

PROGRAMME GROUP RESEARCH UPDATE: Biodiversity indicators & knowledge management programme group

Introduction Duncan Ray

The programme group Biodiversity Indicators and Knowledge Management (BIKM) was established by the merger of the Biodiversity Indicators & Evaluation Programme and the Decision Support Systems for Biodiversity Programme. Projects within this programme group are concerned specifically with the gathering of information and knowledge (I&K), the storage and synthesis of that I&K, and the re-packaging and dissemination of I&K in a form and medium that is useful, clear, and accessible to forest practitioners.

Knowledge Management

Knowledge is a multi-faceted concept. It means different things to different people and organisations, and extends to various components of function, culture, policy and information documents within an organisation (Jones *et al*, 2004). In a forestry context, and within the scope of this programme group, knowledge is considered to be a distillation of data and experience in the context of, for example, forest operations and impacts, tree species type and site quality, observation and evidence of forest biological processes and biodiversity quality etc. The important issue is that "for an individual's or group's knowledge to be useful for others, it must be ... interpretable by the receivers" (Alavi & Leidner, 2001). In essence the work of this programme group is to do just that: synthesise and interpret forest ecology and biodiversity information into useable knowledge, and make it easily available to practitioners.

Review of projects

The following articles give a summary of the

Forest Research

strands of work within BIKM. Further information will soon be published in the programme's web pages under www.forestresearch.gov.uk/woodlandbiodiversity.

References

- Jones, M.C., Cline, M. & Ryan, S. (2004) Exploring knowledge sharing in ERP implementation: an organisational cultural framework. *Decision Support Systems* 41, 411-434.
- Alavi, M. & Leidner, D.E. (2001) Review: knowledge management and knowledge management systems: conceptual foundations and research issues, *Management Information Systems Quarterly* 25 (1), 107-136.

Forests and Biodiversity Guidelines Jonathan Humphrey

The Forests and Biodiversity Guidelines are currently undergoing a process of drafting, review and consultation. The plan is to release these in November 2006 when they will replace the existing Nature Conservation Guidelines. The new guidelines form part of a suite of guidance which will support the UK Forestry Standard.

Key aspects of the new Guidelines are a set of 4 proposed overarching management principles to protect and increase forest biodiversity:

1. Protect and restore priority habitats and species, especially those subject to EU Directives, national legislation, and the UK Biodiversity Action Plan
2. Enhance biodiversity in managed forests, including plantations, while taking account of the need to manage for other objectives
3. Maximise the contribution of woodland to the conservation and enhancement of biodiversity in the wider landscape
4. Maintain the resilience of woodland ecosystems to the negative impacts of environmental change.

Managers will need to demonstrate that they have considered these principles in order to comply with the UK Forestry Standard. The principles are currently being consulted upon.

The remainder of the Forests and Biodiversity Guidelines will provide non-prescriptive guidance on managing woodlands for biodiversity. The information will be presented in the form of bullet point checklists and principles. Specific guidance for the management of particular species and their habitats will be provided by HaRPPS, which is the subject of the next article

For more information on the new Forests and Biodiversity Guidelines, contact:

Jonathan Humphrey
Northern Research Station
Tel: 0131 445 6972
E-mail: jon.humphrey@forestry.gsi.gov.uk

HaRPPS - Habitats and Rare, Priority, Protected Species Decision Support System

Duncan Ray

This is a web-based decision support system providing access to information on habitats and rare, priority and protected species. There are several key components that make this system a unique web-based tool for species and habitat management. An intelligent search engine allows a user to select a location and/or woodland habitat and/or a management operation(s). The system returns a list of species known to occur in that location, associated with the selected habitat(s) and affected by the forest operation(s). In addition, HaRPPS shows a citation and quality score for the information selected from the database.

Version 1 has been tested by a User Group and by volunteers, providing valuable comments and suggestions to improve the system. If you would like to try out the Version 1 prototype, then please navigate to <http://harpps.dbahost.net/> and register for access to the system. You can also access the "getting started" document which provides a more detailed account of the types of query the system can handle.

