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Estimating the distribution of High Nature Value farmland in Ireland

Key external stakeholders:

Policymakers, farmers of HNV farmland, grassland farmers, upland farmers, stakeholders involved in environmental assessment of farmland.

Practical implications for stakeholders:

High Nature Value (HNV) farmland in Europe occurs where agriculture is the major land use and where agriculture sustains or is associated with either a high species and habitat diversity, or the presence of species of European conservation concern, or both. Maintaining both the nature value of this farmland and the livelihoods of farmers in these areas is a key policy challenge.

- The IDEAL-HNV project produced the first national-scale map that used key HNV farmland indicators to estimate the distribution of all HNV farmland in the Republic of Ireland.
- It provides an indication of the nature value of Irish farmland, including farmland outside of designated areas.
- Improved knowledge of the distribution of HNV farmland will allow better evaluation of the extent to which it is being targeted for support, and being maintained or improved.
- These data provide a reference point for the future monitoring of the distribution of HNV farmland in Ireland.
- These data can be used to incorporate estimates of farmland nature value in national-scale models or scenarios for the agricultural sector.

Main results:

- We developed methods to improve knowledge of the distribution of High Nature Value farmland.
- We mapped the distribution of the likelihood of HNV farmland in the Republic of Ireland based on five indicators: semi-natural habitat cover, stocking density, hedgerow density, river and stream density, and soil diversity.
- 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/

Opportunity / Benefit:

These data can be used to incorporate estimates of farmland nature value into national-scale models of the impacts on farmland biodiversity through, for example, land use change, climate change, or alternative scenarios for the agricultural sector.

Collaborating Institutions:

Institute of Technology, Sligo

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1. Project background:

The European Community's Rural Development Measure 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 farmland area over time.

Due to the absence of complete and up-to-date national habitat maps in Ireland, there is relatively poor knowledge of the spatial distribution of HNV farmland. Thus, a major effort is needed to fill the data gaps on the distribution and character of HNV farmland areas. This was addressed by the IDEAL-HNV project.

2. Questions addressed by the project:

- Can we use national-scale indicators to develop an objective method to estimate the likely distribution of High Nature Value farmland in the Republic of Ireland?

3. The experimental studies:

Within a Geographical Information System, values were calculated for each tetrad in the country (2 km × 2 km grid) for all five indicators: semi-natural habitat cover, stocking density, hedgerow density, river and stream density, and soil diversity. 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 to between 0 and 1. 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 and only in farmland areas. Finally, the modelled output was masked with the 1 km^2 pixel farmland data of Ireland to display farmed areas only. Here we present the output rescaled to Electoral Divisions. The map was validated against extensive field work that involved habitat mapping in various farmland areas across the country, along with other data on farming systems and habitats.

4. Main results:

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 weightings) were:

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

Other tasks in the project addressed the following:

- we developed a web-based tool to better assess the HNV status of individual farms using information at the farm-scale (farm area, stocking density, area of improved land, field boundary density) and this is available online at http://www.high-nature-value-farmland.ie/
- we developed a typology of different types of High Nature Value farmland (see Sullivan *et al*., in review) based on extensive field work in multiple landscapes dominated by HNV farmland.
- we investigated the use of remote sensing technologies for improved identification of HNV farmland at higher spatial resolution.
- we profiled the socio-economic characteristics of areas with different likelihood of being HNV farmland.

