

Ecotype

Autumn 2013

Ecotype is the biodiversity and conservation newsletter produced by Forest Research's Centre for Ecosystems, Society and Biosecurity.

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Fungi growing through Sweet chestnut leaf litter

As the leaves start falling, the wet but mild weather of autumn provides ideal conditions to see the fruiting bodies of fungi. A mutually beneficial relationship (Mycorrhizal association) between plants and fungi helps maintain the fertility and productivity of woodlands, whilst also providing food for forest wildlife.

Editorial

Welcome to the Autumn 2013 issue of *Ecotype*, the biodiversity and conservation newsletter produced by Forest Research's Centre for Ecosystems, Society and Biosecurity (CESB).

What's in this issue:

A year on from their article in *Ecotype* (Autumn) 2012, [Stuart A'Hara and Joan Cottrell](#) give an update on progress made on the Wheatley Elm.

[Laura Henderson](#) and FR's Ed Eaton present their findings from examining tree cores as part of the MultiFor cross-border project to see if radial growth patterns have been influenced by past climatic conditions.

[Russell Anderson](#) outlines research by the cross-sector Flow Country Science Group to determine edge effects of forests on the Caithness and Sutherland Peatlands and to translate the findings into practical land management guidance.

[Phil Handley](#) gives us an insight into CESB's work with Chichester District Council to map ecological networks for six key species each representing an important habitat within the local area.

[Michal Petr](#) looks at climate change impacts and implications for forest planning and management in Britain.

[Joan Cottrell](#) summarises current collaborative PhD projects with Universities on conservation genetics.

We round the issue off with our [news and conferences](#) page where we welcome and congratulate PhD students, provide information on a number of publications and give details on a recent 'Economic benefits of Green Space' webinar.

All together these articles highlight a small selection of the current projects we are working on at Forest Research. I hope you find this Autumn 2013 issue of *Ecotype* informative and enjoyable to read.

Lucy Turner
Editor

More on the Wheatley elm

Stuart A'Hara & Joan Cottrell

Since our last article in *Ecotype* we have sampled Wheatley elms from locations around Edinburgh: Avenues at Braidburn Park, Ravelston Dykes Road, Ferry Road and Princes Street Gardens, and a pair of trees at Warriston Cemetery and at Regent Road; Aberdeen: Anderson Drive; and the Isle of Man (one specimen).



Avenue of Wheatley elms in Princes Street Gardens west of floral clock

DNA fingerprinting confirmed that they are all representatives of a single clone. This is interesting as some literature states that there are at least two forms of the Wheatley elm that differ slightly in habit.

The Wheatley elm was first recorded in Guernsey, but is more likely to have originated from Normandy or northern Brittany. The earliest documented evidence of its presence in Guernsey is the following description published in 1815: 'the species of elm on the island was of peculiar form, its branches tending upwards and giving the tree somewhat the appearance of a Lombardy Poplar'. It was a favourite of Prince Albert who planted it around the royal residence on the Isle of Wight. The London nurseryman, George Loddiges, was the first to propagate it in England in 1836 and considered it sufficiently distinctive to warrant its own scientific name *Ulmus sarniensis*, after Sarnia the ancient name for Guernsey. Between 1830 and 1851 the tree was propagated and distributed by Sir William Cooke of Wheatley Park. The earliest use of the name Wheatley elm for this tree occurs in 1869 in the Simon-Louis catalogue.

This is a visually impressive tree that is an important part of Edinburgh's urban planting. As with all single clone populations, lack of genetic diversity puts it at risk of total loss should it be particularly susceptible to a disease as has been found to be the case in France for the iconic plane trees on the Canal du Midi.

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Ring out the old - Detecting climatic drivers of tree growth

Laura Henderson & Ed Eaton

In autumn 2010, as part of the MultiFor cross-border project, 876 tree cores were taken from oak trees in 5 regions across southern and eastern England and northern France. The objective was to examine radial growth patterns to establish if these had been influenced by past climatic conditions. The majority of the trees cored were from single species plantations although some were taken from oak-Scots pine mixtures.

