INSPECTION OF ENVIRONMENTAL PROTECTION

Monitoring of natural habitats

Methodological guide

for natural habitat
6210 Xerothermic grasslands (*Festuco-Brometea*)

by **Wojciech Mróz, Wojciech Bąba**

Translated by
Roman Tertil, Letterman Sp. z o.o.,
ul. Kramerowska 15/2, 31-130 Kraków

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CONTENTS

6210* Xerothermic grasslands (*Festuco-Brometea*)

Photo 1 Grassland on gypsum in „Przęślin" nature reserve (© J. Perzanowska)

I. INFORMATION CONCERNING THE NATURAL HABITAT

1. Phytosociological identifiers

Class: *Festuco-Brometea*

Order: *Festucetalia valesiacae*

Alliance: *Seslerio-Festucion duriusculae*

Festucetum pallentis

Teucrio-Melicetum ciliatae

Community: *Festuca pallens*

Alliance: *Festuco-Stipion*

Sisymbrio-Stipetum capillatae

Potentillo-Stipetum capillatae

Koelerio-Festucetum rupicolae

Alliance: *Cirsio-Brachypoclion pinnati*

Inuletum ensifoliae

Thalictro-Salvietum pratensis

Adonido-Brachypodietum pinnati

Seslerio-Scorzoneretum purpureae

Community: *Carexglauca-Tetragonolobus maritimus* subsp. *siliquosus*

Origano-Brachypodietum

Alliance: *Mesobromion*

Gentiano-Koelerietum pyramidatae

Onobrychido-Brometum erecti

2. Description of the natural habitat

Xerothermic grasslands are a stenothermic grassland habitat of steppe nature, whose occurrence depends on climatic, soil and orographic conditions. It occurs mainly in south-eastern and southern Europe. Outside this zone, it occurs all over Europe, occupying slopes in the valleys of big rivers or eastern limestone slopes rich in calcium carbonate.

These habitats have the form of colourful grasslands with rich and diversified flora, often accompanied by relict and rare species. They usually occur on large slopes of hills and ravines, on the steep slopes of river valleys, on fixed screes, at the foot of limestone rocks, on mountain shelves and walls, on limestone outcrops, and even on southerly exposed artificial banks, excavation sites or waste piles.

Photo 2 Grassland on a rock with fescue Festuca pallens in the Jura (© J. Perzanowska)

Photo 3 Grassland with wild marjoram *Origanum vulgare* on Podskalnia Skała in the Pieniny mountains (© J. Perzanowska)

Photo 4 Grassland with feathergrass *Stipa joannis* in Skorocice reserve (© J. Perzanowska)

Photo 5 Grassland with capillary needlegrass *Stipa capillata* in Gartatowice (Niecka Nidziańska) (© J. Perzanowska)

Xerothermic grasslands grow on shallow pararendzina and rendzina soil, loess and chernozem on dry basic or neutral substrate, rich in calcium carbonate. They occur on locations with high solar exposure, exposed to the west, with high air and soil temperatures.

3. Ecological conditions

Substrate type – sandy, rocky, dry, with a basic or neutral reaction. Soils – pararendzinas and rendzinas, loesses, chernozems, on dry substrate, with neutral or basic reaction, rich in calcium

carbonate. Inclination – highly diversified, 0° to 45°. Exposure – mostly southern, south-eastern, and south-western.

