Ecotype

No. 40 January 2008

The Biodiversity and Conservation Newsletter of Ecology Division

Forest Research

Contents

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Brilliant green patches in our woods

*The early months of the year with all the rain and dampness are a good time to spot the lower plants in our woodlands. While the rest of the vegetation shows their dull winter appearance, mosses and liverworts often stand out as attractively brilliant green patches on the woodland floor or the bark of trees. Here a close-up of the hair cap moss (*Polytrichum commune*) which can look rather like miniature conifer forests.*

Editorial

Welcome to the January issue of Ecotype, the Biodiversity and Conservation Newsletter for the Ecology Division of Forest Research.

As usual, the main part of Ecotype introduces you to an interesting range of research projects our Division is currently involved in.

Mike Smith looks into habitat conservation of the Machair coastal grasslands and the wet inland heaths on the Western Scottish island of Tiree and explores the potential of focal species modelling for developing habitat networks and guiding integrated land-use change.

Also within landscape ecology, **Kevin Watts** presents two recently commissioned projects to study species response to climate change adaptation measures and connectivity indicators for assessing habitat fragmentation impacts on biodiversity.

As some Sitka spruce plantations on the ancient woodland site of Camas Salach Atlantic oakwood in Scotland are in the process of being restored, **Richard Thompson** wonders whether or not some of Europe's richest bryophyte and lichen assemblages will disappear from the remnant trees when the conifers are clearfelled in the restoration process.

Andrea Kiewitt from Ecology Division and **Elena Vanguelova** from Environmental and Human Sciences Division describe the soil and biodiversity surveys carried out for the pan-European BioSoil project that complements the existing European large-scale forest condition monitoring scheme.

Joan Cottrell takes an opportunity to move thinking in genetic conservation forward and looks at the genetic component of biodiversity as she develops a new project to investigate how accurately designated seed zones reflect patterns of adaptive variation in Scots pine.

And finally, **Sam Catchpole** from the Technical Services Unit, and **Alice Broome** and **Jason Weber** from Ecology Division explain how Forest Research's coning survey on conifer sites throughout Scotland links in with the Scottish crossbill census.

These examples of our research are complemented by a number of short news items, new publications and details on forthcoming conferences.

I hope you will find this selection of topics interesting to read and enjoy this issue of Ecotype.

Andrea Kiewitt
Editor

Habitat networks for guiding integrated land-use

Mike Smith

Habitat networks are an important mechanism for reversing the effects of fragmentation on biodiversity while delivering other environmental benefits such as public access and recreational enjoyment of the countryside. There is a desire for integrated approaches to planning land-use change which take account of conservation objectives for the full suite of associated habitats and species. Focal species modelling offers a useful tool for developing habitat networks and targeting agri-environment and forestry incentives.

The low-lying island of Tiree is situated some 50 km from the Western Scottish mainland and has a unique climate. Traditional crofting is the main form of land-use and based around small townships, with groups of smallholdings sharing common grazings. Cattle are important for habitat conservation, especially for the Machair, unimproved coastal grasslands, and the *Carex nigra* dominated wet heaths on thin peat further inland. The small fields of enclosed land were often sub-divided by the barley oats, potatoes or intermingled hay meadows grown on them.

Land use change

Over the last 40 years, the introduction of black bag silage and non-organic fertilisers has changed the balance on the land. Tiree is an important breeding area for Corncrake (*Cerex cerex*) in Scotland and 10% of agricultural land are under agri-environment schemes for the protection of this species. These schemes also involve late cutting of silage to allow for a second brood and maintenance of *Iris pseudacorus* dominated mires as early cover for the birds. Over the same 40-year-period barley, oats and hay meadows have declined significantly as have associated species such as arable weeds and granivorous birds. Most notably, the corn bunting (*Miliaria calandra*) became extinct on the island in 2000, and although present on nearby islands is also declining there. Winter cattle feed has now to be imported from the mainland threatening sustainable cattle production and the use of grazing as a conservation tool on the Machair and *Carex nigra* heaths.

Cows in the Machair on Tiree

Getting the balance right

Corncrakes and corn bunting are both declining across Europe and any habitats for existing or potential populations should be safeguarded. By using these focal species for integrated habitat networks a balance can be struck between maintaining the corncrake population but also allowing for the corn bunting's return. This would not only benefit associated species but allow for sustainable cattle grazing. Resuming winter feed production on Tiree would also maintain habitat quality for other indicator species such as the bee *Colletes floralis*, another focal species of this case study.

