

Evaluating biodiversity in fragmented landscapes: applications of landscape ecology tools

Kevin Watts

A new Forestry Commission Information Note (FCIN) "Evaluating biodiversity in fragmented landscapes: applications of landscape ecology tools" will soon be published. It will expand on the basic principles of biodiversity evaluation in fragmented landscapes introduced in FCIN 073. It will demonstrate how these principles can be applied to forest management and landscape issues using six case studies at varying spatial scales:

1. Wales – targeting action within a country
2. South west England – targeting action within a region
3. West Lothian – targeting action within a county
4. Scottish Highland – evaluating potential change via the Locational Premium Grant Scheme
5. Isle of Wight – evaluating grant aided woodland de-fragmentation
6. Clocaenog Forest – evaluating a future forest design plan

In this issue of Ecotype we briefly introduce three examples to further illustrate the relevance of this work.

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For more information on the modelling principles and methods, and further examples of its uses, see FCIN 073, which can be downloaded from our website at: www.forestresearch.gov.uk/landscapeecology

Or ordered by post from:

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A GIS method for targeting PAWS restoration management

Amy Eycott

The restoration of Planted Ancient Woodland Sites (PAWS) requires that scarce resources be directed where they will be most effective. Through the Woodland Habitat Networks for Wales project (funded by Forestry Commission Wales and the Countryside Council for Wales), Forest Research are working on a variety of methods for targeting restoration for the benefit of biodiversity in the surrounding landscape. Here we describe part of the work developing the spatial information required to support decision making.

Strategic targeting

Forestry Commission Information Note (FCIN) 073 describes how functional networks have been established for generic woodland focal species. Targeting action in the 20 largest networks (Fig 1) means that the consolidation of broadleaved woodland via PAWS restoration should benefit woodland biodiversity over a wide area.

Specific site selection

The functional networks in Fig. 1 were established using a fixed maximum dispersal distance. This distance is reduced proportionally according to the resistance (termed as 'ecological cost') of each kind of habitat encountered. By fractionally increasing the maximum dispersal distance, the functionally closest networks can be detected. This can show where species would find it easiest to go from one network to another given just a little extra help (see Fig. 2).

