CONTENTS

ACKNOWLEDGMENTS

We wish to thank all those who have helped the Group in many ways during the year.

Foremost, we are very grateful to the National Trust: Wicken Fen Local Committee for continuing to allow us facilities on the Fen for ringing. The Committee has also tangibly supported the Group by reimbursing the cost of rings used during the year and by permitting use of the W. H. Thorpe building. To the National Trust Assistant Agents; the Committee Secretaries, Dr. John Smart, Dr. Max Walters and John Harvey; and the Warden, Lt.Col. Charles Mitchell, the Group is greatly indebted.

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Wicken Fen Group Report No. 5 1973

INTRODUCTION

In February 1974 the Wicken Fen Group will be five years old and this Report covers the fifth summer of its operation. It is longer than before though not as a special anniversary celebration but merely as a reflection of increased productivity based on our growing background of accumulated data and experience.

It seems that no matter how long the Group continues it will never be easy to organise the manpower required to maintain coverage from mid-March to mid-October. Thanks again to the dedication, largely unseen, of the Secretary and the still small nucleus of active supporters, the Fen was visited every weekend for seven months and additional work was done as well. The list on the back cover of 35 members and 14 friends looks impressive, but active support is still very short.

The total number of birds ringed reached an impressive new record well in excess of the previous best. This included a useful 1069 Acrocephalus warblers, and most other species in good numbers as a result of greater catching effort. An important contribution to this success was a series of three week-long visits to St Edmunds Fen, an area which has received little attention in the past. Fifty nest boxes were erected on the Sedge Fen in the spring as described later in the Report and these contributed 64 pulli to the totals. Attempts to catch moulting Tree Sparrows were not as successful as hoped, but the usual autumn Swallow roost provided useful catches for training ringers in handling large numbers of birds. A variety of unusual species ringed included Redshank, Little Owl and Kestrel as new birds for the Group and always enough out of the ordinary species to maintain the novelty and spur the interest that sometimes flags in the hotter more mosquito-ridden moments.

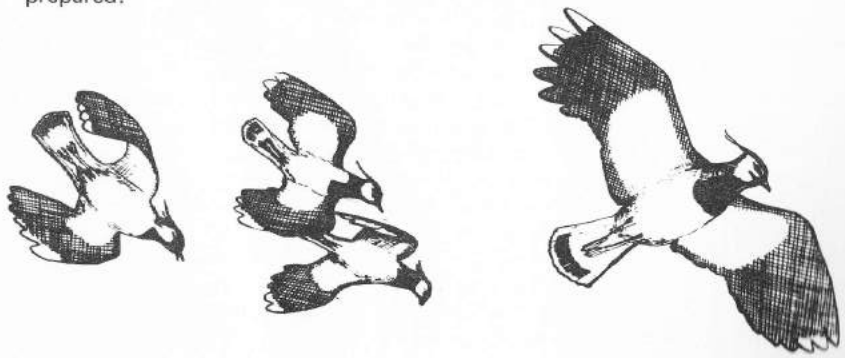
These birds of course like the all too uncommon foreign recoveries are extra bonuses and it is heartening to present a Report which shows that the Group's routine work is producing new results and signs of progress on all fronts. There are now enough year's results to start producing data on breeding, mortality, and population levels of several birds and three papers look at different aspects. One shows how breeding success from year to year is quite variable and apparently largely influenced by summer weather. Four years of data from the weekends of standardised coverage show the value of this study in providing background information on yearly population changes and reveal differences between sites which require further investigation. A third paper examines the retraps of Bullfinches and estimates the annual mortality which fits in with breeding success and population levels. The species on which worthwhile analysis of this kind is possible now number at least a dozen, and especially for the warblers few such studies have previously been done.

Emphasis was placed in last year's Report on the importance of studies of ecology particularly of feeding of warblers to help interpret the habitat preferences, weight changes and activity patterns revealed from ringing data. This year, we are able to publish two further contributions on feeding. Work of the BTO Acrocephalus Study Group has shown how Sedge Warblers fatten for migration at some sites and not at others and we were able to demonstrate how this is largely related to the abundance of one species of aphid on which the Sedge Warbler preys. This study has important lessons for the future, namely the value of exchanging ideas and data with other groups. Secondly it is apparent that without such sophisticated or drastic techniques as serological analysis of faeces or killing birds for gut analysis it is possible to make new and valuable contributions by careful observation of feeding birds. A study of measurements and activity of Sylvia warblers, especially the Blackcap has suggested that there must be feeding differences between the two sexes. If this is confirmed by observation in 1974 it will be a most interesting discovery with far-reaching consequences.

Ancilliary studies such as the investigation of moult continue and a short note shows how many records have now been collected, and draws attention to the notable but little studied behavioural changes during moult. Field methods too are being checked and improved as shown by the search for new and reliable ways of sexing Kingfishers, the study of wing-length changes of the Reed Warbler and the attempt to check the effects of saturation of ringing effort.

During 1973 there have been major advances in the Group's plan to have its data automatically processed. At the time of writing the first trials of punch carding and printing of data have just produced results. An outline of the scheme for future use is presented in this Report. It is hoped that in 1974, a start will be made on coding and punching approximately 25,000 captures of birds so far recorded. When completed this will make access to the data and a variety of routine analyses relatively simple. Once handling of this backlog is automated, the Group can look forward to a period of very high productivity of written results.

I believe that this fifth Report testifies to the progress made by the Wicken Fen Group in its first five years of work. The harvest to be reaped in the next five years is enormous with the ground so well prepared.



SOME NOTES ON SELECTED SPECIES

There follow notes on some of the more interesting sightings of birds and other creatures made at the Fen in 1973 during the course of the Group's normal operations. Records refer to the area of the Mere and Reed Bed on South Adventurers' Fen unless stated otherwise. Records of waders have been excluded as in 1972 because a separate treatment is envisaged in a future year.

Heron Numbers were good in autumn with a siege of ten on Rothschild's Lapwing on Aug 4th being the maximum.

Bittern Singles on Jan 13th and Mar 17th.

Marsh Harrier Singles recorded sporadically, Jul 14th-Aug 9th and Sep 14th-21st.

Comic Tern One on the Mere on Jul 30th.

Little Owl Three records in the Reed Bed area and two at the north end.

Long-eared Owl One found long dead on Apr 15th.

Lesser Spotted Woodpecker One was caught and ringed on St Edmunds Fen on Jul 11th and retrapped on Aug 4th on Spinney Bank.

Nuthatch One on Sedge Fen Drove on Aug 13th. This seems to be the first record ever of the species at Wicken Fen.

Bearded Tit 20-30 present until mid-February but no sign of the eagerly awaited breeding. The first autumn visitor was seen on Oct 6th and numbers soon reached 20-30 and persisted to the end of the year.

Stonechat A male on the Reed Bed on Feb 3rd.

Whinchat Singles caught on Sep 8th, 9th and 14th and one seen on 21st. Previously only one had been caught.

Nightingale This species has become very scarce at Wicken Fen. None were heard singing in the usual areas and only one was caught on Jun 23rd.

Goldcrest One caught on Sep 17th, 2 on Oct 6th and 3 on Nov 25th. Such numbers are exceptional but probably reflect the bird's rocketing numbers in its favoured haunts.

Yellow Wagtail Several present on passage on May 5th but no sign of breeding birds in spite of a search of suitable areas.

Great Grey Shrike One on Jan 13th.

Corn Bunting Three were singing at the Reed Bed on Apr 27th and one on Jul 7th.

Stoat A pair frequented the ringing area on Harrison's Drove and on Jul 15th one was seen carrying a juvenile Song Thrush.

Short-tailed Vole Individuals were seen in Willow trees on May 6th and 26th on both occasions 4-5 feet above ground. Perhaps this species might account for some of the unexplained predation of nests.

Mink One on Jul 23rd.

Common Lizard One took up residence under the ringing hut from mid-summer and was often watched basking in the sun.

SPECIES RINGED IN 1973

	Site A,B & H	Site F,G J & K	1973 Total	Grand Total 1968–1973
Mallard	–	–	–	5
Kestrel	1	–	1	1
Red-legged Partridge	–	1	1	6
Water Rail	–	–	–	1
Moorhen	–	–	–	1
Lapwing	–	1	1	2
Snipe	–	17	17	46
Jack Snipe	–	–	–	1
Woodcock	–	–	–	3
Redshank	–	3	3	3
Woodpigeon	1	–	1	7
Turtle Dove	–	4	4	17
Collared Dove	–	–	–	5
Cuckoo	–	–	–	12
Little Owl	–	1	1	1
Tawny Owl	–	2	2	7
Long-eared Owl	–	–	–	2
Swift	–	2	2	4
Kingfisher	6	16	22	60
Great Spotted Woodpecker	–	1	1	2
Lesser Spotted Woodpecker	1	–	1	2
Skylark	–	1	1	8
Swallow	13	674	687	1845
House Martin	–	7	7	8
Sand Martin	–	–	–	1
Jay	–	1	1	7
Great Tit	11	20	31	206
Blue Tit	37	151	188	658
Coal Tit	–	–	–	4
Willow Tit	13	12	25	145
Long-tailed Tit	15	33	48	261
Tree Creeper	3	7	10	47
Wren	80	123	203	684
Bearded Tit	–	10	10	11
Mistle Thrush	–	1	1	3
Fieldfare	–	10	10	20
Song Thrush	102	156	258	1051
Redwing	–	12	12	48
Blackbird	85	87	172	761
Whinchat	–	3	3	4
Redstart	–	–	–	6
Nightingale	–	1	1	8
Robin	90	68	158	536
Grasshopper Warbler	–	22	22	87
Great Reed Warbler	–	–	–	1
Reed Warbler	116	658	774	2412
Sedge Warbler	32	263	295	1549
Blackcap	72	85	157	534
Garden Warbler	14	14	28	87
Whitethroat	8	8	16	136
Lesser Whitethroat	9	26	35	147
Willow Warbler	32	79	111	753
Chiffchaff	15	13	28	220
Goldcrest	1	6	7	16

Spotted Flycatcher	12	11	23	90
Dunnock	136	155	291	1029
Meadow Pipit	–	1	1	6
Tree Pipit	–	–	–	1
Pied Wagtail	–	–	–	7
Yellow Wagtail	–	–	–	3
Red-backed Shrike	–	–	–	1
Starling	–	–	–	11
Greenfinch	26	49	75	264
Goldfinch	21	49	70	260
Linnet	2	37	39	165
Redpoll	80	108	188	726
Bullfinch	112	124	236	1014
Chaffinch	27	21	48	208
Brambling	–	1	1	24
Corn Bunting	–	–	–	8
Yellowhammer	6	5	11	62
Reed Bunting	14	345	359	1212
House Sparrow	–	–	–	1
Tree Sparrow	165	5	170	933
TOTALS	1358	3510	4868	18477

4268

RECOVERIES

The following list covers all recoveries and controls of birds more than 10 km from the place of ringing, notified to the Group by the B.T.O. since the last report.