This work forms part of a contract to look at lowland habitat networks funded by the Scottish Government.

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Two new Defra projects on landscape ecology

Kevin Watts

Are species likely to respond to climate change adaptation measures?

Climate change is predicted to have a significant impact on biodiversity with many species being forced to adjust their range pole-wards and to higher elevations. This problem is compounded by habitat fragmentation as it may hinder this range adjustment.

Aerial view of a fragmented landscape

Ecological networks, and related landscape-scale interventions, are being proposed as adaptation measures to mitigate the impacts of climate change and habitat fragmentation. Although the creation of such landscape-scale interventions is intuitive, appealing and underpinned by ecological theory, it is important to ensure that such approaches are based on the best available evidence.

As a result, Defra[1] has commissioned Forest Research and the Centre for Evidence-Based Conservation to undertake a systematic review of the evidence for landscape-scale interventions facilitating species movement and improving connectivity.

(PDF-1517K)

Conserving biodiversity in a changing climate

[1] with additional funding from Woodland Trust, Countryside Council for Wales, Scottish Natural Heritage

Developing a UK level connectivity indicator

Defra[2] has also commissioned Forest Research and the Centre for Ecology and Hydrology to develop a connectivity indicator to assess the change in habitat fragmentation impacts on biodiversity. This indicator is one of eighteen proposed biodiversity indicators for UK and Country level reporting.

(PDF-2680K)

Biodiversity indicators in your pocket

Indicators are intended to summarise and distil complex information into simple, robust measures which can be used to assess relative change or trends over time. Indicators are increasingly relied upon to monitor performance against predefined targets and to aid the development of policy.

This project will evaluate a number of potential connectivity indicators from simple structural approaches to more complex functional approaches, recognising that connectivity is essentially a species-based attribute (linked to evidence identified in above project). These indicators will then be used to examine change in various spatial data sets, including Countryside Survey and Land Cover Map produced by CEH.

[2] with additional funding from Forestry Commission, Countryside Council for Wales, Environment Agency, Natural England, Scottish Natural Heritage, Welsh Assembly Government, Department of Environment Northern Ireland

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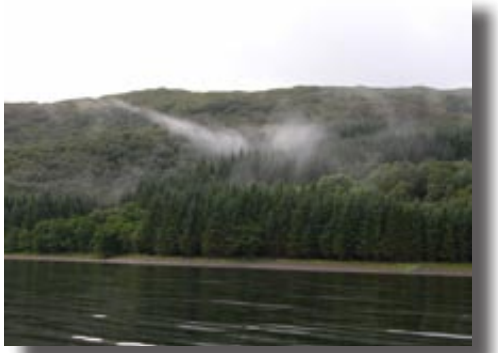
Will they or won't they?

Richard Thompson

Camas Salach Atlantic oakwood is located on the south side of Loch Sunart on the Morvern peninsula. This ancient woodland site is in a hyper-oceanic location, experiencing high rainfall and an equable range of temperatures. The combination of favourable climate and ecological continuity as woodland have resulted in some of the richest lower plant assemblages in Europe.



Camas Salach Atlantic oakwood on Loch Sunart

Within the ancient woodland are patches of Sitka spruce, planted in the 1970's. These Plantations on Ancient Woodland Sites (PAWS) contain many veteran trees, mostly hazel and oak, with a range of epiphytic lichens, many of which are old woodland indicators from the *Lobarion* community - impressive, foliose species. Restoration of these PAWS to native woodland is currently taking place. Ideally, such restoration would be gradual, using low impact silvicultural systems. However, due to very poor access the conifers are being clearfelled and timber extracted by forwarder to a pier for transport down the loch by barge. This presented Forest Research with an opportunity to study the impact of clearfelling on lower plants, particularly epiphytic lichens.

The abundance of some common epiphytic bryophytes is greater within the PAWS than in neighbouring ancient semi-natural woodland, perhaps due to higher humidity within the spruce stands. The *Lobarion* lichen community is favoured to the *Graphidion* community growing on smooth bark.

