

Research Stimulus Fund

Final Report

Identifying the Distribution and Extent of Agricultural Land of High Nature Value
IDEAL-HNV

DAFM Project Reference No: 11/S/108

Start date: 01/01/2013

End Date: 31/03/2016

Principal Coordinator and Institution: Dr John Finn (Teagasc)

Email: john.finn@teagasc.ie

Collaborating Research Institutions and Researchers:

Teagasc: Dr John Finn, Mr Stuart Green, Dr David Meredith, Dr Daire Ó hUallacháin, Dr Eddie O'Riordan

IT Sligo: Dr James Moran

Please place one "x" below in the appropriate area on the research continuum where you feel this project fits

Basic/Fundamental		→	Applied		→	Pre Commercial	
1	2	3	4	5 X	6	7	

Please specify priority area(s) of research this project relates to from the National Prioritisation Research Exercise* (NRPE) report:

Priority Area (s)	I. Sustainable Food Production and Processing
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Key words: (max 4)

biodiversity, sustainability, HNV, ecosystem

1. Rationale for Undertaking the Research

This section should outline the rationale for carrying out the research and identify the need / problem to be addressed

The European Community's 'Strategic Guidelines for Rural Development 2007 – 2013' includes HNV farming and forestry systems as one of the seven impact indicators, and Member States are required to:

- identify areas with HNV farming practices in each Member State (by 2006);
- support and maintain HNV farming through Rural Development Programmes (by 2008), and;
- monitor changes to the HNV area over time.

Although HNV farmland occurs within designated areas (e.g. Natura 2000), they are also widespread in other areas of countryside, especially where agricultural intensification has not occurred. Due to the absence of up to date national habitat maps in Ireland, there is relatively poor knowledge of the spatial distribution of HNV farmland outside of designated sites (Special Areas of Conservation (SACs), Special Protection Areas (SPAs) or Natural Heritage Areas (NHAs)). Thus, a major effort is needed to fill the data gaps on the distribution and character of HNV areas, and thereby support policy efforts to improve the targeting and effectiveness of support measures.

The first step in this process will need to be the development of a national map of HNV potential, based on methodology that is repeatable, and based on transparent and objective criteria. Such an approach will satisfy national and EU policy requirements, and provide a baseline against which future change can be measured. Estimates of HNV farmland in Ireland range from 20% to 40% of the land area (EEA, 2004a; 2008). This range indicates the strong need to develop improved, robust and repeatable methodologies for identifying HNV farmland.

2. Research Approach

Specify the research methodologies employed, emphasising novel techniques and also outline any modifications from the original approved project proposal

National-scale map of likelihood of HNV farmland

We created a national map of the likelihood of HNV farmland using five indicators of HNV farmland from data available at national scale. The indicators used (and weighting) were:

- semi-natural habitat cover (40%)
- stocking density (30%)
- hedgerow density (10%)
- river and stream density (10%) and
- soil diversity (10%).

Values were calculated for each tetrad (2 km×2 km grid) for all five indicators. Each tetrad was assigned the mean value of the input feature, except for the length of river and stream layer, for which the total sum of the line feature was assigned to the tetrad. To maintain all the input layers in one format and range, all the input values were rescaled between 0 and 1. All processing was undertaken using various GIS tools. For the additive overlay analysis, the weighted sum model (WSM) was used, which uses distinct weights to the input layers and combines multiple inputs to create an integrated output at the desired scale. Finally, the modelled output was masked with the 1 km² pixel farmland data of Ireland to display farmed areas only.

Habitat data was used to validate and improve the mapping accuracy. There was very high congruence between field-gathered data and HNV farmland category.

Online tool to assess nature value of individual farms

The decision support tool was added to the project web site and consists of:

- a form where users can enter details about their land
- a results page where the results of the test are displayed for the user,
- a page in the back-end of the online system where administrators can view and download the results of previous tests

The decision support tool is largely based on the HNV farm identification index presented in Boyle et al. (2015), which was extensively field tested during the IDEAL-HNV project and converted into an online decision support tool, based on information on:

- farm area
- stocking density
- area of improved land
- field boundary density

Diverse types of High Nature Value farmland in Ireland

There is a need for descriptions of HNV farmland in each Member State so that national policies can be developed and applied to best support this type of farmland. There has been a paucity of information on what features and characteristics exactly make a farm HNV. This could lead to overlooking certain situations where limited metrics of the characteristics of farming intensity and land cover are insufficient to appropriately identify HNV farming systems.

Based on a preliminary national map of likely HNV distribution in Ireland (see below), we sampled 102 farms wee across ten different geographical sites with a high likelihood of occurrence of HNV farming. On each farm, we recorded habitat information, farm management, landscape structure and farmland biodiversity. We used Principal Components Analysis and cluster analysis to identify distinct types of HNV farmland in our sample.

Innovative use of remote sensing technology to identify HNV farmland

We used eCognition software (Trimble) which offers segmentation technique called Multi-resolution Segmentation algorithm. Multiple trials have produced criteria for segmentation that allow for intra-field scale objects to be reliably detected and for farm landscapes to be classified. The main steps of the object-based image classification methodology considered are: segmentation, descriptive attributes extraction, and classification.

