MERSEYSIDE RINGING GROUP

Annual Report 2016

Differences in the timing of breeding Blue Tits and Great Tits between five local nest box sites. *A.J. Garner, P. Coffey, R. Harris, M.R. Miles and D. Norman*

MERSEYSIDE RINGING GROUP

Registered Charity No 700044

www.merseysiderg.org.uk

Report Editor: Peter Coffey

Cover: a White-crowned Sparrow *Zonotrichia leucophrys gambelii*, caught and ringed at Woolston on 30 April 2016. It has been accepted by British Birds Rarities Committee as belonging to the subspecies *gambelii*, a new subspecies for Britain, and is only the second White-crowned Sparrow to be ringed in the UK. (Photo: D Bowman)

Acknowledgements

Merseyside Ringing Group receives vital co-operation from many landowners, farmers and gamekeepers in Merseyside, Cheshire and north Wales. They permit group members to work on their property and without their generous help, much of the work of the group would be impossible. The Group also receives considerable support from local authority countryside and ranger teams, local Wildlife Trusts and private individuals. Thank you all for your support.

Maps showing the distribution of controls and recoveries have been produced using DMAP.

Merseyside Ringing Group operate under the auspices of the BTO Ringing Scheme which is funded by a partnership of the British Trust for Ornithology, the Joint Nature Conservation Committee (on behalf of: Natural England, Natural Resources Wales, Scottish Natural Heritage and the Department of the Environment Northern Ireland), The National Parks and Wildlife Service (Ireland) and the ringers themselves. Data from the BTO Ringing Scheme has been used in several articles in this report and we acknowledge the use of this valuable resource.

Date of publication: 19 October 2017

CONTENTS

DIFFERENCES IN THE TIMING OF BREEDING BLUE TITS AND GREAT TITS BETWEEN FIVE LOCAL NESTBOX SITES

A.J. Garner, P. Coffey, R. Harris, M.R. Miles and D. Norman

Summary

Five sites in Cheshire and north Wales with nest boxes occupied by Blue Tits and Great Tits, studied over a 13-year period (2003-15), showed consistent differences between the sites in the timing of breeding of the two species. They all vary more or less in parallel – early years are early years and late years are late years; and the sites are usually in the same order – an 'early site' is an early site and a 'late site' is a late site. Reasons for these differences have not been analysed but they are presumably related to the local habitats and emergence of their preferred caterpillar diet with which to feed their chicks. We found no effect of latitude or altitude.

Introduction

Blue Tits are thought to synchronise their breeding to coincide with the maximum availability of suitable food for their chicks. In broadleaved woodland, the main prey is defoliating caterpillars in the tree canopy, especially Winter Moth. The same applies to Great Tits, although to a lesser extent as they have a more catholic diet. For both species, the adult birds are able to use a subtle combination of clues such as tree bud-burst in their local environment, and can vary the timing of their breeding by three weeks or more from one season to another (Perrins 1979).

As well as the year-to-year differences, the timing is reported to vary with latitude (e.g. Fargallo 2004; Phillimore *et al* 2016) and altitude (e.g. Wilkin *et al* 2007). However, within the relatively small geographical area covered by Merseyside Ringing Group, we knew, through informal discussions, that some of our nest box sites tended to be earlier or later than others, apparently consistently. This paper presents and analyses the data from five of our nest box sites, within 60km of each other, over a 13-year period (2003-15) to test the hypotheses for variation in timing of breeding of Blue Tits and Great Tits.

Methods and sites

The main characteristics of our five study sites are summarised in the table:

Site	Grid ref-erence	Altitude (mAOD)	Woodland type	Years of data	Number of occupied boxes (mean; range) Blue Tit	Great Tit
Prion	SJ0661	80-205	Mixed deciduous, predominantly Oak	2003-15	21; 8-37	14; 7-21
Glyn Arthur	SJ1365	150-305	Mixed deciduous: Sycamore, Ash, Oak, Birch	2007-15	19; 4-37	15;10-33
Delamere Forest	SJ5271	65-80	Oak/ Beech/ Sweet Chestnut/ Birch, Corsican Pine/ Scots Pine	2003-15	12; 2-19	7; 3-16
Northwich Woodlands	SJ6575	15-30	Mixed deciduous, predominantly Turkey Oak, Birch, Lime and Horse Chestnut, plus Corsican Pine	2003-08	25;16-35	40;35-46
Woolston Eyes	SJ6588	10-15	Oak/ Birch/ mixed-aged coppiced Willow	2010-15	6; 3-9	12; 7-14