How will this bryophyte mat and associated lichens respond when the adjacent spruce stands are suddenly removed? Plantation trees provide shelter and high levels of humidity, but also greater shade and lower temperatures than in semi-natural stands. Is there a danger that the bryophyte mat, complete with lichens, could dry out and fall off remnant trees or are humidity levels high enough to maintain a moist bryophyte substrate despite increased exposure?

Epiphytic lichens and bryophytes on tree bark

Lichens prefer well lit situations and their range is restricted near the plantation. This study will show how quickly different lichen species can colonise bare bark once the plantation is removed. Will existing old woodland lichens disappear from remnant trees following clearfelling - or won't they? Will the greater area of suitable substrate from well lit veteran trees following clearfelling lead to a long term net increase in woodland lichen abundance?

Felling is in progress - so we shall see...

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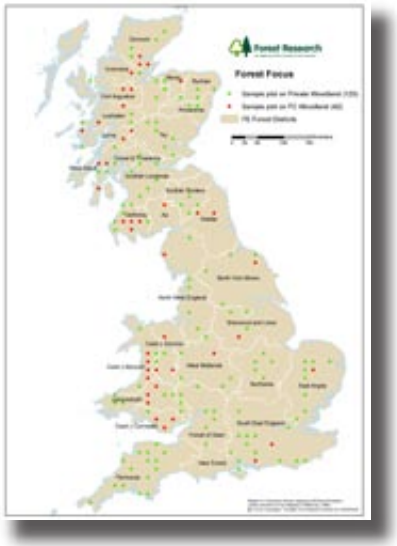
Surveying forest soils and biodiversity - the pan-European BioSoil project

Andrea Kiewitt and Elena Vanguelova

The pan-European BioSoil project was established in 2005 as part of the EU Forest Focus Regulation (2152/2003). Under this regulation the existing European large-scale monitoring scheme for forest condition (ICP Forests, originally set up to monitor impacts of atmospheric pollution and forest fires) has been expanded to also include soils and biodiversity.

Forest Research is the UK partner of this international project which uses a survey network of 6000 sample plots across Europe. The network is based on a 16km x 16km trans-national grid and often includes the Level 1 plots of its 36 member states. The 167 BioSoil plots for the UK were installed in 2006 by Forest Research's Technical Services Unit in both private and public woodlands.



Forest Focus BioSoil plots in the UK

Forest soils

The soil survey was set up to create a joint European dataset of forest soil information for environmental use, e.g. assessing carbon stocks, monitoring acidification/ eutrophication and impacts of climatic changes. Collected by professional soil surveyors in 2006 and 2007, field information and soil descriptions are ready and soil samples are currently being analysed by Forest Research's Chemical Analysis Laboratory (also see BioSoil Forest Soils Manual (PDF-1560K)).

Forest biodiversity

Woodland in central England

The biodiversity survey aims to develop European guidelines for forest biodiversity and suitable indicators. In co-operation with the Joint Research Centre of the European Commission, a stand structure approach was taken assuming greater biodiversity potential with increasing forest stand complexity: classification of each plot according to forest type, age, origin, composition, management and previous land-use (BioSoil Forest Biodiversity Field Manual PDF-294K).

The main focus was on structural forest diversity measured as:

- diameter and species composition of all woody plants, i.e. live and standing or lying dead trees
- deadwood, snags, stumps, woody debris and their decay state
- canopy characteristics, i.e. canopy closure and tree layers

This was complemented by information on vascular plants but without bryophytes or lichens. Surveys of the fauna were not within the scope of BioSoil, however, their diversity is considered as closely linked to the vegetation diversity. The survey was carried out in 2006 and 2007 by the Technical Services Unit from their extensive field station network.

The data of both surveys will be submitted to the European Commission's Institute for Environment and Sustainability (IES) in Ispra, Italy, for a joint analysis by the end of 2008.

For further information on the BioSoil project contact:

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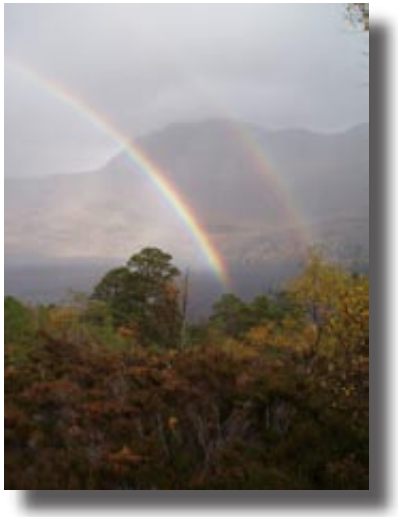
Do seed zones conserve adaptive variation?