Image objects were defined by segmenting both as original spectral bands and as normalized difference vegetation index (NDVI) classification. Initially, we considered three parameters for basic segmentation of the image i.e., scale, shape and compactness. A basic segmentation process was followed by rule-based classification. In this work we carried out two rule-set classification algorithm methods:

- Method 1: we considered multi-resolution segmentation and image object classification based on different threshold values (see below)
- Method 2: we carried out Hybrid classification using NDVI segmentation and object classification using eCognition and ArcMap software.

Socio-economic aspects of HNV farming systems

We used the classification of areas with a high probability of HNVf (from the national map of HNV likelihood, below) to match the corresponding socio-economic data, using data from the Census of Agriculture, the Census of Population and data on electoral divisions. This allowed us to create a socio-economic profile of Electoral Divisions with varying likelihood of being HNV farmland.

3. Research Achievements/Results

Outline main results achieved

National-scale map of likelihood of HNV farmland

The resulting maps (tetrad and ED scale map) represent likelihood of HNV farmland occurrence between 1 and 5. A dark green colour (indicating a score of 5) shows a very high likelihood of HNV farmland occurrence; a blue colour (indicating a score of 0) shows EDs with a very low likelihood of HNV farmland occurrence (see Matin et al. 2016).

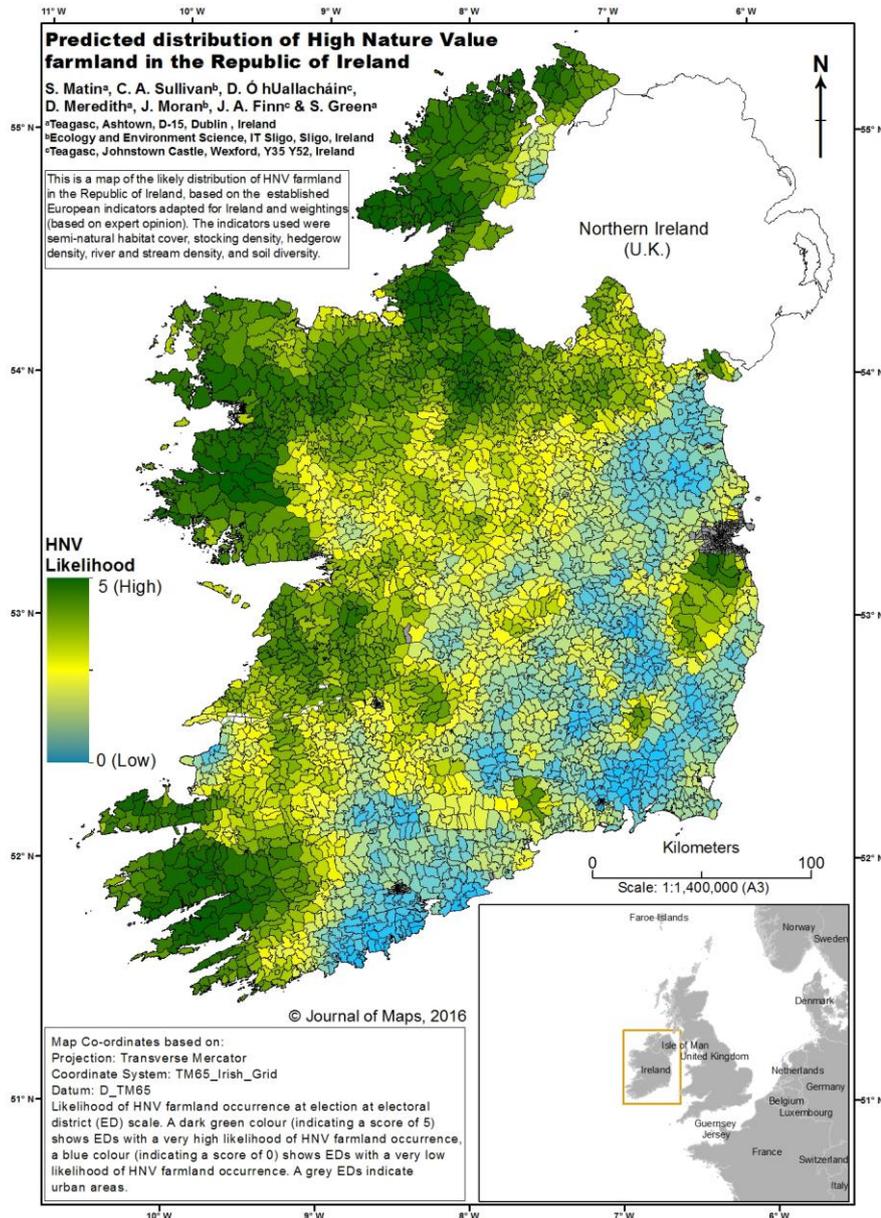


Fig. 1. Likely occurrence and distribution of HNV farmland in each Electoral Division, based on a scale ranging from low (blue colour) to intermediate (yellow) to high (green). Note that non-HNV farmland may still occur in areas with high likelihood of HNV farmland, and vice versa. From Matin et al. (2016).

