

Ecotype

The Biodiversity and Conservation
Newsletter of Ecology Division

Forest Research 

**PROGRAMME GROUP RESEARCH
UPDATE: Habitat management &
ecosystem dynamics**

**A judgement-based method to
assess overgrazing**
Richard Thompson

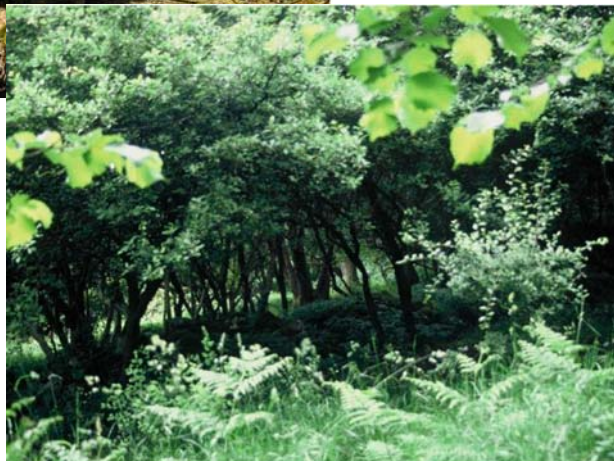
We have devised a method to assess the impact of livestock on upland native woodlands. The full results of this fieldwork were published by English Nature in 2004, details of which can be found at the end of this article.

The Single Farm Payment requires farmers to manage their land in Good Environmental and Agricultural Condition (GEAC). In order to be cross-compliant with this

regulation, farmers must not allow livestock to overgraze their woodlands. We were asked by Defra, English Nature and Forestry Commission England to develop a method to show when overgrazing has taken place. We used a judgement-based (qualitative) method to make surveying as quick and easy as possible and suitable for surveyors with limited knowledge of woodland ecology.

The questions were devised to minimise any ambiguity or uncertainty. The emphasis is on current, as opposed to historic impacts. The following indicators are used:

A woodland grazed by sheep and browsed by roe deer. The fragmented canopy and lack of regeneration suggest that there is an urgency to reduce herbivore impacts.



An obvious browse line in a wood used to shelter cattle in the winter.

Tree regeneration

This is assessed in terms of its abundance and whether it is heavily browsed. Absence of tree regeneration does not necessarily imply that herbivores are responsible, as there are many reasons why regeneration may not be present. Abundant unbrowsed seedlings and saplings are a good indication of limited herbivore impacts. Heavy browsing on abundant seedlings and saplings is an indication that there may be substantial current herbivore impacts, even though a recent period of relaxed grazing must have taken place for initial seedling recruitment.

Preferentially browsed species

A number of common woodland plants are very palatable (e.g. bramble, honeysuckle, ivy, greater woodrush). If these species are present, accessible to herbivores and unbrowsed, this is a clear indication that there are low herbivore impacts. Conversely, heavy browsing on these species is a good indicator of moderate impacts. Complete absence of these species or presence only in inaccessible crevices is most likely to be due to herbivores although, as this method assesses current impacts, it could be argued that grazing levels have reduced in recent years and there has been insufficient time for recolonisation.

Browse line

In a wood with moderate to high herbivore impacts

and an understorey, there is a window of depleted vegetation from ground level to 1.5-1.8m and it is easy to see long distances through the wood. The method uses this indicator where the browse line is obvious and, conversely, where it is absent and

lower branches of understorey trees are well within reach of herbivores.

Epicormic shoots

These grow on the main trunk of some trees (typically those with small burrs – e.g. some oaks). Where there are moderate to high herbivore impacts, there is an obvious difference in the length of these shoots above and below browsing height. Signs of browsing on lower epicormics within the last 12 months need to be present.

Basal shoots

These are obvious on species such as hazel and alder, and, to a lesser extent, on some oak, ash and birch. Not all trees have basal shoots and careful inspection is sometimes needed to locate them. Greater than 75% of basal shoots need to be browsed for this to indicate moderate to heavy herbivore impacts. Unpalatable alder shoots have a lower threshold of 50% of stems browsed.

Ground flora

Heavy grazing is indicated where the sward is less than 5cm and dominated by grass and moss. Unpalatable tufted hair-grass has a lower threshold of 15cm.

Bark stripping/fraying

More than 10% of live trees need to be affected for this to indicate that there are heavy herbivore impacts.

Ground disturbance

This could be sheep tracks or poaching, typically by cattle. More than 20% of the plot needs to be disturbed for this to indicate that there are high herbivore impacts.