Joan Cottrell

Matti Salmela, from Finland, has recently started as a PhD student on a project funded by the Scottish Forestry Trust to study adaptive variation in Scots pine. The project is collaborative with supervisors based in Edinburgh University, the Centre for Ecology & Hydrology, the Macaulay Institute and Forest Research (Ecology Division).

Tree species live and reproduce on a timescale that means today's seed will be likely to experience human-induced climate change. It is therefore important that the adaptability of tree populations is taken into account in planting, if Scottish reforestation efforts are to produce sustainable results in the long term.



Native pine wood at Loch Maree

Designated seed zones are based on early biochemical, environmental and geographic data, but it is not certain whether they genuinely reflect patterns of adaptive variation in Scots pine. Recent work on European trees has shown that gene flow among populations via pollen movement is extensive at the landscape scale and differentiation between populations is maintained by a balance between gene flow and diversifying selection. This suggests that the seed zone concept may require revision because, for example, untested seed from one zone should contain genetic variation reflecting the whole available pollen pool and probably contains both more and less well-adapted genotypes. For planting with climate change in mind, it may be as important to maintain the processes of reproductive contact (gene flow) between zones as the seed zone populations themselves.

This project aims to test the hypotheses that:

- designated seed zones accurately reflect patterns of adaptive variation in Scots pine, and
- local seed is better adapted to the local environment both now and in the future than seed from more distant origins.

The project will estimate the extent to which seed zones are differently adapted and results will be influential in creating a genetic conservation strategy for sustainable forestry in the UK.

This work will advance understanding of the genetic component of biodiversity by providing quantified estimates of the extent of local adaptation in a native tree species. It will demonstrate the importance of taking genetic variation into account when planting. This is an opportunity to move thinking in genetic conservation forward: from selectively-neutral molecular markers to policies based on selectively-influenced quantitative traits – a move that will facilitate predictive modelling of vegetation responses to climate change.

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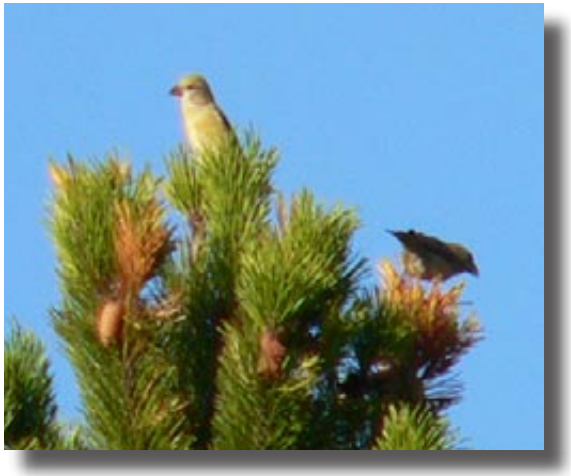
The Scottish crossbill census

Sam Catchpole, Alice Broome and Jason Weber

The Scottish crossbill (*Loxia scotica*) is the UK's only endemic bird species and on the World Conservation Union's red list of threatened species. These birds depend on conifer woodlands and are thought to utilise a range of tree species. They feed on those that cone well and can switch between species as seed becomes available in maturing cones.



Crossbills feeding on pine cones up in the tree tops

The first ever full census of crossbills is being carried out during 2007/2008 as part of the the Statutory Conservation Agency/ RSPB Annual Breeding Bird Scheme (SCARABBS). In collaboration with the census, Forest Research has a survey of coning underway to determine food resource availability.

Coning assessments of Norway spruce, Sitka spruce, Larch and Lodgepole pine at sites throughout Scotland will complement the existing information on Scots pine from the Forestry Commission's Forest Condition Monitoring survey. At each site cone production is being assessed on 20 to 24 selected trees by recording the current year's cones for spruce and larch, and the green cones for pines whose seeds are available to crossbills throughout the winter well into early spring. At the crossbill survey sites presence and coning of conifer species is also being recorded using a series of photographic conifer identification guides especially developed for this purpose.

Pair of Scottish crossbills on nest

Coning information will be used in conjunction with the bird census to provide an understanding of forest use by crossbills and the importance of different conifer species, especially in relation to their cone productivity. Findings will help understand the crossbill's habitat requirements and how to manage conifer forests as habitats of these birds.

