Quakers Coppice Nest Box Report 1985 - 2012

Ordnance Survey Map of 1882

compiled by Bill Fox & John Thompson

Contents

August 2012

In 2009 we took over the duties of surveying, recording and reporting the nest boxes in Quakers Coppice from Colin Lythgoe and Bryan Perkins, but during this short period, we have reached 'a milestone': - that is, **25 years of data**.

We feel that there is enough data to put together this report which is a combination of: -

- the report submitted each year for inclusion in the Newsletter distributed at the beginning of each season to SECOS members
- the seven page handout reporting the findings of the 2011 season

This document also includes the analysis of data received from the British Trust for Ornithology (BTO).

We are extremely grateful for the BTO for supplying the data and we would also like to acknowledge the following:-

- Colin Lythgoe & Bryan Perkins — for the sterling work since 1985
- David Cookson of Cheshire Swan Ringing Group for providing the weather data
- the SECOS Committee for supporting us

The views expressed and any conclusions drawn are not necessarily those of any society, organisation or committee mentioned in this paper.

Bill Fox & John Thompson

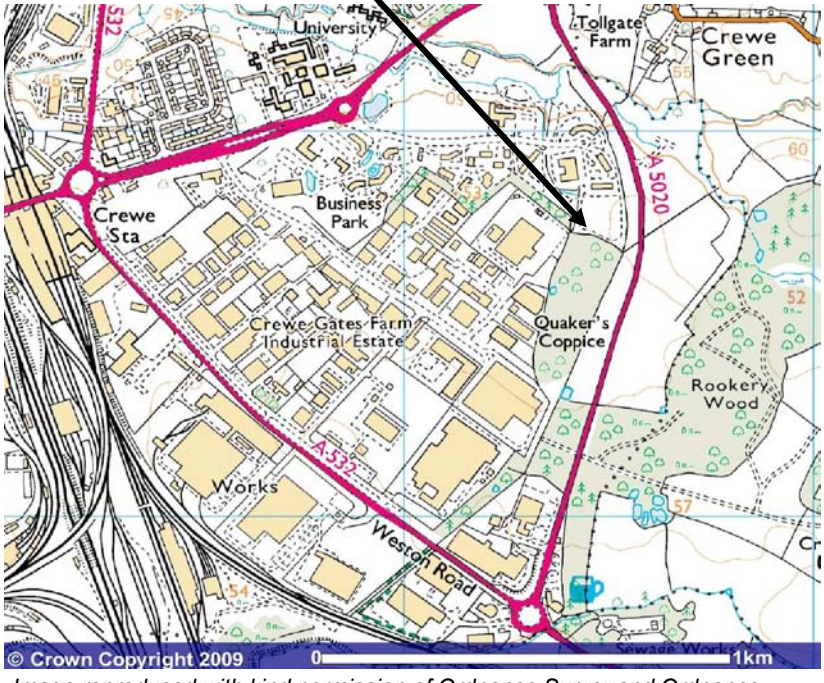
Some background about Quaker's Coppice Nature Reserve

For those of you new to the Society and / or reading our report for the first time, here's some background about the Nature Reserve we have been able to track down.

It is described as: -

> " *5.4 hectares of deciduous woodland with ponds*".
>
> " *.. owned by the local authority & managed by Cheshire Wildlife Trust since May 1986. The woodland extends to approximately 12 acres and stands on heavy clay. The signs are that the wood consists of secondary woodland on an ancient woodland site."*

p.s. – site appears on the Tithe Maps of 1836–51 (Crewe Library) in the same 'shape' as today. The woods are best accessed from the path leading from Mallard Close, off Electra Way.



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The following is a section of a report written by Colin Lythgoe in December 2008 to staff managing the reserve …

> "Nest boxes were first provided at Quakers Coppice in 1985 by Cheshire Wildlife Trust, who managed the area for the owners, Crewe and Nantwich Borough Council. They were numbered 1 to 16. Additional small hole boxes were provided by Colin Lythgoe in 1988 and 1991.
> Several large hole boxes specifically for Stock Doves were provided in 1991. These were monitored in detail from April to September each year from 1991 to 2001. Juveniles were ringed in the nest each year but there were no recoveries. Nest box use has been monitored since 1985 by Colin Lythgoe and Bryan Perkins.
> When one considers the heavy usage of Quakers Coppice by dog walkers and the subsequent limited ground vegetation, the following extract from a leaflet produced by Cheshire Wildlife Trust in 1985 is interesting. "The reserve is closed during the main nesting season March to June inclusive. Damage and disturbance to birds and other wildlife is minimised at other times of the year if visitors would please keep to the paths. Please note that dogs are not allowed on the reserve."
>
> There are a number of obvious changes that have occurred for reasons not known:
>
> - Since 2004 the number of pairs of Blue Tits increased significantly.
> - Since 2001 the number of pairs of Great Tits increased very significantly.
> - Since 2003 the productivity of both species has decreased. The changing weather patterns affecting the availability of food for young will have definitely had some effect. Also the final outcome of fledged young was not monitored quite so closely before that year."

When Colin first visited the area in the early 1980s there were no paths, ground vegetation was mainly dense brambles and it was difficult to walk in the wood! Those of you who have visited the reserve in 2009 will have seen the creation of a grit path, numerous footbridges and a pond-dipping platform. Much of the new path is on a different route to that already trodden. The consequence of this was there was little or no ground vegetation to be seen during the breeding season. Sufficient live food for the chicks must have been extremely difficult to come across for the adults. The site is used heavily by dog walkers, and also by pedestrians and cyclists, so the vegetation and wildlife suffers much disturbance. If the wildlife, particularly ground nesting birds and small mammals, are to be encouraged to use the reserve I feel there needs to be additional 'protection'. Perhaps the middle could be fenced off to allow the ground vegetation to regenerate – similar to that in operation on Wigg Island.

