



Institute <sup>for</sup>  
European  
Environmental  
Policy

**GUIDANCE DOCUMENT TO THE  
MEMBER STATES**

**ON THE APPLICATION OF THE HNV  
IMPACT INDICATOR**

**October 2007**

## ACKNOWLEDGEMENTS

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The Guidance Document provides Member States with instructions to assist with the application of the CMEF indicators relating to HNV Farmland and Forests, and specifically Impact Indicator 5. A minimum amount of information necessary to understand and operationalise the HNV concept and associated indicators is provided. Further material is available from other sources and where this is considered relevant, references are provided.

This document is accompanied by a report on ‘HNV Indicators for Evaluation’, prepared for DG Agriculture. Information and guidance provided in this document is further elaborated in the report.

IEEP, 2007. HNV Indicators for Evaluation, Final report for DG Agriculture. Contract notice 2006-G4-04.

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## **1 STRUCTURE OF DOCUMENT**

This document presents a systematic approach to applying the HNV Baseline Indicator in the Common Monitoring and Evaluation Framework (CMEF). Sections 1 to 5 introduce the HNV concept, the CMEF indicators, obligations on Member States and definitions of the key terms. Sections 6 – 8 introduce a method for measuring the extent and quality of HNV Farmland and Forests and guide Member States in the application of indicators to capture changes over time. In Section 9, guidance is provided to programme evaluators to assess the impact of the rural development programme on a Member State's HNV resource.

## **2 THE HIGH NATURE VALUE CONCEPT**

The High Nature Value (HNV) concept first emerged in 1993<sup>1</sup> and recognises the causality between certain types of farming activity and 'natural values', defined as high levels of biodiversity and / or the presence of species and habitats of conservation concern. Typically, HNV farming systems are low intensity, low input systems, frequently with high structural diversity. In addition, the utilisation of semi natural vegetation by livestock, often in combination with the presence of other semi natural features, is a key characteristic of these systems.

Recently, the high nature value concept has been applied to forestry. On account of a combination of structural, compositional and functional characteristics, all natural, and a majority of semi-natural forests, when coupled with a sympathetic management regime (historical and present), can support high levels of biodiversity and thus can be considered HNV Forests.

## **3 HNV INDICATORS IN THE CMEF**

Under the EAFRD (Council Regulation 1698/2005), Member States receive Community support for agreed rural development programmes which should meet the Community's strategic objectives. The objective relating to High Nature Value Farming and Forestry is as follows:

“To protect and enhance the EU's natural resources and landscapes in rural areas, the resources devoted to axis 2 should contribute to three EU-level priority areas: biodiversity and the preservation and development of high nature value farming and forestry systems and traditional agricultural landscapes; water; and climate change.”<sup>2</sup> (Emphasis added).

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<sup>1</sup> Baldock, D., Beaufoy, G., Bennett, G. and Clark, J. (1993). Nature Conservation and New Directions in the Common Agricultural Policy. Institute for European Environmental Policy, London.

<sup>2</sup> Council Decision of 20 February 2006 on Community Strategic Guidelines for Rural Development (programming period 2007 to 2013), 2006/144/EC, OJ L 55/20, 25.2.2006, Annex 3.2.

Rural development programmes will be subject to a mid term and ex post evaluation in 2010 and 2015, respectively, to assess the extent to which the objectives of the programme have been achieved. The Common Monitoring and Evaluation Framework (CMEF) provides a single framework for the monitoring and evaluation of all rural development interventions through the application of five sets of indicators<sup>3</sup>.

There is a suite of indicators designed to measure whether the High Nature Value resource of a Member State is being preserved and maintained which are also enshrined in the Implementing Regulation (Commission Regulation 1974/2006).

**Baseline Indicator 18:** Biodiversity: High nature value Farmland and Forestry, measured as UAA of HNV Farmland, in hectares.

**Result Indicator 6:** Area under successful management contributing to biodiversity and HNV Farming / Forestry, measured as the total area of HNV Farmland and Forestry under successful land management, in hectares.

**Impact Indicator 5:** Maintenance of HNV Farming and Forestry, measured as changes in High Nature Value areas and defined in terms of quantitative and qualitative changes.

This document develops Impact Indicator 5 (see CMEF Guidance Note J)<sup>4</sup> and guides Member States in its definition and measurement<sup>5</sup>.

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<sup>3</sup> Baseline indicators are used to define strategy objectives and Impact indicators correspond to these objectives. In addition, for each measure, Input, Output and Result indicators are established to assess the extent to which the expected objectives have been achieved.

<sup>4</sup> Available from [http://ec.europa.eu/agriculture/rurdev/eval/index\\_en.htm](http://ec.europa.eu/agriculture/rurdev/eval/index_en.htm).

<sup>5</sup> Impact Indicator 5 measures quantitative and qualitative changes in HNV areas (farming and forestry) and it is recommended that these changes are captured in terms of the extent and the quality or condition of HNV areas. It should be noted that Baseline Indicator 18 does not provide a measure of the quality of these areas and one will need to be established. Under Impact Indicator 5, Member States should measure the extent of HNV Farmland in hectares of the total agricultural area and the extent of HNV Forests in hectares of the total forest area. The measure of the extent of HNV Farmland (hectares of total agricultural area) is a different unit of measurement from that proposed in the Baseline Indicator 18 (hectares of UAA). Programme evaluators should note and account for this difference when assessing changes in the extent of HNV Farmland over time.

## 4 IMPLICIT OBLIGATIONS ON MEMBER STATES

In order to meet the objective to preserve and enhance HNV Farming and Forestry systems and to conduct effective monitoring, there are a number of implicit obligations on Member States (see Figure 1). They should:

- Have measures in place to maintain their HNV Farming and Forests and Traditional Agricultural Landscapes;
- Apply Baseline Indicator 18 at the start of the rural development programme;
- Introduce indicators to measure the extent and quality of their HNV Farmland and Forests annually, from 2010, to the end of the rural development programme. These indicators will relate to Impact Indicator 5 so that changes may be detected over time;
- Apply indicators to monitor the extent and quality of their HNV Farmland and Forests at the end of the rural development programme (Impact Indicator 5);
- Where appropriate, measure the extent (in hectares) of their Traditional Agricultural Landscapes over the period of the current rural programme;
- Appoint programme evaluators to evaluate the extent to which the programme objectives have been achieved.

## 5 DEFINITIONS OF KEY TERMS

In this document, a range of associated terms relating to the overarching HNV farming concept is used, reflecting the diversity of terms in the literature. HNV farming is presented as the umbrella concept and can refer both to HNV farmland areas and HNV farming systems. HNV farmland areas and HNV farming systems are not interchangeable concepts. The distinction broadly reflects differences in approach to their characterisation, and the indicators and data used in their identification. HNV farmland areas are defined with reference to the HNV state, as such, delimiting fairly static areas of farmland, whereas HNV farming systems are characterised, in part, in terms of the driving forces for the HNV state, which are dynamic and change over time. This study sets out an approach to identifying HNV farming systems. Whilst the indicators presented relate to the characteristics that typify an HNV farming system, they refer to land use, and as such, are termed HNV farmland indicators.

### **HNV Farmland Areas and Farming**

A definition of HNV farmland at the European scale has been developed under the IRENA operation<sup>6</sup>. For the purpose of developing the CMEF Impact Indicator, the IRENA definition has been modified to take account of the national and/or regional scale. The definition modified in the context of this study is presented below:

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<sup>6</sup> EEA, 2005. Agriculture and environment in EU-15 – the IRENA Indicator Report. EEA Report No. 6/2005, Copenhagen.

“High Nature Value farmland comprises 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<sup>7</sup>, or the presence of species of European, and/or national, and/or regional conservation concern<sup>8</sup>, or both.”

It must be noted, however, that not all HNV Farmland makes the same contribution in conservation terms. The highest grade of HNV Farmland is that which supports the presence of species of European conservation concern, and the lowest grade is that which supports species of regional conservation concern.

### **HNV Farmland Features**

“An HNV farmland feature supports the presence of habitats and species of European, and/or national, and/or regional conservation concern whose survival depends on the maintenance or continued existence of the feature.”

### **HNV Forests**

“High Nature Value forests are all natural forests and those semi-natural forests in Europe where the management (historical or present) supports a high diversity of native species and habitats, and/or those forests which support the presence of species of European, and/or national, and/or regional conservation concern.”

### **Traditional Agricultural Landscapes**

“Traditional Agricultural Landscapes in Europe are typically derived from historic - frequently family and/or subsistence-style - farming methods where the dominant cultural landscape characteristics are the result of a traditional or locally adapted approach to management. In general, these farming systems are characterised by the presence of farmland features, whose distribution will be regionally and/or locally specific, which contribute to the landscape’s aesthetic qualities as well as to supporting its ecological integrity.”

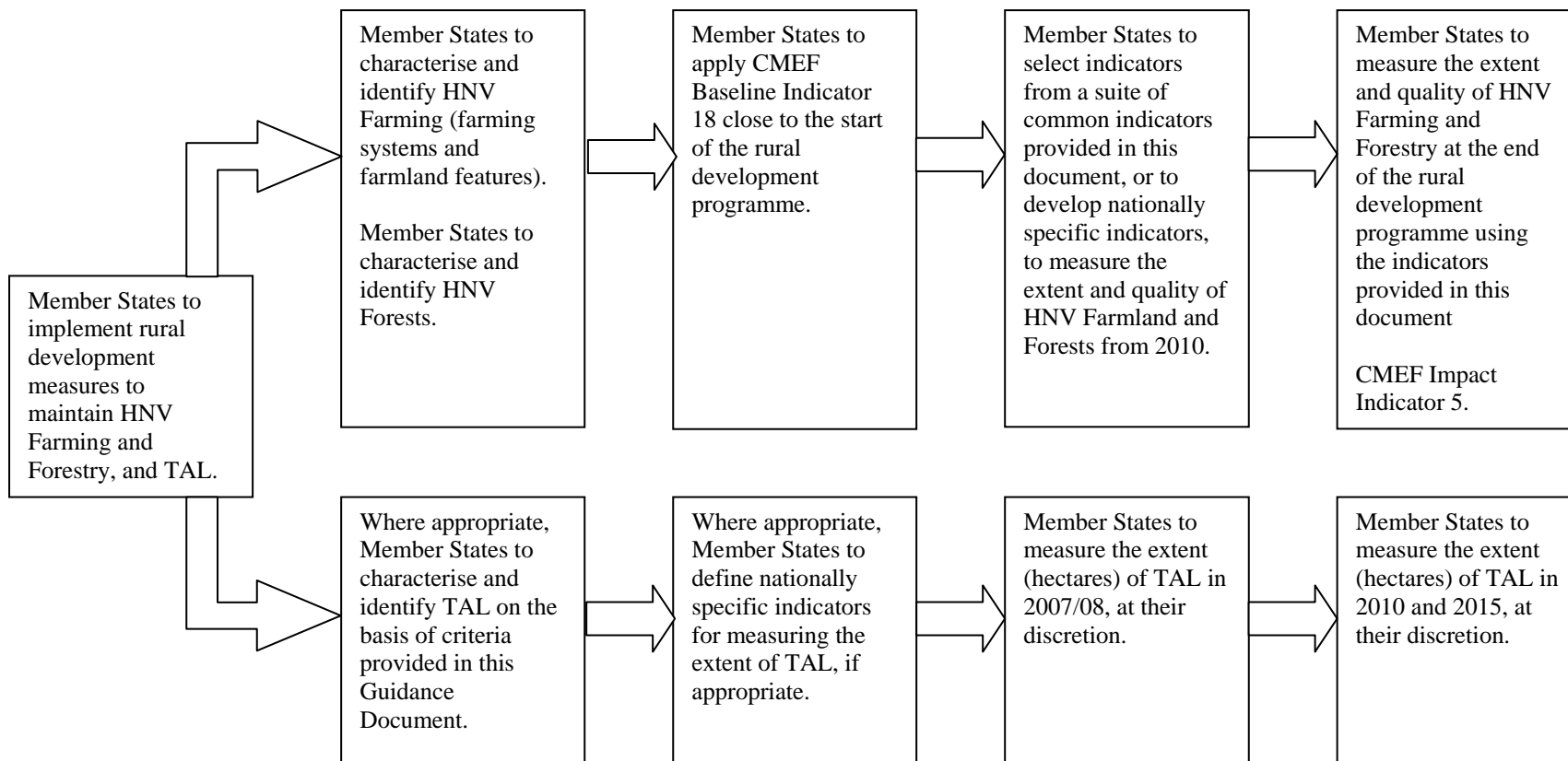
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<sup>7</sup> In the definitions of HNV Farmland and Forests, reference is made to high species and habitat diversity. In each case, this is defined at the Member State level to accommodate the differences in conditions across the European Union.