Between 1968 and 1973, from a ringing total of about 18,500 birds, 36 have been reported more than 10 km from Wicken Fen, 9 of these recoveries being from foreign countries. The recovery rate is therefore almost exactly 0.2%. In the same period a similar number of birds ringed elsewhere, 34 in total, have been trapped at the Fen; none of these, however, originated abroad.

Half of the recoveries shown here are of warblers; the two Blackcaps and Reed Warbler JS 16912 might suggest fairly direct North-South movement with the Reed Warbler presumably on the early autumn migration typical of adults. Reed Warbler JK 34378 is reminiscent of JA 04753 of 1971, ringed in the West Country in the autumn of its first year, but in a later year found (breeding?) in East Anglia.

The Swallow supports the suggestion of a North Westerly origin for the autumn Wicken birds (see 1972 report); details of three further Swallow controls made at the Fen in September/October 1973 are awaited. JB 30856 is the second summer-ringed Wicken Redpoll to be reported from NW France in the winter.

Recoveries

Key to symbols and terms

2–bird ringed, age unknown
3–bird ringed in the calendar year of hatching
4–bird ringed in the year following hatching or later
m–male
f–female
v–controlled (caught alive and released)
x–recovered (found dead)

Mallard	GP01428	4m	1. 8.70	WF	28 km NNW
		shot	16. 10. 73	March (Cambs)	
Swallow	JN69534	3	19. 9.72	Nuneaton (Warwick)	
		v	22. 9.73	WF	120 km ESE
House Martin	HV69044	3	2. 8.69	Ingatestone (Essex)	
		v	5. 5.73	WF	72 km N
Robin	JB30968	3	3. 7.71	WF	
		x	29. 6.73	Milton (Cambs)	10 km SW
Reed Warbler	JJ92304	4	19. 5.73	WF	
		v	9. 7.73	Manea (Cambs)	22 km N
	JK34378	3	7. 9.72	Topsham (Devon)	
		v	17. 8.73	WF	315 km NE
	JS16912	4	11. 8.73	WF	
		v	19. 8.73	Filsham (Sussex)	155 km S
	JN72678	3	26. 8.73	Fowlmere (Cambs)	
		v	15. 9.73	WF	28 km NE
Sedge Warbler	HV81304	3	4. 7.70	WF	
		v	10. 6.73	Fowlmere (Cambs)	28 km SW
Blackcap	JH76724	2f	28. 9.71	Beachy Head (Sussex)	
		v	13. 5.73	WF	170 km N
	JN74099	2f	22. 9.72	Beachy Head (Sussex)	
		v	23. 6.73	WF	170 km N
Redpoll	JB30856	4f	30. 5.71	WF	
		x	1. 1.73	Givors (France)	820 km SSE
	JN64008	3	7.10.72	Elveden (Suffolk)	
		v	6. 7.73	WF	29 km WSW
Chaffinch	JH39260	4f	18.11.72	Madingley (Cambs)	
		v	1. 4.73	WF	18 km NE
Reed Bunting	JJ91407	3	19. 8.72	WF	
		x	28. 6.73	Bleasby, Notts	115km NW

SEDGE WARBLERS AND APHIDS

Introduction

Birds require particularly plentiful food supplies at certain times of year, for example, when feeding young or preparing for migration. Insectivorous birds sometimes exploit temporary abundances of insects at such times, a well studied example being the predation of Great Tits feeding nestlings on the caterpillars abundant on oaks in early summer (Lack, 1966). Sedge Warblers are often numerous in reed-beds in the autumn migration period and some of them accumulate considerable reserves of fat before departure. Aphids also are conspicuously abundant in some reed-beds in summer and autumn. This paper reports the early stages of an investigation of their possible importance to the birds as a source of food.

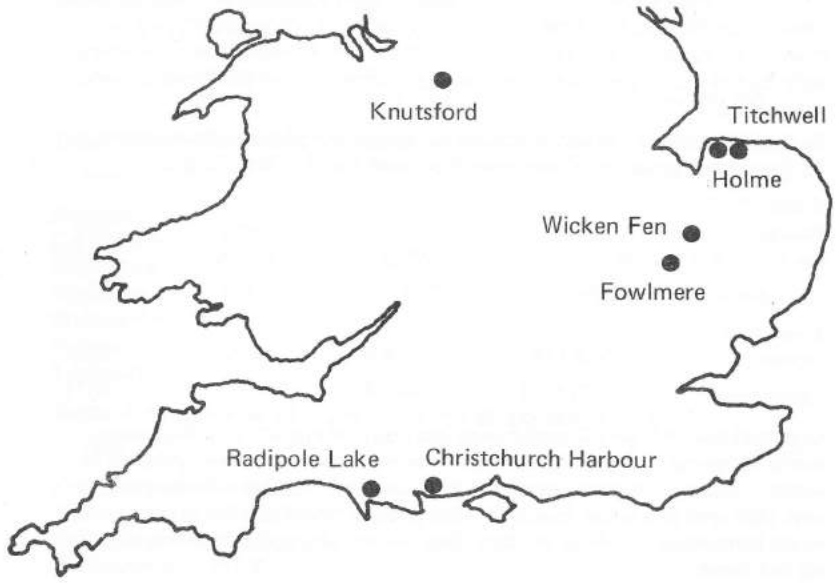
Methods

Sample counts of aphids were made in autumn at the seven English reed-beds shown on the map. Some counts were exact but most involved scoring each leaf of a sample of five reeds on a scale of aphid abundance.

0	–	None
1	–	1 – 10
2	–	11 – 100
3	–	101 – 1000
4	–	1001 – 10000

Several such sample counts were made in different parts of each reed-bed.

Some notes were available on the status of Sedge Warblers at all the sites and at four, ringers supplied further information on abundance and body weights of the birds.



Observations of Sedge Warbler feeding behaviour were made at Wicken Fen and Radipole Lake. The birds were watched through binoculars, the number of feeding attempts being counted and the time of observation being measured with a stopwatch.

Aphid distribution and abundance

The aphids found on reeds were all of one species, the plum-reed aphid, *Hyalopterus pruni* (Geoff). This aphid alternates between two host plants. It emigrates from plum trees (Prunus spp) to reeds in summer and later generations return to plum in autumn. Like most other aphids, the plum-reed aphid has both wingless and winged forms but the latter were rare in all our sample counts (always less than 0.5%).

The aphids on reed leaves were found on both the upper and under-surfaces. On growing reeds, of which the unfurling topmost leaves were vertical, aphids tended to be on the upper surfaces while on the horizontal lower leaves more were on the under-surfaces. Such positions would probably be the most secure against displacement by rain which sometimes causes great aphid mortality (Dixon, 1973). Aphids were more numerous on the leaves near the top of the plant than on lower leaves. On a sample of 35 reeds at Radipole Lake, Dorset, the top three leaves averaged 162 aphids per leaf compared with 86 per leaf lower down. The reed flowers sometimes held particularly large concentrations.

There were two colour morphs, one plum-coloured and the other a yellow-green. These forms were usually found in mixed colonies. In sample counts at Radipole Lake 37% of the aphids on the leaves were plum-coloured compared with 94% in the flowers. Although no detailed counts were made elsewhere,the proportion of plum-coloured aphids on the reed leaves was conspicuously higher at some locations. The biological significance of this dimorphism would be worthy of study.

A large survey at Radipole Lake in late August revealed that aphids were most abundant on the leaves of reeds growing in water and fewer in drier areas or on more mature plants which had flowered. Aphids were very numerous in emerging reed flowers but less so in those which had opened fully (Table 1).

Table 1. Average number of aphids on leaves per plant with numbers on flowers in brackets. Data from Radipole Lake in late August.

Stage of flower development	Water	Mud	Damp ground	Dry ground
No flower	1689(–)	274(–)	1(–)	0(–)
Emerging flower	760(216)	47(88)	3(9)	0(3)
Open flower	212(133)	54(34)	2(5)	0(1)

In a reed-bed fringing Christchurch Harbour, Hampshire, aphids were more numerous on reeds growing in the mud than on those growing in water. However, the situation was complicated because the reed-bed was tidal and the water brackish. The general tendency for aphids to be more numerous in wet or muddy, than in dry situations was found at all the areas.

There were marked differences in aphid numbers between adjacent stands of reeds growing under superficially similar conditions. At one place at Fowlmere, Cambs, the average number of aphids per reed was 1058 while in an apparently similar area 50 yards away, there were only 6 per plant. With such marked variations of population density within a reed-bed any but the largest differences between sites would be difficult to identify. The results of sample counts made in late August/early September, are shown in Table 2. The reeds sampled were growing in water or mud. Aphids were relatively numerous on reed leaves at four locations but were only found in the flowers at Radipole Lake and Christchurch.

Table 2. Mean number of aphids per stem on reeds in water and mud at seven sites.

	leaves	flowers
Radipole Lake	309	108
Christchurch	136	29
Fowlmere	532	0
Knutsford	241	0
Wicken Fen	5	0
Holme	0	0
Titchwell	0	0

Sedge Warblers – abundance and feeding

The status of the Sedge Warbler at the seven sites is summarised in Table 3. Passage birds are particularly numerous at Radipole Lake and Christchurch where they are found throughout August and into September. This late in the summer, they are uncommon at other sites such as Knutsford and Wicken Fen. A proportion of Sedge Warblers accumulate premigratory fat and attain high body weights, especially late in the season. Table 4 shows the percentages of birds whose weight exceeded 13.0 g at four sites. At Knutsford and Wicken Fen where Sedge Warbler passage is slight, the proportion of heavy birds was small, while it was considerably larger at Radipole Lake and Christchurch.

Table 3. Approximate summary of relative abundance of Sedge Warblers.

Site	Breeding	Passage
Radipole Lake	+	++
Christchurch	?	++
Fowlmere	+	+
Knutsford	+	–
Wicken Fen	+	–
Holme	+	–
Titchwell	+	–

Table 4. Percentages of heavy birds (weighing over 13.0 gms).

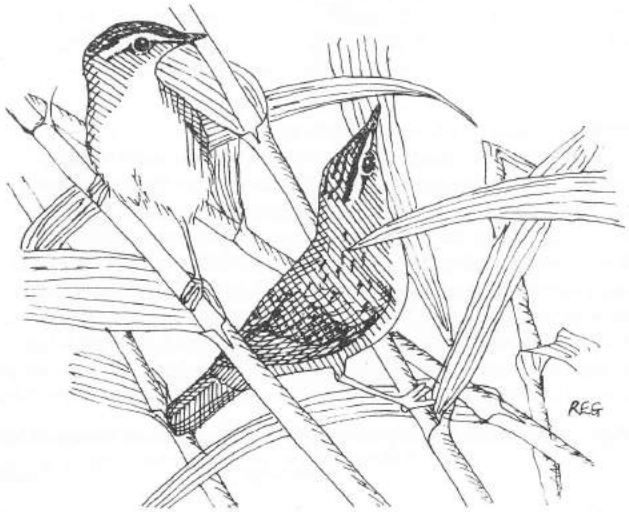
Site	July	Aug	Sep/Oct
Knutsford (1968-1973)	0	0	–
Wicken Fen (1970-1973)	2	3	3
Radipole Lake (1973)	0	10	14
Christchurch (1973)	1	8	17

A study of the feeding behaviour of breeding Sedge Warblers at Wicken Fen showed that they foraged mainly in rush and sedge fields and little food was collected from reeds. In contrast, at Radipole Lake and Christchurch the birds feed mainly in reeds.

