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Firewood stack

*Ever thought about stacking your firewood in a different way?
No additional support required – just don't get unbalanced...*



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

As you will recognise from previous issues, the main part of Ecotype covers a range of research topics, intended to give you an interesting cross-section of current work within our Division.

At first glance this issue appears to contain a lot of dung. A closer look though does not refute but strengthen that impression even more, highlighting different aspects of our work with this matter.

Rob Coope, who works partly for Forest Research and partly for the Tay Forest District in Scotland, gets excited about faeces in the forest as he describes the advancement of scat DNA analysis and opportunities for ecological studies of extremely scarce animals like pine martens.

The same molecular approach so successfully used to tell fox and pine marten scats apart is currently being developed further by **Stuart A'Hara** and **Joan Cottrell** in co-operation with **Mark Hancock** of RSPB in order to distinguish between the three gamebirds black grouse, red grouse and capercaillie.

On a similar topic **Helen Armstrong** introduces pellet group counting as a censusing technique for woodland managers who have, or think they might have, a deer problem in their woodland.

In keeping with the subjects of dung and deer, **Robin Gill** reports on his involvement with a conservation project of the South American huemul in Chile that included movement studies of radio tracked animals together with the obligatory pellet surveys as well as sociological studies within the local people.

The involvement of our Seed Lab in home-grown conservation efforts for the declining juniper is demonstrated by **Shelagh McCartan** and **Peter Gosling** who, in an attempt to counter inefficient propagation of poor quality seed lots, evaluate the potential of an x-ray test for predicting filled and empty seeds in juniper.

In the context of landscape ecology, **Amy Eycott** addresses the potential conflict that could arise where networks of woodland habitat and open habitat overlap.

Finally, **Louise Sing** discusses a new model for estimating future soil moisture regime, used in ecological site classification, under two climate scenarios for 2050 and 2080.

These selected areas of our research are complemented by a number of news items, new publications and details of forthcoming conferences and meetings.

I hope you will find something of interest to you and enjoy reading this issue of Ecotype.

*Andrea Kiewitt
Editor*

What a difference DNA makes?

Rob Coope



Getting excited about faeces in the forest may seem bizarre, but to most mammal ecologists scats (i.e. predatory mammal faeces) are like jewels. Or they were. The authors of “On the origin of faeces” pointed out that field identification of scats was poor and fails completely when the target species is scarce (see Further reading). Pine marten research in particular was vulnerable due to the easy confusion of marten scats with those of foxes.

Enter the PCR (Polymerase Chain Reaction) and DNA analysis. The pioneering work on DNA sampling and differentiation of fox and pine marten scats led by Joan Cottrell and the team at Forest Research in collaboration with the Waterford Institute of Technology in Ireland has been reported in *Ecotype* and the Forest Research annual report (FR Annual Report and Accounts, 2005-2006). The process is intricate - to myself as a field ecologist at any rate - but the results are fantastic, reclaiming robustness for data derived from scats.

A recent workshop at Waterford revealed the scope of this application of molecular ecology, and was eagerly received by the marten enthusiasts present. A detailed survey of pine martens in Eire using DNA analysis suggested a great scope for surveying even extremely scarce animals. Large numbers of potential marten scats can be easily collected by enthusiastic field workers and subjected to a relatively inexpensive DNA test. Most of the scats might turn out not to be from a marten but any that do become immensely valuable.

Dietary study, using scat content analysis, becomes more precise when it can rely on DNA identification of the originator. In the past, mis-identification of scats based on field characteristics alone did

occur and genuine scats were rejected because they did not fit the type description ('twisted and smelling of violets'). Such scats have most likely come from a marten eating atypical food but scat analysis can help establish a much more robust dietary series in the future.

Once DNA testing has started it becomes very infectious. With identification of individual animals it is possible to conduct new studies. Population size and dynamics can be studied over time and in a range of habitats, e.g. young recruits to a population or relict and genetically unique populations. All the work is non-invasive, just collect sufficient scats and resource enough DNA testing, and you can get excellent information with no need to trap, collar and track martens. With this type of understanding applied ecology becomes accessible.

