Forest management and birds

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Forthcoming book:

Ecology and Conservation of European Forest Birds
Editors: Grzegorz Mikusinski, Jean-Michel Roberge and Robert J. Fuller
Cambridge University Press


Continuums of management

Continuums of management

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Native pine

Mixed

Non-native spruce

Different impacts at different scales – but introduction of non-native trees mostly associated with more generalist bird species (e.g. Baguette *et al.* 1994)

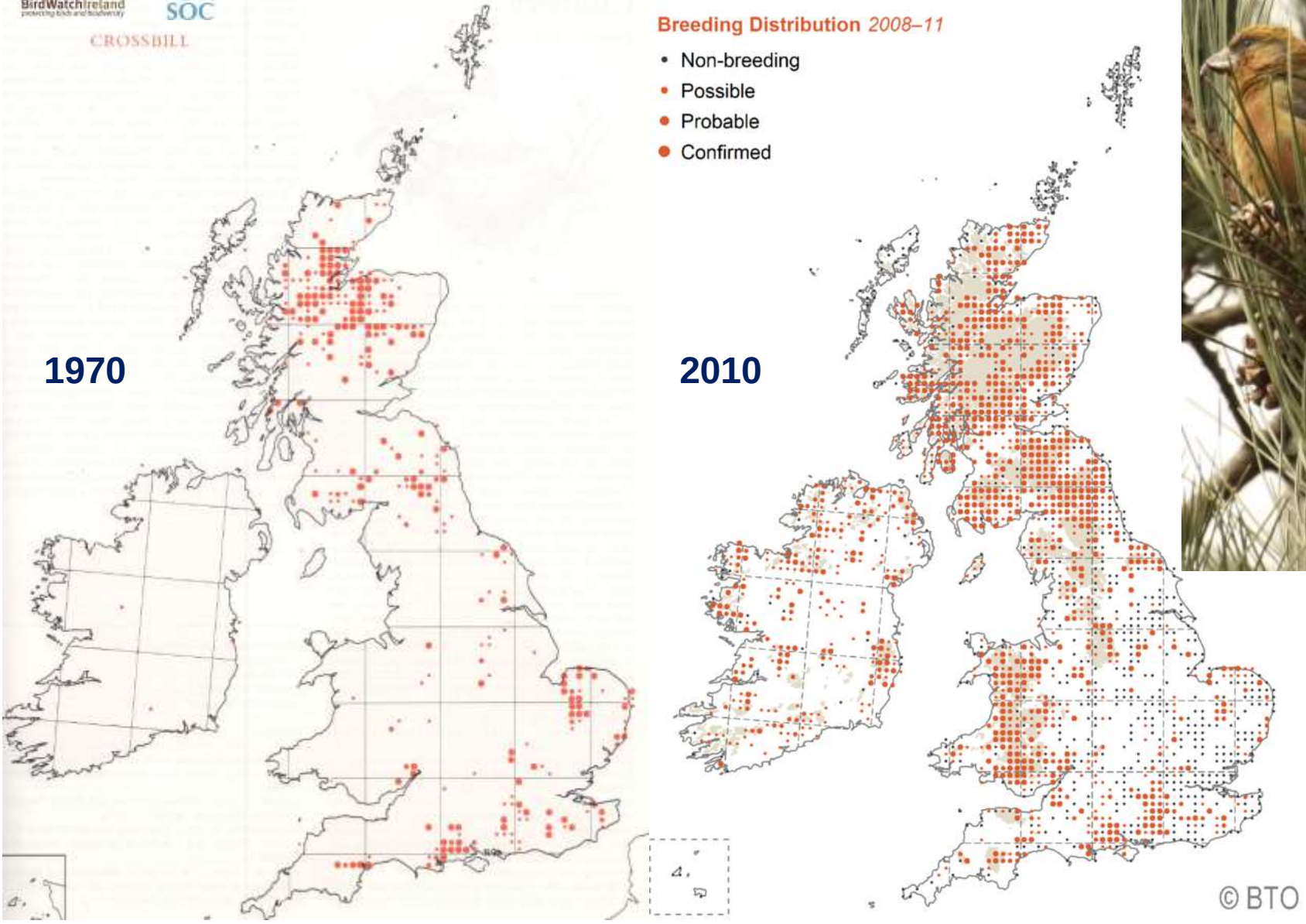
Forest expansion

Forest encroachment onto mountain pastures across Europe

Forest expansion

Crossbill
330% range increase 1970 - 2010

Forest expansion



INFLUENCES OF SILVICULTURAL SYSTEMS

Golden –winged Warbler

Willow Flycatcher

Some birds from eastern North America

Northern Flicker

Blue-winged Warbler

Declines associated with reduced clear-felling of forest

(Thompson & DeGrraaf 2001 *Wildlife Society Bulletin 29: 483-494*)