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News

Steamed peat pudding?

The ecology lab has been in continual use this autumn, scenting the Ecology corridor with the rich, steamed-pudding aroma of drying peat. Carola Caschetto-Bottcher of TSU has been determining the water content and bulk density of peat ten years after applying restoration treatment in a blanket bog restoration experiment in Caithness. The results, when compared with pre-restoration baseline values, will show whether the peat has rewet and/or expanded, helping us to understand the vegetation response to tree clearance and damming of drains and plough furrows. The work is being led by Russell Anderson.

An Integrated Habitat Network for Falkirk

The development of an Integrated Habitat Network will identify key areas for habitat restoration and expansion for the Falkirk area using a Forest Research landscape ecology tool from 'BEETLE'. The identification of the important habitats and focal species for the area was recently explored in a stakeholder workshop organised by Darren Moseley and Mike Smith. Stakeholder engagement is an important part of the habitat network process, helping to direct the process and contribute towards a robust analysis. These Integrated Habitat Networks will be developed for a range of open and woodland habitats and focal species that reflect local landscapes, which can then be used to prioritise conservation effort, identify opportunities within development plans, and provide links to habitat network analyses for Edinburgh & the Lothians and Glasgow & the Clyde Valley.

EUFORGEN Forest Management Network

The third meeting of the network in Finland was recently attended by Jason Hubert. The network aims to bring together forest managers and research scientists at a pan-European level to discuss the impacts of forest management on gene conservation and use. Key topics discussed at the meeting included the role of policy in controlling the use of the best planting stock, the economic benefits of genetic conservation and responses to climate change.

Peri-urban roe deer project

Forest Research is carrying out a project, on behalf of the Scottish Government and the Deer Commission for Scotland, on peri-urban roe deer. The project will focus on central Scotland and has the aim of understanding the main issues relating to the interaction between roe deer and people in the peri-urban environment. As part of the project, Robin Gill and Helen Armstrong will carry out a survey of roe deer densities in two case study areas using thermal imaging.

Development of ESC factors for the republic of Ireland.

The first stage of the CLIMADAPT project has been completed by Georgios Xenakis and Duncan Ray with the development of ESC climatic and soil quality factors. Baseline and future climate scenarios until the end of the 21st century were developed for accumulated temperature, moisture deficit and DAMS scores using a time series of real meteorological data and a set of simulation results by a global circulation model. Finally, Soil Moisture Regime and Soil Nutrient Regime were also developed based on a digital soil map and the results of a Delphi process with a group of expert soil scientists, which took place last July in Dublin. The next phase of the project includes the development of suitability curves for all major tree species and all data integration under a friendly graphic user interface.

Workshop on natural regeneration of Scots pine woodlands

In December, Colin Edwards, of Forest Management Division, ran a workshop in Aviemore on 'Natural Regeneration in the Native Pinewoods'. Helen Armstrong, of Ecology Division, talked about the impact of deer and cattle on native pinewoods. Other presentations considered the requirements for successful pinewood regeneration. Participants were pinewood managers and researchers and much useful discussion ensued during the afternoon field trip.

Final revision of FC Practice Guide 'Managing Open Habitats in Upland Forests'

Many environmental organisations sent useful comments to Russell Anderson on the initial draft of this Practice Guide and these have now been incorporated. The most significant change is the withdrawal of guidance on where and in what circumstances forest clearance should be undertaken to restore open habitats. This information will be published later in a separate guide. A final revision is in progress to ensure that the Guide will be useful to upland forest managers in England, Northern Ireland, Scotland and Wales. Publication is planned for autumn 2008.

Finnish Academy of Science and Letters 100 years celebratory day in Helsinki

The Finnish Academy of Science and Letters will be celebrating its centenary in 2008 on 9th April 2008 in the Great Hall of Helsinki University. As part of the celebrations the Discipline of Agricultural and Forestry Sciences within the Academy held a seminar day "Biotechnology: experiences and visions in agriculture, food processing, forestry and environment" at the University of Helsinki earlier this month which was attended by Tytti Vanhala. More information including the programme can be found on:

http://viikki.helsinki.fi/acadscimm/index.htm

Departure of Richard Thompson

Richard Thompson has left Forest Research in early January to take up a new post of forest ecologist with the Forestry Commission in Scotland. There he will be specialising in native woodlands and forming one third of a new team of FC ecologists - together with Kenny Kortland (species), and Jeff Waddell (open habitats). Based in West Scotland, he will also have ecological input into the planning and management of FC forests there.