Thanks to DNA, there is a future for scats...

Further reading

Davison, A., Birks, J. D. S., Brookes, R. C., Braithwaite, T. C. and Messenger, J. E. (2002) On the origin of faeces: morphological versus molecular methods for surveying rare carnivores from their scats. *Journal of Zoology*, **257**: 141–143.

For further information on scat identification contact:

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A scat - but is it fox or pine marten?

Can we tell these three birds apart from their droppings?

Stuart A'Hara, Joan Cottrell (Forest Research)

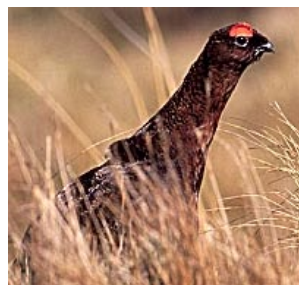
Mark Hancock (RSPB, Inverness)

The black grouse (*Tetrao tetrix*) is a large gamebird, closely related to the capercaillie. In the past widespread in Britain it is now one of the most rapidly declining bird species in the UK. This is thought to be caused by habitat loss and degradation, increased predation and collisions with deer fences, and has led to the species being regarded as of high conservation concern. Activities have centred on improving black grouse habitat either by thinning trees in commercial plantations to create more open ground or patchy forest edges, or by reducing herbivore impacts on moorland edges. Recently, attention has also focussed on understanding whether techniques such as heather burning and cutting can benefit this species.

Monitoring success is difficult as black grouse are both rare and shy. Counts of displaying males in March-May are a reliable census. However, this is time consuming and displaying males are sensitive to both weather and time of day. Also, patterns of habitat use by females and chicks, a key factor in understanding population trends, can not be determined this way.

[Stuart A'Hara](#) and [Joan Cottrell](#) of Forest Research are working with [Mark Hancock](#) and colleagues of RSPB (Royal Society for the Protection of Birds) to develop another approach. Faecal pellet group counting is a widely used survey method for deer and foxes and should also be appropriate for black grouse. Of particular interest here are their preferences in relation to different habitat management. However, black grouse droppings are often confused with those of red grouse and capercaillie and the three species can occur together. Forest Research has successfully distinguished fox and pine marten scats through their

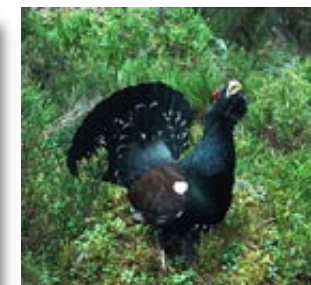
© RSPB (Chris Gomersall)



Red Grouse



Black Grouse



Capercaillie

DNA (see [Rob Coope's article on the topic](#) in this issue). A real-time PCR based test is currently being developed that will distinguish black grouse from other closely related bird species on the basis of DNA from their droppings. In order to verify this test we are seeking black grouse carcasses. So, if you come across any definite black grouse remains, please contact one of us - many thanks.

Further reading

Baines, D., Blake, K. & Calladine, J. (2000) Reversing the decline: a review of some Black Grouse conservation projects in the United Kingdom. *Cahiers d'Ethologie* **20**: 217-234.

Hancock, M., Baines, D., Gibbons, D., Etheridge, B. & Shepherd, M. (1999) Status of male Black Grouse *Tetrao tetrix* in Britain in 1995-96. *Bird Study* **46**: 1-15.

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Not just a load of old dung

Helen Armstrong



Do you have a deer problem in your woodland? If so, do you manage the deer by culling and, if you do, how do you know how successful you have been and how do you decide how many deer to cull in future?

Over the years, Forest Research's Ecology Division have been steadily improving their advice to deer managers who want to answer these questions. In 1999 Brenda Mayle, Andy Peace and Robin Gill produced Field Book 18 entitled '*How many deer? A field guide to estimating deer population size*'. This described the many methods available to determine how many deer are using a piece of land.