The cores were scanned with the use of new technology developed by the Slovenian Forestry Institute and the ring widths measured to the nearest 0.01mm. Subsequent analysis, alongside meteorological data, indicates that the trees have demonstrated considerable resilience to changing climatic and environmental conditions for over 100 years.

Specimens from all regions showed significant increases in growth rates over the 20th century. The largest annual growth was observed in the Pas-de-Calais region in France ($2433\text{mm}^2.\text{yr}^{-1}$) with the highest increase in growth rate in the New Forest ($26\text{mm}^2.\text{yr}^{-1}.\text{yr}^{-1}$).



Cross section of tree trunk showing radial growth rings

Pointer year analysis, which identifies years of exceptionally good or poor growth, indicated that such years very rarely coincided between regions. This

demonstrated that the drivers of growth are quite localised and implies they are influenced by on environmental more than climatic factors. This was emphasised by noticeable variation in the growth of the trees cored from within the same region.

The results help us to understand the on-going growth potential of our native oak trees. An extension to the project has allowed Scots pine and additional oak trees to be cored in Thetford Forest and the New Forest. The data, currently being analysed, will allow the growth of oak and pine in single species and mixed stands to be further investigated.



Ben Jones taking a core from a Scots pine in the New Forest

MultiFor was an EU project funded by the European Regional Development Funds and the Forestry Commission. The project was based on cross border research and initiatives associated with multi-functional forestry.

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Flow Country Science Group

Russell Anderson

Twenty-five years on from the Flow Country land use controversy of the late 1980s, Forestry Commission Scotland convened a group of scientists from Forest Research, FC Corporate and Forestry Support, Scottish Natural Heritage and RSPB under Professor Des Thompson to assess edge effects of neighbouring forests on the designated interest features of the Caithness and Sutherland Peatlands Special Protection Areas (SPA) and Special Areas of Conservation.

Professor Jerry Wilson led the task of modelling the relationship between occupancy of habitat by breeding golden plover, dunlin and greenshank and aspects of the vegetation and topography that influenced occupancy, including the distance from the nearest forest edge. Bird survey data from RSPB's Forsinard Flows Reserve was used to identify explanatory variables and build the model.

This work revealed that when the effects of the other influences is allowed

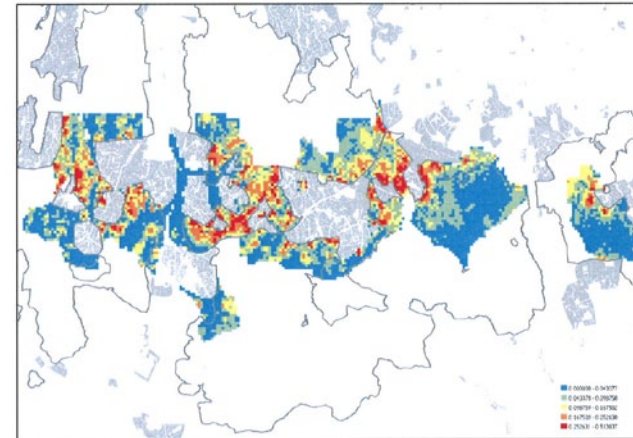


Lodgepole pine spreading onto adjacent blanket bog at Strathmore Forest in the Flow Country

for, there is an increasing trend in golden plover and dunlin breeding densities on open blanket bog with distance from the forest edge. The potential to increase breeding densities by moving the forest edge back was mapped for each of the bird species.

A similar modelling exercise for forest edge effects on habitat quality was less conclusive but consistent with earlier research that demonstrated a drying effect of first rotation forest 40m out onto adjacent blanket bog.

Earlier work on an expert system for predicting habitat sensitivity of the



Predicted increase in Dunlin habitat occupancy probability in response to forest removal. Forestry area are shaded grey and the dark grey line is the SPA boundary

designated site had produced a map of habitat sensitivity to adjacent forests. This was combined with the bird maps to provide a method of identifying where moving the forest edge back is likely to be most effective in reducing impacts on (either the habitats or the birds of) the designated site.