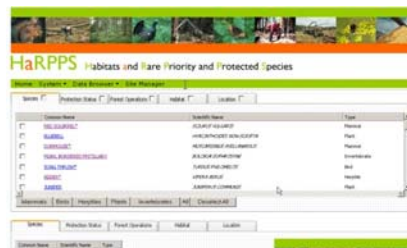
The HaRPPS system will include all rare, priority and protected species for which Forestry Commission in England, Scotland and Wales have a duty of care to protect. This list varies between the three countries, and HaRPPS will acknowledge these differences. In addition the law protecting

species differs between Scotland on the one hand and England and Wales on the other. HaRPPS will also deal with these variations.

HaRPPS handles specific queries on species ecology, providing qualified information on various aspects. The information has been assembled from a review process. In view of the fact that very little information exists for many species, the data quality information is particularly useful, allowing grey literature and experience-based knowledge to be assembled in the database and presented as such in the user interface. HaRPPS will also contain a feedback system to allow users supply new experience and knowledge for consideration in the regular data review process.

Following the trial of Version 1 we have begun the work to develop the HaRPPS for release later in 2006. HaRPPS Version 2 will offer a more user friendly method of setting queries using:

- A citation query wizard
- Woodland Habitat Action Plan and National Vegetation Classification wizards
- A report generation module providing (in PDF format) details of queries and the results returned
- Species management information notes and reports



The HaRPPS Version 1 query builder interface (upper section) and lower section where results are displayed.

Ecological data on the pearl-bordered fritillary (Boloria euphrosyne L.) presented in HaRPPS Version 1.



Initial design for new Harpps V.2 interface

- Species/habitat management conflict tables and guidance
- Case study reports on the experience of managing for species and habitats.

HaRPPS Version 2 will be available for testing in the early summer of 2006.

For more information on HaRPPS contact:

Duncan Ray

Northern Research Station

Tel: 0131 445 6980

E-mail: duncan.ray@forestry.gsi.gov.uk

Biodiversity Indicators & Evaluation Programme

Jonathan Humphrey & Mike Smith

Following from the Biodiversity Assessment Programme (BAP), which was completed in 2001, the Biodiversity Indicators & Evaluation Programme was established to synthesise data collected within the BAP. The main output of the Programme was the publication in 2003 of *Biodiversity in Britain's planted Forests* (Humphrey *et al.*, 2003). Work is continuing to identify potential biodiversity indicators (e.g. Humphrey *et al.*, 2004a; Humphrey *et al.*, 2004b). These indicators take the form of proxies for the biodiversity quality of woodlands in the form of indicators deemed to be useful and pertinent to forest practitioners.

There are two main strands of current work. Firstly, as part of Ecology Division's contributions to the European project [EFORWOOD](#), biodiversity indicators are being developed to assess the sustainability of the forestry wood chain. These are likely to focus on forest structure and deadwood. Similar indicators will also be used within the BIOSOIL project where Ecology Division is helping to test biodiversity in forests sampled randomly across the UK on a 16km by 16km grid.

Secondly research is being carried on sites managed by the [Scottish Forest Alliance](#) (Humphrey *et al.*, 2005). Survey and monitoring at different spatial and temporal scales is being undertaken to identify and indicate changes in woodland biodiversity as a result of:

- Tree development
- Stand development
- Development of a ground flora
- Development of open space
- Development and increasing presence of focal or functional species.

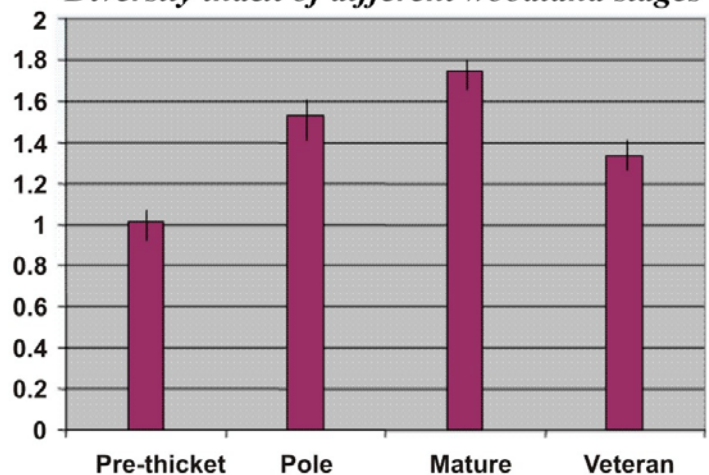
The use of focal and functional species groups is a new concept (Watts *et al.*, 2005) that will try and develop a protocol that relates biodiversity and ecosystem function based on the presence of groupings of species that have evolved to exploit a similar niche. The technique identifies a range of species groups representing key woodland niches, and notes the likely temporal changes of these groups. This can be done by directly recording the presence of the species themselves, using normal survey techniques. Or it can be achieved by finding evidence of their presence: a "smoking gun" technique.

