Woodland Trust Research Briefing

Trees on hen ranges are a haven for wildlife

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Summary

- A valuable woodland edge habitat is created by planting trees on 20% of free range hen range areas.
- It provides food, shelter and nesting for both common and rare species such as song thrush, tree sparrow and bats, and new habitat for a wide range of moths associated with trees and woodland.
- The planted ranges may help to address current concerns for declining woodland bird species, such as willow warbler, by providing valuable additional habitat for them.
- The ranges provide additional habitat to support the expansion of local populations of wildlife. They may also provide some resilience to climate change that appears to be augmenting the northward migration of wildlife species, including those closely associated with woodland habitats.

Introduction and background

Why plant trees for free range hens?

Today's consumers expect food producers to meet high standards of animal welfare, deliver a safe and nutritious product and respect the natural environment. Integrating trees into free range poultry farming helps farmers achieve these standards. Trees on farms can improve animal health and welfare, as well as production – both in the quality and quantity of eggs[1]. This management practice has led to the development of a premium market for woodland eggs – eggs laid by free ranging hens with access to tree cover - and has been shown to improve a farmer's income.

But how can planting trees on hen ranges also deliver benefits for local wildlife? The aim of the research was to assess what wildlife used this treed habitat and how farmers could further enhance its value.

Working with pioneering woodland egg producer David Brass, CEO of The Lakes Free Range Egg Company (LFREC), and Paul Arkle of Cumbrian Farm Environment Partnership (CFEP), a series of annual wildlife surveys were undertaken on 9 woodland egg units in Cumbria from 2016-2019.

(Credit: Jonny Walton/WTML)

Methodology

During 2015, 9 ranges were identified for a series of pilot surveys to monitor the quantity and species of birds and bats using the planted ranges and ground cover.

Table 1 describes the categorisation of the ranges surveyed. All nine are on Cumbrian farms that supply eggs to LFREC.

All of the ranges abide by LFREC's planting standard, where 20% of the range area is planted with 85% native trees.

An enhanced range assessment map was produced for each site recording the location of the hen sheds, range areas and other natural features within the farm. Seven of the sites were improved grassland used for livestock grazing or silage. The remaining two were formerly for arable cropping.

	Description	Age of trees (yrs)	No. of ranges
New	Trees planted within last two years	1-2	3
Intermediate	Trees in early establishment phase	4 - 7	3
Established	Trees fully established	>8	3

Table 1: Description of ranges being assessed

The results of the pilot study indicated the treed ranges were providing wildlife benefits. These results were used to develop an 'enhanced range assessment' programme using the same sites as the pilot. Annual assessments were carried out each spring and summer from 2016-2019, as detailed in Table 2.

Survey	Spring	Early summer	Late summer	Type of survey
Bird	Early breeding	Late breeding	Post-breeding foraging	3 x based on Common Bird Census (CBD)
Bat		Foraging, commuting and social calls		1 x dusk to dawn survey using passive zero crossing recorder
Butterfly		Number and variety of butterflies present		1 transect adapted from UKBMS[2]
Moths		Number and variety of moths present		1 x light trapping between sunset and sunrise using non-lethal moth trap
Ground vegetation		Extent of cover (%) and species and structural diversity		Bespoke ground cover vegetation assessment – developed to take account of variations in cover due to hen foraging and range management
Canopy cover		Growth and development of planted trees		Fixed point photography and site assessment to measure extent of canopy cover (0, 10, 25, 50, 75 and 100%)

Table 2: Annual surveys carried out from 2016-2019 on each of the 9 ranges

Survey constraints:

- Ranges surveyed were categorised into three: new, intermediate and established. Although these broadly reflected the extent of planted tree cover on the respective ranges, there was some overlap in the type of tree cover present.
- The surveys only provide a snapshot of the wildlife species using the range at that time on that date. Ideally a series of surveys would be carried out between March and August with several days between each visit.