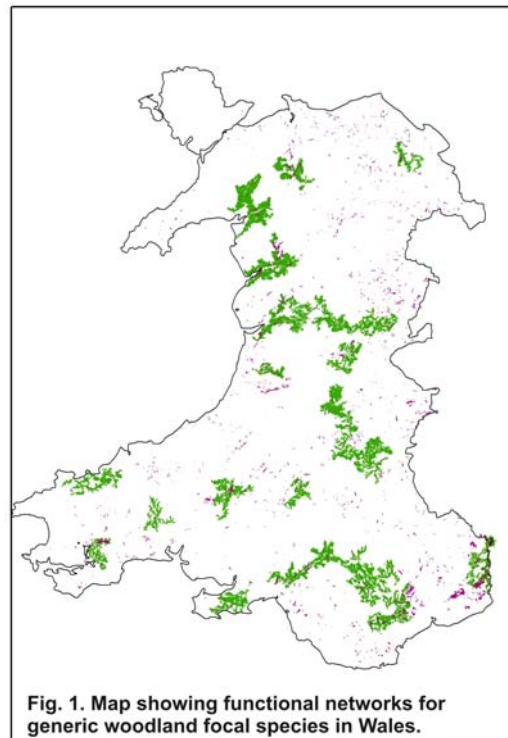
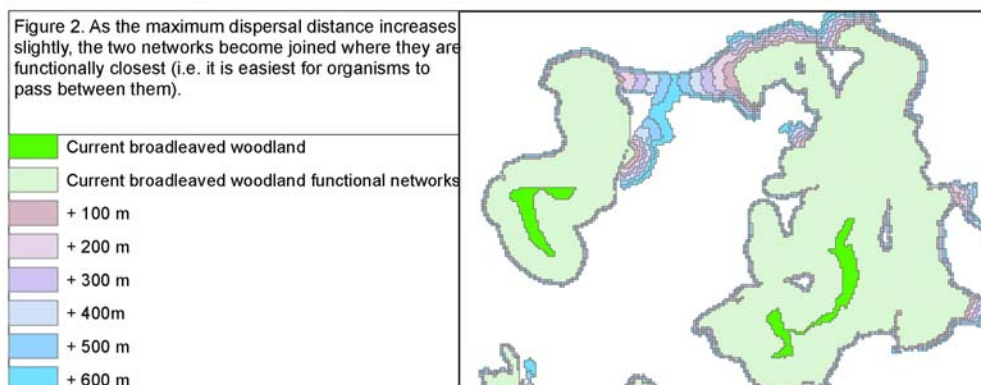
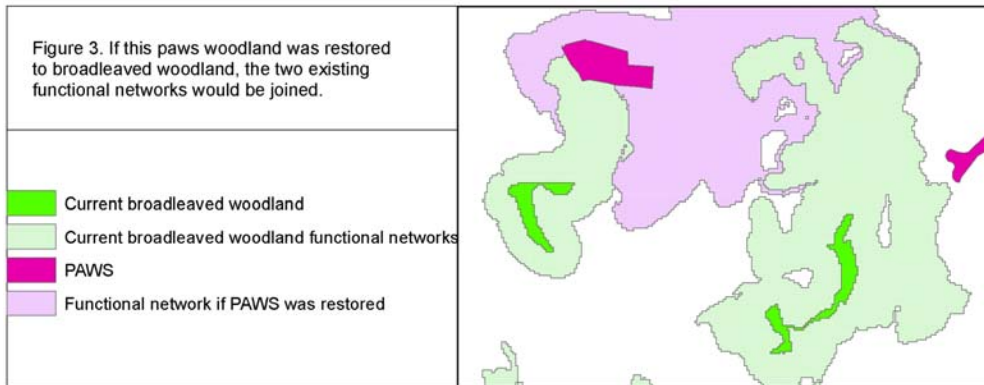


Fig. 1. Map showing functional networks for generic woodland focal species in Wales.



Where PAWS is present in or near the gap, the landcover can be changed from conifer to broadleaved woodland and the functional networks model run again at the original dispersal distance, to evaluate whether restoring that site would join the two networks together (Fig. 3).



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Improving Forest Habitat Networks for high quality woodland specialists

Darren Moseley

Forest Habitat Networks (FHNs) are an important tool for directing the improvement of woodland landscapes using a series of priorities. The highest of these priorities is the protection and management of high quality woodland. However, determination of woodland quality from spatial datasets is difficult, as these data are not always available. The Ancient Woodland Inventory is not always a good predictor of quality as some woodland in the inventory are very degraded and woodlands outside the inventory that may be of high quality are excluded. Here we describe an approach to tackle the problem.

Woodland quality identification

Interviewing local woodland officers and foresters to qualify woodlands is a time consuming process and should be restricted to those woodlands with which the interviewee is familiar. To supplement local knowledge, a procedure for identifying broadleaved woodlands remotely using coincidence mapping was designed for the Lothians and Borders FHNs.

The methodology involved making the assumption that the best quality woodlands will contain more organisms associated with ancient woodlands. As woodlands mature they develop structurally and biologically, providing a greater range of microhabitats, and a longer time frame for slow dispersing species to colonise. The procedure used the following principles:

- Certain plant species can be used as indicators of ancient woodland
- Woodlands supporting a number of plant indicators are also likely to support a wider woodland biodiversity through all taxonomic groups.

Since woodland conditions vary from site to site, the species chosen are associated with poor to rich soil nutrient regimes, and very moist to dry soil moisture regimes. Twenty-one ancient woodland indicator plants were selected, and their point data distribution was queried from the digital data held by local biological records centres.