4. Typical plant species

Italian aster *Aster amellus*, Pannonic thistle *Cirsium pannonicum*, narrow-leaved inula *Inula ensifolia*, stool iris *Iris aphylla*, yellow flax *Linum tlavum*, rough-haired flax *Linum hirsutum*, carline *Carlina onopordifolia*, satiny canary clover *Dorycnium germanicum*, pale bellflower *Campanula bononensis*, Siberian bellflower *Campanula sibirica*, lady orchid *Orchis purpurea*, field cow-wheat *Melampyrum arvense*, field eryngo *Eryngium campestre*, spring adonis *Adonis vernalis*, cross gentian *Gentiana cruciata*, purple serpent root *Scorzonera purpurea*, teesdale violet *Viola rupestris*, blue sesleria *Sesleria uliginosa*, low sedge *Carex humilis*, Michel sedge *Carex michelii*, vernal sedge *Carex praecox*, Illyrian buttercup *Ranunculus illyricus*, hoary ragwort *Senecio erucifolius*, field fleawort *Senecio integrifolius*, meadow saxifrage *Seselii annuum*, feathergrass *Stipa joannis*, small meadow-rue *Thalictrum simplex*, broad-leaved speedwell *Veronica austriaca*, stiff-hair wheat grass *Elymus hispidus* subsp. *barbulatus*, furrow fescue *Festuca rupicola*, wild marjoram *Origanum vulgare*, yellow woundwort *Stachys recta*, wild Basil savory *Clinopodium vulgare*, tor-grass *Brachypodium pinnatum*, common agrimony *Agrimonia eupatoria*, cinamonroot inula *Inula conyza*, carnation grass *Carex flacca*, dragon's teeth *Tetragonolobus maritimus* subsp. *siliquosus*, dyer's woodruff *Asperula tinctoria*, northern bedstraw *Galium boreale*.

5. Distribution in Poland

Grasslands occur in small patches all over Poland, but only in areas with specific climatic and habitat considerations – among others in the Nidziańska Basin, Kielecko- Sandomierska highland, Lubelska highland, Krakowska highland, Lower Oder Valley, Warta Valley, the Lower Vistula Valley, the Western Pieniny mountains, Skalice Nowotarskie and Spiskie mountains, southern part of Krakowsko-Częstochowska highland, eastern part of the Śląska Highland, Kaczawskie foothills, Wałbrzyskie foothills, Sowie mountains, Ślęża range, Strzegomskie hills.