Key Findings (Results)

Vegetation cover

- All sites had 100% ground vegetation except areas near bird housing, where it was 0-10%
- Composition was predominantly species-poor, improved grassland comprising only a few grass and herb species
- Management of vegetation resulted in considerable difference in structure. Image 1 shows how mowing between rows creates areas of short vegetation. Image 2 shows redshank (*Persicaria maculosa*) and corn chamomile (*Anthemis arvensis*). These and other species associated with disturbed ground (ruderals) were a common feature of many of the unmown areas on the ranges. These plants were attractive to butterflies and other invertebrates.

Image 1. Range 2 – new category in 2016 (Credit: Paul Arkle)

Image 2. Range 2 - established category in 2018 (Credit: Paul Arkle)

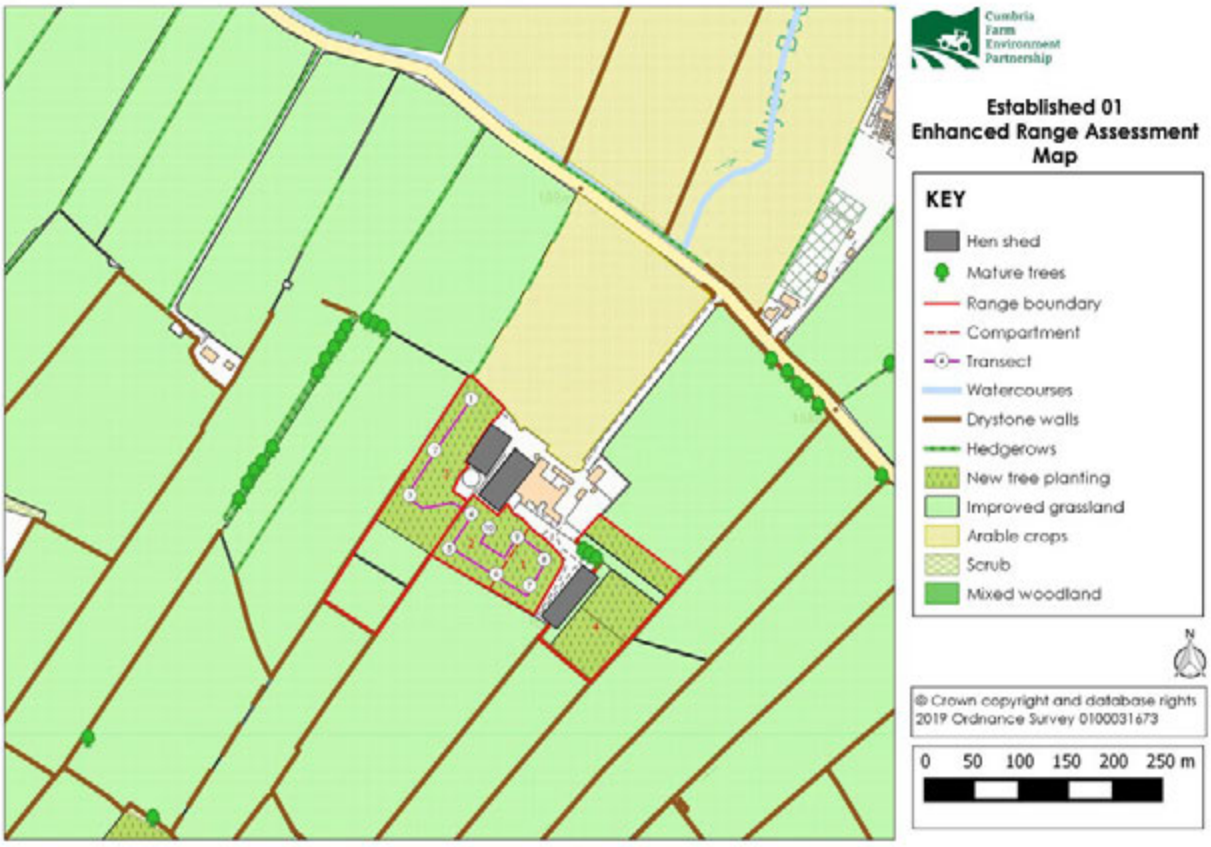
Tree canopy

Changes in canopy cover illustrate how structural diversity changes over time. Initially it increases, then begins to homogenise (integrate) as the trees mature and their canopies coalesce to form a dense layer. This leads to a decline in the extent of woodland edge habitat.