Diverse types of High Nature Value farmland in Ireland

We describe five HNVf types that correspond with existing broad HNVf types and we also describe Landscape-level HNVf which has not been previously described. We include farm structural characteristics, management variables and basic habitat attributes for each HNVf type. We find a diversity of types of High Nature Value farmland summarised as:

- Whole-farm HNV, no commonage e.g. Burren and coastal farms
- Whole-farm HNV, small farms e.g. island farms and throughout countryside
- Whole-farm HNV, large farms e.g. upland areas with some commonage
- Whole-farm HNV, commonage e.g. upland areas close to intensively farmed lowland
- Partial HNV, e.g. throughout Ireland
- Remnant HNV, e.g. throughout Ireland
- Landscape-level HNV, e.g. semi-natural habitat cover can vary (and be low) but it is always a component of a larger intact landscape feature e.g. Shannon floodplains

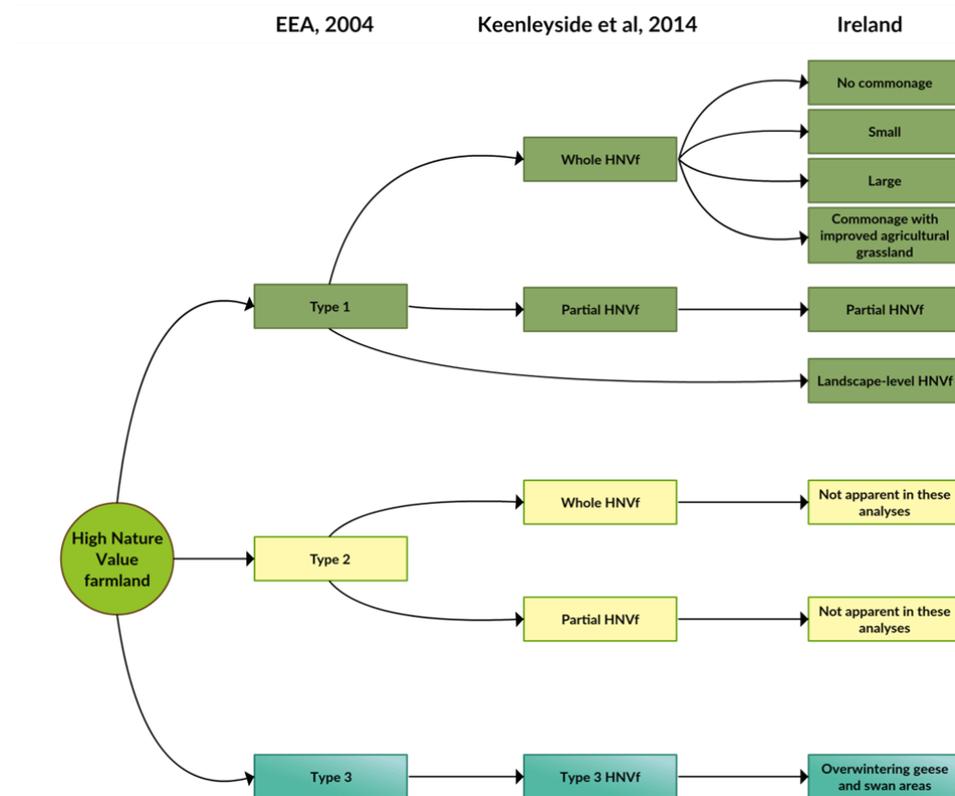


Fig. 2. Overview of types of HNV farmland identified in our study, and their relation to previously described European types by EEA (2004) and Keenleyside et al (2014).

Innovative use of remote sensing technology to identify HNV farmland

We applied two methods to identify HNV farmlands based on object-oriented classification. We found that both classification methods promising for HNV farmland classification on SPOT-7 satellite images. In comparison to Method 2, Method 1 was more sensitive to small objects and changes and very less sensitive to colour variations in the same class object. An example of the resulting output is provided below, which facilitates automated classification of field-scale objects (see legend of the diagram).

