JRC Scientific and Technical Reports

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EUR 23480 EN - 2008

JRC EUROPEAN COMMISSION

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JRC 47063

EUR 23480 EN
ISBN 978-92-79-09568-9
ISSN 1018-5593
DOI 10.2788/8891

Luxembourg: Office for Official Publications of the European Communities

Printed in Italy

Cover photo: courtesy of Markku Siitonen

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Acknowledgements

The authors wish to thank for their contribution to the report:

- Ali Gül for his work on geo-referencing Prime Butterfly Areas and description of the methodology in chapter 2.4.3;
- Dominique Richard and Sophie Conde from the European Topic Centre on Biological Diversity for the analysis of Natura 2000 sites (chapter 2.4.1);
- Ľuboš Halada, Carlos Romao and Doug Evans from the European Topic Centre on Biological Diversity for analysis of Annex I. habitats that depend on extensive agricultural practices (Appendix III) and for writing the main part of chapter 2.4.1;
- Ľuboš Halada, Peter Gajdoš, Marie-Paule Vignault, Dominique Richard and Doug Evans from the European Topic Centre on Biological Diversity for the analysis of taxonomic species groups of European interest in the identification of HNV farmland areas (Appendix V);
- Gebhard Banko, Elisabeth Schwaiger and Ingrid Roder from the European Topic Centre on Land Use and Spatial Information for their contribution in chapter 3.2 - Estimating the share of HNV farmland in farmed area, and Appendix X;
- Dobromil Galvanek for Appendix IX on Important Plant Areas;
- For their help with data on Important Bird Areas: Mark Balman, Frans van Bommel, Ariel Brunner, Szabolcs Nagy, Dan Omolo and Rob Pople (BirdLife International); Ian Fisher, Katrina Marsden and Fiona Sanderson (RSPB); Martin Hellicar and Michael Miltiadou (BirdLife Cyprus); Jane Feehan (EEA); Gregoire Lois (ETC-BD); and Rainer Oppermann (IFAB);
- All the national experts that contributed to workshops and provided methodological advice.

A special thank you goes to Katarzyna Biala for her contribution in the organisation of the meetings at JRC, and to Marc Metzger for providing the Environmental Stratification of Europe.

1. Introduction

1.1 Development of EEA/JRC work on HNV farmland

Europe's agricultural landscapes provide highly varied living conditions for many plants and animals. Baldock *et al.* (1993) and Beaufoy *et al.* (1994) described the general characteristics of low-input farming systems in terms of biodiversity and management practices and introduced the term *high nature value farmland*. Typical high nature value (HNV) farmland areas are extensively grazed uplands, alpine meadows and pasture, steppic areas in eastern and southern Europe and dehesas and montados in Spain and Portugal. Certain more intensively farmed areas in lowland western Europe can also host concentrations of species of particular conservation interest, such as migratory waterfowl.

The need for measures to prevent the loss of high nature value farmland is widely acknowledged. Conservation of biodiversity on agricultural land is an explicit objective of the Pan-European Biodiversity and Landscape Strategy (PEBLDS), the Bern Convention, the European Landscape Convention, and, at EU level, the Habitats and Birds Directives and Rural Development Policy (Community Strategic Guidelines for Rural Development, Programming Period 2007-2013). In its 6th Environment Action Programme, the EU committed itself to halting biodiversity decline by 2010. Conserving High Nature Value farmland is key to achieving this 2010 biodiversity target. Pan-European data on distribution and conservation status of HNV farmland, however, were largely lacking. In their 2003 'Kyiv' declaration, the European Environment Ministers have therefore set the goal to fill this data gap and take adequate conservation measures.

In support of this policy process, EEA and UNEP published a Joint Message (EEA 2004), presenting a preliminary map of HNV farmland and analysing the targeting of agricultural policy instruments. The Joint Message used the concept as developed by Andersen *et al.* (2003) that describes HNV farmland as: "*Those areas in Europe where agriculture is a major (usually the dominant) land use and where that agriculture supports, or is associated with, either a high species and habitat diversity or the presence of species of European conservation concern, or both.*"

As biodiversity data were not sufficiently available at European level, the Andersen *et al.* study proposed two proxy approaches for identifying HNV farmland, based on land cover data (the CORINE data base) and farm system data (derived from the Farm Accountancy Data Network - FADN). Land cover data are considered to provide currently the best proxy information on the distribution pattern of HNV farmland, whereas farm system data give information about the types and characteristics of the farms concerned and their estimated share of the agricultural sector. These two approaches were combined to develop an EU agri-environment indicator on HNV farmland under the IRENA operation (EEA, 2005)

Feedback from experts and countries showed that refinement of the methodology for identifying HNV farmland was needed, and therefore EEA and JRC updated the land cover based assessment in 2005 to 2007 (the farm system data were not included in this updating exercise). This updating necessitated further specification of the criteria applied in the land cover approach on the basis of biological knowledge and data. To support this work three regional workshops for Southern, Western and Eastern Europe were organised by the JRC, and national experts were invited to improve the methodology at regional and national level. A draft of the improved mapping exercise was discussed at a European expert meeting at the EEA and underwent a formal country consultation via the EEA EIONET. The preliminary result was published in the Belgrade report (EEA 2007) as an input into the Pan-European conference of environment ministers in Belgrade (10-12 October 2007). The 'Belgrade map' has been further enhanced

with national and European biodiversity data sets and is presented here as the updated European dataset on the distribution[1] of HNV farmland.

1.2 Objective and rationale

The aim of estimating HNV farmland distribution at European level according to a standardised method is primarily to gain insight into the current status, as well as enabling analysis of European trends and targeting of relevant policy instruments, such as agri-environment schemes and Less Favoured Area (LFA) support. In order to increase accuracy, the preliminary map, published in the EEA/UNEP Joint Message (EEA 2004), was updated and refined on the basis of new land cover data, refined and regionally differentiated selection criteria, and additional biodiversity datasets.

It should be stressed that the result is not intended nor suitable for evaluating the impact of rural development measures at national or regional level. DG Agriculture and Rural Development commissioned a study in 2006 for developing guidance on the design and implementation of an indicator on high nature value farming and forestry systems (as well as traditional agricultural landscapes) for use under the EU Common Monitoring and Evaluation Framework (CMEF) for the evaluation of EU rural development programmes. The results of that study have been published on the website of DG Agriculture (http://ec.europa.eu/agriculture/analysis/external/evaluation/index_en.htm).

The analysis presented in this report builds on a revised definition of the three types of HNV farmland that were proposed in 2004:

Type 1 - Farmland with a high proportion of semi-natural vegetation.

Type 2 - Farmland with a mosaic of low intensity agriculture and natural and structural elements, such as field margins, hedgerows, stone walls, patches of woodland or scrub, small rivers etc.

Type 3 - Farmland supporting rare species or a high proportion of European or World populations.

Areas of the first type are generally very species-rich, by definition require extensive agriculture for their maintenance and have a well-recognised conservation value. The second type is defined because small-scale variation of land use and vegetation and low agricultural inputs are generally associated with relatively high species richness. The farmed habitats within this type may not necessarily qualify as semi-natural, but the management should be sufficiently extensive to allow for floristic variation. The third type is defined because locally more intensive farming systems may also support high concentrations of species of conservation concern. The three types are not mutually exclusive. Semi-natural grasslands as a rule support many rare species and would thus also qualify as type 3. To a lesser extent the same is true for the mosaics of type 2. In addition, the farmed habitats in type 2 may be partially semi-natural and thus qualify as type 1. Common to all types should be a high contribution to biodiversity conservation at the European level.

The overall mapping effort is based as much as possible on existing Europe-wide datasets and consistent selection rules. To improve accuracy, a panel of European experts has reviewed both the selection rules, as well as the corresponding maps. The methodology as it is applied provides consistent results across Europe and the possibility of an update when new data and updates become available. Still, it provides at best a proxy distribution and has different types of uncertainty in the various parts of Europe. More

[1] Please note that this assessment is essentially a momentary 'snap-shot' and subject to further improvement and updating.

precise mapping can be carried out only on the basis of (further) national datasets and/or by including information on farming systems and practices.

2. Methodology

2.1 Introduction

The identification of HNV farmland in the approach was carried out in incremental steps, each refining the level of information from previous steps. Regularly updated EU wide datasets were used in order to harmonize the procedure across Europe and ensure that it can be repeated. This decision also has drawbacks, since there are characteristics of HNV farmland that cannot be identified at EU level (mainly for lack of data), such as the differentiation of land cover classes by intensity of management. In a number of cases the Europe-wide exercise could be augmented with national data, allowing a more precise identification of HNV farmland within the overall conceptual framework.

The basic mapping steps are the following:

1) selection of relevant land cover classes in the different environmental zones in Europe
2) refinement of the draft land cover map on the basis of additional expert rules (e.g. relating to altitude, soil quality) and country specific information
3) addition of the biodiversity data layers with European coverage
4) addition of national biodiversity data sets
5) upscaling of original data to a suitable level of detail in order to provide a harmonized result

The basis of the mapping exercise is provided by the CORINE Land Cover (CLC) map for the year 2000 (EEA 2005) and the Environmental Stratification of Europe (Metzger *et al.* 2005). The CORINE classification is rather coarse (for example it does not allow for the distinction between intensively and extensively used grasslands) and its most detailed resolution does not go below 25 ha units. The selection criteria are differentiated per environmental zone and refined on the basis of information on altitude, soil quality, steepness of slope etc. Additional information is used on the distribution of relevant species related to farmland, particularly regarding HNV farmland types 1 and 3.

The land cover approach adopted for HNV type 1 (and partly type 2) allows an approximation of the localisation of semi-natural vegetation, and to smaller degree of mosaics of low-intensity agriculture.

In order to cover HNV type 3, information is needed on the location of farmland which supports rare species or a high proportion of European or World populations. This is gathered from various sources:

- ***NATURA 2000 network***, which provides information on protected sites that support rare, endangered or vulnerable natural habitats and species of plants or animals (areas designated under the Habitats Directive) and areas supporting significant numbers of wild birds and their habitats (protected sites designated under the Birds Directive)
- ***Important Bird Areas (IBAs)***, which provide information on significant populations of one or more globally or regionally threatened, endemic or congregatory bird species, or highly representative bird assemblages. Data are compiled by BirdLife International and Partners. Important Bird Areas are identified on the basis of standard criteria agreed by the international BirdLife network. In Europe, the criteria take into account the requirements of regional

conservation treaties such as the Emerald Network under the Bern Convention, the Helsinki Convention, the Barcelona Convention, as well as the Wild Birds Directive of the European Union.

- ***Prime Butterfly Areas (PBAs)*** (Van Swaay and Warren 2003), which are an initial selection of important butterfly areas in Europe, focussing on target species that are conservation priorities across the European continent, and including both marginal and core populations.
- ***National biodiversity datasets*** (when made available and suitable for inclusion). These refer mainly to national inventories of agricultural biotopes or semi-natural grasslands (e.g. in the Czech Republic, Sweden, Estonia, Lithuania and England). These have been added where national patterns of HNV farmland could not be captured by the presented land cover approach. An example of this is the parcels of semi-natural grasslands scattered through forested environments in the Nordic countries.

These databases required some analysis because none of them was created for the purpose of identifying HNV farmland areas. Therefore the designated areas have been re-selected on the basis of subsets of habitats (NATURA 2000 – Annex I) and species (IBAs and PBAs), that are considered indicative of high nature value farmland. Birds and butterflies were chosen because IBA and PBA data are harmonised according to common European criteria. Furthermore, the dependence on agriculture of both species groups is very different and acts at different spatial scales, and both groups are somewhat complementary. Plant species are currently not covered in the species list since a habitat approach was considered preferable to a selection procedure based on individual species. With regard to other taxonomic groups, information on mammals would be particularly relevant. However, relevant species distribution data with European coverage are not available. The Habitats Directive lists (non-bird) species, for which special areas of conservation need to be designated (HD Annex II) or that require strict protection (HD Annex IV). These can in principle also be used to identify HNV farmland areas. Appendix V presents a proposed selection of relevant animal and plant species from Annexes II and IV of the Habitats Directive. Due to data and time constraints the corresponding sites have not been included in the current HNV farmland map.

Data from the Important Plant Areas programme (see Appendix IX) were not used in the study. Nevertheless, such data are relevant for the identification of HNV farmland and can be included in the mapping exercise when available for a sufficient number of countries. The Important Plant Areas programme is promoted and coordinated by PlantLife, an international NGO also acting as a secretary to the Planta Europa network. Its aim is to identify the very best sites for plants across the continent of Europe, and to provide a network of sites within each European biogeographic zone, that are critical for the long-term viability of naturally occurring wild plant populations. With support from national agencies as well as private funds, IPA inventories have been compiled in the following countries: Romania, Bulgaria, Czech Republic, Estonia, Poland, Slovenia and Slovakia.

2.2 Selection of land cover classes

The regional differentiation of land cover classes in the different environmental zones in Europe is based on CORINE 2000 (Figure 1) and the Environmental Stratification of Europe Version 6 (Metzger *et al.,* 2005; Jongman *et al.*, 2006 – Figure 2), that drives the selection of land cover classes where HNV farmland may be expected.

For each combination of country and environmental zone, CLC classes are identified (the nomenclature is listed in Appendix II) that are likely to contain *primarily* HNV land. This reflects the fact that due to environmental characteristics and management practices a CLC class (i.e. "land principally occupied by agriculture") can greatly differ across countries and environmental zones in terms of its link to HNV farmland.

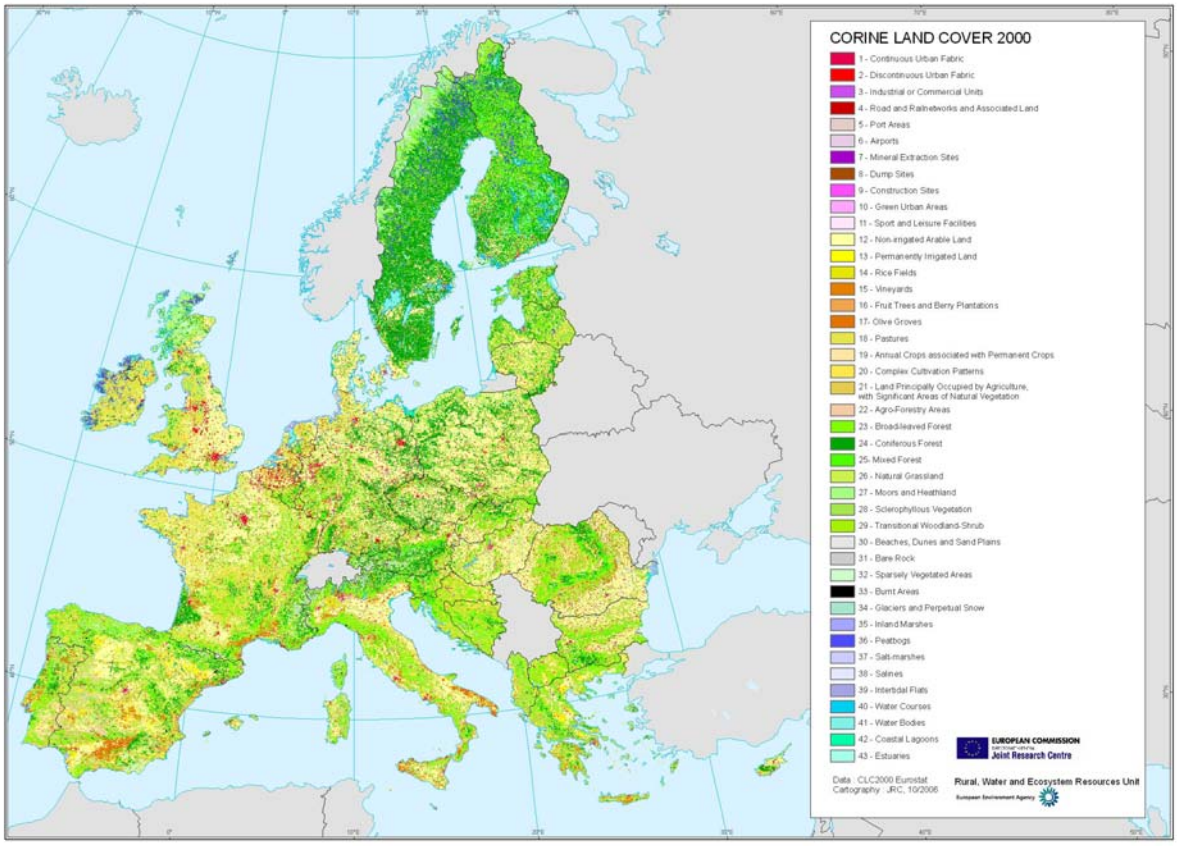


Figure 1 – CORINE 2000

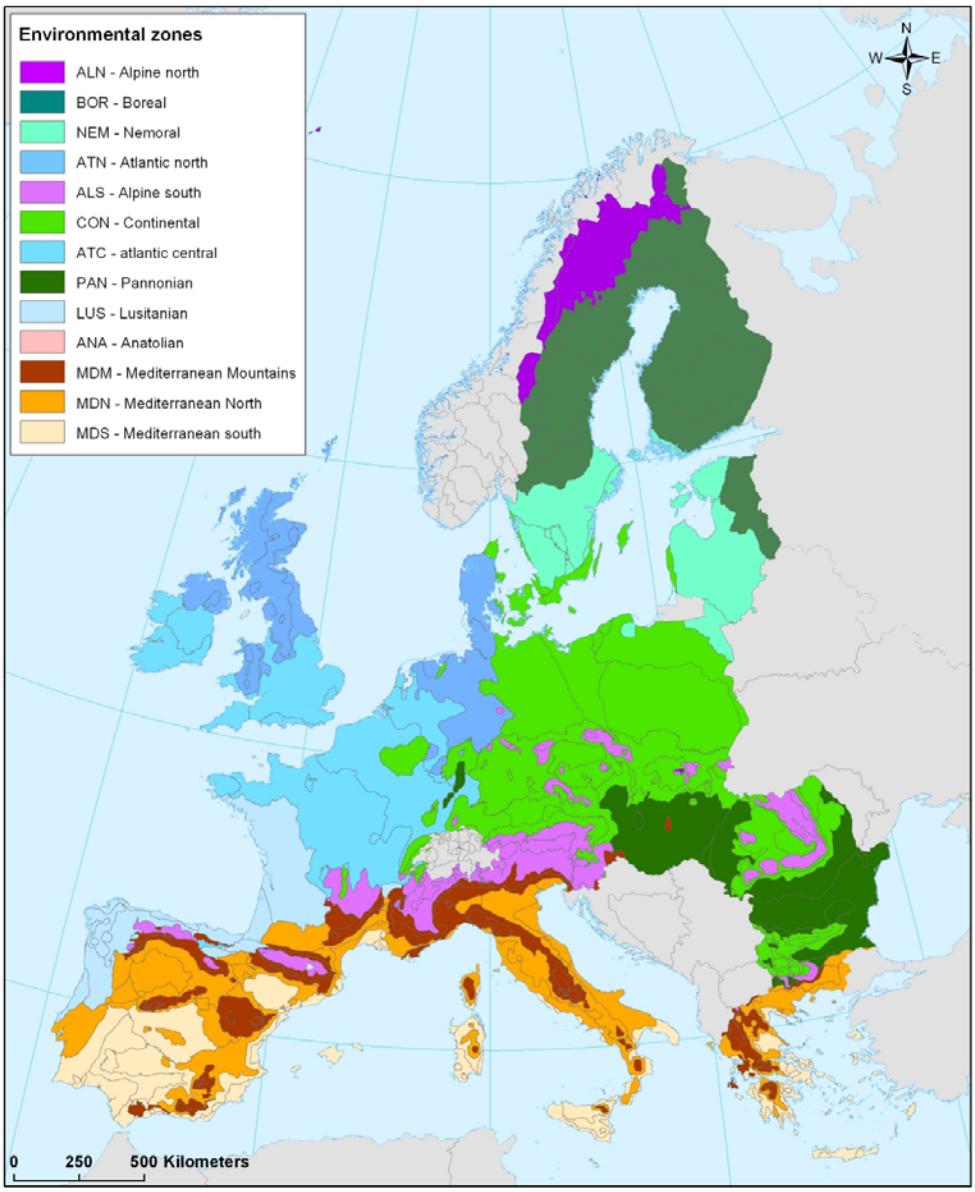


Figure 2 – Environmental Stratification of Europe (Version 6.0)

Re-selection rules for CLC classes per country and environmental zone are based on expert knowledge gathered through direct consultation during general meetings, regional workshops and via email consultation. An example is shown in Table 1, all resulting tables are listed in Appendix II.

Table 1 – Example of CLC re-selection table for Greece. Selected classes are highlighted in green.

CLC	3digits-CLC-codes	Alpine South	Med North	Med Mountains	Med South
Non-irrigated arable land	211	0	0	0	0
Permanently irrigated land	212	0	0	0	0
Rice fields	213	213	213	213	213
Vineyards	221	0	0	0	0
Fruit trees and berry plantations	222	0	0	0	0
Olive groves	223	0	0	223	0
Pastures	231	231	231	231	231
Annual crops associated with permanent crops	241	0	241	241	241
Complex cultivation patterns	242	0	0	242	0
Land principally occupied by agriculture	243	243	243	243	243
Agro-forestry areas	244	244	244	244	244
Natural grasslands	321	321	321	321	321
Moors and heathland	322	322	322	322	322
Sclerophyllous vegetation	323	0	323	323	323
Transitional woodland/shrub	324	0	0	0	0
Sparsely vegetated areas	333	0	0	0	0
Inland marshes	411	411	411	411	411
Peat bogs	412	0	0	0	412
Salt marshes	421	0	421	421	421

2.3 Expert rules and country-specific information

Though the methodology presented so far is constructed in a way to ensure a differentiated but consistent approach throughout Europe, exceptions and derogations have been introduced. These are necessary when the internal variation within a land cover class (often due to the large extension of an environmental zone) is so great that the class contains HNV farmland only in some parts of the environmental zone. During the revision process the national experts also provided comments on the Environmental Stratification. This contains some artefacts in individual areas due to the data analytical procedure applied; comments have been referred back to the authors of the map.

One of the major limitations of the present approach is that it does not explicitly take into account the intensity of management of grassland/pastures in particular and of arable land and permanent crops in general. Two different methods have been tested as a first approach to solve this issue.

a) The first one is based on the information provided by an expert system for soil suitability for various crops. This was obtained in the frame of a study carried out by INRA (Institut National de la Recherche Agronomique) for JRC (unpublished results), in which the ESCAPE (Expert System for Constraints to Agricultural Production in Europe) methodology was applied. It assumes that there are agronomical constraints that drive suitability for specific cultivations, and that those related to soils (information per soil typological unit on soil water regime, dominant slope, depth of an obstacle to roots, topsoil available water capacity, volume of stones - see Soil Map of Europe 1:1 000 000) can be represented as constraints to mechanisation, so that it is possible to classify areas as suitable / acceptable / not suitable for ploughing, mowing or grazing. It is assumed that the possibility of carrying out mechanical cultivation indicates the presence of temporary pastures and/or permanent grassland under medium to intensive management practices in most environmental zones. Therefore the CLC classes 231 (Pastures) and 321 (Natural grasslands) falling in such categories of soil suitability can be removed where the likelihood of intensive management is high.