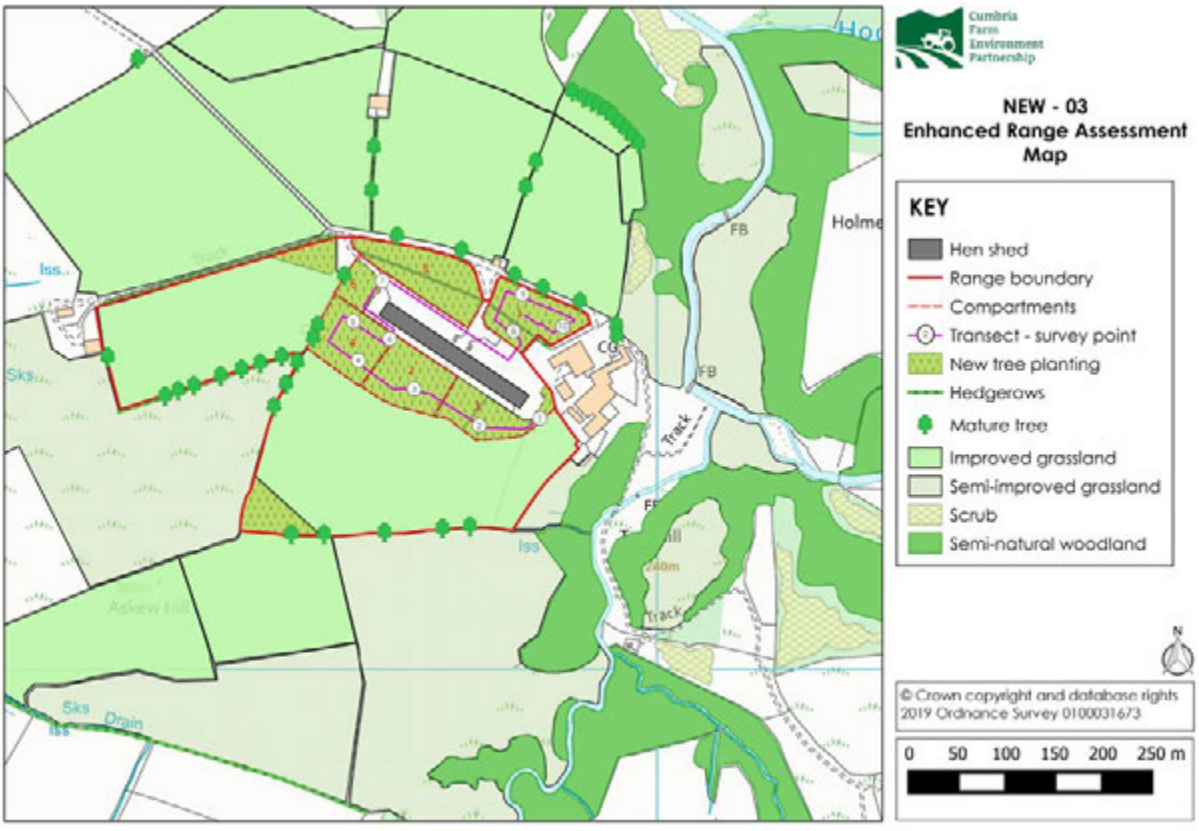
- Canopy cover was most variable in the new sites. Two of the new sites had 50% canopy cover by the end of the project, but one still had only 25% cover at the same stage.
- Intermediate sites went from 50-75% cover over the duration of the survey period
- Established sites went from 75-100% cover over the duration of the survey period
- Structural diversity of this habitat persisted for several years and only began to decline on the ranges when the trees were quite large and their branches merged to form a continuous cover over the ground. This canopy coalescence led to reduced structural diversity of tree cover, heavy shading and suppression of the underlying vegetation. Canopy coalescence within the rows of trees usually occurs at about 7 years after planting but varies depending on the site and tree species planted. Coalescence between the rows takes longer but can occur within 10 years after planting on range sites that were managed intensively in the past. This often manifests on sites where the soil nutrient status is quite high due to past use of inorganic fertilisers and livestock manures on the land.