The group is now supporting FC Scotland's Highland Conservancy in using the maps and a decision framework with forest owners and agents as redesign of forests is considered.

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Incorporating ecological networks within local planning policy

Phil Handley

The National Planning Policy Framework advises local planning authorities to plan “for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure”. Explicit in this framework is the need to identify and map components of the local ecological networks.

CESB working with Chichester District Council, has undertaken to map ecological networks for 6 key species, each representing an important habitat within the local area. The species chosen were: Water Voles (Riparian), Woodland Bats (Woodland and Linear features), Barn Owls (Semi-Natural Grassland), Northern Lapwing (Farmland), Dormice (Ancient and Semi Natural Woodland and Hedgerows (ASNW)) and the Chalkhill Blue Butterfly (Chalk grassland).

For each species we consulted local experts and published literature to create rules and assumptions about how an individual species moves and forages within the landscape. These rules and assumptions were then used to create a resistance matrix for input into our ecological networks modelling. The

resulting networks were then checked against species records from the Sussex Biodiversity Centre and those with a matching species record were marked as occupied.



Water Vole used as a focal species for Riparian ecological networks



The result has been an important advancement for Chichester Districts Green Infrastructure (GI) Strategy, with the council now able to influence development sites to minimise impact on GI. Additionally it has allowed the council to identify opportunities for enhancing landscape connectivity through restoration and management of habitats as well as helping to target survey works for the species involved in the study.



Dormice used as a focal species for Ancient & Semi Natural Woodland ecological networks

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Can climate change impacts be serious? Implications for forest planning and management in Britain

Michal Petr

Over recent decades Britain has experienced an increased mean temperature of about one degree Celsius, mainly as a consequence of climate change from anthropogenic greenhouse gas emissions. The latest International Panel on Climate Change fifth assessment report strengthens and supports such conclusions at a global and regional scale.

The evidence shows that given following the current trends in climate we can expect higher temperatures, more frequent floods and other extreme events. What will these changes in climate mean for forestry? For example, will increased storm frequency lead to more damage to forests and will increased drought frequency lead to changes in growth rates of trees. Where and when these impacts might occur, and with what confidence can they be predicted, is the focus of research.

Research by Michal Petr and Duncan Ray with international collaboration shows how future projected drought can potentially affect tree growth rate as represented by the stand yield class of major tree species. We investigated under different futures - represented by climate scenarios from the UK Climate Projections 2009 - how trees in Britain respond to drought. Our findings summarised in Figure 1 show how Sitka spruce, Scots pine, and Pedunculate oak can become more vulnerable to drought in the lowlands than in the uplands. We can expect an increase in tree growth rate mainly in the uplands. However, due to the complexity of impact modelling, our approach has yet to incorporate other environmental factors such as site conditions that can potentially reduce the negative drought impacts.

To conclude, our research is providing new information about drought impacts to support climate change adaptation in forest management at the national and forest district level.

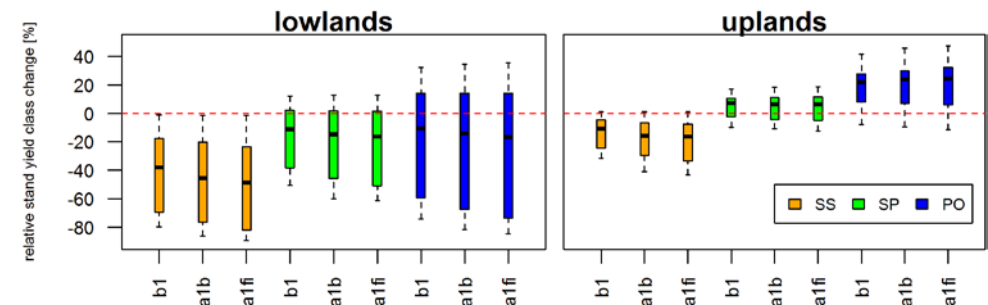


Figure 1. Modelled changes in the stand yield class as a change from the recent conditions (red dashed line) to the 2050s across the Great Britain (SS – Sitka spruce, SP – Scots pine, PO – Pedunculate oak; b1, a1b, and a1fi are alternative emissions scenarios).