Due to the detail of the Soil Map of Europe this criterion proved to be not sufficiently reliable in mountainous areas, where changes in relief are not captured by the resolution of the map. However, in

relatively flat areas the correction can be more successfully applied, such as in the western part of France (Lusitanian zone).

b) The use of national information constitutes the second approach and led to the following corrections:

- Ireland: distinction between raised and blanket bogs. Blanket bogs are in almost all cases grazed by domestic stock whereas this is not the case for raised bogs (apart from in very exceptional cases). The distinction between these two types of bogs is done on the basis of a map showing the main types of bogs in Ireland, provided by the National Parks and Wildlife Service, and published in "Peatlands, Wasteland or Heritage" (1989).
- Scotland: significant areas of Scotland are not used for agriculture but rather for 'deer forest' (areas set aside as hunting reserves for wild red deer) and [red] grouse moors. Using the CLC approach these are in practice indistinguishable from areas where these activities are combined with or replaced by extensive livestock grazing. In order to remove this not negligible area, data from the Scottish LPIS (Land Parcel Identification System) database were obtained from the Scottish Executive Environment and Rural Affairs Department, and their limits have been used to identify the agricultural surface.
- The Netherlands: grasslands on peat soils are identified separately and included in the map; this allows the mapping of areas of wet grassland on peat soils that also contain some areas for wintering and breeding birds and are often characterised by the presence of landscape elements.
- Germany: the country is a particular case, since the base methodology proved not to be adequate for identifying HNV farmland areas in German landscapes. Therefore a different approach was adopted, based on the Map of Landscape Types in Germany (Federal Agency for Nature Conservation, 2004). The map contains a classification of landscapes according to their value for the evaluation of conservation importance. The first three classes in conservation importance were retained as a mask in the mapping and land cover classes re-selected accordingly.
- France: traditional orchards have been mapped following a separate procedure. This land use is often mapped in CORINE in the "pastures" class, since traditional orchards are grazed and the signal of herbaceous vegetation is prevailing in the satellite images used to derive the CLC map. In order to distinguish the pastures corresponding to the "pré-vergers", external information has been used, namely the digital map of traditional orchards per French commune made available to JRC through the study "Validation and Improvement of High Nature Value Farmland Identification" (Pointereau *et al.*, 2007).
- Spain: class 323 (broadleaved forest) is added in the NATURA 2000 and IBA sites in the South-East part of the Mediterranean South zone, to include areas of grazed forest.
- Italy: class 242 (complex cultivation patterns) is retained above 700 m in the Northern zone of Mediterranean Mountains.
- Ireland and United Kingdom: class 333 (sparsely vegetated areas) is mapped above 500 m only.
- Slovenia: class 242 (Complex Cultivation Patterns) is excluded in lowlands (where height < 350 m and slope < 2%).
- Bulgaria: class 321 (natural grassland) not mapped above 1800 m
- Slovakia: CLC selection not mapped above 1400 m
- Romania: the Danube Delta is excluded from the selection of agricultural classes.

The revised methodology described above leads to the result shown in Figure 3 (example for Spain), which maintains the original CORINE resolution of 100 m.

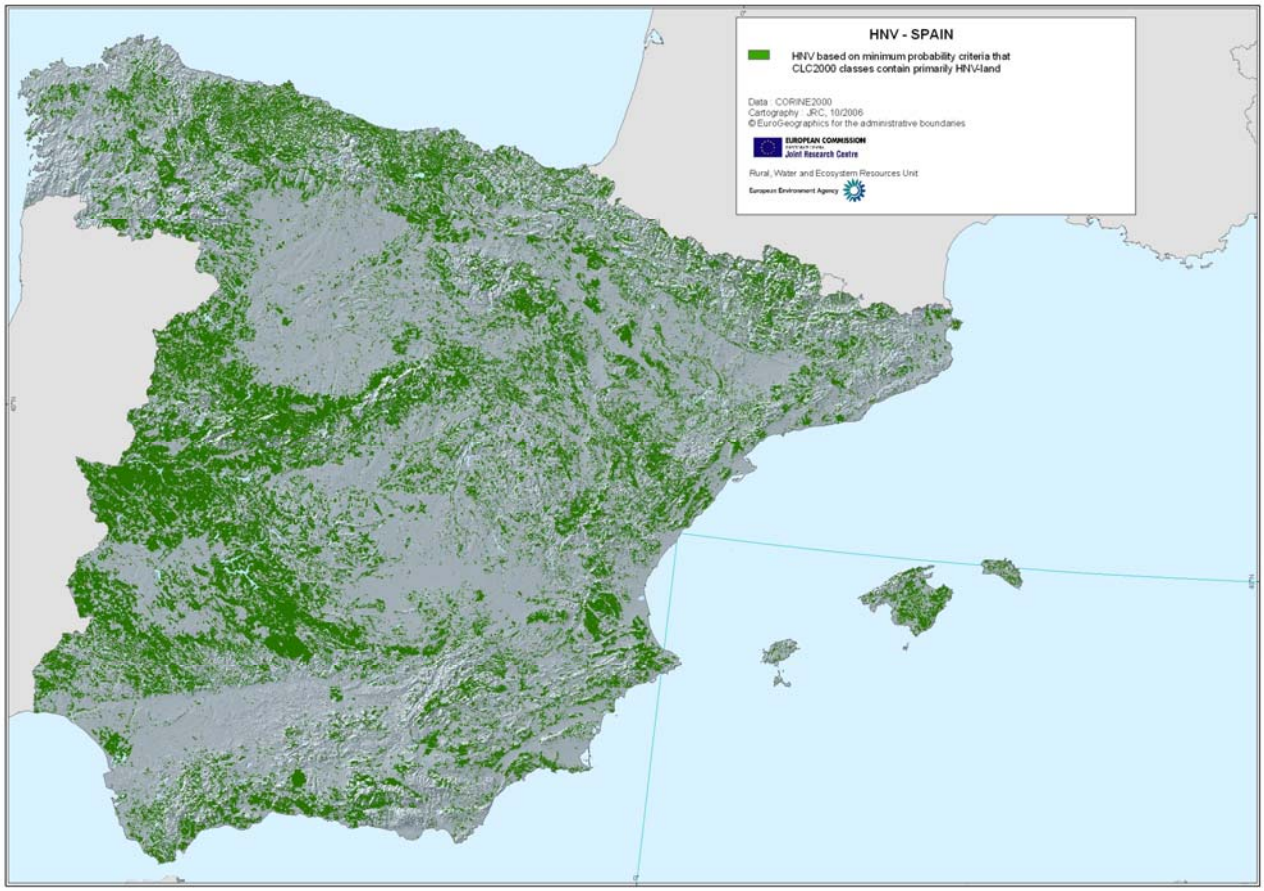


Figure 3 – Spain: potential HNV farmland according to minimum CORINE 2000 selection

2.4 Biodiversity data layers with European coverage

2.4.1 Natura 2000

Natura 2000 is the centrepiece of EU nature and biodiversity policy. It is an EU-wide network of protected sites aiming to assure the long-term survival of Europe's most valuable and threatened species and habitats. The legal basis for the Natura 2000 network comes from the Birds Directive (79/409/EEC) and the Habitats Directive (92/43/EEC). Their Annexes contain habitats and species of European importance. Based on the distribution of these species and habitats, a selection of representative sites is proposed by the Member States for further designation and appropriate management.

Data on Natura 2000 sites are stored in the Natura 2000 database, managed by the European Topic Centre on Biological Diversity (ETC BD). The Natura 2000 database contains standardised data on i) sites designated as Special Protection Areas (SPA) under the Birds Directive (EU-25); ii) sites designated as Sites of Community Interest (SCI) under the Habitats Directive (EU-25); iii) sites proposed as Sites of Community Interest (pSCI) under the Habitats Directive (EU-27).

Because the Natura 2000 database represents an EU-wide source of standardised, geographically located information on habitats and species, it has also potential to contribute to the identification of HNV

farmland areas. It can help to detect especially HNV farmland areas of type 1 (farmland with high proportion of semi-natural vegetation) on the basis of the habitat data and type 3 (farmland supporting rare species or a high proportion of European or World populations) using species data.

In order to use the Natura 2000 database for the HNV farmland area project, the following steps had to be taken:

- Identification of species and habitats that require/prefer (extensive) agricultural management.
- Selection of sites that host such species and habitats.
- Extraction of relevant data from the Natura 2000 database and their utilization in the project.

Selection of Habitats

Ostermann (1998) analysed 198 habitat types listed in Annex I of the Directive 92/43 (Habitats Directive) and in two tables he identified 28 "habitat types of the Habitats Directive, whose Favourable Conservation Status is likely to be threatened by the abandonment of rural practices" and 29 habitat types "which are likely to have their origin in rural practices". These tables contain together 43 Annex I habitat types, and the former is often called the "Ostermann list".

The Ostermann list has commonly been used for the identification of the Annex I habitats related to agricultural activities in different studies, prepared by different authors and organisations (Andersen et al., 2003; EEA/UNEP, 2004). However, several problems were reported on the use of this list, with some missing habitats and others improperly included. Moreover, the Ostermann list was prepared for the EU-15 and there was a need to update it taking into account the addition of new Annex I habitats following the enlargement process in 2004 (the analysis was done for the EU-25). The 224 habitat types of the Habitat Directive's Annex I were therefore analysed again for this study with the aim to select those that meet one of the following criteria:

- their existence depends on the continuation of agricultural activities;
- their existence is prolonged via blocking or reducing succession processes through agricultural activities;

The term 'agricultural activities' refers especially to grazing and mowing in this context. The resulting selection is presented in Appendix III and contains those habitats of the Habitats Directive that depend on, or are associated with, extensive agricultural practices. The list relies inevitably on some subjective decisions: relevant information does simply not exist for all habitats across their range in Europe. However, the proposals by EEA and ETC BD experts were carefully checked with biodiversity specialists in different parts of Europe.

Overall 53 habitat types that depend on agricultural activities or are associated with them were identified. The table in Appendix III indicates the habitats that clearly meet the criteria (44 habitat types) and those with doubts or where the relation to extensive farming practices exists only in part of their distribution area in Europe or is weaker[2] (9 habitat types). The latter ones were not considered by EEA/JRC and ETC BD when selecting relevant Natura 2000 sites. However, if the relationship between agricultural activities and the nine habitats in the second group is clearer at national level, these habitats could be taken into account for national survey activities regarding HNV farmland.

[2] Habitats of the second group profit from agricultural management because it either prolongs the habitat's existence (mainly by stopping or reducing natural succession) or enlarges/maintains the habitat distribution area.

Though not used directly in the mapping process, in the frame of this study it was felt useful to analyse the potential contribution of other taxonomic species groups of European interest in the identification of HNV farmland areas: mammals, insects (Hemiptera, Orthoptera, and Coleoptera) and plants (see Appendix V).

Site selection

From the Natura 2000 sites in the EU-25, only those have been selected for which at least one Annex I habitat type related to agricultural activities (see Appendix III) is recorded. The overall selection comprises 11 293 sites that cover a total of 534 867 km^2 in the EU-25.
Once the Natura 2000 sites had been selected, relevant agricultural areas within the site boundaries were mapped on the basis of agricultural CORINE Land Cover classes (see list presented in Appendix IV). This approach was also applied to IBAs and PBAs (see Figure 4).

Figure 4 – NATURA 2000 sites contributing to the identification of HNV farmland

The Natura 2000 sites designated under the Birds Directive (SPAs) have not been used as a direct source for HNV farmland identification, since farmland bird distribution was derived from the Important Bird

Areas database of BirdLife International (see following section), which also includes data from Bulgaria and Romania. However, in many cases SPAs have been designated on the basis of the same data source and in most countries there is a high overlap between IBAs and SPAs.

2.4.2 Important Bird Areas (IBAs)

Because biodiversity is not distributed evenly across the globe, BirdLife International has created a method of identifying the most important places on earth for birds - Important Bird Areas (IBAs) - so that conservation efforts and resources can be applied in the most cost-effective and efficient way. IBAs are places of international significance for the conservation of birds and other biodiversity and recognised worldwide as practical tools for choosing conservation priorities. IBAs are identified using standardised, agreed criteria, and together they form part of a wider, integrated approach to conservation and sustainable use.

Twenty IBA criteria have been developed for the selection of IBAs in Europe (BirdLife International, 2008). These allow the identification of IBAs, based on a site's international importance for threatened species, congregatory species, restricted-range (endemic) species, and biome-restricted species. The criteria have been developed such that, by applying different ('staggered') numerical thresholds, the international importance of a site for a species may be categorised at three distinct geographical levels: Global ('A' criteria), European ('B' criteria) and European Union ('C' criteria). Given the scope of the HNV farmland project, only sites meeting 'C' criteria were considered (see Table 2).

Table 2 - IBA 'C' criteria applied in the European Union

C1. Species of global conservation concern
The site regularly holds significant numbers of a globally threatened species, or other species of global conservation concern.
C2. Concentrations of a species threatened at the European Union level
The site is known to regularly hold at least 1% of a flyway population or of the EU population of a species threatened at the EU level (listed on Annex I and referred to in Article 4.1 of the EC Birds Directive).
C3. Congregations of migratory species not threatened at the EU level
The site is known to regularly hold at least 1% of a flyway population of a migratory species not considered threatened at the EU level (as referred to in Article 4.2 of the EC Birds Directive) (not listed on Annex I).
C4. Congregatory – large congregations
The site is known to regularly hold at least 20,000 migratory waterbirds and/or 10,000 pairs of migratory seabirds of one or more species.
C5. Congregatory – bottleneck sites
The site is a 'bottleneck' site where at least 5,000 storks (Ciconiidae) and/or at least 3,000 raptors (Accipitriformes and Falconiformes) and/or 3,000 cranes (Gruidae) regularly pass on spring or autumn migration.
C6. Species threatened at the European Union level
The site is one of the five most important in the European region (NUTS region) in question for a species or subspecies considered threatened in the European Union (i.e. listed in Annex I of the EC Birds Directive).
C7. Other ornithological criteria
The site has been designated as a Special Protection Area (SPA) or selected as a candidate SPA based on ornithological criteria (similar, but not equal, to C1–C6) in recognised use for identifying SPAs.

To date, more than 3,400 IBAs have been identified across the EU-27. Many of these were documented in the latest European IBA inventory (Heath & Evans 2000), but a significant number have been identified more recently, by BirdLife Partners in countries that have acceded to the EU since 2000, which have now published national IBA inventories applying the 'C' criteria. These inventories (and the supporting data

held in BirdLife's World Bird Database) were the basis on which the subset of sites was selected for the HNV farmland project. The boundaries of all terrestrial IBAs in the EU-27 have now been digitised by BirdLife Partners (http://www.birdlife.org/eu/pdfs/EU27%20IBA%20poster%20pdf), so it was these data (for the relevant subset of sites) that were supplied by BirdLife International for inclusion in the HNV farmland map.

The procedure used to select IBAs for inclusion in the HNV farmland map involved two main phases. *Phase I* involved producing an agreed list of HNV farmland bird species:

1. The starting point was the list of 173 European birds identified as priority species of agricultural and grassland habitats by Tucker & Evans (1997), based on their threat status and the importance of these habitats to them during their annual cycle.
2. Species that do not occur regularly in the wild in the EU-27 were excluded.
3. Species for which agricultural and grassland habitats are considered to be relatively unimportant (i.e. used by less than 10% of the European population) were excluded.
4. Species restricted to montane grasslands were excluded, on the grounds that the factors affecting this habitat type are different to those affecting other agricultural habitats (e.g. arable, steppes, wet grassland, rice cultivation, perennial crops and pastoral woodland).
5. Species listed on Annex I of the EC Birds Directive, and/or considered to have an Unfavourable Conservation Status in Europe (BirdLife International 2004), were retained.
6. Species considered to have a Favourable Conservation Status in Europe (BirdLife International 2004), but to be concentrated in Europe and have a medium or high dependence on agricultural and grassland habitats (i.e. used by more than 10% of the European population) were retained.
7. The resulting list was checked by the EEA, who then circulated it for consultation around national Member State experts involved in the HNV farmland project.
8. The EEA collated Member State feedback, and the species list was revised accordingly.

Fig. 5 – Pin-tailed Sandgrouse *Pterocles alchata* (left) and Northern Lapwing *Vanellus vanellus* (right) (Photos: Stefan Benko)

The final list of HNV farmland bird species appears in Appendix VI. It should be noted that some of these species are not IBA 'trigger species' (i.e. species for which quantitative IBA 'C' criteria thresholds have been calculated and applied). Some are relatively widespread and common farmland birds at a European scale. The IBA approach is not designed to identify sites for such dispersed species – its contribution to this project is to help capture Type 3 HNV farmland, in the form of sites that support rare species or

concentrated populations. In some parts of Europe, however, species that are generally common and dispersed at continental level have more restricted ranges, or are more dependent on supportive types of farming, than elsewhere. Many of these should be captured by the selection of Type 1 and 2 HNV farmland, but it was considered important to retain them in the list, so that Member States could use them to identify areas of HNV farmland that are important at local, regional or national (rather than European) scales.

Phase 2 involved using the final list of HNV farmland species to select IBAs with links to HNV farmland:

1. BirdLife's World Bird Database was queried to select all IBAs in the EU-27 triggered by one or more of these species (i.e. sites where these species contribute to the site qualifying as an IBA; thus, sites where these species occur, but in sub-threshold numbers, were excluded).
2. Sites where these species trigger IBA criteria, but in a season when the qualifying birds are not reliant on HNV farmland (e.g. breeding swans and geese), were excluded.
3. The digital boundaries of retained IBAs were isolated and made available to the HNV project.
4. The same rules (listed in Appendix IV) for reselection of CLC classes as in the case of NATURA 2000 sites and PBAs were applied (Figure 6).

Figure 6 – IBA sites contributing to HNV farmland mapping

2.4.3 Prime Butterfly Areas

Europe is an important region for butterflies, containing 576 butterfly species, one third of which are endemic to the continent. However, the rapid economic development of the twentieth century has brought about profound changes in the European environment, with many deleterious effects on butterflies and other wildlife groups. The Red Data Book of European Butterflies (Van Swaay & Warren, 1999) provided the first comprehensive review of the status of butterflies across the continent. The report showed that a large number of butterflies are declining through substantial parts of their range and that many species are highly threatened. Out of 576 butterfly species known to occur in Europe, 71 species (12% of the total) are considered threatened according to the 1994-IUCN criteria. They comprise 19 globally threatened species and 52 threatened at the European level.

The overall conclusion of the 1999 report was that the status and overall diversity of European butterflies are under serious threat from widespread environmental change, especially from rapidly changing land-use over the continent and the intensification of agricultural and forestry. Van Swaay *et al.* (2006) provide details on the dependence of butterflies on man-made biotopes such as dry grassland and meadows (Figure 6), which are typically maintained by traditional forms of farming management such as livestock grazing and hay-making. A wide range of factors associated with the rapid intensification of agriculture across the region threatens such biotopes.

Figure 7 - Flower rich, semi-natural meadows can be extremely rich in butterflies, both in species and in absolute numbers. Photo: Chris van Swaay, De Vlinderstichting/Butterfly Conservation Europe.

In 2003, Butterfly Conservation Europe published a book aiming at identifying Prime Butterfly Areas (PBAs) in Europe where conservation efforts should be focussed as a matter of urgency. PBAs are an initial selection of Important Butterfly Areas in Europe, they are identified on the basis of the presence of

specified target species in Europe, combined with a wide geographic coverage that includes both marginal and core populations. The 34 selected target species (see Appendix VII – Table VII.1) meet at least two of the following criteria:

1. Species is restricted to Europe (Range Affinity 4 in Van Swaay & Warren, 1999): 189 species.
2. Species is listed in Appendix II of the Bern Convention and/or the Habitats Directive: 23 species.
3. Species is threatened according to the recent Red Data Book of European butterflies (Van Swaay & Warren, 1999) or the IUCN Red List of threatened animals: 71 species.

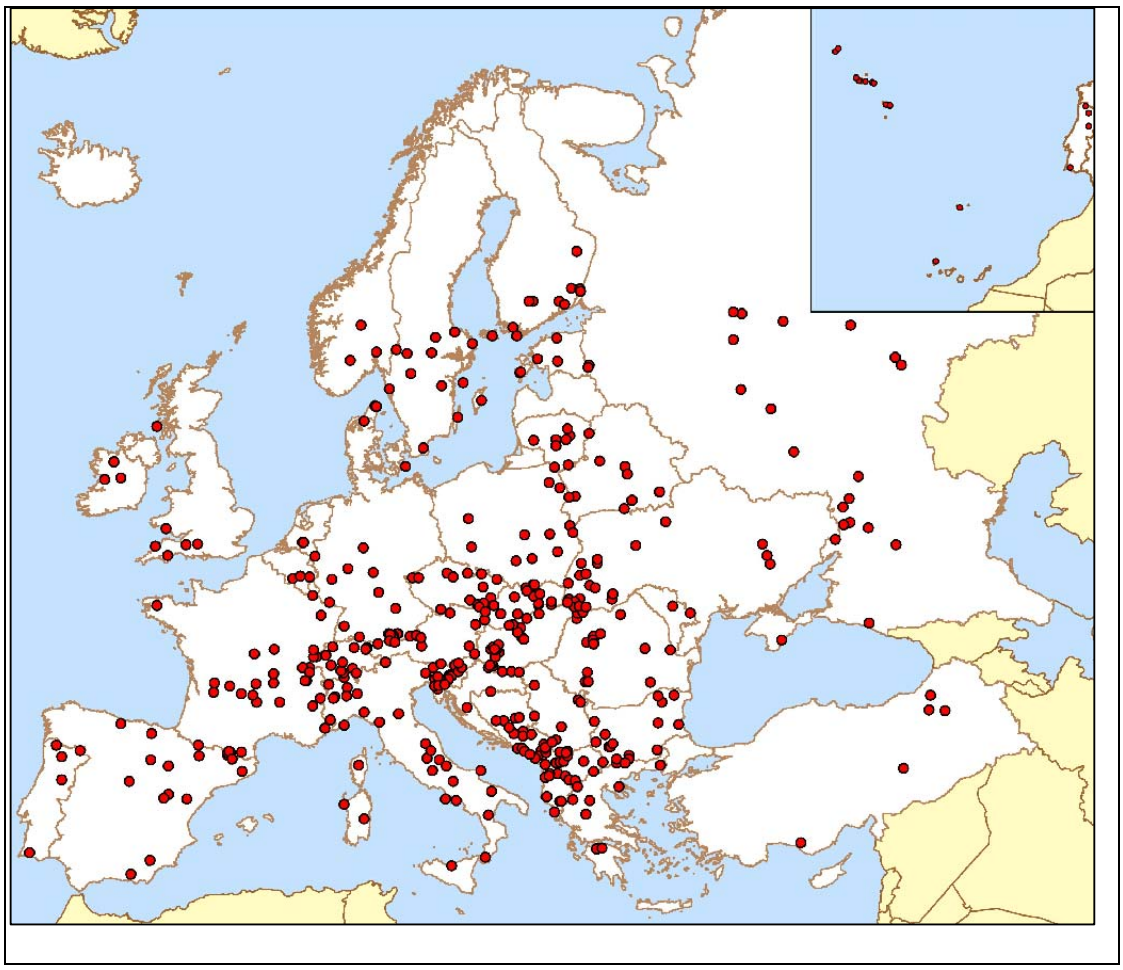


Figure 8: The location of the Prime Butterfly Areas in Europe. There are 431 PBAs covering more than 21 million ha, equivalent to 1.8% of the land area of Europe (Van Swaay & Warren, 2003).

Information about the ecology, present status, distribution, habitats, threats and conservation measures can be found in Van Swaay & Warren (1999) and Van Swaay *et al.* (2006).

A total of 431 Prime Butterfly Areas, all containing a substantial resident population of at least one of the target species, were identified among 37 countries and three island archipelagos (Figure 8)[3].They cover more than 21 million ha, equivalent to 1.8 % of the land area of Europe. 192 PBAs in Europe (44% of the total) have at least some protection under national law (Figure 9). In the countries of the European Union 53% of the PBAs were also classified as Natura 2000 sites.

