European Environment Agency
European Topic Centre on
Biological Diversity

Working paper N° C/2017

Working paper on pressures hotspots on selected grassland ecosystems using Art. 17 reporting

Ľuboš Halada, Juraj Lieskovský and Sophie Condé

November 2017

The European Topic Centre on Biological Diversity (ETC/BD) is a consortium of twelve organisations under a Framework Partnership Agreement with the European Environment Agency for the period 2014-2018
AOPK-CR Ecologic ILE-SAS ISPRA JNCC MNHN NATURALIS SC-NAT SLU S4E UBA WER

Authors' affiliation:

Ľuboš Halada, Institute of Landscape Ecology of the Slovak Academy of Sciences (SK)
Juraj Lieskovský, Institute of Landscape Ecology of the Slovak Academy of Sciences (SK)
Sophie Condé, Muséum national d'Histoire naturelle (FR)

EEA project manager:

Markus Erhard, European Environment Agency (DK)

ETC/BD production support:

Muriel Vincent, Muséum national d'Histoire naturelle (FR)

Context:

The Topic Centre has prepared this Working paper in collaboration with the European Environment Agency (EEA) under its 2017 work programmes as a contribution to the EEA's work on biodiversity assessments.

Citation:

Please cite this report as
Halada, L., Lieskovský, J. and Condé, S., 2017. Working paper on pressures hotspots on selected grassland ecosystems using Art. 17 reporting. ETC/BD report to the EEA.

Disclaimer:

ETC/BD Working paper N° C/2017
European Topic Centre on Biological Diversity
c/o Muséum national d'Histoire naturelle
57 rue Cuvier
75231 Paris cedex, France
Phone: + 33 1 40 79 38 70
E-mail: etc.biodiversity@mnhn.fr
Website: http://bd.eionet.europa.eu

Contents

Executive summary

The aim of this report is to explore the possibilities for developing the maps for European Union territory showing hotspots of specific pressures to grasslands using Article 17 database. The group of 42 habitats listed in the Habitats Directive Annex I and corresponding to the MAES grasslands typology is considered as "grasslands" in this document. The full list of the habitat types used provides Appendix 1.

The basic information about pressures to Annex I habitats we extracted from the database of the EU Member States reporting on conservation status of habitat and species (Article 17 of the Habitats Directive). The Article 17 reporting data submitted by Member States (MS) in 2013 and referring to period 2007-2012 were used. The spatial reporting unit for Article 17 reporting is biogeographical region within the MS territory, to which is related the reported value of pressure (low, medium, high). This is quite coarse spatial resolution and we looked for data and method for its refinement. **First dataset used for the spatial resolution improvement were distribution maps of habitat types that MS delivered together with their Article 17 reports as grid maps with resolution 10x10 km. This dataset provides information on habitat types distribution across EU. The second type of data layers used were pressure maps developed by the European Topic Centre on Spatial Information and Analysis (ETC SIA) and University of Amsterdam (IES UA).** These data layers provide information about distribution and intensity of pressures across EU. Based on availability of pressure maps, we decided to produce maps for following pressures: intensive agriculture, grassland abandonment, land take, habitat loss, nitrogen input, and nitrogen pollution.

The report provides for each pressure following information: basic information about pressure importance and effect to grassland habitats, method of pressure maps producing by ETC SIA and IES UA), list of Article 17 pressure types related to the respective pressure, number of habitats affected by particular pressure in the Article 17 reporting units in form of both table and map, and map showing hotspots of pressures to grassland habitats with resolution 10x10 km. This map is the result for each pressure and the mapped hotspots represent combination of pressure intensity and number of affected habitats. The map displays number of habitats not affected by the pressure for grid cells from which the pressure was not mapped. The resulting maps are stored as GIS data layers and they are available for further analysis.

The approach used and described in this report proved to be useful for mapping of hotspots of the pressures to grassland habitats listed in the Annex I of the Habitats Directive. Using ancillary data – maps of pressures distribution – we were able to overcome limitation of coarse spatial resolution of previous approach that was based solely on Article 17 data. **However, some limitations still exist and they should be taken into account when interpreting the maps**. The resulting maps are highly influenced by reporting by Member States and quality of ancillary data (maps of pressures). If the Member State did not report specific pressure, it is not mapped in the resulting map in his territory. The limitations of reporting could arise from not sufficient knowledge of habitat distribution or impacts of pressures to particular habitat and some limitations are related also to the reporting methodology. The limitations are discussed in Conclusions, individual factors influencing the resulting maps could and should be improved in the future.

1 Introduction

This document is part of the 2017 ETC BD Action plan, task 175A Biodiversity assessments including in support to EU Biodiversity Strategy target 2 action 5, part III. Towards the assessment of the condition of ecosystems (EEA project 1.7.6).

The European Environment Agency (EEA) developed framework and is working on Mapping and Assessment of Ecosystems and their Services (MAES) initiative - collaboration between the European Commission, the EEA and Member States. The challenge is to implement the MAES framework using the data and other information that are available. There is a large amount of data and information, but much of it is not available for all regions or all ecosystems, or it is based on inconsistent classifications. Therefore the EEA has devoted considerable effort to assessing the existing data and information and building a feasible methodology around it (EEA 2016). The EEA's approach consist of five stages, this report is related and should contribute especially to two of them:

3. *assessing the pressures acting on ecosystems, classified into five main groups — habitat change, climate change, overexploitation of resources, invasive alien species, and pollution or nutrient enrichment;*

4. *assessing the current condition of ecosystems using data from the Habitats Directive (EC, 1992), the Birds Directive (EC, 2009), the Water Framework Directive (EC, 2000), the Marine Strategy Framework Directive (EC, 2008a) and other sources (e.g. soil quality*)

In our work we focused to pressures on grasslands, because grasslands are widespread (third most dominant ecosystem within the EU - after cropland and woodland), they have high importance for nature conservation because of their high biodiversity and in the same time they are under severe pressures related to land use changes, overexploitation, abandonment, and pollution.

Semi-natural temperate grasslands are among the most species-rich vegetation types in Europe. Most European grasslands are considered to be semi-natural ecosystems because they have developed over long periods of grazing, cutting or deliberate light burning regimes. Because they are created, maintained or modified by agricultural activities, they provide habitats for species that would not survive without grassland management measures (ETC SIA 2014). EEA (2016) formulated following key messages for grassland ecosystems:

- *Grasslands, which have traditionally been managed through grazing or cutting, include some of the most species-rich habitats in Europe, and they have the richest soil biodiversity. They are the source of a wide range of ecosystem services, ranging from meat and dairy products to recreational and tourism opportunities, and they also act as carbon sinks.*
- *Over the last century, more than 90 % of semi-natural grasslands have been lost in most European countries owing to intensification or abandonment, and populations of a large number of grassland species have declined or become extinct. Almost half (49 %) of the grassland habitats assessed under the Habitats Directive are in 'unfavourable-bad' condition (EEA 2016).*
- *It is therefore imperative for EU rural development policies to reconcile agricultural development and conservation through measures such as agri-environment schemes.*

Agricultural intensification, grassland conversion and land abandonment are resulting in habitat loss and fragmentation, and an associated loss of grassland biodiversity. Figure 1.1 shows major pressures to grasslands as reported by EEA (2016).

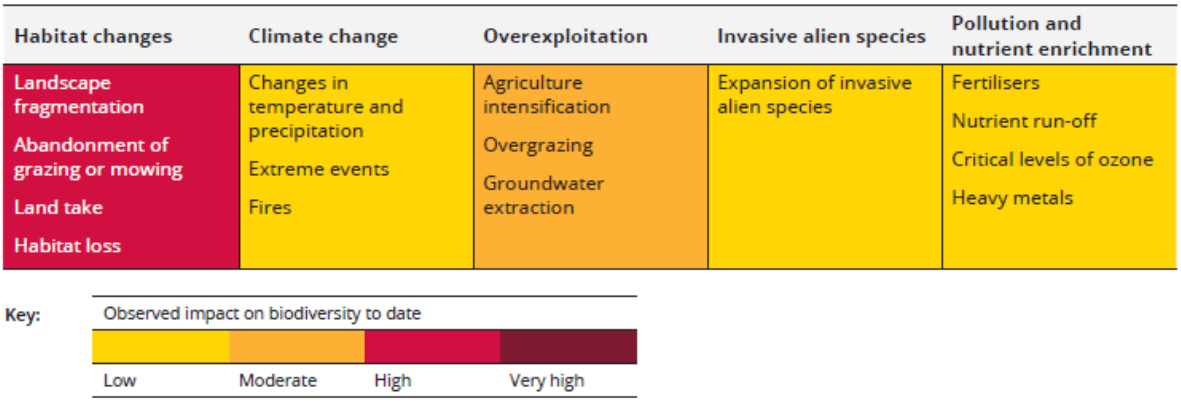

Fig. 1.1: Major pressures on grasslands, and their impacts on biodiversity in Europe
Source: EEA (2016)

The main reasons for the loss of grassland habitats in Europe are urban sprawl and development, conversion of pastures and (semi-natural) grasslands to arable land (in areas where agriculture is profitable), and land abandonment, causing grassland to revert to shrub land or forest (in areas where socio-economic conditions are unfavourable for farming) (EEA 2016).

The ETC BD started with attempts to map pressures to the Habitats Directive Annex I habitats in 2016 by producing methodological paper (Halada et al., 2016). The reporting under Article 17 of the Habitats Directive (further "Article 17 reporting") on conservation status of the species and habitats listed in Annexes of the Habitats Directive was identified as a main source of information. In this reporting, the Member States reported besides conservation status also threats and pressures to species and habitat listed in annexes of the Habitat Directive. The most frequently reported pressures by Member States were the modification of cultivation practices, including agricultural intensification and conversion of grasslands to arable land, as well as the abandonment of mowing or grazing, leading to replacement of grassland by shrubs or forests (EEA, 2015b).

The spatial unit for Article 17 reporting is biogeographical region within the Member State (further "reporting unit"). This is quite coarse resolution for mapping of pressures, therefore we had looked for data enabling us to reach better resolution. Because the Member States delivered with the Article 17 reporting also distribution maps for species and habitats with resolution 10x10 km, these maps could be used for improving of spatial resolution of pressures mapping. Using these data, ETC BD produced set of maps showing distribution of pressures to grasslands both on levels of reporting units and grid maps (Halada et al., 2016). However, because of restriction to data from Article 17 reporting, the grid maps were produced with assumption that the reported pressures operate with the same intensity as reported in whole area of the reporting units. This is quite big simplification and therefore these maps were considered as maps of potential pressures distribution.

The maps that produced European Topic Centre for Spatial information and Analysis (ETC SIA, now ETC ULS) in 2014 for mapping of pressures in Europe were found useful to obtain more detailed information about spatial distribution of pressures to grassland habitats. Another useful dataset on intensity of grassland and cropland use with pan-European coverage is produced by the Institute for Environmental Studies, Vrije Universiteit Amsterdam. These two sources of data on pressures distribution enabled us to develop maps for following 6 pressures: intensive agriculture, agriculture abandonment, nitrogen pollution, nitrogen deposition, habitat loss and land take.

2 Goal

The aim of this report is to explore the possibilities for developing the maps for European Union territory showing hotspots of specific pressures to grasslands using Article 17 database.

As "grasslands" is in this document considered group of 42 habitats listed in the Habitats Directive Annex I corresponding to grasslands according to the MAES typology. Using this approach, we moved from assessment of pressures affecting one habitat to pressures affecting habitat group/ecosystem type.

3 Methodology

This chapter provides information about data used for analyses and describes how the data was processed.

3.1 Data used

The chapter describes types of data used for this analysis. It provides information about selection of the habitat types that are subject of the analysis, sources of data on pressures to these habitat and sources of data on spatial distribution of selected pressures across European Union.

Habitat types

This analysis if focused to grassland habitats in sense of the MAES typology that are listed in the Annex I of the Habitats Directive (further only "grassland habitats"). This group of habitats includes 42 habitat types in which grasses and grasses-like plants (e.g. sedges and rushes) dominate. Most of these habitats (31 types) are classified in the Habitats Directive Annex I typology as grasslands as well, but some of them are assigned to other habitats groups: three habitat types to coastal habitats (1340, 1510, 1530), seven habitat types are classified as dune habitats (2120, 2130, 21A0, 2220, 2230, 2240, 2330), and one type (9070) as forest habitat. The full list of the habitat types used provides Appendix 1 of this document.

Reporting under Article 17 of the Habitats Directive

We used information about pressures to habitat types from reporting of the EU Member States on conservation status of the species and habitats listed in Annexes of the Habitats Directive. The obligation to provide this report each 6 years is specified in the Article 17 of the Habitats Directive (further "Article 17 reporting"). For the consistent reporting, the Guidelines were prepared and used. In this analysis, we used data delivered in 2013 that are related to reporting for the period 2007-2012. Data were available for 26 Member States because Greece was not delivered data in 2013 and because Croatia joined the European Union in July 2013, it has not reporting obligation.

For the pressures reporting, hierarchical system was developed. The system consists of four hierarchical levels, having 17 pressure types on 1st hierarchical level and 75 categories on 2nd hierarchical level. The full list of the pressures is available at the Article 17 Reference Portal. The MS were asked to report pressures at least at the 2nd hierarchical level. The use of 3rd level and 4th level

was voluntary, referred in the Guidelines as to be used by "Member States or users who need more precision".

It is important to know structure of pressures reporting, because some pressures mapped in this analysis (e.g. agriculture abandonment) correspond to pressures on third level of the Article 17 reporting. Thus, if the country reported them on second level, they were not included to our analysis. In total, MS reported most of pressures on second level, followed by third level (Table 3.1). Almost all countries used third and fourth levels for their reporting, with exception of France that used only first and second level. United Kingdom used dominantly second level, and marginally (in 13 records) also third level. Also Spain dominantly used second level (2,362 records) followed by third level with 545 records. The use of the second level prevailed also in some other countries (Austria, Denmark, Lithuania, and Malta), but these countries used third or fourth level frequently as well. Other countries used mostly third level, with lower number of records reported on other levels.