The last page of this section shows in table form the nest box breeding productivity. Not shown in the table is the box number used by a species, its height above the ground, its orientation or the species of tree it's on. For those considering erecting a small hole nest box in their garden, below are some observations we have drawn from the data - *bearing in mind it is not a 'controlled' study*.

- All are between 4 & 6 metres off the ground
- 60% are on Oak, 20% on Hornbeam, the rest either on Alder, Horse or Sweet Chestnut
- orientation is evenly spread from East through North to West
- of the 5 boxes used by the same species **each year** since 2003,
    - Great Tit prefer Oak or Alder (exclusively)
    - while Blue Tit only used Oak

Further analysis of nest box positioning is covered on pages 21 & 22.

Nest Box Breeding Results – Summary for 2012

The tables below are a summary of the data compiled over the last five years for comparison …

Blue Tit

Year	Nests	Eggs	Hatched	Fledges	Productivity (i.e. fledges ÷ nests)
2012	12	115	95	74	6.2
2011	15	131	110	73	4.9
2010	15	149	135	83	5.5
2009	10	111	94	59	5.9
2008	10	90	76	8	0.8

average (since '85) 6.6

Great Tit

Year	Nests	Eggs	Hatched	Fledges	Productivity (i.e. fledges ÷ nests)
2012	8	51	45	28	3.5
2011	5	40	35	21	4.2
2010	4	27	25	14	3.5
2009	7	50	45	38	5.4
2008	7	45	32	12	1.7

average (since '85) 5.1

Stock Dove

Year	Nests	Eggs	Hatched	Fledges	Productivity (i.e. fledges ÷ nests)
2012	5	13	5	4	0.8
2011	7	16	14	8	1.1
2010	9	19	10	7	0.8

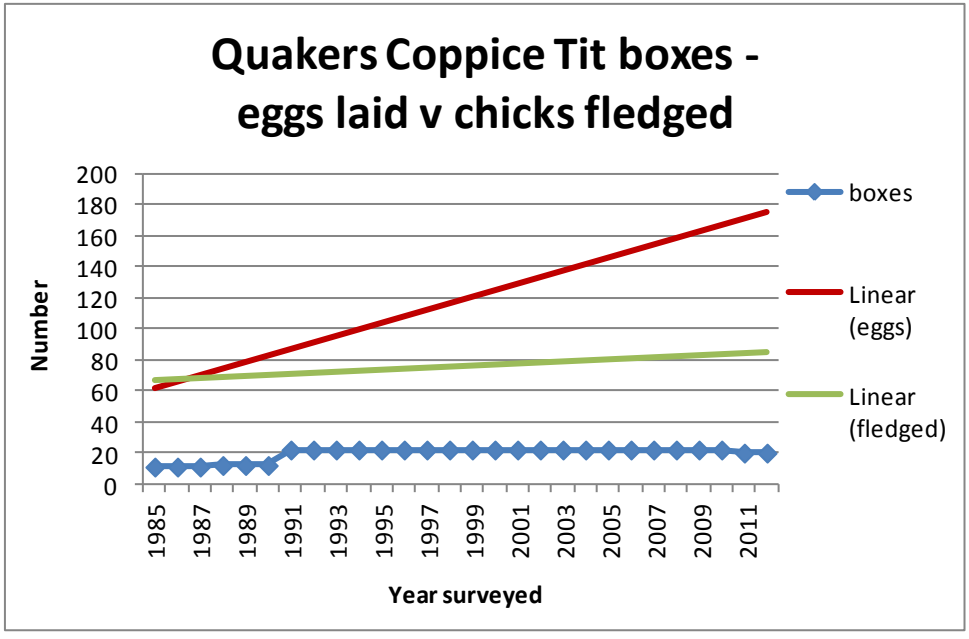
The Stock Doves breeding season extends beyond our recording period, so their data is incomplete

As you can see from the tables above, the poor weather we have been experiencing locally has not affected 'productivity'. The average 'first egg date' are 19th Apr for Blue Tits and 23rd Apr for Great Tits; this year the date is 3 and 4 days earlier than the average. ***Did the birds know something we didn't?***

SECTION 2

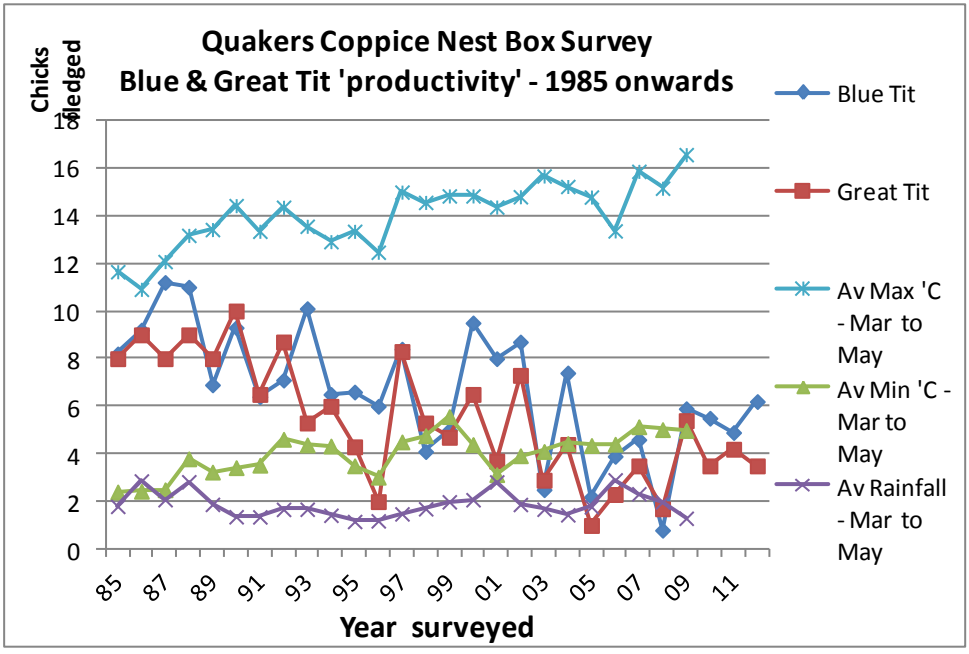
This next section looks at the historical data and computes the trends from when Colin and Bryan began the survey work up to the present: -

We have done some 'number-crunching' from the data we have added to that previously collected by Colin and Bryan. Firstly, following a comment from Colin to us in 2009 about the biomass possibly having reached capacity, the first graph appears to support that theory.