Open canopy

If there are no signs of regeneration (whether seedlings/saplings or basal shoots), an open canopy may indicate that the wood is beginning to senesce (particularly where there are signs of dead and dying canopy trees) and there is more urgency for a change in the grazing regime.

Which species of herbivore?

At the end of the questionnaire, the surveyor is asked to assess which herbivores are present. This is not always easy and it is usually necessary to rely on circumstantial evidence such as hair on fences, height of browse line or shape of hoof prints. This is an important task as a wood may be heavily grazed but by deer or rabbits, with only minor impacts from farm livestock.

Summary of herbivore impacts

After working through a decision tree, based on the answers to the indicators above, it is possible to summarise herbivore impacts into one of five classes:

Definition of the assessment classes

Level	Description of typical characteristics	Implication
A	<ul style="list-style-type: none"> Frequent saplings, well developed ground and field layer vegetation Branches in understorey well within reach of grazing animals 	<ul style="list-style-type: none"> Grazing / browsing is not causing any problems within this woodland
B	<ul style="list-style-type: none"> The sward is not being heavily grazed but woody plants are being moderately to heavily browsed 	<ul style="list-style-type: none"> Not a grazing management issue. May become necessary to control browsing animals in the long-term
C	<ul style="list-style-type: none"> There are moderate to heavy levels of grazing and browsing under a full canopy 	<ul style="list-style-type: none"> Survival of the woodland is not threatened in the short-term but there is limited structural diversity May become unsustainable in the medium-term
D	<ul style="list-style-type: none"> There are moderate to heavy levels of grazing and browsing under a fragmented canopy or animal disturbance under a full canopy 	<ul style="list-style-type: none"> Grazing or browsing at this level would be unsustainable in the short-term (i.e. c.10-15 years).
E	<ul style="list-style-type: none"> The woodland habitat is under serious threat from this level of grazing/browsing pressure (e.g. heavy poaching and/or bark stripping together with an absence of tree seedlings and heavily grazed sward), under an open canopy 	<ul style="list-style-type: none"> Such management is currently unsustainable.

The method should ideally be carried out in February/March. However, we have devised an alternative questionnaire and accompanying notes to be used in the growing season. Greater care is needed at this time of year as new growth may develop from heavily browsed plants and may not be browsed off until the following winter/early spring. Additionally, areas heavily disturbed in the winter (e.g. by cattle) may quickly re-vegetate in the growing season, obscuring impacts.

We have recently trained staff from the Rural Development Service (RDS) and English Nature, and they are currently using the method in a number of woods in the south-west and north-east of England. We hope to work with the RDS in 2006-

2007 to further develop the method.

Reference

Thompson, R, Peace, A and Poulson, E (2004) A judgement-based method to identify overgrazing in English upland native woodlands. English Nature Research Report 621. English Nature, Peterborough. The report can be downloaded from the English Nature website at: www.english-nature.org.uk/pubs/publication/pub_results.asp?C=3&K=&K2=621&I=&A=&Submit1=Search

For more information contact:

Richard Thompson

Northern Research Station

Tel: 0131 445 6951

E-mail: richard.thompson@forestry.gsi.gov.uk

Bog deforestation and restoration – some science at last

Russell Anderson

The restoration of bogs altered by afforestation has been in progress in Britain for at least 17 years but with no scientific research undertaken, little guidance on cost-effective methods has been available. The Forestry Commission, with support from Scottish Natural Heritage and Royal Society for the Protection of Birds, has undertaken two experiments comparing a range of restoration treatments for a blanket bog and a lowland raised bog. The initial results are now available in a paper being submitted to 'Forestry'.

The blanket bog experiment, at Bad 'a Cheo in Caithness, shows that:

- The combination of felling trees and damming plough furrows results in a more suitable water regime for recovery of bog vegetation than either operation on its own
- However in terms of soil water regime, the minimum requirements for successful restoration are unclear so we cannot yet say which treatment is most cost-effective
- Damming plough furrows not only improved the water regime but also enhanced the recovery of hare's-tail cottongrass (*Eriophorum vaginatum*), a key species in bog vegetation recovery
- Removing whole trees from the site did not confer an advantage except by making more ground instantly available for re-vegetation
- An initial flourish of Lodgepole pine seedlings died out within two years but new seedlings continued to appear close to the forest edge and grew slowly.

The lowland raised bog experiment is in the former Poldar Plantation on Flanders Moss National Nature Reserve, near Stirling.

- Felling caused the water table to rise much closer to the surface than before
- Damming plough furrows did not improve the water regime further
- If either whole trees or branches and tops were left on site rather than removed, summer draw-down of the water table was less, favouring recolonisation by bog plants
- Colonisation by more nutrient-demanding plants, particularly grasses, was no less if whole trees were removed
- Leaving whole trees lying on the ground had one major disadvantage – it protected birch seedlings from browsing by roe deer, which have so far suppressed birch regeneration in the other treatments.