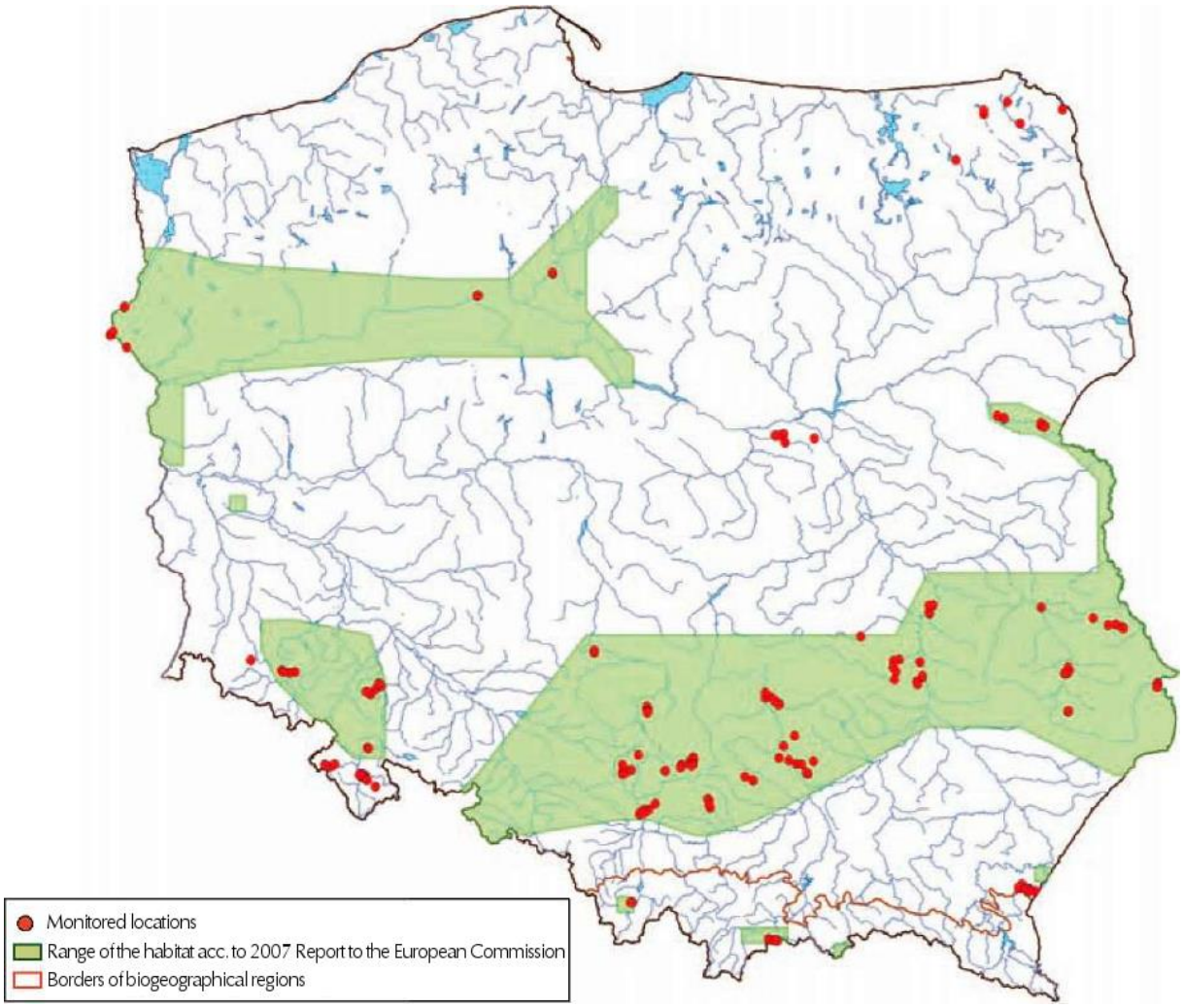

Fig. 1 Distribution of the habitat in Poland and locations monitored from 2006 to 2008.

II. METHODOLOGY

1. Methodology of monitoring studies

Selection of monitoring locations

The distribution of monitoring locations should reflect the regional diversification of the habitat. The appropriate number of locations (e.g. 50) should correspond to each habitat subtype. Attention should be paid to less studied grasslands in north-western Poland. The monitoring location should match a unit clearly defined in space such as a hill or scarp of an area measuring ca.10,000 square metres.

Study method

One transect, 200m long, should be marked in each selected area. It should be a straight line, which can be adapted to the topographic conditions of the monitoring locations. Three points for taking three relevés are selected along the transect: at the beginning, middle and end of the transect, respectively. If the delineation of the transect is not possible, three closely located patches of the grasslands are marked. Coordinates for these points are determined using a GPS receiver. The value

of the below-mentioned indicators for the specific structure and functions of the habitat is determined when walking along the transect defined by this method.

Timing and frequency of studies

The period between May and mid-August, when the majority of species are in full bloom, is preferred for conducting studies. Studies conducted in the later part of the vegetative season are possible, but the probability of incorrect evaluations of the coverage by some species and the inability to identify some of them should be taken into account. Observations should be made every 5-6 years.

Equipment required

The studies do not require any specialised equipment. Necessary tools include a notepad (a form for filling-in) a GPS receiver, a measuring tape, a camera.

2. Assessment of parameters of the conservation status of a natural habitat and the indicators of its specific structure and functions

Table 1 Description of indicators of specific structure and function of the natural habitat and of "prospects for conservation" for natural habitat 6210 Xerothermic grasslands (*Festuco-Brometea*)