Scoring woodland quality using ancient woodland indicator plant occurrence

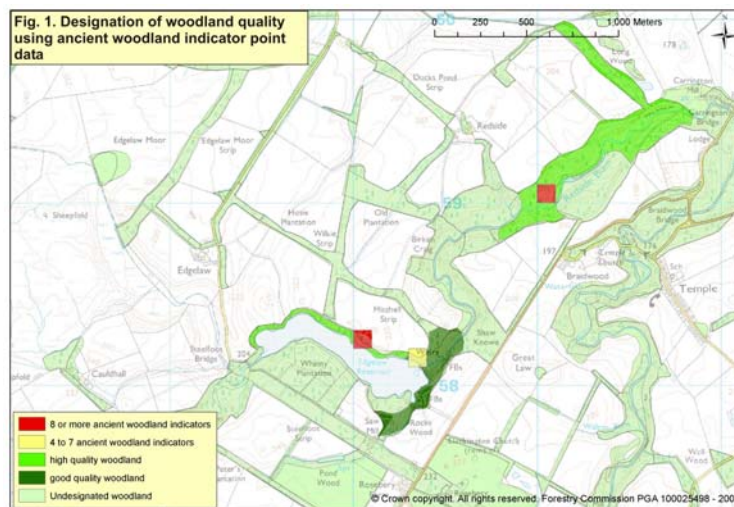
Whilst the presence of one indicator species may occur by chance or could reflect an introduction, the presence of additional species strengthens the assessment. The presence of four species was considered as the minimum number required to rate an area of woodland as good quality, whilst eight or more species would represent particularly rich woodlands and would be likely to be high quality woodland.

Therefore three standards of woodland quality were developed for the study:

- Average quality woodlands (with less than 4 ancient woodland indicator plants)
- Good quality woodlands (with 4 to 7 indicator plants)
- High quality woodlands (with 8 or more indicator plants).

Data Extraction

Two approaches were used to identify woodland associated with the presence of ancient broadleaved woodland specialists (Figure 1).



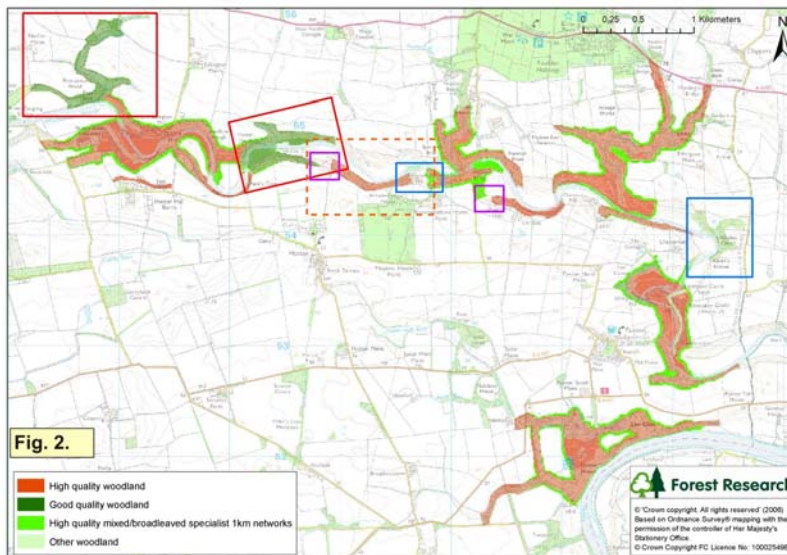
1. Woodland polygons in the Ancient Woodland Inventory intersecting the indicator plant point data were selected. From this dataset, polygons with a high broadleaved component from Scottish Semi-natural woodland

inventory (SSNWI), National Inventory of Woodland and Trees (NIWT), Phase 1, Woodland Grant Scheme 3 (WGS3), and Scottish Forestry Grant Scheme (SFGS) that intersected the ancient woodland polygons were selected.

2. The Ancient Woodland Inventory did not cover woodlands with < 20% canopy cover, and so some parkland with ancient trees may have been missed. To improve data capture, SSNWI, NIWT, Phase 1, WGS3, and SFGS polygons with a high broadleaved component intersecting ancient woodland indicator points were selected.