[3] For details on the identification procedure, see Van Swaay and Warren (2003).

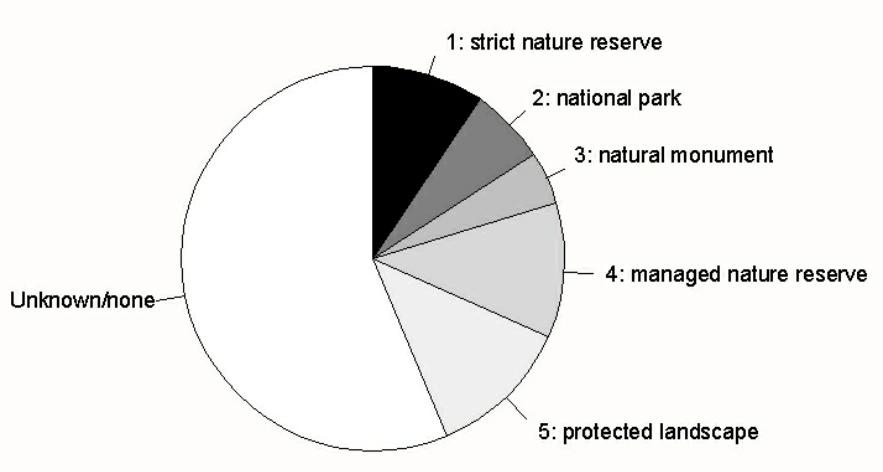


Figure 9: The main national protection status of Prime Butterfly Areas in Europe (Van Swaay & Warren, 2003).

The most frequently occurring species within PBAs are Large Blue Butterfly (*Maculinea arion*), Marsh Fritillary Butterfly (*Euphydryas aurinia*), Apollo Butterfly (*Parnassius apollo*), which are found in over 100 PBAs.

Fig. 10 - Euphydryas aurinia is a target species characteristic of humid, flower rich meadows. Photo: Chris van Swaay, De Vlinderstichting/Butterfly Conservation Europe.

Many target species, however, have a very restricted range and the sites selected are of the utmost importance for the conservation of rare and highly threatened species. They include several endemic species that are restricted to just one or two sites in the entire world, for example: *Gonepteryx maderensis, Hipparchia maderensis, Hipparchia azorina ssp., Polyommatus dama and P. humedasae* (Van Swaay & Warren, 2006).

For identification of HNV farmland, only those PBAs were selected that contain one or more of 27 target species depending on (extensive) agriculture for maintenance of their habitats (alpine grassland, humid

grassland and dry grassland). The remaining 7 species occur in woodland and were ignored. The experts of European Butterfly Conservation were consulted to ensure that all the sites with HNV relevance are included in the final selection, which comprises 178 sites in total (Appendix VIII). Table 3 shows the share of PBAs per country that were selected.

Table 3. Distribution of available and selected PBA sites in EU-27

Country	Number of Available PBAs	Number of Selected PBAs
Austria	5	5
Belgium	3	2
Bulgaria	14	2
Czech Republic	15	7
Cyprus	0	0
Denmark	4	0
Estonia	7	6
Finland	11	6
France	26	16
Germany	19	17
Greece	10	8
Hungary	22	12
Ireland	3	2
Italy	32	16
Latvia	0	0
Lithuania	8	7
Luxembourg	1	1
Malta	0	0
The Netherlands	3	2
Poland	16[(1)]	0
Portugal	5	5
Romania	13[(2)]	8
Slovakia	13	10
Slovenia	20	18
Spain	14	14
Sweden	12	10
United Kingdom	6	4
EU-27	**282**	**178**

[(1)] No target species have been assigned to the PBAs in Poland.
[(2)] 3 sites (RO-01, RO-03, RO-15) have recently been eliminated from the initial list of 16 sites designated in 2003.

The PBA layer was extracted using the following original data sources:

- Vector data including the PBA boundaries of some sites which are defined by De Vlinderstichting
- Images from the sites where the data on digital boundaries were missing (mainly provided by national experts).

The digital boundaries provided by De Vlinderstichting needed geo-referencing. The site boundaries that were provided as images only were digitized first. By comparing with GoogleEarth and using common points of reference (e.g. intersection of a road with a railway, polygon corners of a forest/urban area), all boundaries were then transformed into their original coordinates with the help of GIS software (Figure 11).

(a) (b) (c)

Figure 11. (a) FIN-04: Stortervolandet, Finland; (b) LT-03: Dukstyna forest, Lithuania; (c) UK-03: Islay, UK

Inconsistencies between the calculated areas inside the PBA sites and the original area estimates reported to Dutch Butterfly Conservation by national experts were corrected by up- or downscaling the sites in the GIS[4]. A fixed-distance buffering technique was applied to to prevent displacement artefacts due to irregular geometry of the sites (Figure 12).

Original site boundary after georeferencing *Site boundary after areal adjustment*

(a) (b) (c)

Figure 12.(a) Adjustment for SK-04 site (Slovakia) through shrinking; (b) Adjustment for NL-03 (The Netherlands) site through expanding; (c) No substantial adjustment required for NL-01 (The Netherlands)

Where there were big differences between the computed and estimated areas, the national experts were consulted again before making any corrections. They advised to rely on the computed figures in these cases (Figure 13).

(a) (b) (c)

Figure 13. Examples of big differences between computed areas and initial expert estimations: (a) E-02 site (Spain): estimated: 2 ha, calculated: 613 ha ; (b) E-09 site (Spain): estimated: 6 ha, calculated: 820 ha; (c) IRL-03 (Ireland): estimated: 20,000 ha, calculated: 42,395 ha.

Finally, the digital boundaries of the 178 identified PBA sites were then used to reselect CORINE agricultural classes according to Appendix IV (Figure 14).

[4] Prior to any area calculation in the GIS platform, all site boundaries were reprojected onto the ETRS_1989_LAEA_52N_10E projection system by using their original geographic coordinates.

Figure 14. PBA sites contributing to HNV farmland mapping[5]

2.5 National biodiversity data sets

As stated in section 2.1 additional national data were used in a few countries for a further refinement of the HNV farmland data layer derived from European information. This opportunity arose where they were available in a format that allowed integration in the GIS data layers developed by JRC/EEA and where national data corresponded to the concept and definition of HNV farmland adopted in the current exercise. Such an approach is necessary to ensure common standards and comparability at the European level. The following data sets could be integrated by the end of 2007:

- Estonia: Estonian Semi-natural Community Conservation Association (ESCCA) database of Estonian semi-natural plant communities. This database was initiated by the Estonian Fund for

[5] In large parts of Austria it is difficult to distinguish separate sites as Prime Butterfly Areas, as many species occur widely. For this reason, a few very large areas have been selected.

Nature in the beginning of 1990s, then continued by ESCCA. The database contains field inventory data (plant species list, floristic value, aesthetic value, management regime and potential for restoration etc) for 12 200 sites covering more than 100 000 ha (Figure 15).

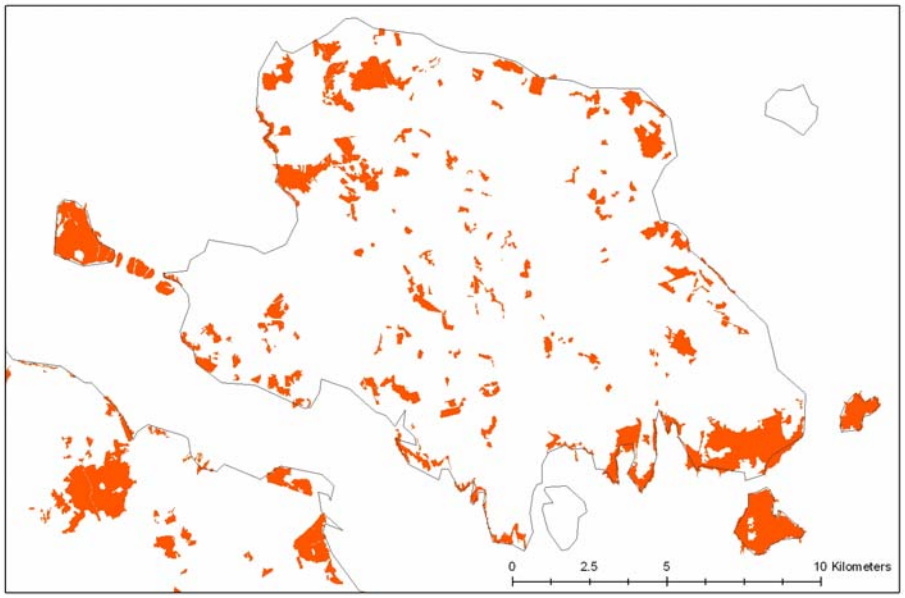


Figure 15 – Estonian Semi-natural Community Conservation Association (ESCCA) database of Estonian semi-natural plant communities (Muhu island)

- Lithuania: National Grasslands Inventory. Nineteen grassland vegetation classes were identified as basic mapping units for the field work. In total, 5,975 grassland polygons were examined, with a minimum mappable unit of 0.5 ha; the total area covered corresponds to 54,918 ha of important grasslands (Figure 16). The mapping was carried out in the period 2002-2005. The inventory was organised by the Lithuanian Fund for Nature and the Royal Dutch Society for Nature Conservation.

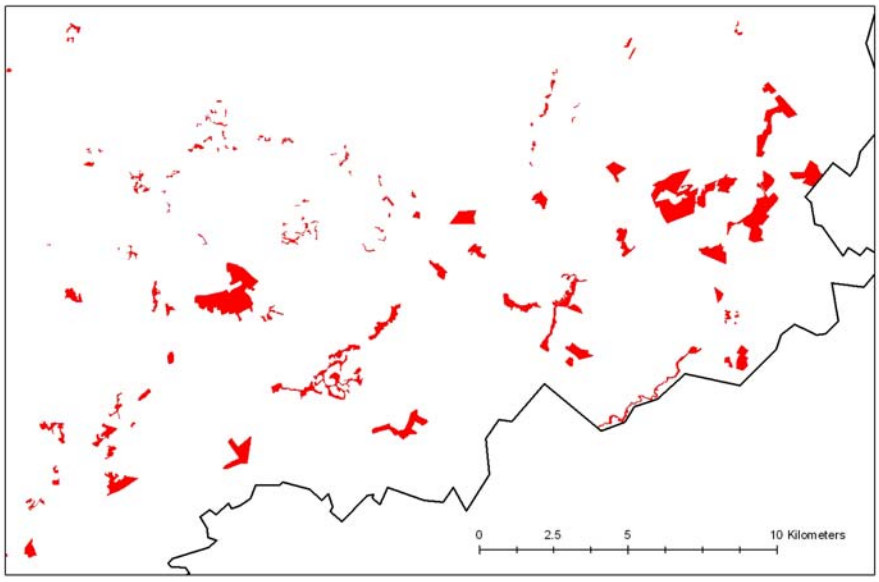
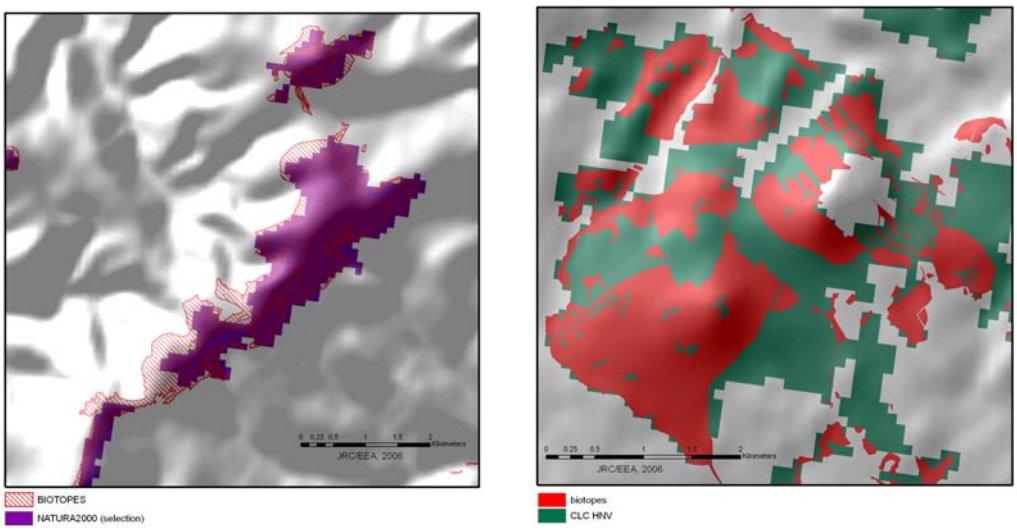


Figure 16 – A detail of the National Grasslands Inventory of Lithuania (surroundings of Adutiskis)

- Czech Republic: Results of a national biodiversity mapping exercise ('biotopes map' used in the preparation for Natura 2000 designation) were used. Data layers that correspond to the habitat and biodiversity criteria drawn up for the European exercise were integrated. These provide more detailed spatial information than European data sets on habitat and biodiversity features on farmland (land use: arable land, vineyards, hop-garden meadows, grassland, water courses and other not specified farmland; woods and urban areas are excluded). The scale of the national map is 1:10 000, allowing a high level of detail (see Figures 17a and 17b for a comparison of European and national GIS layers). The national inventory is planned to be updated every 12 years.



Figures 17a (left) and 17b (right) – Overlap of Biotopes Map of the Czech Republic with results of the CLC approach

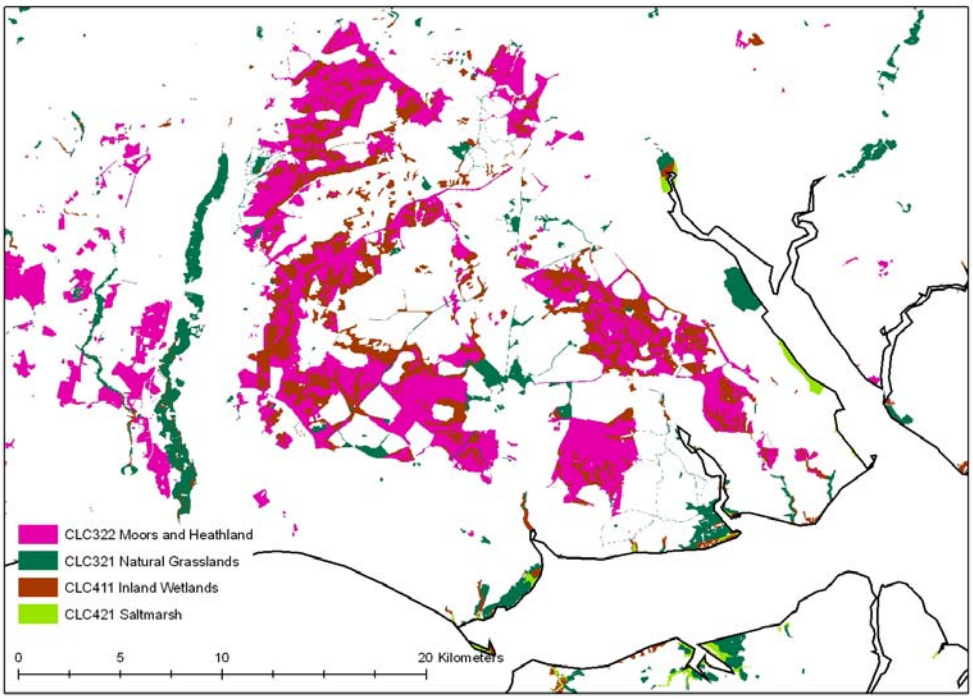


Figure 18. Detail of the English dataset (surroundings of Southampton)

- England: Four data layers were received from Natural England, concerning grasslands, moors and heathlands, inland marshes and salt marshes. These habitats correspond to CORINE classes 321, 322, 411 and 421, respectively, but provide more spatial detail. The layers contain aggregated data; habitat inventories for 23 terrestrial UK BAP (United Kingdom Biodiversity Action Plan) priority habitats were used as the basis for the aggregation; in particular the grasslands layer was created by merging inventories for lowland calcareous grasslands, lowland meadows, lowland dry acid grasslands, upland calcareous grasslands and upland hay meadows; the heathland layer was created by merging inventories for upland heaths and lowland heaths.
- Sweden: Swedish survey of semi-natural meadows and pastures. In the years 2002-2004 the Swedish Board of Agriculture and the County Administrative Boards conducted a survey of valuable semi-natural pastures and meadows in Sweden (Swedish Board of Agriculture, 2005a, b). The survey is used for evaluating the Swedish Agri-Environmental and Rural Development Programme as well as the national environmental objective: A Varied Agricultural Landscape. The survey database (TUVA) contains field inventory data for a total area of 301,348 ha. The majority (270,126 ha.) is considered to be semi-natural (pasture 228,919 ha, meadow 6,600 ha, forest and mountain grazing 15,104 ha) 34,546 hectares contain significant nature and cultural heritage values but this land is in need of restoration in order to preserve these values. Since the last inventory, 31,222 hectares have changed and are no longer considered valuable. An update of the survey is to some degree carried out from 2007 and onwards.

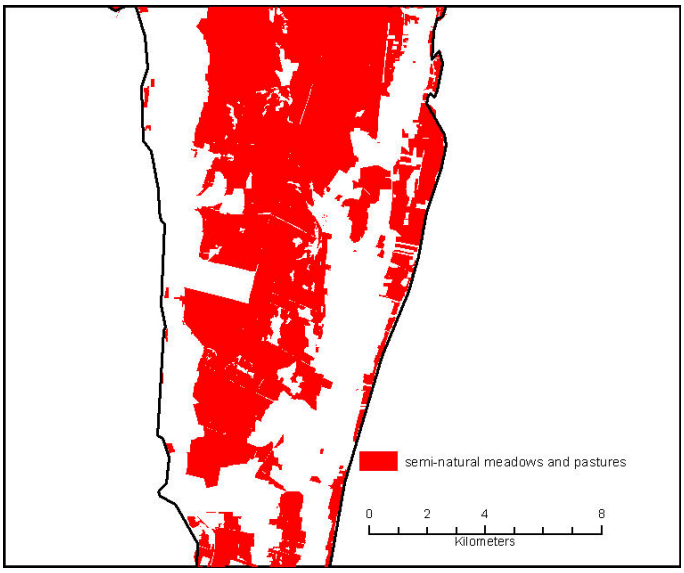


Figure 19. Detail of the Swedish dataset (Öland Island)

2.6 Presentation and upscaling of results

The comparison of the CLC derived data layer at 100m with national datasets has shown that, due to the CLC level of detail and accuracy, it can and should not be used to draw conclusions on the presence of HNV farmland at the local level. Therefore the decision has been taken, supported by national experts involved in the development of the HNV farmland data layer, to upscale the results to a resolution mirroring the detail available in the data. Such resolution corresponds to a reference mapping unit of 1

square km. Therefore all (or most of the) data used to produce the map have been up-scaled to a 1 km cell resolution.

This poses different methodological problems, depending on the input data. In the case of CLC-derived layers the final map is obtained by assigning to each 1 km cell the % of surface covered by HNV farmland cells in the original map. Information on NATURA 2000, IBAs and IPAs is added separately at the initial resolution of 100m, but can eventually be merged with the information provided by the CLC approach, as shown in chapter 3.

Incorporating national datasets poses different problems, linked to the resolution differences. The biotopes map of the Czech Republic, for example, contains 285,000 sites with an average area of 1.7 ha. This is far below the CORINE mapping scale and necessitated a special method to incorporate the information. In this approach the national datasets do not substitute CORINE 2000, but supplement the information per cell. Figure 20 overlays the CLC derived and national data layers. The selection of CLC classes was carried out following the standard procedure, the result was vectorised and the polygons thus obtained were merged with the polygons of national datasets. A 1 km grid was overlaid on the resulting layer (see Figure 21) and the share of HNV farmland (no. of ha) was calculated for each cell (see Figure 22).

A similar procedure was also applied in the other countries that made national data sets available. In the case of England the structure of the provided data required the merging of five different datasets before calculating the final share.

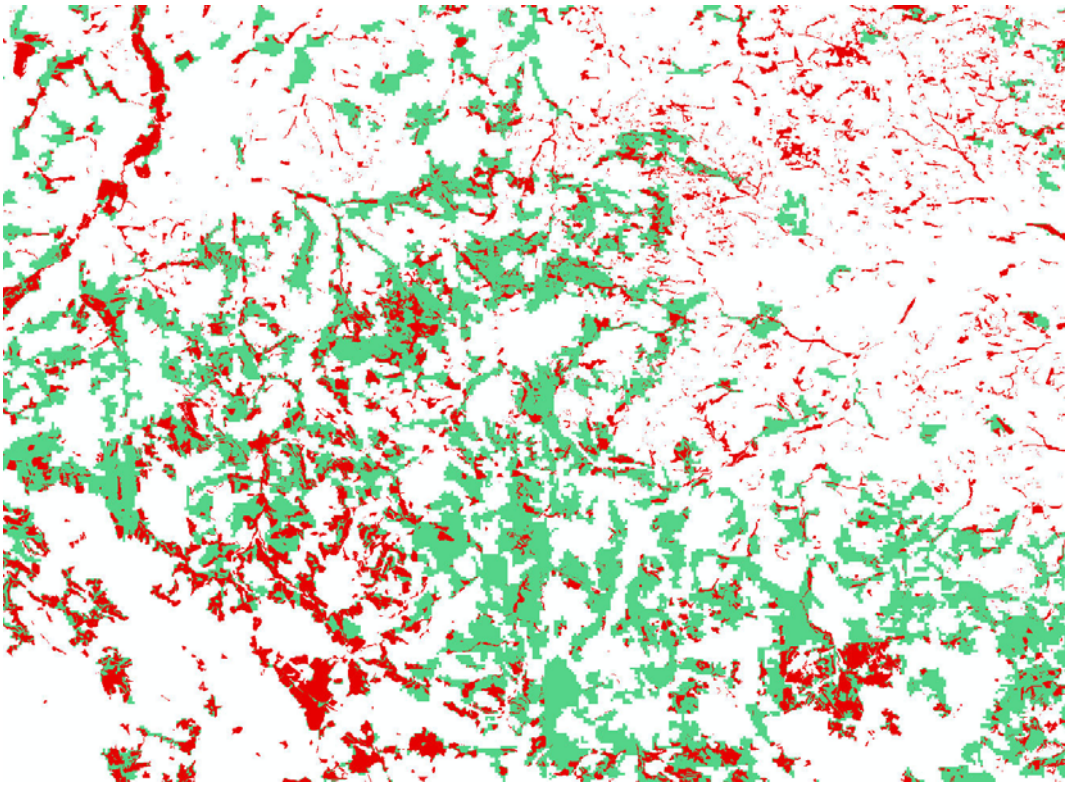


Figure 20. In green CORINE2000 selected classes and in red the Biotopes map of Czech Republic