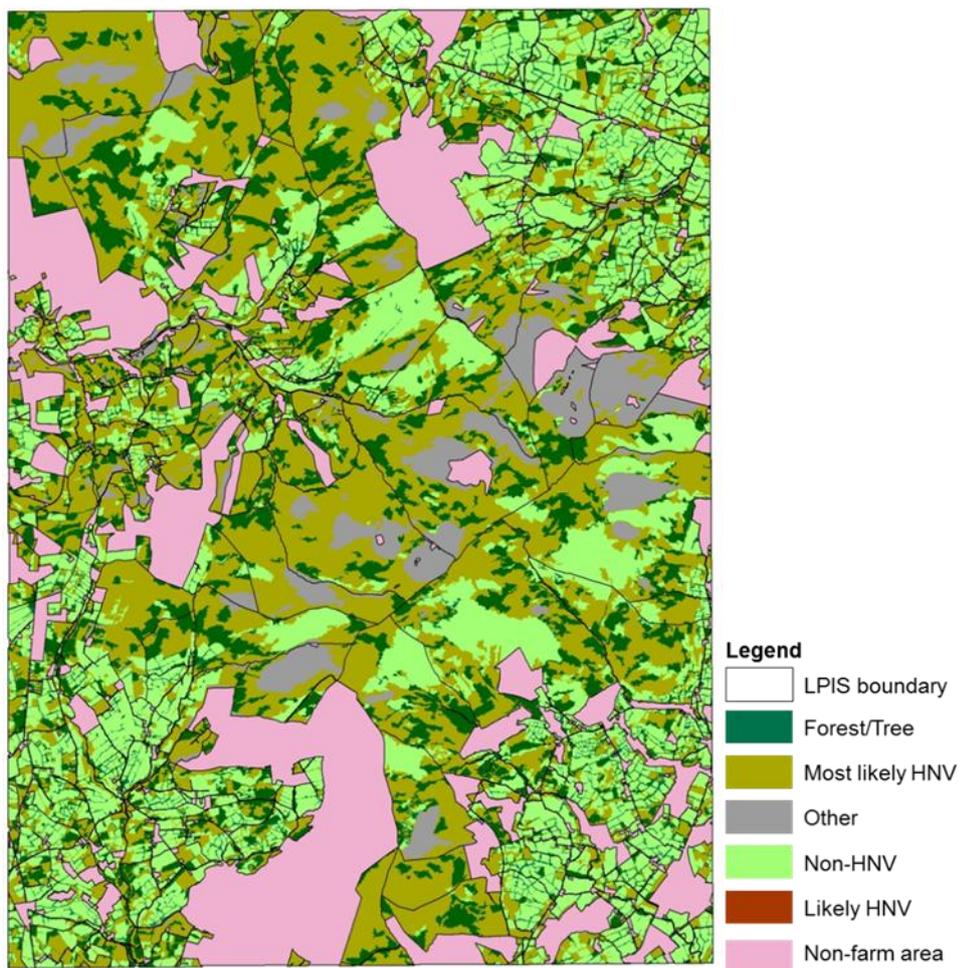


Fig. 3. Example of final output of the remote sensing analysis, with automated identification and classification of landscape objects.

Socio-economic aspects of HNV farming systems

We calculated profiles for electoral divisions that varied in their probability of being High Nature Value farmland, focusing on:

- Farm size
- Farm specialisation
- Standard output (average monetary value of the agricultural output at farm-gate prices)
- Demographic structure of farmer population

An example of farm specialisation is provided in Fig. 4.

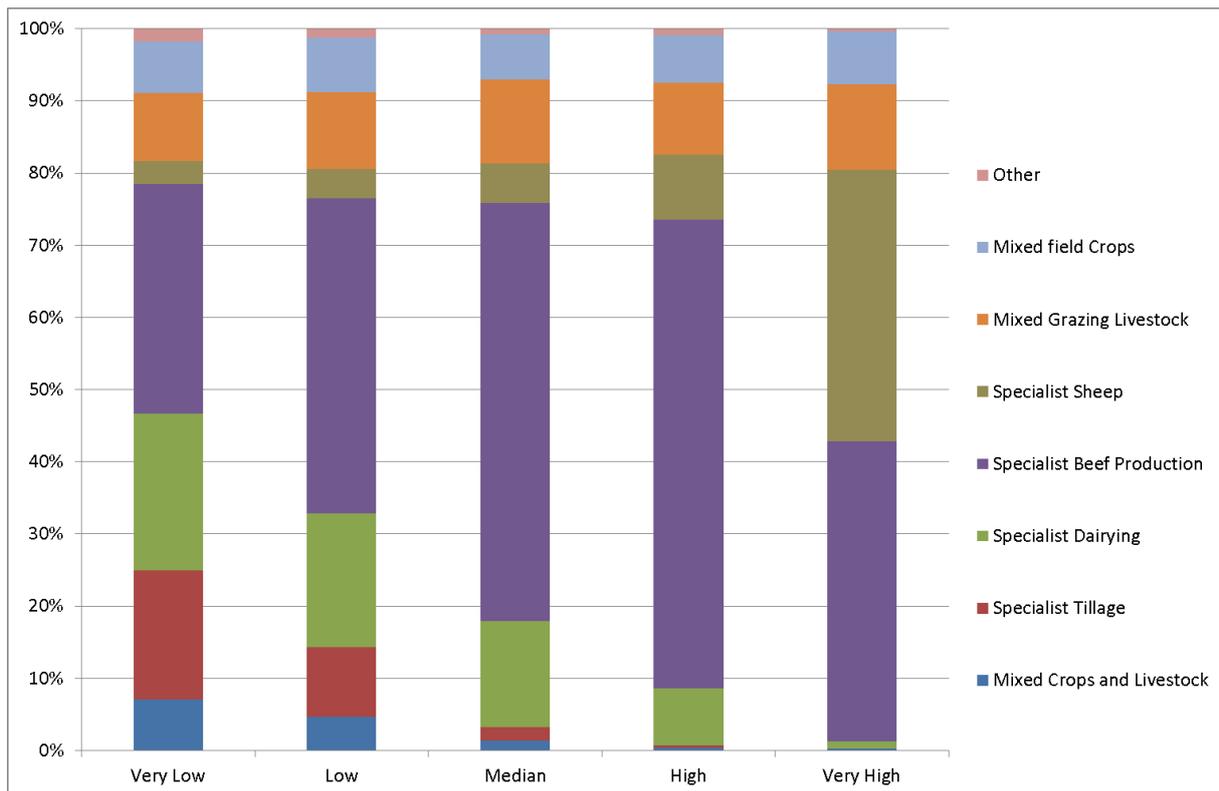


Fig. 4. Distribution of farming categories across Electoral divisions with different likelihood of occurrence of HNV farmland. As the likelihood of occurrence of HNV increases, there is lower incidence of specialist dairying and increasing incidence of specialist beef and sheep systems.