As more tit boxes were erected, pairs occupied them and the results recorded. It would be expected that as the number of pairs increased then the number of eggs laid would rise. The graph confirms that. However, unexpectedly, the number of chicks fledged appears to be only marginally higher - interesting?

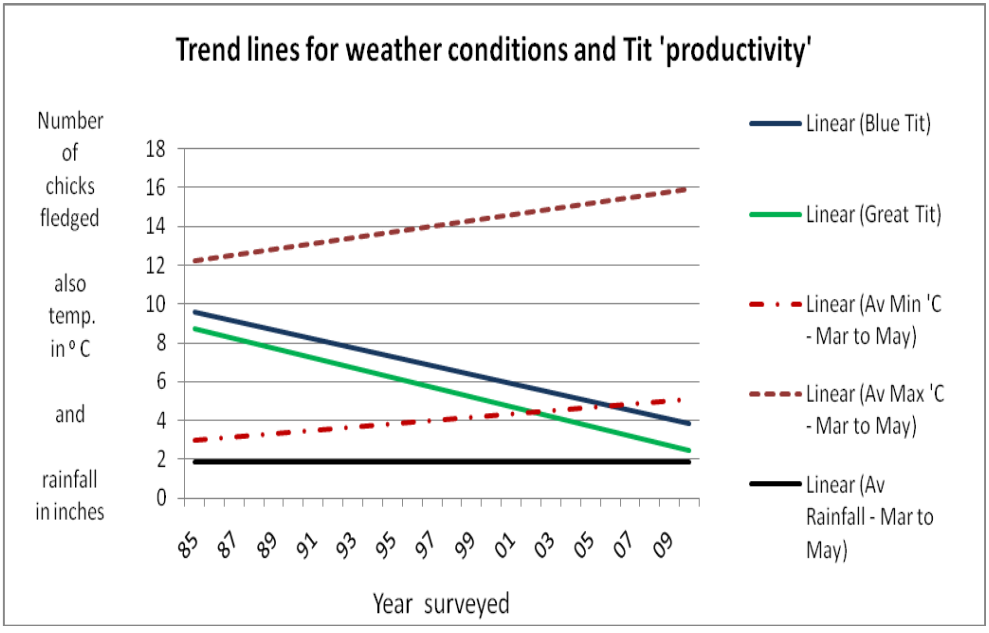
As 2009 was the 25th anniversary, we also thought it would be interesting to consider if we could get weather related data covering the same period. I am extremely grateful to David Cookson of the Cheshire Swan Study Group[1] for supplying us with the information.



The rather 'busy' graph above shows the productivity of the Blue and Great Tits using the nest boxes over the 26 years and we have overlaid the max. and min. temperatures, plus average rainfall for the months of March to May.

The graph on the next page shows the same data, but uses trend lines[2] to represent the information and it reveals some 'disturbing' results: -

- that even though more boxes have been made available and more pairs are using them, productivity has dropped at a similar rate for both Blue and Great Tits over the period
- average temperature and rainfall for the breeding season has remained constant or risen slightly over the 26 years - suggesting 'climate change' may not be a factor or if the slight rise in the average min. and max. temperature is having an effect, it is having a detrimental one!



What conclusions can we draw from this information?

Not all of the boxes erected are used each year. So it is also likely that the species we have been monitoring over the years have also been nesting in natural nest sites on the reserve. We have not been able to identify any recently to record their successes. We have no way of checking how they are faring.
While on our weekly Spring visits to the reserve we often hear and see the migrants - Chiffchaff, Willow Warbler, Blackcap, etc. They, too, will want to feed themselves and their brood.

Other nesting records:
During the visits over the years there have been evidence of other species nesting at Quakers Coppice. These include Great Spotted Woodpeckers in holes in the trees - we have heard young calling; a Goldcrest's nest in a yew tree; a Wren nesting on the ground, young Moorhen on the pond at the south end of the reserve.

What is contributing to the decline in productivity?
Could it be: -

- the weather conditions (although relatively constant) were unfavourable
- the biomass can only support a certain number of fledged chicks
- human disturbance -
  - encroachment of industrial units / business park
  - dog walkers and others visiting the wood
- man-made nests distort the productivity of the total population
- has the feeding station been regularly 'topped up'? Have some birds been depending on it?
- decline in recent years of the biomass surrounding the reserve due to change of land use from farmland to industrial and commercial premises

References: -

1 Cheshire Swan Study Group Website - http://www.record-lrc.co.uk/Group.aspx?Mod=Article&ArticleID=G0012001 and the Forum site is http://www.record-lrc.co.uk/forum/viewforum.php?f=30. On behalf Cheshire Swan Study Group (including North Wales Swan Study Group) British Swan Study Group, Cheshire and Wirral Ornithology Society and Wildfowl and Wetlands Trust.

2 a trend line is (usually a straight line) used to depict trends in your existing data or forecasts of future data

Pages 12, 13, 14 & 15 show in table and graph form the data collated over the 25 year period.