The indications are that it is easy to restore vegetation mainly of bog species. It remains to be seen whether this will become similar in species composition to that of undamaged bogs. And the crucial factor in the longer term is whether tree regeneration will direct succession towards woodland and, if so, whether it can be cost-effectively dealt with, preferably by a one-off clearance operation.

For further information contact:

Russell Anderson

Northern Research Station

Tel: 0131 445 6971

E-mail: russell.anderson@forestry.gsi.gov.uk

Plans for improving survey coverage of birds in woodlands

Jonathan Humphrey

Recent reports show that populations of some woodland birds have been declining. However, because of gaps in the coverage of bird surveys, particularly in upland conifer plantations, it is unclear whether these declines are taking place across all woodland types and in all parts of Britain.

Information from these under-monitored habitats is also needed to feed into woodland bird indices for Wales, Scotland and England, which are considered to be important indicators of sustainability and biodiversity. There is also a need

to evaluate the effects of changing forest management on woodland bird communities in conifer forests, such as the increasing move away from clear-felling to lower impact silvicultural systems.

Representatives of the following organisations met in January to discuss country requirements:

- Forestry Commission
- Royal Society for the Protection of Birds
- British Trust for Ornithology (BTO)
- Scottish Natural Heritage
- Forest Research

They concluded that surveys of birds in conifer woodland (and other upland woods) should take place through an extension of the BTO's Breeding Bird Survey methodology. Forest Research will be involved in developing the habitat survey protocols in collaboration with the BTO. If things go to plan, survey work will begin in 2007.

For more information contact:

Jonathan Humphrey
Northern Research Station
Tel: 0131 445 6972

E-mail: jon.humphrey@forestry.gsi.gov.uk

For more information on the Breeding Bird Survey visit www.bto.org/bbs/index.htm.

The Repeat Woodland Bird Survey

The Repeat Woodland Bird Survey has been published by the Royal Society for the Protection of Birds (RSPB) and the British Trust for Ornithology (BTO). The report is based on research in broadleaved and some mixed woodland, commissioned and funded by Defra, the Forestry Commission, RSPB, BTO, the Woodland Trust and English Nature. It can be downloaded from www.forestry.gov.uk/woodlandbirdsurvey.

Research on Lowland Planted Ancient Woodlands (PAWS)

Ralph Harmer

Current research on the restoration of lowland conifer PAWS has concentrated on the study of thinning treatments in plantations dominated by Corsican Pine, growing on clay soils. These were established in 2001 to gain a greater understanding of the processes of natural regeneration and

Centre of one of the experimental blocks showing control area with brash remaining after harvesting, and cleared areas that have been planted, sown or left to colonise naturally.



Evidence of mammal activity was clearly visible in the direct sown plots where many small holes were created during the excavation of acorns.

vegetation change that occur following restoration operations, and to test the advice that maintaining woodland conditions by thinning over a long period of time is the most appropriate method of restoration. These experiments are still in progress and no data has yet been properly analysed, but casual interpretation of the results suggests that current advice may not be satisfactory for all sites.

A new study was established over the winter of 2005/06 to investigate different methods of restocking clear-felled sites. This is a joint experiment between Ecology and Forest Management divisions in which we are comparing the use of direct sowing, planting and natural regeneration at a site near Winchester. The species sown and planted are typical of those of National Vegetation Classification W10 woodland that would probably be the natural type for the site. Growth and establishment of tree seedlings and the ground flora will be observed over the next few years. Within the same area short term experiments are being carried out to study the predation of tree seed by small mammals.

For more information on PAWS restoration, natural colonisation and planting contact:

Ralph Harmer
Ecology Division
Alice Holt
Tel: 01420 526152

E-mail: ralph.harmer@forestry.gsi.gov.uk
Website: www.forestresearch.gov.uk/fr/infd-5z5qj8

For more information on seed predation contact:

Richard Jinks
Forest Management Division
Alice Holt
Tel: 01420 526225
E-mail: richard.jinks@forestry.gsi.gov.uk

For more information on direct sowing contact:

Ian Willoughby
Forest Management Division
Alice Holt
Tel: 01420 526226
E-mail: ian.willoughby@forestry.gsi.gov.uk
Website: www.forestresearch.gov.uk/fr/INFD-678DWY

Research on bramble in woodlands

Andrea Kiewitt

Bramble is regarded as one of the worst forest weeds, especially in relation to natural regeneration, because it is very vigorous and competes strongly with tree seedlings. Within our recent PAWS restoration experiments we have gathered a wide range of data on the vegetative growth and fruiting of bramble in permanent assessment quadrats over a number of years, and in relation to different forest thinning treatments.