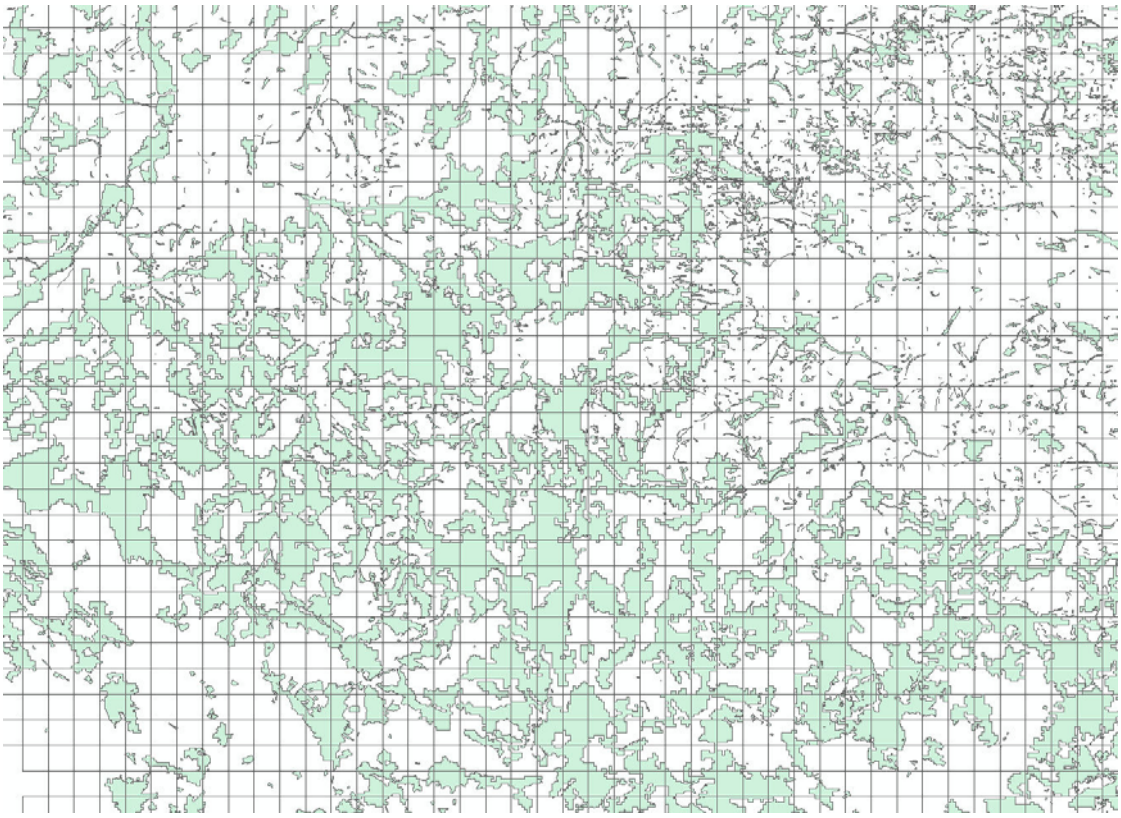


Figure 21. CORINE2000 (selected classes) and Biotopes map of Czech Republic merged

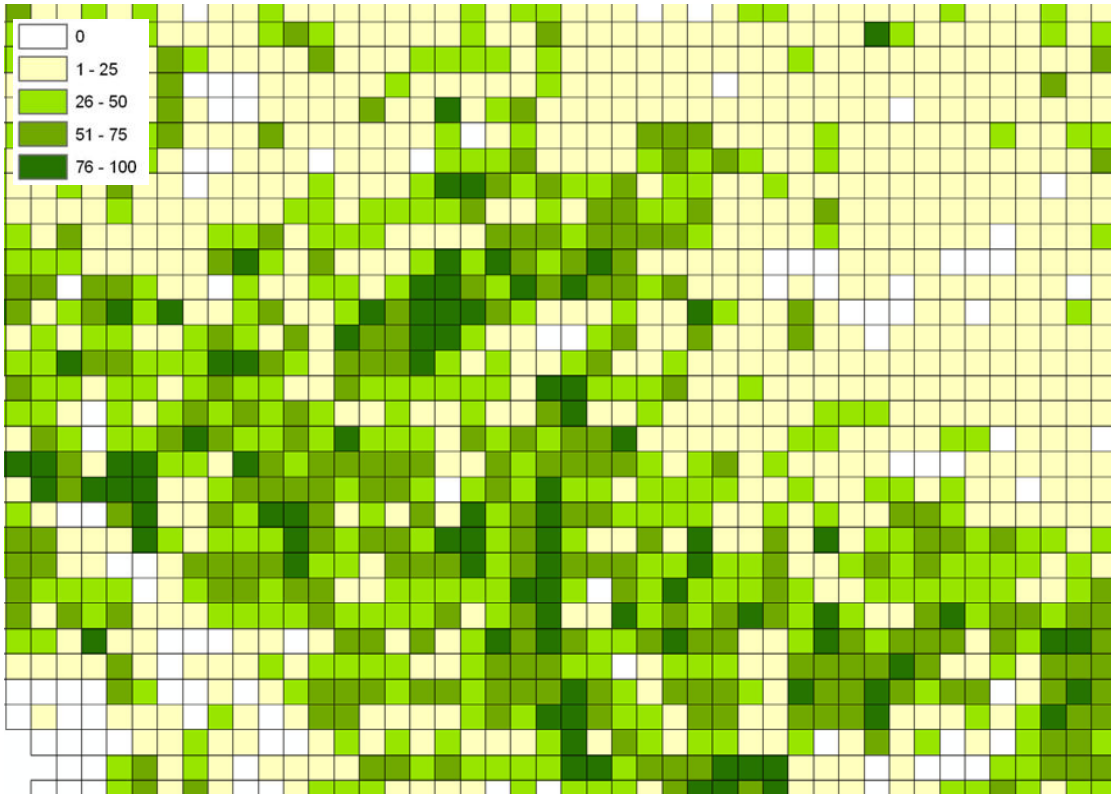


Figure 22. Share of HNV farmland per square kilometre

3. Results

3.1 Estimated distribution of HNV farmland in the EU-27

By putting the different data layers together it is possible to model the likely distribution of HNV farmland in the EU-27. The outcome of that exercise is presented in Figure 23. In this approach the information on NATURA 2000, IBA and PBA data layers is added separately, and maintains the initial resolution of 100m.

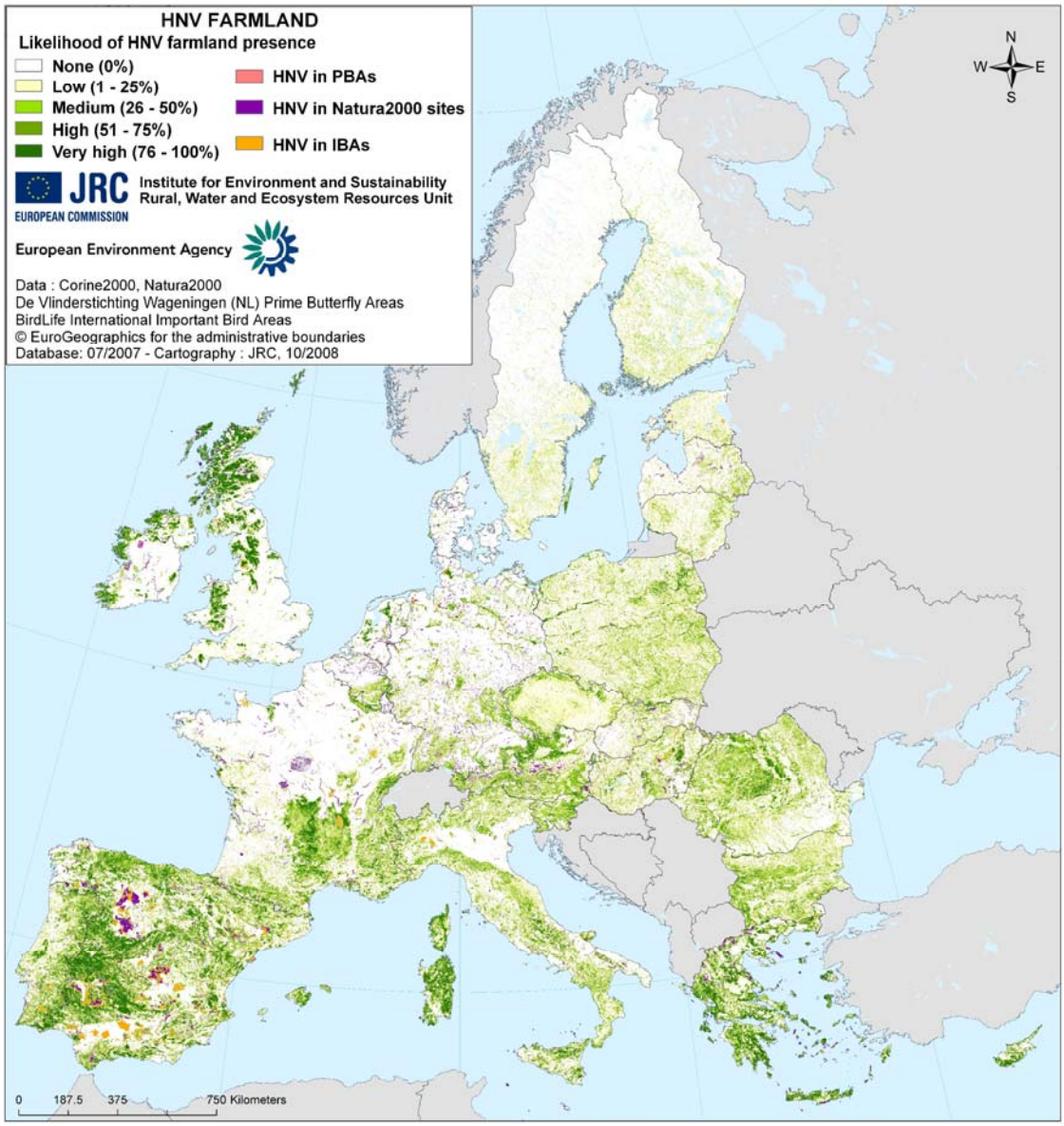


Figure 23. Upscaling of results to 1 km cell

The information provided by the four layers can be merged into one – see Figure 24. This map of likely presence of HNV farmland is obtained by overlaying the NATURA 2000, IBA and PBA data layers into one layer and producing the final map by assigning to each cell the largest value between the CLC selection and the new layer. This causes some underestimation of the final score, but that is considered acceptable given the considerable uncertainties in the different data sources utilised.

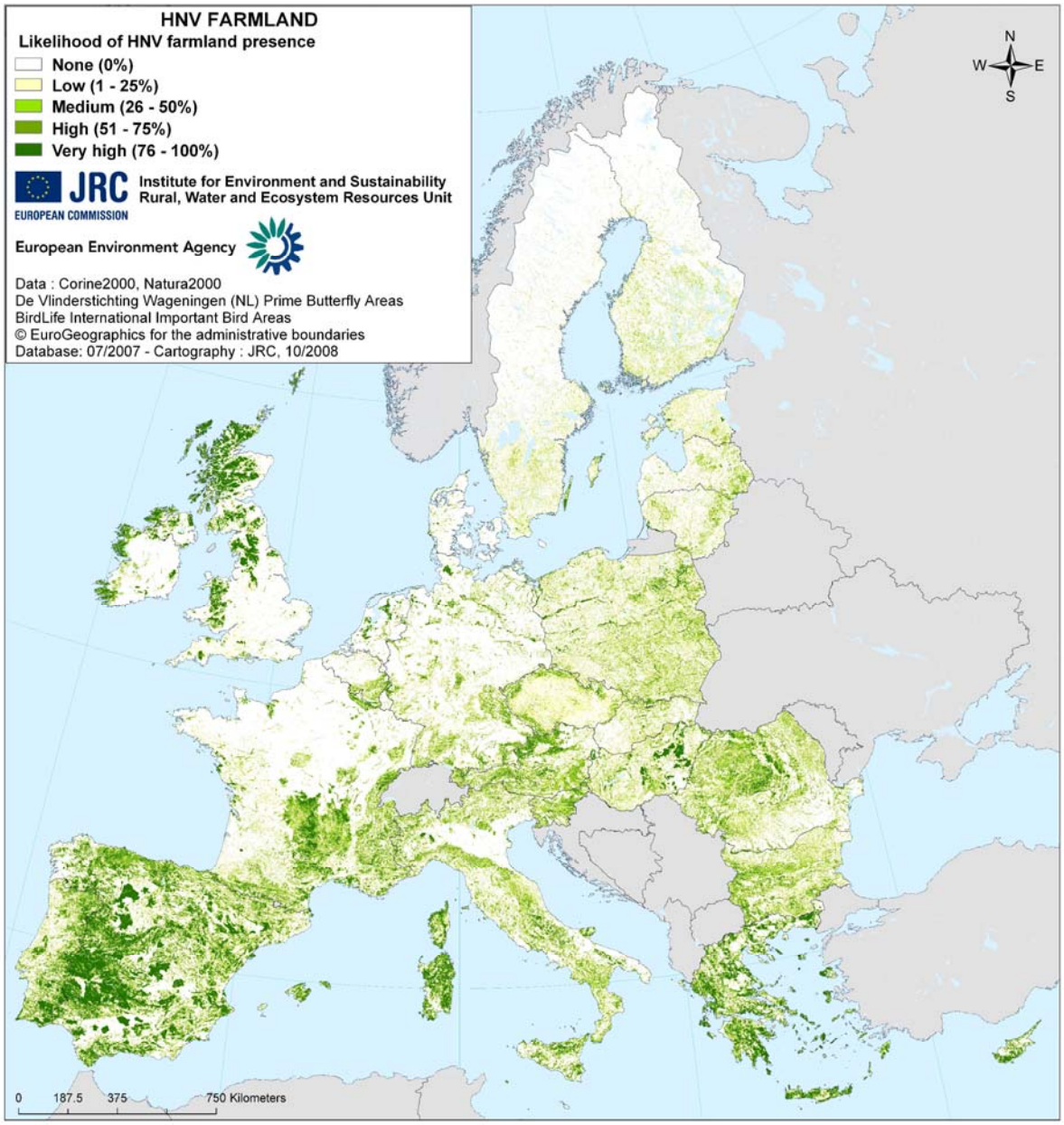


Figure 24. Likelihood of HNV farmland presence at EU level

Methodological considerations

The final result includes data sources of different levels of detail, ranging from CLC land cover polygons of 25 to several thousand hectares to individual plots of semi-natural grassland of only a few ha in size. Given this fact and the uncertainty associated with using CLC classes for modelling biodiversity presence, the value of the cells should not be interpreted as the share of HNV farmland and thus should not be converted to hectares. Instead the 'map' derived from the modelling exercise should be taken as representing likelihood of presence of HNV farmland and an estimate of its distribution at the European scale. Some further methodological issues of relevance for the correct interpretation of the results are discussed in the paragraphs below.

The mapping requirements of the CORINE land cover data layer lead to a minimum size of 25 ha per mapping unit - below this size objects are not mapped. In the case of HNV farmland this implies that it is often not possible to identify patches of HNV farmland within mixed classes, or when the dominant class is mapped (i.e. in the Alps patches of alpine meadows are often included in forest classes). In addition, the photo-interpretation techniques show some limits in the identification of structurally complex classes (e.g. 2.4.2 Complex cultivation patterns).

The CORINE mapping methodology does not allow for identification of different levels of management intensity within or between CLC classes. The intensity of farm management (expressed, for example, in the quantity of fertilizer applied or in livestock densities per ha) is often the crucial factor for the presence of biodiversity values on European farmland, in particular for grassland habitats. It had to be assumed, therefore, that the selected classes within each environmental zone are associated to a certain extent with low input farming (underpinned by the use of expert rules). Nevertheless, the selection of certain CLC classes as an indication of the presence of high nature value has clear limitations, even if the selection of CLC classes was handled quite restrictively. For some land-cover categories included in the excercise, it is not certain that all of the mapped areas are under farming use. This is the case for various types of scrubland, heaths and moorlands, which historically are associated with grazing, but are not necessarily grazed by domestic livestock at present.

The most problematic HNV farmland type to be mapped with the current approach is Type 2. This is particularly true where landscape features are an important factor in the characteristics of HNV farmland. Information on structural elements is generally not contained in CORINE data even though individual classes provide some information on the diversity of land use (e.g. 2.4.2 and 2.4.3). However, in areas dominated by intensive agriculture it is often not possible to distinguish pockets of HNV farmland deriving from mixed or low-input farming coupled with structural elements.

3.2 Estimating the share of HNV farmland in farmed area

Estimating the share of HNV farmland in the farmed area allows a comparison of the importance of HNV farming in different EU Member States and regions and provides the possibility to track trends in the extent of HNV farmland over time. Consequently, there is considerable interest in deriving a percentage share estimate from any exercise on the identification of HNV farmland. Such attempts, however, face two important constraints: one is the inherent uncertainty in the data on the distribution and extent of HNV farmland in different countries and regions, the other relates to the issue of finding comparable data for total agricultural area or farmed land.

Both factors clearly apply in the current approach that relies to a large degree on Corine Land Cover for estimating the distribution and extent of HNV farmland. The uncertainty associated with using this data set for the identification of HNV farmland has already been described in the previous sections. This section reviews past and current results and discusses the comparability of the estimated extent of HNV farmland in the current exercise with the UAA.

The IRENA indicator on HNV farmland combined CORINE land cover data with farm system data from the Farm Accountancy Data Network (FADN). The estimated share of HNV farmland in UAA for the EU-15 Member States was presented in five different categories to express data uncertainties. The data reflect the state of knowledge in 2004 and have not been updated since then. The most recent attempt to estimate the share of HNV farmland in UAA was presented in the latest report by DG Agriculture and Rural Development on the baseline indicators in the Common Monitoring and Evaluation Framework (CMEF) for rural development programmes. This included the EU-15 only and also used different classes

of share in UAA to reflect data uncertainties in the underlying results of the updated land cover approach (see further information under http://ec.europa.eu/agriculture/agrista/rurdev2007/RD_Report_2007_Chapter3.pdf).

For this report the extent of HNV farmland for each NUTS 2 area in the EU-27 was calculated. The area of farmed land is calculated as the total land area belonging to the CLC agricultural classes (the 11 'agricultural' classes of Corine level 3 and parts of class 3.2.1 'natural grasslands') plus identified HNV farmland outside these classes. This provides a better basis for comparison than the official UAA figures, which do not fully capture HNV farmland in different environmental zones of Europe. The results for each NUTS 2 area were then summed up per Member State to derive national figures.

Table 4. HNV farmland – shares per Country (*) and relation between UAA and CLC agricultural classes (see text for explanation). Highlighted in bold the Member States that provided national biodiversity datasets which have been included in the estimates together with CLC data (see chapter 2.5). Those Member States where further refinement of current data appears particularly important are marked in italics.

	col 1	col 2	col 3	col 4	col 5
COUNTRY	HNV farmland area according to this study	Agricultural land (CLC agricultural classes + HNV areas)	Utilised Agricultural Area (official figures from EUROSTAT FSS)	Discrepancy (col2/col3)*100	Area share of HNV farmland (col1 / col2)
Austria	*2,447,292*	*3,578,621*	*3,266,250*	*109.6%*	*68.4%*
Belgium	347,960	1,786,942	1,385,580	129.0%	19.5%
Bulgaria	2,509,989	6,734,217	2,729,390	246.7%	37.3%
Cyprus	*342,045*	*637,043*	*151,500*	*420.5%*	*53.7%*
Czech Republic	1,043,973	4,950,869	3,557,770	139.2%	21.1%
Germany	3,162,699	21,607,362	17,127,350	126.2%	14.6%
Denmark	172,267	3,446,150	2,707,690	127.3%	5.0%
Estonia	380,879	1,695,820	828,930	204.6%	22.5%
Spain	18,986,960	34,038,906	26,085,390	130.5%	55.8%
Finland	*1,330,797*	*2,967,068*	*2,215,970*	*133.9%*	*44.9%*
France	7,797,145	35,311,870	27,856,320	126.8%	22.1%
Greece	5,349,572	9,122,263	3,583,180	254.6%	58.6%
Hungary	1,906,124	6,822,877	4,555,110	149.8%	27.9%
Ireland	1,162,594	5,777,390	4,443,970	130.0%	20.1%
Italy	6,127,030	18,359,587	13,062,260	140.6%	33.4%
Lithuania	627,202	4,159,700	2,792,040	149.0%	15.1%
Luxembourg	12,871	142,632	127,510	111.9%	9.0%
Latvia	568,400	2,853,680	1,432,680	199.2%	19.9%
Netherlands	368,788	2,621,717	1,958,050	133.9%	14.1%
Poland	4,813,243	20,231,887	14,754,880	137.1%	23.8%
Portugal	2,900,462	5,035,890	3,736,140	134.8%	57.6%
Romania	4,860,372	14,433,920	13,906,700	103.8%	33.7%
Slovenija	591,314	754,255	485,880	155.2%	78.4%
Slovakia	547,582	2,485,476	2,159,900	115.1%	22.0%
Sweden	1,136,030	4,759,869	3,192,440	149.1%	23.9%
United Kingdom	5,165,466	19,368,468	13,174,690	147.0%	26.7%
Total	74,659,056	233,684,479	171,277,570	136.4%	31.9%

(*) Malta not included

The analysis was done at NUTS 2 level because environmental conditions can be very different within Member States, and an approach at national level would level out such differences when relating CLC-derived estimates to UAA. Furthermore, the boundaries of environmental zones often cut across the Member States whereas nearly all NUTS2 areas can be classified into one or other environmental zone. The resulting estimates of share of HNV farmland in farmed area (as defined by the chosen land cover approach) per NUTS 2 are therefore considered to be comparable across the EU Member States covered (see Appendix X for further details). Given the often large differences between UAA as derived from agricultural statistics and agricultural area derived from CLC, however, the estimated shares of HNV farmland under this approach cannot be directly transposed to official UAA. Table 4 provides an overview of the relationship (column 4) between the agricultural area as estimated based on CLC (column 2) and that derived from UAA (column 3) per Member State, and should guide the user in better understanding the results presented in column 5 on the area share of HNV farmland as calculated from the presented HNV map.

4. Conclusions and potential further development of the methodology

The methodological and data refinements that were introduced in the current exercise add considerable detail to the original land cover map. The refined selection rules for CLC classes create a better base layer of HNV farmland developed from the CLC 2000 land cover data set. Adding EU biodiversity data sets and (in some cases) national biodiversity information brings in spatially referenced biodiversity information, which corresponds to the core of the HNV concept. Further work is required in completing and refining EU level data sets but the approach used provides a comprehensive and comparable coverage. Nevertheless, the current results only allow an approximation to the distribution of HNV farmland in Europe and should not be considered to provide an accurate spatial map at local level.

Further progress with the identification and understanding of HNV farming (including farmland areas and farming structures) requires an improvement of the farming systems approach. This was part of the IRENA approach but is hampered at the European level by data availability. In order to derive a spatially explicit map, data on farming practices at parcel, farm, 1 km cell or municipality level are needed, and none of these are currently available, on the whole (or most of) the EU-27 territory. The land cover/biodiversity approach was therefore chosen in this project for developing improved distribution patterns of HNV farmland on the basis of high resolution land cover/biodiversity data.

Need is now emerging for developing a joint European approach that would integrate the land cover/biodiversity approach of JRC/EEA with the work on HNV farming systems sponsored by DG Agriculture and Rural Development. Methodological discussions on combining the two approaches have started and exploratory work has been commissioned. Apart from the likely gains of combining the two approaches this would also avoid the potential confusion that the existence of two parallel HNV methodologies can create among different users at national and European level.