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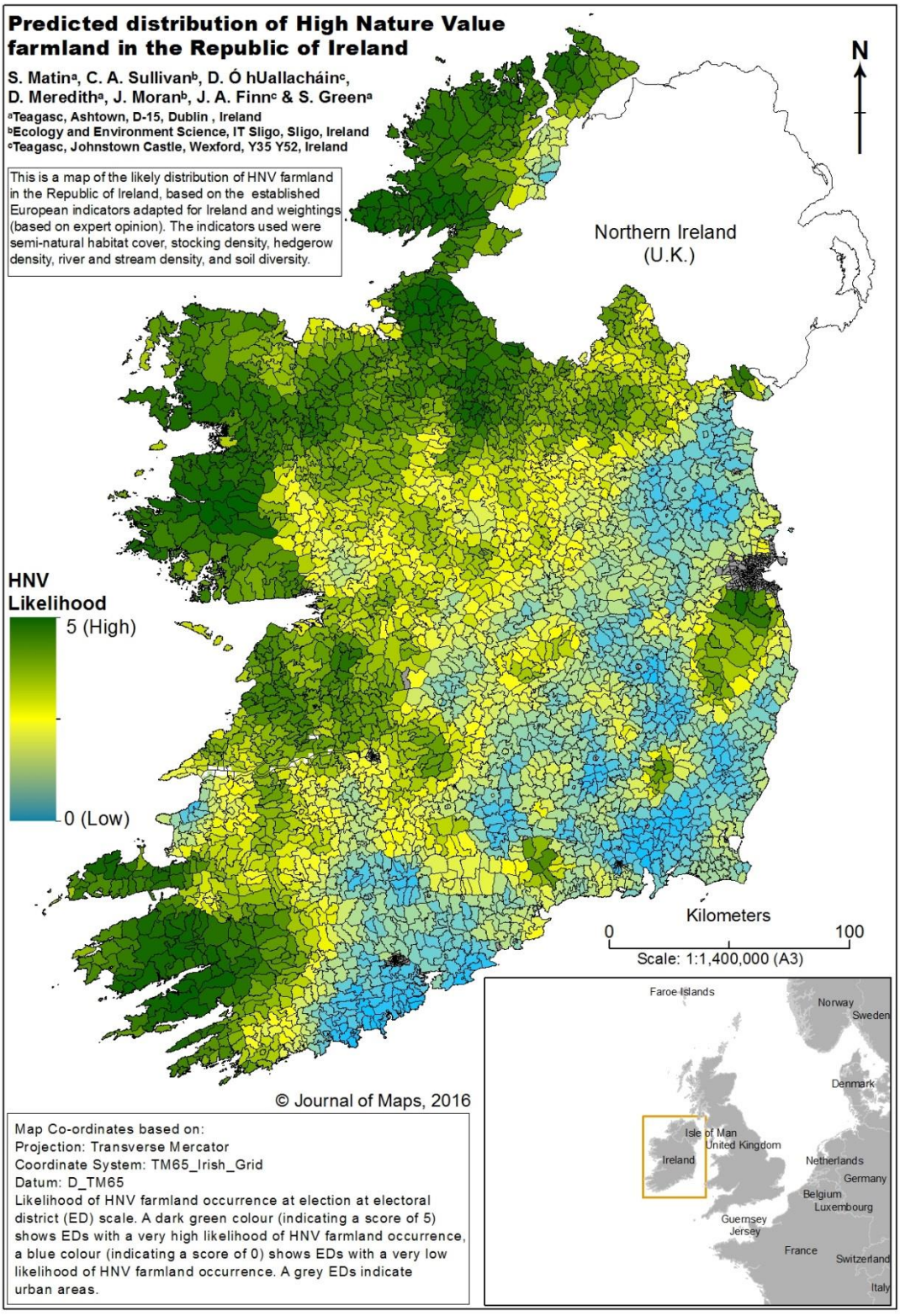

Figure 1. Likelihood of HNV farmland occurrence at electoral district (ED) scale.
A dark green colour (indicating a score of 5) shows EDs with a very high likelihood of HNV farmland, a blue colour (indicating a score of 0) shows EDs with a very low likelihood of HNV farmland. A grey colour indicates urban areas. From Matin et al. (2016, Supplement available as Open Access).

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5. Opportunity/Benefit:

This map provides a national-scale reference point for the likely current distribution of HNV farmland. This knowledge can help fulfil some of Ireland's commitments in the current Rural Development Plan to restore, preserve and enhance High Nature Value farmland. It could also be used to develop a method for future monitoring of the distribution of HNV farmland in Ireland. 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 can be used to incorporate estimates of farmland nature value into national-scale models of the impacts on farmland biodiversity through, for example, land use change, climate change, or alternative scenarios for the agricultural sector.

6. Dissemination:

Main publications:

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, and Finn, J.A (in review) 'Typology based on farm-scale characteristics reveals diversity of High Nature Value (HNV) farmland types in Ireland' *Land Use Policy*

Matin, S., Green, S., Clifford, B. (2015) 'Mapping high nature value farmland distribution in Irish uplands' In: Agricultural Research Forum, Tullamore, 9-Mar-2015, p.142.

Popular publications:

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

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

See project blog at: https://idealhnv.wordpress.com/

See project website at: http://www.high-nature-value-farmland.ie

See blog posts by John Finn at: http://farmecol.blogspot.ie/

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