Table 3.1: Overview of level of pressures used by MS in the Article 17 reporting

Code	Country	Level 1	Level 2	Level 3	Level 4	Total
AT	Austria	5	270	254	20	549
BE	Belgium	1	284	711	150	1,146
BG	Bulgaria		481	1,137	136	1,754
CY	Cyprus	1	69	113	10	193
CZ	Czech Republic		232	391	38	661
DE	Germany	3	560	597	169	1,329
DK	Denmark	1	515	338	66	920
EE	Estonia	3	82	119	30	234
ES	Spain	16	2,362	545	97	3,020
FI	Finland	19	99	231	42	391
FR	France	10	2,803			2,813
HU	Hungary		140	165	47	352
IE	Ireland		166	327	115	608
IT	Italy	1	786	1,196	71	2,054
LT	Lithuania	2	142	96	9	249
LU	Luxembourg	3	72	143	17	235
LV	Latvia		105	198	22	325
MT	Malta		106	75	10	191
NL	Netherlands		34	136		170
PL	Poland	2	306	384	44	736
PT	Portugal	1	467	728	186	1,382
RO	Romania	3	266	461	131	861
SE	Sweden	4	388	684	53	1,129
SI	Slovenia	8	76	134	65	283
SK	Slovakia	1	155	240	28	424
UK	United Kingdom	2	1,020	13		1,035
Total		**86**	**11,986**	**9,416**	**1,556**	**23,044**

The Member States reported the pressures to habitats and species for individual biogeographical regions in their territory. So, this is the spatial resolution to which is possible directly to relate the reported pressures. In addition, MS provided also maps of individual species and habitats distribution. These maps are grid maps with the pixel size 10 x 10 km. It means, they indicate occurrence or absence of the species or habitat for each pixel. We used these distribution maps as well.

Distribution of pressures

The information on pressures to habitats available from Article 17 was related to quite broad spatial units – biogeographical regions within the MS territories. To obtain more detailed information about spatial distribution of pressures, we needed to use the ancillary data. Our aim was to use these data together with habitat distribution maps from Article 17 reporting. This determined the nature of data to be used: they should have the EU coverage, should be related to pressures to grasslands and should have spatial resolution of 10x10 km or better. We found two datasets that met these criteria: data on pressures to ecosystems produced by the ETC SIA and data on agricultural land use intensity that produced the Institute for Environmental Studies, Vrije Universiteit Amsterdam (IES UA).

ETC SIA data

The European Topic Centre for Spatial information and Analysis prepared information and map of distribution of pressures to agricultural land within its activities related to support of the MAES (Mapping and Assessment of Ecosystem Services) process, namely to its part focused to ecosystem conditions. The maps were developed as grid maps with resolution of 1x1 km using methodologies specific for each pressure below. We used data for these pressures: grassland abandonment, land take, habitat loss, nitrogen input, nitrogen pollution. The datasets are specified as follows.

Agriculture abandonment. The intensity of land abandonment calculated by using LEAC tools and Corine Land Cover (CLC) change 2000 and 2006 (100 m resolution) on 1 km grid (0-100%).

Nitrogen input. Total N input to agro-ecosystem for the year 2010, in kgN/km^2/yr. Input includes manure application, inorganic fertilizer input, atmospheric deposition and biological fixation.

Nitrogen pollution. Total N atmospheric deposition to grassland ecosystems for the year 2010, in kgN/km2/yr. The map is based on EMEP database

Land take. The change from grasslands to non-agricultural land was classified as land take. To map this pressure, CLC change 2000-2006 (100 m resolution) and LEAC tools were used. The intensity of land take expressed as percentage (0-100%) on 1 km grid.

Habitat loss. Intensity of grassland habitat loss due to agriculture was calculated using LEAC tools and CLC 2000 and 2006 (100 m resolution) on 1 km grid [0-100%]

IES UA data

We used the IES UA data for mapping pressures of intensive agriculture. The IES UA data were prepared using a combination of European level databases to construct land use intensity maps with separate methodologies for arable land and grassland (Temme and Verburg 2011). The arable and grassland land cover as designated in the CLC2000 land cover data were re-classified in respectively 3 classes of intensity of agricultural management for arable land (extensive, moderately intensive, and intensive) and 2 classes of intensity for grassland (extensive, intensive). Resulting data layer is a grid with resolution 1 x 1 km. The methodology is described in more detail and the data are available at web site http://www.environmentalgeography.nl/site/data-models/data/agricultural-land-use-intensity-data/.

3.2 Data processing

Our aim was to map the pressures with spatial resolution of both Article 17 reporting of pressures (biogeographical region within MS) and habitat distribution (grid 10 x 10 km). Because pressures intensity was reported only on biogeographical region, we decided to assign to individual grids the pressures intensity from ancillary data (ETC SIA and IES UA).

Adaptation of the pressure database

As a first step, we removed from the database the records with the low intensity of pressures because they seem to be not important – low intensity pressures usually do not change structure of the habitat nor threaten its existence. Only records reporting medium and high pressures were kept in the database.

Because of availability of ancillary data, the originally foreseen number of pressures to be mapped was increased to 6 pressures. Three of them - nitrogen pollution, nitrogen deposition, and habitat loss have only one corresponding pressure type in Article 17 reporting system of pressures. Other three pressures have several corresponding units each: 13 pressure types are related to intensive agriculture, 3 pressure types to agriculture abandonment, and 60 pressure types to land take. For these three pressures, we merged all corresponding pressure types and the resulting database contained information for each reporting unit if each of 6 pressures is present or not.

Development of pressure maps Article 17 reporting units

These maps were the base data for mapping the pressures distribution in grid 10x10 km. Taking into account the aggregation of reported pressures types for three pressures, we decided to produce only maps showing number of habitats affected by particular pressure. This number was calculated from the modified database (see previous paragraph) and the resulting maps (shown in chapter 4) are based solely on results of Article 17. Especially for interpretation of these maps we found useful to develop also map showing number of grassland habitats present in individual reporting units and this map is in Figure 4.1.

The intensity of pressure impacting habitats is not shown in this level; it is shown in the grid maps with resolution of 10x10 km.

Development of grid maps

In the first step, from distribution maps of Article 17 reporting, we calculated for each cell number of grassland habitats present (Figure 4.2). In the next step we processed ancillary data from ETC SIA and IES UA described above in chapter 2.1. Firstly, we needed to harmonise the spatial resolution. The input ancillary data had resolution 1x1 km grid, therefore we re-scaled them to achieve the same resolution as habitat distribution maps – 10x10 km. We calculated the average pressure intensity for each grid 10x10 km by summing values of the respective cells 1x1 km and dividing the sum by number of cells. For intensive agriculture, the original dataset contained only two categories: extensive grasslands and intensive grasslands. We expressed the degree of intensification as percentage of cells of intensive grasslands from total number of grassland cells.
The results were re-classified into three degree of pressure with values depending on the original data. Similarly, the number of affected habitats (number of habitats present in the particular cell) was re-classified to three classes and in maps we present combination of intensity of pressures and number of affected habitats. For cells without pressure we display number of present and thus not affected habitats.

4 Results

In this chapter we provide information about results achieved in the analysis. The first chapter (4.1) contains overview of grassland habitats distribution both in Article 17 reporting units and across EU using grid maps with resolution 10x10 km.

The other chapters are focused to individual pressures. They provide information about pressures types of Article 17 reporting relevant for the particular pressure, maps of pressures for reporting units (number of habitats affected) and grid maps 10 x 10 km (pressure intensity and number of habitats affected). In the later map is shown number of habitat present in grids for which the pressure was not mapped. Because the respective pressure is not operating in that grid cell (was not mapped there), we consider these habitats as not affected by the pressure. The number of habitats affected by individual pressures in individual reporting units is provided in the table form in Appendix 2.

4.1 Grassland distribution

The Annex I grassland habitats classified as grassland habitats by MAES typology, are unevenly distributed across countries and biogeographical region. Table 4.1 provides information about number of habitats occurring in individual reporting units (biogeographical region within the country). The highest number of grassland habitats is reported from Continental region of Bulgaria (19) and Italy (18).

Table 4.1: Number of grassland habitat in reporting units

Country/BGR	ALP	ATL	BLS	BOR	CON	MAC	MED	PAN	STE
Austria	12				15				
Belgium		10			10				
Bulgaria	12		11		19				
Cyprus							4		
Czech Republic					13			12	
Denmark		7			9				
Estonia				11					
Finland				13					
France	11	13			13		15		
Germany	6	14			16				
Hungary								13	
Ireland		9							
Italy	12				18		16		
Lithuania				12					
Luxembourg					6				
Latvia				12					
Malta							3		
Netherlands		11							
Poland	7				16				
Portugal		8				2	14		
Romania	10		7		10			5	6
Sweden	7			15	11				
Slovenia	9				7				
Slovakia	10							10	
Spain	11	13					16		
United Kingdom		14					2		

Explanations – biogeographical regions: ALP – Alpine; ATL – Atlantic, BLS – Black Sea, BOR – Boreal, CON – Continental, MAC – Macaronesian, MED – Mediterranean, PAN – Pannonian, STE – Steppic.

The Fig. 4.1 shows distribution of MAES grassland habitats in the reporting units of the Article 17 reporting while map in Fig. 4.2 shows distribution of these habitats in grid cells 10x10 km.

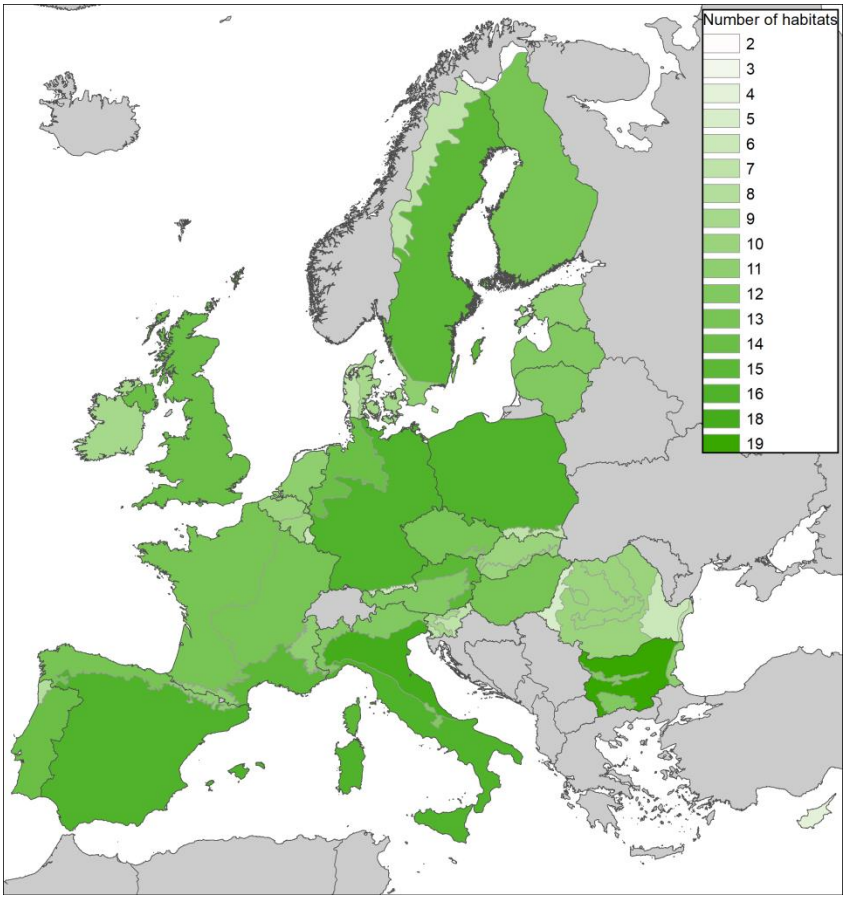

Fig. 4.1: Number of the MAES grassland habitat listed in the Habitat Directive Annex I in the reporting units of Article 17

The map in Fig. 4.2 indicates hotspots of MAES grassland Annex I habitats in south Sweden, southwest France and some regions of other countries (EE, LV, LZ, SK, CZ, HU, AT, DE, IUT, ES, BG). The lower number of these habitats in Finland mountain part of Sweden was expected, lower number of these habitat is indicated for United Kingdom, Ireland and north half of France. Surprisingly low number of MAES grassland Annex I habitats is indicated for Romania.

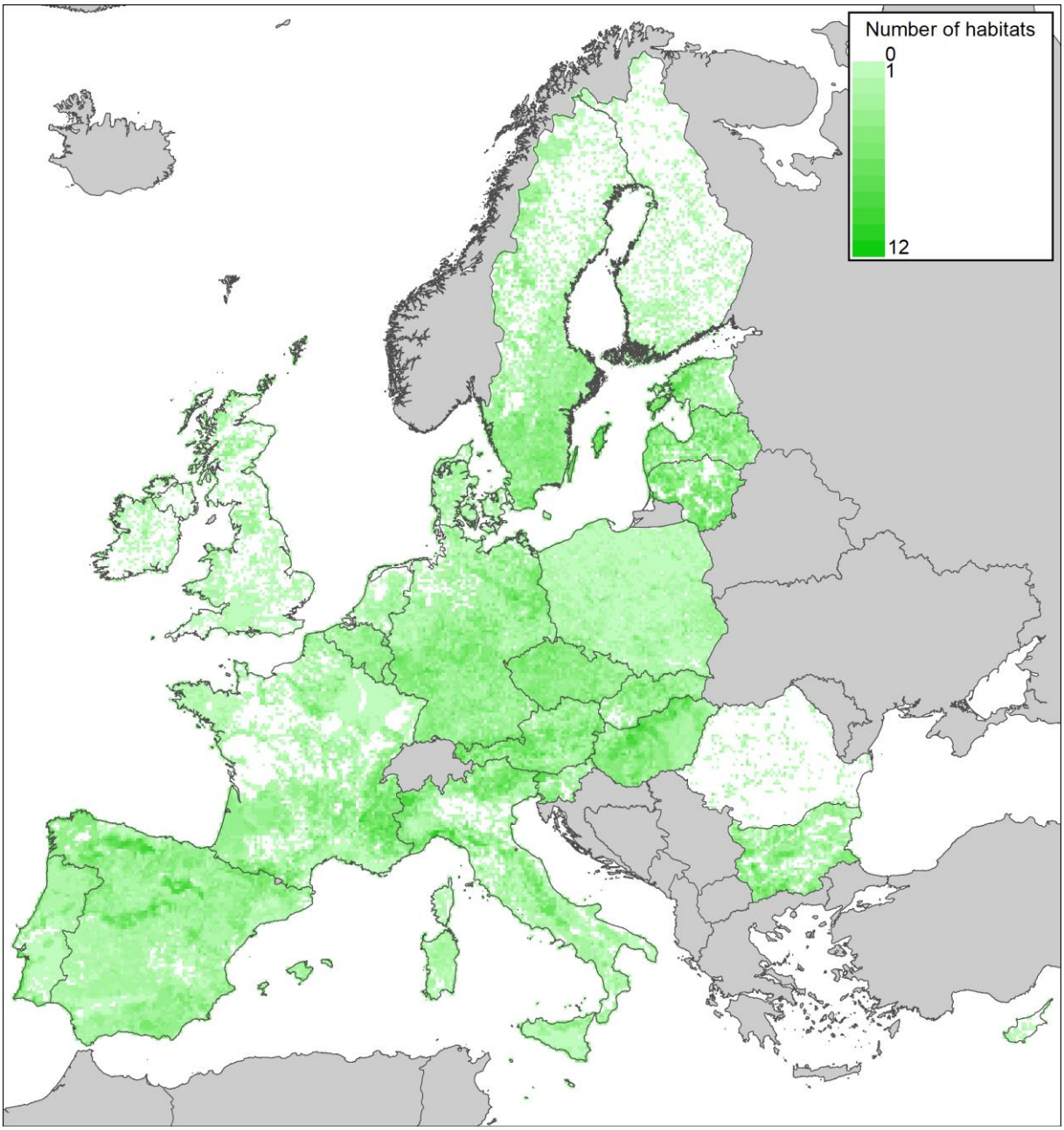

Fig. 4.2: Distribution of the MAES grassland habitats listed in the Habitat Directive Annex I

4.2 Intensive agriculture

The main overexploitation pressures on grassland are agricultural intensification and overgrazing. Although the demand for food is increasing because of the growing population, the preferences of European citizens are shifting towards meat from pigs and poultry rather than beef and lamb. The resulting changes in the number and distribution of livestock can profoundly affect grasslands and their value for wildlife, mainly by intensification of grassland management leading to shorter mowing intervals, higher inputs of fertiliser and pesticides or even regular ploughing and seeding of a small number of highly productive grass species, turning grasslands into monocultures. Intensification of grassland management leads to a number of pressures, such as the use of fertilisers and pesticides, as well as the introduction of alien plants and mechanical mowing techniques. This change in management may increase plant density and biomass, but it also reduces the structural and floristic diversity of grasslands (EEA 2016).