Bueno-Enciso *et al.* (2016) showed that various aspects of the breeding performance of Blue Tits and Great Tits vary between different types of nest box material; this is not a complicating factor for our sites as four of them had exclusively wooden boxes. Only in the Northwich

Woodlands were there some woodcrete boxes. The orientation and height of the boxes varied between the sites and some were changed over the years.

All occupied nest boxes were visited and data submitted to the BTO's Nest Records Scheme. The main focus, at least for some members, is ringing the pulli and not all nests were seen with eggs. So for this analysis of the timing of breeding we use hatching dates rather than laying dates. As argued by Tomás (2015), this is perhaps ecologically more sensible: after laying, to some extent birds can adjust the start of incubation and the length of the incubation period to fine-tune their response to environmental variables. In our case it is also practically sensible as not all boxes were seen with eggs. This does mean that clutches that failed before hatching are not included in this analysis but we have no reason to expect that this biases our comparison between sites.

The hatching date for each nest was calculated according to the state of growth of the chicks:

Chick code		Age
NA/ BL	Naked/ blind	3 days
EY	Eyes open	5 days
IP	Feathers in pin	6 days
FS	Feathers small	9 days
FM	Feathers medium	12 days

Both species, in all years of our study, were single-brooded.

Two of the sites, Delamere Forest and Prion, were studied in every year of our 13-year study period (2003-15), with at least one, and often two, of the other sites contributing in other years so that our data cover three or four sites in every year.

Results

It is not self-evident what measure to take of the average date each year. Some of the date distributions appear to be skewed. As a test of this, we have compared the median and the mean dates, using all our data for every site and year.

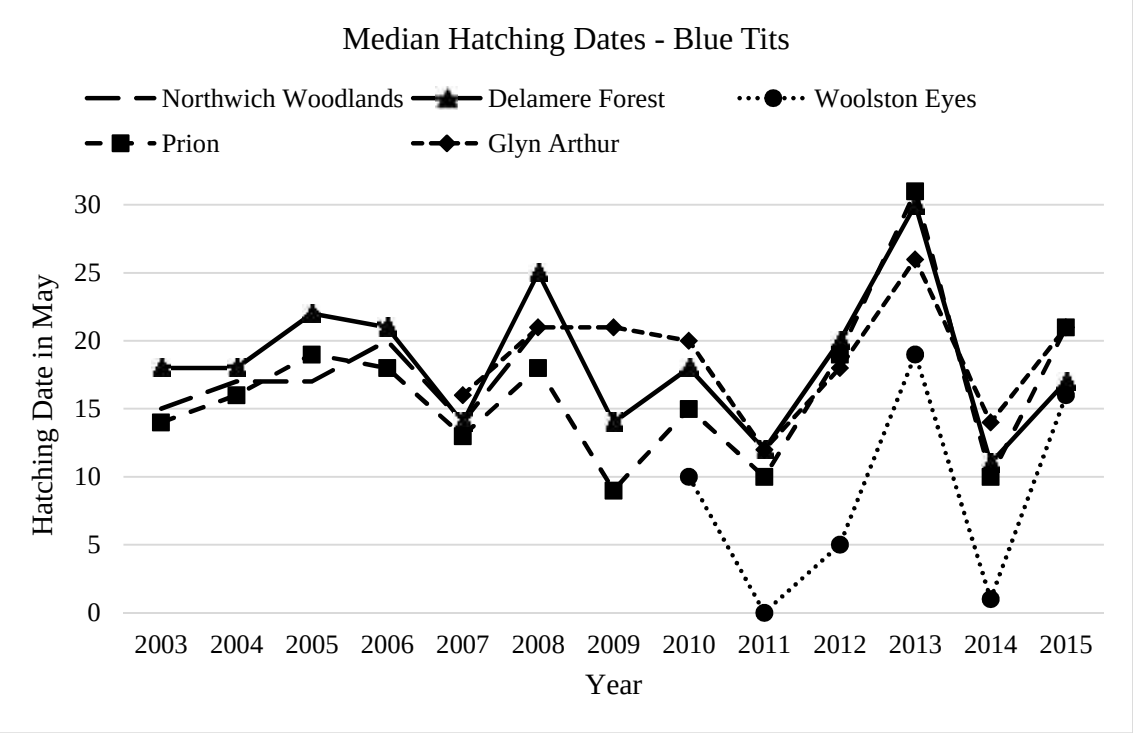
Mean compared to median (days)	+3	+2	+1	0	-1	-2	-3	-4
Blue Tit		3	14	13	14	2	1	
Great Tit	1	3	11	17	11	2	1	1