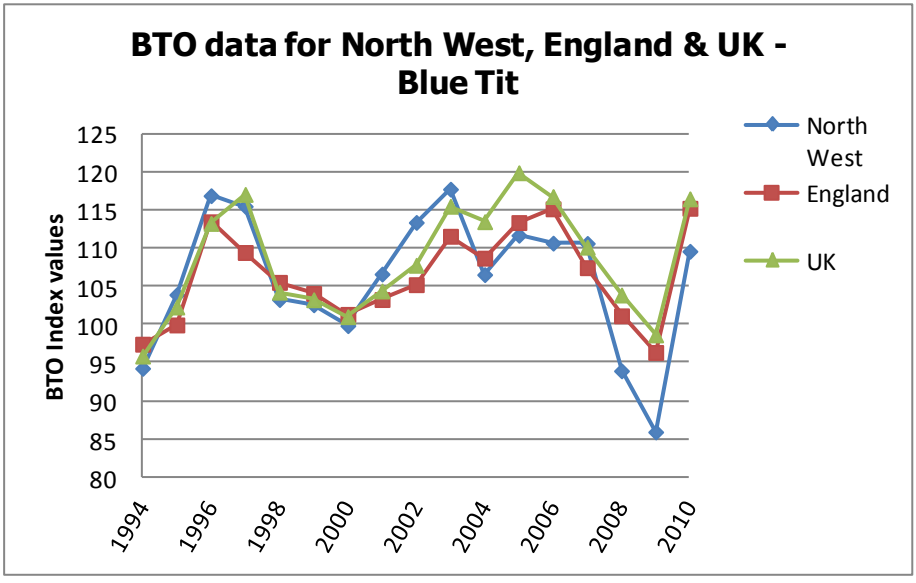
The graphs on pages 14 & 15 show the data provided by the BTO and show the 'index value' for the North West, England and the UK for Blue Tit and Great Tit gathered during their annual Breeding Bird Surveys. The graphs below show the graphs 'smoothed out' into trend lines (or linear) with Quakers Coppice data superimposed for comparison.

Blue Tit

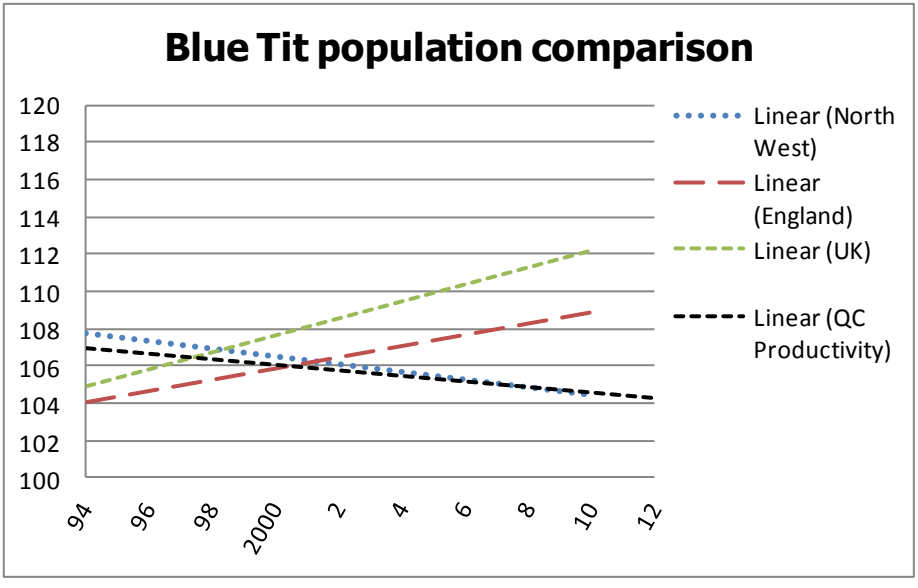
Year	No. of nests	Eggs	Hatched	Fledges	Productivity (i.e. fledges ÷ nests)	1st egg date
1985	6	53		50	8.2	
1986	6	66		55	9.2	
1987	5	57		56	11.2	
1988	9	94		88	11	
1989	9	76		62	6.9	
1990	6	58		56	9.3	
1991	9	65		58	6.4	
1992	8	83		57	7.1	
1993	8	89		81	10.1	
1994	8	72		52	6.5	
1995	10	96		66	6.6	
1996	8	79		54	6	
1997	8	73		67	8.4	
1998	7	65		29	4.1	
1999	8	77		40	5	
2000	11	134	124	104	9.5	
2001	8	93		64	8	28-Apr
2002	9	100		78	8.7	14-Apr
2003	8	74		20	2.5	22-Apr
2004	11	107		81	7.4	23-Apr
2005	12	103	84	26	2.2	24-Apr
2006	14	133	99	54	3.9	26-Apr
2007	12	108	86	55	4.6	18-Apr
2008	10	90	76	8	0.8	28-Apr
2009	10	111	94	59	5.9	05-Apr
2010	15	149	135	83	5.5	19-Apr
2011	15	131	110	73	4.9	13-Apr
2012	12	115	95	74	6.2	13-Apr
Average	**9.4**	**91.1**	**100.3**	**58.9**	**6.6**	**19-Apr**