Parameter/Indicator	Description
Specific structure and functions	
Characteristic species	When analysing floristic composition, proportions of species forming the structure should be taken into account: *fescue* Festuca (F. pallens fescue in grasslands growing on rocks, *furrow fescue* F. rupicola, Valais fescue F. vallesiaca in xerothermic grasslands), *needle grass* Stipa, *sedge* Carex (low sedge C. humilis, *soft sedge* C. ornithopoda, *serradella sedge* C. supina, *Michel sedge* C. michelii), *koeleria* Koeleria (*crested hair-grass* K. macrantha, *pyramidal koeleria grass* K. pyramidata), and remaining characteristic species for class Festuco-Brometea. - in subtype 6210-1 xerothermic grasslands on rocks, presence of such species as *Festuca pallens* fescue, hen-and-ducken houseleek *Jovibarba sobolifera*, rock onion Allium montanum, *bluish-green hawkweed* Hieracium bitidum, mountain meadow seseli Libanotis pyrenaica, *Transylvanian melic grass* Melica transsilvanica, *hairy thyme* Thymus praecox, *cilated melic grass* Melica ciliata, cut-leaved germander Teucrium botrys, Carthusian pink Dianthus carthusianorum, yellow woundwort Stachys recta, *Jersey knapweed* Centaurea stoebe *is recorded*; in subtype 6210-2 stipa grasslands, the presence of such species as those listed below is recorded: annual rockcress Arabis recta, soft sedge Carex supina, Valais fescue Festuca valesiaca, *brush rocket* Sisymbrium polymorphum, *capillary needlegrass* Stipa capillata, *feathergrass* Stipa joannis, *elegant needlegrass* Stipa pulcherrima, mountain alyssum Alyssum montanum, grey cinquefoil Potentilla arenaria (in northern Poland), *fastigiate gysophila* Gysophila fastigiata, Hieracium echioides *hawkweed*, *wolly milk-vetch* Oxytropis pilosa, Erysimum crepidifolium *mustard treacle*, *St.-Bernards lily* Anthericum liliago, furrow fescue Festuca rupicola and *crested hair-grass* Koeleria macrantha; in subtype 6210-3 flowering xerothermic grasslands, the presence of such species as those listed below is recorded: *Italian aster* Aster amellus, Pannonic thistle Cirsium pannonicum, *narrow-leaved inula* Inula ensifolia, stool iris Iris aphylla, *yellow flax* Linum flavum, *rough-haired flax* Linum hirsutum, carline Carlina onopordifolia, satiny canary clover Dorycnium germanicum, feathergrass Stipa Joannis, *pale bellflower* Campanula bononensis, lady orchid Orchis purpurea, spring adonis Adonis vernalis, *purple serpent root* Scorzonera purpurea, *large-leaved ragwort* Senecio macrophyllus.
Alien invasive species	Optimum values of this indicator occur when alien invasive species are absent. In locations studied to-date, the invasion of alien species was not found.
Native expansive species of herbaceous plants	In the case of xerothermic grasslands the expansion of highly competitive grass species, especially *tor-grass* Brachypodium pinatum, *is a threat to the proper species structure*. It is a permanent component of mesophilic grasslands Cirsio-Brachypodion, *but if it is managed in an inappropriate way it drives other species out, to the* impoverishment of species composition of grassland patches. Other grass species, e.g. *wood small-reed* Calamagrostis epigejos, wheat grass Elymus spp., bramble (Rubus) *play a similar role*. Their presence in relevés with the quantity ratio above 4 is treated as unfavourable – bad status (U2).
Expansion of shrubs and underwood	Secondary succession is one of the biggest threats to xerothermic grasslands. The presence of shrubs and undergrowth is the best indicator of its progress. In addition, the composition of growing shrub species is essential.
Number of orchid species	It is one of the requirements of the Habitats Directive to classify the habitat as a priority habitat. In Poland, in xerothermic grasslands, they occur rarely, (mainly in south-eastern Poland).
Maintenance of the ecotonal zone	Absence of the ecotonal zone with forest was assumed to be the optimum value of the index; only a mosaic with other patches of grasslands or meadows.

Parameter/Indicator	Description
Conservation prospects	Prospects for habitat conservation and maintaining it in an undeteriorated state are assessed together with realistic impacts on habitat that can occur in the near future. The current conservation status (location in the protected area, conservation regime), biotic, abiotic and anthropogenic state, economic impact and tourism are taken into account.