For grasslands, IES UA estimated the LUCAS observations of the nitrogen input to grassland based on the local stocking densities with cattle. Stocking densities were derived from the livestock maps of Neumann et al. (2009). It was assumed an uniform quantity of 100 kg N/ha per cow per year and reclassified the observations into two classes: intensive grassland with > 50 kg N/ha and extensive grassland with < 50 kg N/ha. Then the country-specific logistic regression models were estimated and used to downscale within the administrative units the areas of the different intensity classes to individual locations. Resulting data layer is a grid with resolution 1 x 1 km (Figure 4.3).

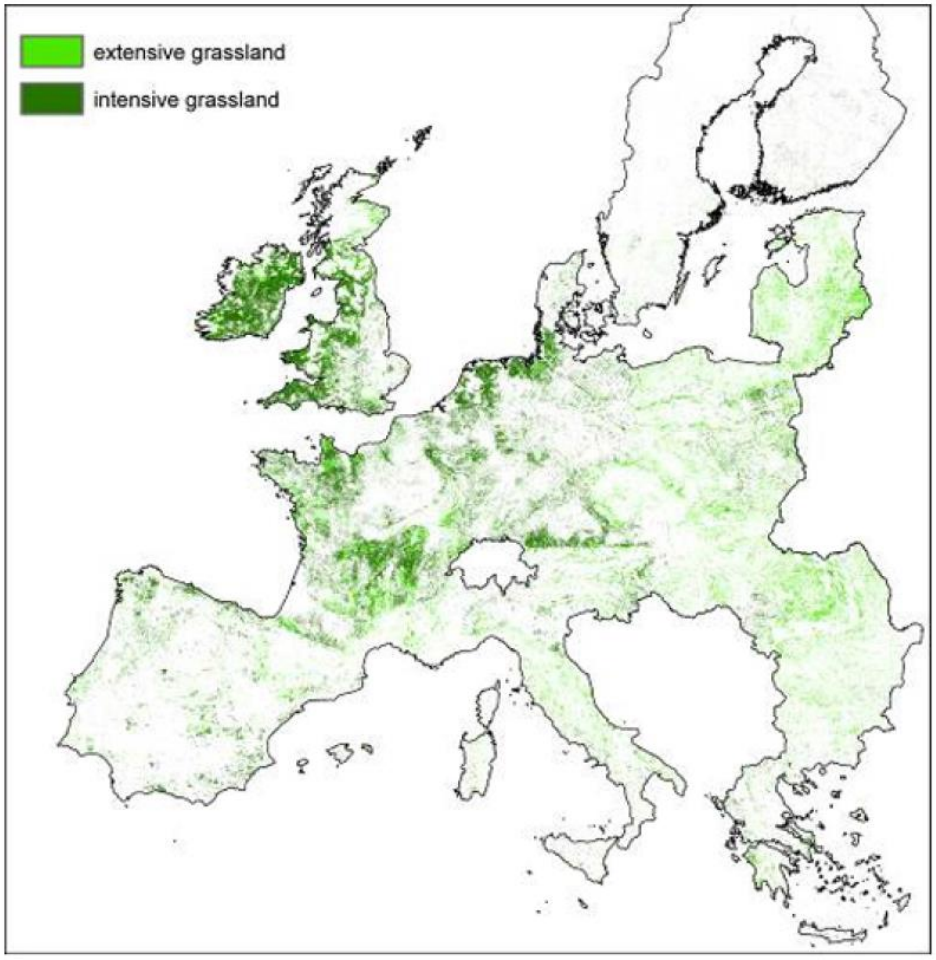

Fig. 4.3: Map of intensive and extensive grasslands produced by the IES UA (2017)

Table 4.2: Pressures related to agriculture intensification

Code	Pressure		Code	Pressure
A02.01	agricultural intensification		A04.01.05	intensive mixed animal grazing
A03.01	intensive mowing or intensification		A06.01.01	intensive annual crops for food production/ intensification
A04.01	intensive grazing		A06.02.01	intensive perennial non-timber crops/intensification
A04.01.01	intensive cattle grazing		A07	use of biocides, hormones and chemicals
A04.01.02	intensive sheep grazing		A08	Fertilisation
A04.01.03	intensive horse grazing		A09	Irrigation
A04.01.04	intensive goat grazing			

In total, 13 pressure types of Article 17 reporting of 2nd – 4th level are related to agriculture intensification, they are listed in table 4.2.

The intensification is widely reported by Member States as pressure to grassland (see Table 4.3 and Fig. 4.4). Only Finland, Latvia, Malta, and Slovakia did not report this pressure, therefore there countries absent in the table. The highest number of habitats (19) affected by intensive agriculture reported Bulgaria in Continental biogeographical region.

Table 4.3: Number of grassland habitats affected by intensive agriculture

Country/BGR	ALP	ATL	BLS	BOR	CON	MAC	MED	PAN	STE
Austria	6				7				
Belgium		4			7				
Bulgaria	11		9		19				
Cyprus							1		
Czech Republic					5			4	
Germany	5	6			6				
Denmark		5			7				
Estonia				4					
Spain	5	3					5		
France	6	7			10		6		
Hungary								6	
Ireland		6							
Italy	9				3		2		
Lithuania				3					
Luxembourg					5				
Netherlands		4							
Poland	2				1				
Portugal		1					4		
Romania	7		2		5			3	3
Sweden					7				
Slovenia	7				6				
United Kingdom		4							

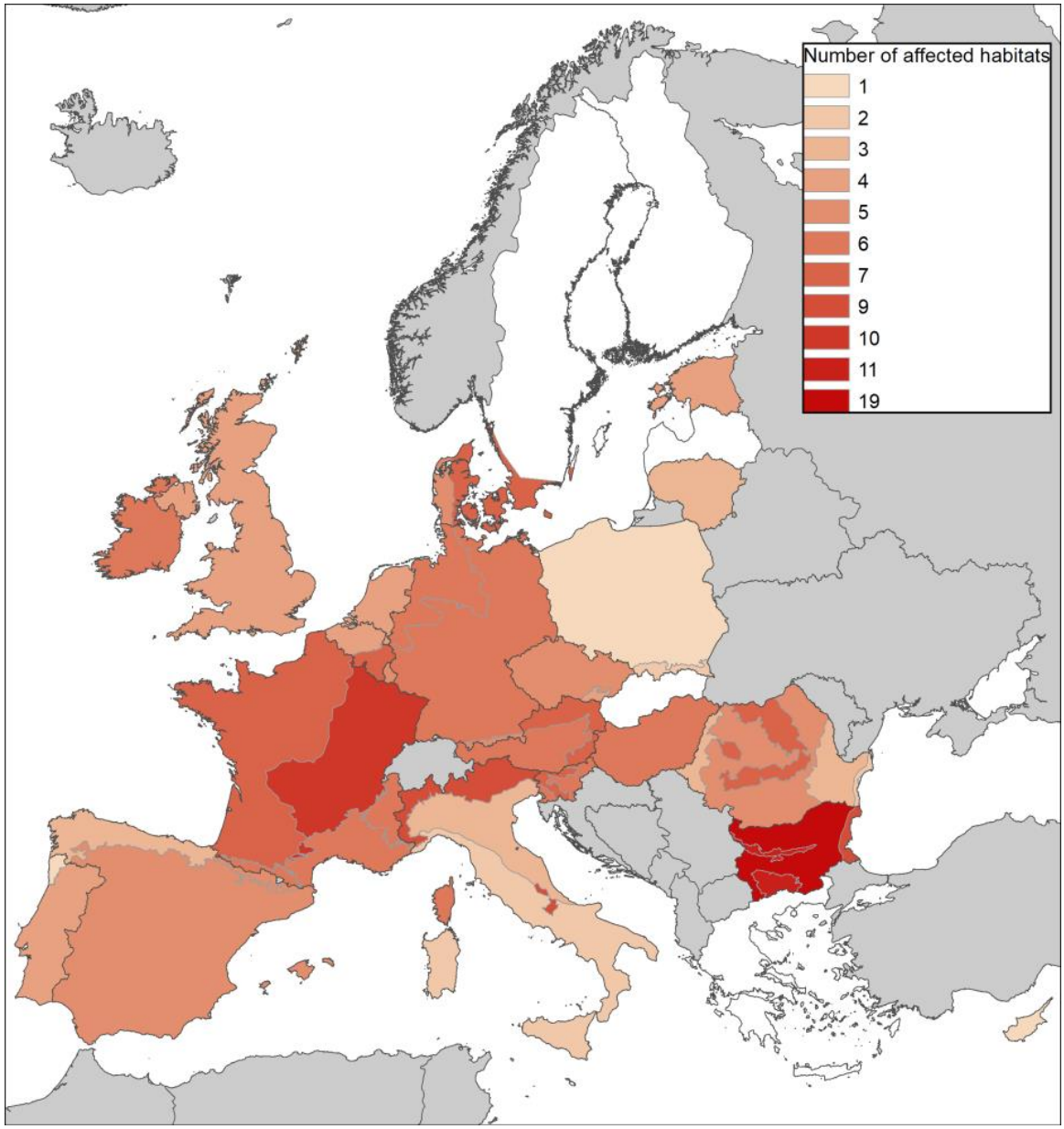

Fig. 4.4: Number of grassland habitats under pressure of the agriculture intensification

The hotspots of the pressures caused by the intensive agriculture to the grassland habitats were mapped especially in Germany, Belgium, Luxembourg, and France (Fig. 4.5). In other countries, namely in Denmark, Ireland, United Kingdom, Netherlands, Spain, Portugal, Italy, Austria is this pressure either less abundant or has lower intensity. The pressure was mapped as more scattered and mostly with lower intensity in Sweden, Poland, Hungary, and Bulgaria. The pressure was not reported by Finland, Latvia, Malta, and Slovakia.

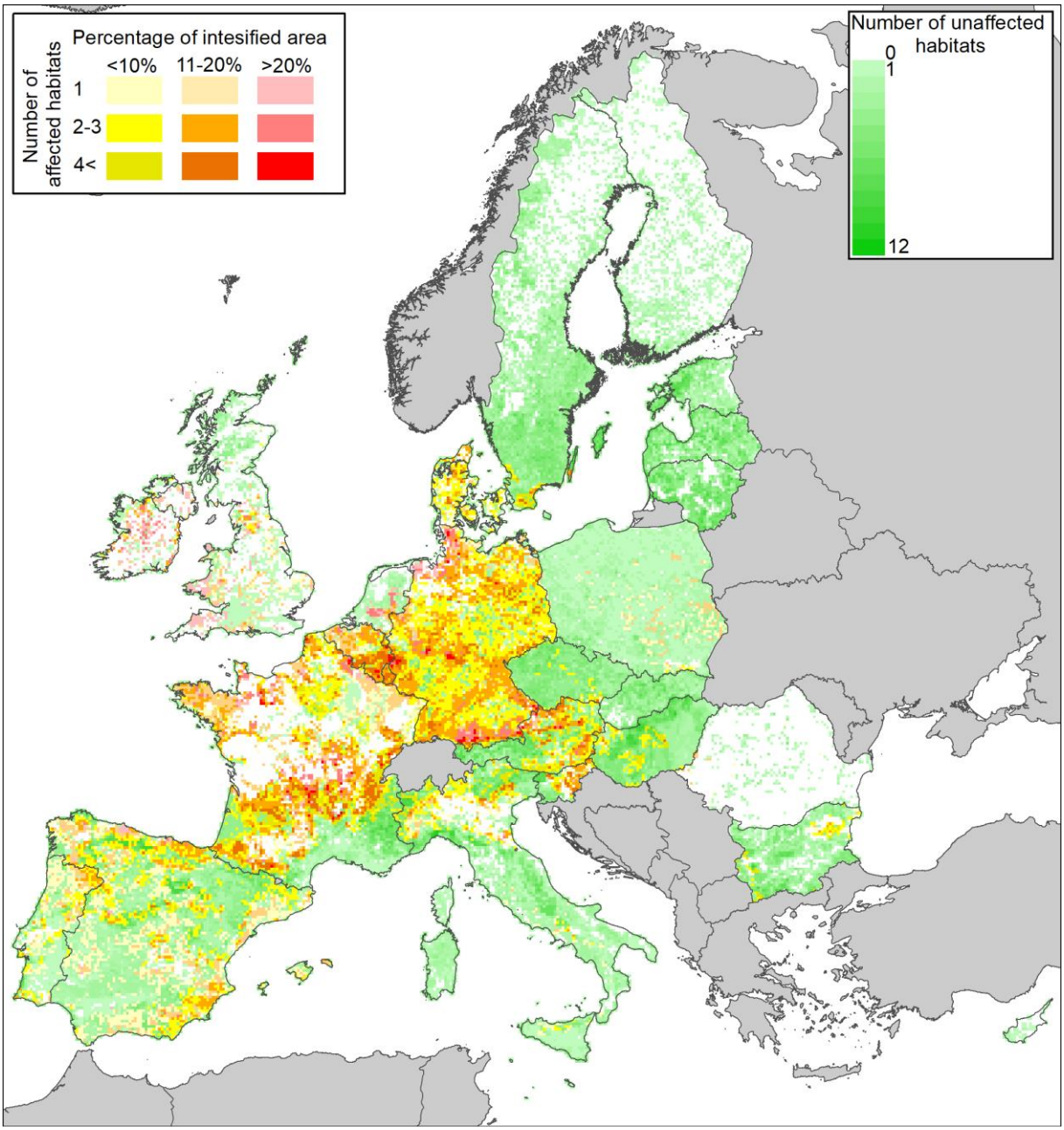

Fig. 4.5: Distribution of agriculture intensification pressures affecting grassland habitats

4.3 Grassland abandonment

The abandoned land is defined as a land which has not been used for agricultural production for two years, it is usually in the transition from the original habitat to another habitat type by vegetation succession (natural or planned). The semi-natural ecosystems often depend on low-intensity management and the change in land management leads to vegetation succession, usually to species-poor and more homogeneous vegetation types resulting in a structural change from an open to a closed landscape and loss of biodiversity (ETC SIA (2014).