Clear Fell Rotations

- 30 – 40 year rotations
- Clear felled and replanted
  – large plots (> 10 ha)
- High planting densities
  (*ca.* 1300 stems per ha)

Continuous Cover

- Long term retention of tree cover
- Selective felling
  - small plots (< 5 ha)
- Self-seeded regeneration

Two categories in both treatments

Plantations of Sitka spruce

Continuous Cover Forestry

Clear-fell Rotation Forestry

Understorey of regenerating shrub-sized trees

No understorey No active regeneration

Young trees (thicket and pre-thicket growth stages)

Older trees (post-thicket growth stage)

Comparison of ‘forest’ bird species

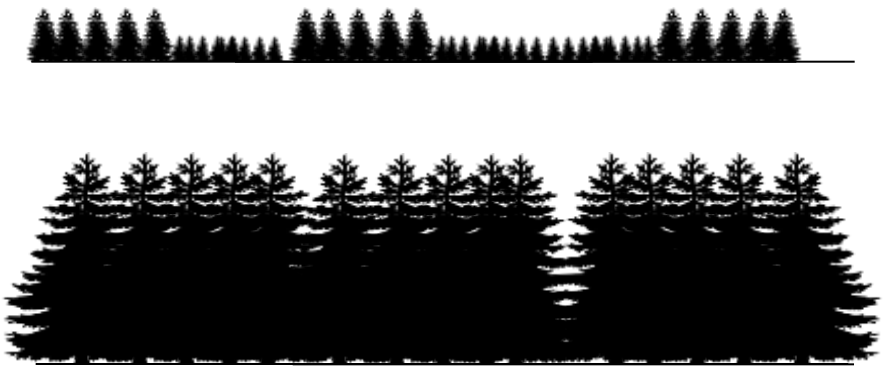
Comparison of ‘shrub’ bird species

Continuous Cover Forestry

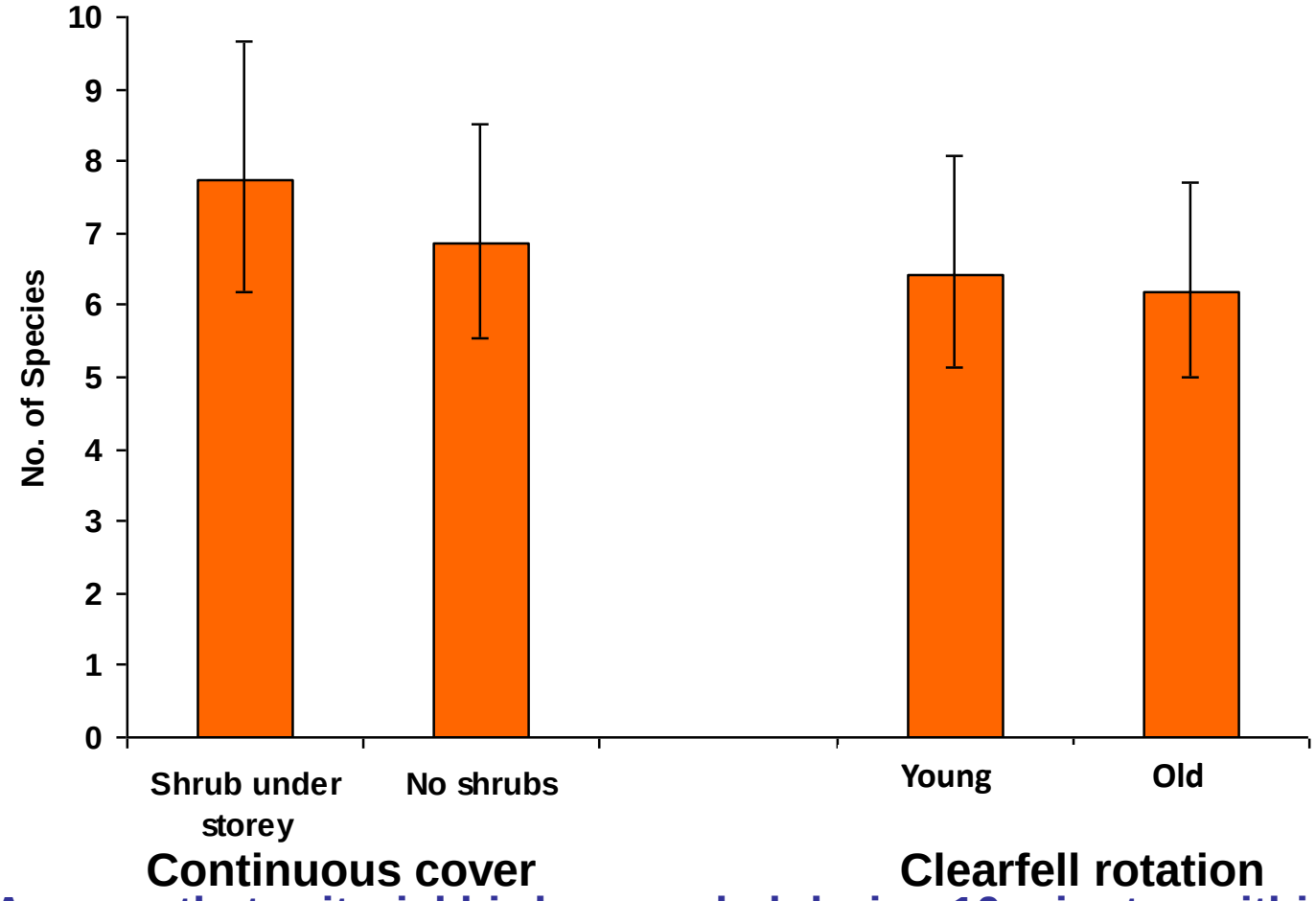
- **Understorey of regenerating shrub-sized trees**
- **No understorey No active regeneration**