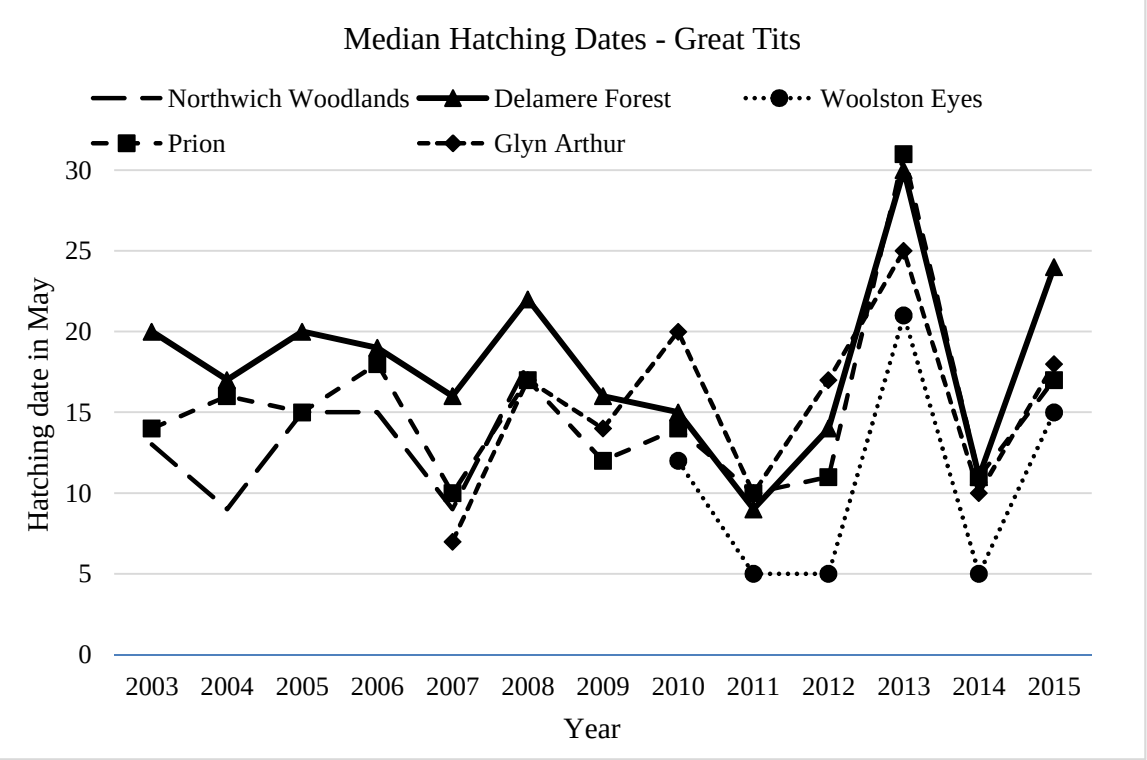
These calculations show that, for Blue Tit, the mean and median date were within one day of each other for 41 out of 47 (87%) of our site-year comparisons, and the spread was uniform. For Great Tit, the mean and median date were within one day of each other for 39 out of 47 (83%) of our site-year comparisons, and the spread was uniform. These data indicate that there is no systematic skew to early or late dates, so we are justified in using the median as a measure of the dates at each site and year.

