Peter Michael Miles Bircham

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, by waiving access restrictions and by reimbursing the cost of rings used during the year, has given the Group tangible support. To the National Trust Assistant Agent; the Committee Chairman and Secretaries, Dr. John Smart, Dr. Max Walters, Dr. Richard Barnes and John Harvey; the Warden, Lt.Col. Charles Mitchell and to Mr. and Mrs. Wilfred Barnes, the Group is greatly indebted.

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Wicken Fen Group Report No.6 1974

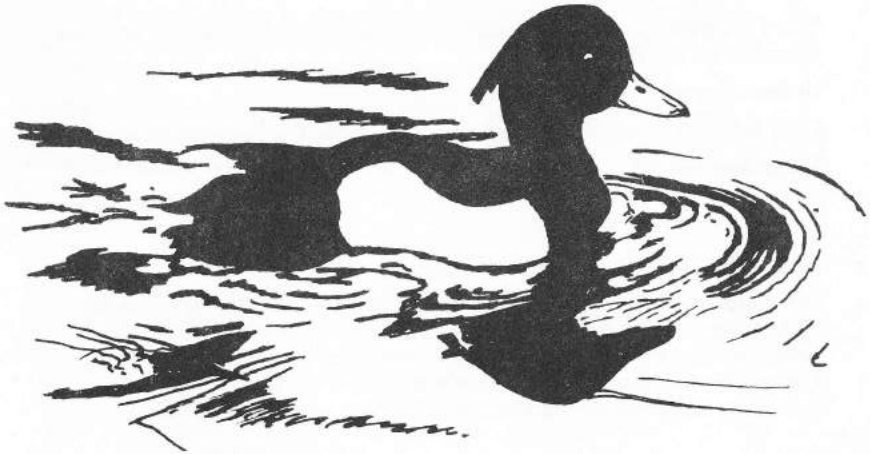
INTRODUCTION

In 1974 the Group conducted its routine programme on the Fen, working on 31 successive weekends from mid-March to mid-October. As always the Group's manpower resources were stretched from time to time but the Secretary's efforts successfully maintained coverage.

As usual this Report includes several contributions based on the results of trapping and ringing and on information collected from birds in the hand. The volume of data collected is now impressively large for many species. Considerable progress has been made in preparing some of this information for automatic processing and a short paper reports the first analyses using this new facility. Two papers on moult reflect the growing bank of information we have on this interesting topic.

Interest and proficiency in other methods of bird study continue to grow and this Report contains notes on work on nesting birds and the results of a mapping census.

The Group's activities have also diversified into small scale management work. Six years study have given a sufficiently long view of the bird populations of the Fen to establish that the situation is in constant flux. Members are increasingly interested in the relationships between the conditions prevailing on the Fen and the diversity of the bird fauna. An analysis of the records collected of waders emphasises that these birds are particularly responsive to the manipulation of the Fen's drainage and it is heartening that the management policies pursued by the National Trust appear to be increasing the suitability of Wicken Fen as a haven for a group of birds often threatened by the activities of man elsewhere.



SOME NOTES ON SELECTED SPECIES

There follow notes on some of the more interesting sightings of birds made on the Fen in 1974. Records refer to the area of the Mere and Reed Bed unless otherwise stated. Records of waders are dealt with elsewhere.

Cormorant Nine flew North on April 7th.

Bittern One on November 17th.

Marsh Harrier One on May 18th.

Hen Harrier One female/immature on November 9th and 17th.

Sandwich Tern Nineteen flew South West on May 3rd.

Little Auk One on the Lode November 1st.

Long-eared Owl Two sightings in June at the Brick Pits. One retrapped on Trevelyans Piece on July 27th and a further sighting on August 2nd.

Great Spotted Woodpecker One on April 7th.

Lesser Spotted Woodpecker Singles were trapped near the Brick Pits on July 6th and August 3rd and at the Reed Bed on September 1st.

Green Woodpecker One heard on March 31st.

Magpie One on March 30th.

Bearded Tit Up to 20 present until the end of March. The last spring record was on April 28th. At least four juveniles present July 26-28th. Up to six sighted in October and November.

Stonechat One on January 6th.

Nightingale One singing at the Brick Pits on May 12th and one trapped at the Reed Bed on July 27th.

Goldcrest Singles on February 27th and March 24th. A pair attempted to breed, apparently unsuccessfully, at the Brick Pits. One trapped on September 20th and two on November 17th.

Firecrest One at Little Drove on April 7th.

Pied Flycatcher A juvenile trapped on August 31st is probably the first recorded on the Fen.

Yellow Wagtail 2 – 3 pairs bred.

Corn Bunting A winter roost of about 30 birds. One singing on March 30th.

Brambling Ten on January 19th.

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. There are eight recoveries from abroad (Belgium, France, Germany and Morocco); these almost equal all foreign recoveries reported during the preceding five years combined.

The Bearded Tits, presumably a pair travelling together, give further indication of the distant origin of the birds wintering in Cambridgeshire. These records form an interesting appendix to Colin Bibby's recent paper (Cambridge Bird Club Report 47, 1973, 56).

The Swallow movements continue the pattern shown by earlier years. JB 29924 is the first Group Swallow to be found in Africa (presumably a bird dying on its way north in the spring), although with almost 2,000 Swallows ringed, a recovery from South Africa is now a statistical possibility.

Morocco also provided two Reed Warbler recoveries; JJ 92321 seems to have been a very late bird still in North Africa in early summer. JV 44388 is interesting: it was a bird of normal weight (11.7g) when caught at Wicken, but in Sussex it was clearly fattened up prior to its further migration, and weighed 15.0 grams.

JS 85577 is the first Wicken Sedge Warbler to be recovered abroad; CP 64330 is the first Snipe to be reported. The Song Thrush and Blackbird recoveries are the second of each species to be found overseas.

Key to symbols and terms

1—bird ringed as nestling
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—found dead
+—shot
()—trapped

Snipe	CP64330	4	17. 5.70	WF	
		+	17. 1.74	Leighton Bromswold	45 km W
Swallow	JB29924	3	16. 9.70	WF	
		x	21. 4.74	Merzouga (Morocco)	2440 km S
	JE46703	1	4. 7.73	Blyth (Notts)	
		v	21. 9.73	WF	150 km SE
	JJ82190	1	2. 9.73	Oakington (Cambs)	
		v	5.10.73	WF	16 km ENE
	JN94530	1	24. 6.73	Great Glen (Leics)	
		v	22. 9.73	WF	90 km ESE
	JS17997	3	22. 9.73	WF	
		x	21. 5.74	Linton (Cambs)	25 km SSE
	JV24216	1	20. 6.74	Eagle (Lincs)	
		v	13. 9.74	WF	115 km SE
Reed Warbler	JH18860	4	29. 7.72	WF	
		v	12. 5.74	Wendover (Bucks)	90 km SW
	JJ92321	4	17. 6.73	WF	
		()	1. 6.74	Mechrabel Ksiri (Morocco)	2200 km SSW
	JS17139	3	8. 9.73	WF	
		v	3.11.73	Inezgane (Morocco)	2600 km SSW
	JV44388	4	10. 8.74	WF	
		v	28. 8.74	Steyning (Sussex)	160 km SSW
Sedge Warbler	JS85577	3	12. 7.74	WF	
		v	16. 8.74	Lillo (Belgium)	300 km SE
Blackbird	CP64714	4f	9.10.71	WF	
		x	12. 7.74	Cloppenburg (Germany)	510 km E
Song Thrush	CJ11053	3	17. 6.72	WF	
		+	– .12.73	Rochechinard (France)	900 km SSE
	CJ11069	3	23. 6.72	WF	
		x	21. 5.74	St. Neots (Hunts)	38 km WSW
Bearded Tit	JJ91633	4f	13. 1.73	WF	
		v	3. 3.74	Pommeroeul (Belgium)	300 km SE
	JJ91643	4m	3. 2.73	WF	
		v	3. 3.74	Pommeroeul (Belgium)	300 km SE
Blue Tit	JS16885	3	8. 9.73	WF	
		x	31. 5.74	Bottisham (Cambs)	10 km S
Reed Bunting	JR11864	4m	6. 4.74	Fowlmere (Cambs)	
		v	18. 5.74	WF	28 km NNE
	JS17415	4	22. 9.73	WF	
		v	22.12.73	Hoddesdon (Herts)	60 km SSW
Redpoll	JE83887	3	12.11.72	Sawston (Cambs)	
		v	5. 5.74	WF	22 km NNE

SPECIES RINGED

	Sites A,B & E	Sites F,G J & K	1974 Total	Grand Total 1968-1974
Mallard	–	–	–	5
Kestrel	–	–	–	1
Red-legged Partridge	–	–	–	6
Water Rail	–	–	–	1
Moorhen	–	5	5	6
Lapwing	–	6	6	8
Snipe	–	18	18	64
Jack Snipe	–	–	–	1
Woodcock	–	1	1	4
Redshank	–	–	–	3
Woodpigeon	–	1	1	8
Turtle Dove	1	3	4	21
Collared Dove	–	1	1	6
Cuckoo	–	9	9	21
Little Owl	–	–	–	1
Tawny Owl	–	2	2	9
Long-eared Owl	–	–	–	2
Swift	1	2	3	7
Kingfisher	4	10	14	74
Great Spotted Woodpecker	–	–	–	2
Lesser Spotted Woodpecker	2	1	3	5
Skylark	–	–	–	8
Swallow	4	120	124	1969
House Martin	2	–	2	10
Sand Martin	–	–	–	1
Jay	1	4	5	12
Great Tit	30	17	47	253
Blue Tit	108	85	193	851
Coal Tit	–	–	–	4
Willow Tit	10	9	19	164
Long-tailed Tit	9	74	83	344
Tree Creeper	1	4	5	52
Wren	29	103	132	816
Bearded Tit	–	17	17	28
Mistle Thrush	–	–	–	3
Fieldfare	–	7	7	27
Song Thrush	23	91	114	1165
Redwing	–	20	20	68
Blackbird	29	48	77	838
Whinchat	–	–	–	4
Redstart	–	–	–	6
Nightingale	–	1	1	9
Robin	37	50	87	623
Grasshopper Warbler	–	9	9	96
Great Reed Warbler	–	–	–	1
Reed Warbler	46	374	420	2832
Sedge Warbler	12	184	196	1745
Blackcap	13	46	59	593
Garden Warbler	2	6	8	95
Whitethroat	1	3	4	140
Lesser Whitethroat	9	20	29	176
Willow Warbler	32	61	93	846
Chiffchaff	9	16	25	245