Great Tit

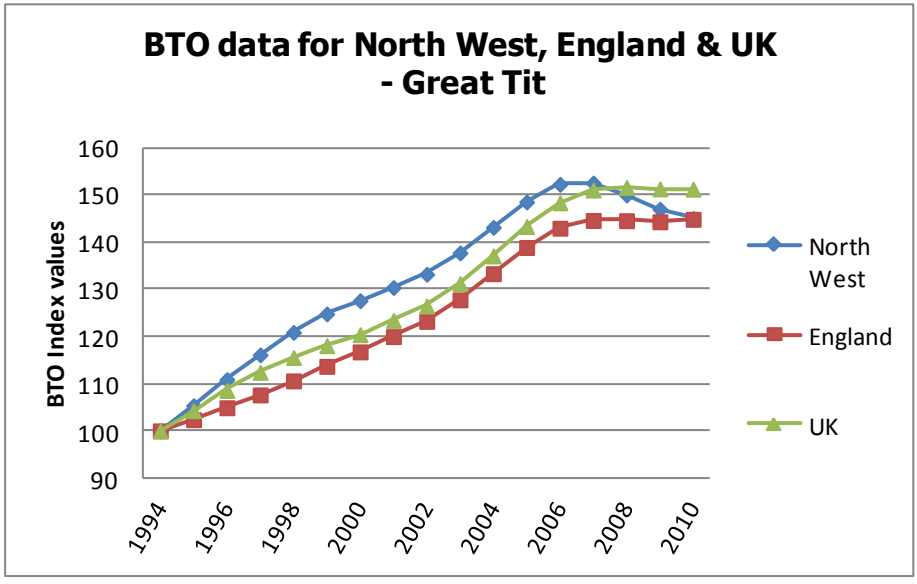
Year	No. of nests	Eggs	Hatched	Fledges	Productivity (i.e. fledges ÷ nests)	1st egg date
1985						
1986	1	10		9	9	
1987	1	8		8	8	
1988						
1989						
1990	1	10		10	10	
1991	2	16		13	6.5	
1992	3	27		26	8.7	
1993	3	26		16	5.3	
1994	1	8		6	6	
1995	3	19		13	4.3	
1996	2	12		4	2	
1997	3	27		25	8.3	
1998	3	21		16	5.3	
1999	3	19		14	4.7	
2000	2	13	13	13	6.5	
2001	6	40		22	3.7	03-May
2002	7	56		51	7.3	22-Apr
2003	9	53		26	2.9	27-Apr
2004	8	65		35	4.4	23-Apr
2005	5	32	23	5	1	25-Apr
2006	7	50	20	16	2.3	29-Apr
2007	6	36	33	21	3.5	23-Apr
2008	7	45	32	12	1.7	03-May
2009	7	50	45	38	5.4	16-Apr
2010	4	27	25	14	3.5	17-Apr
2011	5	40	35	21	4.2	15-Apr
2012	8	51	45	28	3.5	19-Apr
Average	**4.3**	**30.4**	**30.1**	**18.5**	**5.1**	**23-Apr**

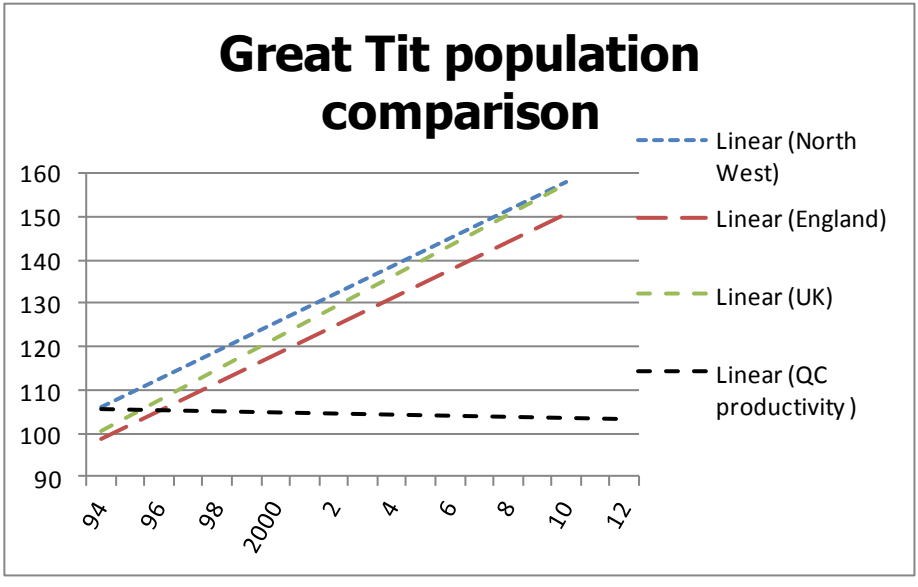


Acknowledgement—We are grateful to the BTO/JNCC/RSPB Breeding Bird Survey for providing the data



The Quakers Coppice Blue Tit line reflects that of the data collected throughout the North West.





The Quakers Coppice Great Tit line shows no resemblance to either of the regional lines!

About BBS population trends

The BBS is a line-transect survey based on randomly-located 1-km squares. Squares are chosen through stratified random sampling, with more squares in areas with more potential volunteers. The difference in sampling effort is taken into account when calculating trends.

Through comparing standardised annual counts, BBS provides reliable population trends for a large proportion of our breeding species. Trends can also be produced for specific countries, regions or habitats. For these analyses, we take the higher count from the two visits for each species, summed over all four distance categories and ten transect sections. Only squares that have been surveyed in at least two years are included in the analyses. Population changes are estimated using a log-linear model with Poisson error terms. Counts are modelled as a function of year and site effects, weighted to account for differences in sampling effort across the UK, with standard errors adjusted for overdispersion.

In 2009, additional randomly selected 1-km squares surveyed as part of the Scottish Woodland BBS and the Upland BBS were added to the Scotland and England BBS data respectively. These squares were surveyed using the same methodology as standard BBS squares.

For more information about BBS trend calculations, see the Metholodology section on the BTO website.

Caveats

Work has been carried out to assess the reliability of BBS trends, to ensure that reported trends are based on reliable data and sufficient sample sizes.

** please note that the spreadsheets supplied by the BTO simply contains the index values for each year, rather than any actual bird counts.

