution in Bulgaria but the richness of the communities and their floristic diversity is much higher than in the silicate areas.

Altitude in Pirin: 1700–2600 m.

Category according to *Red Data Book of Bulgaria*: Near Threatened (Roussakova in press).

NATURA 2000 code and habitat name: 4060 Alpine and boreal heaths.

Palaearctic classification code: 31.4.

Characteristic species: *Carex kitaibeliana*, *Daphne oleoides*, *Dryas octopetala*, *Festuca penzesii*, *F. pirinensis*, *Juniperus sibirica*, *Iberis sempervirens*, and *Sesleria latifolia*.

Dominant species: *Juniperus sibirica*, *Festuca penzesii* and *F. pirinensis*.

Total area: 16.7 ha.

F2.27 Alpine *Arctostaphylos uva-ursi* and *Arctostaphylos alpinus* heaths

Arctostaphylos uva-ursi is a pioneer species in the rocky and stony areas in the Bulgarian mountains at altitudes from 1000 m up to 2500 m. Its optimal development is in the subalpine belt. It participates also in the secondary communities in areas with destroyed soil and vegetation cover. The species prefers silicate areas but can also occur on calcareous ground (limestone, dolomites). The localities are flat or slightly slanting, seldom steep.

Altitude in Pirin: 2300–2600 m.

Category according to the RDB of Bulgaria – Endangered (Roussakova, in press)

NATURA 2000 code and habitat name: 4060 Alpine and boreal heaths

Palaearctic classification code: 31.47

Characteristic species – *Anthyllis vulneraria*, *Arctostaphylos uva-ursi*, *Carex kitaibeliana*, *Dryas octopetala*, *Festuca penzesii*, *Leontopodium alpinum*, *Sesleria latifolia*, *S. rigida*, *Thymus* sp. div.

Dominant species: *Arctostaphylos uva-ursi*

Total area – 3.8 ha.

F2.2917 Rhodopide mountain avens mats

The communities of *Dryas octopetala* in the Pirin Mts are of primary origin. The species forms small communities on the highest mountain ridges exposed to the strong winds. The total projection cover is 80–100%. In some communities the projection cover is limited, but the roots are well developed, hence the great importance of these plants for consolidation of the screes.

Altitude in Pirin: 2200–2800 m.

Category according to the *Red Data Book of Bulgaria*: – Endangered (Roussakova in press).

NATURA 2000 code and habitat name: 4060 Alpine and boreal heaths.

Palaearctic classification code: 31.49

Characteristic species: *Anthyllis vulneraria*, *Armeria alpina*, *Artemisia eriantha*, *Carex atrata*, *Carex bulgarica*, *C. ericetorum*, *C. kitaibeliana*, *Carex rigidulum* subsp. *bulgaricum*, *Dianthus microlepis*, *Dryas octopetala*, *Iberis saxatilis*, *Leontopodium alpinum*, *Oxytropis campestris*, *Pedicularis verticillata*, *Primula minima*, *Saxifraga paniculata*, *Sesleria latifolia*, *Silene acaulis*, and *Thymus* sp. div.

Dominant species: *Dryas octopetala*.

Total area: 9.9 ha.

F2.48 Balkano-Rhodopide *Pinus mugo* shrub

In the Pirin Mts, Dwarf Pine dominates the phytocoenoses that outline the upper subalpine belt. Part of this vegetation is still of primary origin, because Dwarf Pine is a pioneer species and occurs on rocks and in stone fields with large rocks. Dwarf Pine is an aggressive pioneer species and behaves like a chasmophyte on steep and vertical rocks, without any soil cover. The monodominant communities of the Dwarf Pine prevail everywhere in the subalpine belt. Participation of other tree species (*Picea abies*, *Pinus peuce*, *P. sylvestris*, *P. heldreichii*), especially near the timberline is very limited. Only Siberian Juniper (*Juniperus sibirica*) participates in the Dwarf Pine communities and very often replaces the Dwarf Pine after its destruction, forming some secondary shrub communities.