Permanent assessment quadrats for bramble, 1m wide and 5m long, on PAWS restoration experiment, showing different amounts of bramble.

Investigation of vegetative growth showed that bramble cover, height and shoot length increased steadily over three years of observation in all thinning treatments. Most bramble was recorded in the heavy thinning treatment (80% of trees taken out) with final cover being almost 60% at an average height of 60cm. This compares with about 35% bramble cover at 40cm height in the lightest

thinning treatment (10% of trees taken out).

In addition to vegetative growth, we also looked at flowering and fruiting of bramble, recording:

- Numbers of inflorescences
- Flowering and fruiting stages (ten categories from an unopened bud to a ripe blackberry)
- Numbers of fruits and seeds.

We then extracted the seeds so we could assess their quality using a microscope. A seed was either filled with live embryonic and storage tissue or it contained a collapsed embryo whose tissue was dry and shrivelled.



Bramble seeds extracted from the fruits (left) and cut in half in order to assess their quality (right): filled or empty. Intermediates counted as filled if the live tissue filled more than half the seed.

We found that:

- Both the number of inflorescences and the number of berries were affected by the thinning treatments, with more of each found in the heavier thinning
- Fruit development was faster under the heavier thinning
- The ripening stage of a berry had no influence on either the number of seeds within it, or on the proportion of filled seeds
- Thinning treatment had no effect on either the number of seeds in the berries or the proportion of filled seeds
- Roughly half the seeds were filled and could probably germinate.

What does this all mean for practical forest management? Opening the forest canopy by thinning is likely to encourage bramble growth, leading to the development of a dense bramble thicket that can suppress naturally regenerating trees. In addition, the number of seeds produced will increase, and as these can remain in the soil seed bank for years and germinate once the

ground is disturbed, they provide a source of plants in the future. In contrast, the bramble thicket can give valuable nature conservation benefits, for example providing habitat and food for mammals, birds and invertebrates.

For more information contact:

Andrea Kiewitt

Alice Holt

Tel: 01420 526154

E-mail: andrea.kiewitt@forestry.gsi.gov.uk

Bramble in woodland – bane or benefit?

This one day meeting aims to bring together both forest managers and ecologists to discuss the role of bramble in woodland. It will comprise a series of short talks in the morning and an afternoon field visit. The meeting will be held on 21 June 2006 at Westonbirt National Arboretum, Tetbury.

For more information visit the Forest Research website at:

www.forestresearch.gov.uk/website/forestresearch.nsf/ByUnique/INFD-6K4C2G

Or contact:

Ralph Harmer

Alice Holt

Tel: 01420 526152

E-mail: ralph.harmer@forestry.gsi.gov.uk

Proceedings of the Native Pinewood conference, Drumnadrochit, 2004

Jonathan Humphrey

We expect to publish the proceedings of this meeting in a special issue of *Forestry* on the ecology and management of native pinewoods in late 2006. Subject to approval by the journal editors, the proceedings will comprise the following papers:

- Ecology and management of native pinewoods: overview of Special Issue
- Native pinewoods: perspectives on policy and management
- Long-term ecology of native pinewood communities in East Glen Affric, Scotland
- Long-term woodland dynamics in West Glen Affric, northern Scotland
- Recent pine woodland dynamics in East Glen Affric, northern Scotland, from highly resolved palaeoecological analyses
- The pinewoods and human use, 1600-1900
- The lichens of the Scottish native pinewoods
- Diversifying Scots pine stands using artificial

regeneration

- Ecology, history and silviculture of Scots pine in western Norway - a literature review
- Stand structure and dynamics in four native Scots pine woods in northern Scotland
- Modelling the effects of forest landscape dynamics on focal species in Glen Affric, northern Scotland

For more information contact:

Jonathan Humphrey

Northern Research Station

Tel: 0131 445 6972

E-mail: jon.humphrey@forestry.gsi.gov.uk

CONTACT DETAILS

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

Andy Brunt

Ecology Division, Forest Research

Alice Holt Lodge

Wrecclesham

Farnham

Surrey GU10 4LH

Tel: 01420 22255

Fax: 01420 520180

E-mail:

andrew.brunt@forestry.gsi.gov.uk

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

Chris Quine

Head of Ecology Division, Forest Research

Northern Research Station

Roslin

Midlothian EH25 9SY

Tel: 0131 445 2176

Fax: 0131 445 5124

E-mail: chris.quine@forestry.gsi.gov.uk

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