The ETC SIA computed the indicator of the intensity of land abandonment on 1 km grid and it represents the percentage [0-100] of the land-cover change due to the land abandonment. The higher intensity indicates the higher pressure. The resulting map is in Figure 4.6.

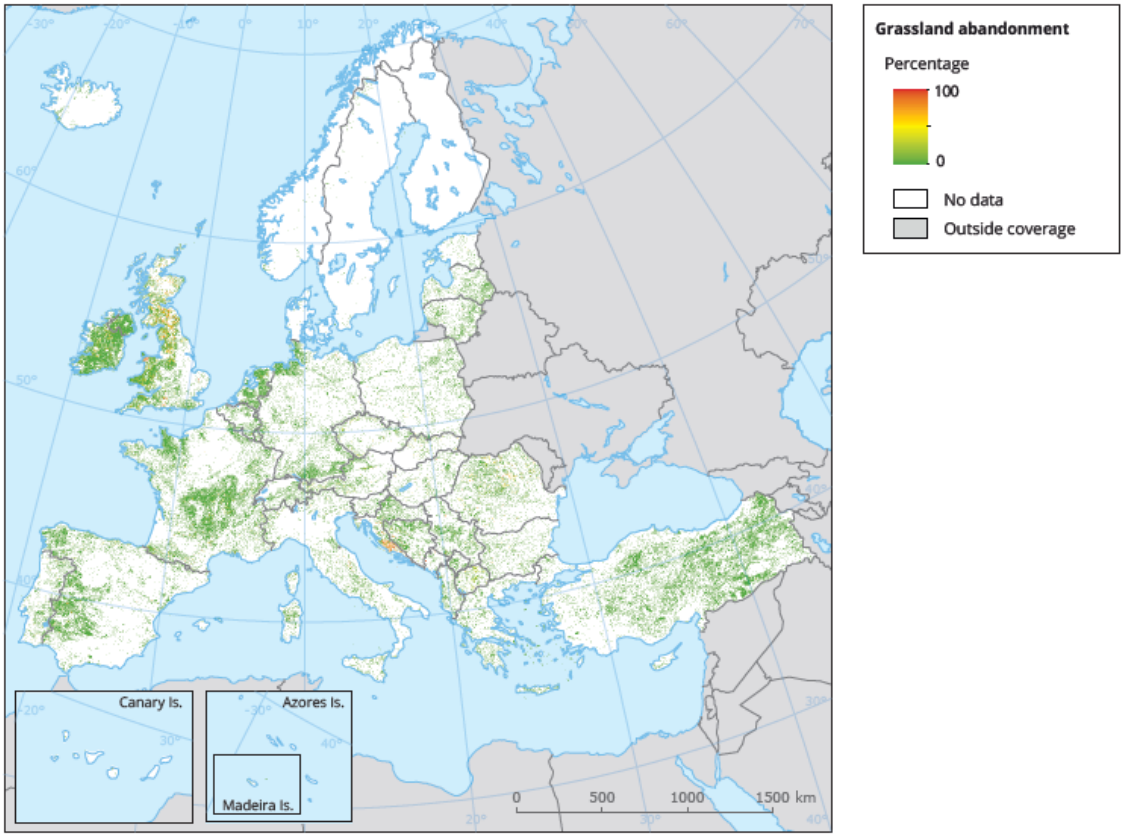

Fig. 4.6: Grassland abandonment map produced by the ETC SIA (2014)

Table 4.4: Pressures related to grassland abandonment

Code	Pressure
A03.03	abandonment / lack of mowing
A04.03	abandonment of pastoral systems, lack of grazing
A05.03	Lack of animal breeding

Three pressure types of Article 17 reporting of 3rd level are related to agriculture abandonment, they are listed in table 4.4.

The abandonment is widely reported by Member States as pressure to grassland (see table 4.6 and Fig. 4.7). Only France, Romania, United Kingdom did not report this pressure, therefore there countries absent in the table. The reporting of all pressures by France and almost all pressures by United Kingdom on 2nd level is reason that abandonment was not identified as relevant pressure for these countries – all pressures related to abandonment are on 3rd level. In case of Romania, it is surprising that this pressure is not reported. The highest number of habitats (13) affected by abandonment reported Sweden from Boreal biogeographical region.

Table 4.6: Number of grassland habitats affected by abandonment

Country/BGR	ALP	ATL	BLS	BOR	CON	MAC	MED	PAN	STE
Austria	8				11				
Belgium		3			2				
Bulgaria	5		2		6				
Cyprus							1		
Czech Republic					8			7	
Germany	2	10			10				
Denmark		5			7				
Estonia				9					
Spain	3	4					3		
Finland				11					
Hungary								9	
Ireland		6							
Italy	7				2		1		
Lithuania				11					
Luxembourg					4				
Latvia				10					
Malta							1		
Netherlands		7							
Poland	2				3				
Portugal		3					6		
Sweden	7			13	10				
Slovenia	6				5				
Slovakia	4							5	

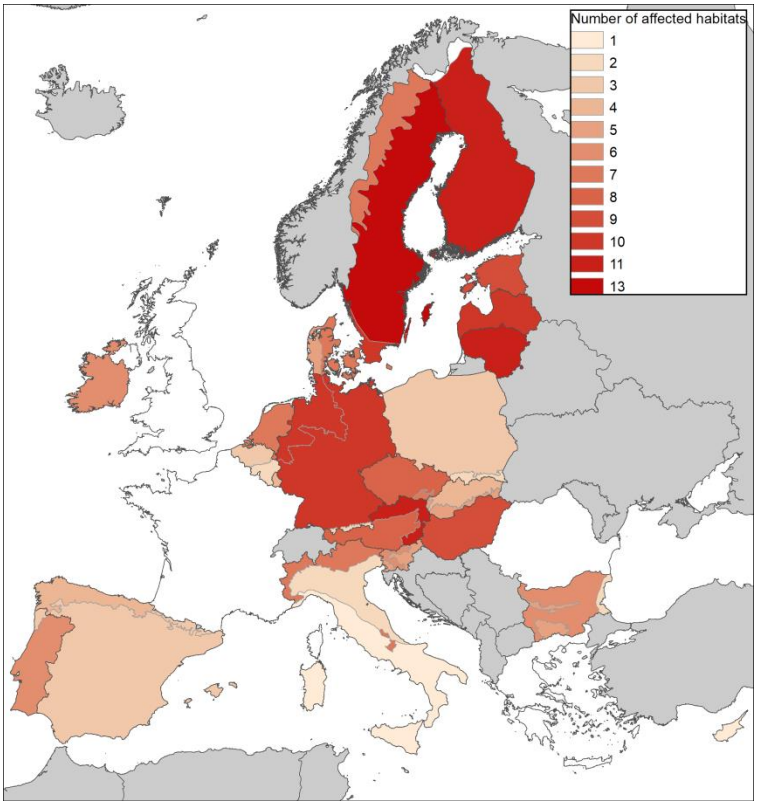

Fig. 4.7: Number of grassland habitats under pressure of abandonment

The hotspots of the pressures caused by grassland abandonment were mapped especially in Czech Republic, Austria, and Hungary (Fig. 4.8). The abandonment is widespread, but mostly with lower intensity or influencing lower number of habitats in Estonia, Latvia, Lithuania, Poland, Slovakia, Slovenia, Germany, Netherlands, Luxembourg, Ireland, Portugal, and Spain. The pressure was

mapped as more scattered and mostly with lower intensity in Sweden, Finland, Denmark, Belgium, and Malta. France, United Kingdom, and Romania did not report the pressure – this issue is commented above.

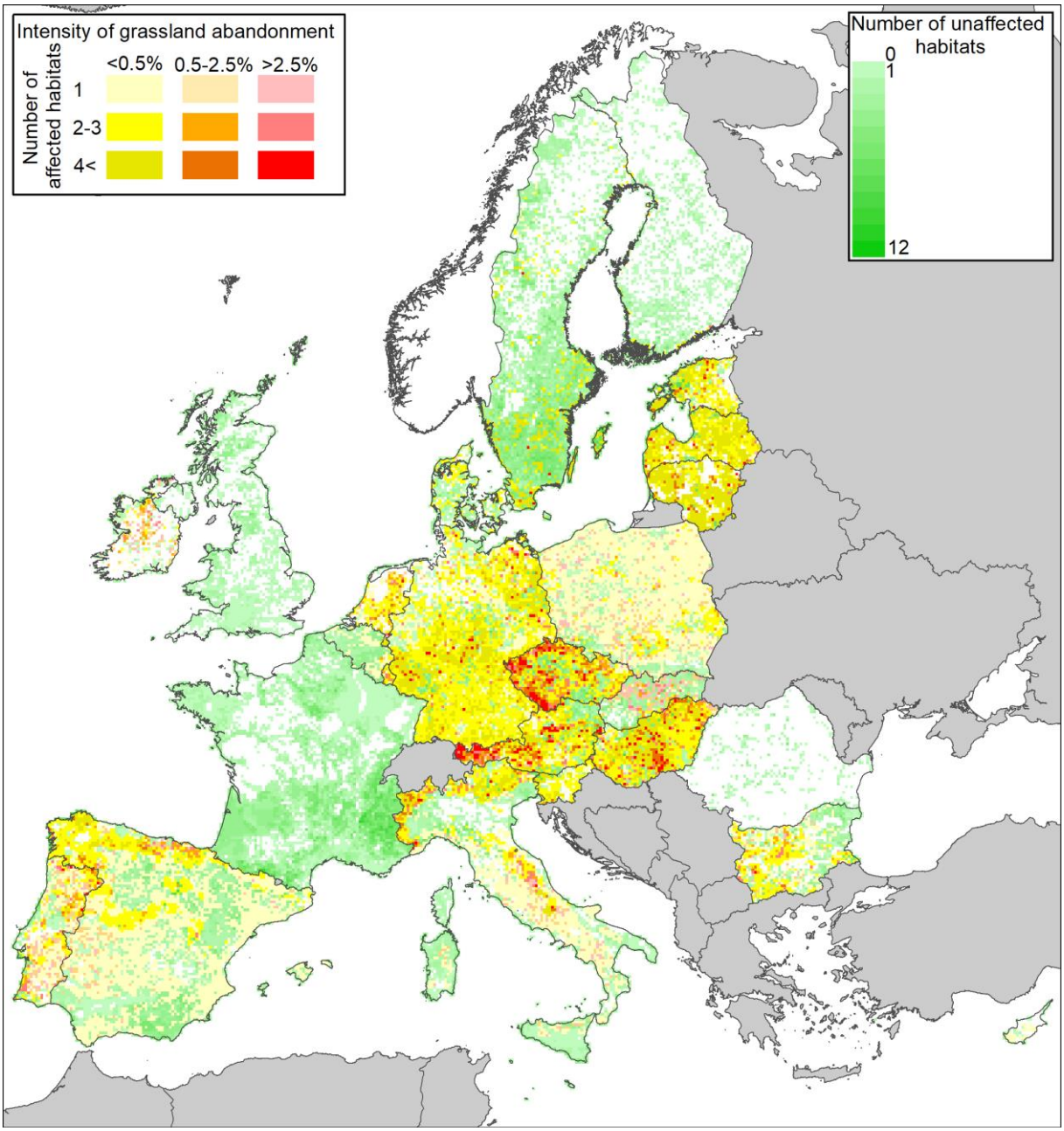

Fig. 4.8: Distribution of agriculture abandonment pressures affecting grassland habitats listed in the Habitats Directive Annex I

4.4 Land take

The main pressure causing habitat change in terrestrial ecosystems is land take. This causes impacts, such as fragmentation, soil sealing, soil erosion and soil degradation that can cause direct degradation of a habitat or its loss and replacement by another habitat type (EEA 2016). The increase in the coverage of urban land affects the living space of a number of species, and causes habitat change and loss and landscape fragmentation.

The ETC SIA calculated the intensity of land take (due to urban expansion and urban sprawl) between the years 2000 and 2006 using LEAC tools and CLC 2000 and 2006 (100 m resolution) on 1 km grid. The indicator represents the percentage [0-100] of the land-cover change due to land take. The higher intensity indicates the higher pressure. The resulting map is in Figure 4.9.