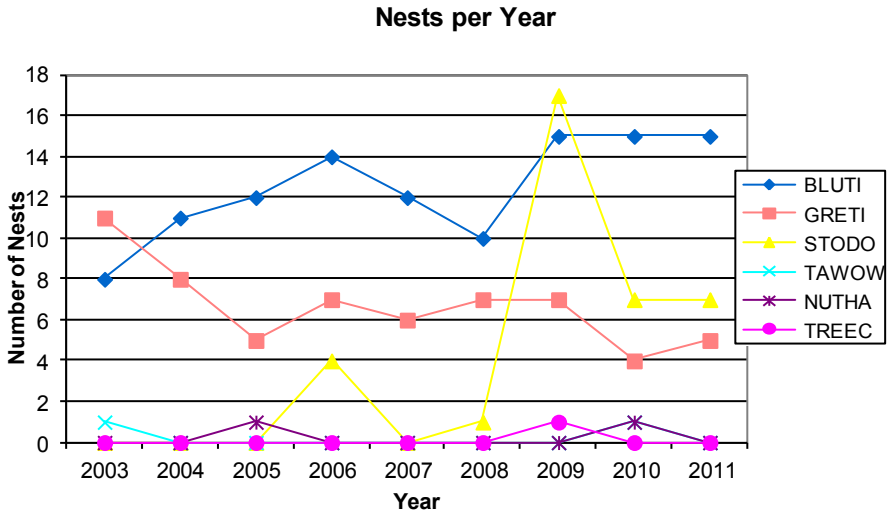
SECTION 3

This section covers Further Analysis

We have nest and nest box data available in a spreadsheet; we have done some analysis of this data as shown below, to see what might emerge. There is a slight difference in the number of boxes now identified in our spreadsheet, and the number previously noted in handwritten records. The difference does not significantly affect the data analysis. We will use the updated numbers going forward.

There are 41 boxes listed, but 3 of them (numbers 20, 24, 39) have not been in place for many years. Of the 38 boxes in place, 20 are "small hole" tit boxes (A1), 3 are "tree creeper" boxes (A2), and 15 are "large hole" or "chimney" type boxes (A3 & A6).

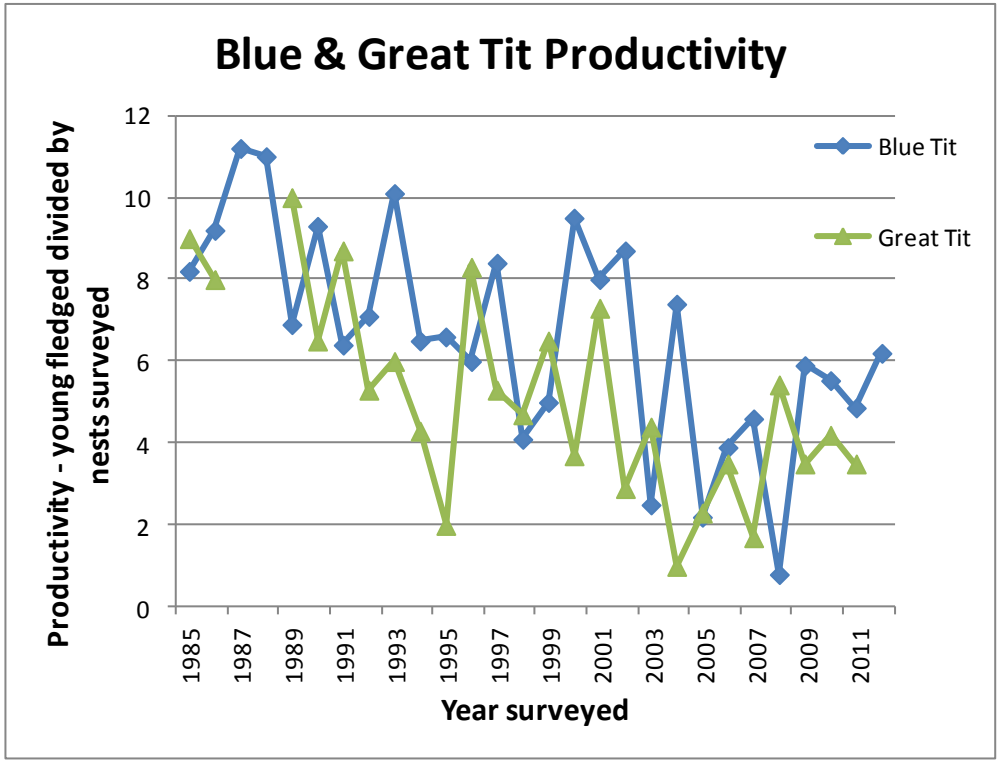
Colin Lythgoe has provided us with a considerable amount of nest box data for earlier years, particularly relating to Stock Dove nests. We haven't yet had time to incorporate this with the more recent records, so for this report we include the recent Stock Dove information, but we do not comment on it or draw any conclusions; we plan to have the more complete Stock Dove data available for next year's report and we hope then to analyse it to see what may emerge.



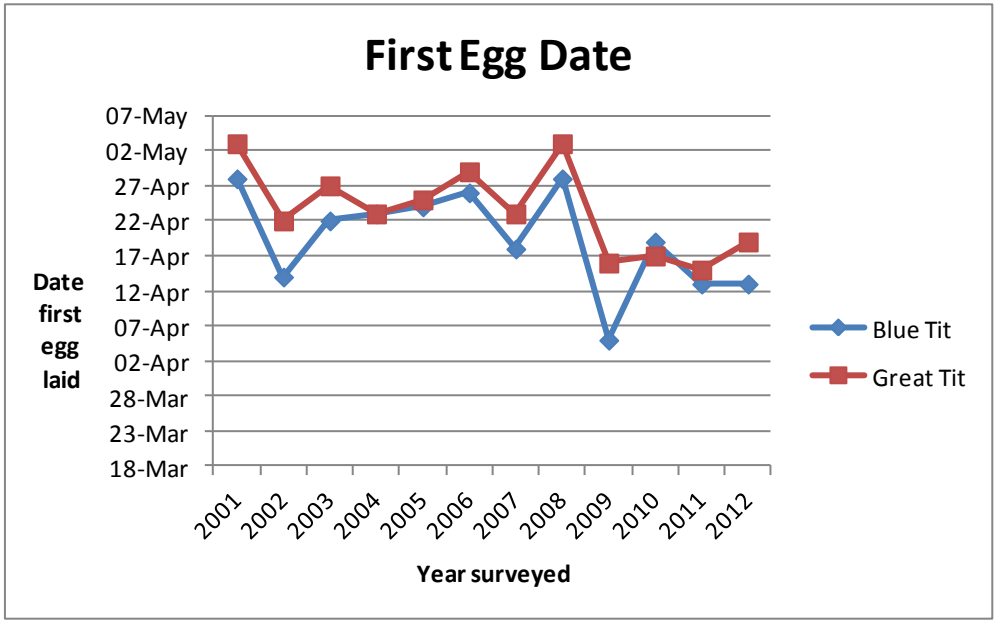
This chart summarises the number of nests observed each year.
Stock Doves nest from April to Sept, but we only monitor Stock Dove nests during