4. Impact of the Research

A summary of the tangible impact of the research project should be provided under the outcomes' and 'outputs' heading below. In addition, please provide a short narrative synopsis of the benefits / improvements the research has made to the area under investigation particularly as regards end users, e.g. industry, consumers, regulatory authorities, policymakers, the scientific community, etc

National-scale map of likelihood of HNV farmland

To our knowledge, this is the first Irish national-scale map that has used objective agri-environmental criteria to predict the likely distribution of HNV farmland. This provides a reference point for the future monitoring of the distribution of HNV farmland in Ireland. It can also assist in policy planning and development for the rural environment. For example, comparisons of the spatial distribution of HNV areas and the spatial distribution of agri-environment and other payments can assess the degree to which payments are targeted toward HNV farming systems. In addition, these data can be used to incorporate impacts on farmland biodiversity of, for example, land use change and climate change in national-scale models or scenarios.

As an indicator-based prediction, such maps should be interpreted within the limitations of the data used. The spatial scale of the map is restricted by the coarse scale of data at national level. Given the predictive and aggregated nature of the outputs, it is important to note that non-HNV farmland may still occur in areas with high likelihood of HNV farmland, and vice versa. We also know that some very specific types of HNV farmland are not well-represented by this approach. For this reason, this output is not suitable for strictly deciding whether individual farmers in certain areas should be eligible or not for agri-environmental measures aimed at HNV farming systems. Instead, there is a requirement for a farm-

scale assessment to confirm the high nature value state of individual farms. As part of the IDEAL-HNV project, we also examine the farm-scale characteristics of HNV farmland.

Online tool to assess nature value of individual farms

We developed a web-based tool to better assess the HNV status of individual farms, and this is available online at <http://www.high-nature-value-farmland.ie/>

This is an important supplementary tool to the map developed in Task 1. The spatial resolution of the map means that a particular area with a high likelihood of being HNV may still contain farmland that is not HNV. This farm-scale tool allows individual farmers to assess the nature value status of their farms through an easy-to-use online application.

See the project website (www.high-nature-value-farmland.ie) for further details.

Diverse types of High Nature Value farmland in Ireland

For the first time in Ireland, we described the diversity of HNVf farms and the characteristics that distinguish the different types from one another, using farm-scale land cover and management data.

Design and targeting of policy supports can be improved with greater knowledge of the diversity of HNV farmland types. The identification of similar characteristics across geographically disparate parts of Ireland indicates one could develop and apply a common policy support framework adapted to take account of the range of HNV types.

The design of support measures such as agri-environment schemes need to be cognisant of the diversity of HNVf that exists. This is particularly important given the multifunctional objectives of the CAP in the EU. Certain farm types will have natural advantages which make them important for the provision of regulatory, support, cultural and aesthetic ecosystem services as well as traditional production services i.e. food.

Socio-economic aspects of HNV farming systems

The research is highly relevant to policymakers, especially in relation to the support of High Nature Value farming systems through the Rural Development Programme.

The detailed socio-economic profile of farmers, farm households and farm enterprises in areas dominated by HNV farmland highlights a number of critical issues: the relatively elderly age profile of the population of farmers; low farm incomes, and; changes in the nature of farm enterprises.

The challenges confronting farm households in areas with HNV farmland are spatially variable and suggest that flexible or targeted approaches may be most appropriate to support farm enterprises in different types of HNV areas and farming systems.

4(a) Summary of Research Outcomes

(i) Collaborative links developed during this research

This project has led to a number of successful collaborations and EU funding applications including:

- A DG Environment Action Grant on the development of results based agri-environment pilot schemes in Ireland and Spain funded by DG Environment with co-funding from Teagasc, The Heritage Council and project partners. Partners include: European Forum on Nature Conservation and Pastoralism; Institute of Technology Sligo; Birdwatch Ireland; National Parks and Wildlife Service; GESTIÓN AMBIENTAL DE NAVARRA; High Nature Value Services Ltd. Total Project Budget = €1.48million

- EU Horizon 2020 project: HNV-LINK High Nature Value Farming: Learning, Innovation and Knowledge which is an EU wide Thematic Network funded under call H2020-ISIB-2015-1 “Closing the research and innovation divide: the crucial role of innovation support services and knowledge exchanges”. Partners include: Centre International de Hautes Etudes Agronomiques Méditerranéennes – Institut Agronomique Méditerranéen de Montpellier CIHEAM-IAMM, France - Coordinator; European Forum on Nature Conservation and Pastoralism EFNCP, United Kingdom; Instituto de Ciências Agrárias e Ambientais Mediterrânicas – Universidade de Evora, Portugal; University of Agricultural Sciences and Veterinary Medicine – Cluj Napoca, Romania; University of National and World Economy STEP, Bulgaria; County Administrative Board of Västra Götaland, Sweden; Application des Sciences de l’Action ASca, France; Institute of Technology Sligo, Department of Environmental Science, Ireland; University of Thessaly - Department of planning and regional development, Greece; University of Helsinki – department of Agricultural Sciences, Finland; Local action group LAG 5, Croatia; Conservatoire Espaces Naturels Languedoc-Roussillon, France; Fundación entretantos, Spain. Total Project Budget = €2.2million