In addition to the general perspective above, several suggestions for further development of the JRC/EEA approach emerged during the regional workshops and from other work. A brief discussion follows on possible alternative approaches and additional data sources:

a) Farming systems and/or livestock density:

In the Andersen *et al.* study (2003) the possibility of using the Farm Accountancy Data Network (FADN) dataset was explored. This led to the identification of six HNV farming systems (Cropping systems, Permanent crops, Off-farm grazing systems, Permanent grassland systems, Arable grazing livestock

systems, Other systems). The method has limitations due to the fact that in total the FADN sample represents only 52% of the farms and 86% of the Utilised Agricultural Area in the EU-15 (and possibly less in the new Member States). Small farms (defined in economic terms) are therefore not sufficiently represented, causing a bias in the identification of HNV farming systems. Furthermore, the reference area in data collection is Utilised Agricultural Area (UAA), not the area actually occupied by the agricultural business. Seasonal lets (common in some countries, such as Ireland) or wintering/summering arrangements, as well as the use of common land and the grazing of fallows, are thus excluded from the data set. Finally, the fact that data are available per FADN region (approximately NUTS2 level) makes the results available at a very coarse scale. Similar constraints apply to the use of European farm structure survey (FSS) data, as long as data are only available at NUTS 2 or 3 level.

A study carried out in France and Wallonia for the JRC (Pointereau *et al.*, 2007) shows that national statistics, when available at NUTS 5 level, can provide very useful information for the identification of the share of HNV farming in agricultural area at municipal level. In addition, there are currently some EU funded projects (i.e. CAPRI, SEAMLESS) that are trying to produce disaggregated layers on farm typologies, livestock density, nitrogen input. In this context it is possible that new approaches will become available over the coming years that would introduce the farm system approach into HNV farmland mapping. A validation of these approaches with spatially referenced biodiversity data sets would appear useful (which also applies to the current methodology).

b) The Integrated Administration and Control System (IACS) database:

A study carried out for JRC on the Walloon region has shown that the use of IACS data allows the calculation of indicators that can be useful in the identification of HNV farmland (i.e. crop diversity, grassland cover, % of permanent grassland in the UAA, parcel size). A validation of the approach with biodiversity-related data would again be useful as there is a general relationship between the indicators proposed and farmland biodiversity but not necessarily the target habitats and species utilized at European level.

In addition, Land Parcel Identification System data were used in Scotland for differentiating farmland areas from estates used for shooting etc. The use of these data was granted by agreement with the Scottish Executive Environment and Rural Affairs Department. This was an exception, as this type of data is generally not made available because it contains sensitive information, and formal requests must be sent to data owners (at least one per country) in order to have access to parcel limits and some other basic information. In addition, a full database covering a whole country would include millions of polygons and it would be quite difficult to manage. Therefore, for the time being, the use of IACS data is foreseen only in particular and well identified cases, given that the data are made available.

Work by the European Forum for Nature Conservation and Pastoralism illustrates the potential of the IACS system. Several countries have undertaken inventories of semi-natural grasslands in recent years. These have been carried out as separate mapping excercises, without relation to the land parcel identification system (LPIS). However, in Bulgaria, a national inventory of semi-natural grasslands has been incorporated in the LPIS, so that the presence of semi-natural grasslands can be identified at the level of the farm parcel via LPIS. At present the system apparently has teething problems, as considerable areas of farmland have not been registered on the LPIS data base. However, once these problems are resolved, the incorporation into LPIS of data on semi-natural vegetation types should provide a robust tool to

support the identification of HNV farmland. Further information can be found on the EFNC website: www.efncp.org/projects/hnv-bulgaria-romania/

Lastly, IACS data can also potentially be used for the location of some types of common land. Commonages are normally managed extensively and are representative of HNV farmland Type 1. It is at times possible to derive information on farms that make use of common lands from farm surveys and some national inventories exist. However, such information is not harmonised at the EU level and at the moment no map exists on the geographical distribution of common pastures. The information provided by FSS at NUTS 2 level does not hold a sufficient detail to be used in the described mapping approach.

c) Yield distribution/land capability:

It has been suggested that information on bio-physical factors that drive crop productivity could provide means to discriminate extensively managed land, normally characterised by lower amounts of biomass. The use of such data is complex, due to the fact that it is not always true that extensively managed land holds lower yields and to the fact that yields are subject to high variations across Europe, depending not only on climate and soil conditions, but also on the type of management. However, further research into this approach, potentially in combination with farming systems work, could be useful.

d) Landscape typologies:

Geographic information on different types of agricultural landscapes can provide useful background information for identifying areas with HNV farmland Type 2. Such an information system would need to contain information on parameters, such as field systems, presence of linear elements, field size etc.

Although European initiatives exist that aim at providing harmonised information on landscape typologies and landscape elements (i.e. LANMAP - Alterra, Wageningen; information on linear elements in the LUCAS survey) the information they contain does not allow for a successful mapping of HNV farmland (in particular Type 2, characterised by mosaics of low intensity agricultural patches and linear elements). Such information potentially can be derived from landscape maps where they exist at national level. The approach used for Germany (see above) shows the added value of using national landscape information for identifying landscape types of nature conservation interest. This national background information was used in the current methodological approach for refining the selection of CLC classes at regional level. In most instances, landscape information will have to be used in combination with land use intensity data to provide a reliable indication of the likely presence of HNV farmland.

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Appendices

Appendix I - Corine Land Cover Classification System

LEVEL 1	LEVEL 2		LEVEL 3
1. Artificial Surface	1.1 Urban fabric	1	1.1.1 Continuous urban fabric
		2	1.1.2 Discontinuous urban fabric
	1.2 Industrial, Commercial and transport units	3	1.2.1 Industrial or commercial units
		4	1.2.2 Road and rail networks and associated land
		5	1.2.3 Port Areas
		6	1.2.4 Airports
	1.3 Mines, dumps and construction sites	7	1.3.1 Mineral extraction sites
		8	1.3.2 Dump sites
		9	1.3.3 Construction sites
	1.4 Artificial non-agricultural vegetated areas	10	1.4.1 Green urban areas
		11	1.4.2 Sport and leisure facilities
2. Agricultural areas	2.1 Arable land	12	2.1.1 Non-irrigated arable land
		13	2.1.2 Permanently irrigated land
		14	2.1.3 Rice fields
	2.2 Permanent crops	15	2.2.1 Vineyards
		16	2.2.2 Fruit trees and berry plantations
		17	2.2.3 Olive groves
	2.3 Pastures	18	2.3.1 Pastures
	2.4 Heterogeneous agricultural areas	19	2.4.1 Annual crops associated with permanent crops
		20	2.4.2 Complex cultivation patterns
		21	2.4.3 Land principally occupied by agriculture, with significant areas of natural vegetation
		22	2.4.4 Agro-forestry areas
3. Forest and semi-natural areas	3.1 Forests	23	3.1.1 Broad-leaved forest
		24	3.1.2 Coniferous forest
		25	3.1.3 Mixed forest
	3.2 Scrub and/or herbaceous vegetation associations	26	3.2.1 Natural grassland
		27	3.2.2 Moors and heathland
		28	3.2.3 Sclerophyllous vegetation
		29	3.2.4 Transitional woodland-scrub
	3.3 Open spaces with little or no vegetation	30	3.3.1 Beaches, dunes, sands
		31	3.3.2 Bare rocks
		32	3.3.3 Sparsely vegetated areas
		33	3.3.4 Burnt areas
		34	3.3.5 Glaciers and perpetual snow
4. Wetlands	4.1 Inland wetlands	35	4.1.1 Inland marshes
		36	4.1.2 Peat bogs
	4.2 Coastal Wetlands	37	4.2.1 Salt marshes
		38	4.2.2 Salines
		39	4.2.3 Intertidal flats
5. Water bodies	5.1 Continental waters	40	5.1.1 Water courses
		41	5.1.2 Water bodies
	5.2 Marine waters	42	5.2.1 Coastal lagoons
		43	5.2.2 Estuaries
		44	5.2.3 Sea and ocean

Highlighted classes are those related to HNV farmland

Appendix II – CLC class re-selection rules per Member State

Appendix II – 1

CLC class re-selection rules - Austria

CLC classes	CLC codes	Alpine South	Continental	Mediterranean Mountains	Pannonian
Non-irrigated arable land	211	0	0	0	0
Permanently irrigated land	212	0	0	0	0
Rice fields	213	0	0	0	0
Vineyards	221	0	0	0	0
Fruit trees and berry plantations	222	0	0	0	0
Olive groves	223	0	0	0	0
Pastures	231	231	231	231	231
Annual crops associated with permanent crops	241	0	0	241	0
Complex cultivation patterns	242	242	242	242	242
Land principally occupied by agriculture	243	243	243	243	243
Agro-forestry areas	244	244	0	244	244
Natural grasslands	321	321	321	321	321
Moors and heathland	322	0	0	322	0
Sclerophyllous vegetation	323	0	0	323	0
Transitional woodland/scrub	324	0	0	0	0
Sparsely vegetated areas	333	0	0	0	0
Inland marshes	411	411	411	411	411
Peat bogs	412	0	0	0	0
Salt marshes	421	0	0	0	0

Appendix II – 2

CLC class re-selection rules - Belgium

CLC classes	CLC codes	Atlantic Central	Continental
Non-irrigated arable land	211	0	0
Permanently irrigated land	212	0	0
Rice fields	213	0	0
Vineyards	221	0	0
Fruit trees and berry plantations	222	0	0
Olive groves	223	0	0
Pastures	231	0	231
Annual crops associated with permanent crops	241	0	0
Complex cultivation patterns	242	0	242
Land principally occupied by agriculture	243	0	0
Agro-forestry areas	244	0	0
Natural grasslands	321	321	321
Moors and heathland	322	322	322
Sclerophyllous vegetation	323	0	0
Transitional woodland/shrub	324	0	0
Sparsely vegetated areas	333	0	0
Inland marshes	411	411	411
Peat bogs	412	0	0
Salt marshes	421	421	421

Appendix II – 3

CLC class re-selection rules - Bulgaria

CLC classes	CLC codes	Alpine South	Continental	Mediterranean Mountains	Mediterranean North	Pannonian
Non-irrigated arable land	211	0	0	0	0	0
Permanently irrigated land	212	0	0	0	0	0
Rice fields	213	0	0	0	0	0
Vineyards	221	0	0	0	0	0
Fruit trees and berry plantations	222	222	0	222	0	0
Olive groves	223	0	0	0	0	0
Pastures	231	231	231	231	231	231
Annual crops associated with permanent crops	241	0	0	0	0	0
Complex cultivation patterns	242	242	242	0	242	0
Land principally occupied by agriculture	243	243	243	243	243	243
Agro-forestry areas	244	0	0	0	0	0
Natural grasslands	321	321	321	321	321	321
Moors and heathland	322	322	322	322	322	322
Sclerophyllous vegetation	323	0	323	323	323	0
Transitional woodland/shrub	324	0	324	0	0	324
Sparsely vegetated areas	333	0	0	0	0	333
Inland marshes	411	411	411	411	411	411
Peat bogs	412	0	0	0	0	0
Salt marshes	421	0	421	421	421	421

Natural grasslands not mapped above 1800 m

Appendix II – 4

CLC class re-selection rules - Cyprus

CLC class	CLC codes	
Non-irrigated arable land	211	0
Permanently irrigated land	212	0
Rice fields	213	0
Vineyards	221	0
Fruit trees and berry plantations	222	0
Olive groves	223	223
Pastures	231	231
Annual crops associated with permanent crops	241	241
Complex cultivation patterns	242	242
Land principally occupied by agriculture	243	243
Agro-forestry areas	244	
Natural grasslands	321	321
Moors and heathland	322	0
Sclerophyllous vegetation	323	323
Transitional woodland/shrub	324	0
Sparsely vegetated areas	333	0
Inland marshes	411	0
Peat bogs	412	0
Salt marshes	421	0

Olive groves are mapped above 400 m

Appendix II – 5

CLC class re-selection rules – Czech Republic

CLC classes	CLC codes	Alpine South	Continental	Pannonian
Non-irrigated arable land	211	0	0	0
Permanently irrigated land	212	0	0	0
Rice fields	213	0	0	0
Vineyards	221	0	0	0
Fruit trees and berry plantations	222	0	0	222
Olive groves	223	222	0	0
Pastures	231	231	231	0
Annual crops associated with permanent crops	241	0	0	0
Complex cultivation patterns	242	0	0	0
Land principally occupied by agriculture	243	243	0	243
Agro-forestry areas	244	244	0	244
Natural grasslands	321	321	321	321
Moors and heathland	322	322	322	322
Sclerophyllous vegetation	323	0	0	0
Transitional woodland/shrub	324	0	0	324
Sparsely vegetated areas	333	0	0	333
Inland marshes	411	411	411	411
Peat bogs	412	0	0	0
Salt marshes	421	0	0	421

Appendix II – 6

CLC class re-selection rules – Denmark

CLC classes	CLC codes	Atlantic North	Continental
Non-irrigated arable land	211	0	0
Permanently irrigated land	212	0	0
Rice fields	213	0	0
Vineyards	221	0	0
Fruit trees and berry plantations	222	0	0
Olive groves	223	0	0
Pastures	231	0	0
Annual crops associated with permanent crops	241	0	0
Complex cultivation patterns	242	0	0
Land principally occupied by agriculture	243	0	0
Agro-forestry areas	244	0	0
Natural grasslands	321	321	321
Moors and heathland	322	322	322
Sclerophyllous vegetation	323	0	0
Transitional woodland/shrub	324	0	0
Sparsely vegetated areas	333	0	0
Inland marshes	411	411	411
Peat bogs	412	0	0
Salt marshes	421	421	421

Appendix II – 7

CLC class re-selection rules – Estonia

CLC classes	CLC codes	Boreal	Nemoral
Non-irrigated arable land	211	0	0
Permanently irrigated land	212	0	0
Rice fields	213	0	0
Vineyards	221	0	0
Fruit trees and berry plantations	222	0	0
Olive groves	223	0	0
Pastures	231	0	0
Annual crops associated with permanent crops	241	0	0
Complex cultivation patterns	242	0	0
Land principally occupied by agriculture	243	243	243
Agro-forestry areas	244	0	0
Natural grasslands	321	0	321
Moors and heathland	322	0	0
Sclerophyllous vegetation	323	0	0
Transitional woodland/shrub	324	0	0
Sparsely vegetated areas	333	0	0
Inland marshes	411	0	0
Peat bogs	412	0	0
Salt marshes	421	421	421

Appendix II – 8

CLC class re-selection rules – Finland

CLC classes	CLC codes	Alpine North	Boreal	Nemoral
Non-irrigated arable land	211	0	0	0
Permanently irrigated land	212	0	0	0
Rice fields	213	0	0	0
Vineyards	221	0	0	0
Fruit trees and berry plantations	222	0	0	0
Olive groves	223	0	0	0
Pastures	231	0	231	231
Annual crops associated with permanent crops	241	0	0	0
Complex cultivation patterns	242	0	242	0
Land principally occupied by agriculture	243	243	243	243
Agro-forestry areas	244	0	0	0
Natural grasslands	321	0	321	321
Moors and heathland	322	0	0	0
Sclerophyllous vegetation	323	0	0	0
Transitional woodland/shrub	324	0	0	0
Sparsely vegetated areas	333	0	0	0
Inland marshes	411	0	411	411
Peat bogs	412	0	0	0
Salt marshes	421	0	421	421

Appendix II – 9

CLC class re-selection rules – France (1)

CLC classes	CLC codes	Mediterranean Mountains	Mediterranean North	Mediteranean South	Pannonian
Non-irrigated arable land	211	0	0	0	0
Permanently irrigated land	212	0	0	0	0
Rice fields	213	0	0	0	0
Vineyards	221	0	0	0	0
Fruit trees and berry plantations	222	0	0	0	0
Olive groves	223	223	0	0	0
Pastures	231	231	231	231	231
Annual crops associated with permanent crops	241	241	241	241	0
Complex cultivation patterns	242	242	0	0	0
Land principally occupied by agriculture	243	243	243	243	243
Agro-forestry areas	244	244	244	244	244
Natural grasslands	321	321	321	321	321
Moors and heathland	322	322	322	322	322
Sclerophyllous vegetation	323	323	323	323	323
Transitional woodland/shrub	324	0	0	0	0
Sparsely vegetated areas	333	0	0	0	0
Inland marshes	411	411	411	411	411
Peat bogs	412	0	0	412	0
Salt marshes	421	421	421	421	421

Appendix II – 9

CLC class re-selection rules – France (2)

CLC classes	CLC codes	Alpine South	Atlantic Central	Continental	Lusitanian
Non-irrigated arable land	211	0	0	0	0
Permanently irrigated land	212	0	0	0	0
Rice fields	213	0	0	0	0
Vineyards	221	0	0	0	0
Fruit trees and berry plantations	222	0	0	222	0
Olive groves	223	0	0	0	0
Pastures	231	231	231	231	231
Annual crops associated with permanent crops	241	0	0	241	0
Complex cultivation patterns	242	0	242	242	0
Land principally occupied by agriculture	243	243	0	243	243
Agro-forestry areas	244	244	0	0	244
Natural grasslands	321	321	321	321	321
Moors and heathland	322	322	322	322	322
Sclerophyllous vegetation	323	0	323	0	323
Transitional woodland/shrub	324	0	0	324	0
Sparsely vegetated areas	333	0	0	0	0
Inland marshes	411	411	411	0	411
Peat bogs	412	0	0	0	0
Salt marshes	421	0	421	421	421

Pastures (231) and natural grassland (321) are excluded in Lusitanian zone where they are apt or suitable to ploughing (see chapter 2.3 for explanation).	Pastures (231) and complex cultivation patterns (242) are added in the Atlantic Central zone only above 400 m.	Traditional orchards are added on the basis of auxiliary data (see chapter 2.3).

Appendix II – 10

CLC class re-selection rules – Germany

Polygons reselected from the Landscape Types of Germany map - class 1) especially 'worthy of protection' landscapes; class 2) 'worthy of protection' landscapes; Within these polygons the following CLC classes are included:

all permanent crops (222 *,223)
mosaics (241,242,243)
grassland/pastures (231,321)

Polygons reselected from the Landscape Types of Germany map - class 3) 'worthy of protection' landscapes with deficits. Within these polygons the following CLC classes are included:

all permanent crops (222 *,223)
mosaics (241,242,243)

* class 222 is added only above 500 m asl

Appendix II – 11

CLC class re-selection rules – Greece

CLC classes	CLC codes	Alpine South	Mediterranean North	Mediterranean Mountains	Mediterranean South
Non-irrigated arable land	211	0	0	0	0
Permanently irrigated land	212	0	0	0	0
Rice fields	213	213	213	213	213
Vineyards	221	0	0	0	0
Fruit trees and berry plantations	222	0	0	0	0
Olive groves	223	0	0	223	0
Pastures	231	231	231	231	231
Annual crops associated with permanent crops	241	0	241	241	241
Complex cultivation patterns	242	0	0	242	0
Land principally occupied by agriculture	243	243	243	243	243
Agro-forestry areas	244	244	244	244	244
Natural grasslands	321	321	321	321	321
Moors and heathland	322	322	322	322	322
Sclerophyllous vegetation	323	0	323	323	323
Transitional woodland/scrub	324	0	0	0	0
Sparsely vegetated areas	333	0	0	0	0
Inland marshes	411	411	411	411	411
Peat bogs	412	0	0	0	412
Salt marshes	421	0	421	421	421

Appendix II – 12

CLC class re-selection rules – Hungary

CLC classes	CLC codes	Alpine South	Continental	Mediterranean Mountains	Pannonian
Non-irrigated arable land	211	0	0	0	0
Permanently irrigated land	212	0	0	0	0
Rice fields	213	0	0	0	0
Vineyards	221	0	0	0	0
Fruit trees and berry plantations	222	222	0	222	0
Olive groves	223	0	0	0	0
Pastures	231	231	231	231	231
Annual crops associated with permanent crops	241	241	0	241	0
Complex cultivation patterns	242	242	0	242	0
Land principally occupied by agriculture	243	243	0	243	243
Agro-forestry areas	244	244	0	244	244
Natural grasslands	321	321	321	321	321
Moors and heathland	322	322	322	322	322
Sclerophyllous vegetation	323	0	0	0	0
Transitional woodland/shrub	324	0	0	0	324
Sparsely vegetated areas	333	0	0	0	333
Inland marshes	411	411	411	411	411
Peat bogs	412	0	0	0	0
Salt marshes	421	0	0	0	0

Appendix II – 13

CLC class re-selection rules – Ireland

CLC classes	CLC codes	Atlantic North	Atlantic Central
Non-irrigated arable land	211	0	0
Permanently irrigated land	212	0	0
Rice fields	213	0	0
Vineyards	221	0	0
Fruit trees and berry plantations	222	0	0
Olive groves	223	0	0
Pastures	231	0	0
Annual crops associated with permanent crops	241	0	0
Complex cultivation patterns	242	0	0
Land principally occupied by agriculture	243	0	0
Agro-forestry areas	244	0	0
Natural grasslands	321	321	321
Moors and heathland	322	322	322
Sclerophyllous vegetation	323	0	0
Transitional woodland/shrub	324	0	0
Sparsely vegetated areas	333	333	0
Inland marshes	411	411	411
Peat bogs	412	412	412
Salt marshes	421	421	421

Raised bogs are excluded (see chapter 2.3 for explanation).

Sparsely vegetated areas are mapped above 500 m only

Appendix II – 14

CLC class re-selection rules – Italy

CLC classes	CLC codes	Alpine South	Mediterranean Mountains	Mediterranean North	Mediterranean South
Non-irrigated arable land	211	0	0	0	0
Permanently irrigated land	212	0	0	0	0
Rice fields	213	0	0	0	0
Vineyards	221	0	0	0	0
Fruit trees and berry plantations	222	0	0	0	0
Olive groves	223	0	223	0	0
Pastures	231	231	231	231	231
Annual crops associated with permanent crops	241	0	241	241	241
Complex cultivation patterns	242	0	242	0	0
Land principally occupied by agriculture	243	243	243	243	243
Agro-forestry areas	244	244	244	244	244
Natural grasslands	321	321	321	321	321
Moors and heathland	322	322	322	322	322
Sclerophyllous vegetation	323	0	323	323	323
Transitional woodland/shrub	324	0	0	0	0
Sparsely vegetated areas	333	0	0	0	0
Inland marshes	411	411	411	411	411
Peat bogs	412	0	0	0	412
Salt marshes	421	0	421	421	421

Class 242 is corrected in the Mediterranean Mountains zone, being excluded below 500 m in the following regions: Val d'Aosta, Piemonte, Lombardia, Veneto, Trentino, Alto Adige, Friuli

Appendix II – 15

CLC class re-selection rules – Latvia

CLC classes	CLC codes	Boreal	Nemoral	Continental
Non-irrigated arable land	211	0	0	0
Permanently irrigated land	212	0	0	0
Rice fields	213	0	0	0
Vineyards	221	0	0	0
Fruit trees and berry plantations	222	0	0	0
Olive groves	223	0	0	0
Pastures	231	0	0	0
Annual crops associated with permanent crops	241	0	0	0
Complex cultivation patterns	242	0	0	0
Land principally occupied by agriculture	243	243	243	0
Agro-forestry areas	244	0	0	0
Natural grasslands	321	0	321	321
Moors and heathland	322	0	0	0
Sclerophyllous vegetation	323	0	0	0
Transitional woodland/scrub	324	0	0	0
Sparsely vegetated areas	333	0	0	0
Inland marshes	411	0	0	411
Peat bogs	412	0	0	0
Salt marshes	421	421	421	421

Appendix II – 16

CLC class re-selection rules – Lithuania

CLC classes	CLC codes	Continental	Nemoral
Non-irrigated arable land	211	0	0
Permanently irrigated land	212	0	0
Rice fields	213	0	0
Vineyards	221	0	0
Fruit trees and berry plantations	222	0	0
Olive groves	223	0	0
Pastures	231	0	0
Annual crops associated with permanent crops	241	0	0
Complex cultivation patterns	242	0	0
Land principally occupied by agriculture	243	243	243
Agro-forestry areas	244	0	0
Natural grasslands	321	321	321
Moors and heathland	322	0	0
Sclerophyllous vegetation	323	0	0
Transitional woodland/scrub	324	0	0
Sparsely vegetated areas	333	0	0
Inland marshes	411	411	411
Peat bogs	412	0	0
Salt marshes	421	0	0

Appendix II – 17

CLC class re-selection rules – Luxembourg

CLC classes	CLC codes	Atlantic Central	Continental
Non-irrigated arable land	211	0	0
Permanently irrigated land	212	0	0
Rice fields	213	0	0
Vineyards	221	0	0
Fruit trees and berry plantations	222	0	0
Olive groves	223	0	0
Pastures	231	0	0
Annual crops associated with permanent crops	241	0	0
Complex cultivation patterns	242	0	0
Land principally occupied by agriculture	243	0	0
Agro-forestry areas	244	0	0
Natural grasslands	321	321	321
Moors and heathland	322	322	322
Sclerophyllous vegetation	323	0	0
Transitional woodland/scrub	324	0	0
Sparsely vegetated areas	333	0	0
Inland marshes	411	411	411
Peat bogs	412	0	0
Salt marshes	421	0	0

Appendix II – 18

CLC class re-selection rules – The Netherlands

CLC classes	CLC codes	Atlantic North	Atlantic Central	Continental
Non-irrigated arable land	211	0	0	0
Permanently irrigated land	212	0	0	0
Rice fields	213	0	0	0
Vineyards	221	0	0	0
Fruit trees and berry plantations	222	0	0	0
Olive groves	223	0	0	0
Pastures	231	0	0	0
Annual crops associated with permanent crops	241	0	0	0
Complex cultivation patterns	242	0	0	0
Land principally occupied by agriculture	243	0	0	0
Agro-forestry areas	244	0	0	0
Natural grasslands	321	321	321	321
Moors and heathland	322	322	322	322
Sclerophyllous vegetation	323	0	323	0
Transitional woodland/shrub	324	0	0	0
Sparsely vegetated areas	333	0	0	0
Inland marshes	411	411	411	411
Peat bogs	412	0	0	0
Salt marshes	421	421	421	421

Class 3.2.1 (natural grasslands) is deleted when occurring on dunes.