Sedge Warblers gather most of their food by picking resting insects from the surfaces of twigs and foliage (Green & Davies, 1972). At Radipole Lake, Sedge Warblers were seen taking aphids from reed leaves and flowers. The rate at which feeding attempts were made was calculated from a collection of observations made at Radipole and Wicken Fen and the median rates are shown in Table 5. The feeding rate of the birds watched at Radipole was higher than those observed at Wicken but the birds were in different habitats and therefore not strictly comparable

Table 5. Feeding rates of Sedge Warblers – attempts per second.

Radipole Lake	–	juveniles	0.24
Wicken Fen	–	ads feeding young	0.16
Wicken Fen	–	juveniles	0.08



Conclusion

In some reed-beds aphids were numerous in late summer. The insects were especially common in reed flowers at two sites (Radipole Lake and Christchurch).

At Radipole and Christchurch where Sedge Warblers were numerous on passage and sometimes showed significant weight gains, aphids were abundant whereas at three sites where the birds were scarce in the migration period aphids were also scarce. Observations on foraging birds showed that aphids were taken as food. Our results suggest that plum-reed aphids may be an important food source for Sedge Warblers on autumn passage but further work and an extension of the survey are required. The project lends itself to cooperative study with other ringing groups.

Acknowledgements

We are grateful for the help of the South Manchester Ringing Group, John Morgan and Giles Pepler for providing information on numbers and weights of birds at their respective sites. The aphid counts were done by the authors with additional data from Anne Naylor. Steve Wratten helped us with identification of aphids.

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ON SYLVIA FEEDING

Late in 1972 we started measuring bills of various warblers to see how their shapes might relate to differences in feeding behaviour. The Sylvia warblers attracted obvious interest with four superficially similar species occurring at Wicken. Unexpected findings stimulated further thoughts which as yet are very tentative but are discussed here to encourage work in 1974.

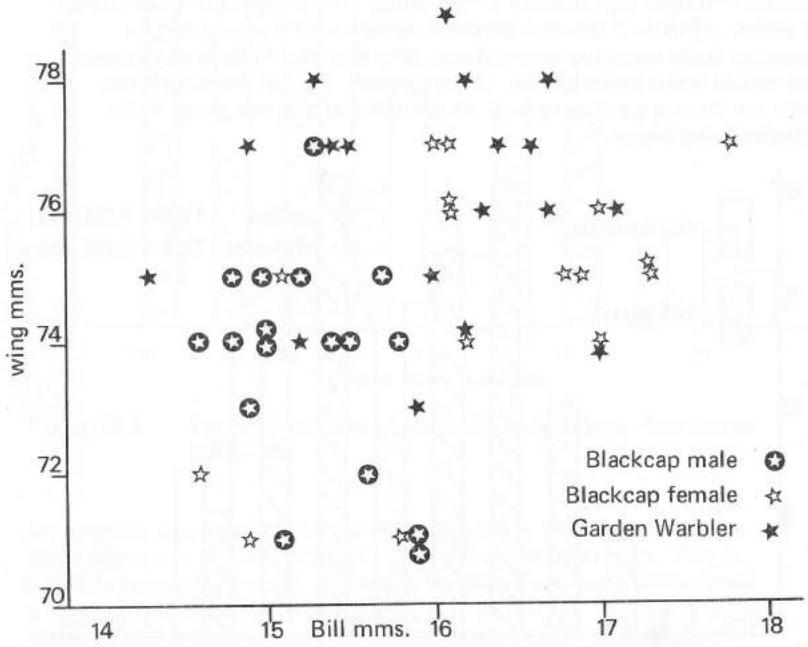

FIGURE 1 Wing and bill lengths of Sylvia Warblers.

Bills were measured to the nearest 0.1 mm, using vernier callipers. Length was measured from the tip to the gape which is not conventional but is more precise than measuring to the feathering or the skull. Width and depth were measured at the feathering. In the Sylvia, depth and width seem to correlate with length between and probably within species. Thus differences are most clearly shown by length alone, though there are probably subtle but important differences of shape which have so far evaded quantification by our rather crude techniques.

Few Whitethroats and Lesser Whitethroats were measured and analysis has so far concentrated on Blackcaps and Garden Warblers. In Figure 1 bill and wing lengths are plotted for these two species. It is apparent that there is a near complete overlap in bill length between Blackcap and Garden Warbler.

Willow Warbler and Chiffchaff measurements also showed considerable overlap which suggests that our initial thinking was too simple and there is more to ecological separation than bill size!

After this revelation, it was surprising to discover an almost complete separation between the sexes of Blackcap; the bill of the female being on average 10% longer than that of the male. A simple explanation suggested by the winglengths in Figure 1 would be that female Blackcaps are bigger than males. Figure 2 examines the possibility by comparing much larger samples of wing measurements. No difference emerges which is surprising because in most passerines the males are bigger than the females and have significantly longer wings. The winglength distribution of males in Figure 2 shows a bimodal pattern which would not be expected from sampling errors alone. Why this should be is not known and would merit investigation. Unfortunately the bill measurements were not from a good sample of winglengths of the two sexes – the females being bigger.

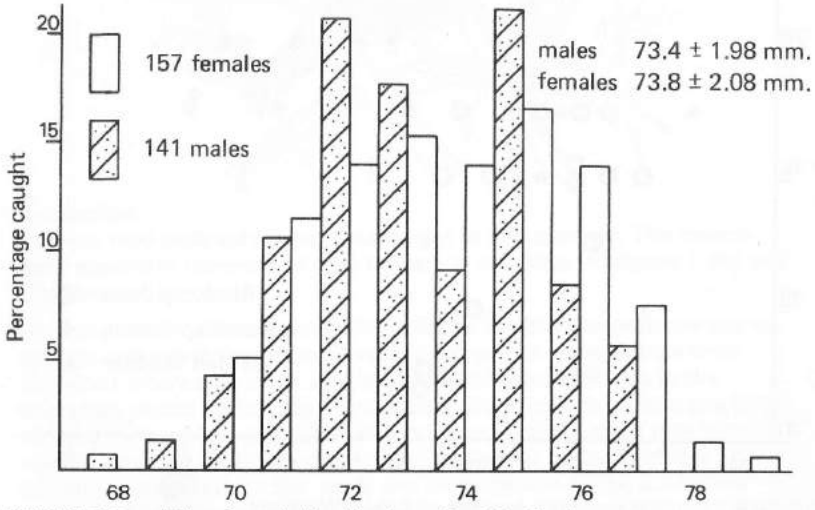

FIGURE 2 Wing length distribution of adult Blackcaps.

Of passerines caught at Wicken the Blackcap has another unusual property; both sexes incubate the eggs. In several species, such as Reed Warblers, the males sit on the eggs for short periods but they do not develop a naked vascularised brood patch like the females. In the Blackcap, most males caught during the breeding season have a brood patch. Thus it seems that the Blackcap has a different arrangement for sharing duties at the nest than is commonly found in other passerine species. This fact coupled with the differences of bill size led us to consider that there might be a difference in feeding between the two sexes. Circumstances unfortunately prevented a direct test by watching birds at the nest but if there is a difference in feeding then perhaps there is a difference in the daily pattern of activity of the two sexes. This was checked by examining the times of capture of males and females. In the months June to September there is a difference in the daily activity patterns of the sexes, as shown in Figure 3. In May no difference was found so the suggested feeding difference probably involves a food supply not readily available in the early summer.

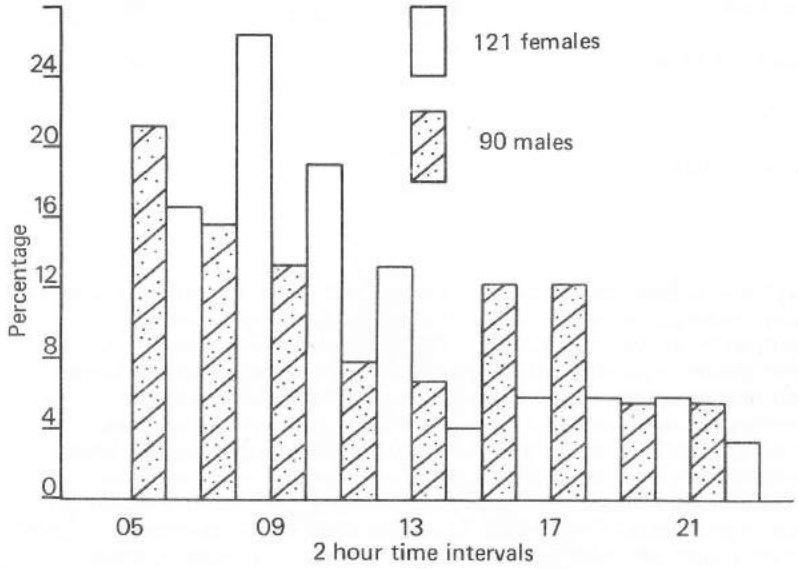

FIGURE 3 Times of capture of adult Blackcaps June–September 1968–73.

An attempt was made to find whether the other three species in the genus share any of the Blackcap's interesting characteristics. This is difficult because the sexes of Garden Warbler and Lesser Whitethroat are not distinguishable by plumage. Only the Garden Warbler provided sufficient bill measurements for examination though all but one of those shown in Figure 1 were juveniles so possibly not fully grown. The

range of bill length of the Garden Warbler was greater than that of either sex alone of the Blackcap with the total ranges of the two species being very similar. Thus it seems that there could well be a difference in bill size between the sexes of Garden Warbler similar to that found in Blackcaps.

In an attempt to see whether or not the sexes share incubation, the number of birds with and without brood patches were compared during the breeding season as shown in Table 1. June was chosen arbitrarily to exclude birds which might not acquire brood patches until late.

Table 1. Numbers of adult birds with (P) and without (N) brood patches in June 1969-1973 inclusive.