Some questions to answer if you want to use pellet group counting:

- Should I use the 'standing crop' or 'accumulation rate' method?
- How do I define a dung pellet group?
- How do I tell the dung of different deer, and other, species apart?
- How many sample plots do I need?
- What size and shape should the plots be?
- How should I position the plots?
- What is the most efficient way to search the plots?
- How do I account for deer culled during the period of study?
- How do I check observer accuracy?
- How do I calculate deer use from pellet group density?
- How do I determine the precision of the result?
- What can I do with the final result?

In woodlands, where visibility is usually limited, one of the most commonly used methods is to count the number of dung pellet groups present in sample plots. Using published information on the rate of production of pellet groups by different deer species, an estimate can be made of the effective density of deer using the area sampled.

But this isn't quite as simple as it may seem! There are lots of questions you might want to answer before you go out into the field and start counting pellet groups (see box).

Next month the Forestry Commission publishes the bulletin 'Estimating deer abundance in woodlands: the combination plot technique' that will help you to answer all of these questions. It describes a dung counting technique that a private ecological consultancy, Strath Caulaidh Ltd., has spent ten years developing, applying and testing with Forestry Commission Scotland. By describing and justifying every aspect of the technique the authors (Graeme Swanson, Douglas Campbell and [Helen Armstrong](#)) provide the most comprehensive overview currently available of how to assess deer density using dung counting. If you are considering counting dung then this bulletin will tell you everything that you ever wanted to know about it, and perhaps more!



Deer pellet group

For further information on deer abundance contact:

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Conservation of Huemul in Chile

Robin Gill



The huemul *Hippocamelus bisulcus* is an endangered species of deer occupying temperate woodland in the Andes of southern Chile and Argentina.

Its population has been declining due to hunting and forest clearance for grazing ever since Europeans first settled the area around 100 years ago. The species has attracted relatively little study and the continuing declines mean that there is now a need for conservation measures.

In 2000, Raleigh International started a project with funding from the Darwin Initiative to investigate the ecology and conservation needs of huemul in region XI, Chile. Forest Research (represented by [Robin Gill](#)), Chile's government agency for conservation and forest protection (CONAF) and the Macaulay Land Use Research Institute were partners in the project.



Young male huemul

Collared huemul in La Baguala, on cliffs overlooking Lago Cochrane



Children in a local school showing pictures of huemul



The aim of the project was to find out more about movements, habitat use and mortality of the huemul, as well as their response to grazing and logging disturbance. The work involved radio tracking of marked animals together with pellet surveys and also included sociological studies such as interviews with farmers and a wildlife education programme in local schools.

The movement study will be published shortly (*Journal of Zoology*, 2007).

Huemul have a relatively small home range (450 ha) and make only modest seasonal migrations, much less than other mountain deer. Their preferred habitats included Lenga (*Nothofagus pumilio*) forest, mixed vegetation and rocky places. The animals used quite steep valley sides, avoiding mountain tops and valleys.

Huemul were killed by illegal hunting and domestic dogs and well as native pumas and foxes. This combined predation exceeds recruitment of young fawns and since the end of our fieldwork, many more collared animals were killed by poachers, even in protected areas.

The South American huemul highlights the need for both ecological knowledge as well as education to protect endangered species.



Hide of a radio collared huemul shot by a local farmer and recovered from his house. He was unaware that the radio revealed its location!

For further information on the Huemul contact:

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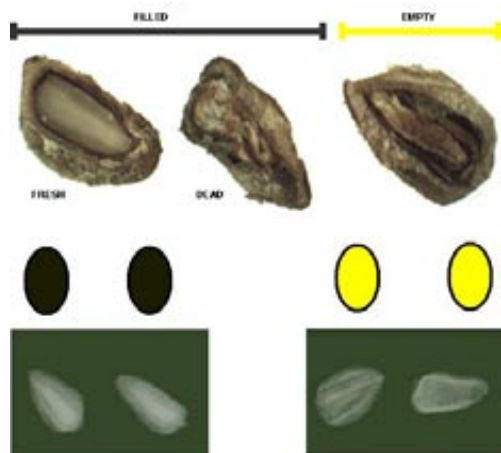
E-mail: robin.gill@forestry.gsi.gov.uk