Goldcrest	1	4	5	21
Spotted Flycatcher	12	17	29	119
Pied Flycatcher	–	1	1	1
Dunnock	56	149	205	1234
Meadow Pipit	–	8	8	14
Tree Pipit	–	–	–	1
Pied Wagtail	–	1	1	8
Yellow Wagtail	–	1	1	4
Red-backed Shrike	–	–	–	1
Starling	–	–	–	11
Greenfinch	5	47	52	316
Goldfinch	26	55	81	341
Linnet	15	48	63	228
Redpoll	25	236	261	987
Bullfinch	42	123	165	1179
Chaffinch	8	16	24	232
Brambling	–	1	1	25
Corn Bunting	–	3	3	11
Yellowhammer	2	4	6	68
Reed Bunting	16	352	368	1580
House Sparrow	–	–	–	1
Tree Sparrow	47	14	61	994
TOTALS	670	2508	3178	21655

THE SHAPE OF TAIL FEATHERS AS AN AGEING TECHNIQUE IN REDPOLLS AND REED BUNTINGS

P. M. M. Bircham

In autumn, after the post nuptial moult of the adult birds the tips of the two outer pairs of tail feathers tend to be rounded in adult Redpolls and Reed Buntings while in first year birds the tail feathers are more pointed It would be expected that the usefulness of this character for ageing might decline as wear makes the rounded adult tail feathers more pointed. In 1974 Group members noted the shape of the two outer pairs of tail feathers in order to determine the period over which the technique is reliable. Three categories of tail feather shape were used; round, intermediate and pointed. Table 1 shows the numbers of birds recorded in each category by month.

Table 1 Tail feather shape of Redpoll and Reed Bunting by month

	Redpoll			Reed Bunting		
	rounded	intermediate	pointed	rounded	intermediate	pointed
Feb/Mar	2	1	6	9	0	5
April	0	3	4	9	3	6
May	6	4	25	14	7	17
June	2	4	9	0	3	0
July	1	3	4	3	2	4
Total	11	15	48	35	15	32

Table 2 Tail feather shapes of retraps of known age

	Redpoll			Reed Bunting		
	rounded	intermediate	pointed	rounded	intermediate	pointed
adult	3	1	4	9	2	0
first year	1	2	3	3	1	0

In both species the proportions of birds in the different categories does not change significantly with time although data for the autumn and winter are clearly required here. The possibility that tail feather shape may be of use in ageing these two species in spring and summer is examined by looking at the tail feather shapes of birds of known age (Table 2). Only one of six first year Redpolls was recorded as having rounded tail feathers while three of eight adults fell into this category. There is no sign of any difference between the tail shapes of first year and adult Reed Buntings.

Conclusion

This technique may be of use in conjunction with others in spring and summer for ageing Redpolls but it is unlikely to be of any value in the Reed Bunting at this time. There was considerable observer error which may be remedied by improving the method used for assessing tail feather shape.

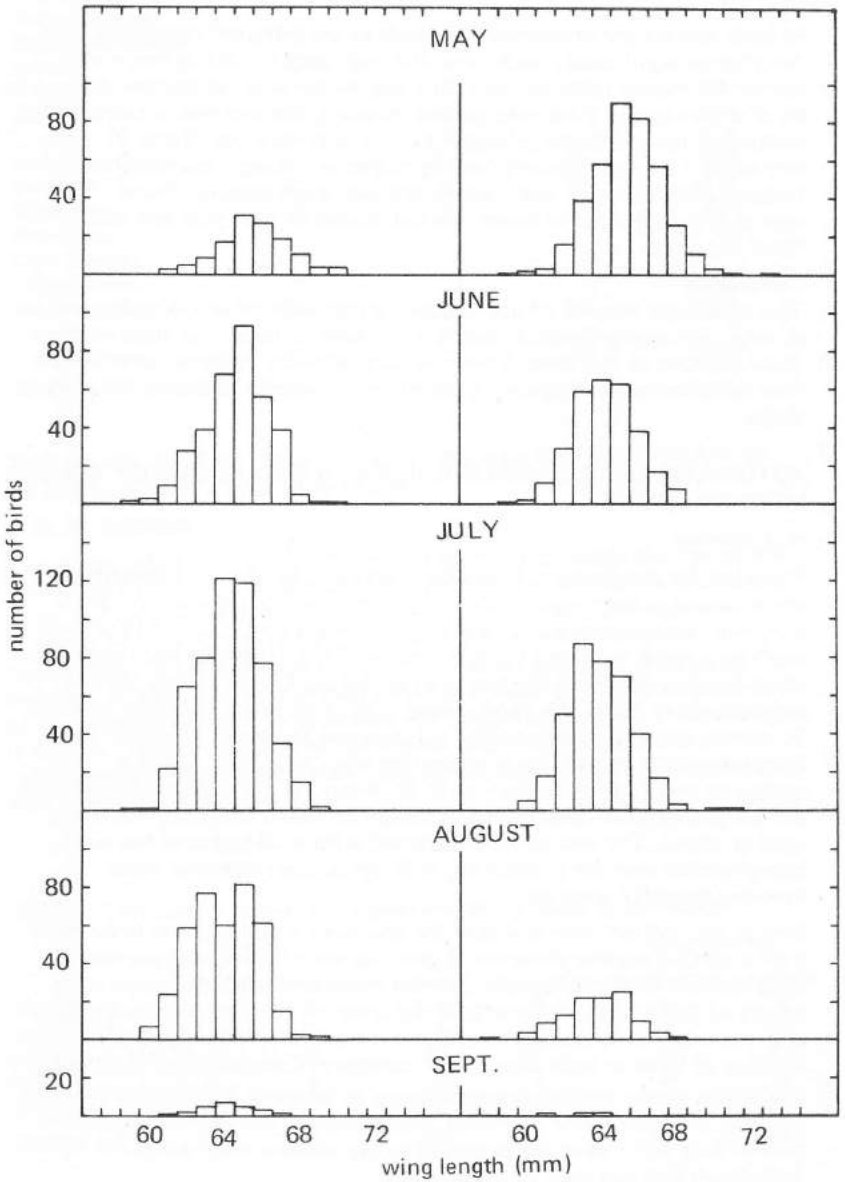
AUTOMATIC DATA HANDLING II: THE WING LENGTH OF ADULT REED WARBLERS

H. J. Harvey

Proposals for the format of punched cards and for coding conventions which would allow ringing data to be transferred to punched cards for computer analysis were outlined in last year's report. During 1974 hard work by a small number of group members and associates has resulted in all of the data for Reed Warblers caught by the Group having been punched on to cards, the total numbers of cards being in excess of 4700. To demonstrate the value of this exercise and the types of use to which the cards might be put , an examination was carried out, using a computer programme written by R. W. Marrs, of the seasonal variation in the wing lengths of Reed Warblers caught between 1969 and 1974 and aged as adults. The results were obtained within 18 hours of the cards being handed over for processing, with the actual computer time involved being 46 seconds.

Due to the limited time available the analysis carried out was little more than a sorting routine designed to give, for each half month period, the total number of adults caught over the six-year period, the mean wing length of those birds, the standard deviation of the data, the maximum and minimum wing lengths recorded during each interval, and the number of birds in each wing length category. Calculation of standard deviations allows statistical comparisons to be made between half-month periods. Data for about 120 birds, not all adults, caught in the second half of July 1971 were not included in the analysis since cards for these individuals had not then been punched.

Figure 1 Wing length distribution of adult Reed Warblers during half-monthly intervals. For each month the left-hand histogram covers the period 1st-15th and the right-hand histogram the period from the 16th to the end of the month



The results of the analysis are shown in Table 1 and Figure 1. The mean wing length of the total sample of 2617 handlings is 64.41 mm (S.E. ± 0.036).

Table 1 Number of Adult Reed Warblers caught in half-monthly periods together with mean, maximum and minimum wing lengths and standard deviations

Date	Number of birds handled	Min. wing length recorded (mm)	Max. wing length recorded (mm)	Mean wing length (mm)	Standard deviation
1-15 April	0	–	–	–	–
16-30 April	1	66	66	66	–
1-15 May	130	61	70	66.55	1.913
16-31 May	390	59	73	65.35	1.831
1-15 June	345	59	70	64.60	1.677
16-30 June	313	59	68	64.22	1.598
1-15 July	538	59	69	64.30	1.691
16-31 July	370	60	71	63.90	1.680
1-15 August	392	60	69	63.98	1.794
16-31 August	111	58	68	63.68	1.734
1-15 September	24	61	67	64.08	1.442
16-30 September	3	61	64	62.67	1.527
1-15 October	0	–	–	–	–

Although the analysis hides year-to-year variations, the changes in the number of birds caught in each half month interval do illustrate the seasonal occurrence of adults at Wicken. A single bird in April is exceptional and, although birds begin to arrive in the first half of May, it is not until the second half of May that large numbers of birds are caught. In contrast to the lack of April captures at Wicken, Catchpole (2) at Attenborough Nature Reserve in Nottinghamshire recorded about 10 singing males in the last 10 days of April between 1966 and 1968. Numbers begin to fall off sharply after mid-August with few adults remaining into September and very few beyond September 15th. The large peak of handlings in the first half of July was not expected and no immediate explanation is available, although greater activity associated with the feeding of nestlings is one possibility. The fall in handlings in the second half of July as compared with the immediately preceding and following intervals is probably due to the exclusion of some late July birds from the analysis.