<sup>8</sup> Species of conservation concern are defined according to the IUCN Red List criteria of threatened species. Three categories of threatened species are recognised. ‘Critically Endangered’ – a taxon is critically endangered when it is considered to be facing an extremely high risk of extinction in the wild; ‘Endangered’ – a taxon is endangered when it is considered to be facing a very high risk of extinction in the wild; and ‘Vulnerable’ – a taxon is vulnerable when it is considered to be facing a high risk of extinction in the wild (IUCN Red List Categories and Criteria, Version 3.1, 2001).



**Figure 1. A Systematic Approach to Operationalising the HNV Indicators in the Monitoring and Evaluation of the 2007 -2013 Rural Development Programmes.**



## 6 MONITORING CHANGES IN THE EXTENT AND QUALITY OF HNV FARMLAND AND FORESTS

Data exist on the approximate extent of potential HNV Farmland Areas in 26 Member States of the EU at the present time (excluding Malta)<sup>9</sup>. The maps produced by the JRC/EEA are useful in providing a preliminary indication of the location of HNV Farmland Areas, however, this measure of the extent of HNV Farmland Areas is not sensitive enough to inform the monitoring of the impact of policy over the reasonably short time frame of a rural development programme.

As a result, a complementary approach has been developed for the purposes of monitoring and evaluating rural development programmes and is described below. This approach comprises two sequential steps which are elaborated in sections 7 and 8.

1. To characterise potential HNV Farming and Forests and identify the nature values - including the species and habitats of European and/or national, and/or regional conservation concern - associated with them.
2. To select indicators to identify and measure the extent and quality of HNV Farmland and Forests over the period of the rural development programme, and define the threshold at which farmland and forests can be classed as HNV, justified through an *a priori* characterisation of the HNV resource.

Member States will apply Baseline Indicator 18 at the start of the rural development programme. However, this only measures the area of HNV Farmland. The area of HNV Forestry is not included. In subsequent years, the indicators used in monitoring will need to be adapted to measure both the extent and the quality of HNV Farming and Forestry Areas, so that Impact Indicator 5 can detect changes over time (see footnote 5).

Member States are also encouraged to measure the extent of Traditional Agricultural Landscapes, if appropriate. In addition, this would require Member States:

3. To characterise TAL on the basis of three criteria defined in section 7.
4. To develop nationally specific indicators to measure the extent of TAL.

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<sup>9</sup> The work of the EEA and JRC is documented under:  
<http://eea.eionet.europa.eu/Public/irc/enviowindows/hnv/library>.

## **7 STEP 1. CHARACTERISING AND IDENTIFYING HNV FARMING AND FORESTS, AND TRADITIONAL AGRICULTURAL LANDSCAPES**

### **7.1 Characterising and Identifying HNV Farming Systems**

Member States are advised to refer to the typology presented in Annex 1 of livestock, arable and permanent crop systems in the EU-27. It identifies generic characteristics which distinguish systems which are most likely to be HNV from non-HNV systems (see Annex 2). The broad potential HNV farming systems identified through the European typology are observed in national and / or regional sub-types. Member States should identify those farming systems which are likely to be HNV at the most appropriate geographical scale.

Once potential HNV systems have been identified, their key characteristics should be described, drawing on expert knowledge and relevant literature<sup>10</sup>. Information should be collected on three core criteria which characterise an HNV farming system. A summary example of how to characterise an HNV farming system is provided in Annex 3. The three criteria are:

- 1. Intensity of land use;**
- 2. Presence of semi-natural features;**
- 3. Presence of a land use mosaic.**

### **7.2 Characterising and Identifying HNV Farmland Features**

Semi-natural features are an integral part of an HNV farming system as captured in criterion 2, above. In addition, semi-natural features can be found in more intensive agricultural landscapes. Although these features contribute an HNV presence to the intensive agricultural landscape, they do not render the farming system an HNV farming system.

To identify likely HNV farmland features, Member States are encouraged to refer to the table presented in Annex 4 of typical features associated with each of Europe's broad Environmental Zones (see Annex 5 for map of Zones). If they are of a high enough habitat quality to support the presence or likely reintroduction of species of conservation concern they can be regarded as HNV Features occurring within a non-

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<sup>10</sup> The characterisation of the system will include information on the physical characteristics of the region; the production characteristics of the system (for example, stocking densities, input and biocide use); management practices; semi-natural features; the scale and diversity of land cover; the biodiversity supported by the system, including the species and habitats of European, national and/or regional conservation concern, and Natura 2000 habitats and species. In particular, the relationships between the intensity of use, the presence of semi-natural features, the presence of a land use mosaic and the nature values - the conservation needs of habitats and species - need to be specified.

HNV Farmland Area (see decision tree in Annex 6). To identify HNV features, Member States will need to:

1. Identify selected species of European, and/or national, and/or regional conservation concern, which depend on the maintenance or continued existence of farmland features for their survival.
2. For the species selected, provide a description of their relationship with, and dependence upon, patch, linear and point features in the agricultural landscape<sup>11</sup>.
3. Include those features which support selected species of conservation concern in a national inventory of HNV Features.

It is unlikely that data will be available for all features. Member States are advised to draw on national data sources and the data collected under Output Indicator 35 of the CMEF<sup>12</sup>.

### **7.3 Characterising and Identifying HNV Forests**

Member States are advised to identify potential HNV Forests at either the national or regional scale. This will first involve classifying forests as naturally dynamic, semi natural or plantation (see Annex 7 for a definition of these terms). All naturally dynamic forests are HNV; all semi natural forests have the potential to be HNV, although some will not be; and plantation forests are not HNV Forests in their current state (see Annex 8 for a typology of potential HNV Forests in the EU-27).

The HNV status of a semi-natural forest is a function of its state and the present day and/or historical management regime. Management may mimic natural processes, or comprise cultural practises that were typical in pre-industrial woodland and which are known to promote biodiversity. Member States with more widespread natural forest may be more selective about which semi-natural forests may qualify.

To determine whether a semi-natural forest is HNV, Member States should apply one, or a combination of, the criteria listed below at the scale most appropriate to national conditions. The first is the core criterion and must be applied. It will eliminate most semi-natural forests that are not HNV. One, or a combination of criteria two to four need only be applied where there is some uncertainty over whether a forest is HNV or not. For each criterion, Member States should set the threshold at which a forest is classified as HNV, providing a justification based on the ecology of the forest. The four criteria are:

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<sup>11</sup> Attention should be paid to the size, density and condition of the feature, and its spatial pattern in the landscape.

<sup>12</sup> Data to be collected on Ecological Features (for example, field margins, buffer areas, green cover, hedgerows and trees) and Historical Features (for example, stonewalls, terraces and small wood).

1. **Proportion of native tree species (measured as the percentage of native species per given area).**
2. **Volume of standing and lying deadwood in the forest (measured in metres<sup>3</sup> / hectare).**
3. **Density of large trees in the forest (measured as the number of trees per given area).**
4. **The proportion of the area of a forest which is made up of stands older than the age of economic maturity (measured as the percentage of old trees per given area).**

#### **7.4 Characterising and Identifying Traditional Agricultural Landscapes**

If appropriate, Member States are encouraged to characterise and identify TAL on the basis of the following three criteria:

1. **The existence of high aesthetic and cultural values;**
2. **The pursuit of a broadly traditional or locally adapted approach to management;**
3. **The presence of features, whose distribution is regionally and/or locally specific, which contribute to its aesthetic qualities and to its ecological integrity.**

### **8 STEP 2. INDICATORS TO MEASURE THE EXTENT AND QUALITY OF HNV FARMLAND AND FORESTS**

Having identified and characterised their HNV Farming and Forestry, and TAL, Member States will be in a position to establish indicators with the aim of measuring:

- **The Extent of HNV Farmland and Forests.**

The total extent of HNV Farmland in a given Member State (in hectares of total agricultural area)	=	The area of HNV semi-natural forage land + HNV arable/improved grassland + HNV permanent cropland + The area covered by HNV features.
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The total extent of HNV Forests (in hectares of total forest area)	=	The area of natural and semi-natural HNV Forests.
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- **The nature values associated with HNV Farmland and Forests to provide an indication of changes in the quality of the HNV resource.**

The indicators will be applied at the national and/or regional scale, corresponding to the scale at which the programme operates. Measurements should be taken over the course of the rural development programme.

### **8.1 Indicators to Measure the Extent of HNV Farmland**

It is not feasible to use indicators common to all agricultural land uses. Therefore, Member States should define quantified indicators, specific to:

- Semi-natural forage land;
- Arable and improved grassland;
- Permanent cropland.

For each land use, indicators should be applied which relate to the three criteria characterising HNV Farming (see section 7.1):

1. Intensity of land use (mandatory);
2. Presence of semi-natural features (mandatory);
3. Presence of a land use mosaic (where appropriate).

The *minimum number* of indicators that should be applied to identify and measure the extent of HNV Farmland is one indicator relating to the intensity of land use, and one indicator relating to the presence of semi-natural features. Indicators relating to the presence of a land use mosaic will be applied *in addition* to the other two under appropriate conditions.

The following overview table shows the indicators Member States should use for each of the three land uses. These indicators are further elaborated in Annex 9 and potential sources of data are discussed in Annex 10. Member States should define indicator thresholds that are appropriate for the conservation of nature value (habitats and species), informed by the regional characterisations of HNV farming systems.