Exposed! - Predicting filled and empty seeds in juniper with X-radiographs

Shelagh McCartan, Peter Gosling (Forest Management Division)

Due to declining populations, Common juniper (*Juniperus communis*) has been listed as a priority species in the UK Biodiversity Action Plan. So far, conservation efforts have focussed on the re-introduction and expansion of populations ([Forestry Commission Information Note 50, 'Growing Juniper: Propagation and Establishment Practices' by Alice Broom](#)). But propagation can be difficult as juniper often produces empty seeds (up to 98% in some populations) as well as filled-dead and filled-live ones. This results in poor quality seed lots, making propagation inefficient and expensive.

Several seed tests have been developed to minimise the risks associated with sowing potentially poor quality seeds. The germination test is very slow as the seeds require a long pre-treatment (40 weeks at 15°C, followed by 24 weeks at 4°C) prior to sowing and the simple cut-test is destructive. The x-test, however, is a non-destructive test, and provides an 'instant snapshot' of seed quality. It uses 'soft' x-rays, just like a medical x-ray, to



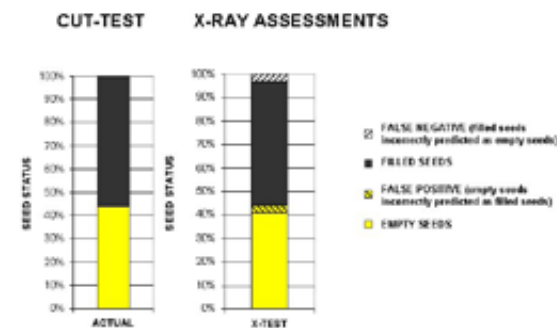
Cut test: filled and empty juniper seeds

X-ray images: filled and empty juniper seeds

produce images of the seeds on photographic paper. The seeds are classified as filled, empty, insect- or physically-damaged, providing a measure of quality assurance and likely performance.

[Shelagh McCartan](#) and [Peter Gosling](#) of the Seed Lab (Forest Research, Alice Holt Lodge) evaluated the potential of the x-test for predicting filled and empty seeds in six populations of juniper. Individual seeds were checked with a cut-test and the accuracy and precision of the x-test at predicting filled and empty seeds correctly was determined. In one population, for instance, 95% of the filled and 93% of the empty seeds were predicted correctly. Similarly good results were obtained for four of the other populations and only in one population the results were not as good.

This suggests that the x-test is a very useful means for predicting filled and empty seeds in juniper. However, the x-test cannot distinguish between live and dead seeds. Despite this limitation, though, its value cannot be underestimated in the quest to achieve good germination, considering the cost and effort wasted sowing empty seeds. Future work will focus on the idx-test (imbibition, drying and x-ray), which has the potential to differentiate between live and dead seeds due to their differences in retaining water during drying.



Comparing cut-test and x-test predictions: percentage filled and empty seeds correctly predicted, and assessment errors as false negatives or false positives

For further information on seed research contact:

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Open and woodland habitat networks: Not a conflict, an opportunity

