

Influences on breeding numbers of migratory warblers

Chiffchaff © Peter Thompson

BACKGROUND

Long-term monitoring of bird numbers at the Allerton Project research and demonstration farm in Leicestershire over the past three decades provide a valuable insight into population trends. Changes in breeding numbers of warblers have differed considerably between species. While on-farm management can benefit these and other species, for migratory warblers, conditions in their wintering areas, or on migration, can also have an influence.

Two ecologically similar migratory warblers that shed light on the complexity of these international impacts are chiffchaff (*Phylloscopus collybita*) and willow warbler (*P. trochilus*). Despite occupying similar ecological niches, their population trends at the Allerton Project have been very different. Chiffchaff (shown above) which has increased in abundance fifteen-fold over the thirty years of monitoring has a more northerly wintering range, with increasing numbers of birds remaining in the UK as winters have become milder

over this period. Willow warblers winter further south in sub-Saharan Africa. Their numbers at Loddington have declined substantially, in line with the same population trend for the rest of southern England. This is thought to be due to deteriorating conditions associated with climate change and land use pressure in their sub-Saharan wintering area.

Blackcap *Sylvia atricapilla* and garden warbler *S. borin* are also closely related species which have shown very different population trends. Blackcaps have been wintering further north and show an increase in numbers while garden warblers winter in sub-Saharan Africa and have been declining. A century ago, garden warblers out-numbered blackcaps, but now the situation is very much the reverse.





FIGURE 1

Blackcap (above) and garden warbler (below) breeding abundance at Loddington based on annual transect data.



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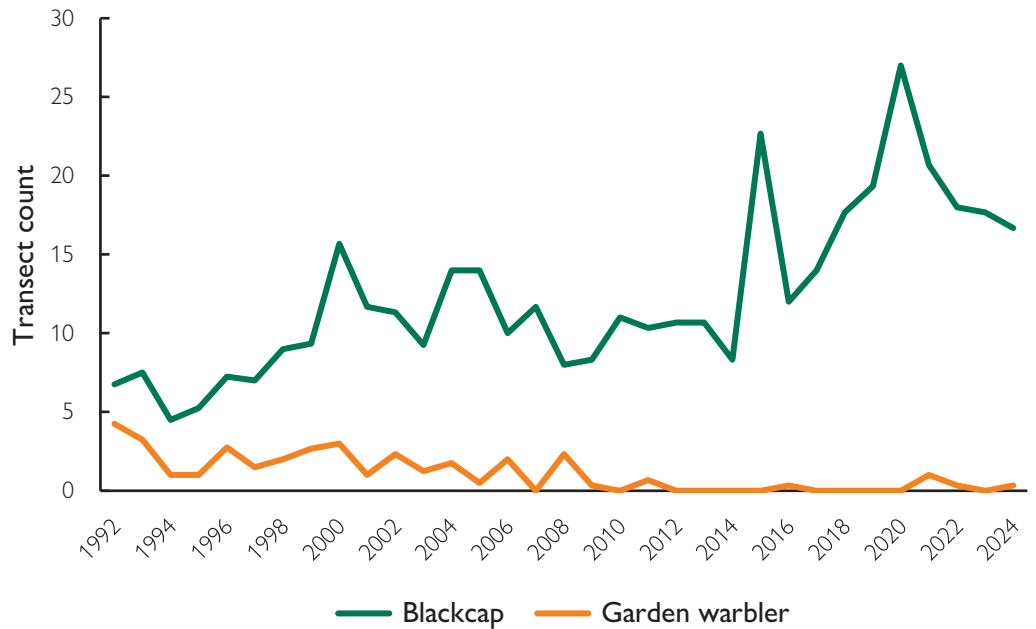
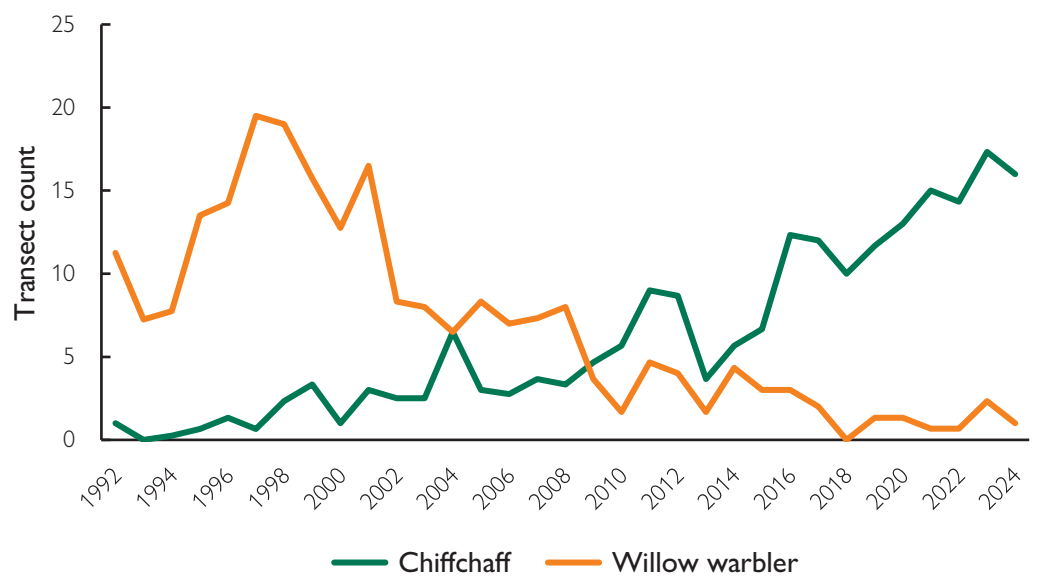