	<b>1</b> <b>Intensity of Land Use</b>  <b>Indicators</b>	<b>2</b> <b>Presence of Semi-Natural Features</b>  <b>Indicators</b>	<b>3</b> <b>Presence of a Land Use Mosaic</b>  <b>Indicators</b>
<b>Semi-Natural Forage Land</b>	Livestock density for all forage land (LU/ha/year).	Livestock density for all forage land (LU/ha/year)  <i>Or</i>  Extent of semi-natural vegetation (if grassland survey data are available)	Modal parcel size in hectares  <i>And/or</i>  Proportion of total agricultural area under semi-natural field margins  <i>And/or</i>  Number of land uses on the holding
<b>Arable and Improved Grassland</b>	N input / biocide use (kg/ha/year)  <i>And/or</i>  Average yield (t/ha/year)  <i>And/or</i>  Fallow as a proportion of total arable area and the number of years the land is in fallow  For improved grassland, Livestock density for all forage (LU/ha/year)	Proportion of total agricultural area under semi-natural features	Modal parcel size in hectares  <i>And/or</i>  Proportion of total agricultural area under semi-natural field margins  <i>And/or</i>  Number of land uses on the holding
<b>Permanent Cropland</b>	N input / biocide use (kg/ha/year)  <i>And/or</i>  Average yield (t/ha/year)	Presence of standard or semi-standard productive trees  <i>And</i>  Presence of a semi-natural understorey	Modal parcel size in hectares  <i>And/or</i>  Proportion of total agricultural area under semi-natural field margins  <i>And/or</i>  Number of land uses on the holding

## 8.2 Indicators to Measure the Quality of HNV Farmland and Forestry

Changes in the ecological condition or quality of HNV Farmland and HNV Forestry will be assessed using a combination of biodiversity indicators to provide broad contextual trends.

Member States should identify species of conservation concern associated with their HNV Farming Systems and Forests. In both cases, these may be plant species; vertebrates, including birds; invertebrates, including butterflies; and fungi, depending on data availability.

Member States should select suites of species on the basis of available data. They may be species of European, national and regional conservation concern. See Annex 11 for a list of farmland bird and butterfly species of European conservation concern. The selection of species should not be limited to the most threatened or emblematic species, rather, suites of plant and animal species that are considered to be indicators of habitat quality should be selected.

The state of the populations of these species, measured as the **abundance of individuals at the national level**, provides a measure of the nature value of HNV Farmland and Forests for a Member State.

Systems should be established for measuring the abundance of populations at the national level, or through regional case studies, with observed trends extrapolated to the national level.

Additional indicators to assess the quality of HNV Forests could include:

1. **Volume of standing and lying deadwood in the forest, measured in metres<sup>3</sup>/hectare.**
2. **The degree of forest fragmentation over time, measured in terms of the mean forest patch size.**



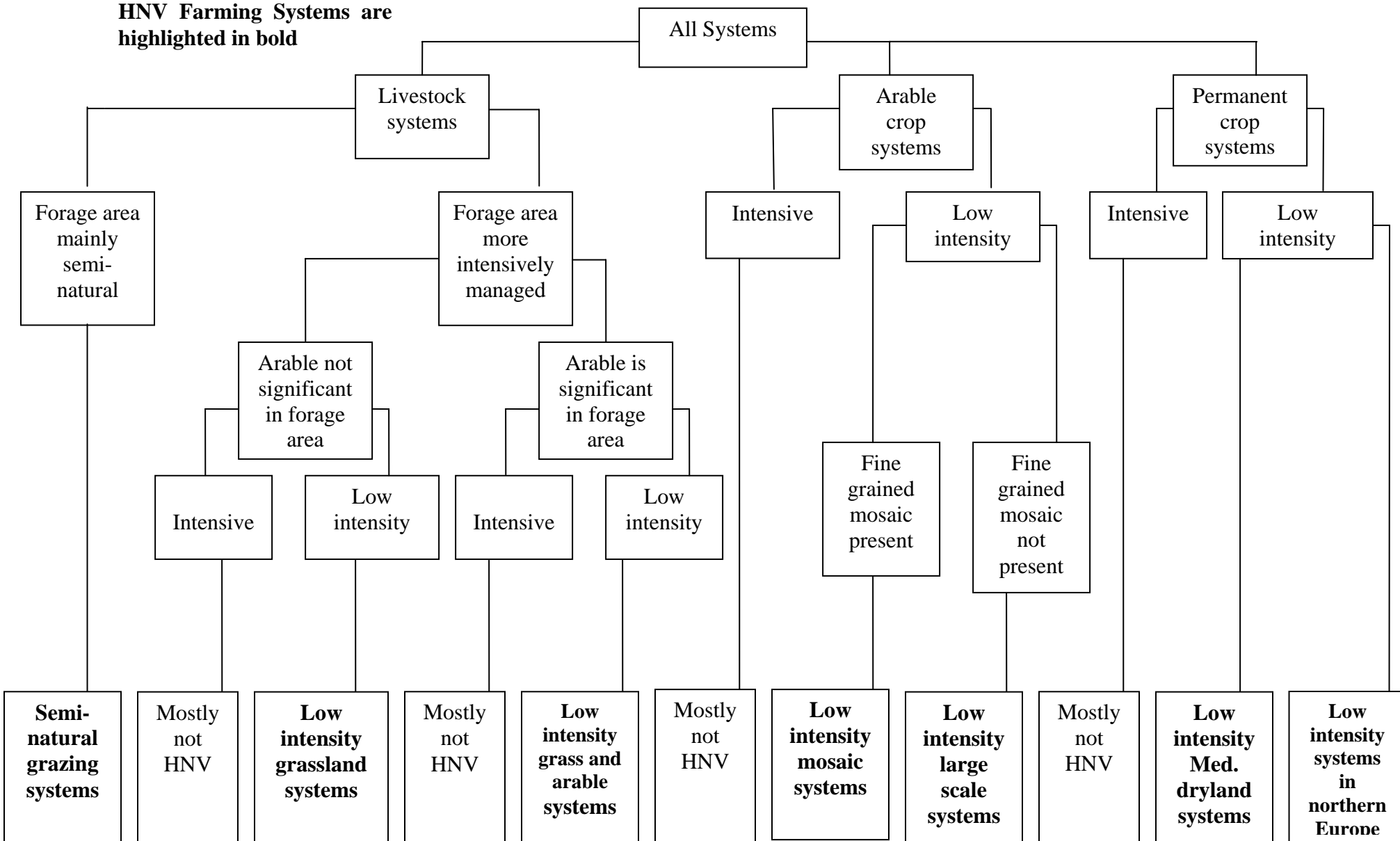
## **9 IMPACT OF RURAL DEVELOPMENT PROGRAMMES**

Over the period of the 2007 – 2013 rural development programme, indicators measuring the extent and quality of the HNV resource could reveal various changes in state. The area of HNV farmland and forests could increase, remain stable, or decline which would be coupled with changes to the quality of the resource. In some cases, this change in state would indicate an improvement, in others a deterioration, and in still others, conflicting trends may emerge. The aggregation and weighting of trends at the national level must, however, be conducted with sensitivity as trends may vary significantly between regions, farming systems and forests, for example. Judgements on the part of programme evaluators will need to be made in this regard.

The indicators reflect changes in the environment arising from a variety of driving forces and decisions by different actors. The extent to which the changes observed can be attributable to rural development programmes will need to be inferred by programme evaluators on the basis of evidence available to them.

**Annex 1. Typology of Potential HNV Farming Systems in the EU-27**

**HNV Farming Systems are highlighted in bold**



## **Annex 2. Generic Characteristics of Potential HNV Farming Systems**

HNV livestock systems are characterised by the presence of livestock - cattle, sheep, goats, pigs and/or horses - pastured on semi-natural vegetation, extensive grasslands or in a mixed system of extensive crops and grass, at low stocking densities. Stocking densities provide a measure of the intensity of a system and an indication of the condition of the semi-natural vegetation. The HNV stocking density threshold will vary between locations. Semi-natural vegetation may be grassland, scrub, woodland or hay meadows, or a combination of different types, and it is the proportion of utilised semi-natural vegetation relative to the total farmed area that is important in defining whether a system is HNV or not. In those systems where the proportion of grazed or mown semi-natural vegetation is lower, the presence of other semi-natural features becomes more significant for nature value.

HNV arable crops systems are characterised by a diversity of land cover derived from a rotation of crops, grass and fallows; low input use; no irrigation; and the presence of semi-natural vegetation, including elements such as field margins, headlands, patches of scrub and woodland. If it is under low intensity management, other types of forage land, such as alfalfa, may contribute to nature value, when combined with the presence of semi-natural vegetation or features. Less widespread than HNV livestock systems, these are often found in drier and less intensively managed areas, especially in southern and central Europe.

HNV permanent crops systems include low intensity traditional fruit and nut orchards. These systems are not irrigated and nitrogen fertilisers, biocides or broad spectrum insecticides are not used, or only at very low levels. In southern Europe, the largest areas of low intensity permanent crops are olives, and to a lesser extent almonds, figs, hazelnuts and walnuts. They are only considered HNV when large, old trees are combined with a semi-natural herbaceous understorey which is often grazed by livestock. Other significant semi-natural elements include field margins, headlands, patches of scrub and woodland, and dry stone walls.

### **Annex 3. An Example of a Characterisation of a Regional HNV Livestock System in Basse-Normandie**

Basse-Normandie is situated in the north west of France, in the Atlantic biogeographical zone. The European HNV sub-type can be described as a low intensity cattle grassland system for the production of milk and meat. The thresholds cited are specific to this regional system. It is characterised by:

#### Semi-Natural Features

- A high proportion of permanent grasslands, in excess of 70 per cent of the UAA of the farm holding.
- Semi-natural features, including hedges, wood edges and traditional orchards comprise at least 20 per cent of the UAA of the agricultural region.

#### Intensity of Land Use and Management of Semi Natural Features

- Low inputs of mineral Nitrogen fertiliser, less than 50kg/hectare/annum, the grassland is generally not fertilised, and no pesticide use.
- The permanent grasslands have a high natural productivity, allowing a stocking density of between 0.8 and 1.2 LU/ha. Below 0.8 LU/ha, encroachment of scrub presents a risk to nature values.
- A wide range of mowing dates between June and July.
- Hedges are cut by hand, leading to a diversified age structure and the presence of old trees.

#### Nature Values

- Stocking densities of around 1LU/ha on non fertilised permanent grassland allow a high number of plant species per field (up to 50 – 60).
- The presence of hedges and their management, combined with a large proportion of unimproved, semi-natural grassland, is a key factor in explaining the high nature value of the farming system. Hedges significantly increase the number of insects and birds.
- The nature value of traditional orchards is high because they are always associated with hedges and permanent grasslands. This nature value is also linked to the small size of the parcels and the presence of a minimum number of old trees. For example, 74 breeding bird species have been observed in traditional orchards with an average of 24 to 44 species per orchard.
- The following species of farmland birds of European and/or regional concern are present (*Phoenicurus phoenicurus*, *Passer montanus*, *Pyrrhula pyrrhula*, *Lanius collurio*, *Jynx torquilla*, *Upupa epops*, *Athene noctua*, associated with extensive grazing systems with traditional orchards, and *Emberiza citronella*, *Milvus milvus*, *Lanius collurio*, *Hippolais polyglotta*, *Sitta europea*, *Athene noctua*, *Strix aluco*, associated with extensive grazing systems with hedges).