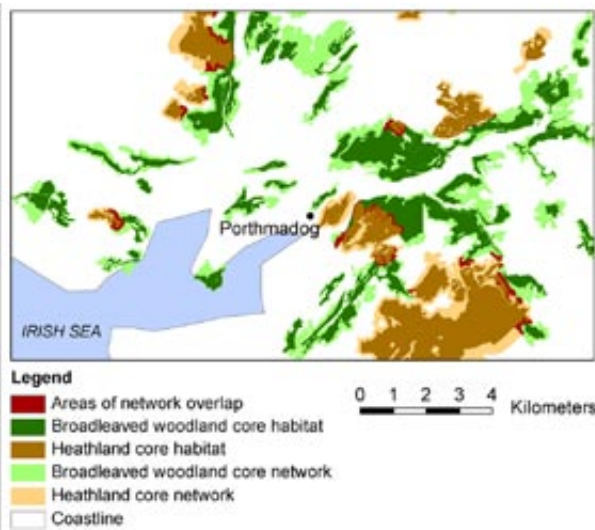
Amy Eycott



There has been recent concern voiced at conferences and stakeholder meetings across the UK and beyond that the expansion of woodland habitat networks could lead to the interruption of open habitat networks. This is understandable as afforestation between 1922 and 1980 was often insensitive to open habitat protection. However, the Commission has recently begun a number of projects restoring valuable open habitat where woodland was planted inappropriately ([Ecotype 33](#)).

Landscape ecologists at Forest Research are using their habitat network method (from the BEETLE suite of tools and outlined in [Forestry Commission Information Note 085](#)) to help open ground and woodland distribution complement one another. The same method is used as for the woodland habitat networks, except that this time an

open habitat provides the 'source' patches, and the network shape depends on the permeability of different land uses to species from the open habitat.



Distribution of heathland and broadleaved woodland habitats around Porthmadog in Wales, particular attention to both habitat networks will be needed in the red areas of overlap.

Possible outcomes where open and woodland habitat networks overlap:

- ▶ The current landuse may be a good balance between open and woodland species requirements, for example scrub where woodland and heathland networks overlap.
- ▶ The current landuse could be a semi-natural habitat of its own value, e.g. blanket bog, and therefore not be suitable for planting.
- ▶ The current landuse may be relatively impermeable for species from either habitat, for example intensively managed arable land. If conservation measures in that location were possible, the target landuse could be one that is beneficial for species of both habitats, or the planting of woodland or heathland could benefit species from both habitats as compared to the current landuse.

The use of habitat network tools allows us to focus on the areas where any land use change needs a little extra consideration to ensure a more secure future for all biodiversity.

For more information see our webpages at

www.forestresearch.gov.uk/habitatnetworks

or contact [Amy Eycott](#) in England & Wales and [Darren Moseley](#) in Scotland.

For further information on habitat networks contact:

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Estimating future soil moisture regime

Louise Sing



Soil Moisture Regime (SMR) is one of six factors used in Ecological Site Classification (ESC), and one of the two soil quality variables. Until now spatial analyses of ESC from the landscape scale to the national scale have used digital data based on 1:250 000 national soil maps (Soil Survey of England and Wales, Soil Survey of Scotland) from which default soil moisture regime values were applied. Future ESC climate variables have now been calculated from carbon emissions scenarios of the UKCIP02 climate change data. Since the change in climate will also affect the soil moisture regime, it has been adjusted for predicted future climates.

Climate factors and soil moisture regime are now spatially coupled by extending a method described by Pyatt *et al.* (2001). The model estimates separately the regime for the summer and winter period using a combination of soil properties, moisture deficit and rainfall predictions. It has been applied to the baseline climate data (1961–90) and also to produce new summer and winter datasets for UKCIP's 2050s and 2080s high and low carbon emissions scenarios.

The soil moisture maps for the baseline period and 2080s high emissions scenarios show significantly drier soils during summer across England, Wales and eastern Scotland by 2080s, and wetter soils, particularly in western areas, during winter.