	N	P	%P
Blackcap	14	55	80
Garden Warbler	2	12	86
Whitethroat	11	9	45
Lesser Whitethroat	1	32	97

The Table suggests that in Garden Warbler and Lesser Whitethroat both sexes almost certainly incubate as the proportions with brood patches significantly exceed the expected 50% if only females incubated. In other species examined such as Reed and Sedge Warbler, the proportion with brood patches is in fact less even than 50%. The Whitethroat provides figures typical of a species in which only one sex incubates which is confirmed by the fact that only one bird caught has ever been described as a male with a brood patch and that was by a trainee not noted for conscientousness! These findings are supported by a recent paper from Russia (Efremov and Payevsky 1973) which reported shared incubation and males with brood patches in Blackcap, Garden Warbler, Lesser Whitethroat, and Barred Warbler but no male Whitethroats with brood patches. No other species caught at Wicken appear to share incubation to the extent of males developing brood patches.

Timing of captures of sexes of Garden Warbler and Lesser Whitethroat cannot be investigated as there is no way of separating them. The Whitethroat data were examined though this species has been rather scarce at Wicken since 1969 so the sample was not very large. No obvious difference was found on examination of times of capture of 92 birds of which the sex was recorded.

Conclusion

With direct observations not yet available it would be unwise to speculate on the significance of our findings. It seems very probable that feeding differences will be found between the sexes of Blackcap and possibly some of the other Sylvia warblers as well. Obviously there is interesting work to be done and this will be developed in 1974. Two lines of observations would be worthwhile.

1. Watching of nests to see how incubation is shared and more importantly to see if the sexes differ in timing of visits to young and kinds of prey brought.
2. Watching of adult Sylvia warblers especially Blackcaps which can be sexed in the field to see how they compare in feeding method and stations.

Reference

Efremov V.D. & Payevsky V.A. (1973) (Incubation behaviour and incubation patches of males in five species of genus Sylvia) Zool. Zh. 52: 721-728. (Russian with English summary).

AUTOMATIC DATA HANDLING

After six years of ringing at Wicken the volume of data available is so great as to present considerable problems in data handling for the purpose of analysis. This is particularly true for the Acrocephalus warblers where nearly 4000 birds have been ringed and many retraps handled. For many species information retrieval for even simple analyses is daunting while complex analyses are virtually impossible, so that little use is being made of much valuable data. It is clear that this situation can but deteriorate further if ringing activities continue and there is an obvious need for the introduction of some mechanical data handling procedure. While the prime aim of introducing such a technique would be to increase the accessability of data it would also make possible more complex analyses, such as multiple regression or principle component analyses, and should permit the automation of chores such as the compilation of species sheets and ringing schedules.

Following discussions a system based on punch cards has been developed and is being tested using Great Tit data. The system is based on the preparation for each bird handled of a punch card bearing full details of species, date, place, ring number, ringer and all measurements or observations. Since it is planned that cards will be prepared from field sheets, either directly or indirectly via coding sheets, layout has been based on current field sheets. It is envisaged that the normal procedure will be the transfer of data from field sheets to coding sheets, this preferably being done at the Fen or before field sheets are returned to the Secretary, followed by card punching.

The possibility of redesigning field sheets to obviate the need for separate coding sheets is being considered but punching from coding sheets does avoid the necessity of the operator being conversant with coding conventions.

Card layout and coding conventions are detailed below. With characters separated by one column to facilitate card checking 55 of the 80 columns available are committed. The 25 columns remaining are available for further measurements; such as bill dimensions, eye colour or eye ring status, tarsus length, secondary or tail moult, etc.; or for derived data.

Card columns	Character	Notes on Coding
1–2 (2)	Place	Arbitrary code for place of ringing (e.g. Wicken Fen), left blank at present.
4–6 (3)	Site	Wicken ringing sites (A–K) and subsites (1–9) plus one spare column currently allocated to standard and non-standard sites (S/N).
8–13 (6)	Date	Day (2), month (2) and year (2).
15–21 (7)	Ring Number	
23–25 (3)	Species*	Unique three letter code for each species. Code derived from first, second and last letters of name save in case of species with three word names where initial letter of each word used. A limited number of clashes occur but can be easily removed.
27 (1)	Age	Euring code 1–9
29 (1)	Sex	No sex/Male/Female (O/M/F).
31 (1)	Moult	Presence or absence of moult (M/O).
33–34 (2)	Primary Score	1–50 for passerines.
36–38 (3)	Wing	Wing length in mm.
40–43 (4)	Weight	Weight in tenths of grams to avoid decimal points.
45–46 (2)	Time	To nearest hour on 24 hour clock, 30–59 minutes past hour taken to previous hour.
48–50 (3)	Ringer	Initials of ringer.
52 (1)	Brood Patch	Brood patch present or absent (P/N).
54 (1)	Ringing Status	Unringed/Retrap/Control (O/R/C).

*Sufficient space is currently available to allocate 20 columns for this character which would allow the inclusion of the full name of most species. Such provision would, however, increase punching time, could increase punching errors and would reduce to eight columns the space available for other material.

If the system proves viable then details of more than 20,000 birds ringed and retrapped since 1968 and presently recorded on species sheets will need to be coded and punched. It is probable that the intermediate transfer to coding sheets will be necessary in view of the contrasting orders in which data are recorded on field and species sheets and the absence of Euring age codes prior to 1971. This exercise will obviously be demanding of time and enthusiasm but will save considerable amounts of both once completed. One can then envisage the virtually instantaneous plotting of curves of the number of birds caught against time of day, immediate calculation and comparison of male and female wing lengths or the rapid computation and contrasting of seasonal weight changes. More complex exercises such as the preparation of life tables or population age structures will become straightforward and complex analyses such as the multiple regression of weight on sex (or winglength), time of day and time of year become feasible.

THE MASS COVERAGE WEEKENDS

In 1970 a scheme was started to monitor bird populations of different areas of the Fen by netting in a standard way on four selected weekends (WFGR 2: 26-29). This scheme has been continued each summer with only minor interruptions, though it has sometimes proved difficult to assemble the man-power and the net required to work so many sites simultaneously. This note aims to demonstrate the kind of results likely to emerge from such a scheme and outlines a recommendation for its continuation with minor modifications in future.

Sites

One of the first aims of this study was to quantify the differences of bird populations between the six sites chosen. The sites were described briefly in 1970. A and B at the north end have predominant scrub and carr with the reed-fringed brickpits at A1. F is the Reed Bed on Adventurers' Fen. The sites are sub-divided but without a more detailed and quantitative analysis of the surrounding vegetation it would at the moment be speculative to discuss any but the more obvious differences of bird communities.

To present the differences between sites it was found preferable to express the number of captures of adults of any one species as a percentage of the total catch for the site. This compensated for the marked variation in total catch from site to site. Non-passerines, Swallows and Jays were excluded from the analysis because they are not sampled representively by mist netting. In the four years there were only 59 captures of these species from a total of 4887 birds handled. Thirty other species of small passerines were caught.

The data presented in Table 1 show the composition of bird populations of the six sites and suggest a host of questions to be answered and avenues of further research to be explored. It would be valuable to obtain some quantification of the diversity of the vegetation particularly its structure to compare with the different diversities of the bird communities. At the level of bird species one wants to know why any one is more common on one site than another and this suggests a need for further studies of habitat utilisation of different birds. Some associations and differences are immediately apparent such as the only dry scrubby site (B3) being a favoured haunt of Whitethroat, Lesser Whitethroat and Willow Warbler, while Reed and Sedge Warblers are scarce there. The sites most closely associated with the carr (A2 and B2) have Bullfinches in number while Redpolls seem to favour wetter scrubby areas particularly with small willows. Overall, there is a remarkable similarity between sites. Four species (Reed Warbler, Sedge Warbler, Bullfinch and Dunnock) together make up more than half the total bird population and three or four of these occupy the top four places on each site. The Dunnock and Sedge Warbler seem to be the most generally numerous birds with the Reed Warbler and Bullfinch showing more signs of preference for special habitats in which they are very numerous.

Table 1. Percentage composition of total catch of adult passeries at each of six sites sampled 1970-73. The thirty species listed make up 99% of all birds caught.

SITE	A1	A2	B2	B3	FR	FL	TOTAL
TOTAL CATCH	543	496	698	326	379	481	2923
Great Tit	<1	2.0	1.3	2.5	–	<1	1.1
Blue Tit	<1	3.8	2.6	2.5	1.3	2.1	2.1
Willow Tit	<1	1.6	<1	–	<1	1.0	<1
Long-tailed Tit	<1	1.0	<1	2.8	1.6	<1	<1
Treecreeper	<1	<1	–	–	1.1	–	<1
Wren	4.4	4.6	2.9	3.4	1.8	2.7	3.4
Song Thrush	3.1	5.2	8.3	5.5	3.9	4.4	5.3
Blackbird	4.8	5.2	5.2	11.3	3.9	3.7	5.4
Robin	4.4	4.0	3.4	2.1	1.3	<1	2.9
Dunnock	6.1	10.5	9.7	12.0	6.3	7.7	8.7
Nightingale	–	<1	<1	–	–	–	<1
Grasshopper Warbler	–	<1	<1	<1	1.6	<1	<1
Reed Warbler	34.6	14.9	10.9	4.0	27.2	40.5	22.2
Sedge Warbler	10.7	10.1	15.0	6.7	16.9	12.5	12.3
Blackcap	3.9	2.2	3.3	2.5	3.7	1.5	2.9
Garden Warbler	<1	<1	<1	<1	<1	–	<1
Whitethroat	<1	–	2.1	4.0	<1	<1	1.3
Lesser Whitethroat	1.5	–	2.0	4.3	1.1	<1	1.5
Willow Warbler	1.8	2.0	2.6	3.3	2.6	2.5	2.4
Chiffchaff	<1	2.0	<1	<1	<1	<1	<1
Greenfinch	1.5	4.2	1.1	2.1	1.3	1.5	1.9
Sp. Flycatcher	1.5	<1	<1	1.8	1.1	<1	<1
Goldfinch	1.5	1.4	1.7	1.2	1.3	–	1.2
Linnet	–	–	–	<1	1.1	<1	<1
Redpoll	2.4	1.6	5.2	3.1	5.5	3.7	3.6
Bullfinch	10.1	15.7	12.6	10.4	5.0	8.5	10.8
Chaffinch	<1	<1	1.3	3.1	<1	<1	<1
Yellowhammer	<1	–	<1	1.2	–	–	<1
Reed Bunting	2.9	5.8	3.2	2.1	7.9	3.1	4.1
Tree Sparrow	1.1	–	2.0	5.5	–	<1	1.4

Population changes

Many birds have changed their numbers during the six years that Wicken Fen has been studied. Some are very obvious but many could go unnoticed and it was hoped that the standardised netting operations would both reveal and measure any such changes. This analysis was again calculated from the percentage composition of the total catch because if the totals themselves were used they would be susceptible to enormous variations caused by weather and to a lesser extent the conditions of the nets and the enthusiasm of the netters. This method has the disadvantage that it will not detect changes in the total number of birds on the Fen. Shown in Table 2 are the changes of the more numerous species in the last four years.

Table 2. Percentage composition by species of the total catch each year. The 15 less numerous species are omitted.