The ground layers are well developed in most communities.

Altitude in Pirin: 1700–2800 m.

Category according to the *Red Data Book of Bulgaria*: Vulnerable (Roussakova in press).

NATURA 2000 code and habitat name: 4070 Bushes with *Pinus mugo* and *Rhododendron hirsutum* (*Mugo-Rhododendretum hirsuti*).

Palaearctic classification code: 31.5.

Characteristic species: *Carex kitaibeliana*, *Daphne oleoides*, *Dryas octopetala*, and *Festuca penzesii*.

Dominant species: *Pinus mugo*.

Total area: 514.3 ha.

H3.2A12 Rhodopide calcicolous chasmophyte communities

This habitat is represented by vertical or very steep calcareous rock walls and sharp rock crests, which often occur between the cirques. It is amongst the most unfavourable habitats for plants. The plants there are subjected to the direct impact of climatic factors determined by altitude, slope, exposure, and characteristics of the rock substrate. The total projection cover is very small.

Altitude in Pirin: 2000–2900 m.

Category according to the *Red Data Book of Bulgaria*: Vulnerable (Gussev & Roussakova in press).

NATURA 2000 code and habitat name: 8210 Calcareous rocky slopes with chasmophytic vegetation.

Palaearctic classification code: 62.1.

Characteristic species: *Alchemilla flabellata*, *Alyssum cuneifolium* subsp. *pirinicum*, *Alyssum orbelicum*, *Arenaria pirinica*, *Armeria alpina*, *Campanula cochlearifolia* var. *pirinica*, *Carex kitaibeliana*, *Festuca pirinica*, *Galium anisophyllum*, *G. demissum* subsp. *stojanovii*, *Kernera saxatilis*, *Leontopodium alpinum*, *Papaver degenii*, *Poa alpina*, *P. nemoralis*, *Potentilla apennina* subsp. *stojanovii*, *Saxifraga adscendens* subsp. *adscendens*, *S. adscendens* subsp. *discolor*, *S. exarata* subsp. *pirinica*, *S. ferdinandi-coburgi*, *S. luteoviridis*, *S. oppositifolia*, *S. paniculata*, *S. pseudosancta*, and *Vernonia kellererii*.

Dominant species: *Festuca pirinica* and *Poa alpina*.

Total area: 293.4 ha.

H3.2E Bare limestone inland cliffs

These rock habitats are inhabited only by lichens communities. Lichens are among the first organisms that occupy the rocks. Their projection cover varies wide-

ly, depending on such factors as type of ground, access of direct light, humidity, period of development, etc. There are also single specimens of some vascular plants.

Altitude in Pirin: 1000–2900 m.

Category according to the *Red Data Book of Bulgaria*: Vulnerable (Roussakova in press).

NATURA 2000 code and habitat name: 8210 Calcareous rocky slopes with chasmophytic vegetation.

Palaearctic classification code: 62.1.

Characteristic species: Lichens *Bagliettoa baldensis*, *B. limborioides*, *Caloplaca alociza*, *C. aurantia*, *C. calcicola*, *C. chalybaea*, *C. variabilis*, *C. xantholyta*, *Collema cristatum*, *Placocarpus schaeferi*, *Petractis clausa*, *Polyblastia albida*, *P. sendtneri*, *Verrucaria bulgarica*, *V. calciseda*, *V. caerulea*, *V. cyanea*, *V. dufourii*, *V. foveolata*, *V. fuscella*, *V. hochstetteri*, and *V. marmorea*.

Vascular plants: *Leontopodium alpinum*, *Aubrieta gracilis* subsp. *pirinica*, *Alyssum cuneifolium* subsp. *pirinicum*, *Campanula cochlearifolia*, and *Erigeron uniflorus* subsp. *vihrenensis*.

Dominant species: *Caloplaca alociza*, *Placocarpus schaeferi* and *Verrucaria marmorea*

Total area: 127 ha.