Clear-fell Rotation Forestry

- **Young trees (thicket and pre-thicket growth stages)**
- **Older trees (post-thicket growth stage)**



More breeding bird species in Continuous Cover Forestry than in Clear-fell Rotation Forestry Management



Apparently territorial birds recorded during 10 minutes within 100 m from sampling points

Two timed visits to each of 334 sampling points across 4 treatments

Five common ‘forest’ species that were significantly MORE abundant in CCF than in mature rotation stands

Great-spotted Woodpecker

Blue Tit

Great Tit

Common Crossbill

Blackcap

One common ‘forest’ species significantly LESS abundant in CCF than in mature rotational forestry plots

Treecreeper

Statistical analyses used GLMM:

Count per point = Treatment (n = 4, fixed variable)

Site (n = 4, random variable); Poisson error, Log-link

Scarce ‘forest’ species found ONLY in CCF

Goshawk

Nuthatch

Redstart

Willow Tit

Hawfinch

An influence of canopy tree structure in the absence of a regenerating under-storey

Woodpigeon

Blue Tit

Great Tit

Goldcrest

Lesser Redpoll

Five species that were significantly MORE abundant in CCF with NO shrub under-storey than in mature Clearfell rotation stands

‘Shrub’ species – a comparison of abundance within CCF under-storey and young clearfell forestry