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Conservation Genetics at FR - Collaborative PhD projects with Universities

Joan Cottrell

We are currently involved in several collaborative PhD projects around the theme of conservation genetics.

Annika Telford, a staff member at the Centre for Ecology & Hydrology has registered for a PhD at Edinburgh University. She is examining the susceptibility of Scottish provenances of Scots pine to *Dothistroma* needle blight. She has recently travelled to New Zealand to learn more about this disease in *Pinus radiata*.



Common garden trial to test susceptibility of Scots pine provenances to *Dothistroma* needle blight on an infected site

Duncan Proctor at York University is studying the ecology and population genetics of wood ants (*Formica lugubris*) on the North York Moors. He has spent his first year conducting detailed mapping of the anthill locations in order to determine whether he can detect evidence of migration into planted conifer forests.

Kevin Donnelly at Edinburgh University has been studying the distribution of adaptive variation in Scottish populations of Scots pine by flooding treatments in pot based common garden trials.

Finally, Richard Whittet has just started his PhD at Edinburgh University where he will be studying various aspects of the native tree seed and plant supply chain.

These collaborative projects are building good links between universities and applied organisations such as FR. They provide an insight to the students on the practical application of the results they generate during the course of their PhD studies and provide us with access to new techniques, facilities and perspectives.

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News and conferences

PhD congratulations

Matt Elliot successfully completed his PhD 'The epidemiology of *Phytophthora ramorum* and *P. kernoviae* at two outbreak sites in Scotland' at the University of St Andrews. This Scottish Government funded project measured inoculum levels of these pathogens in rainwater, watercourses and soil. Many of the findings from this work are now being used to better inform policy related to the management of *Phytophthora* diseases in Scotland.

PhD student joins CESB

Richard Sands is investigating the population ecology of oak processionary moth in semi-natural woodlands. Richard's studentship is funded by FC England and is jointly supervised by CESB's Dr Nigel Straw, Professor Guy Poppy and Dr Judith Lock at the University of Southampton, and Dr Robbie Girling at the Organic Research Centre, Newbury.

'Economic benefits of Green Space' webinar

On September 19th CESB's Vadim Saraev presented 'Economic Benefits of Green Space' webinar hosted by Mark Durk of Forestry Commission England and aimed at Green Infrastructure (GI) Partnership members who are seeking to use an evidenced approach to demonstrating net economic benefits when writing reports, preparing bids and making the case for Greenspace. The primary focus was on greening initiatives where trees, woodlands or forests are a principal component. Underlying messages are transferable to other GI contexts.

Publications

A framework for sharing experiences of community woodland groups.
Anna Lawrence & Bianca Ambrose-Oji.
Forestry Commission Research Note. FCRN015.

Anna Lawrence and Norman Dandy have had a paper published in Land Use Policy which explores the evidence surrounding landowners' approaches to forestry. Visit <http://www.sciencedirect.com/science/article/pii/S0264837713001713> to access the paper.

Russell Anderson, Chris Quine and Jordan Chetcuti have co-written a paper published in Journal of Applied Ecology titled 'Modelling edge effects of mature forest plantations on peatland waders informs landscape-scale conservation' which provides a scientific account of the work introduced by Russell on [page 5](#).

Mark Ferryman and Kevin Watts have co-written a journal paper published in Ecology & Evolution titled [Using GPS telemetry to validate least-cost modelling of grey squirrel \(*Sciurus carolinensis*\) movement within fragmented landscape](#)

About 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 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.

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Web links

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www.forestry.gov.uk/forestresearch

www.forestry.gov.uk/fr/growingplaces