	1970	1971	1972	1973
Blue Tit	2.0	2.4	2.0	1.8
Long-tailed Tit	1.4	0.3	0.5	2.2
Wren	2.6	2.5	5.1	3.3
Song Thrush	4.8	5.7	5.5	5.1
Blackbird	4.1	5.1	5.6	7.4
Robin	1.8	3.3	3.1	3.3
Dunnock	8.2	8.8	9.8	7.4
Reed Warbler	23.0	22.7	19.5	24.1
Sedge Warbler	19.0	13.4	8.1	7.3
Blackcap	2.6	2.4	3.9	2.5
Willow Warbler	2.0	3.2	3.0	0.9
Greenfinch	2.6	0.9	0.7	4.4
Redpoll	3.7	3.6	3.3	4.2
Bullfinch	6.5	9.4	14.1	14.0
Reed Bunting	3.7	4.6	4.1	3.8

The most notable changes apparent from the table are the increase of Bullfinches which is considered elsewhere in this Report and the marked decline of Sedge Warblers. It is apparent that figures for some species – particularly the less numerous ones are fairly erratic. Only time will tell whether the changes such as the apparent 70% fall of Willow Warblers in 1973 are real or not. The Sedge Warbler data are set out in more detail in Table 3 to see if differences between sites are apparent when a bird changes its numbers so drastically.

Table 3. Percentage change of Sedge Warbler population from year to year on six standard sites.

Year	A1	A2	B2	B3	FR	FL	TOTAL
70-71	–55	–42	+16	–56	–13	–30	–29
71-72	–58	+1	–48	–30	–32	–76	–40
72-73	–23	–80	+22	+40	+56	+53	–10
70-73	–85	–89	–26	–56	–8	–74	–62

It seems that there have been differences between sites. It is suggested that A1 and A2 are the least good sites for Sedge Warblers with the largest overall declines and no signs of the recovery apparent on the other sites in 1973. On the Reed Bed (F) conditions for Sedge Warblers have been variable from year to year as a result of differences in the early summer burning of the Reed Bed and the intensity of breeding season grazing of the surrounding areas. Further work of analysing Sedge Warblers retraps and habitat preferences could throw light on these apparent variations between sites.

Conclusion

The brief samples of data presented in this note suggest that our programme of standardised coverage of the six sites will yield information on the relationship between the bird populations and the surrounding vegetation. It also seems that any analyses of survival of different species

conducted in future will need supporting information on population levels of the bird and this method is our only satisfactory way of obtaining it. No mention has been made of the juveniles caught on these weekends and without doubt there is the possibility of comparing the productivity of young between sites and years which could be valuable in future. The value of the information generated has to be set against the very real difficulties of manning these four weekends.

One problem has been that in the first year the sites for each individual net were selected and have been adhered to since. As a result of growth of surrounding bushes at the north end and heavy cattle grazing at the Reed Bed many of these net sites have become totally unsuitable. Because of this and also because bad weather does not affect all sites equally, it is now believed that the total number of birds caught on a site is not a valuable statistic.

Thus for the future it is recommended that the standard footage of net allocated is deployed in the best places to catch birds within the bounds of the six sites. Thus ringers will use their skills to catch the maximum number of birds within the chosen areas and analysis will be based on species composition or age ratio of the catch.

Another possibility suggested has been to abandon the Reed Bed on these weekends and concentrate all the manpower and equipment at the north end. This would be a very regrettable sacrifice of information as it would prevent direct comparison between the two ends of the Fen which represent the most extreme differences of vegetation communities sampled. That sampling on all sites be simultaneous is very important because from week to week there are huge differences in the activity of birds. For instance one weekend might catch the first appearance of young or the first arrivals of a migrant while the previous weekend would miss them all and the following weekend would produce larger numbers.

It is strongly recommended that these four weekends generate more information per unit effort than normal operations and should be continued. If manpower is short it would be better to make cuts of coverage at other times.

BREEDING SUCCESS AND WEATHER

The large numbers of juvenile Blackbirds and Song Thrushes observed and caught during the summer of 1973 suggested that these species had had a good breeding season and stimulated the search for some procedure by which to compare breeding success in different years. Ideally any such measure should not be influenced by year to year differences in catching effort or in the weather conditions affecting mist-netting and should as far as possible be unaffected by non-resident adults and dispersing juveniles. The period over which adults and juveniles are safely distinguishable might also affect the choice of method. The index chosen to meet these criteria was the ratio of juveniles to adults caught during the period June, July and August, with any one individual contributing only once to the number of birds present. The ratio was calculated for eight common resident species and the values for the years 1968-73 are given in Table 1.

Table 1. Juvenile/adult ratios during the period June to August for the years 1968-73.

Species	Year					
	1968	1969	1970	1971	1972	1973
Blue Tit	0.75	2.88	4.00	2.60	1.70	3.65
Wren	0.77	0.97	3.33	2.44	0.98	2.66
Song Thrush	0.46	1.19	1.20	2.09	1.16	1.76
Blackbird	0.27	0.18	0.75	0.65	0.41	0.82
Robin	1.10	1.38	4.80	4.06	3.42	4.71
Dunnock	0.38	0.82	1.65	1.43	0.66	2.23
Redpoll	–	0.31	2.00	0.57	0.63	0.85
Reed Bunting	–	0.28	1.28	0.42	0.15	0.79

In some years small numbers of juveniles of certain species were caught in late May, these have been excluded from the calculation of the ratio but the numbers involved were too small to have any marked effect. Examination of the data suggests that the ageing of certain species was not entirely accurate in all years but no consistent bias was detectable. The low juvenile/adult ratios for all species in 1968 are associated with very limited ringing activity in July and August that year while the high figure for Reed Buntings in 1970 is partly due to juveniles being caught in late August feeding and roosting flocks, these values are not, therefore, fully comparable with those of other years. Despite these qualifications several species show marked differences between years and there are clear differences between species.

To test the significance of within species differences chi-squared comparisons based on the numbers of adults and juveniles caught were made for all possible pairs of years from 1969 to 1973. The results of these analyses are summarised in Table 2 from which it is evident that for most species juvenile/adult ratios were low in 1969 and 1972, suggesting poor breeding seasons, and high in 1970 and 1973, possibly indicating good breeding seasons. In the cases of Song Thrush and Blue Tit few differences are significant.

Table 2. Rank order of individual species juvenile/adult ratios for years 1969-1973 and significance of differences in ratio between years as indicated by chi-squared comparisons.

	Rank Order of Years					Significant Differences		
	1	2	3	4	5	P<0.001	P<0.01	P<0.05
Blue Tit	1970	1973	1969	1971	1972	–	–	70>72
Wren	1970	1973	1971	1972	1969	70>72,69 73>72	71>72	73>69 71>69
Song Thrush	1971	1973	1970	1969	1972	–	–	71>69
Blackbird	1973	1970	1971	1972	1969	73>69 70>69 71>69	–	73>72 70>72 72>69
Robin	1970	1973	1971	1972	1969	–	–	70>69 73>69 71>69
Dunnock	1973	1970	1971	1969	1972	73>69,72 70>72 71>72	–	73>71 70>69 71>69
Redpoll	1970	1973	1972	1971	1969	70>71,69	70>73,72	73>69
Reed Bunting	1970*	1973	1971	1969	1972	70>71,69,72	71>72	73>69

* Value possibly inflated, see text.

Overall differences between years were assessed by converting the rank order of juvenile/adult ratios for each species (Table 2) to rankits (Bliss, 1967) and comparing the rankit values of years by an analysis of variance. Years differed significantly (P<0.001) in their rank position. Table 3 summarises these differences and confirms that 1970 and 1973 were probably good breeding seasons whereas in 1969 and 1972 breeding success was probably low.

Table 3. Overall juvenile/adult rank order of years and significance of differences between years as indicated by the Duncan multiple-range test.

Rank order		1973	1971	1969	1972
1	1970	n.s.	*	**	**
2	1973	–	n.s.	**	**
3	1971	–	–	*	**
4	1969	–	–	–	n.s.
5	1972	–	–	–	–

* significant at the 5% level.
** significant at the 1% level.

Weather conditions during the breeding season, particularly during the nesting period, are one possible cause of yearly variations in breeding success. Different species are of course likely to be affected by conditions at different times of the year while any relationship may be complex or may be due to extreme conditions occuring on only a few days. A crude attempt to detect any association was made using the limited weather data available from Swaffham Prior, 6 km S.S.E. of the Fen, for the years 1969-72 (Clarke, 1970, 71, 72, 73). Data for 1973 are not yet available but impressions suggest that the summer was warm and dry. The apparently good breeding seasons of 1970 and 1973 were characterised by warm, dry, weather while the remaining years were colder, wetter, or both colder and wetter, than these. 1969 was warm but wet, especially in May; 1972 was dry but colder than normal; while 1971 had low temperatures and high rainfall but was not as cool as 1972 nor as wet as 1969. The not surprising conclusion is that either lower than average temperatures or higher than average rainfall reduce breeding success. It is not currently possible to assess the relative importance of the two variables nor to indicate the period of the year at which their levels are most critical.

It would appear from these results that there is scope for the use of summer juvenile/adult ratios as an index of breeding success. When more data are available it might prove possible to suggest likely causes for the obvious year to year variations which occur.

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BULLFINCH SURVIVAL & POPULATIONS

This note aims to examine how retrap data accumulating from Wicken ringed birds can provide information on how long birds live. The Bullfinch was selected because it is one of Wicken's more numerous breeding birds and it also has a recognisable first year plumage which can throw confirmatory information on the results of the retrap analysis. Bird survival from retraps is not well studied and when a good body of data for other species has accumulated, it will be possible to calculate mortality rates of warblers which are not known at all.

Retraps

Shown in Table 1 below are all the individual Bullfinches which have been recaught in at least one summer subsequent to ringing. Each individual is recorded once only, in the year in which it was last seen.

Table 1. Years of last capture of Bullfinches proved to have survived at least one year

Year ringed	1969	1970	1971	1972	1973
1968	11	1	1	0	0
1969	–	15	8	7	9
1970	–	–	26	6	10
1971	–	–	–	41	20
1972	–	–	–	–	42

This table takes no account of the number of birds ringed in the initial year and the analysis only considers birds which were caught in at least two different years, thus excluding all but birds which actually breed in the area.

Survival of adult birds from one year to the next can be estimated from the table. For instance in 1971, all the 67 birds enclosed in the solid line were known to be alive. Of these, the 35 partitioned by the dashed line were not known to have lived beyond 1971 and were thus presumed to have died. Between 1971 and 1972 an estimated 35 out of 67 or 52% died and 48% survived.

This is a minimum survival figure because some birds will live a year (or more) longer than recorded by avoiding capture during their last summer(s). To compensate for this, all retraps were checked to see how many birds known to have survived a period were actually caught in intervening years and how many were not. There were 42 cases of birds missing a year and then reappearing out of a possible total of 98. Thus in the years 1970-72 trapping efficiency was about 57%. Differences in catching effort between the years 1970-73 were small. Survival rates were corrected from a theoretical calculation which show that:

$$S = s^1 / e(1 + s^1)$$

where s^1 is the initial estimate of survival rate, s the true value and e the trapping efficiency.