Maximum and minimum wing lengths show a spread of 15 mm with extreme values of 58 and 73 mm, both beyond the ranges quoted by Williamson (5) and Svensson (3). Williamson gives a theoretical wing length range of 58 to 71 mm, which is close to the 0.001 probability range of 58.4 to 70.4 mm for the total Wicken sample. The single value of 73 mm may well be erroneous for the chance of encountering a bird of this wing length in either the late May or the total samples is less than 1 in 10,000.

Over the period May to August, when half-monthly samples are greater than 100, mean wing length falls by almost 2.0 mm. Save for early July and early August the mean value for each half month is lower than that for the preceding interval; the two increases are both less than 0.1 mm. Comparisons of the differences in the mean wing lengths of successive half months, using t-tests, indicate that the decreases between the second half of May and the first half of June, and between the first and second halves of July are both highly significant ($P<0.001$). The fall between the first and second halves of June is also significant ($P<0.01$) but no other differences reach significance level.

Possible explanations for the fall in mean wing length over the summer period include both wing abrasion and a change in the composition of the population as regards the relative proportions of long-winged birds, possibly males, and short-winged birds, possibly females. Wing abrasion in Reed Warblers was examined by Thorne (4) who suggested a possible abrasion rate of 0.2 mm per month, markedly less than many of the decreases per half month in Table 1.

It has been suggested by Catchpole (2) that male Reed Warblers return to breeding areas before females and Bibby (1) has suggested that males have longer wings than females. If these suggestions are correct then the high early summer means could be accounted for by the early arrival of males with the subsequent fall in the population mean being explained by the later arrival of females. Possibly the lowest late summer values might be explained by males departing for winter quarters earlier than females, leaving a population dominated by short-winged birds. This pattern is to some extent supported by examination of Figure 1. Birds of wing length less than 64 mm are poorly represented in the first half of May and the increase in this category during the second half of this month is much greater than could be explained by the wing abrasion of birds present in the first period. Conversely, birds with a wing length of greater than 65 mm are badly represented in the second half of August. Supporting evidence comes from the contrast between the first and second halves of July. Save for the 63 mm wing length category, where numbers increase, and for the 70 and 71 mm categories, where single birds are involved, all categories are less numerous in the second half of the month. The proportional fall is large, almost 50%, in wing length categories over 65 mm, and is negligible in categories below 63 mm. Changes in the ratio of long-winged and short-winged birds in the population therefore seem to be a likely explanation for seasonal changes in mean wing length.

This investigation would have been extremely tedious and time-consuming if carried out by hand, the ease and speed with which it has been performed demonstrates the value of computer analysis in handling the large volumes of data which have been accumulated by the Group. Many further, and more sophisticated, analyses of the Reed Warbler population are possible now that the data for this species has been transferred to punched cards; similar analyses will soon be possible for other species if card punching continues at the present rate. This analysis would not have been possible without the hard work of the members of the Group who assisted with data coding, card punching and the checking of print-outs.

References

1 Bibby, C. J. (1969) Wicken Fen Group Report 1:29-34

2 Catchpole, C. K. (1973) J. Anim. Ecol., 42:623-635

3 Svensson, L. (1970) Identification Guide to European Passerines p. 72

4 Thorne, C. J. R. (1973) Wicken Fen Group Report 5:33-35

5 Williamson, K. (1968) Identification for Ringers 1:66

BLUE TITS AT MADINGLEY HALL

T. D. Price

Blue Tits have been ringed at Madingley Hall near Cambridge over the past seven years, mainly trapped coming to bait during the winter but more recently while breeding in nest boxes.

The Hall has a large breeding population of Blue Tits and in winter these birds and others from other areas visit the Hall and may be netted at the baiting area. The abundance of the birds varies greatly through the winter. A simple capture-mark-recapture method has been used to obtain some estimate of the numbers of birds present. Table 1 shows details of four series of trapping sessions in two winters. It can be noted that populations tend to be high in February and March having increased over the winter months. The proportion of birds ringed in the first week of the session in subsequent catches decreases with time inflating the population estimate. This decrease may be due in part to trap shyness but, combined with the large numbers of unringed birds caught at each session, suggests a population with high immigration and emigration. In March and April the situation becomes more stable, 50% of the birds ringed in this period are caught again in subsequent winters compared with 30% for the rest of the winter. It is suggested that a breeding population is becoming established at this time.

Table 1 Capture-mark-recapture population estimates

date	No. ringed	recaptures/total				population estimate			
		weeks after ringing							
		1	2	3	4	1	2	3	4
21.11.70	16	5/21	2/18	2/32		49	108	192	360
5.12.70	16	6/32				80	144		
14. 2.71	21	6/72	5/113	5/108		192	334	394	
11. 2.73	12		7/44		5/89		132		360

The proportion of first year birds in the catch varies marked from year to year and during the course of a winter. Figure 1 shows the proportion of first year birds in the catch through the winter in five winters. It can be noted that in three winters, (1968-69, 1970-71 and 1972-73), the proportion of first years reaches a high level in February-March apparently because of immigration of young birds. This explanation fits with the population size pattern discussed earlier. In 1971-72 and 1973-74 the proportion of first year birds trapped is low and remains low

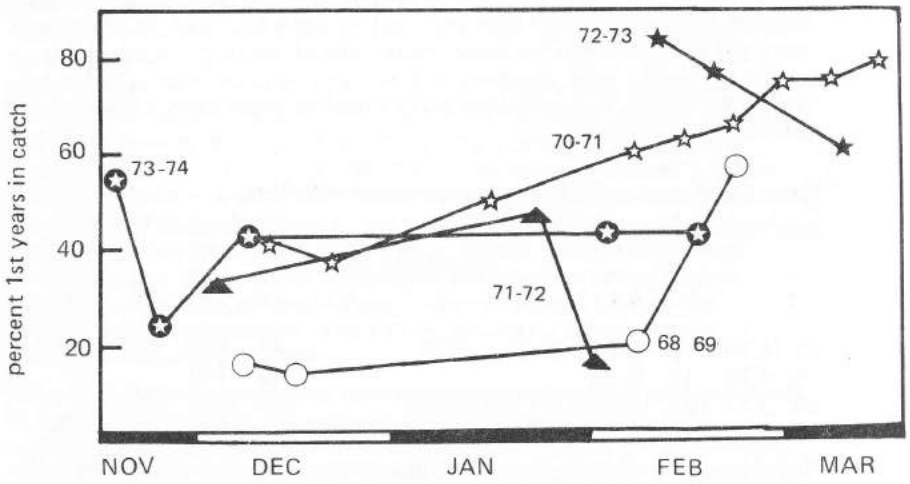
throughout the winter. A dramatic decrease in the proportion of young birds over one week in November 1973 was associated with a cold spell and may have been due to differential mortality or emigration. The marked overall differences between winters in the extent of trapping of young birds may be attributable to differences in the production of young in the preceding summer. For two years in which breeding data is available for comparison it would appear that low production and survival of young is associated with the failure of large numbers of first year immigrant Blue Tits to arrive at the winter bait points (Table 2). It may be that in years of high production of young there are larger numbers of wandering young birds in the winter.

Continuation of winter trapping and summer monitoring of breeding performance should elucidate the situation.

Table 2 Breeding success and winter catch of first year birds

	nestboxes occupied	young found dead in box	max. young fledged	young retrapped in winter	peak winter first year proportion
1972	13	0	94	13	84
1973	12	28	64	1	47

Figure 1 Proportion of first year Blue Tits caught at Madingley Hall



WEIGHT VARIATION OF BLACKBIRDS AND SONG THRUSHES AT WICKEN FEN

A. K. Naylor

Blackbirds and Song Thrushes are common residents on the Fen and during the winter months Continental migrants are also present, 823 Blackbirds and 1153 Song Thrushes have been ringed in the period 1968-1974. This note examines seasonal and diurnal weight variations in relations to activities such as breeding and moulting. The study only deals with the spring, summer and autumn, too few birds being caught in winter to permit analysis.

Seasonal variation

Figure 1 shows the mean monthly weights of Blackbirds and Song Thrushes. The weights have been corrected to a predicted value at 12 hours after dawn.

All post-juvenile female Blackbirds are considered together as identification of first year birds is less reliable than in males. There is a steady decrease in weight from April to July and then weight increases rapidly over the late summer to high autumn weights. In March females with brood patches are on average 11% heavier than those without them. Presence of a brood patch indicates active breeding and many of the birds caught in March must be carrying eggs and large metabolic reserves associated with their production. The fall in weight later in the breeding season is probably due to the increased activity required for the feeding of the young. Heavy females are no doubt caught at this time which are about to lay replacement, late or second clutches but these are probably too desynchronised to affect the mean weight for the month. The weights of moulting and non-moulting females are not significantly different.

Male Blackbirds show a similar pattern of decrease in weight through the breeding season with an increase in the late summer and autumn. First year males are heavier than adults in March. This could be an indication of extended maintenance of a high winter weight associated with later breeding by the younger birds. Lack (1) suggests that birds breeding for the first time are less efficient than older birds in competition for mates, nest sites etc. Moult begins earlier in first summer males than in older males as does the late summer increase in weight. Snow (2) has shown that older birds rear more young per brood and also more broods in the season than first years and this prolonged breeding probably delays the onset of moult and late summer fattening. A similar tendency has been noted in Bullfinches by Newton (3).

Moulting male Blackbirds are heavier than non-moulters.