**Annex 4. Inventory of Potential HNV Features**

Environmental Zone	Characteristics of Typical HNV Farmland Areas	Typical Features		
		Patch	Linear	Point
Alpine North and Boreal	HNV areas are found in upland, mountain and lowland areas with open semi-natural grasslands. These areas are strongly constrained by climate (long, cold winters with long snow cover and short growing season), topography (steep slopes), and isolation (low population density). Agricultural activities have declined strongly in the last century in both zones resulting in wide-spread abandonment of land. Main extensive agricultural activities include summer-grazing with cows, sheep and goats, reindeer pastoral systems and mixed farming systems similar to that in Northern-Scotland (in-by and out-by systems).	Extensive arable fields, hay meadows, semi-natural grasslands (e.g. mountain and alpine pastures), extensive grasslands, grazed mires, moors and heathlands, grazed coastal meadows, wooded hay meadows, wooded pastures, grazed salt meadows, grazed orchards, traditional orchards	Stonewalls, rows of trees, vegetated margins	Woodland patches, springs
Nemoral	This zone only consists of lowland areas dominated by open semi-natural grasslands. These areas are also constrained by climate (long, dark and cold winters). Agricultural activities have also declined strongly in the last century resulting in wide-spread abandonment. Main extensive agricultural activities include summer grazing with cows and sheep.	Extensive arable fields, hay meadows, semi-natural grasslands, extensive permanent grasslands, grazed mires, moors and heathlands, grazed coastal meadows, wooded hay meadows, wooded pastures, grazed salt meadows, grazed orchards, traditional orchards	Stonewalls, rows of trees/shrubs, vegetated margins	Ponds, pools, woodland patches, springs, solitary trees

Environmental Zone	Characteristics of Typical HNV Farmland Areas	Typical Features		
		Patch	Linear	Point
Atlantic North	HNV areas are found in lowland but more often in upland areas dominated by open semi-natural and/or wet grasslands, moors and heathlands. These HNV areas are most often constrained by soil (wet, unfertile and shallow and /or salty) and/or topography (steep slopes) and remote location (island or inland location in low populated and isolated regions). Agriculture is the most important land use in this zone, but has generally intensified strongly although abandonment is also a problem in the more isolated regions. Main extensive agricultural activities include extensive grazing with cows and sheep and mixed farming.	Hay meadows, semi-natural grasslands, extensive permanent grasslands, grazed mires, moors and heathlands, grazed salt meadows	Stonewalls, hedges, rows of trees/shrubs, vegetated margins	Ponds, pools, woodland patches, springs, solitary trees
Atlantic central	Very limited HNV areas are found in this zone which consists of flat or undulating lowland. HNV is mainly found in areas dominated by semi-natural and/or wet permanent grasslands, moors and heathlands and (salt) marshes. These HNV areas are most often constrained by soil (wet, unfertile and shallow and /or salty). Agriculture is the most important land use in this zone, but has generally intensified significantly. Main extensive agricultural activities include extensive grazing with cows and sheep.	Semi-natural grasslands, extensive permanent grasslands, grazed moors and heathlands, grazed salt meadows	Stonewalls, hedges, rows of trees/shrubs, vegetated margins, ditches, dykes	Ponds, pools, woodland patches, solitary trees
Alpine	HNV areas are found in both upland and mountain areas dominated by semi-natural, unimproved grasslands, hay meadows and/or a mosaic of small arable fields and grasslands. These areas are strongly constrained by topography (steep slopes and altitude) and climate (cold and long snow cover above 1000 metres). Only a small part of the zone is still used for agricultural activities. Both intensification in the valleys and land abandonment in the mountains is a problem in these areas. Main extensive agricultural activities include extensive grazing with cows and sheep with some transhumance practices and mixed farming.	Hay meadows, semi-natural grasslands (e.g. mountain and alpine pastures), extensive permanent grassland, grazed mires, moors and heathlands, grazed orchards, traditional orchards	Stonewalls, rows of trees/shrubs, vegetated margins	Woodland patches, springs, solitary trees

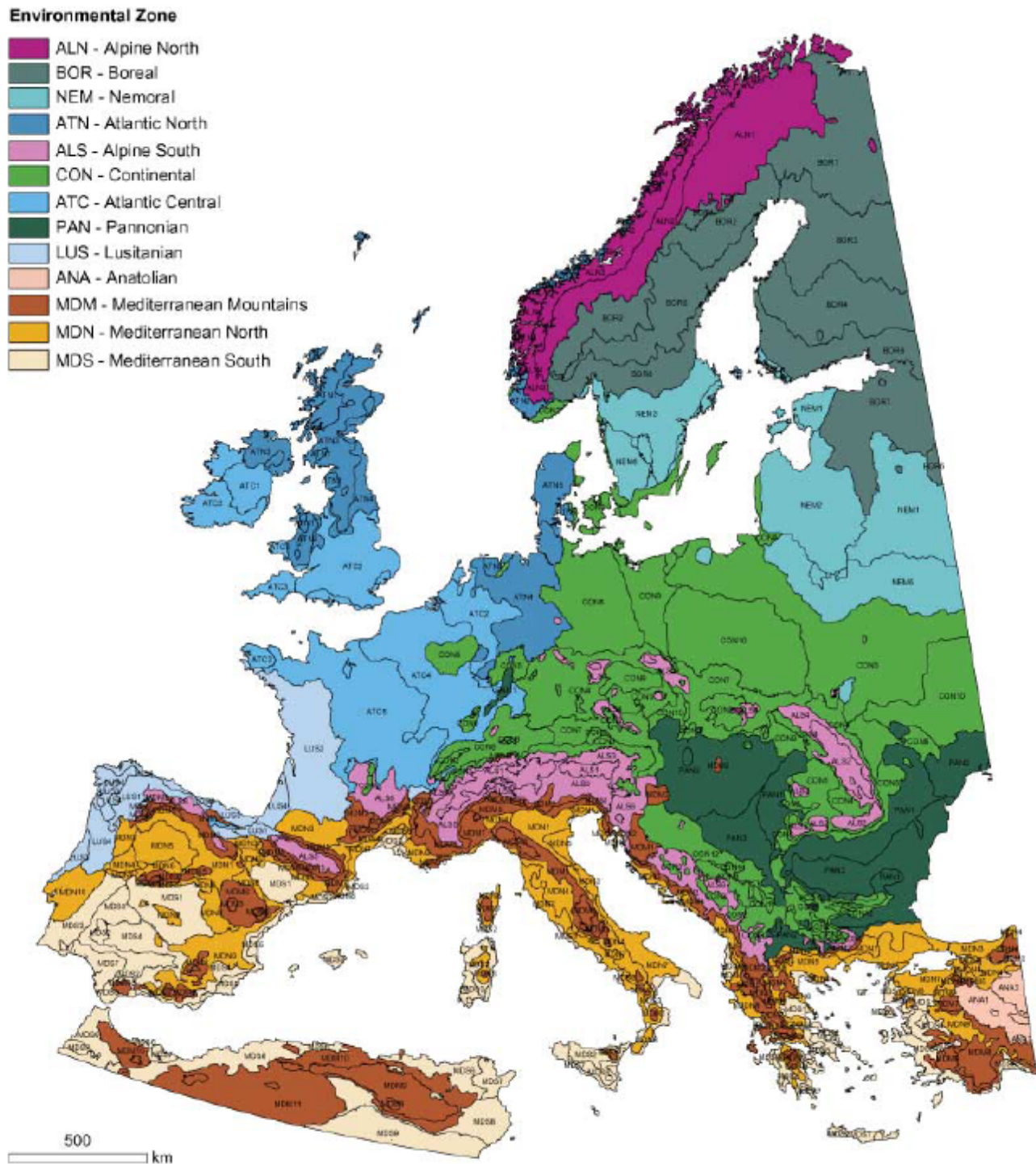
Environmental Zone	Characteristics of Typical HNV Farmland Areas	Typical Features		
		Patch	Linear	Point
Continental	HNV areas are found in lowland but more often in upland areas dominated by extensive semi-natural, unimproved grasslands, hay meadows and/or a mosaic of small arable fields and grasslands. Agricultural land use is very important in this zone, in terms of share of land use, and there may be a significant variation in intensity. HNV areas in this zone still mostly coincide with areas where natural constraints are most severe in relation to topography (steep slopes and higher altitudes), soil quality (e.g. shallow, wet, peaty, alkaline soils) and/or climate (very arid zones e.g. semi-steppes or mountain ranges with long cold winters) and in regions where farm structures are dominated by small family holdings. Both intensification and land abandonment is a problem in this region. Main extensive agricultural activities include grazing with cows, sheep and goats, with or without transhumance practices, mixed farming and low intensity arable cropping.	Extensive arable fields, hay meadows, semi-natural grasslands (e.g. mountain pastures), extensive permanent grasslands, grazed mires, moors and heathlands, wooded hay meadows, wooded pastures, grazed salt meadows, grazed orchards, traditional orchards	Hedges, rows of trees/shrubs, vegetated margins	Ponds, pools, woodland patches, springs, solitary trees
Pannonian	HNV areas are dominated by extensive semi-natural, unimproved grasslands and/or a mosaic of small arable fields and grasslands. The whole zone can be categorised as lowland and agricultural land use is very important in this zone, in terms of share of land use, there may be a significant variation in intensity. HNV areas in this zone still mostly coincide with areas where natural constraints are most severe in relation to soil quality (e.g. shallow and alkaline soils) and/or climate (very arid zones e.g. semi-steppes) and in regions where farm structures are dominated by small family holdings. Both intensification and land abandonment is a problem in this region. Main extensive agricultural activities include extensive grazing with cows, sheep, goats and pigs and mixed farming.	Extensive arable fields, hay meadows, semi-natural grasslands, extensive permanent grasslands, grazed salt meadows, grazed orchards, traditional orchards	Rows of trees/shrubs, vegetated margins	Ponds, pools, woodland patches