Wren

One species more abundant in CCF

Three species less abundant in CCF

Willow Warbler

Dunnock

Lesser Redpoll

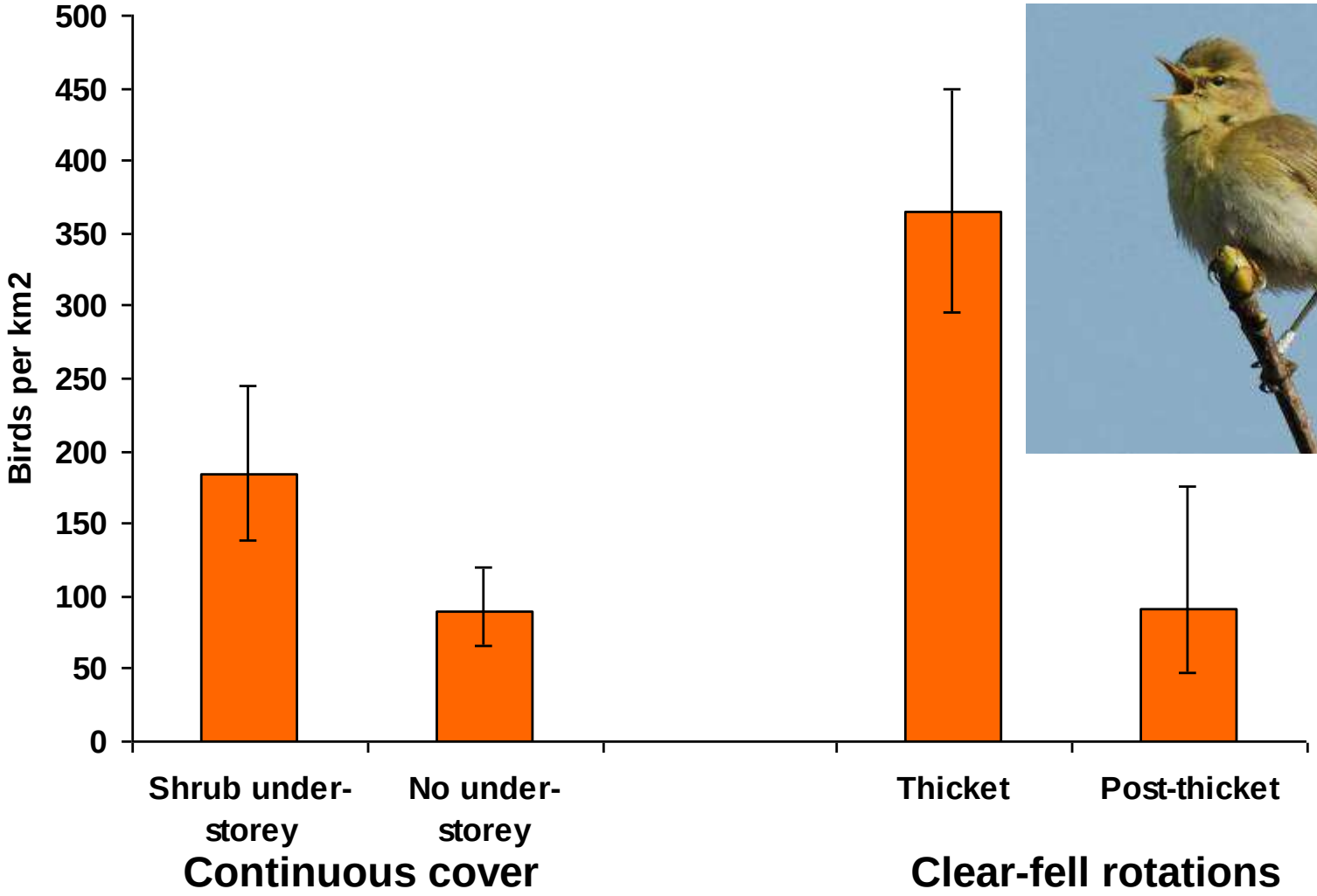
Scarce ‘shrub’ species found ONLY in young clearfell stands