FIGURE 2

Chiffchaff and willow warbler (below) breeding abundance at Loddington based on annual transect data.



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Whitethroat *Sylvia communis* is the warbler species that was studied most intensively at The Allerton Project and experienced the highest nest survival rates of the species studied, even in the presence of high predator numbers¹. Breeding numbers in the UK reflect conditions such as drought during the winter and northerly winds and dust storms in the spring. As with other warblers, the northwards migration in the spring requires accumulation of fat towards the end of the dry season on the southern edge of the Sahara, prior to crossing to northern Africa when wind conditions are favourable.

Fuelling migration

Laying down fat as fuel for migration is achieved by increasing fruit consumption. For example, the berries of *Salvadora persica* which grows in floodplain areas on the southern edge of the Sahara contribute to pre-migratory fattening of whitethroats and other *Sylvia* warblers². Larger berries (>6mm diam.) are selected preferentially.

In one year, very substantial defoliation of *Salvadora* bushes by desert locusts *Schistocerca gregaria* enabled a comparison to be made with the previous year. Inflorescences had partially regrown by the time of the whitethroat migration but the abundance of inflorescences was less than 20% of that in the previous year, and berries were significantly smaller³. Whereas 49% of the whitethroats present had high fat scores in the year with high berry abundance, after the locusts had been through, only 14% did so, reducing the likelihood of successful crossing of the Sahara on the northward migration.



Berries of *Salvadora persica* in the floodplain of the River Senegal on the southern edge of the Sahara. © Chris Stoate

Although, in this case, reduced berry abundance was the result of defoliation by locusts, drought, excessive browsing by cattle, or clearance of bushes for agricultural purposes are all additional pressures that reduce habitat and food availability to migratory birds.

Woodland as a wintering habitat

Elsewhere in West Africa, livestock browsing and clearance of trees and shrubs for cropping are also threats to birds including migratory species that over-winter in the region. *Acacia* species such as *Faidherbia albida* and *Acacia nilotica* support potential invertebrate food for warblers and are particularly important tree species for migratory birds⁴. *F. albida* is unusual in that it is leafless for part of the year, coming into leaf in December, but supports an abundance of invertebrate food for birds.



Acacia woodland on the northern Gambia/Senegal border. © Chris Stoate

A comparison of the use of grazed and ungrazed *Acacia* woodland by wintering olivaceous warblers *Hippolais pallida*, in November and February highlights the ecological implications of livestock in savanna woodland⁵. 65% of trees in the ungrazed area supported climbing plants and olivaceous warbler density in November was significantly correlated with the canopy area of *Acacia* trees with climbers, but not with total canopy area. This is explained by the fact that potential invertebrate food for the warblers was significantly more abundant in trees with climbers than in those without.



Guiera senegalensis bushes and scattered trees on farmland on the northern Gambia/Senegal border. © Chris Stoate



Guiera senegalensis on farmland on the northern Gambia/Senegal border. © Chris Stoate



Zebu cattle browse *Piliostigma* shrubs on farmland in northern Nigeria. © Chris Stoate

The positive effect of climbing plants on invertebrates and birds was not apparent in February when the *Acacia* trees were in leaf, and although invertebrate numbers were higher in February, there was no longer a difference between trees with and without climbers. Relatively undisturbed woodland that supports climbing plants therefore increases the availability of food in the early part of the wintering period, potentially influencing winter survival.

Farmland as a wintering habitat

Where trees have been cleared for crop production, few trees remain and the woody vegetation is represented mainly by shrubs. On agricultural land on the northern Gambia/Senegal border, although some trees were present at low densities, no whitethroats were recorded using them, but whitethroat density was correlated with overall shrub cover, and with cover of the most common species, *Guiera senegalensis* at 1.02/ha⁶. *G. senegalensis* was also the shrub species supporting highest numbers of potential bird food invertebrates, most notably caterpillars and spiders. The whitethroat density present in this study area was similar to that of 1.1/ha in northern Nigeria where *Piliostigma* shrub species were associated with high invertebrate abundance⁴.

Even where trees have been cleared, shrubs such as these perform an important ecological role in supporting some of the migratory birds that breed in northern Europe. The management of those shrubs and trees will depend largely on their perceived value to farmers for agricultural uses as well as medicine, fuel, timber and cultural uses or values^{6,7}. Major additional influences include climate change impacts and the pressure on land that results from large-scale production of crops for urban and global markets.

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