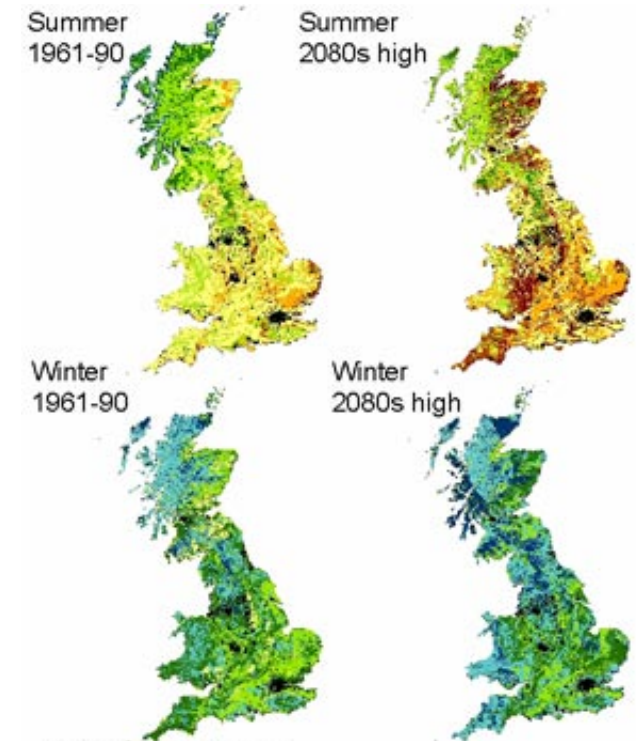
The main limitation of the data remains the national soil maps. In England and Wales the mapped units are soil associations, and the soil types within an association can vary widely in both moisture and fertility. For the national dataset, the characteristics of the primary soil series of an association have been used to estimate the soil moisture regime. Although estimating the moisture regime for each of

the four soil types within a mapping unit is possible, their location within an association is not known. Consequently this data is most suited to analyses on a national scale, and is now being used on a number of projects within Forest Research, e.g. habitat fragmentation in ecological networks (contact: [Kevin Watts](#)), and developing the policy for adapting forestry to the impacts of climate change (contact: [Duncan Ray](#) and [Georgios Xenakis](#)).

Further reading

Pyatt, D.G., Ray, D. & Fletcher, J. (2001)

An Ecological Site Classification for Forestry in Great Britain. Bulletin 124, Forestry Commission, Edinburgh.



Soil Moisture Regime

No data	Very moist	Slightly dry
Very wet	Moist	Moderately dry
Wet	Fresh	Very dry

Soil moisture maps for the baseline period (1961-90) and 2080s high carbon emissions scenarios.

For further information on soil moisture regime contact:

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Departure of Jonathan Humphrey

Jonathan has left Forest Research and the Forestry Commission in mid September to pursue a new vocation by training to be a Minister in the Church of Scotland. During his 14 years in the organisation Jonathan has contributed enormously to the scientific understanding of biodiversity in Britain's forests – and to the policies and practices that seek to conserve and enhance this. He leaves an impressive record of achievement including quality scientific papers, technical releases and innovative publications such as “Life in the Deadwood” - as well as a network of friends and colleagues built up through work on a wide range of Forestry Commission business, and EU and UK agency contracts.

Squirrel bark-stripping

This summer we have received a lot of enquiries about squirrel bark-stripping and other damage. We should now be approaching the end of the bark-stripping period, which usually lasts from mid-April to September. Control should be targeted between mid-March and mid-August, so now is too late and the focus should be on preparing for control next spring.

[Forestry Commission Practice Note 4](#) has been revised to take account of changes in the the legislation regarding the use of warfarin for the control of grey squirrel bark-stripping damage. Also see the [List of manufacturers and suppliers of equipment](#).

Research into the effects of the Great Storm of 1987

Many will remember the Great Storm of October 1987 as it caused some widespread damage, especially to the Southeast of England. Wind damage can have a great impact on the ecology of woodlands and numerous ecological studies were established in the immediate aftermath of the storm. Forest Research carried out a survey of storm-damaged conifer woodlands there in 1988 and a follow-up survey in 2002. The results are used to improve guidance on the restoration of plantations on ancient woodland sites (PAWS). Current advice recommends to maintain woodland conditions and remove conifers gradually from PAWS. The catastrophic outcome of the storm contrasted dramatically with this recommended scenario and provided an opportunity for looking at regeneration of woodland on conifer plantations that had been destroyed overnight and subsequently cleared.

A brief description of the surveys and the naturally regenerated broadleaved woodlands on some of the sites can be found on the website <http://www.forestresearch.gov.uk/fr/INFD-76PDEN> together with a list of selected publications on the topic.