Cuckoo

Linnet

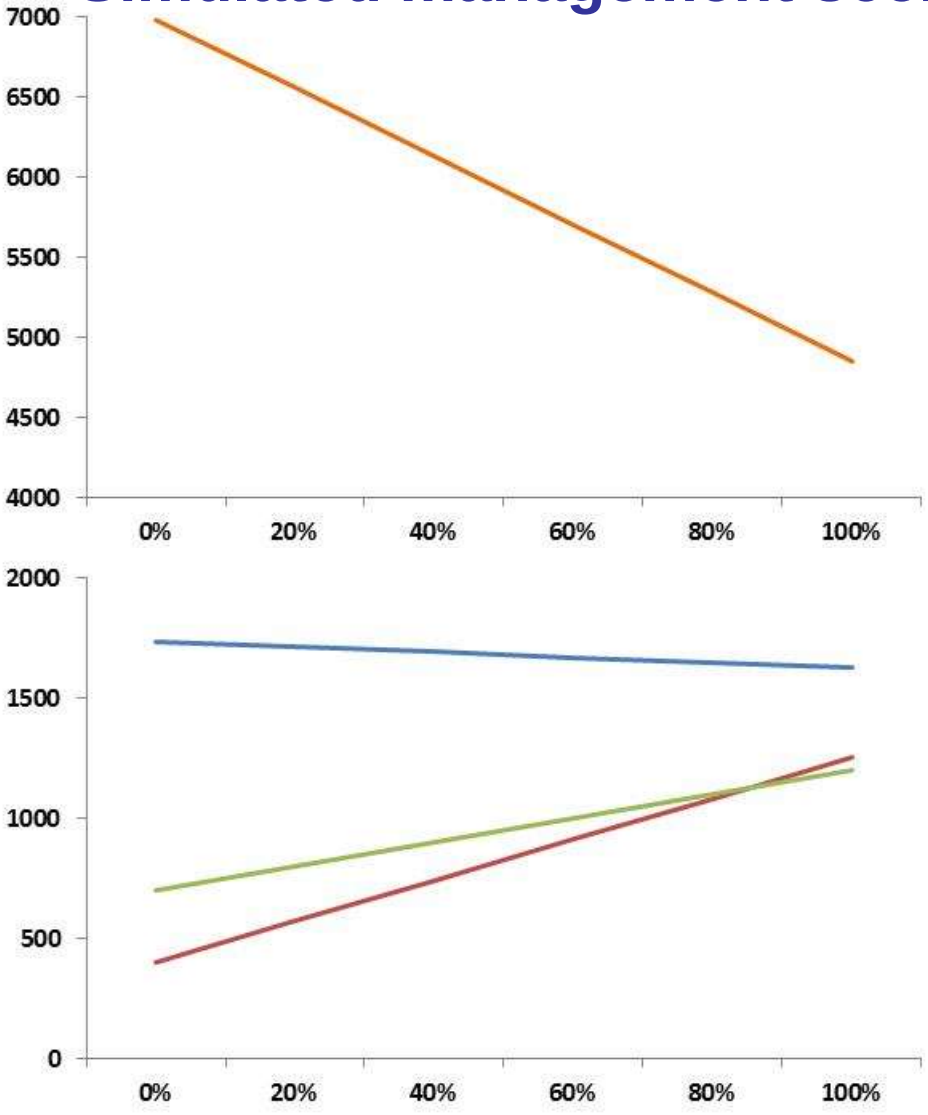
Whitethroat

Young clearfell stands supports twice the density of singing male Willow Warblers than CCF with shrub under-storey



Density estimates derived by Distance sampling

Simulated management scenarios for 50 km² plantation of Sitka spruce



Willow Warbler

Lesser Redpoll

Great Tit

Blackcap

Assumptions:
One-third of CCF has a shrubby understorey;
One-third of Clear-fell rotation is young.

SUMMARY: Sitka spruce in Scotland & Wales

- **Continuous Cover Forestry appears to benefit birds of 'mature forest';**

- **Disadvantages to some 'shrubland birds' of Continuous Cover Forestry could be mediated by harvest and herbivore management that ensures continuity of shrub/regenerating understorey;**

- **For some shrubland birds (e.g. Willow Warbler and Lesser Redpoll), Continuous Cover Forestry may not support densities that are found in young growth stage clear-fell rotations;**

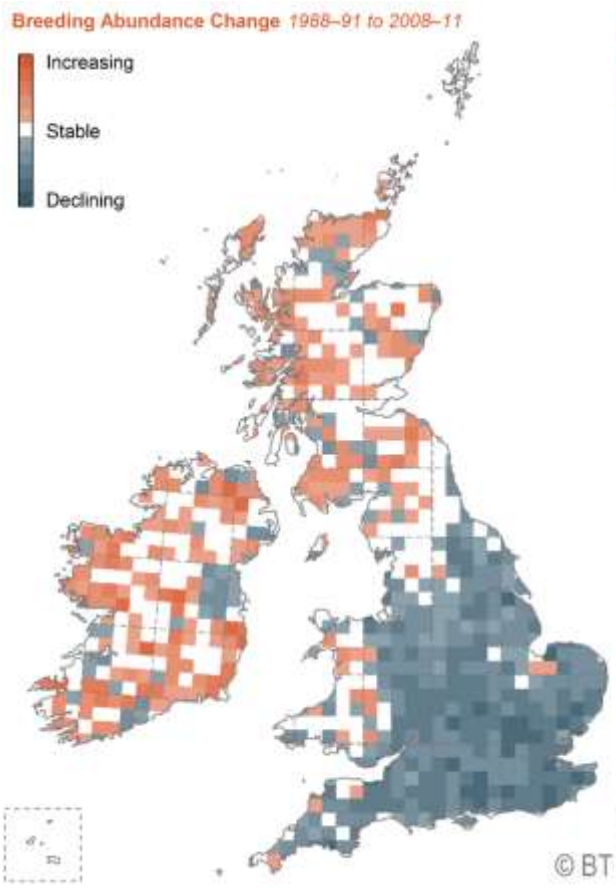
- **Forest management that includes some young growth areas alongside Continuous Cover Forestry could provide a range of conditions for shrub and forest dependent species.**