Richard joined FR in 1998 from Wales and took up research into upland native woodlands. His knowledge and commitment to the conservation of native woods is widely valued, and he has established effective networks with practitioners and conservation bodies alike. This included an interlude as the Forest Research Liaison Officer for Scotland. Richard played an integral part in developing the definitive Guide to PAWS restoration. In co-operation with herbivore ecologists, he has recently been developing practical methods of assessing herbivore impacts.

We miss Richard and his contribution to ecological research but are pleased that his new post will capitalise on his time with us. We are looking forward to working with him on knowledge transfer.

New publications

Three new Information Notes

The Role of Forest Genetic Resources in Helping British Forests Respond to Climate Change *(Information Note 086)* (PDF-960K)

This information note aims to provide an overview of the key points of tree genetics and then use these ideas to propose three strategies that forest managers could use to reduce the impact of climate change. All three strategies aim to increase the levels of genetic diversity, and hence robustness, at a site. The choice of strategy will depend on the aims of the forest manager and the level of risk they are willing to accept going into an uncertain future.

Evaluating biodiversity in fragmented landscapes: the use of focal species *(Information Note 089)* (PDF-3551K)

This information note is the last in a series of three (preceeded by Information Notes 073 (PDF-489K) and 085 (PDF-1479K)). It describes the use of focal species profiles in landscape ecology modelling, clarifying how generic focal species profiles are used to examine habitat connectivity with examples from FR research projects.

Forests and woodants in Scotland (Information Note 090) (PDF-2101K)

This information note provides information on the three main wood ant species in Scotland. It is aimed at anybody with an interest in wood ants and wood ant conservation and describes the species' legal and conservation status, ecology, habitat requirements and management advice.

Conferences

The Mammal Society's 2008 Easter Conference and AGM

Date: 4-6 April 2008
Venue: York St. John University, York,

Contact:

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website: http://www.mammal.org.uk

The Mammal Society is also organising a conference to present new developments and best practice in wildlife disease ecology.

For dates and further details please see
http://www.wildlifediseases2007.co.uk/

Northern Coleopterists Meeting 2008

Date: 27th September 2008
Time: 10am to 16.30pm
Venue: Manchester Museum, Oxford Road, Manchester, M13 9PL

Contact:

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Dmitri Logunov (Curator of Arthropods, Manchester Museum)
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This is an open invite to any persons interested in beetles and beetle recording to attend the inaugural meeting of Coleopterists in the north of England.

It is aimed at both the novice and more experienced coleopterist as well as other interested parties, in order to meet and discuss ideas and records. There will be a series of presentations and practical demonstrations as well as a chance to view the museum's extensive collection of beetles.

There will also be assistance in identifying problem specimens, so whether you are a beginner with your first identification queries, or a more experienced coleopterist wanting a second opinion, please feel free to bring along your specimens for checking and discussion.

Please contact Tom Hubball or Dmitri Logunov to register an interest and you will be forwarded a copy of the agenda nearer the time.

About Ecotype

Who reads Ecotype

Ecotype addresses forestry practitioners and conservation professionals, in both the public and private sectors. Amongst our readership are people from:

- County and District Councils
- Natural England
- DEFRA
- Wildlife Trusts
- National Trust
- British Trust for Ornithology
- RSPB
- Woodland Trust
- Forestry Commission, Forest Enterprise
- Centre for Ecology & Hydrology
- Natural Environment Research Council
- Universities, Museums
- Private Consultants
- Interested individuals

Who contributes

Most of the articles are written by people within the Ecology Division and sometimes other parts of Forest Research about work related to biodiversity and conservation management of forests and woodlands. Contributions may also be invited from other parts of the Forestry Commission, and others working within forest biodiversity and conservation, subject to relevance to the main themes of Ecotype. Note that the editor reserves the right to edit, delay or reject articles depending on the space available and relevance of the subject.

Contact details

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

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Visit the web pages of Ecology Division at:
www.forestresearch.gov.uk/ecology

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www.forestresearch.gov.uk

For information on seminars, conferences and training days in which Forest Research are involved see the events webpage at:
www.forestresearch.gov.uk/events