Shown in the table below are the observed (minimum) survival rates and the corrected values estimated on the basis of a 57% trapping efficiency.

Table 2. Percentage survival and mortality rates of Bullfinches

Year	Minimum (s^1)	corrected (s)	Mortality
1969-70	15	23	77
1970-71	61	66	34
1971-72	48	57	43
1972-73	42	52	48

These figures indicate a variation between years with particularly heavy mortality in winter 1969-70, and more consistency in the other three years. There is suggestion of an increased survival rate in the recovery period following the 1969-70 crash so it is difficult to decide which is the normal annual mortality of a stable population. A figure just under 50% is indicated from the last two winters.

Age of breeding birds

In a stable population the annual loss of adults will be balanced by an identical recruitment of young into the breeding strength. A species like the Bullfinch can be aged during its first summer of life so the recruitment can be measured as the percentage of one year old birds in the breeding population. The figures for April to July were lumped because there was no sign of systematic variation of the age ratios during the summer. The sexes were also combined because differences were too small for significance though it seemed that females might have a slightly higher mortality than males.

Table 3. Percentage of first year Bullfinches in breeding population (April–July)

	1969	1970	1971	1972	1973	Total
Adults	116	65	107	79	130	497
First year	88	46	189	125	91	539
% First year	43	42	64	61	41	52

The mean annual mortality of Bullfinches based on this method is 52% – marginally higher than that found from the retrap analysis.

Breeding success

Calculation of mortality rates from the first year/adult ratio has the disadvantage that breeding success the previous summer and population change could in any one year give an erroneous mortality estimate. Before comparing the mortality rates derived by the two methods, it is thus important to see how breeding success and total Bullfinch numbers have varied at Wicken in the relevant years. Breeding rate was assessed by comparing the numbers of adult and juvenile birds caught as shown in Table 4.

1969 figures are unreliable because coverage in August was thin, so the main flush of juveniles avoided capture. In the other years, breeding success was variable. Furthermore the most productive year, 1970, was followed by the summer with the highest first year/adult ratio and the least productive, 1972, was followed by the lowest ratio the next year.

Table 4. Total number of individual Bullfinches caught on the Reed Bed each summer (April–August)

	1969	1970	1971	1972	1973	Total
Adults	63	54	120	100	96	433
Juveniles	9	38	64	39	55	205
Juvs/Ad.	0.14	0.70	0.53	0.39	0.57	0.47

Thus although the argument stands that in the long term the recruitment and annual adult mortality should be equal, in any one year the previous season's breeding success will influence the results so that mortality differences between years cannot reliably be detected by this method.

Population levels:

Since 1970 netting has been organised in a standardised way on four weekends each summer in order to provide a comparable sample from year to year of the numbers of birds present. Bullfinch figures are shown in Table 5.

Table 5. Total captures of adult Bullfinch on standardised weekends, compared with catches of all adult birds.

	1970	1971	1972	1973	Total
Adult Bullfinches	48	82	108	77	315
Total adult birds	748	883	775	557	2963
Bullfinch as % of total	6.4	9.3	13.9	13.8	10.6

It seems that Bullfinch populations were at a low level in 1970 and increased steadily by 45-50% per annum, to a stable level in 1972 and 1973.

Conclusion

The data presented give a coherent picture of breeding, mortality and population levels of Bullfinches at Wicken since 1969. Abnormally high mortality in winter 1969-70 probably reduced the population to half its normal level in 1970. Recovery then took two years and it seems that during this period adult mortality was low and productivity and recruitment of young were high. In future years, these techniques of assessing breeding, mortality and population levels of Wicken birds will provide enough data to calculate normal levels and their variability and thus to construct population models for a range of species most importantly the warblers which have received little previous study. The analysis of first year/adult ratios was not very helpful in showing up annual variations but it did serve as a rough confirmation of mortality rates calculated from retraps. For most species, this extra method of study is not available.

ST EDMUNDS FEN

St Edmunds Fen is an area of Wicken Fen that has received little attention from the Group in the last five years. A limited amount of ringing was conducted there in 1970 and there have also been a small number of visits for specific purposes. In order to show that this neglect is unjustified and to investigate the avifauna of the area, ringing was carried out on St Edmunds Fen for three weeks during summer 1973 – a week each in July, August and September.

The vegetation of St Edmunds Fen is similar to that of a large part of Wicken Sedge Fen (Harvey 1969). It consists of dense impenetrable thickets of buckthorn and alder buckthorn, 3–4 metres in height. There is also some hawthorn. Along the north side there are tall willows and thickets of osier and privet with a ground flora consisting of grasses, brambles and nettles with a few reeds. In the centre of the Fen there is a small ash-wood, and a few oaks. To the north of the Fen there is an open area of dry land with grasses, meadowsweet, willowherb and a few young willows. The small adjoining area of Wicken Poors Fen is at a lower level than the main part of St Edmunds Fen. It is permanently very wet – almost a swamp, with dense alder buckthorn, willows and a sparse undergrowth of sedges.

Access to St Edmunds Fen is limited by the small number of paths and this restricts the available areas for erecting mist nets. Netting was confined to the north and west sides of the Fen. Within any one area, about 400ft of net was used in certain standard sites to allow comparisons of catches by month. A wide variety of sites and habitats was sampled. The most successful sites were those between bushes that were favoured as feeding areas. Nets in the open areas showed very variable productivity, being most successful in overcast conditions. Nets under tall trees with little or no shrub layer caught few birds as did those erected on paths closely flanked by buckthorn taller than the nets. These results support general observations elsewhere on the Fen.

A total of 681 birds were caught of which 576 were ringed. The species composition of the catch is shown in Table 1.

Table 1. Variations in catch composition by month for thirteen more numerous species. Figures are percentages of the total catch in the month concerned.

	July	August	September
Blue Tit	4.9	2.8	2.5
Wren	6.4	9.6	7.0
Song Thrush	9.0	4.8	5.8
Blackbird	9.0	6.0	4.6
Robin	7.0	7.2	10.5
Reed Warbler	5.5	12.4	9.3
Sedge Warbler	4.6	1.2	1.2
Blackcap	9.3	10.4	5.8
Garden Warbler	–	4.0	–
Willow Warbler	2.0	4.8	–
Chiffchaff	0.9	3.2	–
Dunnock	12.8	9.6	8.1
Bullfinch	12.2	10.2	30.2

Few adult Acrocephalus warblers were caught reflecting the absence of suitable breeding habitat though a considerable number of young Reed Warblers all apparently independent of their parents moved into the area later in the autumn. The numbers of Robins, Blackbirds, Song Thrushes, Dunnocks and Wrens were comparable to those caught in the brickpits area of the Sedge Fen.

The most notable feature of the August catch was the large number of Sylvia and Phylloscopus warblers comprising 25% of the total. Most had weights well above the breeding season average but unfortunately none were retrapped at suitable time intervals to show individual weight gains. It appears that St Edmunds Fen might be an area for feeding in the premigratory period. Since the retrap rate for these warblers was low, they may have been passing through fairly rapidly. No adult Blackcaps or Garden Warblers were caught in August although in July, 25% of the Blackcap catch consisted of adults many still with brood patches.

The catch contained very large numbers of Bullfinches. In July and August they comprised 12% and 10% of the catch which is high compared with elsewhere on the Fen, and in September there was apparently a massive influx with 30% of the catch being Bullfinches, mainly young birds.

Very few birds ringed on other areas of the Fen were retrapped. Although the brickpits area is slightly closer than the Reed Bed and of more similar habitat, there were equal numbers of birds originally ringed at these two sites. Willow Tits from the Reed Bed showed a tendency to visit St Edmunds Fen, even being subsequently retrapped again on the Reed Bed. Robins in the area appeared to have come from the brickpits, as had most of the Bullfinches and Chiffchaffs, while Willow Warblers were all from the Reed Bed. The apparent movement of adult Bullfinches into St Edmunds suggests that this might be an important moulting area.

In addition to ringing, various other work was carried out on St Edmunds Fen. A considerable number of moult cards was completed including one for a Lesser Spotted Woodpecker which was subsequently retrapped on Spinney Bank. Bill measurements of all Sylvia and Phylloscopus warblers were taken. Several nests were found and some pulli ringed.

St. Edmunds Fen is a useful additional site on which to study bird populations of Wicken Fen. Preliminary observations suggest that it is an important autumn feeding area for some warblers and a moulting ground for finches. It deserves further study.

Reference

Harvey H.J. (1969) The Vegetation of Wicken Fen and Adventurers' Fen. WFG Report 1: 12-16.

THE MOULT ENQUIRY

Since its inception the Group's policy has been to collect as much information as possible from the birds trapped for ringing relevant to studies being carried out on a national or local scale. For this reason ringers-in-charge have been asked to ensure that moult cards should be completed for any species in wing or tail moult, and a note on the enquiry appeared in the Group's report for 1970.

The following table shews a list of species for which moult cards have been completed in the past three years and indicates which species are most commonly caught at the Fen while moulting.

Table 1. Totals of moult cards by species and index of catches.

	1971	1972	1973	Total 1970-73	Catching index (Ads)
Mallard	2			3	
Red-legged Partridge		1		1	
Snipe	1		2	3	12
Woodcock			1	1	
Woodpigeon	1			1	3
Turtle Dove			1	1	3
Collared Dove				1	
Tawny Owl		1		1	1
Swift			1	1	
Kingfisher				1	1
Lesser Spotted Woodpecker	1		2	3	1
Jay		2	1	4	3
Great Tit	2	6	3	13	32
Blue Tit	11	19	21	66	61
Willow Tit	8	6	1	22	18
Long-tailed Tit	20	83	25	137	29
Treecreeper		1		4	9
Wren	5	10	7	23	98
Song Thrush	9	15	14	54	155
Blackbird	17	35	25	115	158
Nightingale				1	2
Robin	4	2	6	16	84
Blackcap	1	13	4	20	84
Whitethroat	2	1	1	7	37
Lesser Whitethroat	3	2		5	43
Willow Warbler	15	9	4	33	71
Chiffchaff	3		2	6	20
Spotted Flycatcher				2	26
Dunnock	12	20	13	55	253
Greenfinch	5	4	1	14	56
Goldfinch	3	5	4	15	37
Linnet	2	4	2	9	7
Redpoll	1	34	8	47	106
Bullfinch	23	19	19	64	315
Chaffinch	5	2	2	11	25
Yellowhammer		1		4	10
Reed Bunting	12	19	6	56	119
House Sparrow			2	2	
Tree Sparrow	2	113	136	561	
Yellow-faced Grassquit		1			
Totals	170	448	316	1385	

From even a cursory glance certain anomalies appear in such a table, some of which can readily be explained, while others are more puzzling. The most conspicuous figure (apart from the Tree Sparrow's, which flocks in autumn, and for which a special trapping effort has been made), is probably that for the Long-tailed Tit, which although caught less commonly than the Blue Tit at the Fen, regularly accounts for a much larger number of completed cards. In this case the explanation is simply that the species undergoes a complete post-juvenile moult so that both adults and juveniles are likely to be in moult if caught during the late summer and early autumn.