Calladine, J., Bray, J., Broome, A. & Fuller, R.J. (2015). *For. Ecol. and Man.* 344: 20-29

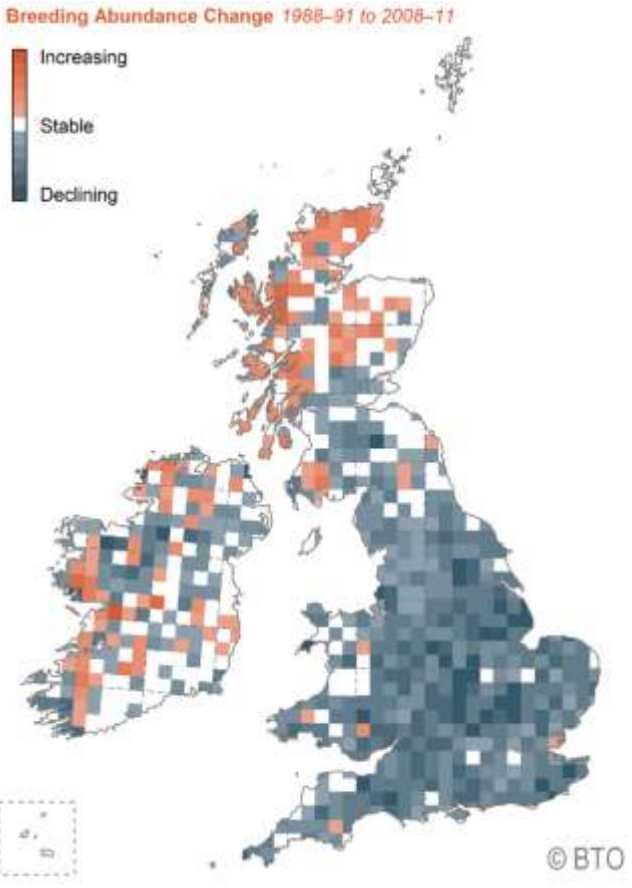
Contrasting changes in abundance 1990 – 2010

Increases in North vs Decreases in South

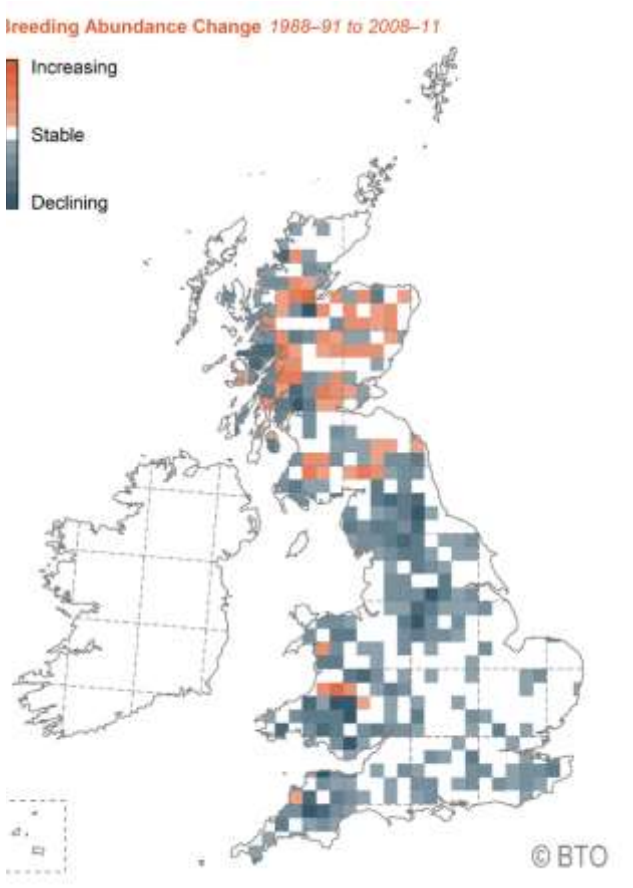
Willow Warbler



Cuckoo



Tree Pipit



Bird Atlas 2007-11









Scots pine forests in Scotland

Most abundant

Within top 10

Numerous

Influence of scrub for birds in neighbouring habitats

More Meadow Pipit and Skylark on moorland

More Blackbird and Song Thrush in plantations

Redistribution of Goldcrest and Willow Warbler

Calladine *et al.* 2013 Bird Study 60: 345-356

Young growth stages as habitats for birds:

Limited by growth (~succession)

- 12 – 20 years for Black Grouse (Pearce-Higgins *et al.* 2007)
- 6 + years for Tree Pipit (Burton 2007)

Limited by extent and connectivity to open habitats

- 200 ha for Black Grouse (Garson & Starling 1990)
- 62 ha for Short-eared Owl (Shaw 1995)
- < 5 ha for Hen Harrier (Wilson *et al.* 2009)

Influenced by land use history

- More shrubland birds in second rotation plantings (Sweeney *et al.* 2010)
- Second rotation plantings less readily used by some open-habitat birds (e.g. Black Grouse, Short-eared Owl, Meadow Pipit, Skylark) but readily colonised by some others (e.g. Nightjar, Woodlark, Hen Harrier)

Hen Harrier

Lesser Grey Shrike

Whinchat

Young growth stages as ecological traps?

Bártol & Lovászi 2000; Wilson *et al*. 2012; Murray *et al.* 2016

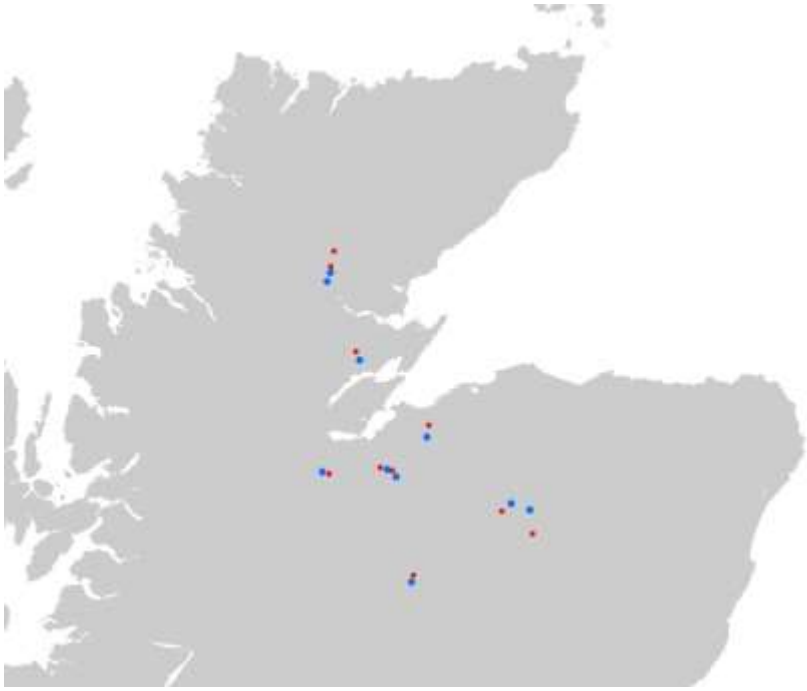
Short rotations

Faster growing species and the temporal occurrence of shrubs

Thinning of closed canopy plantations

Garcia-Del-Rey *et al.* 2010 *Ornis Fennica* 87, 180-188 ; Broome *et al.* 2014 *For. Ecol. Man. 314, 94-103*

Thinning of closed canopy plantations



Thinned plantations – 1400 trees per ha
Unthinned plantations – 2000 trees per ha

No measurable difference in number of bird species or their abundance between treatments

Calladine *et al.* 2009 *Bird Study* 56, 137-141

Spacing

Some suggestions for further research:

- Landscape scale assessment of gains and losses through afforestation;
- Birds in novel crop species;
- How the spatial and temporal frequency of harvesting can influence birds;
- Potential of retaining trees beyond their commercially optimal age;
- Empirical evidence for positive contributions of thinning operations to the delivery of conservation objectives;
- The nature, distribution and ecological role of deadwood within managed plantations, particularly in relation to its use by birds;
- Bird-tree interactions, particularly in the case of seed dispersers;
- The role, influence and effectiveness of policy and incentive instruments such as forest certification schemes in delivering enhanced biodiversity within plantation forests.

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