If Song Thrushes with brood patches are assumed to be females and most of those without them are males (4), it can be seen that this species shows a similar pattern of weight variation to the Blackbird. From May onwards both sexes show a decrease in weight followed by an increase over the late summer and autumn. Moulting and non-moulting birds are not markedly different in weight. As with Blackbirds, birds with brood patches are heavier early in the breeding season than those without them. The

Key to Figures

M male	1stY first year	P brood patch
F female	pj post juvenile	N no brood patch
ad adult		m in moult

Figure 1 Seasonal weight variation

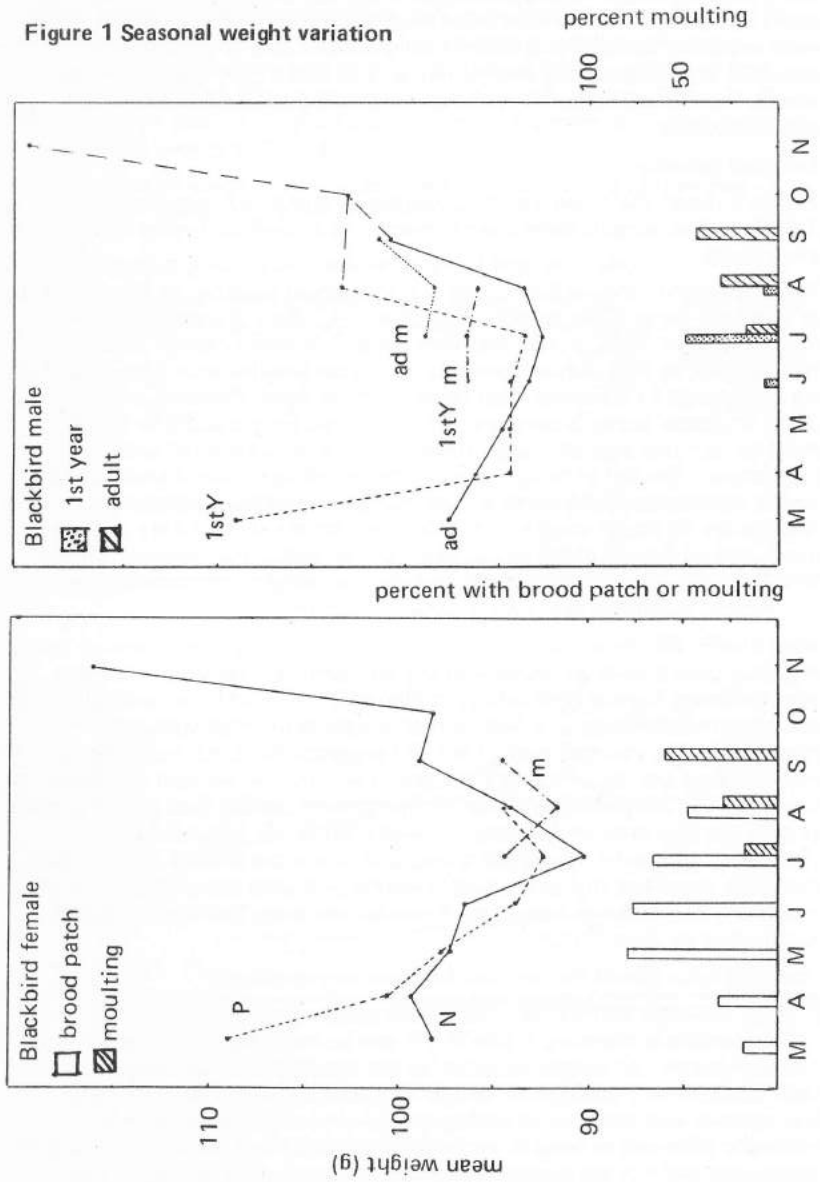
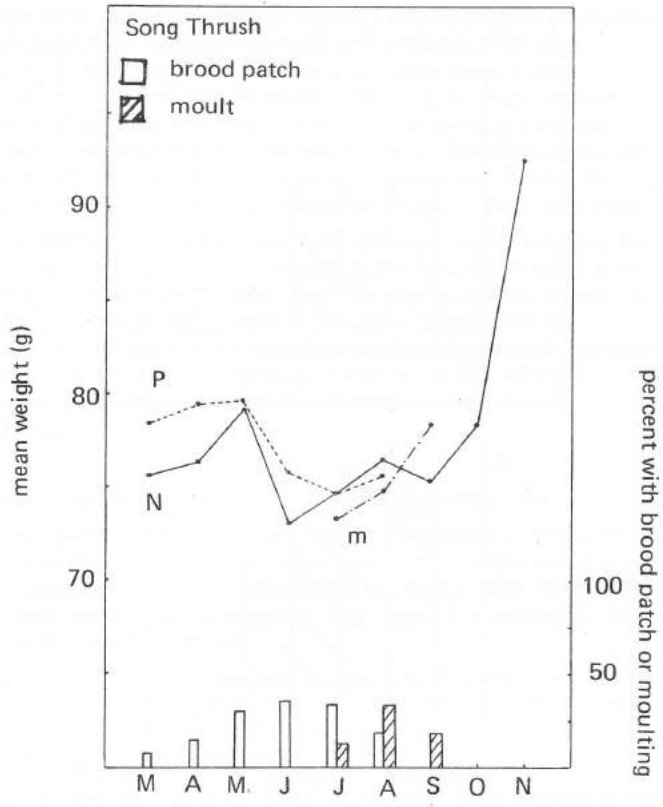


Figure 1 Seasonal weight variation



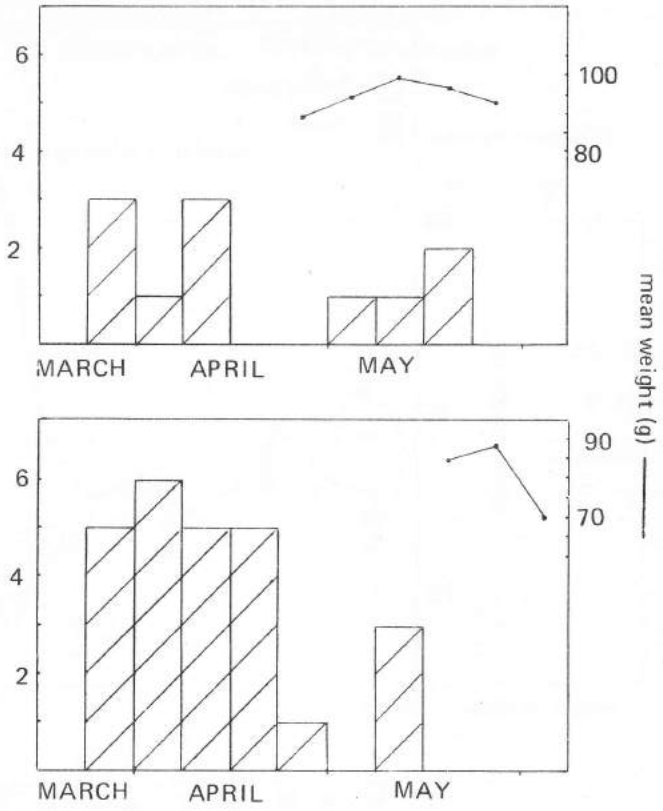
extent of this difference is less than in the Blackbird which may be due to the absence of large reserves of fat in laying and incubating female Song Thrushes. Female Song Thrushes are considered steadier incubators than female Blackbirds by Snow (5) and this tendency might be due to more regular courtship feeding by the males in Song Thrush than in Blackbird. This might reduce the need for large stores of fat in female Song Thrushes.

The timing of the breeding season was similar for Blackbirds and Song Thrushes in 1974 although in some years Song Thrushes nest earlier (Figure 2). Figure 2 also shows average body weight of breeding females during the late spring (there is insufficient data for the early spring in 1974). The following points can be made;

1 Female Blackbirds show an increase in weight in early May which is roughly correlated with a second peak in laying.

2 Female Song Thrushes show a large weight decrease at the end of May which is two weeks after the laying of the second clutches and so is associated with the hatching of these clutches and the onset of feeding the young which involves a large expenditure of energy.

Figure 2 Distribution of first egg dates, 1974



Diurnal variation

In Figure 3 three hour running means of body weight are plotted against the time from dawn. Three hour running means of "activity" are also shown. This statistic is the percentage of the total catch of the group being considered occurring in the three hour period shown. The results are examined for three periods, spring (March, April, May), summer (June, July, August) and autumn (September, October, November).

Spring

In spring breeding is in full progress and is at its most successful in terms of fledged young (5). Female Blackbirds show two weight peaks, one in the morning and one in the evening. The morning peak occurs earlier in birds without brood patches. Both are active early and it may be that breeding females feed their young before putting on weight themselves. Females without brood patches show a marked evening peak in activity and a high dusk weight compared with birds with brood patches but the dawn weights of the two groups are similar. This suggests a larger overnight weight loss for females without brood patches and it may be that roosting in a nest helps breeding females to conserve energy.

Male Blackbirds show two periods of weight increase during the day in the spring. Weight rises to a plateau a few hours after dawn and there is a large evening increase. A marked peak of activity occurs shortly after dawn. This is not associated with a weight increase and probably indicates territorial activity. It is of interest that first year males show a less pronounced early morning peak than adults reflecting, perhaps, less well developed territorial behaviour. Later in the morning there is a smaller activity peak associated with the first weight increase. The evening weight peak is associated with increased activity which may in part be due to territorial behaviour since it is more pronounced in adults than first years.

Song Thrushes show less marked diurnal fluctuations in weight during the spring than do Blackbirds. Birds with brood patches initially show a drop in weight, perhaps associated with feeding of the young as they are active at this time. There is then a fairly uniform weight increase with no marked evening peak. Birds without brood patches show a steady increase in weight throughout the day. The activity is similar to that of male Blackbirds and again the peaks may be due to territorial behaviour rather than feeding.

Summer

In summer late broods are still in the nest and moult is beginning.

The pattern of weight variation shown by female Blackbirds with brood patches is similar to that found earlier in the year. Activity, particularly in the morning, is noticeably greater. This may be associated with the greater proportion of nests containing young rather than eggs. The second activity peak coincides with a weight increase.