H2.45 Rhodopide calcareous screes

The northern divide of the Pirin Mts is rich in calcareous screes, located mainly on the slopes of glacial river valleys in the subalpine belt and in the glacial cirques, at high altitudes in the alpine belt. The soil-forming substrate is marble or schist rich in limestone, which explains the varying characteristics of different habitats.

Altitude in Pirin: 1800–2750 m.

Category according to the *Red Data Book of Bulgaria*: Vulnerable (Roussakova in press).

NATURA 2000 code and habitat name: 8120 Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*).

Palaearctic classification code: 61.2.

Characteristic species: *Alyssum cuneifolium* subsp. *pirinicum*, *Arabis ferdinandi-coburgi*, *A. pirinica*, *Armeria alpina*, *Asplenium fissum*, *Aubrieta gracilis*, *Dianthus microlepis*, *Doronicum columnae*, *Draba scardica*, *Euphrasia salisburgensis*, *Galium demissum* subsp. *stojanovii*, *Moehringia pendula*, *Myosotis alpestris*, *M. suaveolens*, *Papaver degenii*, *Pedicularis orthantha*, *Poa alpina*, *Saxifraga adscendens* subsp. *discolor*, *Saxifraga androsacea*, *S. exarata* subsp. *pirinica*,

S. oppositifolia, *Thalictrum minus* subsp. *olympicum*, *Thymus perinicus*, and *Veronica kellererii*

Dominant species: *Papaver degenii* and *Thalictrum minus* subsp. *olympicum*.

Total area: 65.9 ha.

Discussion

The habitats of conservation importance on an area of 1631.9 ha in the Northern Pirin Mts were mapped during this study. The mapping was also part of the process of upgrading of information about the rich and valuable vegetation and natural habitats in the Pirin Mts. Identification of habitats in that part of the mountain also in turn was part of the efforts for mapping out Bulgarian vegetation and habitats in the National Ecological Network (protected areas and NATURA 2000 sites). The future activities should expand the mapping of EUNIS habitats across the territory of the National Park and the NATURA 2000 site.

Thirteen habitats have been identified in the studied area. They all are of conservation importance and also fall under Annex I of the Directive 92/43/EEC. Most of the area is covered by the habitats F2.48 Balkano-Rhodopide *Pinus mugo* shrub (31.52%), E4.41721 Rhodopide pungent fescue grasslands (31.52%) and H3.2A12 Rhodopide calcicolous chasmophyte communities (17.98%). They occupy 81.02% of the entire area (Fig. 4). The last two habitats are mostly rocky and have slight plant coverage. But it were specifically these habitats that were the richest in local endemic and relict species, such as *Papaver degenii*, *Festuca pirinica*, *Erigeron uniflorus* subsp. *vichrenensis*, *Potentilla apenina* subsp. *stojanovii*, *Salix reticulata*, *Saxifraga adscendens* subsp. *pirinica*, *Alyssum cuneifolium* subsp. *pirinicum*, *Campanula cochlearifolia*, *Arenaria pirinica*, *Arabis ferdinandi-coburgii*, *Dryas octopetala*, *Oxytropis urumovii*, *Leontopodium alpinum*, *Viola grisebachiana*, *Saxifraga ferdinandi-coburgii*, *Saxifraga exarata* subsp. *pirinica*, *Galium demisum* subsp. *stojanovii*, *Carum rigidulum* subsp. *bulgaricum*, *Allysum orbelicum*, *Brassica jordanovii*, and *Oxytropis kozhuharovii*, etc. Habitats F2.27 Alpine *Arctostaphylos uva-ursi* and *Arctostaphylos alpinus* heaths and E5.572 Moesian tall herb communities, F2.1211 Alpic espalier willow snowbed communities, E4.4 Calcareous alpine and subalpine grasslands, and F2.2915 Rhodopide mountain avens mats have insignificant par-

ticipation (Fig. 4), because each of them covers less than 1% of the entire territory.

All mapped habitats are of conservation importance and are also targeted by the NATURA 2000 site BG0000209 Pirin. Therefore, the map could be used in the future integral management plans of the protected area and SCI.

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