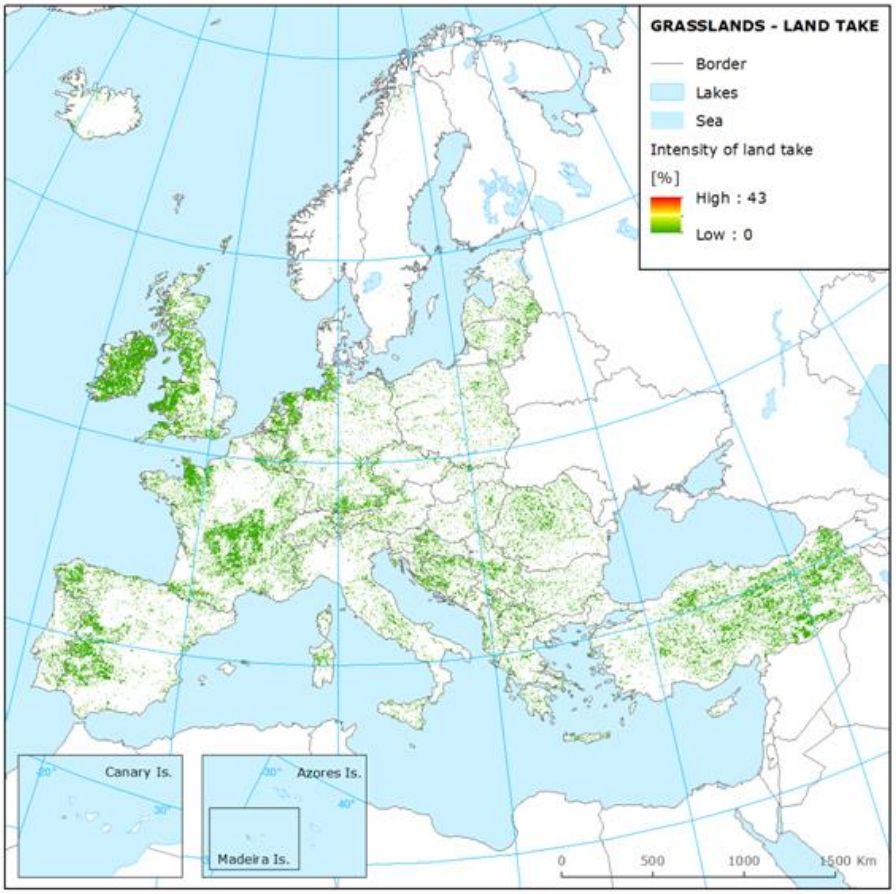

Fig. 4.9: Map of land take produced by the ETC SIA (2014)

Table 4.7: Pressures related to land take

Code	Pressure		Code	Pressure
B01	forest planting on open ground		C01.03.02	mechanical removal of peat
B01.01	forest planting on open ground (native trees)		C01	Mining and quarrying
B01.02	artificial planting on open ground (non-native trees)		C01.01	Sand and gravel extraction
C01.03	Peat extraction		C01.01.01	sand and gravel quarries
C01.03.01	hand cutting of peat		C01.02	Loam and clay pits
C01.04.01	open cast mining		E05	Storage of materials
D01	Roads, paths and railroads		E06	Other urbanisation, industrial and similar activities
D01.01	paths, tracks, cycling tracks		E06.01	demolishment of buildings & human structures
D01.02	roads, motorways		E06.02	reconstruction, renovation of buildings
D01.03	car parcs and parking areas		G02	Sport and leisure structures
D01.04	railway lines, TGV		G02.01	golf course
D04	airports, flightpaths		G02.02	skiing complex
D04.01	airport		G02.03	stadium
D04.02	aerodrome, heliport		G02.04	circuit, track
D04.03	flight paths		G02.05	hippodrome
E01	Urbanised areas, human habitation		G02.06	attraction park
E01.01	continuous urbanisation		G02.07	sports pitch
E01.02	discontinuous urbanisation		G02.08	camping and caravans

Code	Pressure		Code	Pressure
E01.03	dispersed habitation		G02.10	other sport / leisure complexes
E01.04	other patterns of habitation		G04	Military use and civil unrest
E02	Industrial or commercial areas		G04.01	Military manouvres
E02.01	factory		G04.02	abandonment of military use
E02.02	industrial stockage		J02.03	Canalisation & water deviation
E02.03	other industrial / commercial area		J02.03.01	large scale water deviation
E03	Discharges		J02.03.02	canalisation
E03.01	disposal of household / recreational facility waste		J02.05.04	reservoirs
E03.02	disposal of industrial waste		J02.05.05	small hydropower projects, weirs
E03.03	disposal of inert materials		J02.12	Dykes, embankments, artificial beaches
E04	Structures, buildings in the landscape		J02.12.01	sea defense or coast protection works, tidal barrages
E04.01	Agricultural structures, buildings in the landscape		J02.12.02	dykes and flooding defense in inland water systems
E04.02	Military constructions and buildings in the landscape			

In total, 60 pressure types of Article 17 reporting of 2nd – 4th level are related to land take, they are listed in table 4.7. We included to these pressures also conversion of grasslands to forests because also this conversion means grassland habitat loss.

The land take reported all Member States as pressure to grassland (see Table 4.8 and Fig. 4.10). The highest number of habitats (18) affected by land take reported Bulgaria and Italy in the Continental biogeographical region.

Table 4.8: Number of grassland habitats affected by land take

Country/BGR	ALP	ATL	BLS	BOR	CON	MAC	MED	PAN	STE
Austria	6				7				
Belgium		8			10				
Bulgaria	11		11		18				
Cyprus							3		
Czech Republic					7			5	
Germany		2			3				
Denmark		2			2				
Estonia				7					
Spain	8	12					15		
Finland				1					
France	5	13			7		11		
Hungary								7	
Ireland		4							
Italy	12				18		15		
Lithuania				10					
Luxembourg					1				
Latvia				1					
Malta							2		
Netherlands		4							
Poland	1				8				
Portugal		4				2	9		
Romania			4		3				2
Sweden	4			6	2				
Slovenia	4				1				
Slovakia	5							4	
United Kingdom		3					1		

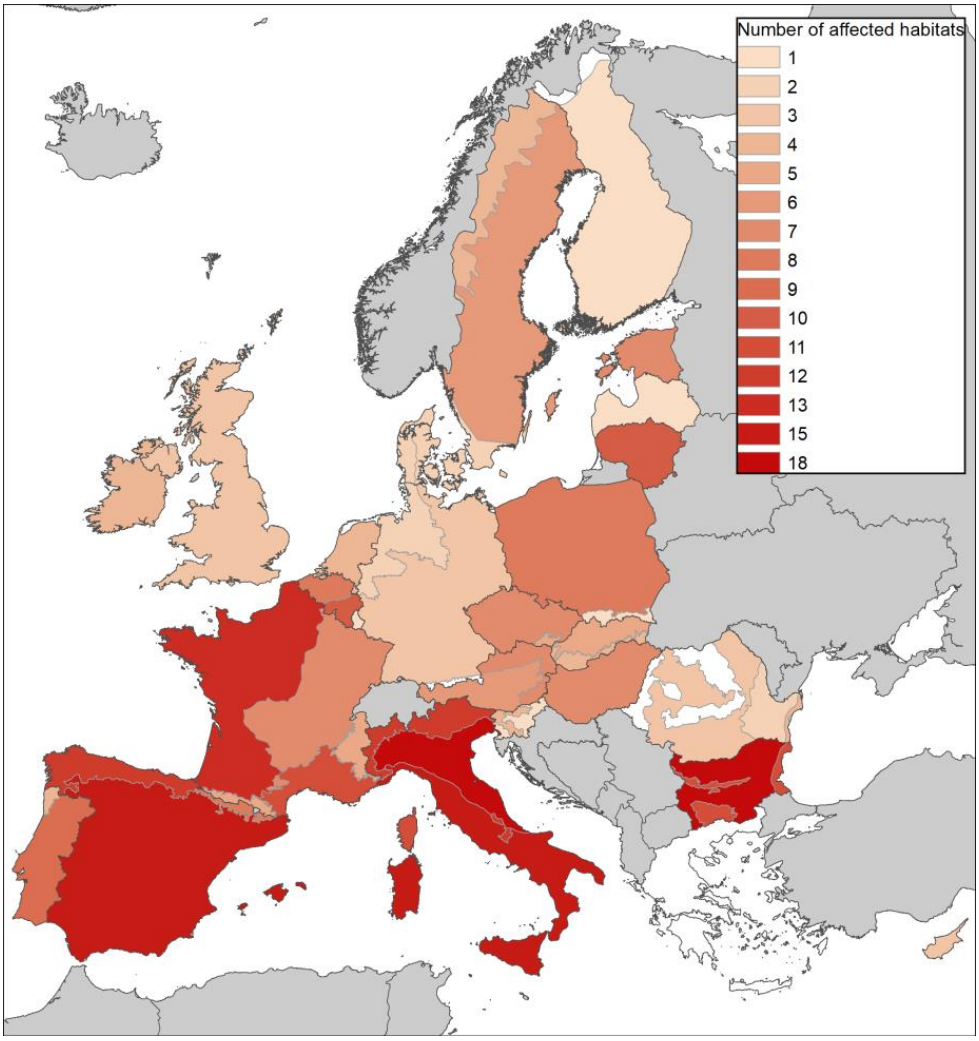

Fig. 4.10: Number of grassland habitats under pressure of the land

The hotspots of the pressures caused by the land take to the grassland habitats were mapped especially in Czech Republic and Austria, in lower extend in Netherland, Belgium, France, Spain, Hungary and Bulgaria (Fig. 4.11).

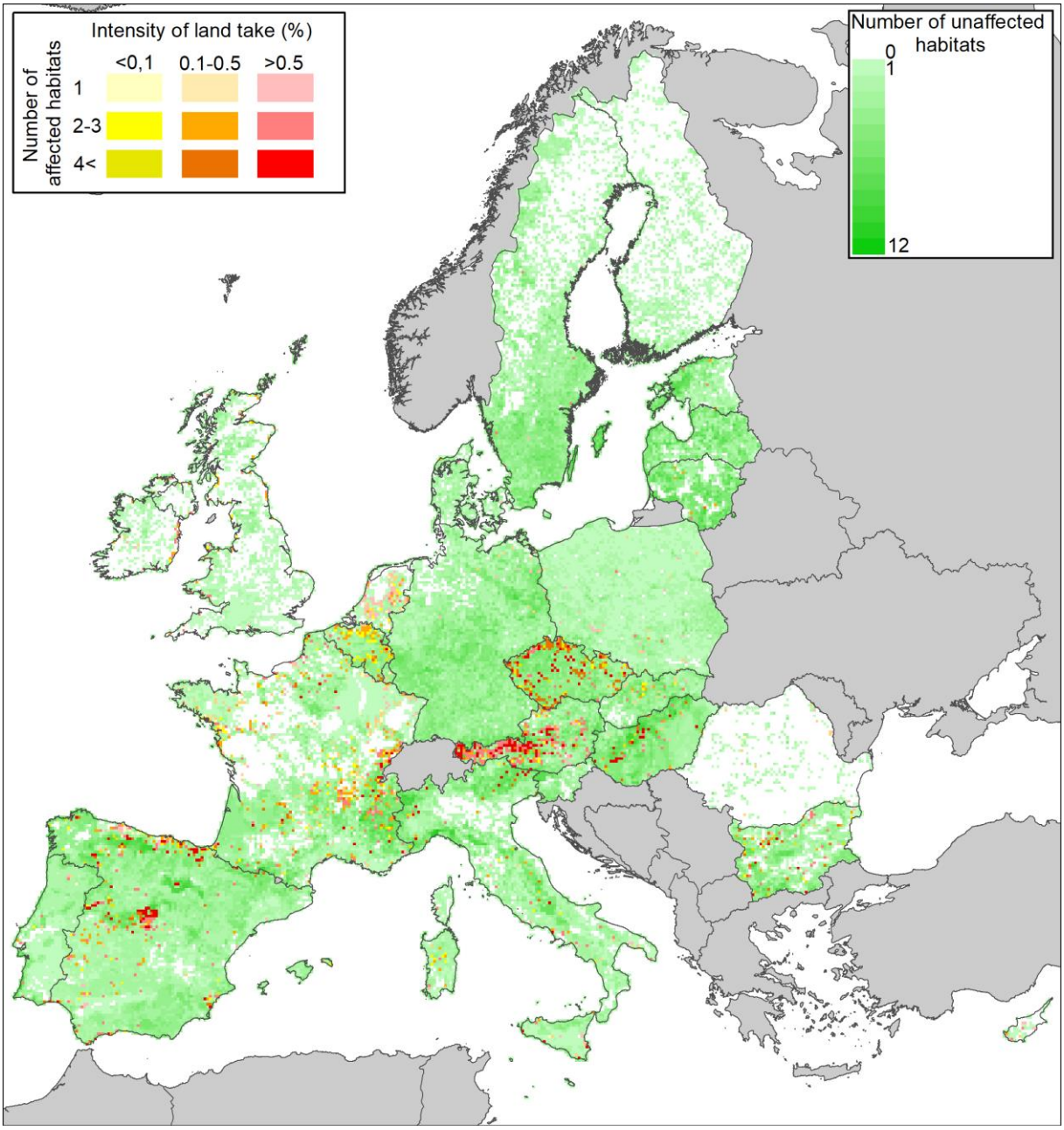

Fig. 4.11: Distribution of land take pressures affecting grassland habitats

4.5 Habitat loss

Habitat loss corresponds to the conversion of grasslands mainly to agriculture. Large areas of grasslands have been lost in recent decades, causing severe fragmentation of the remaining habitat areas and a consequent drop in populations of certain species. The ETC SIA calculated intensity of habitat loss due to agriculture using LEAC tools and CLC 2000 and 2006 (100 m resolution) on 1 km grid. The indicator represents the percentage [0-100] of land-cover change due to the habitat loss. The higher intensity indicates the higher pressure. The resulting map is in Figure 4.12.

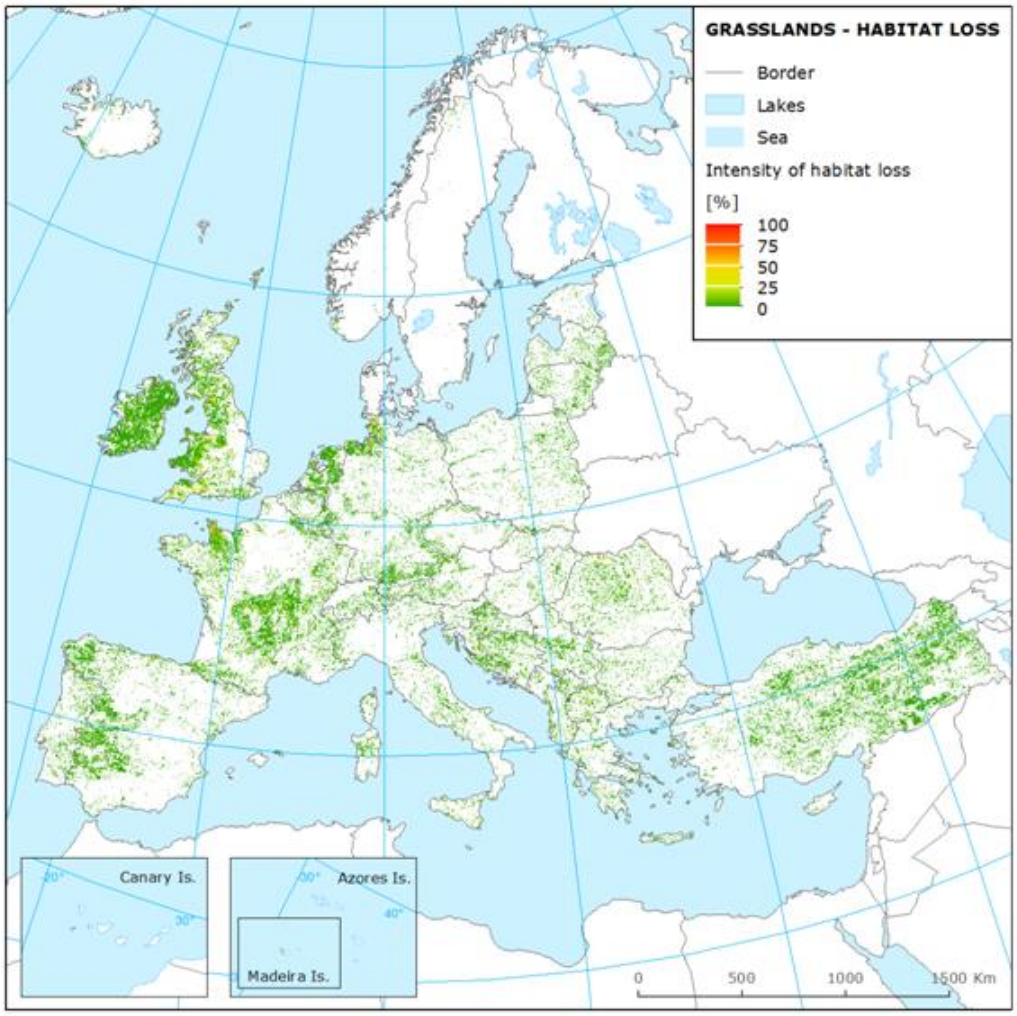

Fig. 4.12: Map of habitat loss produced by the ETC SIA (2014)

To habitat loss is related only one pressure A02.03 “Grassland removal for arable land”.