Females without brood patches show similar patterns of weight and activity to those earlier in the year except for a high morning activity peak associated with a fall in weight. At this time this is unlikely to be due to nest building and its cause remains a mystery.

Male Blackbirds in summer have an activity pattern similar to that in spring. The weight pattern however is rather different. There is a gradual increase over the day with no marked peaks.

Song Thrushes both with and without brood patches show similar weight and activity patterns in summer supporting the statement in the Handbook that the sexes share the feeding of the young equally.

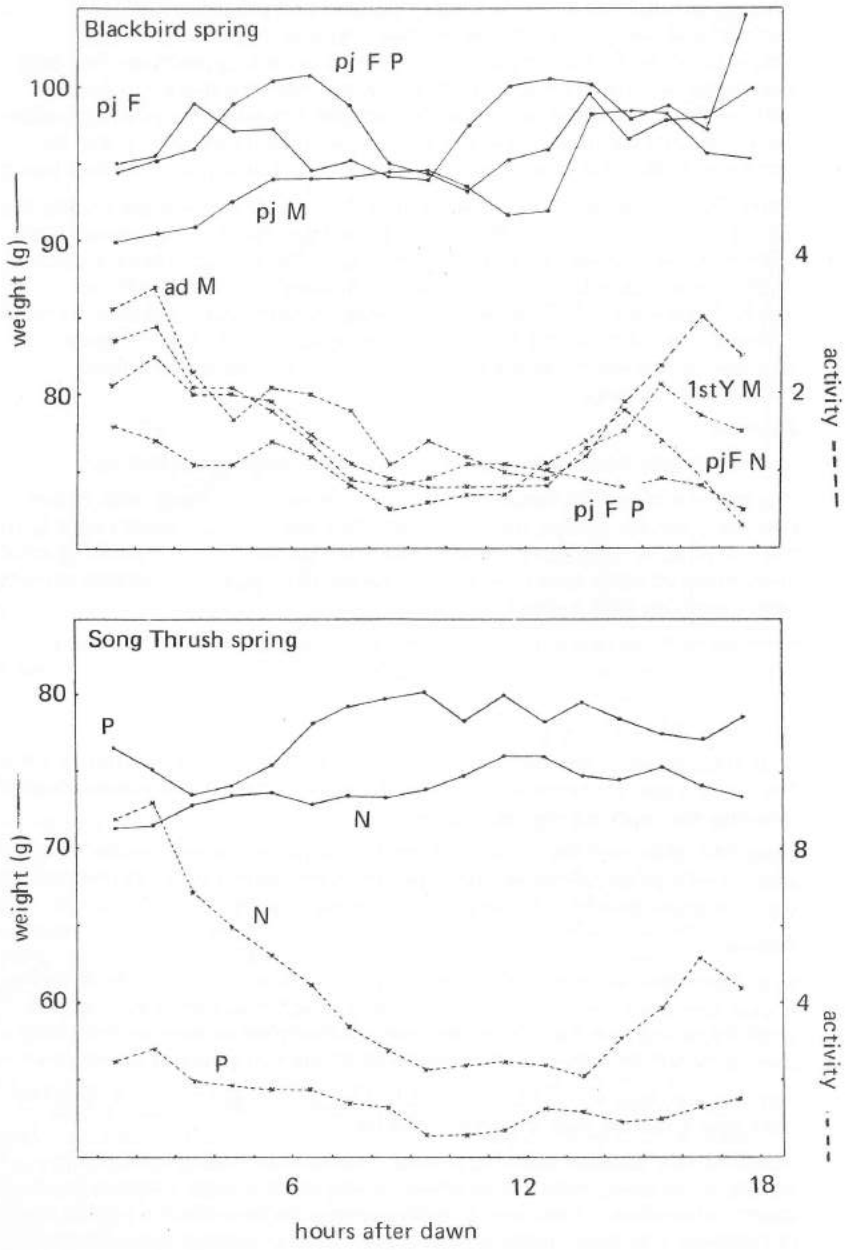
Autumn

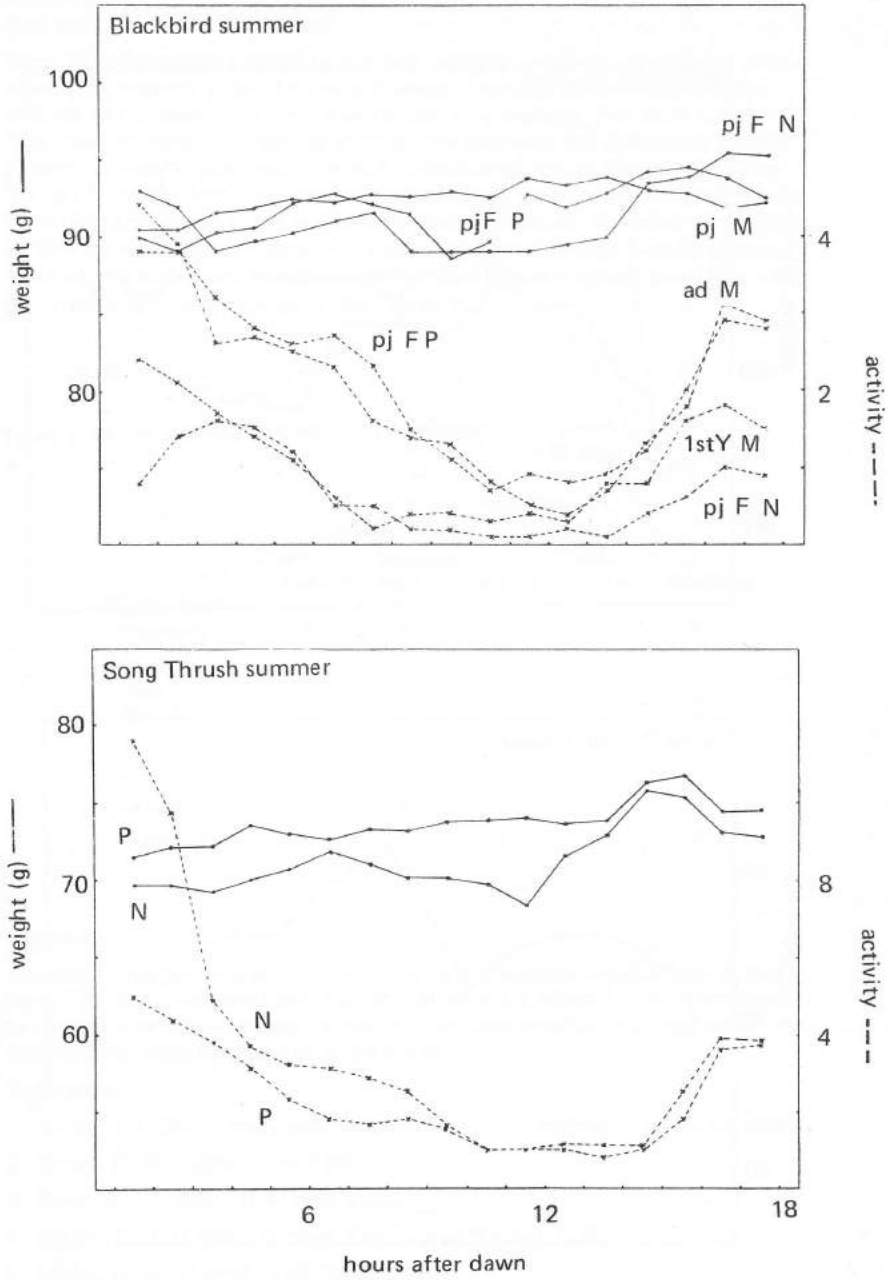
In autumn the resident birds are joined by Continental migrants. Breeding is over and moult is in progress. Blackbirds and Song Thrushes, together with Redwings and Fieldfares, are feeding to a great extent on fruits and berries rather than the invertebrate food of the summer and spring.

Activity patterns are similar for all Blackbirds in autumn with a morning peak and a fall off over the rest of the day.

Adult female Blackbirds show a weight increase in the morning and a second small peak before dusk. Adult males show a large increase in weight shortly after dawn. First winter males show a pattern closely similar to that of females. The main increase occurs later than in adult males. Adult males may be able to gain weight earlier than younger males and females by displacing them from the feeding bushes by aggressive behaviour. The

Figure 3 Diurnal variation in weight and activity



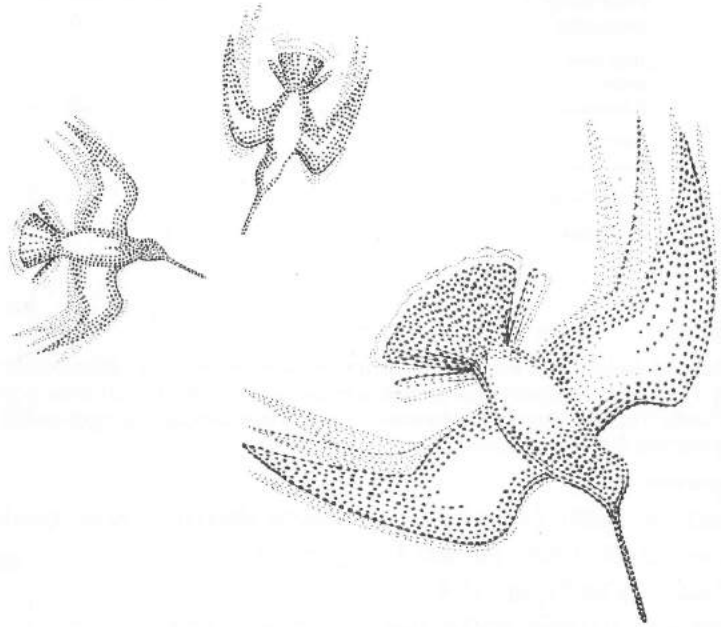


MANAGEMENT WORK 1974

P. M. M. Bircham

Ever since the Group was formed in 1969 the members have continually discussed, on an informal basis, ways in which the Fen could be managed or habitats modified to attract a greater number of birds of a wider variety of species. Inevitably most of this discussion concerned the area upon which our activities are centred (Adventurer's Fen), and last autumn a number of practical suggestions for minor works were gathered together and submitted to the Wicken Fen Management Committee for approval which was duly received. It was recognised that the possibilities for major developments are limited until the Management Committee obtains control over the drainage and water levels in the area.