Class 2.3.1 (pastures) is added when occurring on peatland (see chapter 2.3 for explanation).

Appendix II – 19

CLC class re-selection rules – Poland

CLC classes	CLC codes	Alpine South	Continental	Nemoral
Non-irrigated arable land	211	0	0	0
Permanently irrigated land	212	0	0	0
Rice fields	213	0	0	0
Vineyards	221	0	0	0
Fruit trees and berry plantations	222	0	0	0
Olive groves	223	222	0	0
Pastures	231	231	231	231
Annual crops associated with permanent crops	241	0	0	0
Complex cultivation patterns	242	0	242	242
Land principally occupied by agriculture	243	243	0	0
Agro-forestry areas	244	0	0	0
Natural grasslands	321	321	321	321
Moors and heathland	322	0	0	0
Sclerophyllous vegetation	323	0	0	0
Transitional woodland/shrub	324	0	0	0
Sparsely vegetated areas	333	0	0	0
Inland marshes	411	411	411	0
Peat bogs	412	0	0	411
Salt marshes	421	0	421	421

Appendix II – 20

CLC class re-selection rules – Portugal

CLC classes	CLC codes	Lusitanian	Mediterranean Mountains	Mediterranean North	Mediterranean South
Non-irrigated arable land	211	0	0	0	0
Permanently irrigated land	212	0	0	0	0
Rice fields	213	0	0	0	0
Vineyards	221	0	0	0	0
Fruit trees and berry plantations	222	0	0	0	0
Olive groves	223	223	223	223	223
Pastures	231	231	231	231	231
Annual crops associated with permanent crops	241	0	241	241	241
Complex cultivation patterns	242	0	242	0	0
Land principally occupied by agriculture	243	243	243	243	243
Agro-forestry areas	244	244	244	244	244
Natural grasslands	321	321	321	321	321
Moors and heathland	322	322	322	322	322
Sclerophyllous vegetation	323	323	323	323	323
Transitional woodland/scrub	324	0	0	0	0
Sparsely vegetated areas	333	0	0	0	0
Inland marshes	411	411	411	411	411
Peat bogs	412	0	0	0	412
Salt marshes	421	421	421	421	421

Appendix II – 21

CLC class re-selection rules – Romania

CLC classes	CLC codes	Alpine South	Continental	Boreal	Pannonian
Non-irrigated arable land	211	211	0	0	0
Rice fields	213	0	0	0	0
Vineyards	221	0	0	0	0
Fruit trees and berry plantations	222	222	0	0	0
Olive groves	223	0	0	0	0
Pastures	231	231	231	231	231
Annual crops associated with permanent crops	241	0	241	0	0
Complex cultivation patterns	242	242	242	242	0
Land principally occupied by agriculture	243	243	243	243	243
Agro-forestry areas	244	0	0	0	0
Natural grasslands	321	321	321	0	321
Moors and heathland	322	322	322	322	322
Sclerophyllous vegetation	323	0	323	0	0
Transitional woodland/shrub	324	0	324	0	324
Sparsely vegetated areas	333	0	0	0	333
Inland marshes	411	411	411	0	411
Peat bogs	412	0	0	0	0
Salt marshes	421	0	421	0	421

In the area of the Danube Delta only natural grassland is selected.

All what is above 1800 m is excluded.

Appendix II – 22

CLC class re-selection rules – Slovakia

CLC class	CLC codes	Alpine South	Continental	Pannonian
Non-irrigated arable land	211	0	0	0
Permanently irrigated land	212	0	0	0
Rice fields	213	0	0	0
Vineyards	221	0	0	0
Fruit trees and berry plantations	222	222	0	0
Olive groves	223	0	0	0
Pastures	231	231	231	231
Annual crops associated with permanent crops	241	241	0	0
Complex cultivation patterns	242	242	0	0
Land principally occupied by agriculture	243	243	0	243
Agro-forestry areas	244	0	0	0
Natural grasslands	321	321	321	321
Moors and heathland	322	322	322	322
Sclerophyllous vegetation	323	0	0	0
Transitional woodland/scrub	324	0	0	0
Sparsely vegetated areas	333	0	0	333
Inland marshes	411	411	411	411
Peat bogs	412	0	0	0
Salt marshes	421	0	0	0

CLC selection above 1400 m excluded from mapping.

Appendix II – 23

CLC class re-selection rules – Slovenia

CLC class	CLC codes	Alpine South	Continental	Mediterranean Mountains	Mediterranean North
Non-irrigated arable land	211	0	0	0	0
Permanently irrigated land	212	0	0	0	0
Rice fields	213	0	0	0	0
Vineyards	221	0	0	0	0
Fruit trees and berry plantations	222	222	0	222	0
Olive groves	223	0	0	223	0
Pastures	231	231	0	231	231
Annual crops associated with permanent crops	241	241	0	241	241
Complex cultivation patterns	242	242	0	242	242
Land principally occupied by agriculture	243	243	0	243	243
Agro-forestry areas	244	244	0	244	244
Natural grasslands	321	321	321	321	321
Moors and heathland	322	322	322	322	322
Sclerophyllous vegetation	323	0	0	323	0
Transitional woodland/shrub	324	0	324	0	0
Sparsely vegetated areas	333	0	0	0	0
Inland marshes	411	411	411	411	411
Peat bogs	412	0	0	0	0
Salt marshes	421	421	421	421	421

Class 2.4.2 (complex cultivation patterns) is not mapped when height < 350 m and slope < 2%.

Appendix II – 24

CLC class re-selection rules – Spain

CLC class	CLC codes	Alpine South	Atlantic Central	Lusitanian
Non-irrigated arable land	211	0	0	0
Permanently irrigated land	212	0	0	0
Rice fields	213	0	0	0
Vineyards	221	0	0	0
Fruit trees and berry plantations	222	0	0	0
Olive groves	223	0	0	0
Pastures	231	231	231	231
Annual crops associated with permanent crops	241	0	241	0
Complex cultivation patterns	242	0	242	0
Land principally occupied by agriculture	243	243	0	243
Agro-forestry areas	244	244	0	244
Natural grasslands	321	321	321	0
Moors and heathland	322	322	322	322
Sclerophyllous vegetation	323	0	323	323
Transitional woodland/shrub	324	0	0	0
Sparsely vegetated areas	333	0	0	0
Inland marshes	411	411	411	411
Peat bogs	412	0	0	0
Salt marshes	421	0	421	421

CLC class	CLC codes	Mediterranean Mountains	Mediterranean North	Mediterranean South
Non-irrigated arable land	211	0	0	0
Permanently irrigated land	212	0	0	0
Rice fields	213	0	0	0
Vineyards	221	0	0	0
Fruit trees and berry plantations	222	0	0	0
Olive groves	223	0	0	0
Pastures	231	231	231	231
Annual crops associated with permanent crops	241	241	241	241
Complex cultivation patterns	242	242	0	0
Land principally occupied by agriculture	243	243	243	243
Agro-forestry areas	244	244	244	244
Natural grasslands	321	321	321	321
Moors and heathland	322	322	322	322
Sclerophyllous vegetation	323	323	323	323
Transitional woodland/shrub	324	0	0	0
Sparsely vegetated areas	333	0	0	0
Inland marshes	411	411	411	411
Peat bogs	412	0	0	412
Salt marshes	421	421	421	421

Class 3.1.1. (broadleaved forest) is added in NATURA 2000, IBA and PBA sites in the South-East part of the Mediterranean South zone.

Appendix II – 25

CLC class re-selection rules – Sweden

CLC classes	CLC codes	Alpine North	Continental	Boreal	Nemoral
Non-irrigated arable land	211	0	0	0	0
Permanently irrigated land	212	0	0	0	0
Rice fields	213	0	0	0	0
Vineyards	221	0	0	0	0
Fruit trees and berry plantations	222	0	0	0	0
Olive groves	223	0	0	0	0
Pastures	231	231	231	231	231
Annual crops associated with permanent crops	241	0	0	0	0
Complex cultivation patterns	242	0	0	242	242
Land principally occupied by agriculture	243	243	243	243	243
Agro-forestry areas	244	0	0	244	244
Natural grasslands	321	0	321	321	321
Moors and heathland	322	0	322	0	0
Sclerophyllous vegetation	323	0	0	0	0
Transitional woodland/shrub	324	0	324	0	0
Sparsely vegetated areas	333	0	333	0	0
Inland marshes	411	0	411	411	411
Peat bogs	412	0	0	0	0
Salt marshes	421	0	421	421	421

Classes 324 and 333 are mapped on the Åland islands only.

Appendix II – 26

CLC class re-selection rules – United Kingdom

CLC class	CLC codes	Atlantic North	Atlantic Central
Non-irrigated arable land	211	0	0
Permanently irrigated land	212	0	0
Rice fields	213	0	0
Vineyards	221	0	0
Fruit trees and berry plantations	222	0	0
Olive groves	223	0	0
Pastures	231	0	0
Annual crops associated with permanent crops	241	0	0
Complex cultivation patterns	242	0	0
Land principally occupied by agriculture	243	0	0
Agro-forestry areas	244	0	0
Natural grasslands	321	321	321
Moors and heathland	322	322	322
Sclerophyllous vegetation	323	0	0
Transitional woodland/scrub	324	0	0
Sparsely vegetated areas	333	333	0
Inland marshes	411	411	411
Peat bogs	412	412	0
Salt marshes	421	421	421

Sparsely vegetated areas are mapped above 500 m.

Raised peat bogs (4.1.2) are excluded in Ulster - see chapter 2.3 for explanation.

The agricultural area in Scotland is identified using LPIS data (see chapter 2.3 for explanation).

Appendix III: Revised list of habitats from Annex I of the Habitats Directive that depend on, or are associated with, extensive agricultural practices

For the consultation meeting in December 2006 the EEA proposed a new list of habitats from Annex I of the Habitats Directive that depend on, or are associated with, extensive agricultural practices. This list built on a review by the EEA Topic Centre for Nature Protection and Biodiversity and revised a previous proposal by Ostermann, 1998. Following the country consultation period the list of proposed habitats was reviewed again on the basis of country feedback, EEA internal discussions and some expert advice.

Table III.1 contains the final selection by the EEA of habitats that are characteristic of HNV farmland as they generally depend on extensive farming practices. These habitats have been grouped into two categories: those that clearly fulfil the conditions to be listed, and those where doubts exist or the relationship with extensive farming practices only holds true for part of their distribution in Europe. The latter ones are also marked with a ° and were not considered by the EEA/JRC in the selection of relevant Natura 2000, IBA and PBA sites.

This selection is necessarily subjective to some degree; relevant information does simply not exist for all habitats across their range in Europe. Inclusion in the first category required a clear dependence on extensive agricultural land use and an increase in the diversity or extension of the relevant habitat type is not enough. Some habitats proposed by countries were excluded from the final list if they represent pioneer habitats (e.g. class 2120 - shifting dunes along the shoreline) or appeared to be climax habitats (e.g. Olea and Ceratonia forests). In addition, those habitats that still underlie a more natural dynamic (e.g. coastal dunes) were less likely to receive a 'full status' than those in more transformed landscapes (e.g. Pannonic inland dunes).

Notes: D – degree of habitat dependence on agricultural practices (usually extensive ones):
f – fully dependent;
p - partly dependent, the agricultural practices prolong the habitat existence or enlarge its area of distribution.

Table III.1 - Final selection of habitats that are characteristic of HNV farmland (marked in yellow the habitats where doubts exist about the relationship habitat/HNV, or the relationship with extensive farming practices only holds true for part of their distribution in Europe)

Code	Habitat name	D	Comment
1330 °	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	f *	* some types only
1340	Inland salt meadows	p	
1530	Pannonic salt steppes and salt marshes	p	
1630	Boreal Baltic coastal meadows	p	
2130 °	Fixed coastal dunes with herbaceous vegetation (grey dunes)	p	* at least some sub-types dependent on grazing
2140 °	Decalcified fixed dunes with Empetrum nigrum	p	
2150 °	Atlantic decalcified fixed dunes (Calluno-Ulicetea)	p	
2160 °	Dunes with Hippophae rhamnoides	p	
2170 °	Dunes with Salix repens ssp. argentea (Salicion	p	

Code	Habitat name	D	Comment
	arenariae)		
21A0	Machairs (* in Ireland)	f	rotational cultivation
2310	Dry sandy heaths with Calluna and Genista	f	
2320	Dry sandy heaths with Calluna and Empetrum nigrum	f	
2330	Inland dunes with open Corynephorus and Agrostis grasslands	f	
2340	Pannonic inland dunes	f	
4010	Northern Atlantic wet heaths with Erica tetralix	f	
4020	Temperate Atlantic wet heaths with Erica ciliaris and Erica tetralix	f	
4030	Dry heaths (all subtypes)	f	
4040	Dry Atlantic coastal heaths with Erica vagans	f	
4090	Endemic oro-Mediterranean heaths with gorse	p	
5130	Juniperus communis formations on heaths or calcareous grasslands	p	
5420	Sarcopoterium spinosum phryganas	p	
5430	Endemic phryganas of the Euphorbio-Verbascion	p	
6110	Rupicolous calcareous or basophilic grasslands of the Alysso-Sedion albi	p	
6120	Xeric sand calcareous grasslands	p	
6140	Siliceous Pyrenean Festuca eskia grasslands	p	
6150	Siliceous alpine and boreal grasslands	p	
6160	Oro-Iberian Festuca indigesta grasslands	p	
6170	Alpine and subalpine calcareous grasslands	p	
6180	Macaronesian mesophile grasslands	p	
6190	Rupicolous pannonic grasslands (Stipo-Festucetalia pallentis)	f	
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites)	f	
6220	Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea	f	
6230	Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and sub-mountain areas, in continental Europe)	f	except in natural alpine and sub-alpine grasslands
6240	Sub-pannonic steppic grassland	f	
6250	Pannonic loess steppic grasslands	f	
6260	Pannonic sand steppes	f	

Code	Habitat name	D	Comment
6270	Fennoscandian lowland species-rich dry to mesic grasslands	f	
6280	Nordic alvar and precambrian calcareous flatrocks	f	
62A0	Eastern sub-mediteranean dry grasslands (Scorzoneratalia villosae)	f	
6310	Sclerophyllous grazed forests (dehesas) with Quercus suber and/or Quercus ilex	f	
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	f	
6420	Mediterranean tall humid herb grasslands of the Molinio-Holoschoenion	p	
6430 °	Eutrophic tall herbs	p	some types
6440	Alluvial meadows of river valleys of the Cnidion dubii	f	
6450	Northern boreal alluvial meadows	f	
6510	Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis)	f	
6520	Mountain hay meadows	f	
6530	Fennoscandian wooded meadows	f	
7140 °	Transition mires and quaking bogs	p	
7230	Calcareous (and alkaline) fens	p	
8230 °	Siliceous rocky slopes with pioneer vegetation	p	
8240	Limestone pavements	p	
9070	Fennoscandian wooded pastures	f	

Appendix IV – Rules for CLC class selection in NATURA 2000 and IBAs

1	1.1.1 Continuous urban fabric
2	1.1.2 Discontinuous urban fabric
3	1.2.1 Industrial or commercial units
4	1.2.2 Road and rail networks and associated land
5	1.2.3 Port Areas
6	1.2.4 Airports
7	1.3.1 Mineral extraction sites
8	1.3.2 Dump sites
9	1.3.3 Construction sites
10	1.4.1 Green urban areas
11	1.4.2 Sport and leisure facilities
12	2.1.1 Non-irrigated arable land (ES - P only)
13	2.1.2 Permanently irrigated land
14	2.1.3 Rice fields (ES - P - I - HU)
15	2.2.1 Vineyards
16	2.2.2 Fruit trees and berry plantations
17	2.2.3 Olive groves
18	2.3.1 Pastures
19	2.4.1 Annual crops associated with permanent crops
20	2.4.2 Complex cultivation patterns
21	2.4.3 Land principally occupied by agriculture, with significant areas of natural vegetation
22	2.4.4 Agro-forestry areas
23	3.1.1 Broad-leaved forest
24	3.1.2 Coniferous forest
25	3.1.3 Mixed forest
26	3.2.1 Natural grassland
27	3.2.2 Moors and heathland
28	3.2.3 Sclerophyllous vegetation
29	3.2.4 Transitional woodland-scrub
30	3.3.1 Beaches, dunes, sands
31	3.3.2 Bare rocks
32	3.3.3 Sparsely vegetated areas
33	3.3.4 Burnt areas
34	3.3.5 Glaciers and perpetual snow
35	4.1.1 Inland marshes
36	4.1.2 Peat bogs
37	4.2.1 Salt marshes
38	4.2.2 Salines
39	4.2.3 Intertidal flats
40	5.1.1 Water courses
41	5.1.2 Water bodies
42	5.2.1 Coastal lagoons
43	5.2.2 Estuaries
44	5.2.3 Sea and ocean

Accepted
Rejected
General rules (Env.zone + Country)
Only in selected Countries

Appendix V – Species associated with High Nature Value Farmland in the Habitats Directive (Annexes II and IV)

Species selection

The identification of HNV farmland on the basis of certain bird and butterfly species has been performed in the presented study using other data sources than NATURA 2000 (see chapters 2.4.2 and 2.4.3 of this report). However, it was felt useful to analyse the potential contribution of other taxonomic species groups of European interest in the identification of HNV farmland areas: mammals, insects (*Hemiptera, Orthoptera, and Coleoptera*) and plants.

For mammals and insects, species listed in Annex II and IV of the Habitats Directive have been thoroughly analysed with regard to their dependence on farmed habitat types. For plants, due to limitation of information, only priority species have been considered. The evaluation and selection of species was based on published literature; the information sheets, prepared by ETC BD for Annex II species during previous years were very helpful in this context.

Among the relevant species, a distinction in three groups was made as regards their geographic distribution range: stenotopic species (i.e. with limited distribution), species with medium distribution range and species with broad distribution range. These groups refer to the suitability of the respective species as indicators of HNV farmland areas - the wider the geographic distribution of the species assessed (and the more specific their habitat requirements) the higher their potential to serve as indicators for the likely presence of HNV farmland. In addition, species that have a less strict dependence on farmland habitat types were grouped separately. The results of the analysis are as follows:

Plants

Out of the 204 analysed species (priority species listed in Annex II of the Habitats Directive),

- Four plant species are considered as the best indicators both in terms of their dependence on farmland habitat types and on their broad distribution range: *Serratula lycopifolia, Bromus grossus, Stipa zalesskii* and *Gladiolus palustris*. However, *Stipa zalesskii* is a taxonomically problematic species.
- Eleven species are relevant in terms of their dependence on farmland habitat types, but their distribution range is limited to some regions: *Dianthus diutinus, Leontodon siculus, Saussurea alpina subsp. esthonica, Gentianella bohemica, Stipa austroitalica, Astragalus algarbiensis, Astragalus centralpinus, Ononis hackelii, Colchicum arenarium, Scilla litardierei, Trisetum subalpestre*.
- Other 13 species are relevant in terms of their dependence on farmland habitat types, but their distribution range is very limited: *Ophioglossum polyphyllum, Campanula bohemica, Dianthus arenarius subsp. bohemicus, Artemisia laciniata, Centaurium rigualii, Astragalus aquilanus, Astragalus verrucosus, Lythrum flexuosum, Galium cracoviense, Gentianella anglica ssp. anglica, Linaria ricardoi, Narcissus asturiensis, Pinguicula nevadensis*.

The distribution of the above mentioned plants in the European countries is specified in Table V.1.

There is also a group of species with broader habitat amplitude (growing in other habitat types), but often growing in agriculturally managed land as well. They were not used for selecting Natura 2000 sites for the HNV farmland areas project, but could be useful in regional or local studies if the importance of extensive agricultural practices for their presence in specific areas is established: *Botrychium simplex, Echium russicum, Campanula serrata, Herniaria latifolia* subsp. *litardierei, Artemisia granatensis, Artemisia pancicii, Aster pyrenaeus, Cirsium brachycephalum, Lamyropsis microcephala, Senecio elodes,*

Tephroseris longifolia subsp. *moravica, Arabis scopoliana, Biscutella neustriaca, Crambe tataria, Eleocharis carniolica, Centaurium somedanum* and *Stipa styriaca*.

Table V.1: Distribution of selected plant species

Name	Distribution	
Bromus grossus	B	AT, BE, CH (4 sites), CZ, DE, FR, IT, LU
Gladiolus palustris	B	AL, AT, BG, BY, CZ, DE, FR, CH, HU, IT, LT, PL (probably extinct), RO, RS, SK UA, YU. Everywhere rare
Serratula lycopifolia	B	AT, BH, CR, CZ, FR, HU, IT, PL (1 site), RO, RS, SI, SK (1 site), UA
Stipa zalesskii	B	CZ, KZ, MD, RO, RS, UA
Dianthus diutinus	R	HU, YU. Extinct in RO
Leontodon siculus	R	IT: Calabria, NE Sicily
Saussurea alpina subsp. *esthonica*	R	EE, LV (2 sites), RS (St. Petersburg region)
Gentianella bohemica	R	AT, CZ, DE. PL: probably extinct
Ophioglossum polyphyllum	R	PT: Canary Islands and one site in mainland
Stipa austroitalica	R	IT
Astragalus algarbiensis	R	ES, PT
Astragalus centralpinus	R	FR, IT
Ononis hackelii	R	PT
Colchicum arenarium	R	CR, HU, RO, SK (2 populations), Serbia
Scilla litardei	R	BH, CR, SI, Montenegro
Trisetum subalpestre	R	FI, NO, SE

Distribution: S: stenotopic. R: restricted. B: broader. AL – Albania, AT – Austria, BE – Belgium, BG – Bulgaria, BH – Bosnia and Herzegovina, BY – Belarus, CH – Switzerland, CR – Croatia, CZ – Czech Republic, DE – Germany, EE – Estonia, ES – Spain, FI – Finland, FR – France, HU – Hungary, IT – Italy, KZ – Kazakhstan, LT – Lithuania, LU – Luxembourg, LV – Latvia, MD – Moldova, NO – Norway, PL – Poland, PT - Portugal, RO - Romania, RS – Russia, SE – Sweden, SI – Slovenia, SK – Slovakia, UA – Ukraine, YU – countries of former Yugoslavia.