(ii) *Outcomes where new products, technologies and processes were developed and/or adopted*

New method for objectively assessing the extent and distribution of HNV farmland (NPWS DAHG, Irish NGOs, researchers. This is based on the GIS information on HNV likelihood – new knowledge for national-scale data infrastructure and modelling of agricultural and agri-environmental scenarios.

Online tool to assess the nature value of an individual farm. <http://www.high-nature-value-farmland.ie/is-your-farm-hnv/>

New GIS modelling processes for identification of HNV farmland

New typology of HNV farmland in Ireland

(iii) *Outcomes with economic potential*
Not applicable.

(iv) *Outcomes with national/ policy/social/environmental potential*

National-scale map of likelihood of HNV farmland

This map provides a national-scale reference point for the likely current distribution of HNV farmland. This helps fulfil some of Ireland’s commitments in the current Rural Development plan to restore, preserve and enhance High Nature Value farmland as identifying where these areas are is an important step. It could also be used carry out future monitoring of the distribution of HNV farmland in Ireland. It can assist in policy planning and development for the rural environment. Comparisons of the spatial distribution of HNV areas and the spatial distribution of agri-environment and other payments can assess the degree to which payments are targeted toward HNV farming systems. In this way, this map can help progress the meeting of obligations toward the High Nature Value Indicator of the Rural Development Programme. In addition, these data on the likely occurrence of HNV farmland can be used to incorporate impacts on farmland biodiversity of, for example, land use change and climate change in national-scale models or scenarios.

Online tool to assess nature value of individual farms

For individual farmers, farm advisors and consultants, this online tool facilitates a farm-scale assessment to confirm the nature value status of an individual farm.

Diverse types of High Nature Value farmland in Ireland

Knowledge on the diversity and characteristics of HNV farmland will aid development of Results-based agri-environment schemes and payments for ecosystem services. HNV farming systems in particular have very high potential for delivering environmental public goods and this information can help target particular regions for the delivery of specific environmental public goods such as water quality or upland landscapes.

Socio-economic aspects of HNV farming systems

The research is highly relevant to policymakers, through improved knowledge of the socio-economic status of High Nature Value farming systems. This highly relevant to policy objectives to target support from the Rural Development Programme to maintain the farming and biodiversity of HNV farmland.

4 (b) Summary of Research Outputs

(i) Peer-reviewed publications, International Journal/Book chapters.

Matin, S., Sullivan, C.A., Ó hUallacháin, D., Meredith, D., Moran, J., Finn, J.A., Green, S. (2016) Predicted distribution of High Nature Value farmland in the Republic of Ireland. Journal of Maps <http://www.tandfonline.com/doi/abs/10.1080/17445647.2016.1223761>

Sullivan, C.A., Finn, J.A., Ó hUallacháin, D., Green, S., Clifford, B., Matin, S., Meredith, D., Moran J. A typology based on farm-scale characteristics reveals diversity of High Nature Value (HNV) farmland types in Ireland. Land Use Policy, in review.

(ii) Popular non-scientific publications and abstracts including those presented at conferences

Finn, J.A., Matin, S., Sullivan, C.A. (2016). High Nature Value farmland. TRResearch Spring 2016, pp 24-25.

Sullivan, J. Finn, S. Matin, S. Green, J. Moran. (2015). Putting policy into practice: identifying High Nature Value (HNV) farmland at a national scale and a farm scale. BES Annual meeting 13-16 December 2015 Edinburgh.

Meredith, D., Crowley, C., Jones, G., Green, S., Matin, S., Moran, J., O'Sullivan, C., O'hUallachain, D. and Finn, J.A. (2015). Implications of socio-economic change for the production of High Nature Value Farmland: A case study of Ireland 2000 and 2011. Teagasc Biodiversity Conference 2015, Portlaoise, Co. Laois, 21-Oct-2015.

O'Sullivan, C., Finn, J.A., Green, S., Matin, S., O'hUallachain, D., Meredith, D. and Moran, J. (2015). The types of High Nature Value (HNV) farmland in Ireland. Teagasc Biodiversity Conference 2015, Portlaoise, Co. Laois, 21-Oct-2015, p. 34-35.

Matin, S., Green, S., Finn, J.A., Moran, J. and Sullivan, C. (2015). Characterising indicator based HNV farmland distribution in Ireland- a GIS approach. Teagasc Biodiversity Conference 2015, Portlaoise, Co. Laois, 21-Oct-2015, p. 32-33.

Sullivan, C., Finn, J.A., Matin, S., Green, S. and Moran, J. (2015) National distribution and descriptive typology of farmland of High Nature Value (HNV). Environ 2015, IT Sligo, 08-Apr-2015, p. 115.

