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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.*



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.



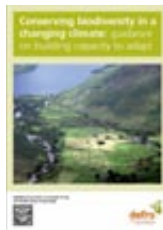
Aerial view of a fragmented landscape

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



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



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[Conserving biodiversity in a changing climate](#)

connectivity.

Developing a UK level connectivity indicator

Defra² 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.

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



(PDF-2680K)

[Biodiversity indicators in your pocket](#)

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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.

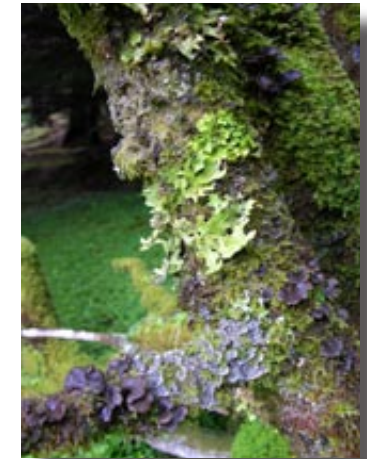
The abundance of some common epiphytic bryophytes is greater

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?

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...



Epiphytic lichens and bryophytes on tree bark

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