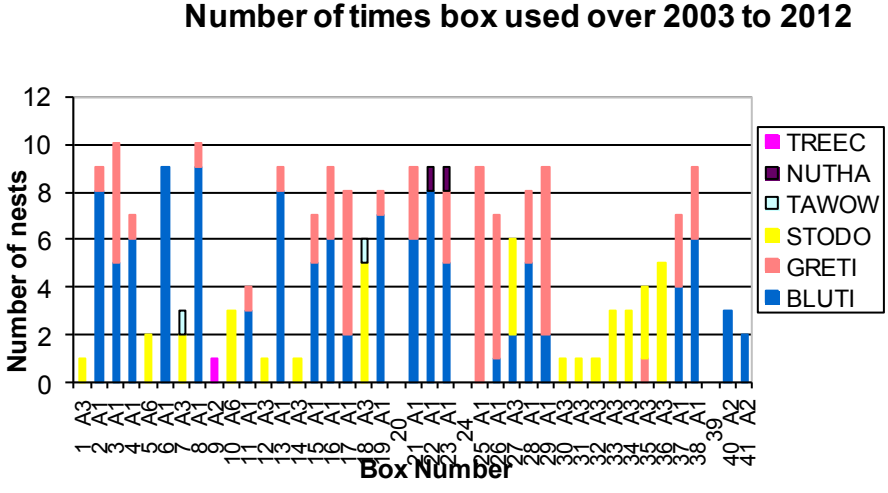
Tit nesting, which usually finishes in June.

The graph on the previous page indicates that the number of Blue Tit nests per year has increased slightly from 2003 to 2011, whereas the number of Great Tit nests has declined slightly.
It is interesting to see the Great & Blue Tit Productivity (number fledged / nest) graph for 1985 to 2012 (see graph below). Overall the graph shows a steady reduction in productivity for both species between 1985 and 2012. So both species are suffering a reduction in productivity, but Great Tits are also suffering a slight reduction in nest numbers.



Looking at the "Average First Egg Date" graph shown below, it seems that Blue Tit dates are generally a few days earlier than Great Tits. Does this tend to mean that a Blue Tit gets to a nest box first, before a Great Tit, and so has an advantage, or is a Great Tit aggressive enough to oust an occupying Blue Tit? This graph shows the usage of the boxes. As mentioned previously, there are no boxes 20, 24 and 39.





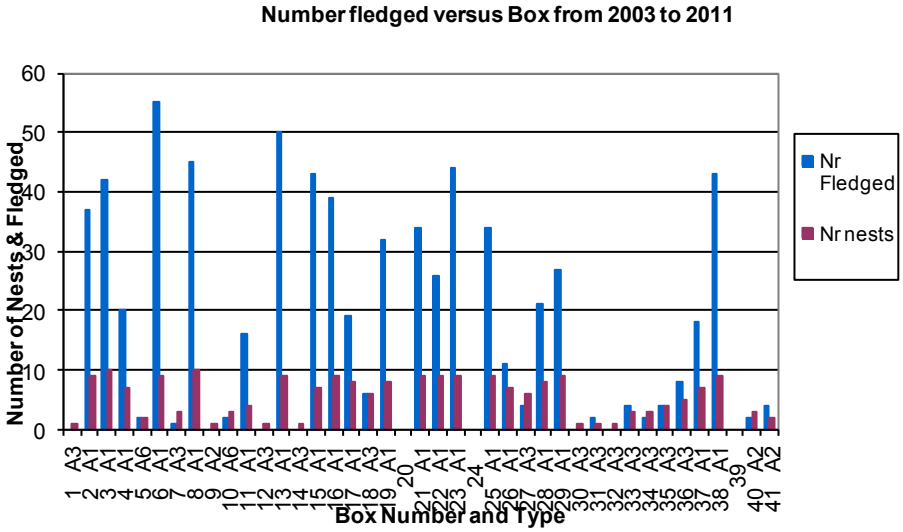
The graph indicates that several of the "large hole / chimney" boxes have only been used once by Stock Doves. This is probably due to a lack of Stock Dove nest data. As above, more on Stock Doves in next year's report.

Unsuccessful Tawny Owl nests were found in box 7 in 2003 and in box 18 in 2010.

A tree creeper nested in 2009 in box 9, a tree creeper box. This box has not otherwise been used.
Nuthatches have nested twice, in 2005 and 2010, in boxes 22 and 23. Despite being numbered consecutively, these two boxes are at opposite ends of the coppice.

Boxes 27 and 35 are "large hole" (A3) boxes, but there are 2 records of a Blue Tit nest in 27, and 1 of a Great Tit nest in 35.

Of the 20 small hole (A1, tit) boxes, Box 11 has only been used once in 3 years. Of the others, 4 have been used in at least 7 years and 12 have been used every year. This would seem to give a fairly high average usage of the boxes, so perhaps the boxes are providing significantly more nest sites than are available naturally in the area.



The graph above shows the number of nests (ie: the number of times the box has been used) and the number of young successfully fledged from each box. The number fledged (mostly Stock Doves) from the A3 and A6 boxes is relatively low – probably due to the lack of records for the earlier years.