S. Matin, S. Green, B. Clifford (2015) .Mapping high nature value farmland distribution in Irish uplands, Agricultural Research Forum- ISBN: 978-1-84170-615-3

Shafique Matin, S. Green. (2015). Object Oriented Classification Using High-Resolution Satellite Images For High Nature Value Farmland Identification. October 30, 2015, Irish Earth Observation symposium, NUIG, Galway

Matin S, Green S, Finn J, Meredith D, Moran J, Ó hUallacháin D and Sullivan C. (2015). Farm scale object-oriented classification of high nature value farmland using high resolution satellite images. The 5th International Conference on Earth Observation, DECEMBER 8 – 10 2015, United Arab Emirates, Al Ain , UAer Global Changes (EOGC 2015)

J. Moran, P. Boyle, J. Finn, M. Gormally, S. Green, M. Hayes, G. Jones, P. McGurn, D. O. Huallacháin, C. Sullivan. (2015). Supporting HNV farmland conservation: lessons learnt and future needs for science into policy and practice. Ecology at the Interface. Book of Abstracts, 21-25 September, 2015, Rome. p. 251.

C. Sullivan, J. Finn, S. Matin, S. Green, J. Moran (2015). National distribution and typology of HNV farmland in Ireland and how these can aid targeting. Ecology at the Interface. Book of Abstracts, 21-25 September, 2015, Rome. P. 253.

Sullivan, C. A., Finn, J. A., Matin, S., Green, S., O hUallachain, D. & Moran, J. (2014). Distribution and typologies of High Nature Value (HNV) farmland in Ireland. British Ecological Society Annual General Meeting. 09-12/12/2014

Sullivan, C. A., Finn, J. A., Green, S., O hUallachain, D. & Moran, J. (2013). Ideal-HNV: Identifying the Distribution and Extent of Agricultural Land of High Nature Value. Irish Plant Scientists' Association Meeting (IPSAM), p. 34. 16/05/13.

(iii) **National Report**
Not applicable.

(iv) **Workshops/seminars at which results were presented**

Project team. Workshop, IT Sligo. Preliminary results on HNV typologies, and feedback. 09/04/15

Project team. Farmer workshop, Peacock's Hotel, Maam Cross, Co. Galway. July 28th 2015 Discussion of HNV farming

Project team. Farmer workshop, Castletownbere, Co.Cork. Discussion of HNV farming 30/07/15

Project team. Farmer workshop, Glendalough Hotel, Laragh, Co.Wicklow. Discussion of HNV farming, 04/08/15

Project team. Farmer workshop, Sligo IT, Sligo. Discussion of HNV farming and presentation of preliminary results. 10/04/15

Project team. Teagasc National Biodiversity Conference. Dedicated sessions for end-of-project conference dissemination. 21/10/15

James Moran, Caroline Sullivan. Burren Winterage Festival. Discussion of HNV farming 23/10/15

Caroline Sullivan, Daire O hUallachain, Gwyn Jones, James Moran. Irish Uplands Forum. Gave out information leaflets on HNV farmland, scouted for potential IDEAL-HNV farmers, contributed to discussions on policy, HNV farmland and farmland biodiversity in general. 28-29/05/2014

Caroline Sullivan. BTAP meeting. Attended a Slieve Aughty farmers BTAP meeting and talked about the IDEAL-HNV project and farmland biodiversity in the area. 10/06/14

Caroline Sullivan. Organised a farmer meeting through the local IFA group. Met farmers from the Oughterard area, gave a presentation on the IDEAL-HNV project and recruited farmers for the project. 12/06/14

Caroline Sullivan. Travelled to Arranmore Island, Donegal. Gave a presentation on the IDEAL-HNV project and recruited farmers for the project. 25/08/14

Caroline Sullivan, James Moran, Shafique Matin, David Meredith and Gwyn Jones. Burren Winterage Workshop. James Moran introduced the workshop aims, Caroline Sullivan presented details on the Slieve Aughty farms along with a local farmer. David Meredith and Gwyn Jones participated in a closing panel discussion. 24/10/14

John Finn, Stuart Green, Daire O'hÚallacháin, James Moran, Caroline Sullivan. Workshop on High Nature Value Farming Systems, Galway. Workshop jointly organised by Heritage Council/IdealHNV. 21/02/13

John Finn, Stuart Green, Daire O'hÚallacháin, David Meredith, James Moran. Workshop on High Nature Value Farming Systems, Galway Presentation: Identifying the Distribution and Extent of Agricultural Land of High Nature Value. 21/02/13

Caroline Sullivan and James Moran. Field visit to upland site in the Ox Mountains. HNV farmland discussions with farmer and IFA representatives. 19/07/13

Caroline Sullivan and Brian Clifford. REPS course Manorhamilton. Informing farmers in study site region of the project. Presentation title: Identifying the distribution and extent of High Nature Value (HNV) in Ireland. 08/10/13

Caroline Sullivan and James Moran. Derrybrien Farmer Meeting. Visiting farms in the area and talking with the farmers about HNV farmland. 06/12/13