Environmental Zone	Characteristics of Typical HNV Farmland Areas	Typical Features		
		Patch	Linear	Point
Lusitanian	HNV areas are still found in lowland areas but more often in upland areas dominated by extensive semi-natural, unimproved grasslands, hay meadows and/or a mosaic of small arable fields and grasslands. Agricultural land use may vary significantly in intensity but there is still extensive farming present. HNV areas in this zone mostly coincide with areas where natural constraints are most severe in relation to topography (steep slopes and higher altitudes) and/or soil quality (e.g. shallow soils) and some agricultural areas with very small family holdings. Both intensification and land abandonment is a problem in this region. Main extensive agricultural activities include extensive grazing with cows, sheep and goats, with or without transhumance practices, mixed farming and low intensity permanent cropping.	Extensive arable fields, hay meadows, semi-natural grasslands (e.g. mountain pastures), extensive permanent grasslands, grazed mires, moors and heathlands, wooded hay meadows, wooded pastures, grazed orchards, traditional orchards	Stonewalls, rows of trees, vegetated margins, terrace boundaries	Ponds, pools, woodland patches, springs, solitary trees
Mediterranean North	HNV areas are found in both lowland and upland areas dominated by extensive semi-natural, unimproved grasslands, dehesas/montados and/or a mosaic of small fields of arable, permanent crops and grasslands. Agricultural land use may vary very significantly in intensity. HNV areas in this zone mostly coincide with areas where natural constraints are most severe in relation to topography (steep slopes) and/or soil quality (e.g. shallow and alkaline soils). Both intensification and land abandonment is a problem in this region. Main extensive agricultural activities include extensive grazing with cows, sheep and goats, with or without transhumance practices, mixed farming, low intensity permanent cropping and agro-forestry.	Semi-natural grasslands (e.g. Mountain pastures), extensive permanent grasslands, garrigue, maquis, grazed salt meadows, dehesa, montado, traditional olive groves	Stonewalls, rows of trees, vegetated margins, terrace boundaries	Woodland patches, springs, solitary trees



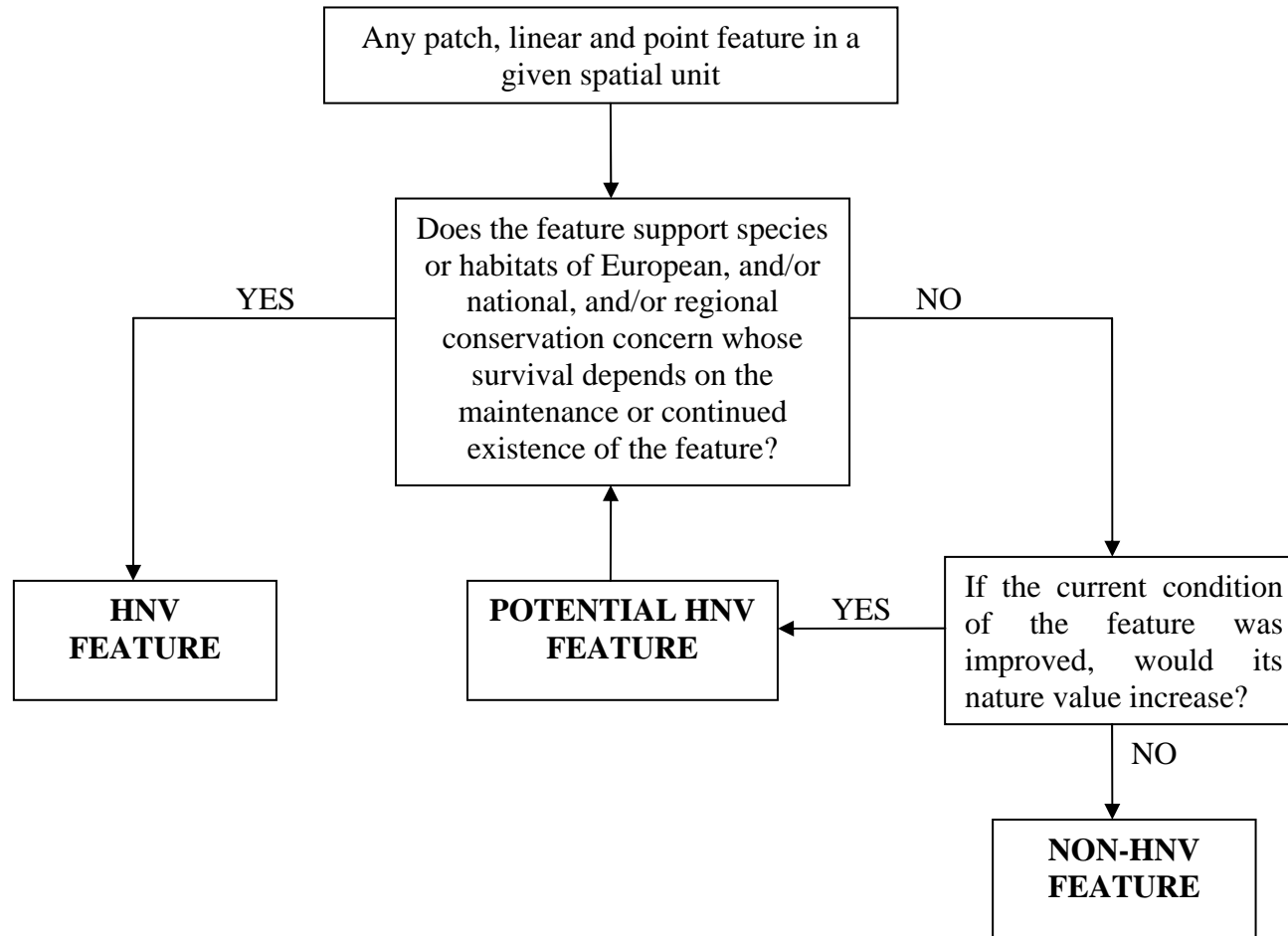
Environmental Zone	Characteristics of Typical HNV Farmland Areas	Typical Features		
		Patch	Linear	Point
Mediterranean Mountains	In these upland areas, HNV areas are dominated by extensive semi-natural, unimproved grasslands. Natural constraints are severe in this zone in relation to topography (steep slopes and higher altitudes) and/or soil quality (e.g. shallow, wet and alkaline soils) and/or climate (short growing season in higher mountains but generally low precipitation). Mostly land abandonment is a problem in this region. Main extensive agricultural activities include extensive grazing with cows, sheep and goats, with or without transhumance practices, mixed farming and low intensity permanent cropping.	Semi-natural grasslands (e.g. mountain pastures), extensive permanent grasslands, garrigue, maquis, wooded hay meadows, wooded pastures, dehesas	Stonewalls, rows of trees, vegetated margins, terrace boundaries	Woodland patches, springs, solitary trees
Mediterranean South	In these upland areas, HNV areas are dominated by extensive semi-natural, unimproved grasslands. In these lowland areas HNV areas are dominated by extensive semi-natural, unimproved grasslands, dehesas/montados and/or a mosaic of small fields of arable, permanent crops and grasslands. Agricultural land use may vary significantly in intensity. HNV areas in this zone mostly coincide with areas where natural constraints are most severe in relation to topography (steep slopes and higher altitudes) and/or soil quality (e.g. shallow, wet and alkaline soils) and/or climate (very dry long summers). Both intensification and land abandonment is a problem in this region. Main extensive agricultural activities include extensive grazing with cows, sheep and goats, with or without transhumance practices, mixed farming, low intensity permanent cropping and agro-forestry.	Semi-natural grasslands (e.g. mountain pastures), extensive permanent grasslands, garrigue, maquis, dehesa, montado, traditional olive groves	Stonewalls, rows of trees, vegetated margins, terrace boundaries	Woodland patches, springs, solitary trees

## Annex 5. Map of European Environmental Zones



Source: Metzger, M.J., Bunce, R.G.H., Jongman, R.H.G, Mucher, C.A., Watkins, J.W., 2005 A climatic stratification of the environment of Europe. *Global Ecology and Biogeography*, **14**, 549–563.

**Annex 6. Decision Tree to Identify HNV Features**



## **Annex 7. Definitions of Forest Categories**

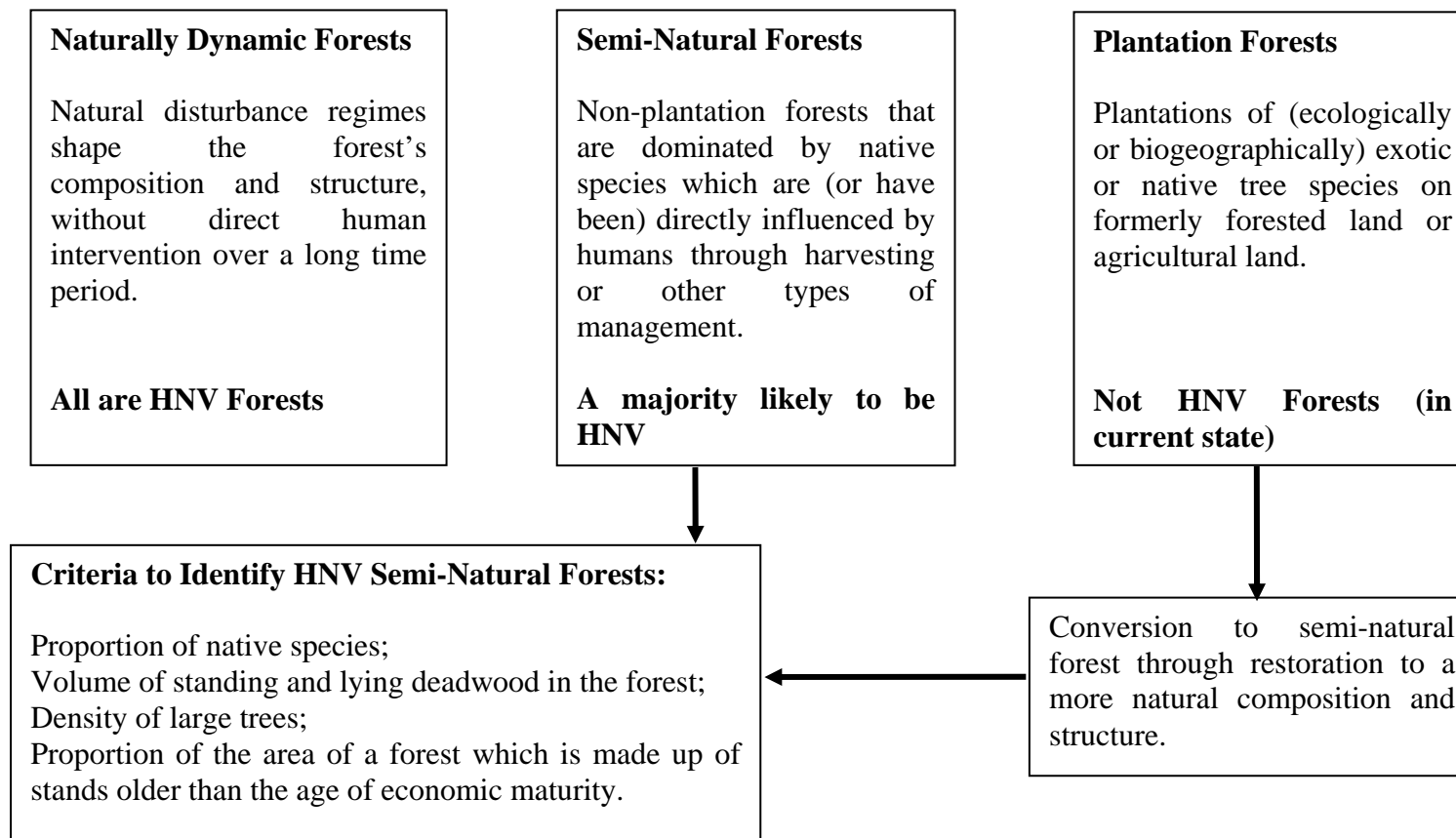
This schema of forest categories is based on the three categories used to assess the degree of forest naturalness under the MCPFE Indicator 4.3 – Undisturbed by Man, Semi-natural Forest and Plantation (EEA, 2006).