Of the small hole (A1, tit) boxes some, such as 6, 8, 13, 15, 16, 23, 38, appear to have relatively high success rates; over the years these seven boxes have held 48 Blue Tit nests and 13 Great Tit nests. Others such as 17, 26, 37, have relatively low success rates; over the years these three boxes have held 5 Blue Tit nests

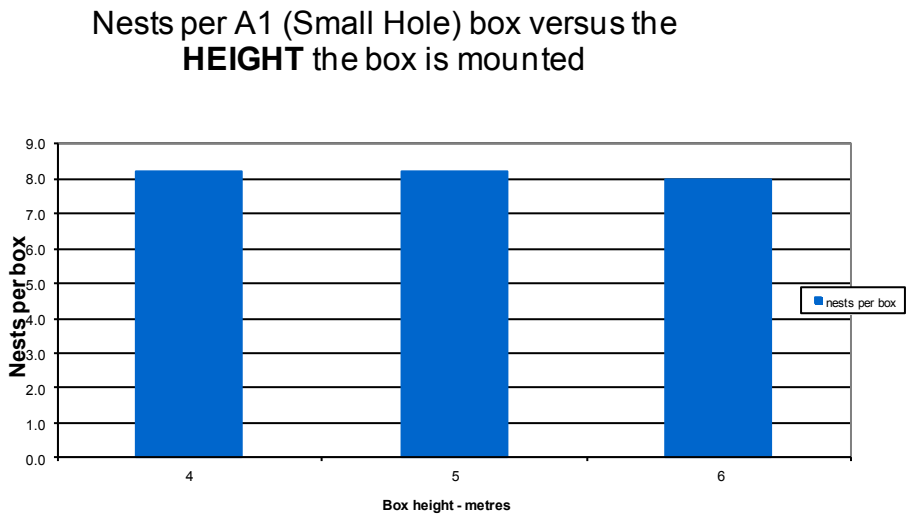
and 15 Great Tit nests.
Perhaps the difference in success rate between these groups of boxes is due to the different ratios of Blue and Great tit nests (as above, 48 blue: 13 great, against 5 blue:15 great), and to the Great Tit's clutch size generally being smaller than that of the Blue Tit. Could there also be other reasons?

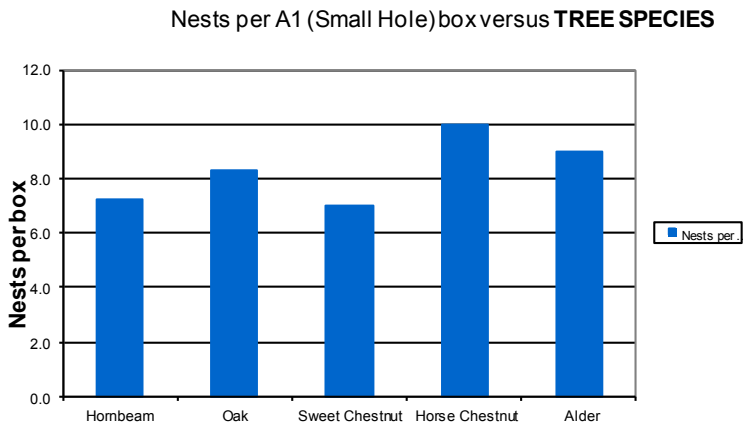
A review of the locations of the more, and less, successful nest boxes shows that they are all spread throughout the reserve; so we can rule out geographic or specific locations as a reason for the outcome.

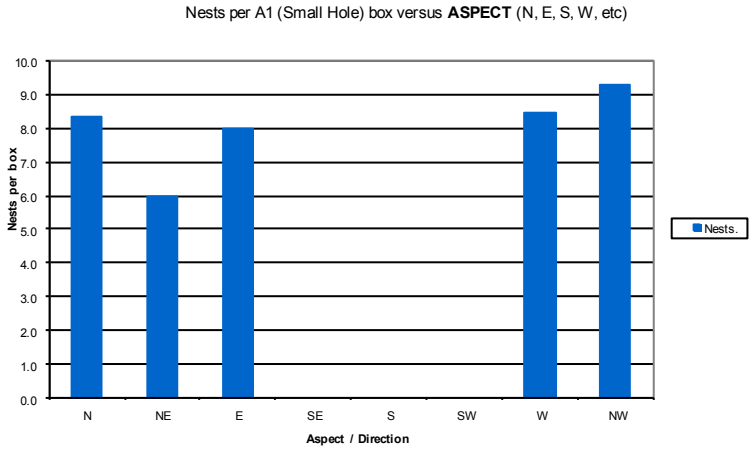
Positioning of nest boxes.

For each box, we have a record of the height at which it is mounted, the species of tree it is mounted on, and the aspect (direction) it faces (N, S, etc).

Usually boxes in public areas such as Quakers Coppice are mounted higher and out of easy reach to avoid human interference, whereas in private woodland lower mounting is usually safe from interference and can make for easier inspection.







Looking at this data for the Small Hole (A1) boxes, it does not appear to that any particular height or tree type or aspect, has any significant impact on the usage of individual nest boxes, as shown in the two graphs below.

Looking at the "Aspect" graph above, for the lowest (NE) and highest (NW) "nest per box" figures, there are 2 NE facing boxes (11, 22), which have 6 nests per box; there are 3 NW facing boxes (2, 3, 6), which have 9.3 nests per box. All 5 of these boxes have mostly been used by Blue Tits. There are no small hole boxes facing SE, S, or SW in the coppice; it is generally accepted that boxes should not face a southerly direction to avoid them becoming too warm.

Conclusion.

The data above indicates that for the Blue and Great Tits:

- between 2003 and 2012 the number of Blue Tit nests recorded has increased whereas the number of Great Tit nests has decreased;
- between 1985 and 2012 Blue and Great Tit productivity (number fledged/nest) has declined;
- over the period from 2001 to 2012 the first egg dates are becoming earlier;

The nest box "aspect" data suggests that the positioning of the small hole boxes (height, tree species and aspect), does not significantly influence their usage. Also, the whereabouts of a box within the reserve does not appear to have an effect.

Given the quite high usage of many of the nest boxes, they certainly seem to serve a need in Quakers Coppice. Without the boxes, the number of Blue, Great Tits and Stock Doves fledged in the area would probably be considerably reduced.