Incorporating woodland quality data into a Forest Habitat Network analysis

The polygons were then designated as high, good, or average quality as appropriate in the FHN analysis and networks produced for high quality broadleaved woodland specialists, representing those species only associated with ancient and long established woodlands. These networks are used to identify woodlands requiring protection and management, and to indicate opportunities for expanding high quality broadleaved woodland networks through woodland improvement, buffered expansion, and conversion (Figure 2).



The ancient woodland indicator quality criteria method is a useful tool to supplement local knowledge and should be viewed as a starting point for building a woodland quality

database since some information will be lacking from the biological records centre. The records are open to false negative results, since 'no records' cannot be assumed to mean 'not present', only 'not recorded'. We have tested 21 species to try and minimise non-recording of certain species, however woodlands that are infrequently visited are perhaps less likely to have complete records. As the data are refined, we can obtain a greater understanding of where the best quality woodlands are, and where other woodlands could benefit from management to expand the high quality woodland habitat networks.

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Developing Lowland Habitat Networks in Scotland Jonathan Humphrey and Mike Smith

The development of habitat networks is seen as an important mechanism for reversing the effects of fragmentation on biodiversity while delivering a range of other environmental benefits such as enhancing local landscape character and creating more opportunities for public access and recreational enjoyment of the countryside.

Phase I of the Lowland Habitat Networks project consisted of a desk-based review of approaches to developing lowland habitat networks. The review recommended testing the usefulness of the BEETLE focal species method for evaluating the consequences of land use change for biodiversity and informing the development and targeting of agri-environment incentives.

Work is going on this year testing the BEETLE approach in four case-study areas: Tiree, East Fife, Strathspey and the Irvine catchment in Ayrshire. In consultation with end-users, priority species groups for scenario modelling were identified. One of the major issues of concern is the survival of the red squirrel population in Fife and how existing red squirrel networks might be strengthened against the rampaging grey squirrel. The exciting challenge is to cater for the needs of red squirrels (essentially conifer forests) while also addressing other high priorities for conservation such as maintaining semi-natural species-rich grassland networks and fields of winter stubble for corn buntings.

We are also investigating ways of combining ecological network analyses with assessments of landscape character and recreational impacts. The anticipated output from the project is a set of decision support tools accessible to end-users involved in the strategic planning of land use change. Funding comes from a partnership of:

- Scottish Natural Heritage
- Scottish Executive Environment & Rural Affairs Department
- Forestry Commission Scotland.

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CONFERENCES

New Woods, New Lives, New Landscapes

17th - 18th October 2006, The Lowry, Manchester

This conference will be looking at how woodland creation can transform our lives and familiar landscapes for the better through a mixture of information and inspiration with speakers from the UK and abroad. It will explore questions such as the rationale for woodland expansion, how much more woodland do we need and how might we achieve this.

The conference is aimed at those in government, government agencies, voluntary bodies and the private sector who are interested in the policy and practice of woodland creation from not only the woodland perspective but also from the health, biodiversity, urban regeneration, planning, public access, and cultural sectors.

For more information, visit the Woodland Trust website at:

www.woodland-trust.org.uk/wcc

Scrub – The Cinderella Habitat? 19th – 20th September 2006, Reading University

British Ecological Society, Conservation Ecology Group

Often seen as a conservation problem, but rich in its own distinctive biodiversity, the scrub habitat is arguably the least well understood and most paradoxical of all important wildlife habitats in Britain and Europe.

Aimed at ecological researchers, conservationists and policy makers, this conference will explore:

- Our understanding of the biodiversity features of scrub
- The ecological processes which have created them
- The ways in which management can maintain scrub as a characteristic and important element in the landscape.

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For information on seminars, conferences and training days in which FR are involved see the events webpage at: www.forestresearch.gov.uk/fr/infd-5zm9un