Wildlife colonisation of ranges

The first range in the established category consistently supported less wildlife than others in the same category. The map assessment for this site showed it had significantly fewer natural features than all other sites. All other sites had woody habitats, ranging from mature hedges, riparian tree cover, scrub or mature woodland adjoining or nearby.



The difference in wildlife was noticeable at the first of the established sites due to the lack of surrounding natural features

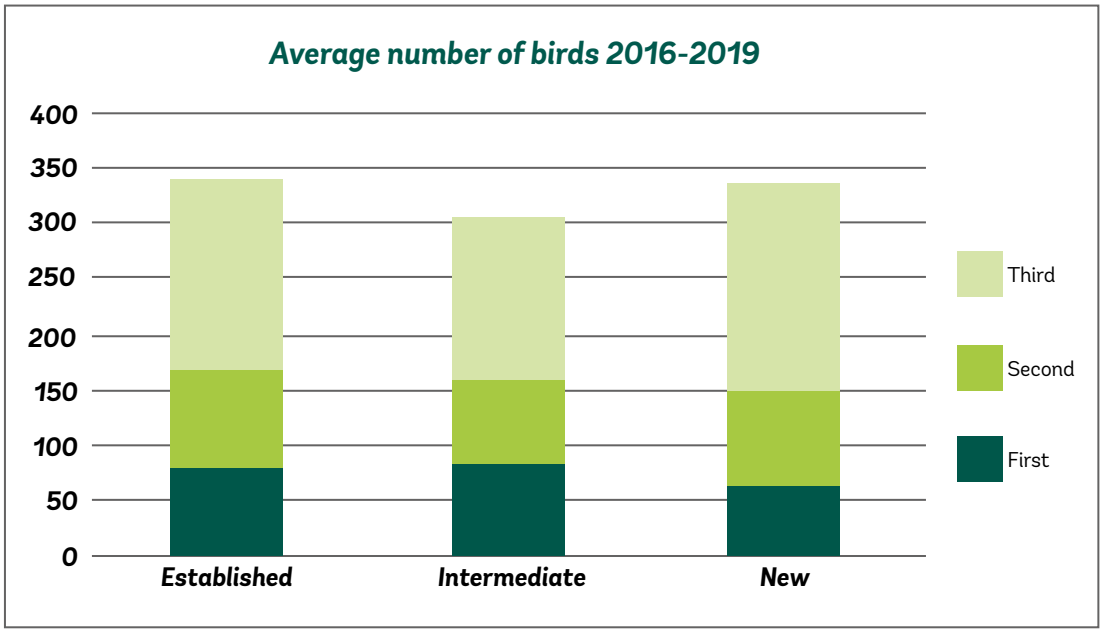


Nearby habitats helped to support wildlife activity on eight of the surveyed sites

Birds

- 59 species were recorded during 2016-2019 across all range types. Twelve are currently included on the Red List of Birds of Conservation Concern, including song thrush, tree sparrow and linnet. A further 11 are currently on the Amber List, such as meadow pipit and bullfinch.
- Three bird surveys were done at each site every year as detailed in Table 2.
- The numbers of breeding pairs on the 'New' ranges generally increased over the four years. On the 'Intermediate' and 'Established' ranges, they peaked in 2017 and then declined.
- Although this pattern was consistent across the sites, the highest total number of breeding pairs, 78, over all of the four years of the project was recorded in the second of the Established range sites. This may be because the new tree cover on this site had established particularly well and adjoined an extensive area of mature, semi-natural woodland where birds were able to colonise from.
- The decline after 2017 may have been due to very dry springs in 2018 and 2019, which may have limited invertebrate food for young birds. 2017 appears to have been a particularly good year for breeding birds by comparison, when numbers were quite high across all of the sites.