Mammals

Out of the 142 *Mammal* species listed in Annex II and Annex IV of the Habitats Directive:

- Two species are considered to be the best indicators both in terms of their dependence on farmland habitat-types and on their broad distribution range: European souslik (*Spermophilus citellus)* and Common hamster (*Cricetus cricetus*
- Two species are relevant in terms of their dependence on farmland habitat-types but their distribution range is limited to a few regions: Southern birch mouse (*Sicista subtilis)* and Steppe polecat (*Mustela eversmannii)*.
- Seven species are of very limited distribution range: Spotted souslik (*Spermophilus suslicus),* Cabrera's vole *(Microtus cabrerae),* Algerian hedgehog *(Atelerix algirus*), Canary shrew *(Crocidura canariensis)* and Sicilian shrew *Crocidura sicula*, Root vole (*Microtus oeconomus arenicola* and *Microtus oeconomus mehelyi)*. The last two species have a more limited dependence on farmland habitat-types.

Insects

Out of the 49 *Hemiptera, Orthoptera* and *Coleoptera* species listed in Annex II and Annex IV of the Habitat Directive:

- Two species are considered to be the best indicators in terms of their large dependence on farmland habitat-types as well as of their broad distribution range: *Paracaloptenus caloptenoides* and *Saga pedo*. *Bolbelasmus unicornis* has also a broad distribution range, but its dependence on farmland habitat types is more limited.

- Three species are relevant in terms of their dependence on farmland habitat types, but their distribution range is limited to a few regions: *Carabus hungaricus, Pholidoptera transsylvanica, Stenobothrus (Stenobothrodes) eurasius*.
- Nine species are of very limited distribution range: *Dorcadion fulvum cervae, Pilemia tigrina, Probaticus subrugosus, Odontopodisma rubripes, Isophya stysi, Isophya costata,* and *Myrmecophilus baronii.* Among them, two species have a more limited dependence on farmland habitat types: *Carabus hampei* and *Brachytrupes megacephalus*.

The distribution of the above mentioned animals in the European countries is specified in Table V.2.

Table V.2: Distribution of selected animal species

Name	Distribution	
Mammals		
Spermophilus citellus	B	Central EU, Balkan
Cricetus cricetus	B	NL,BE,FR,DE,CZ,PL,SK,HU,RO,SI,CR,BG,SE
Sicista subtiliis	R	Pannonian Plain, PL,RO,BG,YU,MD,RS,UA
Mustela eversmannii	R	CZ,AT,SK,PL,RO
Spermophilus suslicus	S	PL only (among EU 25)
Microtus cabrerae	S	Iberian Peninsula only (among EU 25)
Atelerix algirus	S	ES, PT (Canary Islands), MT
Crocidura canariensis	S	PT (eastern Canary Islands)
Crocidura sicula	S	IT,MT (Sicilian-Maltese archipelago)
Microtus oeconomus arenicola	S	NL only (among EU 25)
Microtus oeconomus mehelyi	S	HU,SK (among EU 25)
Insects (*Hemiptera, Orthoptera, Coleoptera*)		
Paracaloptenus caloptenoides	B	AT,BH,BG,CR,GR,HU,YU,FYROM,MD,RO,SI,TU
Saga pedo	B	FR,GR,PT,IT,ES,BG,HU,RO,SK,CH,RS,SI,CR,YU, FYROM
Bolbelasmus unicornis	B	AT,BG,DE,CZ,FR,GR,HU,IT,YU,SK,UA,UK
Carabus hungaricus	R	AT, CZ, SK, RO
Pholidoptera transsylvanica	R	BG,RO,HU,SK
Stenobothrus (Stenobothrodes) eurasius	R	AT?, CZ, HU, SK, RO
Dorcadion fulvum cervae	S	HU
Pilemia tigrina	S	HU, RO, BG
Probaticus subrugosus	S	SK, HU
Odontopodisma rubripes	S	RO,HU,SK
Isophya stysi	S	RO,HU,SK
Isophya costata	S	AT,HU,RO
Myrmecophilus baronii	S	MT
Carabus hampei	S	HU,RO,UA
Brachytrupes megacephalus	S	MT, IT

Distribution: S: stenotopic. R: restricted. B: broader. AT – Austria, BE – Belgium, BG – Bulgaria, BH – Bosnia and Herzegovina, CH – Switzerland, CR – Croatia, CZ – Czech Republic, DE – Germany, ES – Spain, FR – France, FYROM – former Yugoslav Republic of Macedonia, GR – Greece, HU – Hungary, IT – Italy, MD – Moldova, MT – Malta, NL- The Netherlands, PL – Poland, PT - Portugal, RO - Romania, RS – Russia, SE – Sweden, SI – Slovenia, SK – Slovakia, TU – Turkey, UA – Ukraine, UK – United Kingdom, YU – countries of former Yugoslavia.

Appendix VI – HNV Farmland Bird Species and IBA qualifying status

Common name	Scientific name	HNV farmland species	IBA 'C' criteria trigger species in EU27
Black-crowned Night-heron	*Nycticorax nycticorax*	Yes	Yes
White Stork	*Ciconia ciconia*	Yes	Yes
Mute Swan	*Cygnus olor*	Yes (winter)	Yes
Tundra Swan	*Cygnus columbianus*	Yes (winter)	Yes
Whooper Swan	*Cygnus cygnus*	Yes (winter)	Yes
Bean Goose	*Anser fabalis*	Yes (winter)	Yes
Pink-footed Goose	*Anser brachyrhynchus*	Yes (winter)	Yes
Greater White-fronted Goose	*Anser albifrons*	Yes (winter)	Yes
Lesser White-fronted Goose	*Anser erythropus*	Yes (winter)	Yes
Greylag Goose	*Anser anser*	Yes (winter)	Yes
Barnacle Goose	*Branta leucopsis*	Yes (winter)	Yes
Brent Goose	*Branta bernicla*	Yes (winter)	Yes
Red-breasted Goose	*Branta ruficollis*	Yes (winter)	Yes
Garganey	*Anas querquedula*	Yes	Yes
Black-winged Kite	*Elanus caeruleus*	Yes	Yes
Black Kite	*Milvus migrans*	Yes	Yes
Red Kite	*Milvus milvus*	Yes	Yes
Egyptian Vulture	*Neophron percnopterus*	Yes	Yes
Griffon Vulture	*Gyps fulvus*	Yes	Yes
Cinereous Vulture	*Aegypius monachus*	Yes	Yes
Short-toed Snake-eagle	*Circaetus gallicus*	Yes	Yes
Northern Harrier	*Circus cyaneus*	Yes	Yes
Montagu's Harrier	*Circus pygargus*	Yes	Yes
Levant Sparrowhawk	*Accipiter brevipes*	Yes	Yes
Long-legged Buzzard	*Buteo rufinus*	Yes	Yes
Lesser Spotted Eagle	*Aquila pomarina*	Yes	Yes
Greater Spotted Eagle	*Aquila clanga*	Yes	Yes
Eastern Imperial Eagle	*Aquila heliaca*	Yes	Yes
Spanish Imperial Eagle	*Aquila adalberti*	Yes	Yes
Booted Eagle	*Hieraaetus pennatus*	Yes	Yes
Bonelli's Eagle	*Hieraaetus fasciatus*	Yes	Yes
Lesser Kestrel	*Falco naumanni*	Yes	Yes
Common Kestrel	*Falco tinnunculus*	Yes	
Red-footed Falcon	*Falco vespertinus*	Yes	Yes
Lanner Falcon	*Falco biarmicus*	Yes	Yes
Saker Falcon	*Falco cherrug*	Yes	Yes
Black Grouse	*Tetrao tetrix*	Yes	Yes
Chukar	*Alectoris chukar*	Yes	
Red-legged Partridge	*Alectoris rufa*	Yes	
Black Francolin	*Francolinus francolinus*	Yes	
Grey Partridge	*Perdix perdix*	Yes	
Common Quail	*Coturnix coturnix*	Yes	
Spotted Crake	*Porzana porzana*	Yes	Yes
Corncrake	*Crex crex*	Yes	Yes
Common Crane	*Grus grus*	Yes	Yes
Little Bustard	*Tetrax tetrax*	Yes	Yes
Houbara Bustard	*Chlamydotis undulata*	Yes	Yes
Great Bustard	*Otis tarda*	Yes	Yes
Eurasian Oystercatcher	*Haematopus ostralegus*	Yes	Yes
Eurasian Thick-knee	*Burhinus oedicnemus*	Yes	Yes
Cream-coloured Courser	*Cursorius cursor*	Yes	Yes
Collared Pratincole	*Glareola pratincola*	Yes	Yes
Eurasian Golden Plover	*Pluvialis apricaria*	Yes (winter)	Yes
Northern Lapwing	*Vanellus vanellus*	Yes	Yes
Ruff	*Philomachus pugnax*	Yes	Yes
Common Snipe	*Gallinago gallinago*	Yes	Yes
Great Snipe	*Gallinago media*	Yes	Yes
Black-tailed Godwit	*Limosa limosa*	Yes	Yes

Common name	Scientific name	HNV farmland species	IBA 'C' criteria trigger species in EU27
Eurasian Curlew	*Numenius arquata*	Yes	Yes
Common Redshank	*Tringa totanus*	Yes	Yes
Black-bellied Sandgrouse	*Pterocles orientalis*	Yes	Yes
Pin-tailed Sandgrouse	*Pterocles alchata*	Yes	Yes
Stock Dove	*Columba oenas*	Yes	
European Turtle-dove	*Streptopelia turtur*	Yes	
Barn Owl	*Tyto alba*	Yes	
Common Scops-owl	*Otus scops*	Yes	
Little Owl	*Athene noctua*	Yes	
Short-eared Owl	*Asio flammeus*	Yes	Yes
European Bee-eater	*Merops apiaster*	Yes	
European Roller	*Coracias garrulus*	Yes	Yes
Eurasian Hoopoe	*Upupa epops*	Yes	
Eurasian Wryneck	*Jynx torquilla*	Yes	
Eurasian Green Woodpecker	*Picus viridis*	Yes	
Syrian Woodpecker	*Dendrocopos syriacus*	Yes	Yes
Dupont's Lark	*Chersophilus duponti*	Yes	Yes
Calandra Lark	*Melanocorypha calandra*	Yes	Yes
Greater Short-toed Lark	*Calandrella brachydactyla*	Yes	Yes
Lesser Short-toed Lark	*Calandrella rufescens*	Yes	
Crested Lark	*Galerida cristata*	Yes	
Thekla Lark	*Galerida theklae*	Yes	Yes
Wood Lark	*Lullula arborea*	Yes	Yes
Eurasian Skylark	*Alauda arvensis*	Yes	
Barn Swallow	*Hirundo rustica*	Yes	
Tawny Pipit	*Anthus campestris*	Yes	Yes
Yellow Wagtail	*Motacilla flava*	Yes	
Rufous-tailed Scrub-robin	*Erythropygia galactotes*	Yes	
Whinchat	*Saxicola rubetra*	Yes	
Common Stonechat	*Saxicola torquatus*	Yes	
Northern Wheatear	*Oenanthe oenanthe*	Yes	
Black-eared Wheatear	*Oenanthe hispanica*	Yes	
Fieldfare	*Turdus pilaris*	Yes (winter)	
Redwing	*Turdus iliacus*	Yes (winter)	
Common Grasshopper-warbler	*Locustella naevia*	Yes	
Eurasian River Warbler	*Locustella fluviatilis*	Yes	
Aquatic Warbler	*Acrocephalus paludicola*	Yes	Yes
Olivaceous Warbler	*Hippolais pallida*	Yes	
Olive-tree Warbler	*Hippolais olivetorum*	Yes	Yes
Orphean Warbler	*Sylvia hortensis*	Yes	
Barred Warbler	*Sylvia nisoria*	Yes	Yes
Common Whitethroat	*Sylvia communis*	Yes	
Red-backed Shrike	*Lanius collurio*	Yes	Yes
Lesser Grey Shrike	*Lanius minor*	Yes	Yes
Great Grey Shrike	*Lanius excubitor*	Yes	
Woodchat Shrike	*Lanius senator*	Yes	
Masked Shrike	*Lanius nubicus*	Yes	Yes
Red-billed Chough	*Pyrrhocorax pyrrhocorax*	Yes	Yes
Eurasian Jackdaw	*Corvus monedula*	Yes	
Rook	*Corvus frugilegus*	Yes	
Eurasian Tree Sparrow	*Passer montanus*	Yes	
Island Canary	*Serinus canaria*	Yes	
Eurasian Linnet	*Carduelis cannabina*	Yes	
Twite	*Carduelis flavirostris*	Yes	
Trumpeter Finch	*Bucanetes githagineus*	Yes	Yes
Yellowhammer	*Emberiza citrinella*	Yes	
Cirl Bunting	*Emberiza cirlus*	Yes	
Ortolan Bunting	*Emberiza hortulana*	Yes	Yes
Reed Bunting	*Emberiza schoeniclus*	Yes	
Black-headed Bunting	*Emberiza melanocephala*	Yes	
Corn Bunting	*Miliaria calandra*	Yes	

Appendix VII - Selected butterfly species for HNV farmland determination.

Table VII.1: List of 34 target-species fulfilling at least two of three criteria. For more details on the global distribution see Van Swaay & Warren (1999). Threatened species are listed as such in the Red Data Book of European Butterflies or on the IUCN Red List of threatened animals (ibidem). Species listed in the IUCN-list as Not Evaluated (NE) or Low Risk/near threatened (LR/nt) are not considered threatened.

Species	Global distribution restricted to Europe	Threatened	Bern Convention Habitat Directive
Pyrgus cirsii	x	x	
Zerynthia caucasica	x	x	
Parnassius apollo		x	x
Papilio hospiton	x		x
Pieris wollastoni	x	x	
Pieris cheiranthi	x	x	
Gonepteryx maderensis	x	x	
Lycaena ottomana	x	x	
Maculinea arion		x	x
Maculinea teleius		x	x
Maculinea nausithous		x	x
Maculinea rebeli	x	x	
Plebeius trappi	x	x	
Plebeius hespericus	x	x	
Polyommatus golgus	x		x
Polyommatus humedasae	x	x	x
Polyommatus galloi	x		x
Polyommatus dama	x	x	
Argynnis elisa	x		x
Euphydryas maturna		x	x
Euphydryas aurinia		x	x
Lopinga achine		x	x
Coenonympha oedippus		x	x
Coenonympha hero		x	x
Erebia christi	x	x	x
Erebia sudetica	x	x	x
Erebia epistygne	x	x	
Erebia calcaria	x		x
Melanargia arge	x		x
Hipparchia maderensis	x	x	
Hipparchia azorina	x	x	
Hipparchia occidentalis	x	x	
Hipparchia miguelensis	x	x	
Pseudochazara euxina	x	x	

Main Habitat	Species
Alpine grassland	*Erebia calcaria*
	Erebia Christi
	Erebia sudetica
	Parnassius apollo
	Polyommatus golgus
Dry grassland	*Argynnis elisa*
	Erebia epistygne
	Hipparchia azorina
	Hipparchia miguelensis
	Hipparchia occidentalis
	Lycaena ottomanus
	Maculinea arion
	Maculinea rebeli
	Melanargia arge
	Papilio hospiton
	Plebeius hespericus
	Plebeius trappi
	Polyommatus dama
	Polyommatus galloi
	Polyommatus humedasae
	Pseudochazara euxina
	Pyrgus cirsii
Humid grassland	*Coenonympha hero*
	Coenonympha oedippus
	Euphydryas aurinia
	Maculinea nausithous
	Maculinea teleius

Source: Van Swaay, C. & Warren, M. (2003), "Prime Butterfly Areas in Europe: priority sites for conservation", Wageningen, The Netherlands

Appendix VIII - List of selected PBA sites in EU-27 Member States

AUSTRIA
A-01, A-02, A-03, A-04, A-05

BELGIUM
B-01, B-02

BULGARIA
BG-08, BG-13

CZECH REPUBLIC
CZ-01, CZ-02, CZ-04, CZ-05, CZ-06, CZ-09, CZ-10

GERMANY
D-01, D-02, D-03, D-04, D-05, D-06, D-07, D-09,
D-11, D-12, D-13, D-14, D-15, D-16, D-17, D-18, D-19

SPAIN
E-01, E-02, E-03, E-04, E-05, E-06, E-07, E-08, E-09, E-10,
E-11, E-12, E-13, E-14

ESTONIA
EST-02, EST-03, EST-04, EST-05, EST-06, EST-07

FRANCE
F-01, F-03, F-06, F-07, F-08, F-10, F-12, F-13, F-16, F-17, F-18,
F-21, F-22, F-23, F-25, F-26

FINLAND
FIN-02, FIN-03, FIN-04, FIN-06, FIN-10, FIN-11

GREECE
GR-02, GR-04, GR-05, GR-06, GR-07, GR-08, GR-09, GR-10

HUNGARY
H-01, H-04, H-05, H-08, H-09, H-10,
H-11, H-12, H-13, H-18, H-19, H-22

ITALY
I-01, I-02, I-03, I-09, I-10, I-12, I-16, I-17, I-18, I-19, I-20,
I-24, I-26, I-28, I-31, I-32

REPUBLIC OF IRELAND
IRL-01, IRL-03

LUXEMBOURG
L-01

LITHUANIA
LT-01, LT-02, LT-03, LT-04, LT-05, LT-07, LT-08

THE NETHERLANDS
NL-01, NL-03

PORTUGAL
P-01, P-02, P-03, P-04, P-05

ROMANIA
RO-05, RO-06, RO-08, RO-09, RO-10, RO-11, RO-12, RO-14

SWEDEN
S-01, S-02, S-03, S-06, S-07, S-08, S-09, S-10, S-11, S-12

SLOVAKIA
SK-02, SK-03, SK-04, SK-05, SK-06, SK-08, SK-09, SK-10, SK-11, SK-13

SLOVENIA
SLO-01, SLO-02, SLO-03, SLO-04, SLO-05, SLO-06, SLO-07, SLO-08, SLO-09, SLO-11, SLO-12, SLO-14, SLO-15, SLO-16, SLO-17, SLO-18, SLO-19, SLO-20

UNITED KINGDOM
UK-02, UK-03, UK-05, UK-06

Appendix IX. Important Plant Areas (IPAs)

The Important Plant Area (IPA) programme is presented here as potential source for HNV farmland identification; data on IPA were not used in the mapping exercise since they are not extensively available over the EU-27.

The IPA programme tries to ensure the conservation of the best sites of wild plants and fungi in the world. The programme is fully relevant to the goals of the Convention on Biological Diversity and to the Global and European Plant Conservation Strategies.

The identified areas are exhibiting exceptional botanical richness or they host rare and threatened species and habitats. The sites are selected according to three criteria:

- Criterion A is the presence of threatened and endemic species on the site. Attention is paid to the species threatened on global and European level and to the threatened endemic and sub-endemic taxa.
- Criterion B represents extraordinary botanical richness within a broader biogeographical unit.
- Criterion C is based on the evaluation of the presence of habitats threatened on the European level.

To qualify as an IPA, a site must fufill at least one of the criteria. The national networks of IPAs should cover the best localities of those species and habitats that trigger site selection in the respective country.

Fig. IX.1- Traditional land use in NP Mala Fatra, Slovakia

The IPA programme is coordinated by PlantLife International. The organisation was leading several projects oriented on IPA identification mostly in Central and Eastern Europe. Important Plant Areas have been identified so far in 14 European countries. Eight of them are Member States of the European Union (Bulgaria, Czech Republic, Estonia, Poland, Romania, Slovakia, Slovenia, U.K.). IPA identification has already started in some other countries e.g. Italy, Hungary, Croatia, Serbia, Montenegro, FYR of Macedonia

Identified sites represent different areas and different features of interest. Information on IPAs are stored in the international IPA database and is available on www.plantlifeipa.org/reports.asp . The database

provides a brief description and location of the site, information on threatened species and habitats, land use, threats and protection status of the locality and through this information enables the identification of potential HNV areas.
The sites are localised by longitude and latitude information and site dot maps are available on the web. Some countries have fully digitised boundaries of IPA sites. For example, the Slovakia and Slovenia GIS layers are available on request from national project coordinators.