Table 2 Evaluation of selected status parameters and indicators of the specific structure and functions of natural habitat 6210 - xerothermic grasslands (*Festuco-Brometea*)

Parameter/ indicator	Appropriate FV	Unsatisfactory U1	Bad U2
Surface area of the habitat on the monitored location	Does not change or increases	Other combinations	An evident decrease in the habitat area in comparison with previous studies or cited in references
Specific structure and functions			
Characteristic species	There are at least five species of vascular plants among the characteristic species listed	There are 2-5 species of vascular plants among the characteristic species listed	There is one species of vascular plant among the characteristic species listed or these species are absent
Alien Invasive Species	None	Invasive species occur singly and they occupy no more than 5% of the area (up to 2 species)	Invasive species are numerous, occupying more than 5% of the area (more than 2 species)
Native expansive species of herbs	None or possibly one species occurring singly	Present, 1-2 species with scattered occurrence	More than 2 species forming dense patches
Expansion of shrubs and underwood	None or a small coverage by shrubs and undergrowth below 10% of the area, sporadic occurrence	Coverage by shrubs or trees from 10 to 25% of the area (shrubs do not form dense bushes), with scattered occurrence	Coverage by trees and shrubs in more than 25% of the area (they form compact shrub), occur in dense groups
Number of orchid species	Occurs when there are more than 3 species	1-2 species	None
Maintenance of the ecotonal zone	Grasslands transform gradually into other natural and seminatural plant communities	Grasslands border partially with anthropogenic communities or there is not a gradual transition into other natural or seminatural habitats	Clear boundary between grasslands and anthropogenic communities (mainly arable land), delineated by the range of human activity (e.g. ploughing)
General structure and functions	All cardinal indices evaluated as FV, other evaluated at least as U1	All cardinal indices evaluated at least as U1	One or more cardinal indices evaluated as U2
Conservation prospects	Prospects for the maintenance of the habitat good or excellent, no impact of threatening factors is predicted	Other combinations	Conservation prospects for the habitat are bad, strong impact of threatening factors observed, no survival of the habitat can be guaranteed in longer time perspective
Overall assessment	All parameters evaluated as FV	One or more parameters evaluated as U1, no U2 assessments	One or more parameters evaluated as U2

Cardinal indices

- Characteristic species
- Expansive native species of herbs
- Expansion of shrubs and underwood

3. An example of a filled-in habitat observation sheet for a monitored location

Habitat observation sheet for the monitored location	
Basic information	
Code and name of the natural habitat	6210 Xerothermic grasslands (Festuco-Brometea) 6210-3 Flowering xerothermic grasslands
Name of the location	Radomice
Type of the location	Research
Plant communities	Probably the Cirsio-Brachypodion pinnati *alliance*, Scabioso ochroleucae-Brachypodietum pinnati *association*. The habitat requires more detailed syntaxonomic studies
Description of the habitat	Xerothermic grasslands grow on a south-facing slope. near an abandoned limestone quarry in Radomice. This habitat occurs in the complex with another habitat 6510.
Area of habitat patches	20,000 square metres (2 hectares)
Protected areas where the monitored location is situated	Landscape Park of the Bóbr Valley, PLH020054 „Ostoja nad Bobrem"
Manager of the area	Forests and the Bóbr Valley are owned by the State Treasury. The Lower Silesian Landscape Park Complex in Wrocław, forests managed by the Management Board of the Regional State Forest Directorate in Wrocław (Lwówek Śląski Forest District), the Regional Water Management Board in Wrocław
Geographical coordinates	N 50º29' ..."; E 15º37' ..."
Dimensions of the transect	Rectangular area, 20x100 m
Elevation a.s.l.	415-420 m
Name of the Natura 2000 site	PLH020054 "Ostoja nad Bobrem"
Annual report – basic information	
Year	2008
Monitoring type	Integrated
Coordinator	Kamila Reczyńska
Additional coordinators	
Threats	The abandonment of traditional land management methods, i.e. grazing and possibly mowing leads to the presence of shrub species (roses, hawthorns, blackthorn) and invasive species (Canada goldenrod)
Other natural values	The habitat was formed only on one location where several protected species occur: *cross gentian* Gentiana cruciata (VU), *fringed gentian* Gentiana ciliata, *carline thistle* Carlina acaulis (LR), *common twayblade* Listera ovata
Is monitoring required?	Yes
Justification	The only patch of the habitat in the "Ostoja nad Bobrem" Natura 2000 site; evident disturbances in the structure (proportions of invasive species, underwood)
Applied conservation measures and evaluation of their efficiency	Habitat protected within the limits of the Bóbr River Valley landscape park; no significant conservation measures are observed
Proposals for introducing protective measures	Placing the habitat under active protection that will inhibit secondary succession, extensive grazing and removing shrub underwood layer (especially blackhorn) would be the most preferred option
Date of monitoring	26 July 2008
Remarks	