**Plantation Forests:** Forest stands are established by planting and/or seeding in the process of afforestation or reforestation. They are either composed of introduced species (all planted stands), or intensively managed stands of indigenous species which meet all of the following criteria: one or two species in the plantation, even age class, regular spacing. This excludes stands which were established as plantations but which have been without intensive management for a significant period of time. These are considered as semi natural.

**Semi-Natural Forests:** These are non-plantation forests whose natural structure, composition and function are, or have been, modified through anthropogenic activities. Most European forests with a long management history belong to this category.

**Naturally Dynamic Forests:** These are forests whose composition and function have been shaped by natural disturbance regimes without substantial anthropogenic influence over a long time period.

**Annex 8. Typology of Potential HNV Forests in the EU-27**



## **Annex 9. Indicators to Measure the Extent of HNV Farming**

For each indicator, Member States will need to define indicator thresholds that are appropriate for the conservation of nature value (habitats and species). They will be informed by the information collected through the regional characterisations of HNV farming systems.

### **1. Intensity of Land Use**

For **semi-natural forage land**, the indicator is **livestock density** (LU/ha/year), calculated at the holding level and including grazing land off the holding (for example, common land). This is a widely used measurement of intensity of use, and is directly relevant to nature value. Data should be collected on the total Livestock Units (LU), including non ruminants, per forage hectare. In certain cases, the spreading of manures from any animals on fields will have the same effect as high stocking densities. In those areas where this is a significant issue, Member States should take account of farm level nutrient balances in combination with a measure of stocking density.

Livestock density will be set at a level appropriate for semi-natural grazing land and / or unfertilised hay meadows in the region or Member State. It should consist of a range, giving a minimum and maximum livestock density. This range will be established on the basis of the regional characterisations of HNV farming systems, and may vary considerably according to the region and according to the predominant types of semi-natural forage.

The data may be available from national sources. In some Member States, it can be extracted from the IACS declaration of each holding, and aggregated to the regional level. Data may also be found in national Animal Health Registries, and from other sources.

For **arable land**, the indicator is the **volume of Nitrogen or biocide applied**, per annum per hectare, or **average crop yields**, per hectare per annum. Average crop yields can be measured at the holding level, and should be set against a regional reference level. For **improved grassland**, the indicator is **livestock density** (LU/ha/year). Set at an appropriate level, this indicator will distinguish grassland under less intensive management from the more intensively used improved grassland.

In some regions, more specific indicators may be applicable given the characteristics of the HNV system. Particularly in Iberia and in some other Mediterranean regions, low intensity arable land includes a proportion of rotating fallow and it is this fallow land which is important for nature value. In this case, **the proportion of land under fallow, and the number of years the land is in fallow**, are relevant indicators of intensity. More than one indicator may be chosen.

Once an indicator has been chosen, the data collected depends on availability. Data on nitrogen inputs may not be available at the level required. Data on the proportion of arable fallow can be determined from IACS declarations in some Member States. To measure average crop yields at the holding level, the forthcoming Survey of

Agricultural Production Methods will provide this data although it is not likely to be available before 2013.

For **permanent crops**, the **volume of Nitrogen or biocides applied**, per hectare per annum, and **average yields**, per hectare per annum, are reliable indicators of intensity of use. In HNV orchards and olive groves, there is usually no use of synthetic fertilisers, or only occasional use in small quantities. Biocide use is a critical factor for nature value in permanent crop systems. Again, HNV orchards and groves normally involve no or minimal use of biocides. Yields are at the bottom end of yield ranges for these crops. Average crop yields can be measured at the holding level, and should be set against a regional reference level.

## 2. Presence of Semi-Natural Features

Again, it is recommended that Member States use different indicators according to three land use categories.

The most significant semi-natural feature found in HNV farming systems is various types of **semi-natural forage land**, namely unimproved grazed grass, scrub and woodland, and unfertilised hay meadows.

In order to determine if semi-natural forage land is HNV, an intensity of use indicator should be applied. In this case, **livestock density** (LU/ha/year), calculated at the holding level, and excluding grazing land off the holding, is the most appropriate indicator, and is described above.

Data on the **area covered by semi-natural grazed and mown vegetation** can be collected in various ways:

- IACS forms in some Member States include categories of forage land that can be assumed to be semi-natural, if livestock densities are below a certain level. These assumptions, however, should be corroborated by ecologists.
- Vegetation inventories (comprehensive grassland surveys) are available in some Member States and it is recommended that these are used.

If forage land is predominantly semi-natural vegetation and the overall livestock density on this land is within the thresholds that favour nature value for the area in question, these two criteria are considered to provide a sufficient indication of HNV Farmland.

For **arable and improved grassland**, a significant presence of semi-natural vegetation on or adjacent to this land is critical to nature value. To constitute a significant presence, this should be in the form of adjacent semi-natural grazing land or hay meadows, and / or a high coverage of smaller semi-natural features on the land in question.

For **arable land and improved grassland**, the indicator is the **proportion of total agricultural area under semi-natural land or features**. This proportion should be quantified by the Member State, based on their regional characterisations of HNV farming systems. Member States should specify the features that will be included in

the calculation, in accordance with their importance for nature value. These will be features that are known to support species of conservation concern at the European, national or regional levels.

Data on the presence of semi-natural features other than forage land are not generally available at a European level and national authorities will need to utilise the best data available. In some cases, IACS forms may contain useful information. New forms of data collection may be required to complete this task effectively.

In the case of **permanent cropland**, conditions vary considerably and much will depend on the relevant crops, growing conditions, the management of understorey vegetation, and the type of field margins present. The **productive trees** themselves are an important **semi-natural feature**. To be considered semi-natural, they must be large (standards or semi-standards) and not treated with biocides. The indicators are the **density of standard or semi-standard productive trees** per given area and the **presence of a semi-natural understorey**. Data generally are not available for both indicators. Data for these two indicators can be collected at the farm level only. In some regions, inventories of traditional orchards exist.

### **3. Presence of a Land Use Mosaic**

Indicators of land use diversity are particularly relevant for arable and improved grassland, and for permanent crops, in situations where a small scale diversity of land uses is known to be a key factor supporting species of conservation concern.

These indicators should be used in combination with indicators on the intensity of use and the presence of semi-natural features, but only in situations where this diversity is known to be significant for nature value. However, an indicator of the presence of a land use mosaic is not sufficient by itself to identify a farming system as an HNV system.

The indicator can be one or a combination of the following, applied at the holding level:

- **Modal parcel size below a given maximum, in hectares;**
- **Proportion of total agricultural area under semi-natural field margins;**
- **A minimum number of different land uses (for example, types of crop) on a single holding.**

Member States should define the threshold level for each indicator, informed by the characterisations of regional HNV farming systems.



## Annex 10. Potential Data Sources for HNV Farmland Indicators

The following tables detail the data available at the farm level in a sample of Member States.

**Table 1 Relevant data from national Farm Structure Survey (FSS) data for selected Member States**

Member State	Livestock Categories Recorded	Semi-Natural Vegetation (SNV) or Permanent Grassland (PG) Categories Recorded	FSS information
<b>Denmark</b>	All: pigs, poultry, dairy cattle, beef, sheep, goats and horses	Permanent grassland not in rotation	Census every 10 years and an annual sample
<b>Finland</b>	-	-	-
<b>France</b>	All: pigs, poultry, dairy cattle, beef, sheep, goats and horses		Census, every 10 years and no integration with IACS or LPIS
<b>The Netherlands</b>	All: pigs, poultry, dairy cattle, beef, sheep, goats and horses	3 categories of natural grassland (per parcel) are recorded: natural grassland (max 5 ton dry matter production) with 1) >75% grassland coverage; 2) 75-50% grassland coverage; 3) <50% grassland coverage.	Yearly recording because FSS is matched with IACS

**Table 2 Relevant data from IACS Declarations for selected Member States**

<b>Member State</b>	<b>Livestock Categories Recorded</b>	<b>Semi-Natural Vegetation/Permanent Grassland Categories</b>	<b>Other Landscape Elements Recorded</b>
<b>Denmark</b>	Not registered in IACS but in separate animal registry	Since 2005 the following categories: Permanent grassland, very low yield Permanent grassland, low yield Permanent grassland, normal yield Permanent grassland <50% clover, re-sown <5 years Permanent grassland >50% clover, re-sown <5 years Permanent grassland without clover, re-sown <5 years Permanent grassland and clover-grass, re-sown <5 years Permanent grassland for drying industry min. yield 6 t/ha Permanent grassland for grass layers Permanent grassland under AEP scheme pre-2003, max. 80 kg N/ha Permanent grassland under AEP scheme pre-2003, 0 kg N/ha	

<b>Member State</b>	<b>Livestock Categories Recorded</b>	<b>Semi-Natural Vegetation/Permanent Grassland Categories</b>	<b>Other Landscape Elements Recorded</b>
<b>France</b>	Animal categories are only registered if subject to decoupled payments or second pillar payments (e.g. LFA and/or special AE grassland payment (PHAE) and/or the “extensification premium”). This implies that a proportion of cows and pigs are not registered. However, these are usually the share of the animals which are not generally part of HNV system.	At farm level following the categories are collected: Permanent grassland: >5 years, Temporary grassland: 1-5 years old, Estive (summer pasture) (on farm only, no mention of collective estive), Moorland and individual grazing land (on farm).	Non-productive surfaces (“non agricultural surfaces” such as ponds, woods, and other features) are registered if subject to cross compliance and/or AE payments.
<b>The Netherlands</b>	All: pigs, poultry, dairy cattle, beef, sheep, goats and horses	3 categories of natural grassland (per parcel) are recorded: natural grassland (max 5 ton dry matter production) with: 1) >75% grassland coverage; 2) 75-50% grassland coverage; 3) <50% grassland coverage.	

**Table 3 Relevant Data from the Land Parcel Information System (LPIS) for selected Member States**

Member State	Title of LPIS System, Status, Scale, Methodology	Semi-Natural Vegetation or Permanent Grassland Categories Recorded	Other Landscape Elements Recorded	Link to IACS
<b>Denmark</b>		Same land use categories are registered as in IACS, but at the level of a block of fields (this is an amalgamation of parcels/fields (max 10 fields))		Yes, link at the level of block of fields, but not individual fields
<b>France</b>	Registre Parcellaire Graphique	At parcel level all productive land uses receiving payments are registered. A link is established with IACS, so all IACS land uses are registered per parcel: Permanent grassland: >5 years: Temporary grassland: 1-5 years old, Estive (summer pasture) (on farm only, no mention of collective estive), Moorland and individual grazing land (on farm).	Mon-productive surfaces (“non agricultural surfaces” such as ponds, woods, and other features) are registered if subject to cross compliance and/or AE payments.	
<b>The Netherlands</b>	Dutch LPIS system called GIAP collects information through BRP (Parcel registration information) and FSS survey (Landbouw meitelling). In the GIAP system all collected information is integrated at farm level (both BRP and Landbouw meiteling). In addition a link at farm level is also established with the animal health registry in which all livestock is registered.	3 categories of natural grassland (per parcel) are recorded: - natural grassland (max 5 ton dry matter production) with: 1) >75% grassland coverage; 2) 75-50% grassland coverage; 3) <50% grassland coverage.		Yes, complete integration at farm level.