These data are shown in the two plots below. There is some 'noise' but, in general, most of our sites fluctuate in parallel. For Blue Tit, 2007, 2011 and 2014 were 'early' years across all sites, with 2008 and 2013 as 'late' years. The Great Tit data show more variation, but again those five years stand out.

The difference between sites for the earliest and latest median hatching dates in each year over the 13 years varied from 2 to 15 days for Blue Tit, with a mean of 7.9 days; for Great Tit, the figures are 4 to 12 days, with a mean of 7.1.

Looking at our sites, Delamere Forest was the latest in 8 of the 13 years for Blue Tit, and 9 out of 13 for Great Tit. For Blue Tit in 2003-09, Prion was the earliest in six of the seven years. For the last six years of our study period, when data from Woolston were available, this was consistently the earliest site for both species.





Discussion

Most previous studies have found that Blue Tits and Great Tits nesting farther north lay later, with the corollary that birds in sites close to each other would have similar timing. Similarly, birds at higher altitudes tend to nest later than at lower-lying sites. Our data confound both of these expectations. All of our sites are at similar latitudes (within 0°14' latitude) yet their breeding varies between sites by a mean of 7.9 days for Blue Tits and 7.1 days for Great Tits. Our two sites at higher altitudes (Prion and Glyn Arthur), up to 300m in the Welsh hills, are not noticeably later than the other three lower-lying sites in Cheshire; there is no obvious effect of altitude.

Fargallo (2004) amassed data from the literature covering 87 studies of Blue Tits from North Africa to Scandinavia, reporting that laying date was later in evergreen than in deciduous habitats, was positively correlated with altitude and showed a quadratic relationship with latitude. The data covered various dates from 1947 to 1995 and thus might have included varying, but unknown, effects of climate change.

Within Britain, Phillimore *et al* (2016) recently used the BTO's Nest Record data to analyse the breeding of four species including Blue Tit and Great Tit, reporting that they showed significant geographic trends with first egg date delayed as latitude increases. They found that first egg dates are earliest in the southeast and there is a significant interaction between latitude and longitude, such that the latitudinal gradient in first egg date is steeper in the east than the west of Britain. This could be explained by the effect of altitude, not mentioned in their paper, as the west of Britain tends to be higher than the east.

Perhaps the closest published example to our findings is that of Blondel *et al* (1999). They reported that several populations of Blue Tits in the Mediterranean region, nesting at similar latitudes and altitudes, differ in timing of breeding by up to one month. The authors attributed this to local habitat differences, particularly in the spring development of foliage and the emergence of leaf-eating caterpillars. We have not recorded these features but expect that similar effects will explain our data.

Acknowledgements
We thank the landowners for access to the sites and other members of MRG who helped with nest-visiting and ringing.

References

Blondel, J., Dias, P.C., Perret, P., Maistre, M. & Lambrechts, M.M. (1999) Selection-based biodiversity at a small spatial scale in a low-dispersing insular bird. *Science*, 285, 1399–1402.

Bueno-Enciso, J., Ferrer, E.S., Barrientos, R. & Sanz, J.J. 2016. Effect of nest box type on the breeding performance of two secondary hole-nesting passerines. *Journal of Ornithology* 157: 759–772.

Fargallo, J.A.F. (2004) Latitudinal trends of reproductive traits in the blue tit *parus caeruleus*. *Ardeola* 51: 177-190.

Perrins, C.M. (1979) British Tits. Collins New Naturalist, London.

Phillimore, A.B., Leech, D.I., Pearce-Higgins, J.W. & Hadfield, J.D. (2016) Passerines may be sufficiently plastic to track temperature-mediated shifts in optimum lay date. *Global Change Biology* (2016) 22: 3259–3272. doi: 10.1111/gcb.13302.

Tomás, G. 2015. Hatching date vs laying date: what should we look at to study avian optimal timing of reproduction? *Journal of Avian Biology* 46: 107–112.

Wilkin, T.A., Perrins, C.M. & Sheldon, B.C. (2007) The use of GIS in estimating spatial variation in habitat quality: a case study of lay-date in the Great Tit *Parus major*. Ibis 149 (Suppl. 2): 110–118.