As shown in Graph 1 there was considerable variation in bird numbers between the three annual survey periods. Numbers during the first two surveys were similar, at an average of around 80 birds in each survey. The numbers of birds recorded during the third survey of the ranges were substantially higher, with an average of 167 across the three range types. This survey corresponded with the time when juvenile birds are able to leave their nests and may have been foraging on the planted ranges.



Graph 1 showing cumulative average numbers of birds recorded during the three annual surveys on the three range types from 2016-2019

Butterflies

- Fourteen species of butterfly were recorded during the butterfly transect surveys. The majority of these are considered common.
- The exception was the comma butterfly *Polygonia c-album* which mainly breeds and hibernates in open woodland and woodland edges. This species appears to be continuing to spread throughout Cumbria where suitable habitat conditions are present, after first being recorded in the county in the early 1990s. This pattern is similar for small skipper, the range of which has been expanding over the past 15 years after decades of declining numbers.

Comma Polygonia c-album (Credit: Paul Arkle)

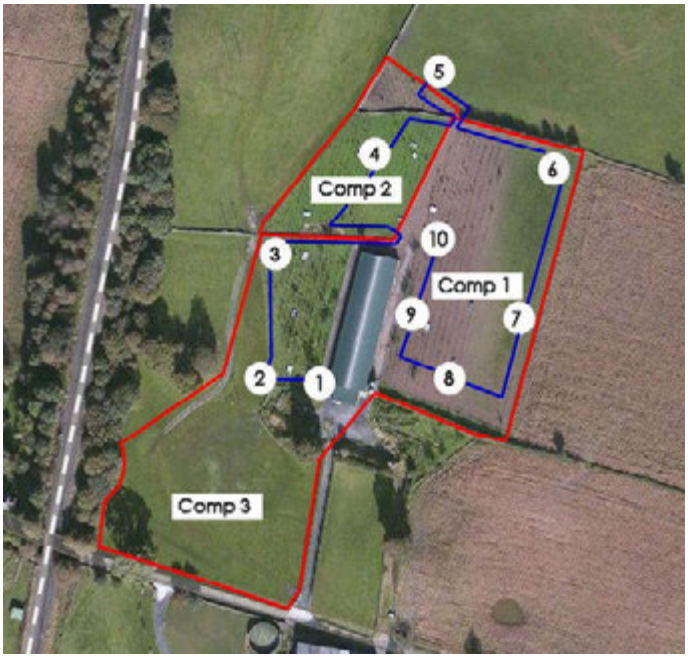
Moths

- 102 species of moth were recorded over the survey period.
- Highest overall numbers of moths were recorded on the established ranges. The average number of moths appears to increase with the age of the planted trees.
- Over a third (36) of these were species closely associated with trees, shrubs and/or woodland habitats. In many cases, the larvae (caterpillars) feed on particular trees or shrubs.

The large emerald moth (Geometra papilionaria), recorded on the first and second of the new ranges, inhabits woodland. Its caterpillar feeds on birch. (Credit: Paul Arkle)

Bats

- Bats were recorded on all nine range sites each year.
- Common and soprano pipistrelle were the most frequently recorded bat species on the planted ranges
- Bat foraging activity was greatest where invertebrate prey was most abundant. This corresponded to the areas with extensive tree cover.



Aerial photograph of the second 'intermediate' site showing survey compartments (red line) and route / stop points (blue lines, numbered circles) used during bat survey

Conclusions

The combination of planted trees and structurally diverse ground cover vegetation creates areas of a woodland edge type habitat on the free range hen ranges.

On the ranges, this appears to benefit a range of wildlife species including birds, bats and their prey and particularly moths.

The benefits of the range tree planting schemes for birds are greatest in late summer. The planting schemes provide valuable foraging sites for birds prior to the autumn migration or to build up energy reserves of overwintering species. As there are currently more woodland birds on the endangered list than of any other habitat, the planted ranges may be important in helping to conserve threatened bird species. This habitat may become increasingly important for populations of bird species that are shifting northwards in response to climate change, such as blackcap.