Member State	Title of LPIS System, Status, Scale, Methodology	Semi-Natural Vegetation or Permanent Grassland Categories Recorded	Other Landscape Elements Recorded	Link to IACS
Romania				<p>The Romanian government is implementing a Land Parcel Information System/Integrated Administration and Control System (LPIS/IACS). Farmers often own or work a number of small, noncontiguous parcels of land. There are approximately 2.5 million agricultural plots farmed by more than 1.5 million people in the country. It is estimated that the LPIS system will handle about 1.5 million subsidy claims per year and will manage about 755,000 claimants. An agricultural information and decision support system will be installed in the country's agency of payments and interventions in agriculture (APIA). In the first phase, only authorised employees from the 210 local offices will have access to the LPIS system. A dedicated geoportal for use by the general public will be integrated into the system at a later date, providing access for farmers to register online for subsidies.</p>

**Table 4 Relevant data from the Animal Health Registry for selected Member States**

Member State	Livestock Categories Recorded	Link to IACS	Other Relevant Data Sources (Scale, Quality, Methodology)	Semi-Natural Vegetation or Permanent Grassland Categories Recorded	Other Landscape Elements Recorded
<b>Denmark</b>	All: pigs, poultry, dairy cattle, beef, sheep, goats (except horses)	Not clear			
<b>The Netherlands</b>	All: pigs, poultry, dairy cattle, beef, sheep, goats and horses	Yes, at farm level	Topographic information (Top-10 vector) at 1:10000 m resolution; SynBioSys (Syntaxonomic Biological System). This is an information system for the evaluation and management of biodiversity among plant species, vegetation types and landscapes. It incorporates a GIS platform for the visualisation of layers of plant species, vegetation and landscape data. The section ‘Vegetation’ holds a distribution database of relevé data (plot data). Because each relevé in the database is – through an automated process using the program ASSOCIA - assigned to a plant community we have a database with distribution of plant communities. SynBioSys can be used to predict the distribution of HNV Farmland. The different HNV farmland areas have first been described in terms of plant communities as described in Symbioses. Subsequently these plant communities have been mapped using Synbioses. For example the type ‘Saltmarsh’ belonging to HNV type 1 can be associated with 8 plant communities.	Semi-natural types that can be mapped are: Dry calcareous and non-calcareous dune grasslands; Salt meadows in or behind dunes; Dry heather and moorland (including on dunes); Peatlands; Dry and wet infertile grasslands; Calcareous grasslands; Wet (semi) - infertile grasslands; Marsh Marigold grasslands in peat, clay and brook valleys.	Top-10 vector provides coordinates of wet (ditches of less and more than 3 metres wide) and green (hedges, tree lines and field boundaries) landscape elements.

<b>Czech Republic</b>			Grassland inventory Czech Republic		
<b>Estonia</b>			Grassland inventory project; Estonian Fund for Nature and Estonian Seminatural Community Conservation Association; period 1998-2001: <a href="http://www.veenecology.nl/data/Estonia.PDF">http://www.veenecology.nl/data/Estonia.PDF</a>	Wooded, floodplain, coastal and alvar meadows	
<b>Hungary</b>			Grassland inventory project: <a href="http://www.veenecology.nl/data/Hungary.PDF">http://www.veenecology.nl/data/Hungary.PDF</a>	Grassland type total area in Hungary (x1.000 ha) Alkali grasslands 250-270 Sand grasslands 35-40 Steppes 100-230 Rock grasslands 1.7-3 Flood-plain and hay meadows 200-250 Fen meadows and sedge-beds 20-60 Mountain grasslands 1.4-2	

<b>Latvia</b>		Grassland inventory project: <a href="http://www.veenecology.nl">http://www.veenecology.nl</a>	Area of grassland habitat type (ha) and % (of all grasslands) 1. Dry grasslands 1851 ha (11%) 1.1. Dune grasslands Corynephorion 124 ha (0.72%) 1.2. Dry siliceous grasslands Plantagini-Festucion 473 ha (2.73%) 1.3. Dry grasslands on cliffs Alysso-Sedion albi 4 ha (0.02%) 1.4. Dry calcareous grasslands Bromion erecti 1116 ha (6.44%) 1.5. Xero-thermophile fringes Geranion sanguinei 12 ha (0.07%) 1.6. Mesophile fringes Trifolion medii 121ha (0.7%) 2. Fresh grasslands 6386 ha (36.86%) 2.1. Nardus grasslands Violion caninae 221 ha (1.28%) 2.2. Mesophile pastures Cynosurion 4236 ha (24.45%) 2.3. Hay meadows Arrhenatherion 1908 ha (11.01%) 2.4. Potentillion anserinae 10 ha (0.06%) 3. Moist grasslands 5876 ha (33.92%) 3.1. Humid riverine grasslands Alopecurion 1088 ha (6.28%) 3.2. Humid eutrophic grasslands Calthion 3889 ha (22.45%) 3.3. Humid oligotrophic grasslands Molinion 46 ha (4.88%) 3.4. Coastal brackish grasslands Armerion maritima 47 ha (0.27%) 4. Wet grasslands 2937 ha (16.96%) 4.1. Acidic dwarf sedge communities Caricion fuscae 258 ha (1.49%) 4.2. Calcareous dwarf sedge communities Caricion davallianae 47 ha (0.27%) 4.3. Tall sedge communities Magnocaricion 2632 ha (15.19%) 5. Semi-ruderal grasslands 273 ha (1.57%)	
<b>Lithuania</b>		Grassland inventory project: <a href="http://www.veenecology.nl">http://www.veenecology.nl</a> (See below)		



<p><b>Slovenia</b></p>			<p>Grassland inventory project:  <a href="http://www.veenecology.nl">http://www.veenecology.nl</a></p>	<p>Area of grassland habitat type (ha) and % (of all grasslands)</p> <ol style="list-style-type: none"> <li>1. Submediterranean-Illyrian- meadows (<i>Scorzonerion villosae</i>) 9534 ha (3%)</li> <li>2. Submediterranean-Illyrian karst pastures (<i>Satureion subspicatae</i>) 10095 ha (4%)</li> <li>3. Suboceanic/submediterranean dry grasslands predominately on basic (calcareous) substrate (<i>Mesobromion</i>) 8875 ha (3%)</li> <li>4. Matgrass (<i>Nardus stricta</i> dominated grasslands on acid substrate (<i>Nardo-Callunetea</i>) 221 ha (1%)</li> <li>5. Oligotrophic moist meadows with <i>Molinia caerulea</i> (<i>Molinion</i>) 2875 ha (1%)</li> <li>6. Mesotrophic wet meadows (<i>Calthion</i>) 354 ha (0.1%)</li> <li>7. Meadowsweet dominated wet meadows and lowland tall herb communities (<i>Filipendulion</i>) 120ha (0.04%)</li> <li>8. Manured mesotrophic and eutrophic slightly moist (<i>Arrhenatheretalia</i>) 84809 ha (27%).</li> <li>8.1. Oatgrass dominated manured meadows (<i>Arrhenatherion</i>) 3884ha (1.4%)</li> <li>8.2. Ryegrass-Crested Dogstail grasslands (<i>Cynosurion</i>) 2719ha (0.01%).</li> <li>9. Small Sedge intermediate mire and swamp swards (<i>Scheuchzerio-Caricetea fuscae</i>) 32ha (0.01%).</li> <li>10. Water fringe vegetation and swamps (<i>Phragmition communis</i>) 1137ha (0.4%).</li> <li>11. Vegetation dominated by bulky sedges (<i>Magnocaricion elatae</i>) 1090ha (0.4%).</li> <li>12. Vegetation dominated by grasses and herbs along the water banks (<i>Glycerio-Sparganion</i>) 8ha</li> <li>13. Pioneer annual flooded mudflats grasslands (<i>Thero-Salicornietea</i>) 271 ha (0.1%)</li> <li>14. Perennial halophytic grasslands of muddy semi-dry soils (<i>Arthrocnemetea fruticosi</i>) 16 ha (0.01%).</li> <li>15. Marine swamps (<i>Juncetea maritimi</i>) (not mapped).</li> <li>16. Submarine grasslands (<i>Posidonia</i>, <i>Cymodocea</i>, <i>Zostera</i> in <i>Ruppia</i> beds) (not mapped)/</li> <li>17. Village mosaic 7935 ha (2.8%).</li> <li>18. Extensive grasslands (based on Land use map 2002) 100905 ha (35.2%).</li> <li>19. Unclassified (mosaic of types) 58303 ha (20.3%).</li> </ol> <p>Total Area 286581ha</p>	
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<b>Slovak Republic</b>			Grassland inventory project: <a href="http://www.veenecology.nl">http://www.veenecology.nl</a>		
<b>Bulgaria</b>			Grassland inventory project: <a href="http://www.veenecology.nl">http://www.veenecology.nl</a>		
<b>Romania</b>			Grassland inventory project: <a href="http://www.veenecology.nl/data/Hungary.PDF">http://www.veenecology.nl/data/Hungary.PDF</a>		

## Grassland Inventories

Source: Veen Ecology (<http://www.veenecology.nl/>)

During the period 1997-2006, mapping projects of semi-natural and natural grasslands were initiated by the Royal Dutch Society for Nature Conservation (KNNV) in close collaboration with colleagues in Central and Eastern Europe.

These were conducted in the following countries:

- Estonia: Estonian Fund for Nature and Estonian Seminatral Community Conservation Association: period 1998-2001:  
<http://www.veenecology.nl/data/Estonia.PDF>
- Latvia: Latvian Fund for Nature: period 1999-2003:  
<http://www.veenecology.nl/data/Latvia.PDF>
- Lithuania: Lithuanian Fund for Nature and Institute of Botany: period 2002-2005: <http://www.veenecology.nl/data/Lithuania.PDF>
- Slovakia: Daphne, Institute of applied ecology: period 1998-2002:  
<http://www.veenecology.nl/data/Slovakia.PDF>
- Hungary: Ministry of Environment, National Authority for Nature Conservation, Institute of Botany: period 1997-2001:  
<http://www.veenecology.nl/data/Hungary.PDF>
- Romania: University of Bucharest, Association of Botanical Gardens, Danube Delta Institute: period 2000-2004:  
<http://www.veenecology.nl/data/Romania.PDF>
- Bulgaria: Institute of Botany, Wilderness Fund, Bulgarian Society for the Protection of Birds: period 2001-2004;  
[http://www.veenecology.nl/data/BG\\_grasslands\\_text.pdf](http://www.veenecology.nl/data/BG_grasslands_text.pdf)
- Slovenia: Slovenian Natural History Society, Institute of Botany, University of Maribor and of Ljubljana: period 1998-2003:  
<http://www.veenecology.nl/data/Slovenia.PDF>

The Grassland inventories are highly standardised following the recommendations of the European Workshop on National Grassland Inventory, held in 1999 in Bratislava by KNNV in cooperation with Daphne, Institute for Applied Ecology, Slovakia.