Other "smoking gun" assessments include measurements of the size and shape of exit holes in deadwood.

The structural indicators, vegetation change indicators, and focal species indicators characterise the principal stages of woodland ecosystem development. Results from the surveys are held in a database from which analyses and information provide knowledge of the key biodiversity performance of woodland.

Pilot studies have been assessed and the method tested. For example, the work on woodland canopy

Diversity index of different woodland stages



indicators (see graph above) has shown a peak in diversity (species and abundance) for mature oak woodlands. The reduction in diversity within open woods dominated by veteran trees is thought to be caused by the grassy field layer associated with open woods of veteran trees. These habitats are likely to have a reduced invertebrate assemblage, compared to the woodland ground layer of mature woodlands.

Full monitoring will begin in 2006/2007, and again

in 2010/2011 and then at set intervals through the development of the Scottish Forest Alliance managed new native woodland in the future.

References

Humphrey, J.W., Gordon, P., Cowie, N. & Wilson, R. (2005) The contribution of the Scottish Forest Alliance to the enhancement of woodland biodiversity in Scotland: a preliminary analysis. *Scottish Forestry*, 59, 13-21

Watts, K., Humphreys, J.W., Griffiths, M., Quine, C. & Ray, D. (2005) [Evaluating biodiversity in fragmented landscapes: principles](#). *Forestry Commission Information Note 73*, Forestry Commission, Edinburgh

Humphrey, J.W., Sippola, A.-L., Lempérière, G., Dodelin, B., Alexander, K.N.A. & Butler, J.E. (2004a) Deadwood as an indicator of biodiversity in European forests: from theory to operational guidance. In *Monitoring and indicators of forest biodiversity in Europe - from ideas to operationality*. M. Marchetti (eds.). European Forest Institute; IUFRO, Joensuu, pp. 193-206

Humphrey, J.W. and Watts, K. (2004b) Biodiversity indicators for UK managed forests: development and implementation at different spatial scales. In *Monitoring and indicators of forest biodiversity in Europe - from ideas to operationality*. M. Marchetti (eds.). European Forest Institute, Joensuu, pp. 79-90

Humphrey, J.W., Ferris, R. and Quine, C.P. (eds.) (2003) [Biodiversity in Britain's planted forests: results from the Forestry Commission's biodiversity assessment project](#), Forestry Commission, Edinburgh

For more information on the Biodiversity Indicators & Evaluation Programme, contact:
Jonathan Humphrey
Northern Research Station
Tel: 0131 445 6972
E-mail: jon.humphrey@forestry.gsi.gov.uk

Ecological Site Classification (ESC) Duncan Ray

First published in 2001 (Pyatt *et al.*), ESC provided a new methodology for assessing and classifying sites for both timber species and native woodland communities. The ESC decision Support System Version 1.7 (Ray, 2001) accompanied the publication of FC Bulletin 124. This provides a computer-based method of undertaking and

interpreting the results of an ESC type survey. ESC has since been recommended as a method for testing site-species suitability in UK Forestry Standard and in the Forestry Strategy documents for England, Scotland and Wales.

ESC uses 6 factors to quantify site variation. Four climatic factors: accumulated temperature, moisture deficit, wind exposure and continentality, and 2 soil quality factors: soil wetness and soil fertility.

The project has developed significantly since 2001-

- A spatial version of ESC (ESC-GIS Version 5) written as an extension to a Geographical Information System (GIS) has been developed, and is used extensively for consultancy work.
- ESC-GIS Version 5 has been extended to test the suitability of species in future climates at the national and regional scales. The model incorporates adjustments to the ESC climatic factors using UKCIP(2002) high and low emissions climate change scenarios.
- ESC-DSS Version 2 (non spatial DSS for site-based analysis) has been developed and written in Java. This allows the application to run on a wide variety of operating systems. New additions to the application include: default soil quality assessments for GB, a soil key, and a plant key. The application will be tested this summer and should be ready for release later in 2006. If you wish to trial ESC-DSS Version 2 please contact: Duncan.Ray@forestry.gsi.gov.uk.