For the disparity between the figures for Song Thrush and Blackbird no such ready explanation is available to test whether such a disparity could be traced to the relative catching rates. Sample figures for the catches of adult birds of the relevant species were taken from the trapping for the weekends when mass effort is applied on several sites simultaneously on the Fen. These figures appear in the righthand column of Table 1.

The total capture figures for the two thrushes on the 'mass weekends' reveal that similar catching rates operate, and yet between 1970 and 1973 almost twice the number of moult cards completed for Song Thrush have been completed for the Blackbird.

From a further inspection of the figures in the righthand column of Table 1 other disparities of a similar kind can be observed, suggesting further evidence for puzzling anomalies between catching rates and the numbers of moult cards completed.

While 315 Bullfinches have been caught only 64 moult cards have been completed, compared with the 56 cards completed for Reed Buntings, for which the mass trapping index is 119. Both the Wren and the Robin are caught regularly through the summer and yet neither is caught in moult as often as the Blue Tit for which the moult card total exceeds the mass weekend index. These data are plotted in Figure 1.

Discussion

Clearly several factors might account for these puzzling anomalies. The first which should be considered is observer error. It may be that in some species moult is overlooked because its presence is not as obvious as in some other species for which cards are more frequently completed. With some 'unpopular' species it may not be looked for at all in the observer's haste to release the bird as soon as possible after the minimum processing has been carried out. This divergence of treatment would not, however, explain the difference in the Blackbird : Song Thrush ratio since both rate 'unpopularity' of this kind.

It may be that not all ringers-in-charge exercise the same degree of watchfulness during the key periods of the summer to ensure that less experienced ringers do not overlook moulting birds, or possibly that they feel the process to be of lower priority than others at times of pressure.

Apart from the speed at which moult is completed, which in species such as the Lesser Whitethroat is faster than in most passerines, there may be other factors which produce anomalies of this kind, and which relate to behavioural differences between the species. In some species changes of food sources and of habitat are known to occur in late summer and this may well take them out of the Group's regular catching areas. For the rest it may be that during the period of the moult certain species remain relatively immobile during the course of this physiologically demanding process, which would again make them much harder to catch.

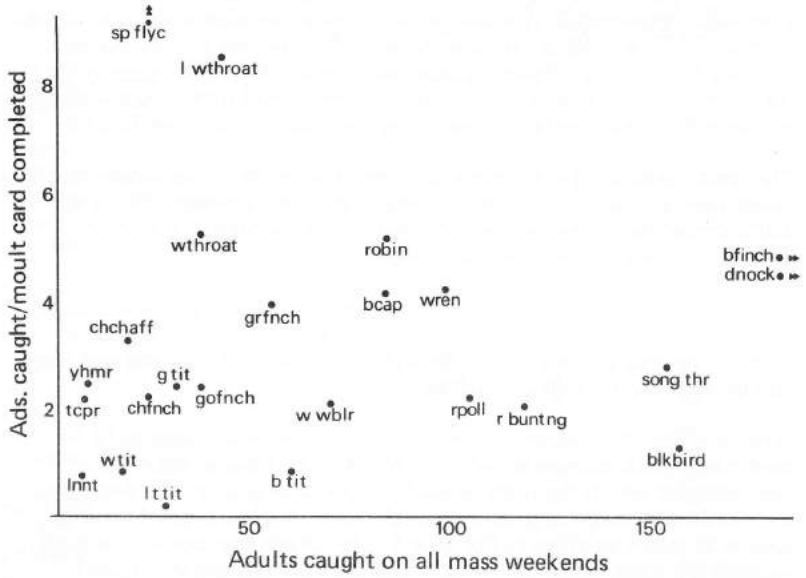


FIGURE 1 Ratio of number of adult birds caught on mass weekends to number of moult cards completed plotted against number of captures (to spread the points).

The purpose of this note is to stimulate all members of the Group to continue to complete moult cards for all species caught in wing or tail moult, since with more data available it may be possible to review the subject more profitably in a few years' time.

GROWTH OF REED WARBLERS

Stewart (1963), studying Blue Tits, suggested that the wing-length of adult birds did not change significantly from year to year, although adult wing-length was clearly longer than that of full-grown first year birds. However, Pienkowski and Minton (1973) have recently shown that, in the Knot, adult birds continue to grow in wing length at each annual moult.

At Wicken Fen, 211 of the 1604 Reed Warblers ringed between 1969 and 1972 have been retrapped in one or more of the following years. A study of this retrap population could provide evidence on wing length variation with age in this species.

Juvenile birds caught in late summer are seldom more than three months old. It is not clear whether their primaries are of maximum length, hence a comparison of juvenile wing length with that of the same birds when they are a year old is likely to be meaningless. In addition, Reed Warbler moult in Africa seems to be a protracted process (70-80 days), occurring throughout the winter (November to March), (Pearson 1973), so adult-plumaged birds arriving in Britain in spring might have primaries anything from two to six months old. This uncertainty in plumage age would add to the hazard of a comparison.

Pearson (1973) indicates that both adult and first year Reed Warblers moult during the winter; birds arriving in Britain in spring can therefore not be aged by plumage. During the summer the primaries appear to become progressively abraded; however, a statistical test on the adult birds (from amongst the 211 surviving at least one migration) does not permit one to claim any linear decrease in wing length with time.

Table 1. Change in wing length of adult Reed Warblers caught more than once in the same summer.

Recapture interval	Sample size	Mean change (mm)	S.D. (mm)	Significance (students' t - test)
Same month	186	−0.10	1.32	–
After 1 month	112	−0.11	1.11	–
After 2 months	34	−0.64	1.09	$P < 0.01$
After 3 months	4	−0.75	0.44	–

Table 1 shows the data – the difference in mm, between successive measurements of the same birds throughout one summer. Although all measurements at Wicken are taken by method 3 of the Ringers Manual, individual variation between measurers (Thorne 1972) causes a large scatter. In Table 1, the mean, and standard deviation, of wing length differences between capture and recapture of individual birds is shown. A tendency, in terms of wing length reduction with age, may perhaps be seen, but with the sample taken, cannot be proved. The use of a larger sample (not restricted to migration-survivors) might settle this point.

Pienkowski and Minton (1973), having demonstrated finite wing length loss between moults in the Knot, were able to apply a correction when subsequently comparing measurements from one year to another. This, of course, cannot at present be done for the Reed Warbler. Tables 2 and 3 however show wing length comparisons from year to year made in two different ways. In Table 2, *all* adult Reed Warblers caught in more than one year were analysed, without any note being taken of which month of the year the capture occurred. When more than one measurement was made in a single year, the mean of those measurements was used to obtain that year's value. Comparison between measurements was then made, for the spans of one, two, three and four years; the data for same month retraps (Table 1) appear again as a baseline. In Table 3, the data are presented similarly, but the Reed Warbler sample is restricted to those adults caught *in the same month* in two or more years. In this way, exact 12, 24, 36 etc. month intervals are taken, whereas in Table 2, a one year's interval, for example, will include any period from about 9 to 15 months.

Table 2. Change in wing length of adult Reed Warblers caught in more than one summer at Wicken. No correction made for month of capture.

Recapture interval	Sample size	Mean of change (mm)	S.D. (mm)	Significance (students' t - test)
Same month	186	−0.11	1.32	–
One year later	158	+0.44	1.40	$P < 0.001$
Two years later	63	+0.84	1.34	$P < 0.001$
Three years later	13	+0.92	1.32	–
Four years later	4	+2.13	1.66	–

Table 3. Change in wing length of adult Reed Warblers caught in the same month of two or more years at Wicken.

Recapture interval	Sample size	Mean of change (mm)	S.D. (mm)	Significance (students' t - test)
Same month	186	−0.11	1.32	–
One year later	84	+0.40	1.22	$P < 0.001$
Two years later	29	+1.04	1.15	$P < 0.001$
Three years later	7	+1.23	1.27	–
Four years later	2	+2.5	–	–

Tables 2 and 3 indicate that there is a growth in wing length of adult Reed Warblers of about 0.4 mm per year, at least over periods of one and two years. These changes in mean wing length are significantly difference from zero (students t-test < 0.001); chi-squared tests of the changes (increases v decreases) confirm the significance of the increase (P in all cases < 0.05). Continued increase over longer periods (3 and 4 years) seems likely, but the sample sizes are too small for significance to be assessed.

Presumably increased wing length is achieved by the development of longer feathers at moult. A progressive ability to reduce abrasion rate (whose value *might* be about 0.2 mm per month, from Table 1) seems most unlikely. The growth rate indicated by the data of this paper is 0.6 – 0.7% per year.

References:

Pearson D. J. (1973) Bird Study *20*, 24
Pienkowski M. W. & Minton C. D. T. (1973) Bird Study *20*, 63
Stewart I. F. (1963) Bird Study *10*, 1
Thorne C. J. R. (1972) Wicken Fen Group Report *4*, 22

SEX OF KINGFISHERS

This short note examines the possible discovery of a method of determining the sex of young Kingfishers, based on bill-length and breast colour. In view of the scarcity of data obtained so far, the intention is to emphasise the importance of recording rather than to state conclusions which cannot reliably be drawn.

Until recently the sex of young Kingfishers was determined by the method given in the BTO Guide, whereby females have an orange area on the lower mandible and males do not. This characteristic does not appear to develop until the first autumn of life so all Kingfishers caught in late summer at Wicken are recorded as males. During 1973, Kingfishers have been examined in the hope of finding a reliable method of sex determination. Since August, two features which could be useful have been noted. The depth of colour of the breast-band has been recorded and the length of the bill from the tip to the junction with the skull has been measured.

The breast-band appears to show two distinct types. The first is a clear band of deep greenish-blue about 1cm in width formed by the distal half of the otherwise chestnut feathers being green. The second type is a faint band of a paler green that is barely visible as a distinct band and the feathers are only tipped with green.

The bill-lengths show a distinctly bimodal pattern correlating with the breast-band colouring. All the birds with dark breast-bands had shorter bills than the others. 40mm seems to be a suitable division between the two types.

A greater frequency of long-billed birds later in the year raises the possibility that the short-billed birds are from later broods and have not grown to their full extent or lost their juvenile breast band. This possibility is weakened by the lack of birds in intermediate plumage or bill-length categories. Unfortunately no birds were retrapped after a sufficient time interval for detection of any change to be possible.