A six step approach was followed:

1. By means of satellite image and/or aerial photo processing the permanent grassland complexes will be identified as well as the boundaries of the complexes. In the screening phase all the potential sites are globally screened by grassland specialists on actual agricultural use and other relevant issues like land abandonment. The field research areas are defined in this phase taking into account the position of the grasslands in the national bio-geographical zones and variation in abiotic conditions like climatic factors and soil types.
2. In preparation for the mapping phase, a list of national grassland vegetation mapping units is compiled in order to achieve comparative outputs across the project. The vegetation units are described by means of a set of indicator species which provide an indication of the development of the vegetation at a local site. The selection of the indicator species is based on existing knowledge concerning threatened and endangered species, endemic species and species which reflect the environmental conditions of the grasslands, for instance for nutrient input, continuity in management, water management and others.
3. In the mapping phase, the semi-natural grassland units are mapped in the field in selected areas by mapping the different vegetation units, listing the species, and drawing the boundaries of homogeneous vegetation or vegetation mosaics. For this purpose, the national project coordinators develop a manual for field mapping activities in which the system of identification of vegetation units to be mapped is included along with the indicator species and other requirements like information regarding management of the sites and soil type.
4. On the base of all the outputs of the previous phases, the GIS database is built up, including information on land management, land use, history of land use, specific threats like land abandonment. The boundaries of the mapped vegetation units are digitised and stored in a GIS database. To achieve compatibility with other geographical information systems at the national level, national digital maps/satellite images are used as a background layer in the database.
5. Based on this information a flexible database is produced which is available for policy makers and other specialists. The results of the project are interpreted and recommendations for protection and management are described.

For the evaluation report see:

<http://www.veenecology.nl/data/EVALUATIONNATIONALGRASSLANDINVENTORYfinal4.pdf>

In Poland, a separate project was organised in the early 1990s by Dorschkamp Institute in the Netherlands. In the Czech Republic, a habitat mapping project was organised by the government and institutions.

## Annex 11. Farmland Species of European Conservation Concern

### European Farmland Bird Species

Bird species indicators of the quality of HNV Farmland can be drawn from the following list of 119 European farmland bird species. They are either species of conservation concern or those species that occur in large abundances<sup>13</sup>.

<b>Scientific Name</b>	<b>Common Name</b>
<i>Accipiter brevipes</i>	Levant Sparrowhawk
<i>Acrocephalus paludicola</i>	Aquatic Warbler
<i>Aegypius monachus</i>	Cinereous Vulture
<i>Alauda arvensis</i>	Eurasian Skylark
<i>Alectoris chukar</i>	Chukar
<i>Alectoris rufa</i>	Red-legged Partridge
<i>Anas querquedula</i>	Garganey
<i>Anser albifrons</i>	Greater White-fronted Goose
<i>Anser anser</i>	Greylag Goose
<i>Anser brachyrhynchus</i>	Pink-footed Goose
<i>Anser erythropus</i>	Lesser White-fronted Goose
<i>Anser fabalis</i>	Bean Goose
<i>Anthus campestris</i>	Tawny Pipit
<i>Aquila adalberti</i>	Spanish Imperial Eagle
<i>Aquila clanga</i>	Greater Spotted Eagle
<i>Aquila heliaca</i>	Imperial Eagle
<i>Aquila pomarina</i>	Lesser Spotted Eagle
<i>Asio flammeus</i>	Short-eared Owl
<i>Athene noctua</i>	Little Owl
<i>Branta bernicla</i>	Brent Goose
<i>Branta leucopsis</i>	Barnacle Goose
<i>Branta ruficollis</i>	Red-breasted Goose
<i>Bucanetes githagineus</i>	Trumpeter Finch
<i>Burhinus oedicnemus</i>	Eurasian Thick-knee
<i>Buteo rufinus</i>	Long-legged Buzzard
<i>Calandrella</i>	Greater Short-toed Lark
<i>brachydactyla</i>	
<i>Calandrella rufescens</i>	Lesser Short-toed Lark
<i>Carduelis cannabina</i>	Eurasian Linnet
<i>Carduelis flavirostris</i>	Twite
<i>Chersophilus duponti</i>	Dupont's Lark
<i>Chlamydotis undulata</i>	Houbara Bustard
<i>Ciconia ciconia</i>	White Stork
<i>Circaetus gallicus</i>	Short-toed Snake-eagle

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<sup>13</sup> This list was drawn up by the JRC/EEA for use in their mapping approach of HNV Farmland areas (Paracchini *et al.*, 2006). The contributions of Birdlife International are acknowledged. An initial list of 75 farmland bird species was derived from Birdlife International's 'Birds in Europe' (2004). Following a consultation exercise with the Member States carried out by the EEA in the second half of 2006, this list was revised. The final list was produced in April 2007.

<i>Circus cyaneus</i>	Northern Harrier
<i>Circus pygargus</i>	Montagu's Harrier
<i>Columba oenas</i>	Stock Pigeon
<i>Coracias garrulus</i>	European Roller
<i>Corvus frugilegus</i>	Rook
<i>Corvus monedula</i>	Eurasian Jackdaw
<i>Coturnix coturnix</i>	Common Quail
<i>Crex crex</i>	Corncrake
<i>Cursorius cursor</i>	Cream-coloured Courser
<i>Cygnus columbianus</i>	Tundra Swan
<i>Cygnus cygnus</i>	Whooper Swan
<i>Cygnus olor</i>	Mute Swan
<i>Dendrocopos syriacus</i>	Syrian Woodpecker
<i>Elanus caeruleus</i>	Black-winged Kite
<i>Emberiza cirrus</i>	Cirl Bunting
<i>Emberiza citrinella</i>	Yellowhammer
<i>Emberiza hortulana</i>	Ortolan Bunting
<i>Emberiza melanocephala</i>	Black-headed Bunting
<i>Emberiza schoeniclus</i>	Reed Bunting
<i>Erythropgia galactotes</i>	Rufous-tailed Scrub-robin
<i>Falco biarmicus</i>	Lanner Falcon
<i>Falco cherrug</i>	Saker Falcon
<i>Falco naumanni</i>	Lesser Kestrel
<i>Falco tinnunculus</i>	Common Kestrel
<i>Falco vespertinus</i>	Red-footed Falcon
<i>Francolinus francolinus</i>	Black Francolin
<i>Galerida cristata</i>	Crested Lark
<i>Galerida theklae</i>	Thekla Lark
<i>Gallinago gallinago</i>	Common Snipe
<i>Gallinago media</i>	Great Snipe
<i>Glareola pratincola</i>	Collared Pratincole
<i>Grus grus</i>	Common Crane
<i>Gyps fulvus</i>	Eurasian Griffon
<i>Haematopus ostralegus</i>	Eurasian Oystercatcher
<i>Hieraaetus fasciatus</i>	Bonelli's Eagle
<i>Hieraaetus pennatus</i>	Booted Eagle
<i>Hippolais olivetorum</i>	Olive-tree Warbler
<i>Hippolais pallida</i>	Olivaceous Warbler
<i>Hirundo rustica</i>	Barn Swallow
<i>Jynx torquilla</i>	Eurasian Wryneck
<i>Lanius collurio</i>	Red-backed Shrike
<i>Lanius excubitor</i>	Great Grey Shrike
<i>Lanius minor</i>	Lesser Grey Shrike
<i>Lanius nubicus</i>	Masked Shrike
<i>Lanius senator</i>	Woodchat Shrike
<i>Limosa limosa</i>	Black-tailed Godwit
<i>Locustella fluviatilis</i>	Eurasian River Warbler
<i>Locustella naevia</i>	Common Grasshopper-warbler
<i>Lullula arborea</i>	Wood Lark

<i>Melanocorypha calandra</i>	Calandra Lark
<i>Merops apiaster</i>	European Bee-eater
<i>Miliaria calandra</i>	Corn Bunting
<i>Milvus migrans</i>	Black Kite
<i>Milvus milvus</i>	Red Kite
<i>Motacilla flava</i>	Yellow Wagtail
<i>Neophron percnopterus</i>	Egyptian Vulture
<i>Numenius arquata</i>	Eurasian Curlew
<i>Nycticorax nycticorax</i>	Black-crowned Night-heron
<i>Oenanthe hispanica</i>	Black-eared Wheatear
<i>Oenanthe oenanthe</i>	Northern Wheatear
<i>Otis tarda</i>	Great Bustard
<i>Otus scops</i>	Common Scops-owl
<i>Passer montanus</i>	Eurasian Tree Sparrow
<i>Perdix perdix</i>	Grey Partridge
<i>Philomachus pugnax</i>	Ruff
<i>Picus viridis</i>	Eurasian Green Woodpecker
<i>Pluvialis apricaria</i>	Eurasian Golden-plover
<i>Porzana porzana</i>	Spotted Crake
<i>Pterocles alchata</i>	Pin-tailed Sandgrouse
<i>Pterocles orientalis</i>	Black-bellied Sandgrouse
<i>Pyrhocorax pyrrhocorax</i>	Red-billed Chough
<i>Saxicola rubetra</i>	Whinchat
<i>Saxicola torquata</i>	Common Stonechat
<i>Serinus canaria</i>	Island Canary
<i>Streptopelia turtur</i>	European Turtle-dove
<i>Sylvia communis</i>	Common Whitethroat
<i>Sylvia hortensis</i>	Orphean Warbler
<i>Sylvia nisoria</i>	Barred Warbler
<i>Tetrao tetrix</i>	Black Grouse
<i>Tetrax tetrax</i>	Little Bustard
<i>Tringa totanus</i>	Common Redshank
<i>Turdus iliacus</i>	Redwing
<i>Turdus pilaris</i>	Fieldfare
<i>Tyto alba</i>	Barn Owl
<i>Upupa epops</i>	Eurasian Hoopoe
<i>Vanellus vanellus</i>	Northern Lapwing

## European Farmland Butterfly Species

The following butterfly species are considered indicators of HNV Farmland habitats and are either species of conservation concern or are present in high abundance in these habitats<sup>14</sup>.

### 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 humedasmae*

*Pseudochazara euxina*

*Pyrgus cirsii*

### Humid Grassland

*Coenonympha hero*

*Coenonympha oedippus*

*Euphydryas aurinia*

*Maculinea nausithous*

*Maculinea teleius*

Note: Woodland species were not included in the list.

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<sup>14</sup> This list was drawn up by the EEA/JRC in their mapping approach of HNV Farmland areas (Paracchini *et al.*, 2006) using Van Swaay, C. and Warren, M. (2003), 'Prime Butterfly Areas in Europe: Priority Sites for Conservation', Wageningen, The Netherlands. The contributions of De Vlinderstichting (Wageningen) are acknowledged. The final list has been revised following consultation with the Member States.