The habitat loss is reported less than other pressures by Member States in relation to grassland (see table 4.9 and Fig. 4.13). Czech Republic, Denmark, Estonia, France, Italy, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Sweden, and United Kingdom did not report this pressure, therefore there countries absent in the table. In case of France and United Kingdom the reporting on 2nd level of pressures classification could be reason – the habitat loss can be identified only on 3rd level. The highest number of habitats (14) affected by intensive agriculture reported Bulgaria in Continental biogeographical region.

Table 4.9: Number of grassland habitats affected by habitat loss

Country/BGR	ALP	ATL	BLS	BOR	CON	MAC	MED	PAN	STE
Austria	1				1				
Belgium		4			4				
Bulgaria	6		8		14				
Cyprus							1		
Germany		1			1				
Spain		1							
Finland				2					
Hungary								3	
Ireland		1							
Latvia				2					
Romania	2		1		3			2	1
Slovenia	2				2				
Slovakia								2	

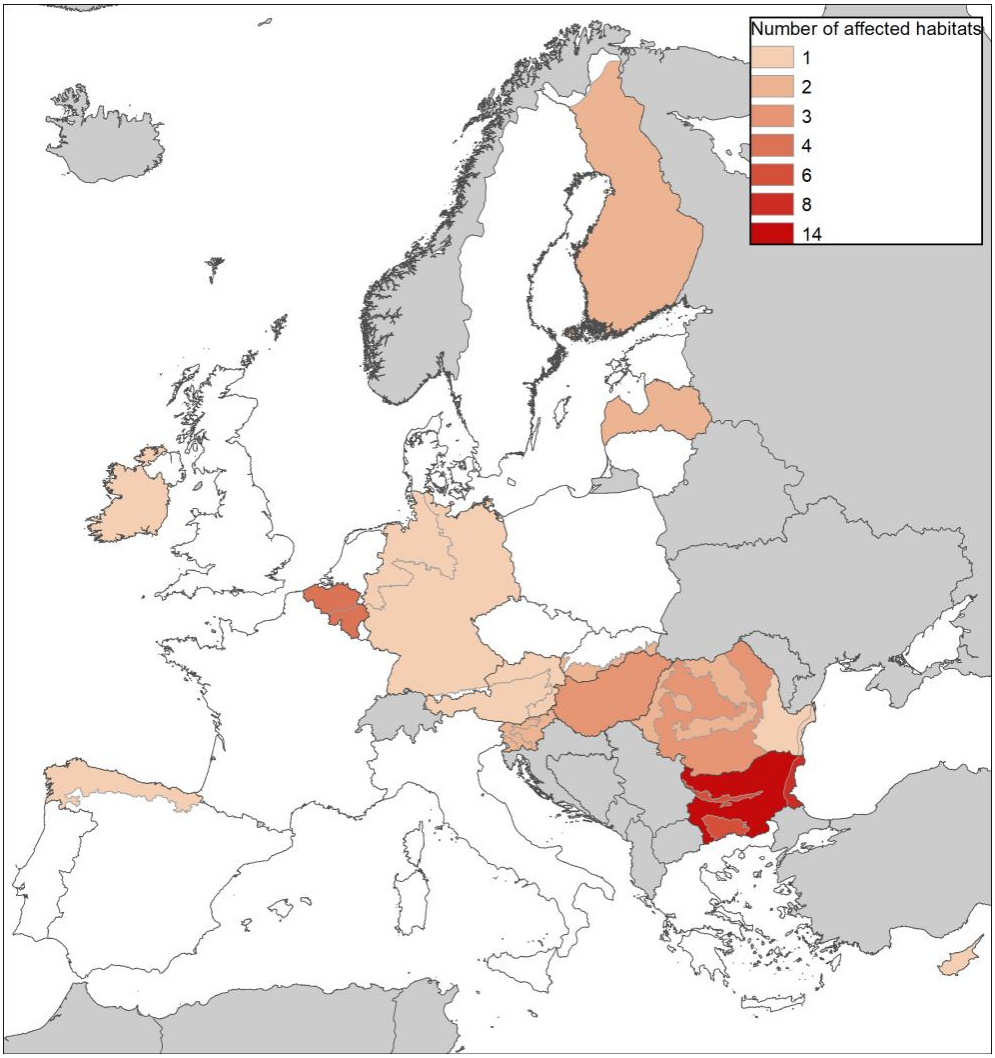

Fig. 4.13: Number of grassland habitats under pressure of the habitat loss

The hotspots of the habitat loss pressure were mapped especially in Hungary and Bulgaria (Fig. 4.14). In some other countries, namely in Latvia, Germany, Austria, Belgium and Romania is this pressure either less abundant or has lower intensity. The pressure was not reported by 13 countries (listed above).

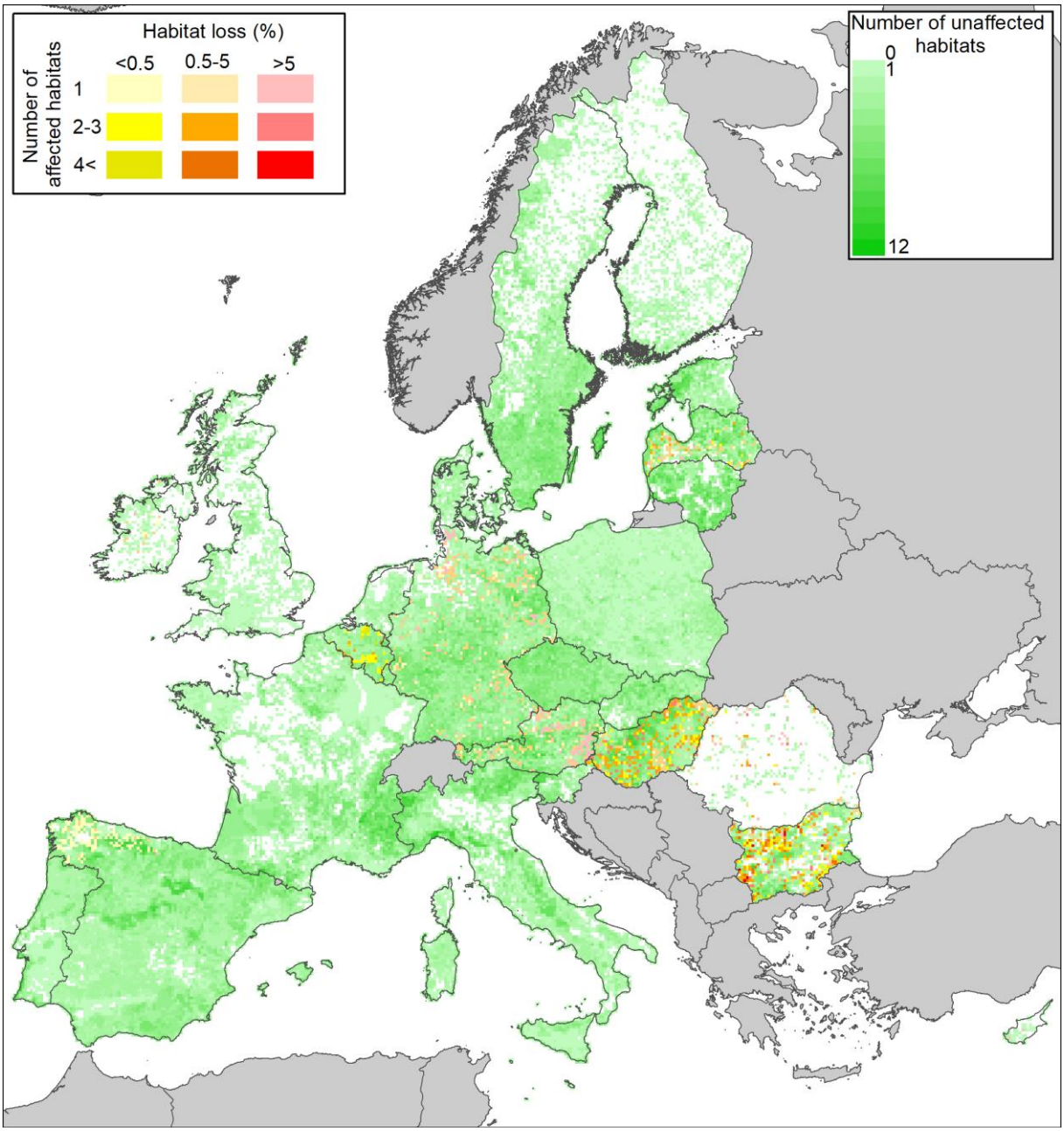

Fig. 4.14: Distribution of habitat loss pressures affecting grassland habitats listed in the Habitats Directive Annex I

4.6 Nitrogen input

The key pollution pressure on grasslands is excessive nitrogen inputs to the soil from organic and inorganic fertiliser application, further enriched by the atmospheric deposition of nitrogen (EEA 2016). The ETC SIA developed the nutrient accounts and derived from them the nitrogen input data. The total N r input to agricultural soils includes intentionally applied (organic or mineral) fertilizer and manure from grazing livestock as well as biological nitrogen-fixation and atmospheric deposition. These data were calculated at a resolution of 1km, using crop and livestock data from the EEA carbon accounts and statistics and conversion factors from different sources, mainly based on the OECD & EUROSTAT 2007. The resulting map (Figure 4.15) shows areas of intense nutrient pressure in Denmark, West Germany, Netherlands, Belgium, North-western France, Galicia and the Italian Po Valley. The overall share of N input to agricultural soils illustrates the high importance of manure and mineral fertiliser as pressures to agro-ecosystems (ETC SIA 2014). The map of nitrogen input to grasslands is in Figure 4.15.

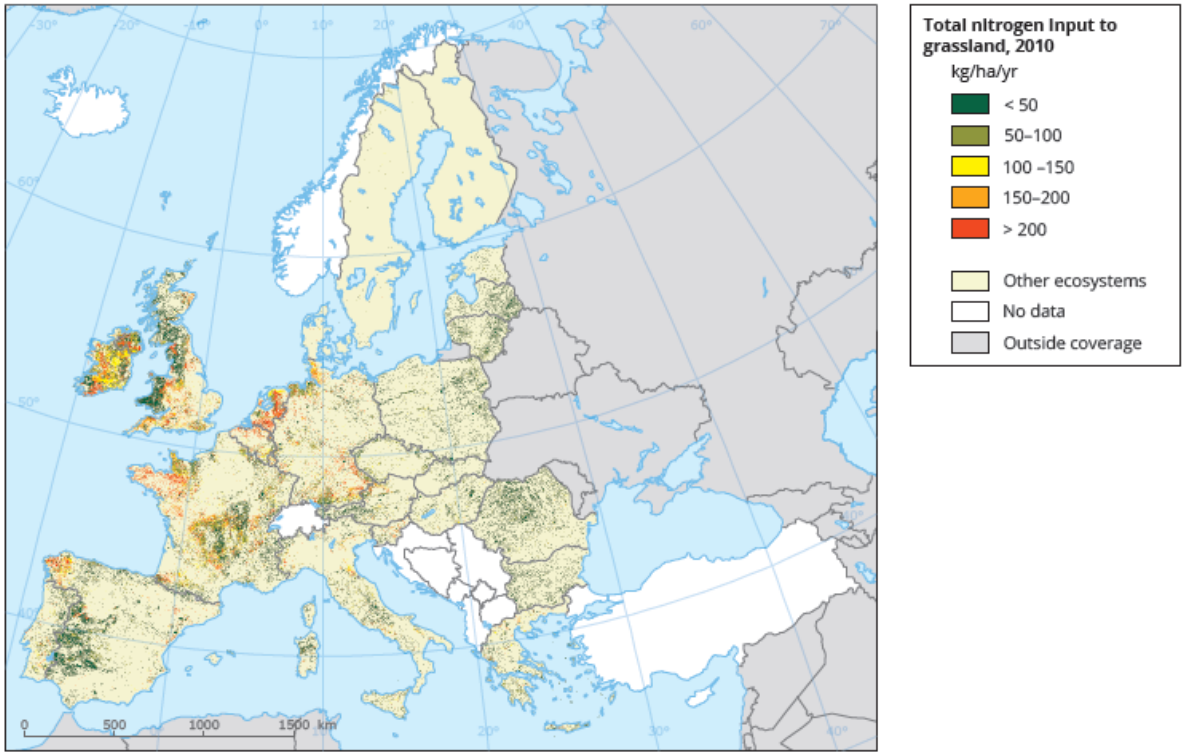

Fig. 4.15: Map of total nitrogen input to grasslands (2010) produced by the ETC SIA (2014)

Only one pressure - A08 “Fertilisation” - is related to nitrogen input.

The nitrogen input was less reported by Member States as pressure to grasslands (see table 4.10 and Fig. 4.16). Eight countries - Bulgaria, Cyprus, Finland, Latvia, Malta, Portugal, Romania, and Slovakia - did not report this pressure, therefore there countries absent in the table. The number of habitats affected by nitrogen input was generally lower than reported for previous pressures. The highest number of affected habitats (9) reported France in Continental and Italy in Alpine biogeographical region.