7th World Congress of the International Association for Landscape Ecology

[Amy Eycott](#), [Darren Moseley](#) and [Kevin Watts](#) attended the 7th World Congress of the International Association for Landscape Ecology (IALE) at Wageningen, Netherlands in July. They presented talks on climate change and habitat fragmentation, modelling techniques for reducing fragmentation, and applying forest habitat networks to target native woodland expansion. They also visited some of the Netherlands' famous large scale ecological restoration projects such as 'green bridges'.

PhD project aimed at improving restocks for black grouse

[Jenny Owen](#) recently started a PhD at the University of Stirling entitled 'Determinants of field layer vegetation in plantation restocks: consequences for black grouse conservation'. The project, jointly funded by RSPB, the Forestry Commission, the University of Stirling and Scottish Natural Heritage, will focus on how forest management and site factors affect vegetation development on restock sites and their usefulness to black grouse.

After reviewing literature on black grouse ecology and habitat usage together with relevant aspects of forestry, clearfell management and revegetation, Jenny is now seeking suitable study sites and has visited a number of FC Forest Districts to discuss possibilities. Finding similar sites to compare contrasting forest management options is proving challenging as choice of management is usually dictated by site factors such as slope and soil type.

For further information e-mail jenny.owen@stir.ac.uk or russell.anderson@forestry.gsi.gov.uk.

New publications

Recently published articles by Ecology Division authors

Harmer, R. & Kiewitt, A. (2007) Restoration of PAWS - Testing some of the advice, *Quarterly Journal of Forestry* **101** (3): 213–218.
Contact: [Ralph Harmer](#) or [Andrea Kiewitt](#)

Watts, K., Ray, D., Quine, C.P., Humphrey, J.W. & Griffiths, M. (2007) Evaluating Biodiversity in Fragmented Landscapes: Applications of Landscape Ecology Tools. *Forestry Commission Information Note 85*, Edinburgh.

 [Evaluating biodiversity in fragmented landscapes: Applications of Landscape Ecology Tools](#) (PDF-1440K)

Contact: [Kevin Watts](#)

Conferences

A Quick Clearfell and a Gentle Thin - Approaches to Woodland Restoration on an Ancient Woodland Site

Friday 5th October 2007, 12.30-16.30

Brick Kiln Wood/ Great Trodgers Woodland, Mayfield, nr. Tunbridge Wells, East Sussex.

The High Weald Plantations on Ancient Woodland Sites Project invite you to an ancient woodland site near Mayfield. The field visit is an opportunity to see woodland restoration in action and meet woodland owners, managers, archaeologists and contractors.

The meeting is for woodland owners, managers, contractors and enthusiasts in the High Weald with an interest in restoring native woodland habitat in plantations on ancient woodland sites.

The event and refreshments are free of charge.

For more details and to reserve your place please contact:

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e-mail: m.chapman@highweald.org

The High Weald PAWS project has been set up to provide specialist management advice to landowners, land managers and forestry contractors on the restoration of Plantations on Ancient Woodland Sites in the High Weald AONB. Partners are Woodland Trust, Forestry Commission, High Weald AONB Unit, INTERREG IIIb under the Lifescape Your Landscape Programme.
See <http://www.highweald.org/text.asp?PageId=224> for more details.

Hampshire Woodland Forum meeting

Wednesday 10th October 2007, 10.00-13.00

The Sustainability Centre, East Meon, Hampshire

Planned are talks about

- Lantra (the sector skills council for the environmental and land-based sector),
- the Rural Development Programme for England (upcoming opportunities for financial support to improve the economic value of woodland and adding value to wood products), and
- the National Coppice Apprenticeship Scheme.

For more details and to book a place please contact:

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The Hampshire Woodland Forum has been established by Hampshire County Council as a means of promoting woodland conservation across the county.

For more information on the Forum contact the County woodland officer:

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www.hants.gov.uk/biodiversity

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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For general enquiries concerning the biodiversity and conservation work of Forest Research, please contact:

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Visit the web pages of Ecology Division at:

www.forestresearch.gov.uk/ecology

For more general information about the work of Forest Research, please visit our website at:

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