Appendix X. HNV farmland – shares per NUTS2 and relation between UAA and CLC agricultural classes

NUTS0	NUTS2	Denomination	HNV farmland area according to this study	Agricultural land (CLC agricultural classes + HNV areas)	Utilised Agricultural Area (official figures from EUROSTAT FSS)	Discrepancy (col2/col3)*100	Area share of HNV farmland (col1 / col2)
AT	NUTS_0	Austria	2,447,292	3,578,621	3,266,250	109.6	68.4
AT	AT11	Burgenland	77,415	236,799	189,100	125.2	32.7
AT	AT12	Niederösterreich	382,809	1,040,250	940,940	110.6	36.8
AT	AT13	Wien	1,733	6,809	8,390	81.2	25.5
AT	AT21	Kõrnten	273,778	315,879	305,960	103.2	86.7
AT	AT22	Steiermark	516,903	600,356	463,930	129.4	86.1
AT	AT31	Oberösterreich	452,568	631,745	565,070	111.8	71.6
AT	AT32	Salzburg	271,775	272,045	267,040	101.9	99.9
AT	AT33	Tirol	369,632	370,642	419,070	88.4	99.7
AT	AT34	Vorarlberg	100,679	104,096	106,750	97.5	96.7
BE	NUTS_0	Belgium	347,960	1,786,942	1,385,580	129.0	19.5
BE	BE10	Region de Bruxelles-Capitale / Brussels Hoofdstede	12	469	350	134.0	2.6
BE	BE21	Prov. Antwerpen	13,667	152,309	90,530	168.2	9.0
BE	BE22	Prov. Limburg (B)	19,722	134,847	85,520	157.7	14.6
BE	BE23	Prov. Oost-Vlaanderen	9,376	211,231	153,110	138.0	4.4
BE	BE24	Prov. Vlaams-Brabant	4,675	126,209	88,050	143.3	3.7
BE	BE25	Prov. West-Vlaanderen	14,820	247,911	212,480	116.7	6.0
BE	BE31	Prov. Brabant Wallon	681	73,694	63,460	116.1	0.9
BE	BE32	Prov. Hainaut	22,676	253,233	220,600	114.8	9.0
BE	BE33	Prov. Liège	89,545	192,823	159,190	121.1	46.4
BE	BE34	Prov. Luxembourg (B)	112,988	195,494	147,460	132.6	57.8
BE	BE35	Prov. Namur	59,798	198,722	164,830	120.6	30.1
BG	NUTS_0	Bulgaria	2,509,989	6,734,217	2,729,390	246.7	37.3
BG	BG11	Severozapaden	231,050	787,304	535,420	147.0	29.3
BG	BG12	Severen tsentralen	407,310	1,226,530	576,710	212.7	33.2
BG	BG13	Severoiztochen	289,150	1,428,290	640,460	223.0	20.2
BG	BG21	Yugozapaden	659,216	988,017	138,270	714.6	66.7
BG	BG22	Yuzhen tsentralen	620,065	1,419,050	300,820	471.7	43.7
BG	BG23	Yugoiztochen	303,198	885,026	537,710	164.6	34.3
CY	NUTS_0	Cyprus	342,045	637,043	151,500	420.5	53.7
CZ	NUTS_0	Czech Republic	824,227	4,605,733	3,557,770	129.5	17.9
CZ	CZ01	Praha	837	19,265	34,310	56.1	4.3
CZ	CZ02	Stredni Cechy	30,727	712,211	549,880	129.5	4.3
CZ	CZ03	Jihozapad	225,255	982,590	750,270	131.0	22.9
CZ	CZ04	Severozapad	160,673	454,365	312,670	145.3	35.4
CZ	CZ05	Severovychod	162,010	741,009	558,760	132.6	21.9

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CZ	CZ06	Jihovychod	45,138	902,313	740,060	121.9	5.0
CZ	CZ07	Stredni Morava	102,243	493,666	392,350	125.8	20.7
CZ	CZ08	Moravskoslezsko	97,344	300,314	219,470	136.8	32.4
DE	NUTS_0	Germany	3,162,699	21,607,362	17,127,350	126.2	14.6
DE	DE9	Niedersachsen	365,577	3,357,838	2,661,380	126.2	10.9
DE	DE1	Baden-Württemberg	469,515	1,874,177	1,473,120	127.2	25.1
DE	DE2	Bayern	965,829	4,074,784	3,294,900	123.7	23.7
DE	DE4	Brandenburg	212,097	1,630,255	1,347,410	121.0	13.0
DE	DE8	Mecklenburg-Vorpommern	224,510	1,631,180	1,362,450	119.7	13.8
DE	DEG	Thüringen	68,223	968,134	805,000	120.3	7.0
DE	DEA	Nordrhein-Westfalen	174,015	2,059,992	1,501,580	137.2	8.4
DE	DEB	Rheinland-Pfalz	184,062	1,016,551	715,830	142.0	18.1
DE	DEC	Saarland	35,617	129,201	76,860	168.1	27.6
DE	DED	Sachsen	57,336	1,124,796	917,500	122.6	5.1
DE	DEE	Sachsen-Anhalt	114,616	1,427,482	1,172,900	121.7	8.0
DE	DEF	Schleswig-Holstein	117,394	1,257,030	1,032,440	121.8	9.3
DE	DE7	Hessen	173,908	1,055,942	765,980	137.9	16.5
DK	NUTS_0	Denmark	172,267	3,446,150	2,707,690	127.3	5.0
DK	DK00	Danmark	172,267	3,446,150	2,707,690	127.3	5.0
EE	NUTS_0	Estonia	484,621	1,581,410	828,930	190.8	30.6
EE	EE00	Eesti	484,621	1,581,410	828,930	190.8	30.6
ES	NUTS_0	Spain	18,986,960	34,038,906	26,085,390	130.5	55.8
ES	ES11	Galicia	765,022	1,630,130	657,230	248.0	46.9
ES	ES12	Principado de Asturias	521,730	571,057	470,030	121.5	91.4
ES	ES13	Cantabria	258,077	295,834	275,200	107.5	87.2
ES	ES21	Pais Vasco	201,011	298,744	255,290	117.0	67.3
ES	ES22	Comunidad Foral de Navarra	307,739	642,387	599,810	107.1	47.9
ES	ES23	La Rioja	128,216	312,696	238,750	131.0	41.0
ES	ES24	Aragon	1,642,660	3,267,860	2,458,900	132.9	50.3
ES	ES30	Comunidad de Madrid	358,909	536,384	373,780	143.5	66.9
ES	ES41	Castilla y Leon	3,722,430	6,660,550	5,771,670	115.4	55.9
ES	ES42	Castilla-La Mancha	2,797,620	5,919,690	4,566,470	129.6	47.3
ES	ES43	Extremadura	3,009,290	3,512,560	2,920,220	120.3	85.7

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ES	ES51	Cataluña	904,103	1,676,450	1,153,430	145.3	53.9
ES	ES52	Comunidad Valenciana	890,335	1,632,280	728,980	223.9	54.5
ES	ES53	Illes Balears	215,220	333,837	220,290	151.5	64.5
ES	ES61	Andalucia	2,959,380	5,924,780	4,941,480	119.9	49.9
ES	ES62	Region de Murcia	305,081	823,003	453,860	181.3	37.1
ES	ES63	Ciudad Autonoma de Ceuta	137	168	0		81.5
ES	ES64	Ciudad Autonoma de Melilla	0	496	0		0.0
FI	NUTS_0	Finland	1,330,797	2,967,068	2,215,970	133.9	44.9
FI	FI13	Itõ-Suomi	309,128	435,212	326,490	133.3	71.0
FI	FI18	Etelõ-Suomi	364,155	1,067,600	811,300	131.6	34.1
FI	FI19	Lõnsi-Suomi	423,153	1,012,820	767,600	131.9	41.8
FI	FI1A	Pohjois-Suomi	221,516	423,638	295,940	143.1	52.3
FI	FI20	Äland	12,845	27,798	14,640	189.9	46.2
FR	NUTS_0	France	7,797,145	35,311,870	27,856,320	126.8	22.1
FR	FR10	Ile de France	3,682	665,172	583,250	114.0	0.6
FR	FR21	Champagne-Ardenne	221,286	1,765,960	1,560,330	113.2	12.5
FR	FR22	Picardie	32,068	1,495,380	1,341,460	111.5	2.1
FR	FR23	Haute-Normandie	18,711	917,207	794,030	115.5	2.0
FR	FR24	Centre	142,594	2,904,770	2,365,690	122.8	4.9
FR	FR25	Basse-Normandie	109,705	1,551,940	1,264,130	122.8	7.1
FR	FR26	Bourgogne	207,131	2,084,130	1,775,180	117.4	9.9
FR	FR30	Nord - Pas-de-Calais	22,475	983,301	838,170	117.3	2.3
FR	FR41	Lorraine	137,238	1,331,670	1,132,530	117.6	10.3
FR	FR42	Alsace	52,025	410,106	336,230	122.0	12.7
FR	FR43	Franche-ComtÚ	318,756	823,687	667,670	123.4	38.7
FR	FR51	Pays de la Loire	226,572	2,753,690	2,169,980	126.9	8.2
FR	FR52	Bretagne	88,212	2,248,260	1,701,570	132.1	3.9
FR	FR53	Poitou-Charentes	153,094	2,087,360	1,761,870	118.5	7.3
FR	FR61	Aquitaine	336,458	2,076,750	1,473,400	140.9	16.2
FR	FR62	Midi-PyrÚnÚes	1,153,950	3,022,540	2,361,910	128.0	38.2
FR	FR63	Limousin	436,078	1,050,090	861,020	122.0	41.5
FR	FR71	Rhöne-Alpes	1,215,200	2,165,080	1,526,720	141.8	56.1
FR	FR72	Auvergne	996,491	1,759,920	1,510,580	116.5	56.6
FR	FR81	Languedoc-Roussillon	747,924	1,468,600	981,460	149.6	50.9
FR	FR82	Provence-Alpes-C¶te d'Azur	806,850	1,306,110	693,250	188.4	61.8
FR	FR83	Corse	370,645	440,147	155,890	282.3	84.2
GR	NUTS_0	Greece	5,349,572	9,122,263	3,583,180	254.6	58.6
GR	GR11	Anatoliki Makedonia, Thraki	433,299	892,993	354,890	251.6	48.5
GR	GR12	Kentriki Makedonia	583,144	1,375,250	635,100	216.5	42.4
GR	GR13	Dytiki Makedonia	317,112	548,351	207,690	264.0	57.8

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GR	GR14	Thessalia	528,678	1,038,260	411,020	252.6	50.9
GR	GR21	Ipeiros	442,741	539,960	124,310	434.4	82.0
GR	GR22	Ionia Nisia	118,366	186,664	85,040	219.5	63.4
GR	GR23	Dytiki Ellada	467,234	763,284	316,770	241.0	61.2
GR	GR24	Sterea Ellada	586,365	968,847	350,640	276.3	60.5
GR	GR25	Peloponnisos	805,736	1,169,020	382,590	305.6	68.9
GR	GR30	Attiki	124,540	211,054	53,950	391.2	59.0
GR	GR41	Voreio Aigaio	208,087	300,486	156,150	192.4	69.3
GR	GR42	Notio Aigaio	286,597	413,938	108,360	382.0	69.2
GR	GR43	Kriti	447,673	714,156	396,670	180.0	62.7
HU	NUTS_0	Hungary	1,906,124	6,822,877	4,555,110	149.8	27.9
HU	HU10	Kozep-Magyarorszag	124,653	429,865	314,340	136.8	29.0
HU	HU21	Kozep-Dunantul	194,222	761,281	528,470	144.1	25.5
HU	HU22	Nyugat-Dunantul	185,511	751,792	502,480	149.6	24.7
HU	HU23	Del-Dunantul	176,033	978,235	687,490	142.3	18.0
HU	HU31	Eszak-Magyarorszag	356,951	843,354	485,270	173.8	42.3
HU	HU32	Eszak-Alfold	463,309	1,487,470	976,080	152.4	31.1
HU	HU33	Del-Alfold	405,445	1,570,880	1,060,980	148.1	25.8
IE	NUTS_0	Ireland	1,162,594	5,777,390	4,443,970	130.0	20.1
IE	IE01	Border, Midland and Western	712,116	2,649,730	1,937,200	136.8	26.9
IE	IE02	Southern and Eastern	450,478	3,127,660	2,506,770	124.8	14.4
IT	NUTS_0	Italy	6,127,030	18,359,587	13,062,260	140.6	33.4
IT	ITC1	Piemonte	536,103	1,340,430	1,068,080	125.5	40.0
IT	ITC2	Valle d'Aosta/VallÚe d'Aoste	74,665	77,148	71,160	108.4	96.8
IT	ITC3	Liguria	85,649	119,484	60,890	196.2	71.7
IT	ITC4	Lombardia	269,203	1,245,130	1,039,400	119.8	21.6
IT	ITD1	Provincia Autonoma Bolzano/Bozen	178,029	213,544	267,390	79.9	83.4
IT	ITD2	Provincia Autonoma Trento	108,612	138,359	146,880	94.2	78.5
IT	ITD3	Veneto	225,355	1,152,090	849,880	135.6	19.6
IT	ITD4	Friuli-Venezia Giulia	91,283	353,976	237,750	148.9	25.8
IT	ITD5	Emilia-Romagna	337,103	1,525,080	1,114,590	136.8	22.1
IT	ITE1	Toscana	290,578	1,108,470	848,170	130.7	26.2
IT	ITE2	Umbria	154,118	470,032	363,560	129.3	32.8
IT	ITE3	Marche	171,604	663,315	505,610	131.2	25.9
IT	ITE4	Lazio	299,594	1,047,150	706,940	148.1	28.6
IT	ITF1	Abruzzo	278,548	631,449	425,980	148.2	44.1
IT	ITF2	Molise	117,364	299,991	213,170	140.7	39.1
IT	ITF3	Campania	239,679	828,918	575,870	143.9	28.9
IT	ITF4	Puglia	266,696	1,681,780	1,223,400	137.5	15.9
IT	ITF5	Basilicata	225,090	639,096	533,440	119.8	35.2
IT	ITF6	Calabria	303,971	823,145	540,060	152.4	36.9

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IT	ITG1	Sicilia	676,176	2,136,220	1,256,530	170.0	31.7
IT	ITG2	Sardegna	1,197,610	1,864,780	1,013,510	184.0	64.2
LI	NUTS_0	Liechtenstein	1,772	6,628			26.7
LT	NUTS_0	Lithuania	603,979	4,022,650	2,792,040	144.1	15.0
LU	NUTS_0	Luxembourg (Grand-Duché)	12,871	142,632	127,510	111.9	9.0
LV	NUTS_0	Latvia	568,400	2,853,680	1,432,680	199.2	19.9
NL	NUTS_0	Netherlands	368,788	2,621,717	1,958,050	133.9	14.1
NL	NL11	Groningen	15,540	211,051	167,150	126.3	7.4
NL	NL12	Friesland	83,924	301,900	239,310	126.2	27.8
NL	NL13	Drenthe	26,524	217,064	157,450	137.9	12.2
NL	NL21	Overijssel	45,111	274,360	214,020	128.2	16.4
NL	NL22	Gelderland	43,708	357,684	246,330	145.2	12.2
NL	NL23	Flevoland	5,752	111,516	91,360	122.1	5.2
NL	NL31	Utrecht	23,103	90,782	70,570	128.6	25.4
NL	NL32	Noord-Holland	41,872	194,688	137,880	141.2	21.5
NL	NL33	Zuid-Holland	55,446	204,667	143,120	143.0	27.1
NL	NL34	Zeeland	5,045	157,745	121,700	129.6	3.2
NL	NL41	Noord-Brabant	17,094	352,299	263,540	133.7	4.9
NL	NL42	Limburg (NL)	5,669	147,961	105,620	140.1	3.8
PL	NUTS_0	Poland	4,813,243	20,231,887	14,754,880	137.1	23.8
PL	PL11	Lodzkie	311,797	1,348,790	1,031,900	130.7	23.1
PL	PL12	Mazowieckie	685,669	2,548,990	1,952,310	130.6	26.9
PL	PL21	Malopolskie	304,606	971,144	648,480	149.8	31.4
PL	PL22	Slaskie	204,048	654,334	413,830	158.1	31.2
PL	PL31	Lubelskie	490,073	1,833,220	1,437,660	127.5	26.7
PL	PL32	Podkarpackie	316,651	1,024,180	650,750	157.4	30.9
PL	PL33	Swietokrzyskie	216,316	793,104	525,610	150.9	27.3
PL	PL34	Podlaskie	476,071	1,329,130	1,058,310	125.6	35.8
PL	PL41	Wielkopolskie	355,736	2,068,330	1,695,740	122.0	17.2
PL	PL42	Zachodniopomorskie	286,175	1,265,620	861,450	146.9	22.6
PL	PL43	Lubuskie	161,947	630,760	414,680	152.1	25.7
PL	PL51	Dolnoslaskie	228,397	1,298,850	905,720	143.4	17.6
PL	PL52	Opolskie	97,741	621,715	506,880	122.7	15.7
PL	PL61	Kujawsko-Pomorskie	185,199	1,286,160	1,019,310	126.2	14.4
PL	PL62	Warminsko-Mazurskie	276,789	1,518,660	933,850	162.6	18.2
PL	PL63	Pomorskie	216,028	1,038,900	698,400	148.8	20.8
PT	NUTS_0	Portugal	2,900,462	5,035,890	3,736,140	134.8	57.6
PT	PT11	Norte	678,745	1,211,170	673,560	179.8	56.0
PT	PT15	Algarve	262,009	322,072	101,930	316.0	81.4
PT	PT16	Centro (P)	680,561	1,314,210	724,550	181.4	51.8
PT	PT17	Lisboa	49,007	132,738	91,850	144.5	36.9
PT	PT18	Alentejo	1,230,140	2,055,700	2,144,250	95.9	59.8
RO	NUTS_0	Romania	4,860,372	14,433,920	13,906,700	103.8	33.7
RO	RO01	Nord-Est	741,197	2,070,320	2,032,950	101.8	35.8

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RO	RO02	Sud-Est	422,703	2,395,440	2,151,210	111.4	17.6
RO	RO03	Sud	318,265	2,486,960	2,325,760	106.9	12.8
RO	RO04	Sud-Vest	492,539	1,788,990	1,782,600	100.4	27.5
RO	RO05	Vest	694,835	1,784,220	1,751,710	101.9	38.9
RO	RO06	Nord-Vest	988,420	1,999,750	1,941,420	103.0	49.4
RO	RO07	Centru	1,195,790	1,788,900	1,743,230	102.6	66.8
RO	RO08	Bucuresti	6,623	119,340	177,820	67.1	5.5
SW	NUTS_0	Sweden	992,856	4,199,391	3,192,440	131.5	23.6
SE	SE01	Stockholm	35,955	144,522	100,580	143.7	24.9
SE	SE02	Ístra Mellansverige	165,608	1,031,880	821,780	125.6	16.0
SE	SE04	Sydsverige	87,656	655,902	558,780	117.4	13.4
SE	SE06	Norra Mellansverige	80,442	366,713	275,020	133.3	21.9
SE	SE07	Mellersta Norrland	64,157	204,702	114,800	178.3	31.3
SE	SE08	Ívre Norrland	70,141	342,094	116,040	294.8	20.5
SE	SE09	SmÕland med ÷arna	303,487	611,692	529,820	115.5	49.6
SE	SE0A	Võstsverige	185,410	841,886	675,620	124.6	22.0
SI	NUTS_0	Slovenija	591,314	754,255	485,880	155.2	78.4
SK	NUTS_0	Slovakia	547,582	2,485,476	2,159,900	115.1	22.0
SK	SK01	Bratislavsky kraj	12,339	101,795	80,550	126.4	12.1
SK	SK02	Zapadne Slovensko	82,240	988,900	842,570	117.4	8.3
SK	SK03	Stredne Slovensko	260,852	663,199	594,130	111.6	39.3
SK	SK04	Vychodne Slovensko	192,151	731,582	642,650	113.8	26.3
UK	NUTS_0	United Kingdom	5,055,984	19,329,865	13,174,690	146.7	26.2
UK	UKC1	Tees Valley and Durham	68,893	251,951	179,590	140.3	27.3
UK	UKC2	Northumberland and Tyne and Wear	115,431	445,338	377,870	117.9	25.9
UK	UKD1	Cumbria	235,264	611,672	449,880	136.0	38.5
UK	UKD2	Cheshire	4,563	189,842	160,920	118.0	2.4
UK	UKD3	Greater Manchester	10,838	54,806	38,570	142.1	19.8
UK	UKD4	Lancashire	91,239	259,008	213,350	121.4	35.2
UK	UKD5	Merseyside	1,300	25,196	16,570	152.1	5.2
UK	UKE1	East Riding and North Lincolnshire	1,519	314,971	270,960	116.2	0.5
UK	UKE2	North Yorkshire	209,532	762,102	609,740	125.0	27.5
UK	UKE3	South Yorkshire	12,689	102,304	83,560	122.4	12.4
UK	UKE4	West Yorkshire	25,951	133,827	94,940	141.0	19.4
UK	UKF1	Derbyshire and Nottinghamshire	33,631	383,425	315,840	121.4	8.8
UK	UKF2	Leicestershire, Rutland and Northamptonshire	675	419,968	361,750	116.1	0.2
UK	UKF3	Lincolnshire	4,881	555,083	489,970	113.3	0.9
UK	UKG1	Herefordshire, Worcestershire and Warwickshire	3,895	519,178	429,980	120.7	0.8

NUTS0	NUTS2	Denomination	HNV farmland area according to this study	Agricultural land (CLC agricultural classes + HNV areas)	Utilised Agricultural Area (official figures from EUROSTAT FSS)	Discrepancy (col2/col3)*100	Area share of HNV farmland (col1 / col2)
UK	UKG2	Shropshire and Staffordshire	24,804	534,845	459,230	116.5	4.6
UK	UKG3	West Midlands	0	20,468	14,220	143.9	0.0
UK	UKH1	East Anglia	25,033	1,121,810	935,720	119.9	2.2
UK	UKH2	Bedfordshire and Hertfordshire	101	223,385	176,080	126.9	0.0
UK	UKH3	Essex	7,229	309,843	240,710	128.7	2.3
UK	UKI1	Inner London	0		90		
UK	UKI2	Outer London	15	22,080	10,790	204.6	0.1
UK	UKJ1	Berkshire, Buckinghamshire and Oxfordshire	1,224	457,621	356,580	128.3	0.3
UK	UKJ2	Surrey, East and West Sussex	14,813	352,590	265,630	132.7	4.2
UK	UKJ3	Hampshire and Isle of Wight	23,014	301,036	213,010	141.3	7.6
UK	UKJ4	Kent	7,320	283,386	220,910	128.3	2.6
UK	UKK1	Gloucestershire, Wiltshire and North Somerset	24,855	627,562	521,960	120.2	4.0
UK	UKK2	Dorset and Somerset	35,869	535,308	453,310	118.1	6.7
UK	UKK3	Cornwall and Isles of Scilly	20,432	303,747	269,890	112.5	6.7
UK	UKK4	Devon	48,557	570,865	485,330	117.6	8.5
UK	UKL1	West Wales and The Valleys	326,941	1,085,550	873,310	124.3	30.1
UK	UKL2	East Wales	244,101	650,260	515,470	126.1	37.5
UK	UKM1	North Eastern Scotland	107,374	552,117			19.4
UK	UKM2	Eastern Scotland	610,066	1,467,430	1,255,430	116.9	41.6
UK	UKM3	South Western Scotland	340,563	969,811	770,950	125.8	35.1
UK	UKM4	Highlands and Islands	2,114,620	2,690,150			78.6
UK	UKN0	Northern Ireland	258,752	1,221,330	1,042,580	117.1	21.2

European Commission

EUR 23480 EN – Joint Research Centre – Institute for Environment and Sustainability
Title: **High Nature Value Farmland in Europe - An Estimate of the Distribution Patterns on the Basis of Land Cover and Biodiversity Data**
Authors: Maria Luisa Paracchini, Jan-Erik Petersen, Ybele Hoogeveen, Catharina Bamps, Ian Burfield, Chris van Swaay
Luxembourg: Office for Official Publications of the European Communities
2008 – 87 pp. – 21 x 29.7 cm
EUR – Scientific and Technical Research series – ISSN 1018-5593
ISBN 978-92-79-09568-9
DOI 10.2788/8891

Abstract
Europe's agricultural landscapes provide highly varied living conditions for many plants and animals. In the early nineties the general characteristics of low-input farming systems were described in terms of biodiversity and management practices and introduced the term high nature value farmland. Typical high nature value farmland areas are the extensively grazed uplands in the UK, alpine meadows and pasture, steppic areas in eastern and southern Europe and dehesas and montados in Spain and Portugal. The more intensively farmed areas in lowland western Europe can also host concentrations of species of particular conservation interest, such as migratory waterfowl.
The need for measures to prevent the loss of high nature value farmland is widely acknowledged. Conservation of biodiversity on agricultural land is an explicit objective of the pan-European Biodiversity and Landscape Strategy, the Bern Convention, the European Landscape Convention, and, at EU level, the Habitats and Birds Directives and the Rural Development Policy (Community Strategic Guidelines for Rural Development Programming Period 2007-2013). In their 6th Environment Action Programme, the EU committed itself to halting biodiversity decline by 2010. Conserving High Nature Value farmland is key to achieving this 2010 biodiversity target. Pan-European data on distribution and conservation status of HNV farmland, however, were largely lacking. In their 2003 "Kyiv" declaration, the European Environment Ministers have therefore set the goal to fill this data gap and take adequate conservation measures.
In support of this policy process, EEA and UNEP published a Joint Message (EEA 2004), presenting a preliminary map of HNV farmland and analysing the targeting of agricultural policy instruments. The Joint Message used the concept as developed by Andersen et al. (2003) that describes HNV farmland as: "Those areas in Europe where agriculture is a major (usually the dominant) land use and where that agriculture supports, or is associated with, either a high species and habitat diversity or the presence of species of European conservation concern, or both".
The aim of estimating HNV farmland distribution at European level according to a standardised method is primarily to gain insight in the current status, as well as enabling analysis of European trends and targeting of relevant policy instruments. In order to increase accuracy, JRC and the EEA have been preparing the first EU27 map of High Nature Value farmland, on the basis of new land cover data, refined and regionally differentiated selection criteria, and additional biodiversity datasets.

The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

LB-NA-23480-EN-C