As the planting grows from new to intermediate, the number of bird species it supports gradually increases then stabilises. After the ranges reach their peak carrying capacity – the point where they support the widest range of bird species - the tree canopies coalesce to become more homogeneous and bird numbers decline.

Range tree planting schemes provide little benefit for butterflies. This is largely due to a lack of a significant food supply as a result of the hens' foraging and scratching activities. However, the combination of open ground and shelter from the trees provides a habitat that may support butterflies driven northward as result of climate change, such as small skipper (*Thymelicus sylvestris*) and speckled wood (*Pararge aegeria*).

Open tree cover coupled with relatively diverse ground cover vegetation on the ranges appeared to benefit a large number of moths and a wide range of species, including several that are threatened such as grey dagger, sallow and ghost moth. These benefits may decline as the trees become more established, as the closing canopies and consequent loss of areas of dappled light will reduce the habitat features preferred by a wide range of moths.

Bat species benefit from tree planting on ranges, particularly where open, continuous rows of tree cover are maintained. These rows attract invertebrates for foraging and provide commuting routes.

As had been presumed, colonisation of trees planted on isolated ranges was slower than on ranges that are close to existing, mature habitats.

Practical applications

Range planting should include a variety of trees of predominantly local native species. Native species in this research included oak, bird cherry, birch, hazel and goat willow. Most were found to attract various invertebrates and birds on the ranges, for example birch is a good food source for foraging birds, while goat willow and hazel provide an early pollen and nectar supply. This diversity will provide resilience against pests and diseases as well as habitat for local wildlife.

Planting schemes should be designed using rows of trees at 4-5 metre spacings to maximise the potential extent of 'woodland edge' habitat.

Selective thinning should be undertaken where canopy coalescence between the planted trees is extensive.

Provision of nesting and roosting boxes within the planted trees could overcome the absence of suitable breeding sites on the ranges.

The rate of colonisation of isolated ranges could be increased by creating additional planted areas on outlying areas to create stepping stones for wildlife species, such as hedgerows or shelter belts.

Complementing tree planting on ranges with additional planting on other areas of the farm will provide a wide range of other environmental benefits, such as a source of food, water management and carbon sequestration. This is expected to be a key component of the new environmental land management schemes.

More research

Further studies could provide more robust information on the biodiversity value of range planting schemes to reflect different landscapes in the UK.

Biodiversity evidence from this research is to be used in a new Catchment Sensitive Farming project 'Ammonia reduction from trees (ART)'. The aim is to provide evidence on how tree planting can reduce ammonia emissions from farming, so that farmers can be given better advice on ammonia mitigation. It builds on earlier research that showed in 2016, agriculture accounted for 88% of all UK ammonia emissions, with the largest contributor being livestock[3]. Modelling of ammonia capture by tree belts has been shown to range from 15-25% for housing emissions, 10-20% for slurry lagoons and up 60% recapture for livestock ranging under the trees[4].

Plant trees on your farm

The Woodland Trust with Sainsbury's and the PUR project supports farmers throughout the UK with tree planting, including many egg producers. For expert advice on planting the right trees in the right place to achieve your goals, visit woodlandtrust.org.uk/largescale or call 0330 333 5303. The Trust can provide generous funding and in some cases help with planting. No obligation advice and support is available even if you decide not to plant.

(Credit: Paul Arkle)

References

1. Laying hens go undercover to improve production A. Bright, A.D. Joret, Short Communication Veterinary Record
2. UKBMS UK Butterfly Monitoring Scheme
3. DEFRA (2018). Code of Good Agricultural Practice (COGAP) for Reducing Ammonia Emissions
4. Bealey, W.J.; Dore, A.J.; Dragosits, U.; Reis, S.; Reay, D.S.; Sutton, M.A.. 2016 The potential for tree planting strategies to reduce local and regional ecosystem impacts of agricultural ammonia emissions. Journal of Environmental Management, 165. 106-116. 10.1016/j.jenvman.2015.09.012

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