Table 4.10: Number of grassland habitats affected by nitrogen input

Country/BGR	ALP	ATL	BLS	BOR	CON	MAC	MED	PAN	STE
Austria	5				6				
Belgium		2			1				
Czech Republic					3			2	
Germany	5	5			6				
Denmark		4			6				
Estonia				4					
Spain	3	2					3		
France	6	7			9		6		
Hungary								1	
Ireland		3							
Italy	9				2		2		
Lithuania				3					
Luxembourg					5				
Netherlands		1							
Poland	2				1				
Sweden					7				
Slovenia	3				3				
United Kingdom		4							

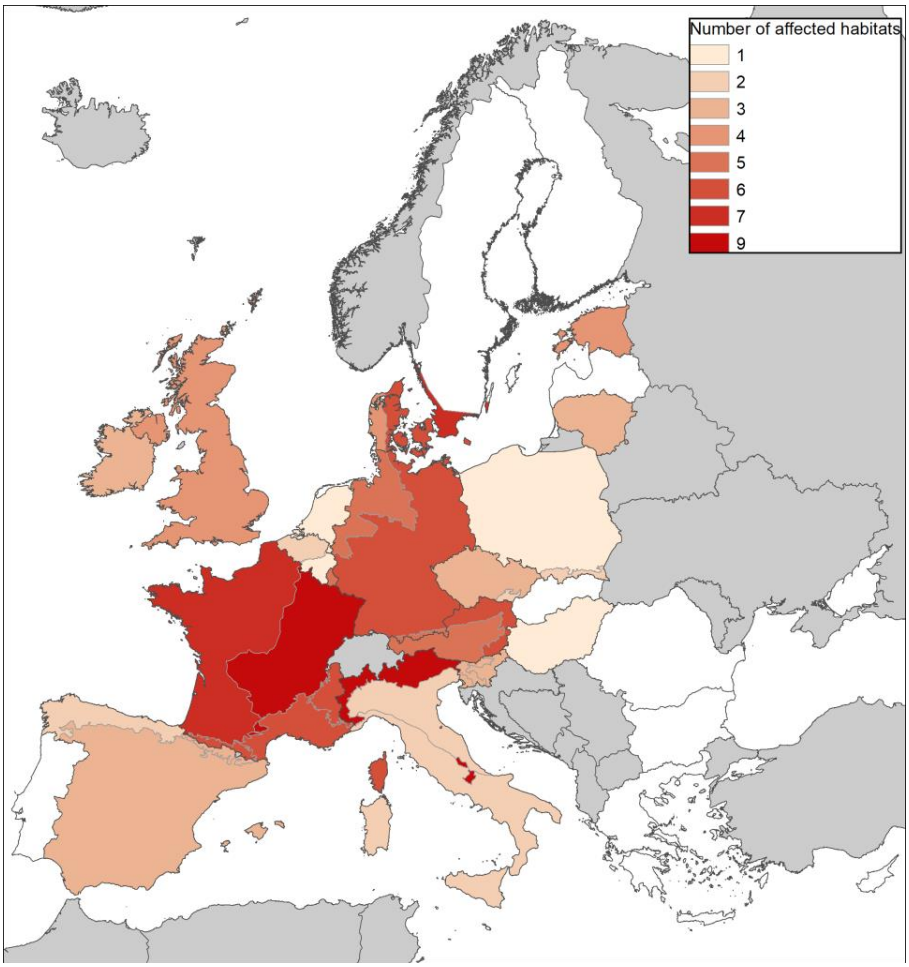

Fig. 4.16: Number of grassland under pressure of the nitrogen input

The hotspots of the pressures caused by the nitrogen input to the grassland habitats were mapped especially in Germany and France, and still abundant, but with lower intensity in Czech Republic, Austria, Slovenia, Lithuania, Estonia and north Spain (Fig. 4.17). In other countries, namely in Denmark, United Kingdom, Ireland, Belgium, and Italy is this pressure either less abundant or has low intensity. The pressure was mapped as scattered and mostly with low intensity in Sweden, Poland, and Netherland. The pressure was not reported by eight countries.

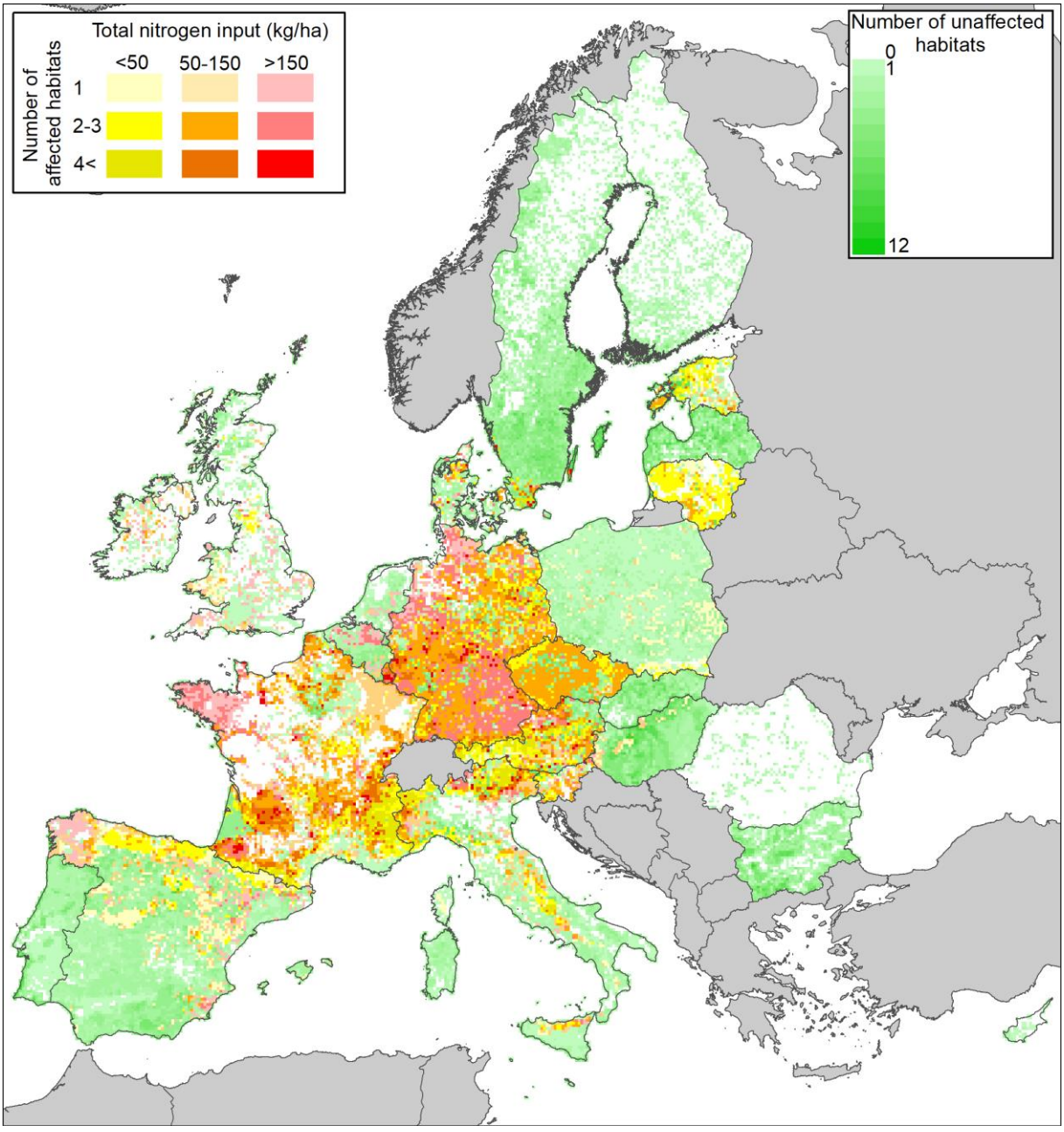

Fig. 4.17: Distribution of nitrogen input pressure affecting grassland habitats

4.7 Nitrogen deposition

The ecosystems are exposed to pollution and nitrogen enrichment also through atmospheric deposition of oxidized and reduced nitrogen. Nitrogen atmospheric deposition may affect the health and productivity of grasslands. Depending on the specific grassland ecosystem, the pressure of nitrogen load is evaluated differently, in terms of critical load. The ETC SIA used five classes of nitrogen deposition, based on Bobbink and Hettelingh (2010) as an approximation to evaluate the level of pressure to grassland ecosystems in general: very low (≤ 5 kg $N.ha^{-1}.year^{-1}$), low (5-10 kg $N.ha^{-1}.year^{-1}$), moderate (10-20 kg $N.ha^{-1}.year^{-1}$), high (20-30 kg $N.ha^{-1}.year^{-1}$), very high (>30 kg $N.ha^{-1}.year^{-1}$). The map of nitrogen atmospheric deposition on grasslands is in Figure 4.18.

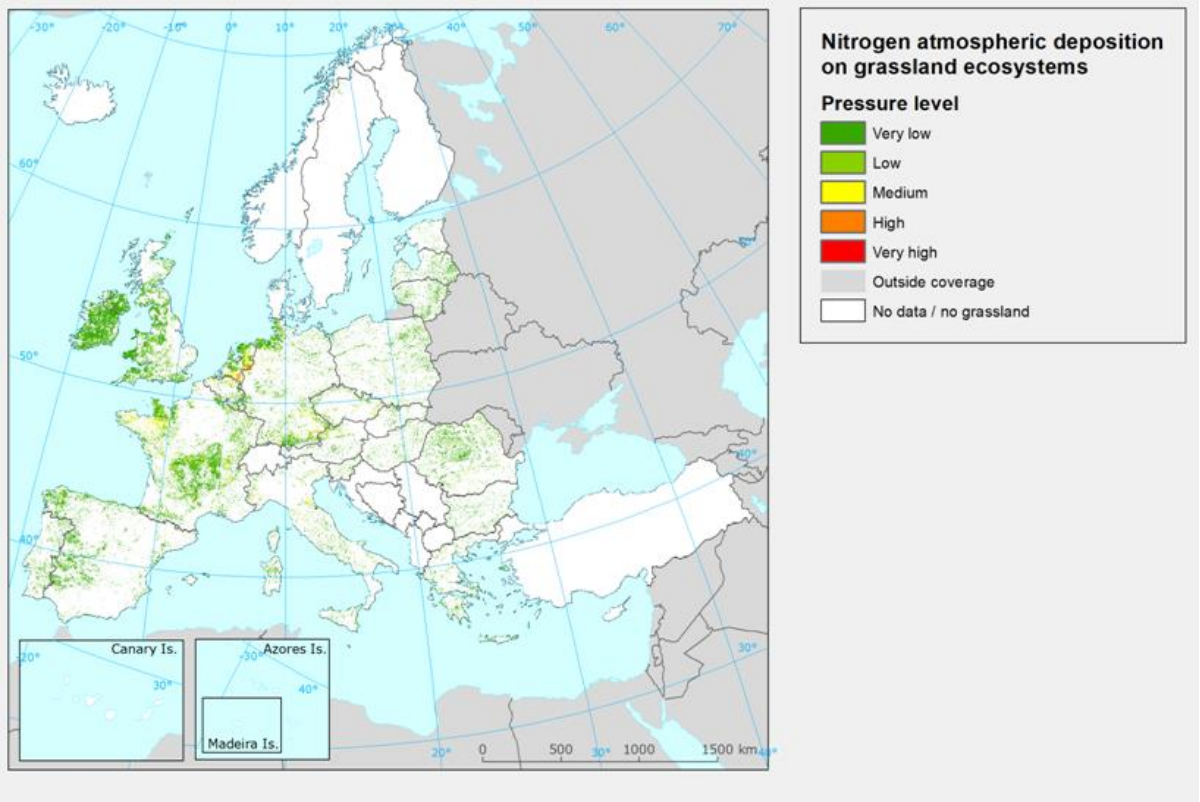

Fig. 4.18: Map of nitrogen atmospheric deposition on grasslands produced by the ETC SIA (2014)

In the Article 17 reporting only one pressure correspond to the nitrogen deposition, pressure H04.02 Nitrogen input. Despite the name of pressure H04.02 is the same as the name of pressure reported above in chapter 4.6, it is really related to deposition – the name of the related pressure on higher (2^{nd}) hierarchical level is "H04 Air pollution, air-borne pollutants".

This pressure was not often reported by the Member States – only 8 countries reported it. The number of grassland habitats affected by nitrogen deposition is in the Table 4.11 (the MS not reporting this pressure are not included), the corresponding map is in Fig. 4.19. The highest number of habitats (11) affected by nitrogen deposition reported Sweden in Continental biogeographical region.

Table 4.11: Number of grassland habitats affected by nitrogen deposition

Country/BGR	ALP	ATL	BLS	BOR	CON	MAC	MED	PAN	STE
Austria					1				
Belgium		5			5				
Czech Republic					2			1	
Germany		4			2				
Finland				2					
Netherlands		3							
Sweden				7	11				
Slovakia	2							2	

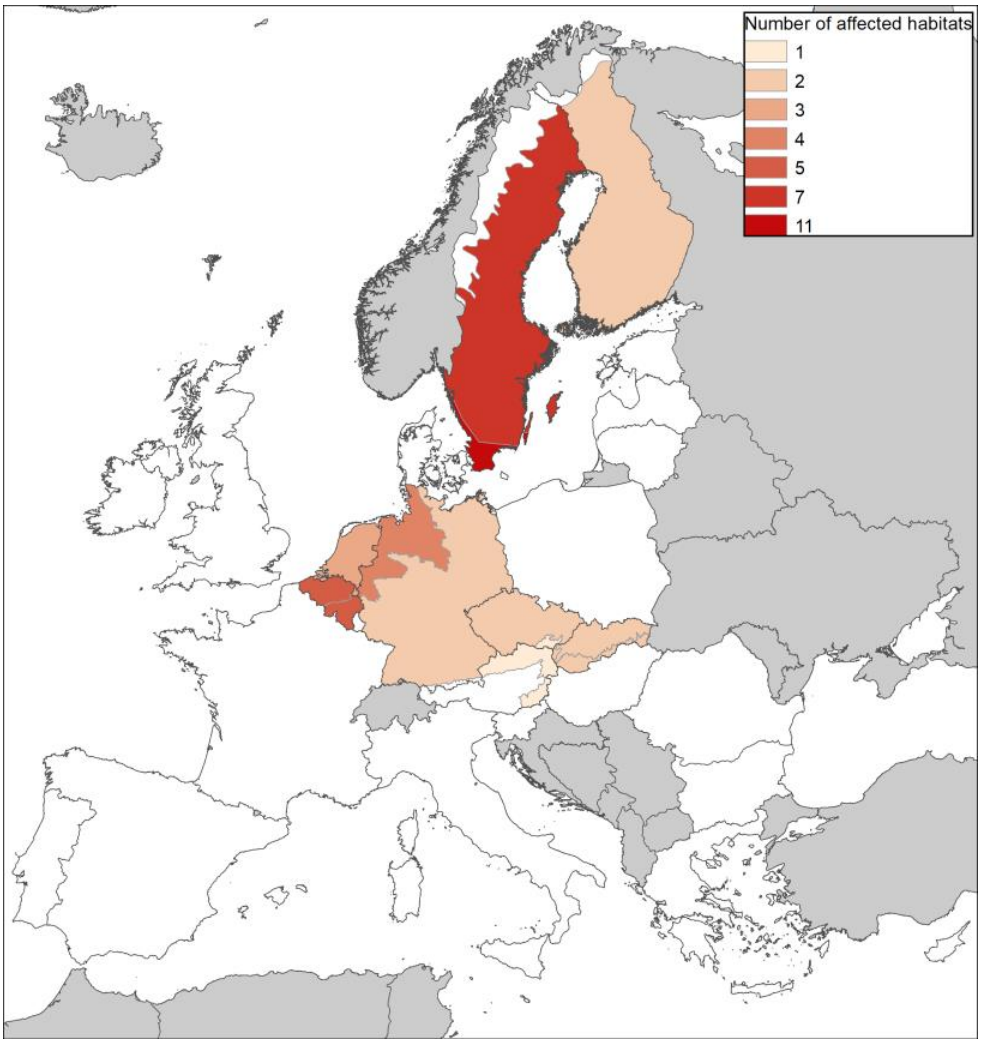

Fig. 4.19: Number of grassland habitats under pressure of the nitrogen deposition

The hotspots of the pressures caused by the intensive agriculture to the grassland habitats were mapped especially in Belgium, Netherlands, Czech Republic and north Germany (Fig. 4.20). In Sweden and Slovakia is this pressure scattered. Only eight countries reported this pressure. Probably the impact of nitrogen deposition to grassland habitats is either not sufficiently recognised or it really absents/is low in most of countries.