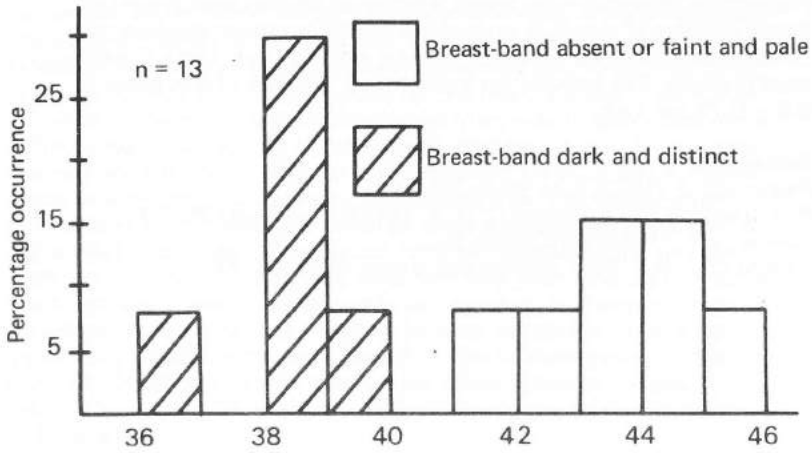


FIGURE 1 Frequency distribution of bill-lengths of young Kingfishers.

With some species where the sexes are indistinguishable by plumage characteristics, the wing-lengths show a bimodal distribution and the probable sex of an individual can be assessed from its winglength. Kingfishers however do not show this characteristic as shown in Fig. 2.

Many more observations must be made before these parameters of bill and colour can be used for sex determination. In conclusion it is tentatively suggested that birds with bills shorter than 40mm and dark distinct breast-bands belong to one sex and birds with bills longer than 40mm and absent or faint breast-bands to the other. It is not yet certain which birds are which sex but seems that the females might be the longer billed.

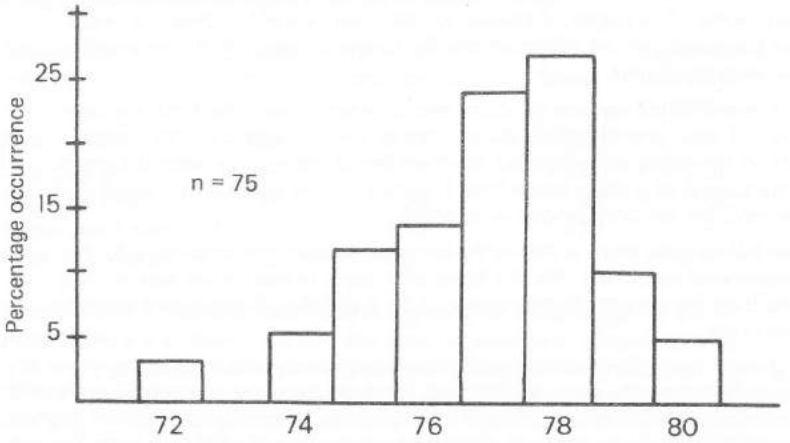
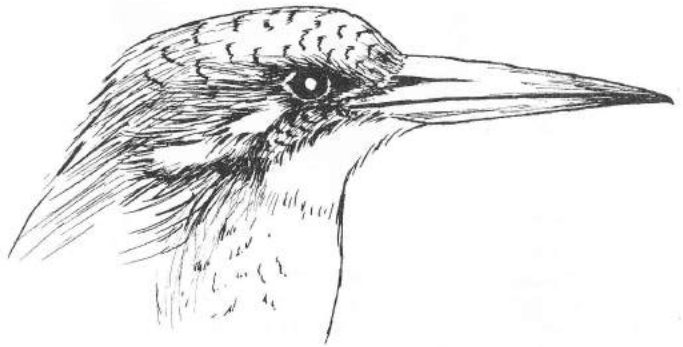


FIGURE 2 Frequency distribution of wing-lengths of young Kingfishers.

Short bill and distinct breast band



Long bill and faint breast band

NOTE Since the writing of this article a skull of a young Kingfisher with a bill only 33mms long has been measured. It seems that bills of juveniles might take some time to reach full length.

RETRAPS AT THE REEDBED

1969 was the first year in which the Group carried out any ringing in the area around the Wicken Reedbed. Since that year, however, the majority of birds handled have been caught within 600 metres of the site of the ringing hut (areas F, G, J and K).

An analysis of retrap frequency in the catch (by half-month periods, for all species combined excluding Swallows) shows that the pattern for the years 1970-1973 has been very consistent. There is little evidence of progressive "ringing saturation", although the 1970 figures are usually lower than those for subsequent years.

The diagram shows the data; individual points are plotted for any half-month period in which the catch for the area exceeded 100. The continuous line represents the combined 1970-73 records. In April and early May retraps form about 45% of the catch,there is a slight but consistent increase in retrap frequency in late May and early June. Subsequently there is a steady drop throughout the summer and autumn. Adequate winter data are lacking.

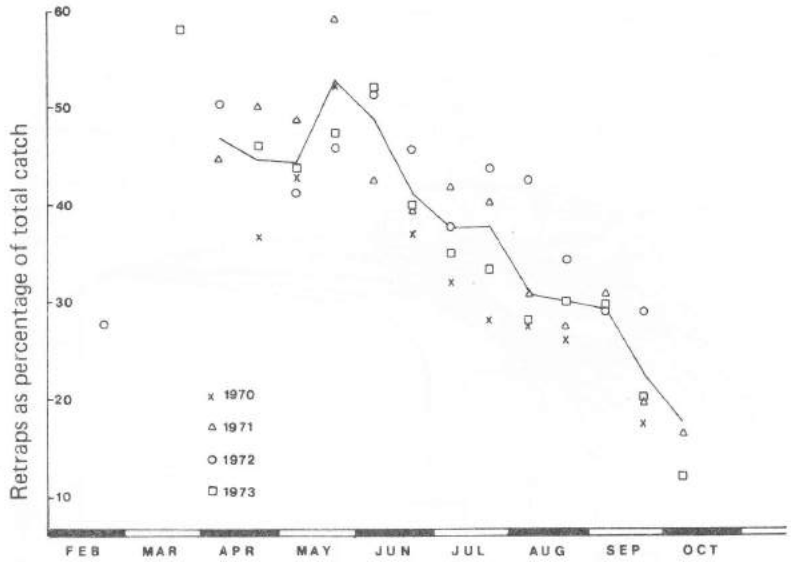
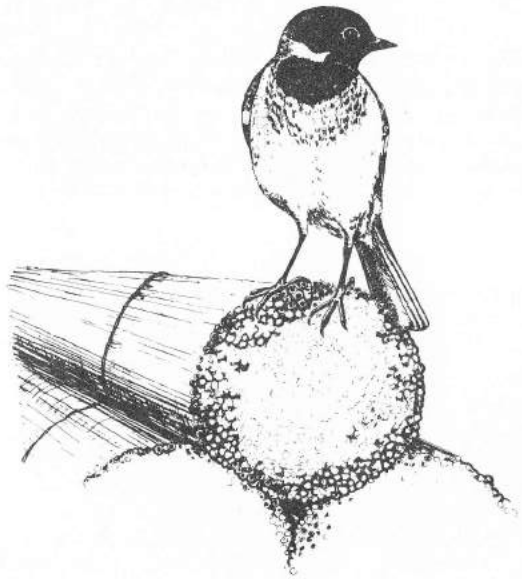


FIGURE Retraps in area F, G, J & K by half-month periods.

A tentative explanation of the pattern might be as follows: the high retrap frequency in May/June is because birds caught then are mainly residents in their breeding territories; the progressive appearance of locally bred young depresses the retrap proportion during the summer.

In autumn there occurs an influx of unringed birds (mainly juveniles) from more distant areas, both on and off the Fen. This, combined with the departure of ringed summer visitors, continues to reduce retrap frequency to its lowest point. During the winter many of the unringed non-residents move on, allowing a higher retrap frequency in April, when the main ringing season begins. Continued emigration of unringed birds, in conjunction with the arrival of ringed summer residents, produces the highest point in late May.

The data presented here refer to the overall bird population of the Reedbed; information on individual species, together with retrap data for the winter months, might fill in details of what is currently only an outline pattern.



NEST BOXES 1973

In April 1973, fifty nest boxes were erected on the west corner of the Fen along the edge of the carr adjoining Howe's and New Dyke. We had hoped to put them on St Edmunds Fen where tits and Tree Sparrows probably breed in better numbers. Apparently,however, human predation is severe in this area and we were warned that not only nest contents but also the boxes themselves would probably disappear.

The boxes were supplied by the Royal Society for the Protection of Birds who wanted to test a plastic design. The plastic boxes alternated with conventional ones at 15-20 metre intervals. Coupled with regular summer netting of adult birds we might collect some useful information on tit population dynamics and our work on Tree Sparrow moult requires some young birds ringed in the nest. It was hoped that boxes might help provide these data.

The actual histories of the boxes occupied are shown below. Odd numbered boxes are conventional wooden ones and even numbers are plastic.

No.	Species	28 Apr	6 May	19 May	26 May	2 June	1st egg	Inc. period
5	Blue Tit	4e	6e	hatching	6y	–	25 Apr	19
7	Blue Tit	unlined	8e	hatching	8y/1e	–	29 Apr	13
11	Blue Tit	7e	12e	y–1 day	10y/1e	–	22 Apr	15
12	Wren	moss	full	(5e)	(5e)	4y–6 days		
14	Tit sp.	nothing	grass	½ nest	–	deserted		
17	Blue Tit	3e	9e	y–1 day	8y/1e	–	26 Apr	14
18	Great Tit	nothing	½ nest	–	9e	deserted		
37	Blue Tit	1e	9e	y–1 day	10y	–	28 Apr	12
49	Blue Tit	9e	10e	y–2 days	9y	–	20 Apr	18

All the young were ringed and some of the Blue Tits were subsequently caught at the Reed Bed. Some of the adults were also caught and three out of six proved to have been ringed previously. Only three nests were started in the plastic boxes and of these only the Wren produced young. These three nests became very wet with condensation and the Wren probably only survived because the nest was well roofed with moss so the eggs didn't get soaked.

All six Blue Tit nests in wooden boxes produced young in quantity.

It was disappointing that no Tree Sparrows nested. It may be that the boxes were up too late for a colonial species which has a period of pre-breeding activity at its nest sites in the autumn. With luck, Tree Sparrows may nest in 1974.

The information presented in the table is obviously inadequate for much discussion, though one interesting point does emerge. Dates of first Blue Tit eggs were calculated on the basis of a laying rate of one egg per day and the incubation period on the assumption that it began on the morning of laying of the last egg. It seems that laying commenced over a period of nine days (April 20th-29th) but that hatching was only spread over two days (May 17th-19th). This increased synchronisation was brought about by enormous variation of the incubation period (12-19 days). This is not a factor mentioned in most studies of birds' breeding and would repay further investigation in future. It is important to time visits to nests carefully to collect all the required data with the minimum of wasted effort and it is hoped that this will be done in future years.

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