Conservation status of the natural habitat on the monitored location	
Relevé I	
Geographical co-ordinates of the centre, elevation a.s.l. Area of the relevé, inclination, exposure Density of layers a, b, c, d Height of layers a, b, c, d Phytosociological unit	Geographical coordinates: N 50°29' ..."; E 1 5°37' ...", elevation of 417 m a.s.l. Area of the *relevé*: 25 m^2, inclination of 5°, S exposure. Density of layer C 100%, height of layer C 0.6 m. *Phytosociological unit*: Scabioso ochroleucae-Brachypodietum pinnati (requires further syntaxonomic studies). Species: Agrimonia eupatoria +, Arrhenatherum elatius +, Brachypodium pinnatum 1, Briza media +, Carex flacca 1, Carlina acaulis +, Centaurea jacea +, Centaurea scabiosa 3, Clinopodium vulgare 1, Coronilla varia +, Crataegus monogyna +, Dactylis glomerata +, Festuca rubra 2, Fragaria vesca 1, Galium mollugo 1, Hypericum perforatum +, Knautia arvensis +, Lathyrus pratensis 1, Pimpinella saxifraga +, Poa pratensis 1
Relevé II	
Geographical coordinates of the centre, elevation a.s.l. Area of the relevé, inclination, exposure Density of layers a, b, c, d Height of layers a, b, c, d Phytosociological unit	Geographical coordinates: N 50°29' ..."; E 1 5°37' ...", elevation of 41 7 m a.s.l. Area of the *relevé*: 25 m^2, Inclination: 5°, S exposure. Density of layer C 95%, Height of layer C 0.6 m. Phytosociological unit: Scabioso ochroleucae-Brachypodietum pinnati (requires further syntaxonomic studies). Species: Agronomia eupatoria +, Anthoxanthum odoratum +, Arrhenatherum elatius 1, Brachypodium pinnatum 1, Briza media +, Campanula rotundifolia +, Carex flacca +, Carlina acaulis +, Centaurea jacea +, Centaurea scabiosa 2, Clinopodium vulgare 1, Coronilla varia +, Crataegus monogyna +, Dactylis glomerata +, Festuca ovina +, Galium mollugo 1, Gentiana cruciata 2, Hypericum perforatum +, Knautia arvensis +, Lathyrus pratensis +, Pimpinella saxifraga 1, Poa pratensis 2, Prunus spinosa +, Pyrus communis +, Rosa canina 1, Solidago canadensis +, Vicia cracca +
Relevé III	
Geographical coordinates of the centre, elevation a.s.l. Area of the relevé, inclination, exposure Density of layers a, b, c, d Height of layers a, b, c, d Phytosociological unit	Geographical coordinates: N 50°29' ..."; E 1 5°37' ...", elevation 41 5 m a.s.l. Area of the *relevé*: 25 m^2, Inclination: 5°, S exposure S. Density of layers C 100%, Height of layer C 0.6 m. Phytosociological unit: Scabioso ochroleucae-Brachypodietum pinnati (requires further syntaxonomic studies). Species: Achillea millefolium +, Agrimonia eupatoria 1, Artemisia vulgaris +, Brachypodium pinnatum 2, Briza media 1, Carex flacca +, Carlina acaulis +, Centaurea jacea +, Centaurea scabiosa 3, Clinopodium vulgare 1, Coronilla varia +, Dactylis glomerata +, Galium mollugo +, Hypericum perforatum +, Pimpinella saxifraga +, Poa pratensis 2, Rosa canina +, Silene vulgaris +, Solidago canadensis +, Viola hirta +