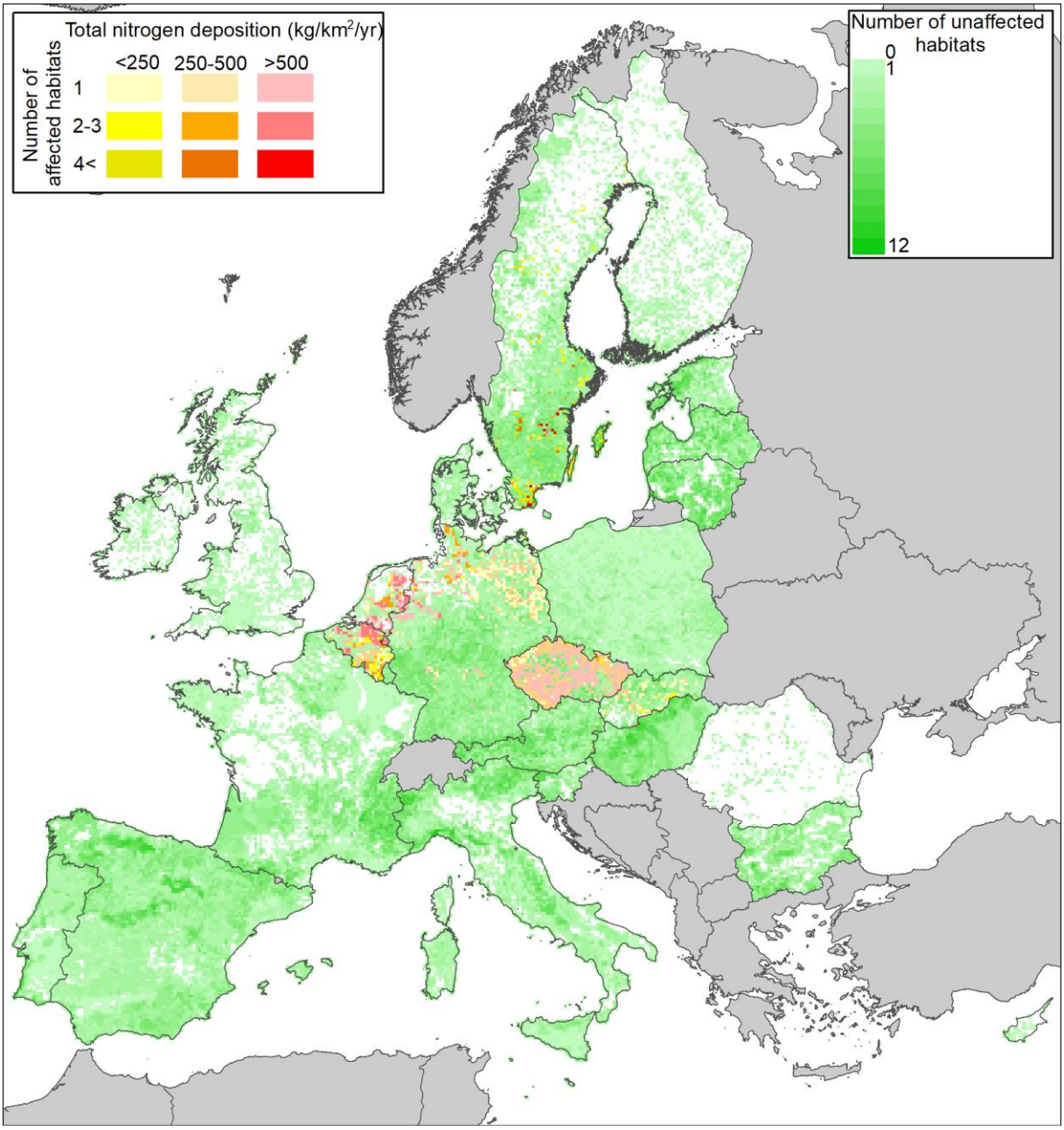

Fig. 4.20: Distribution of nitrogen deposition pressures affecting grassland habitats

5 Conclusions

The approach used and described in this report proved to be useful for mapping of hotspots of the pressures to grassland habitats that are listed in the Annex I of the Habitats Directive. Using ancillary data – maps of pressures distribution – we were able to overcome limitations of previous approach that was based solely on Article 17 data. The resulting maps are stored as GIS data layers and they could be used for further analyses.

The quality of the ancillary data has a determining influence on the accuracy of the spatial distribution of pressures. Further refinement and regular update of the pressures maps in the future will allow more precise mapping of pressures to habitats and assessment of their changes.

Besides ancillary data, also quality and consistency of pressures reporting by Member States is crucial for mapping of the pressures hotspots. If the Member State does not report specific pressure, it is not mapped in the resulting map in his territory. The knowledge could be in this respect limiting factor – both knowledge of habitats distribution and the knowledge of pressures affecting habitats. There are still problems related to interpretation and classification of some habitat types, their identification in the field and mapping. Thus, distribution maps could be incomplete. Also not sufficient knowledge of pressures effect could be reason for some discrepancies between the pressures distribution and their reporting by Member States. These discrepancies could be explained in some cases by spatial dislocation of pressures and habitats: the pressure is operating in the grid cell where the habitat occurs, but not in the habitat area (because of spatial resolution 1x1 km, such situation is possible). Other explanation could be certain resistance of the habitat to pressure, but such situation is not common. And further explanation could be lack of pressures knowledge in (some) Member Countries – this factor could be improved in the future.

In some cases also the improvement of the reporting methodology can increase consistency and usefulness of pressures reporting. For the next round of the Article 17 reporting the list of pressures was modified and hopefully it will be better related to the main pressures to habitats. It is necessary to avoid situation that we faced in this assessment when some pressures cannot be identified from Article 17 reports, because of the reporting level used by some countries (2^{nd} level is not sufficient for identification of some pressures).

Similar procedure as used in this document for group of habitats could be used to map pressure hotspots to single habitat or species or for group of species. We consider this approach useful also in relation to planning of measures for the habitat management. But when interpreting resulting maps, it is necessary to consider limitations of these maps originating from both a way of the pressures reporting by Member States and data and methods used for pressures mapping by ETC SIA and IES UA.

6 References

Bobbink, R., Hettelingh, J., 2010: Review and revision of empirical critical loads and dose-response relationships. Proceedings of an expert workshop. Noordwijkerh- out 23-24 June 2010, Bilthoven, the Netherlands, RIVM.

EEA, 2015a: European Ecosystem Assessment – Concept, Data, and Implementation. – EEA, Copenhagen, 70 pp.

EEA, 2015b: State of nature in the EU: Results from the reporting under the Nature Directives 2007–2012. - EEA Technical report No 2/2015. European Environment Agency, Copenhagen, 178 pp. - http://www.eea.europa.eu/publications/state-of-nature-in-the-eu

EEA, 2016: Mapping and assessing the condition of Europe's ecosystems: progress and challenges. EEA contribution to the implementation of the EU Biodiversity Strategy to 2020. - EEA Report 3/2016, 148 pp.

ETC SIA, 2014a: Assesment of European Ecosystem pressures – Concept, data, and Methodology. – ETC SIA, Malaga, 25 pp.

ETC SIA, 2014b: Indicators to assess major pressures on grasslands and scrubland ecosystems in Europe. – ETC SIA, Malaga, 21 pp.

ETC SIA, 2014c: Nutrient enrichment and pollution related pressures on agricultural, grassland, heathland and forest ecosystems. – ETC SIA, Malaga, 17 pp.

Halada, Ľ., Lieskovský, J., Condé, S., 2016: Methodological note and tests of mapping of pressure hotspots on EU grasslands. – ETC BD report, 47 pp.

IES UA, 2017: Agricultural land use intensity data. – IES UA, Amsterdam, 5 pp. - http://www.ivm.vu.nl/en/Organisation/departments/spatial-analysis-decision-support/ag-intensity/index.aspx

Temme, A.J.A.M, Verburg, P., 2011: Mapping and modelling of changes in agricultural intensity in Europe. Agriculture, Ecosystems and Environment 140, 1-2: 46 - 56.

Appendix 1: HD Annex I habitats classified as grasslands by the MAES typology

Code	Habitat name
1340	Inland salt meadows
1510	Mediterranean salt steppes (Limonietalia)
1530	Pannonic salt steppes and salt marshes
2120	Shifting dunes along the shoreline with Ammophila arenaria ("white dunes")
2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")
21A0	Machairs (* in Ireland)
2220	Dunes with Euphorbia terracina
2230	Malcolmietalia dune grasslands
2240	Brachypodietalia dune grasslands with annuals
2330	Inland dunes with open Corynephorus and Agrostis grasslands
6110	Rupicolous calcareous or basophilic grasslands of the Alysso-Sedion albi
6120	Xeric sand calcareous grasslands
6130	Calaminarian grasslands of the Violetalia calaminariae
6140	Siliceous Pyrenean Festuca eskia grasslands
6150	Siliceous alpine and boreal grasslands
6160	Oro-Iberian Festuca indigesta grasslands
6170	Alpine and subalpine calcareous grasslands
6180	Macaronesian mesophile grasslands
6190	Rupicolous pannonic grasslands (Stipo-Festucetalia pallentis)
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
6220	Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea
6230	Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)
6240	Sub-Pannonic steppic grasslands
6250	Pannonic loess steppic grasslands
6260	Pannonic sand steppes
6270	Fennoscandian lowland species-rich dry to mesic grasslands
6280	Nordic alvar and precambrian calcareous flatrocks
62A0	Eastern sub-Mediterranean dry grasslands (Scorzoneratalia villosae)
62B0	Serpentinophilous grasslands of Cyprus
62C0	Ponto-Sarmatic steppes
62D0	Oro-Moesian acidophilous grasslands
6310	Dehesas with evergreen Quercus spp.
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)
6420	Mediterranean tall humid grasslands of the Molinio-Holoschoenion
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
6440	Alluvial meadows of river valleys of the Cnidion dubii
6450	Northern boreal alluvial meadows
6460	Peat grasslands of Troodos
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)
6520	Mountain hay meadows
6530	Fennoscandian wooded meadows
9070	Fennoscandian wooded pastures

Appendix 2: Number of habitats affected by pressures in the Article 17 reporting units

Country	BGR	No of habitats	Abanon-ment	Intesifi-cation	Habitat loss	Land take	Nitrogen deposition	Nitrogen polution
Austria	ALP	12	8	6	1	6		5
Austria	CON	15	11	7	1	7	1	6
Belgium	ATL	10	3	4	4	8	5	2
Belgium	CON	10	2	7	4	10	5	1
Bulgaria	ALP	12	5	11	6	11		
Bulgaria	BLS	11	2	**9**	8	11		
Bulgaria	CON	19	6	19	14	18		
Cyprus	MED	4	1	1	1	3		
Czech Republic	CON	13	8	5		7	2	3
Czech Republic	PAN	12	7	4		5	1	2
Denmark	ATL	7	5	5		2		4
Denmark	CON	9	7	7		2		6
Estonia	BOR	11	9	4		7		4
Finland	ALP							
Finland	BOR	13	11		2	1	2	
France	ALP	11		6		5		6
France	ATL	13		7		13		7
France	CON	13		10		7		9
France	MED	15		6		11		6
Germany	ALP	6	2	5				5
Germany	ATL	14	10	6	1	2	4	5
Germany	CON	16	10	6	1	3	2	6
Hungary	PAN	13	9	6	3	7		1
Ireland	ATL	9	6	6	1	4		3
Italy	ALP	12	7	9		12		9
Italy	CON	18	2	3		18		2
Italy	MED	16	1	2		15		2
Latvia	BOR	12	10		2	1		
Lithuania	BOR	12	11	3		10		3
Luxembourg	CON	6	4	5		1		5
Malta	MED	3	1			2		
Netherlands	ATL	11	7	4		4	3	1
Poland	ALP	7	2	2		1		2
Poland	CON	16	3	1		8		1
Portugal	ATL	8	3	1		4		
Portugal	MAC	2				2		
Portugal	MED	14	6	4		9		
Romania	ALP	10		7	2			
Romania	BLS	7		2	1	4		
Romania	CON	10		5	3	3		
Romania	PAN	5		3	2			
Romania	STE	6		3	1	2		
Slovakia	ALP	10	4			5	2	
Slovakia	PAN	10	5		2	4	2	
Slovenia	ALP	9	6	7	2	4		3

Country	BGR	No of habitats	Abanon-ment	Intesifi-cation	Habitat loss	Land take	Nitrogen deposition	Nitrogen polution
Slovenia	CON	7	5	6	2	1		3
Spain	ALP	11	3	5		8		3
Spain	ATL	13	4	3	1	12		2
Spain	MAC							
Spain	MED	16	3	5		15		3
Sweden	ALP	7	7			4		
Sweden	BOR	15	13			6	7	
Sweden	CON	11	10	7		2	11	7
United Kingdom	ATL	14		4		3		4
United Kingdom	MED	2				1		