Links with ruLE and Climate Change

The BIKM programme group has close links with the Rural and Urban Landscape Ecology programme (see Ecotype No 31 Nov. 05), particularly regarding the development and implementation of decision support tools for assessing habitat networks. Current applications of Forest Habitat Networks require inputs from ESC and Biodiversity Indicators. In addition questions are being asked about:

- The impact of climate change on forest biodiversity
- The development of forest habitat networks
- Forest tree species suitability
- Carbon mitigation policies
- Social and recreational use of woodlands
- Red squirrel protection,
- Native and commercial woodland expansion.

The close links between the programme groups facilitates a rapid assessment and deployment of modelling techniques and experienced spatial research analysts to help answer such questions.

References

UKCIP (2002) Climate Change Scenarios for the United Kingdom: The UKCIP02 Scientific Report, Tyndall Centre for Climate Change Research, School of Environmental Sciences, University of East Anglia, Norwich, UK. 120pp

Ray, D. (2001). Ecological Site Classification Decision Support System V1.7. Forestry Commission - Edinburgh.

Pyatt, D.G. and Suarez, J.C. (1997). An Ecological Site Classification for forestry in Great Britain: with special reference to Grampian, Scotland. *Technical Paper 20*. Forestry Commission, Edinburgh.

For more information on ESC contact:

Duncan Ray

Northern Research Station

Tel: 0131 445 6980

E-mail: duncan.ray@forestry.gsi.gov.uk

OTHER NEWS

Bramble and the natural regeneration of trees

Ralph Harmer

Bramble is a widespread native species that occurs within many woodland communities across Great Britain. It is often an important component of the groundflora and can become the dominant species in lowland oak and beech woodlands on moderately acidic, fertile, clay soils. It is a shade tolerant perennial that can spread either by growth of vegetative shoots from established plants or by establishment from animal dispersed seeds that can lay dormant in the soil. Under good growing conditions vegetative growth can rapidly produce a



The type of variation in structure and vegetation across the sites are clearly demonstrated in this image, with a narrow windrow of brush in the centre bounded by broader areas of grass. A dense strip of willow is growing to the right of the windrow.

dense thicket of continuous cover bramble.

Although valuable for wildlife, providing both habitat and food, some woodland managers regard it as a weed that may require control during the period when a managed woodland is being restocked. The more open environments created by harvesting operations typically improve the growing conditions for bramble, which can become more abundant and cause adverse effects including:

- Smothering of young trees by vegetative shoots
- Creation of dark, dry conditions at ground level that are unfavourable for the growth of small trees
- Provision of a protected habitat for small mammals (mice, voles and rabbits) that can eat tree seeds and destroy small, young trees.

It is sometimes thought that bramble is beneficial for the natural regeneration of trees, but there is little evidence to support this, and most detailed work suggests the opposite. During the development of methods for the regeneration of beechwoods in the Chilterns, using a shelterwood system, bramble management was found to be an essential part of success. Similarly, detailed studies of oak shelterwoods have found that bramble has a negative effect on the establishment of trees.

Whilst there is no good evidence to suggest that bramble is beneficial to the establishment of trees in shelterwoods, recent observations by forest managers have suggested that this may not be true for some clearfelled areas. In Northamptonshire large areas of conifers have been felled to restore plantations on ancient woodland sites to native broadleaved woodland. After felling, these sites typically develop a rank sward dominated by Wood small reed (*Calamagrostis epigejos*) that restricts regeneration and growth of trees. Uncontrolled observations, made during practical management of such sites over a period of

about 10 years, indicated that there was a relationship between bramble and the appearance of tree regeneration. In July 2004 a survey was

carried out to try and substantiate this relationship.

The Survey

Ten sites were surveyed including 3 identified by the local forester as being ones showing positive effects of bramble. Around 50 2m x 2m quadrats, positioned along transects through each site, were used to assess the height and cover of bramble and grass. The distance of each quadrat from established trees was also noted. As there was a clear difference in the distribution of vegetation across each of the sites, with areas that were predominantly vegetated by either grass or bramble, the sampling was stratified with paired transects being located within each type of vegetation. A [detailed report](#) has been prepared and only a summary of the results is shown below.

Results

More than 500 quadrats were assessed. Although some quadrats had <5% grass the most common score was 50-100% with vegetative leaves averaging 50-60 cm in height. Overall there was less bramble than grass: average cover was only 5-15% at a height of about 60cm. In general the amount of bramble was greatest beside drains and windrows, whereas there was more grass between these.