TRANSECT			
Indicators	**Description**	**Value of the indicator**	**Assessment of indicator**
Surface area of the habitat	Estimated total area of the habitat within the Natura 2000 site is ca 20,000 square metres; 2,000 square metres were evaluated (one monitoring location). The area of the habitat at the monitoring location tends to decrease due to increasing coverage by trees and shrubs. The change rate is not too fast. Current density of layers is ca 10% and there are still characteristic as well as rare and protected species in the habitat.		U1
Specific structures and functions			U1
Percentage proportion of the habitat in the transect	Percentage of the area occupied by the habitat in the transect (with accuracy of up to 10%)	Habitat occupies 100% of the monitored area	FV
Characteristic species	List of characteristic species (Latin names); cite the percentage share of area occupied by every species in the transect (with accuracy of up to 10%)	*Greater knapweed* Centaurea scabiosa 25%, *tor-grass* Brachypodium pinnatum 15%, carnation grass Carex flacca 5%, *carline thistle* Carlina acaulis 5%, cross gentian Gentiana cruciata 5%	FV
Alien invasive species	List of invasive species alien in terms of geographical location (Latin names); cite the percentage share of area occupied by every species in the transect (with accuracy of up to 10%)	*Canadian goldenrod* Solidago canadensis 3%	U1
Native expansive species of herbs	List of species (Latin names); cite the percentage share of area occupied by every species in the transect (with accuracy of up to 10%)	Tall oat grass Arrhenatherum elatius 3%	U1
Expansion of bushes and underwood	List of species (Latin names); cite the percentage share of the area occupied by all expansive species of shrubs and trees in the transect (with accuracy of up to 10%)	Density of shrub layers 10% perry *Pyrus communis* below 2% dog rose *Rosa canina* 5% blackthorn *Prunus spinosa* 2% whitehorn *Crataegus monogyna* 2%	U1
Number of orchid species	Number and list of species	2 species: common twayblade *Listera ovata*, broad-leaved helleborine *Epipactis helleborine*	U1
Maintenance of ecotonal zone	Gradual transformation of grasslands into other natural and seminatural plant communities is an optimal status	Poorly developed ecotonal zone, created mainly by blackthorn Prunus spinosa (b)	U1
Conservation prospects	Prospects for protecting the natural habitats are very good provided that appropriate measures are taken (extensive grazing, removing shrub layer)		FV
Overall assessment		FV	85%	U1
Proportion of the habitat area representing different conservation status within the monitoring location		U1	15%	
		U2	-	

Human activity				
Code	**Name of activity**	**Intensity**	**Impact**	**Description**
141	Abandoned pasturing	A	-	Extensive grazing which maintains correct habitat structure is not applied in the monitoring location

4. Habitats of similar ecological characteristics

Other similar habitats whose development is conditional on grazing and cutting, and on specific ecological conditions: 6120 – grasslands on the sandrock, 6510 Lowland hay meadows (–fresh meadows in the lowland and mountains, extensively used as hay meadows (alliance Arrhenatherion – stenothermic variants of fresh meadows).

5. Protection of natural habitat

Cutting or controlled grazing (e.g. by goats) is the basic recommendation in xerothermic grasslands. The mechanical removing of shrubs or underwood in areas with secondary succession can be applied as short-term measures.

Historical factors: long-term extensive grazing, cutting or burning were important in the developing specific species composition of flowery xerothermic and *Stipa* grasslands, along with climatic and edaphic historical factors. Without regular use of grasslands, most flowering xerothermic grasslands transform completely into floristically poor shrubs within 25-30 years of secondary succession. Over the last few years arable land of lower quality with valuable patches of xerothermic grasslands is being massively abandoned as a result of socioeconomic changes. These areas are often afforested resulting in rapid degradation. The measures of active conservation which include primarily removal of trees and shrubs, and – rarely – grazing, are insufficient, chiefly due to inadequate financial resources for implementing such measures and the lack of scientific knowledge, providing the necessary grounds to carry them out.

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Prepared by: **Wojciech Mróz, Wojciech Bąba**