(v) Intellectual Property applications/licences/patents
Not applicable

(vi) Other

Blog posts by Caroline Sullivan: <https://idealhmv.wordpress.com/>

Blog posts by John Finn: <http://farmecol.blogspot.ie/>

Caroline Sullivan	Blog post	HNV farming in Achill	04/03/16
Caroline Sullivan	Blog post	High Nature Value farmland website	04/03/16
Caroline Sullivan	Blog post	Mapping Work at Earth Observation Symposium	02/11/15
Caroline Sullivan	Blog post	Upcoming events in 2015	22/07/15
Caroline Sullivan	Blog post	IDEAL-HNV farmer workshop outcomes	02/10/15
Caroline Sullivan	Blog post	HNV farming events October 2015	28/09/15
Caroline Sullivan	Blog post	IDEAL-HNV farmer workshops	22/07/15
Stuart Green	Blog post	Feedback wanted on new Online Maps of the Irish Uplands	20/05/16
Stuart Green	Blog post	Teagasc Agricultural Land Use Workshop, RDS Dublin	06/05/15
Caroline Sullivan	Blog post	Calculating a nature value index for Irish farms	13/04/15
Caroline Sullivan	Blog post	Stakeholders meeting for IDEAL-HNV project	13/04/15
Caroline Sullivan	Blog post	IDEAL-HNV progress update	04/03/15
Caroline Sullivan	Blog post	Upcoming events in April	05/02/15
Caroline Sullivan	Blog post	Results based AE Pilot Scheme in Ireland and Navarra	12/01/15
Caroline Sullivan	Blog post	Project fieldwork update	05/11/14
Caroline Sullivan	Blog post	People, Nature and Food: A vision for a sustainable future.	07/11/14
John Finn	Blog post on HNV	Results-based agri-environment schemes	12/12/14
John Finn	Blog post on HNV	HNV research article	26/11/14
John Finn	Blog post on HNV	Impact of BurrenLIFE: conservation of farming and wildlife.	13/08/14
John Finn	Blog post on HNV	Irish Semi-natural Grasslands Survey	28/02/14
John Finn	IdealHNV: High Nature Value Farming systems	Blog post.	09/09/13
Brian Clifford and Caroline Sullivan. IDEAL-HNV: Identifying the Distribution and Extent of Agricultural Land of High Nature Value. 09/09/13			

5. Scientists trained by Project

Total Number of PhD theses: 0

Not applicable

Total Number of Masters theses: 0

Not applicable

6. Permanent Researchers

Institution Name	Number of Permanent staff contributing to project	Total Time contribution (person years)
Teagasc	4	1.23
IT Sligo	1	0.24
Total	5	1.47

7. Researchers Funded by DAFM

Type of Researcher	Number	Total Time contribution (person years)
Post Doctorates/Contract Researchers	2	4.94
PhD students	0	
Masters students	0	
Temporary researchers	0	
Other	0	
Total	2	4.94

8. Involvement in Agri Food Graduate Development Programme

Name of Postgraduate / contract researcher	Names and Dates of modules attended
Caroline Sullivan	Professional skills for the early-career Agri-Food Researcher Sept 18-20 2013. .
Shafique Matin	No

9. Project Expenditure

Total expenditure of the project: €344,703.89

Total Award by DAFM: €371,576

Other sources of funding including benefit in kind and/or cash contribution(specify): €
Not applicable.

Breakdown of Total Expenditure

Category	Teagasc	IT Sligo	Total
Contract staff			
Temporary staff			
Post doctorates	90,989.73	114,720.92	205,710.65
Post graduates	0.00	0.00	
Consumables	14,890.61	569.11	15,459.72
Travel and subsistence	9,075.69	23,641.85	32,717.54
Sub total	114,956.03	138,931.88	253,887.91
Durable equipment		1,670.31	1,670.31
Other		12979.29	12979.29
Overheads	34,486.81	41,679.57	76,166.38
Total	149,442.84	195,261.05	344,703.89

10. Leveraging

Summarise any additional resources'/funding leveraged by this award from other sources e.g. Additional Staff, National/EU funding secured, EI Commercialisation Fund, etc.

Since the IDEAL-HNV project commenced, Dr James Moran (IT Sligo) has pursued further projects on High Nature Value farmland, including the RBAPS (total value €1.4 million) and HNV-LINK (€2.2 million) projects. The Teagasc co-funded contribution to RBAPS was partly a result of the increased awareness and commitment to High Nature Value farmland that was derived from the IDEAL-HNV project.

Dr David Meredith (Teagasc) was awarded a Teagasc PhD Walsh Fellowship on research on Irish commonages (~€70,000).

11. Future Strategies

Outline development plans for the results of the research.

The research team plans on using this successful project as a platform for future collaborations. These are likely to focus on:

- Quantifying the quality of biodiversity in HNV areas
- Developing the use of remote sensing and analysis technology to further automate the identification of HNV areas
- Using these results to inform approaches to measure and model the supply of ecosystem services from HNV areas.

We will make the data that underpin the national map of HNV likelihood available in an Open Access format (through Teagasc).

We will continue publishing the results of the project, with papers on the following themes:

- Remote-sensing and analytical tools
- Trends in socio-economic profiles of HNV farmland areas
- Further details of the mapping technology and validation of the national map of HNV likelihood