The bramble on this site was not uniformly distributed and was typically associated with windrows and drains.

A total of 13 different tree and shrub species were recorded amongst the 900 tree seedlings seen. Willow accounted for more than half of these, the majority of the remainder comprising birch, ash, hawthorn and oak. The distribution of species varied – willow occurred everywhere, but others were absent from one or more sites. The estimated total number of seedlings of all species per hectare varied between 1200 and 11000, but this does not include any allowances for differences in distribution of trees between quadrats, the ages of trees, or the area of each site covered by the different types of vegetation.

If bramble has a marked effect on the establishment of seedlings then the numbers present should be greatest in the areas with most

bramble. As there was generally more bramble beside the windrows and drains, these areas should have more seedlings than in the areas between. However, there was no simple relationship between position and numbers of seedlings. Analyses of data for the most common species (willow, birch, ash and hawthorn) showed that on some sites there were more seedlings beside windrows and drains, but on other sites the reverse was true.

In order to investigate relationships between vegetation and seedling numbers the data for the most common species were analysed separately. Significant relationships were found for only three

species and these were inconsistent. For willow the effect of bramble was significant on only four of the 10 sites, but there was no clear trend in the effect. Similarly for birch, bramble cover had a significant effect on tree seedling numbers on only two sites. Analyses of data for ash showed that bramble had a significant effect at only one site and this was due to the presence of larger numbers of seedlings in quadrats that had very small amounts of bramble (<5% cover). Of the sites identified by the local forester as demonstrating the

beneficial effect of bramble only one showed any significant relationships. However the results for this site were confusing: for ash the highest numbers of seedlings were found at bramble covers of <5%, but for willow the highest numbers were found at 30<50% bramble cover.

Conclusions

- There was no simple relationship between bramble cover and tree seedling numbers that was applicable to all species at the sites surveyed
- There is little evidence to support the hypothesis that bramble facilitates the establishment of tree seedlings
- There are no relationships between bramble cover and seedling numbers for most species at most sites, and those that occur are inconsistent.

If such a relationship exists then there are a number of reasons why it may not have been

revealed by this study. These include:

- Collection of data at a single point in time relative to the changes in vegetation that occur over time
- The size of seedlings – those that were very small may not have been seen
- Differences in the time since felling.

The true relationships between bramble and the establishment of tree seedlings will only be revealed by longer-term studies with repeated assessments that begin during the early phases of vegetation development.

Bramble: Bane or Benefit

This one-day meeting discussing the role of Bramble in woodland is being organised by Forest Research on behalf of the British Ecological Society. For more information visit our [website events page](#) or contact:

Ralph Harmer
Alice Holt
Tel: 01420 526152
E-mail: ralph.harmer@forestry.gsi.gov.uk

CONFERENCES

Woodland Birds: their ecology & management

The University of Leicester, 1 – 3 April 2006

This is British Ornithologists' Union Annual Spring Conference, supported by:

- BTO
- English Nature
- Forestry Commission England
- Forest Research
- RSPB

Further details and a booking form available online at www.bou.org.uk

Or from
British Ornithologists Union
BOU Conference Office
PO Box 417
Peterborough
PE7 3FX
Tel: 01733 844820
E-mail: conferences@bou.org.uk

Woodland Mammals: Their Ecology, Conservation & Management University of Exeter, 13th May, 2006

This one-day symposium is being organised by the Devon Mammal Group

For more information contact:
Emma-Rose Herrera
8, Lucky Lane
Exeter EX2 4UJ
Tel: 01392 495722
Website: www.devonmammalgroup.org

CONTACT DETAILS

To provide material for future issues, or if you wish to receive Ecotype by e-mail, get in touch with:

Andy Brunt
Ecology Division
Forest Research
Alice Holt Lodge
Wrecclesham
Farnham
Surrey GU10 4LH
Tel: 01420 22255
Fax: 01420 520180
E-mail: andrew.brunt@forestry.gsi.gov.uk

For general enquiries concerning the biodiversity related work of Forest Research, contact:

Chris Quine
Head of Ecology Division
Forest Research
Northern Research Station
Roslin
Midlothian EH25 9SY
Tel: 0131 445 2176
Fax: 0131 445 5124
E-mail: chris.quine@forestry.gsi.gov.uk

For more general information about the work of Forest Research, visit our website at: www.forestresearch.gov.uk