During the winter the Group got down to work and in two organised sessions, during which the majority of the Group laboured from nine to five, most of the programme was completed. On the first day the morning was spent erecting a three strand barbed wire fence along the perimeter of East Adventurer's Fen in order to discourage the incursions by cattle of the previous years; the materials for this were kindly provided by the Management Committee. In the afternoon the work force split up. The majority dug an irregularly shaped pool in the new reedbed in



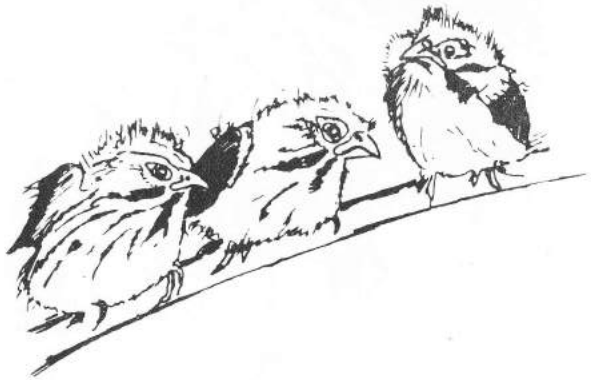
Rothschilds Lapwing (Area K) with the intention of attracting Waders and Rails to within view of the ringing hut. A second party of four stout-hearted individuals dug a "cliff" out of the steepest bank of the "Scrape," a large pool on Rothschilds Lapwing. It was hoped to provide nest sites for Sand Martin or Kingfisher. The session was well attended and the weather or work was such that several members came close to nudity. It also created such enthusiasm that a party of three masochists returned the following weekend to finish the cliff at the "Scrape,". The second session was also well attended and the main task was tackled with commendable fortitude. The intention was to remove topsoil from the western end of the pool and transport it to the northern bank. This had a dual aim. First to provide a further wet feeding area for Waders at the flat western end and second to cover the compacted clay along the foreshore to encourage plant growth. The weather on this occasion was distinctly inclement and in contrast to the first session clothing was much in evidence especially during the lunchtime blizzard when the working parties at different ends of the pool lost visual contact with each other. This did not stop the work! The effort was tremendous and everyone went home tired but happy.

During subsequent months the progress has been observed with interest. The fence is still standing, and the Wader/Rail pool has proved quite successful. The success of the work at the Scrape is more difficult to judge. The "Cliff" was not used by birds this year and the water level dropped dramatically drying the wet area during the spring. The new topsoil, having been trodden in by cattle, seems to be producing vegetation slowly but surely. Without doubt time is needed to assess the real effect of this work.

With this diversification of our activities, albeit on a very small scale, a general awareness of the importance of habitat is sweeping through the Group and ideas are still being discussed as well as there being a good deal of critical analysis of the work already done.

FOOTNOTE

The author wishes to point out that he was one of the four stout-hearted young men but not one of the three masochists.



NESTS AT WICKEN FEN 1974

A. K. Naylor

One of the most successful aspects of the work of the Group this year has been the large number of nests found. Details of 151 nests have been recorded, 30 species being represented. Thirty-two broods of nestlings were ringed comprising 93 birds. A Chiffchaff, a Reed Bunting and three Song Thrushes have subsequently been retrapped.

This is a vast improvement on the performance in previous years and it is hoped that the effort will be maintained so that we can accumulate information on the breeding biology of birds on the Fen, an aspect neglected in our studies so far.

Techniques for finding Reed Warblers nests have been improved and 23 nests were found. It is notable that about one quarter of these were parasitised by Cuckoos. The colour and patterning of the cuckoos' eggs laid were an extremely good match to those of the hosts.

As far as is known a nesting attempt by Goldcrests is the first to occur on the Fen.

NEST BOXES 1974

John Smith and Margaret Smith

During early Spring work was carried out on the 50 nest boxes installed on the west corner of the Fen in 1973. Owing to the winter gales it was necessary to repair and re-site a number of boxes, but the alternating pattern of wood and plastic was adhered to. This maintenance was completed in early March.

As found last year, far more wooden boxes were occupied than the plastic ones, although this could not in anyway have been influenced owing to the random sitings. Nineteen of the 25 wooden boxes were occupied to varying degrees by four species, Blue Tits being predominate, with 9 nests and 66 ringed pulli leaving. It would appear that Tree Sparrows did manage a period of pre-breeding activity during the Autumn around the boxes for 7 wooden and 1 plastic box was occupied as against nil occupation during 1973. Unfortunately this success did not carry on to the pulli stage, and only 7 pulli were eventually ringed and left the boxes. There was very firm evidence that this could have been caused owing to nestling starvation as little or no development took place of the pulli over a period of up to 14 days. It should be mentioned that 4 of these 7 were from a second nest following a Blue Tit from a wooden box, and the Tree Sparrow in this case not breeding until July. All the other Tree Sparrow nests had been started early April.

The remaining species were the Great Tit using 5 boxes and Wren using 2 wooden boxes.

Of the 8 plastic boxes used, only 17 pulli managed to leave the nest. In fact, only 4 of the 8 boxes had ringable pulli, 3 of these being Blue Tit and the remaining one Tree Sparrows.

It is hoped during 1975 to modify some of the boxes slightly in order to accumulate more information on the adults using the boxes. It did prove difficult on many occasions to catch both adult birds.

The project will be carried on during 1975, and a more detailed analysis can then be made on the large amount of information now collected.

WADER OBSERVATIONS 1969-1974

H. J. Harvey

Only four species of wader, namely Lapwing, Snipe, Woodcock and Redshank, breed on the Wicken Fen reserve but during the period 1969-1974 12 other species have been definitely recorded with one more being tentatively identified. At least four other European waders; Little Stint, Little Ringed Plover, Turnstone and Bar-tailed Godwit; have previously been noted on or near the reserve (Easy and Kirtland, 1967) while in 1934 a Lesser Yellowlegs spent some time on the nearby South Adventurers' Fen (Ennion, 1949). Records up to 1965 and the general status of each species in the Wicken area have been summarised by Easy and Kirtland (subsequently in this paper E and K) in the National Trust leaflet 'Birds of Wicken Fen', reference to which will be made only where the groups' observations differ from those documented there.

It is clear from Easy and Kirtland and from the reports of the Wicken Fen Management Committee that there was an increase in the number of waders recorded on the Fen following the construction of the Edith Mere on Adventurers' Fen in 1955, as vegetation developed however so records began to decline. This indicates that waders would occur more frequently on the Fen if conditions were suitable and it is one of the aims of management to create such conditions in that part of Adventurers' Fen lying in the Charles Raven Marshland Reserve. It is partly to this end that a scrape was dug on Rothschilds' Lapwing in 1971 and that attempts are made to keep the southern end of Trevelyan's Piece flooded during the summer. It may be partly due to these activities that both the number of non-breeding species recorded and the number of occurrences of such species, that is the number of individuals or parties of birds noted and not the total number of birds seen, was as great or greater in 1974 than in other years during the period under review (Table 1). Observations also suggest that breeding species such as Redshank and Lapwing were more numerous and successful in 1973 and 1974 than in the immediately preceding years.

Table 1 Occurrence of non-breeding species of wader at Wicken

Year	1969	1970	1971	1972	1973	1974
Number of species observed	1	6	7	9	8	9
Number of occurrences	1	12	17	16	13	21*

*Black-tailed Godwit excluded.

The summaries below are digests of the observations made by members of the group during the period 1969-1974 together with brief examinations of the data collected from ringing between 1968 and 1974. It must be remembered that most ringing visits take place at weekends between April and September so that few observations are available from outside this period, while Adventurer's Fen, the most attractive section of the

reserve to most waders considered here, was visited only half as frequently in 1969 as in subsequent years. It should also be noted that some of the records are based on call-notes heard and may be open to doubt and, most importantly, that observations have not been systematic with the area covered varying from week to week and the recording of common species often being omitted. The casual nature of the records is a particular hindrance in attempting to assess, for a species such as Snipe, the number of birds breeding or the change in numbers during the year.

Oystercatcher
A rare visitor with single birds in October 1971 and April 1972.

Lapwing
Certainly present throughout the year (E and K) but no winter observations. Present on Adventurers' Fen during nesting season in each year and breeding probably occurred or attempted but young only recorded in 1971 and 1974. Up to five pairs in 1974 mainly on Reed Bed and Trevelyan's Piece. From June to September flocks of up to 50 are regularly seen on grassland areas and small parties are often recorded flying over the Fen, with westward movements predominating. The earliest noted passage on May 30th.

An adult was ringed in 1973 and pulli in 1971 (1) and 1974 (6), there have been no recoveries.

Ringed Plover
A passage migrant noted only in 1973 and 1974. Single birds noted in August 1973 and May 1974 and one or two birds present on Trevelyan's Piece throughout most of the second half of July 1974.

Golden Plover
Noted in every year save 1970 but only in spring and autumn and not during winter months (c.f. E and K). The seven records, generally of small parties, are confined to April (3) and early May (1), and to September (3). Maximum of 19 in April 1971.

Snipe
Present throughout the year with apparent increases during migration periods and influx in winter. No count of breeding pairs has been attempted but Reed Bed on Adventurers' Fen generally holds four or five pairs and total Fen breeding population is probably between 20 and 40 pairs annually. On the Sedge Fen recently cut sedge fields are a favoured nesting site but nests have also been found on droves. 'Drumming' has been noted between March 24th and July 23rd with eggs being found from April 25th on.

