Investigating the wildlife benefits of CCF in lowland broadleaved woodland

Christine Reid and Saul Herbert

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Continuous Cover Forestry: Delivering sustainable and resilient woodlands in Britain

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Saul Herbert
In decline: e.g.

- Woodland birds – particularly the 26 woodland specialists

Butterflies of coppice woodland in England – many local extinctions as coppicing has ceased

- 58% woodland flowering plants in decline

- 66% of invertebrates – including declines in 236 species of moth – many in severe decline in southern England

Data from State of Nature 2013

1,256 woodland species assessed
Why are declines happening?

• The woodland wildlife we have today is a result of at least 1000 years of countryside change and woodland management

• Recent wildlife declines have been partly attributed to
  – lack of light and open space in our woodlands
  – lack of ‘structural diversity’ – ie trees of different ages, understorey, decaying wood
  – reduced diversity of native tree species by selection and replacement planting with non-natives
We know present day woodland wildlife needs a diversity of native tree species and a varied woodland structure.

- Native wildlife cannot usually meet its habitat requirements on introduced tree species - they have different phenology and other traits.
- Only 18 of the 257 woodland ‘priority species’ are primarily found in conifer woods – very few exclusively.
Canopy cover in unmanaged oak stands
Sheephouse Wood SSSI
(Rob Fuller unpublished data)
Changes in occupancy of interior unmanaged heavily shaded stands at Sheephouse Woods (% territories)

<table>
<thead>
<tr>
<th>Species</th>
<th>1980s</th>
<th>2000s</th>
<th>P</th>
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</thead>
<tbody>
<tr>
<td>Increased occupancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treecreeper</td>
<td>46%</td>
<td>60%</td>
<td>&lt;0.05</td>
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<tr>
<td>Marsh Tit</td>
<td>30%</td>
<td>47%</td>
<td>&lt;0.05</td>
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<tr>
<td>Decreased occupancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiffchaff</td>
<td>32%</td>
<td>1%</td>
<td>&lt;0.01</td>
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<tr>
<td>Blackcap</td>
<td>17%</td>
<td>2%</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Blackbird</td>
<td>27%</td>
<td>19%</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Wren</td>
<td>31%</td>
<td>7%</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Chaffinch</td>
<td>26%</td>
<td>16%</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>
Interaction between deer and woodland structure (light levels)

- High light levels
- Medium light
- Low light

Understorey Complexity

Deer pressure

Fuller 2013 Journal of Applied Ecology
Wyre Forest – history and vision

- Largest area of ancient woodland in England (2400 ha)
- A history of oak coppicing
- Last 100 years – coppice abandoned, plantation forestry and high deer numbers
- Hugely important for species – birds, butterflies, reptiles – SSSI and NNR

- A Vision to create: ... a more natural woodland landscape, managed to increase the diversity of tree species characteristic of the ancient woodland of Wyre ...
Long-term monitoring of the introduction of irregular silviculture

- Hypothesis: Introducing irregular silviculture will result in a measurable increase in woodland wildlife

  - ‘Permanent’ survey plots stratified by stand type:
    - Limited intervention
    - ASNW – oak dominated
    - ‘Restored’ PAWS
    - Beech and conifer PAWS (Douglas and Scots)
    - Coppice – oak and birch
    - *Rhododendron*

PAWS restoration site
Monitoring methods

Core method from Environmental change biodiversity network.

- Vegetation (ground layer and structure)
- Birds and butterflies (transects and point counts)
- Management/forestry operations

- Soils (%C, %N, P, pH, mesofauna and nematodes, microbial community)
- Annual, 4 year and 6 year cycles
Woodland structure and adders

• Wyre Forest adders in serious decline
• Remnant populations are isolated and few are viable

Three years of detailed study, building on long term survey data
• Electronic tagging
• PhD modelling habitat requirements
Improving connectivity / permeability

Computer modelling (cost surfaces and rule based) based on a range of variables:
Vegetation, aspect, footpath density, habitat patch size, proximity to disturbance features

Forestry operations which create canopy gaps (increased light, warmth and cover from predators) may increase ‘permeability’ of the woodland matrix and improve connectivity for adders
Rushmore Estate – background and objectives

• Big ancient woodland site (830 ha - about 58% semi-natural, rest planted)
• Centre of Cranborne Chase former hunting forest
• Long history of coppicing - much abandoned by 1980

• Huge wildlife and landscape value – for ground flora, old growth lichens (160 spp), butterflies (30 spp), & bats
• SSSI and AONB

• Management plan aiming for structurally and species diverse stands in which natural processes are the preferred means to achieve silvicultural, wildlife and economic objectives
Rushmore Biodiversity Project – Aims

- To compare biodiversity species and abundance in different forest stand types

- *Hypotheses*: biodiversity will be more diverse and abundant where stand structures are more diverse... especially in the irregular silviculture plots

- The 5 year study is monitoring
  - Birds - habitat needs and use across forest
  - Ground flora
  - Invertebrates – leaf miners and moths
  - Canopy invertebrates

- Develop leaf miners as surrogate for invertebrate biodiversity? Application to other sites?
Main structural types being compared are:

- Irregular high forest
- Coppice
- Closed canopy – limited intervention
Rushmore species sampling

• Birds
  o Bird counts at 320 plots in different stand structures (before and during the breeding season)
• Co-ordinate counts with leaf mines sampling and moth trapping – are there links to inverts as bird food supply?

• Moths – 30 plots
• Leaf mines – 100 plots
Rushmore species sampling

Canopy invertebrates

- We know little of canopy – due to access difficulties
- ‘Knock-down’ fogging in canopy trees across 30 plots – ideally early and late summer
- Collect canopy leaf mine samples (early autumn)
Rushmore – measuring structure to help explain variation between plots

- AFI Relascope method – basal area per plot + shrub layer protocol
- Canopy surface variation eg using stereo photography from UAVs, or lidar
Measuring effects of structural variation: light levels, temperature and humidity

- Canopy cover
  - Spherical densiometer

- Data loggers – ibuttons
Rushmore – very early results

- Bird sampling started in April this year
- Surveys are finding birds with different ‘structural needs’ together in the CCF stands (e.g., garden warbler with spotted flycatcher)
- Moth trapping and leaf mines sampling now into second season (1 year of data)
- Moth and leaf mines most abundant and diverse in CCF conversion plots (up to 3x as many)
Conclusions

• CCF / irregular silviculture, if done with biodiversity in mind, may deliver benefits for woodland wildlife

• The evidence base is limited, some good studies are in place, but results will take time

You can...

• Find out what wildlife lives in your wood

• Accommodate its needs in both tree species selection and structural change

• This will help create resilient woods that benefit wildlife as well as meeting economic objectives
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