Between 1968 and 1974 64 birds have been ringed of which 57 were aged as adults, four as juveniles and three were pulli. Ten of the adult birds have subsequently been recaptured, seven once, one twice and two on three occasions. An adult ringed in 1970 and shot in Huntingdonshire (45 km W) three and a half years later, January 1974, is the only recovery. In addition to the bird shot in it's fourth winter from ringing one bird is known to have survived three winters and two to have survived one winter. Six of the birds retrapped were last handled within one month of initial ringing.

The majority of birds handled have been caught in the period April-July with 25% in April, 16% in May, 34% in June and 17% in July. Outside this period two birds have been caught in March, one on 29th and one on 31st, and four in October but no birds have been caught in August or September. The October birds have been caught at sites distant from the normal netting areas. The absence of captures in August and September, when mist netting has been as extensive as in the four preceding months, reflects the evident change in behaviour and in distribution on the Fen after the end of the breeding season. Numbers caught have varied considerably from year to year with totals for the years 1970-74, during which catching activities remained almost constant, being 7, 13, 4, 21 and 27. Examination of the time of day at which birds have been caught suggests a slight peak about three hours after dawn but numbers caught remain remarkably constant throughout the hours of daylight, in contrast to certain passerines considered in previous reports.

The wing length of adult birds ranged from 120 to 141 mm (Mean 132.4 = 4.43), as composed with the Handbook extremes of 128 and 140 mm, and hill lengths (to feathers) fell between 57 and 72 mm, as against Handbook limits of 60 and 73 mm. It would appear from the Handbook that Snipe cannot be sexed by wing or bill measurements. Since 1970 adult birds have been examined for the presence of brood patches and no bird has yet been recorded as having one, possibly indicating that most birds caught are males. Moult has been noted in only three birds, on June 15th, July 13th and July 20th.

Jack Snipe
Probably a regular winter visitor in small numbers but rarely seen with only five records between 1968 and 1974. Singles in October 1968 (ringed), October 1974 and March 1974 with two birds in both April 1970 and April 1974.

Woodcock
Presumably resident throughout the year but no winter data (c.f. E and K). Seen very regularly at dusk between March and September being recorded on seven dates in 1969, six in 1970, 13 in both 1971 and 1972, 15 in 1973 and 16 in 1974. The greatest number of records, 23, in June with two in March, seven in April, 22 in May, nine in July, two in August and five in September; the earliest date being March 24th and the latest September 27th. Fifty-five reports refer to single birds but two have been noted on 14 occasions and three were seen together in July 1971. The distribution of roding birds suggests that at least two, and possibly in some years three or four, pairs breed on the Sedge, St. Edmund's and Verrall's Fens. Young birds were reportedly flushed in 1969 and 1974.

Single adults were ringed in 1971, 1972 and 1974 and a juvenile ringed in 1970 was retrapped in 1973, there have been no recoveries. All birds have been caught within two hours of dawn.

Curlew
A passage migrant with two or three records each year from 1970 to 1974, generally in flight over the Fen. The maximum flock noted was 50+ in July 1972 but six of the 11 records refer to single birds. Three spring records, one in late March and two in the first half of April, with seven of

the autumn records in July and one in August. The earliest autumn data is July 17th.

Whimbrel
Seven records during both spring and autumn passage periods but with the majority in autumn (c.f. E and K). As with Curlew most frequently seen flying over the Fen but less regular than that species with single records in 1970, 1973 and 1974 and four in 1971, often single birds but with parties of 12 and 14 being noted. Two spring records in April with autumn records in July (1), August (2), September (1) and October (1), the extreme autumn dates being July 11th and October 2nd.

Black-tailed Godwit
A single bird reported in April 1972 and parties of up to six noted frequently between April and July 1974.

Green Sandpiper
A regular autumn migrant in small numbers with 15 records between 1970 and 1974, also one bird in May 1973. No information on winter status (c.f. E and K). Fourteen records refer to single birds but two on the Rothschild's Lapwing scrape in both August 1973 and August 1974. Four records for July with earliest on 5th, six records for August and five from the first half of September.

Wood Sandpiper
One possibly heard in August 1970.

Common Sandpiper
An irregular passage migrant with single birds noted on five occasions, three records coming from the Rothschild's Lapwing scrape. Two records in both 1970 and 1972 and one in 1973, one record in early May, one in late July and three in August.

Redshank
Probably a summer visitor with 88 records, more than for any other species, mostly of single birds or pairs between the extreme dates of February 16th and October 12th. Only two records after August, both in 1974. The majority of records in April (23) and May (29) with one in February, six in March, eight in June, 13 in July, six in August and one in both September and October. Maximum count of six adults and two juveniles in July 1974. Present during at least part of the breeding season every year and birds noted holding territory on the Reed Bed and Trevelyan's Piece in several years with the number of pairs ranging from one in 1971 to at least three, and probably four in 1974. Juveniles seen only in 1974 when at least one nest on Trevelyan's Piece was destroyed by cattle.

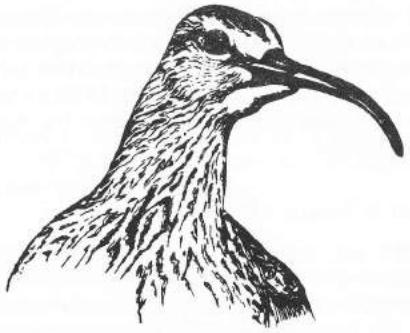
Three adults ringed in 1973, no retraps or recoveries.

Greenshank
Passage migrant with two autumn records each year from 1970 to 1974 and one spring record in early May 1970. Most records refer to single birds but two on two occasions and one party of four, three of the 11 records refer to birds heard. Extreme autumn dates are July 23rd and October 6th with two records in July, three in both August and September and two in October.

Dunlin
A passage migrant noted during spring of 1973 and 1974 and in autumns of 1972 and 1974. Has occurred twice in March and once each in early May, July and September. Records generally refer to single birds but a maximum of three in March 1974. Cambridge Bird Club Reports for the period mentioned winter birds in January 1971 (1) and November 1972 (3).

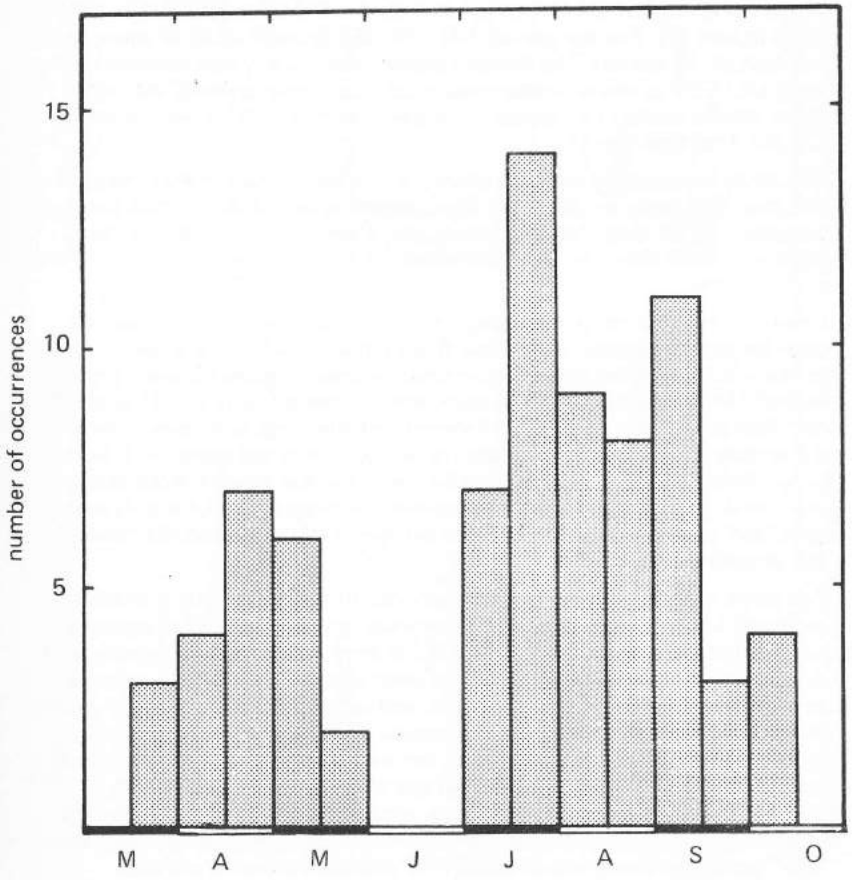
Ruff
An unusual passage migrant recorded once in 1972 and three times in 1974 with a possible in 1971. Records from April, May (2), July and September with three single birds, two on one occasion and a party of four.

Of the species considered above which may be looked upon as visitors to the Fen while on migration all save Wood Sandpiper have occurred in both



spring and autumn but only about 30% of occurrences have been in a relatively short spring passage period as compared to just over 70% in an extended autumn migration (Fig. 1). With the exception of a single Green Sandpiper on May 19th and two Reeves on May 27th all spring records fall between mid-March and mid-May with a peak in the second half of April and the first half of May. The autumn passage, covering a three and a half month period, begins in the first half of July and although there is a peak in the second half of that month records remain at a high level from mid-July to mid September before falling off rapidly. Although the peak of autumn observations may be somewhat earlier at Wicken, and obviously involves many fewer birds, this general picture is much in line with that for autumn wader passage at other Cambridgeshire sites such as Ely Beet Factory, Cambridge Sewage Farm and Wisbech Sewage Farm (Cambridge Bird Club Reports).

Figure 1 Total number of occurrences of migrant waders in half-monthly intervals from March to October during period 1969-1974. All records for Jack Snipe and 1974 records for Black-tailed Godwit excluded.



The records collected over the period 1969 to 1974 indicate that the Fen has a good breeding population of Snipe and Woodcock and that in recent years conditions have become more suitable for the breeding of Lapwing and Redshank. The observations also show that small numbers of the more common migrants and winter visitors visit Wicken regularly, some annually, although numbers and species range are less than at some other Cambridgeshire sites. There appears to be no reason why the creation and maintenance of suitable conditions on the reserve should not be lead to an increase in the occurrence of these species.

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MOULT OF 12 SPECIES AT WICKEN FEN

C. J. R. Thorne

A general survey of the Group's moult card collection appeared in the 1973 report (1). For the period 1971-74, the Group has 18 or more cards for each of 15 species. The present paper presents a simple analysis of the progress of the primary feather moult of 12 of these species; the other three are the subjects of separate studies – Bullfinch (8), Long-tailed Tit (2) and Tree Sparrow (4).

The birds investigated were all adults; retrap data indicate that many of the moulting birds are from the Fen's breeding population. Thus the samples may be fairly homogeneous, and the results obtained can be compared with those already published for broader (national or regional) populations.

Figures 1 and 2 show scatter diagrams for primary moult score against date for the 12 species. Allocating five points to each fully grown primary wing feather, and proportionately lower figures for partly grown feathers in the standard way, a completely renewed wing would score 50 for most passerines, but 45 for Finches and Buntings with only nine detectable primary feathers. Data for all four years are combined. Solid lines joining points represent data for an individual caught more than once in a single year. The figures show an obvious progression of moult with date, and give an indication of both the speed of moult and the timing of the moulting season.

For some species it seems that primary moult score for each individual increases linearly with time (5, 9), although a more sigmoid progression has been claimed in others (6, 12). If linearity is assumed, a regression of date on moult can be determined for each species, and this line used as the measure of average rate of moult, and of moult season. Table 1 shows the data collected for the Wicken sample. Included in the Table is the sample size, followed by two values for an estimate of the time span of primary moult. The first is based on the few retraps (solid lines in Figures 1 and 2), the number of such retraps following in brackets. The second value is obtained from the regression line, using the grouped data. The "average primary moult season" is also determined from the

regression equation; the final figure is the correlation coefficient. This coefficient is a measure of the degree of relationship in the data – a value of unity representing perfect functional relationship between moult progress and date, lower values indicating an increasing degree of scatter of data.

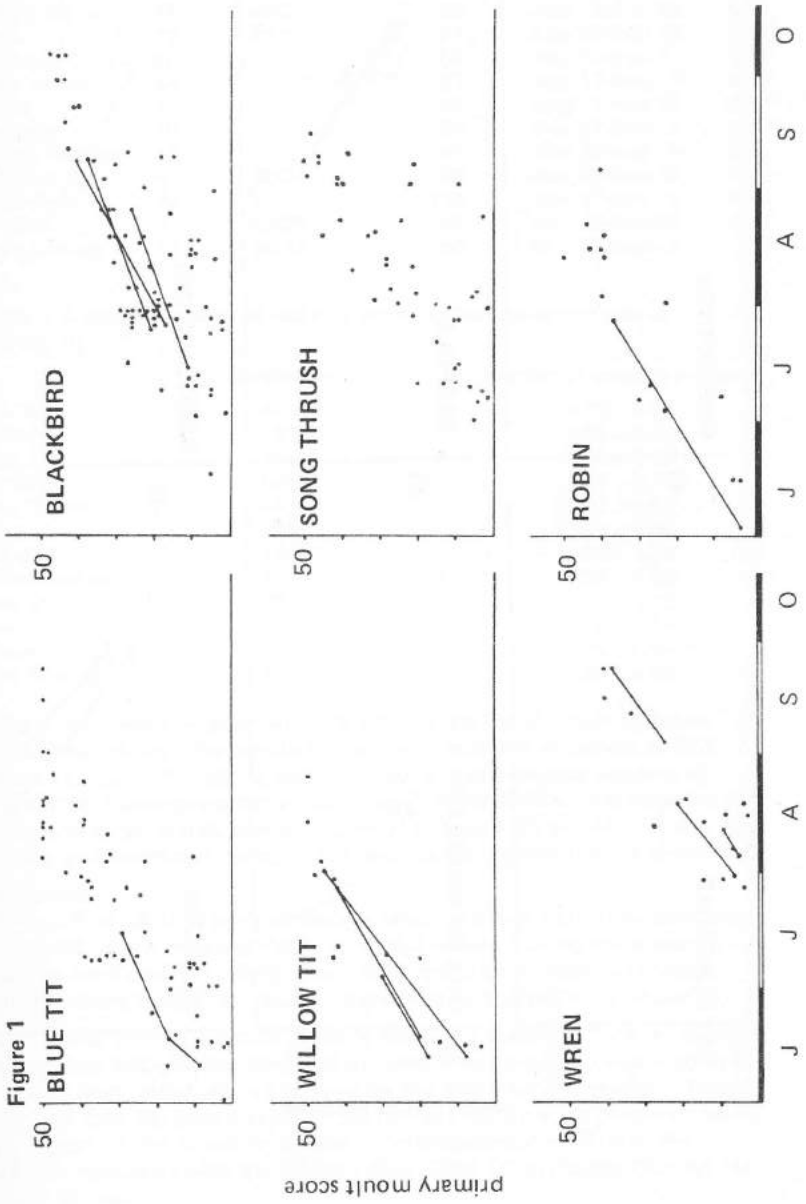

Figure 1

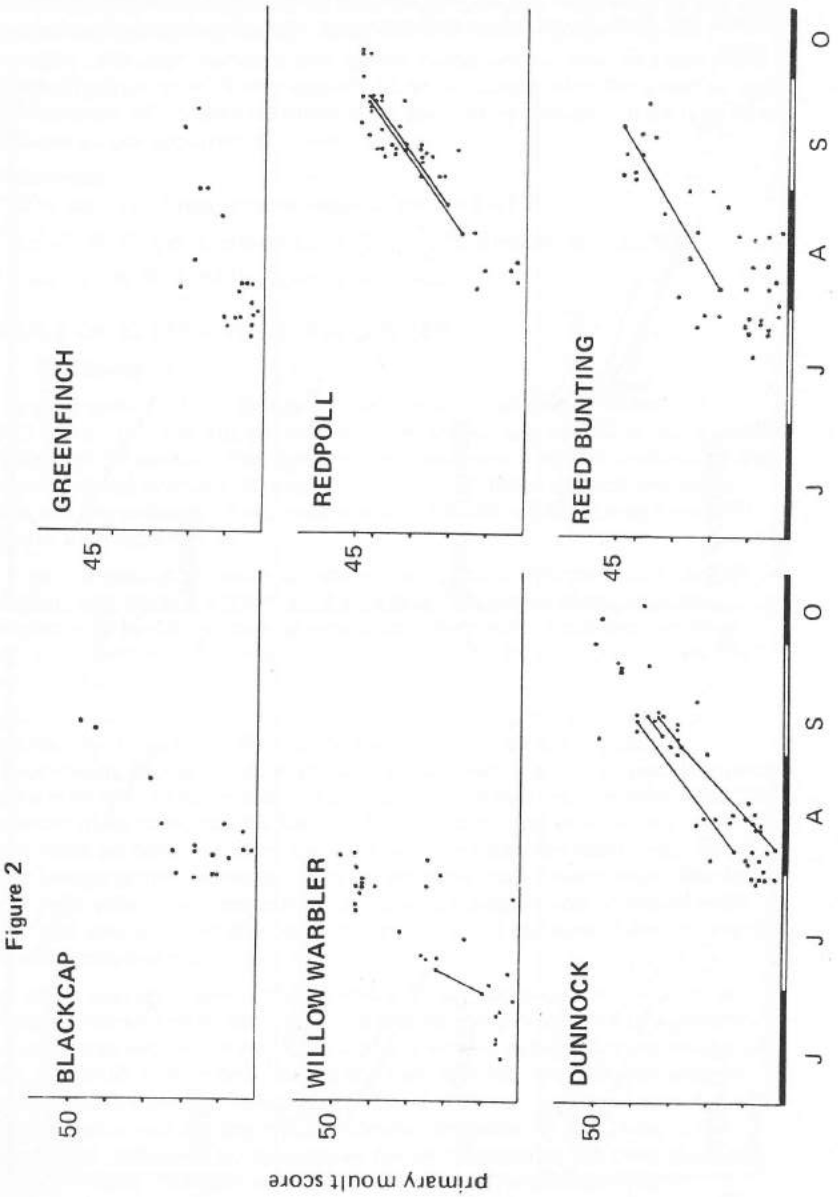

Figure 2

Table 1 Moult data for Wicken birds

	sample size	primary moult span (days) from retraps	primary moult span (days) from regression	"average season" from regression equation	correlation coefficient
Blue Tit	67	85(2)	62	June 15-Aug 16	0.81
Willow Tit	18	63(3)	58	June 3-July 30	0.91
Wren	19	67(2)	61	July 29-Sept 27	0.86
Blackbird	80	117(3)	66	July 13-Sept 17	0.68
Song Thrush	44	–	52	July 17-Sept 7	0.73
Robin	19	81(1)	82	June 7-Aug 28	0.91
Blackcap	19	–	37	July 27-Sept 2	0.78
Willow Warbler	32	–	40	June 25-Aug 4	0.81
Dunnock	50	60(2)	63	July 28-Sept 29	0.89
Greenfinch	20	–	115	July 17-Nov 9	0.88
Redpoll	48	63(2)	52	Aug 5-Sept 26	0.93
Reed Bunting	42	74(1)	45	July 26-Sept 10	0.77

Table 2 Average number of actively growing primaries in birds in mid-moult

	sample size	number of growing primaries
Blue Tit	40	1.35 ± 0.53
Willow Tit	8	1.00 ± 0.87
Wren	10	1.10 ± 0.30
Blackbird	57	1.32 ± 0.78
Song Thrush	24	1.67 ± 0.62
Robin	11	1.45 ± 0.50
Blackcap	12	1.92 ± 1.19
Willow Warbler	11	2.36 ± 1.30
Dunnock	28	1.61 ± 0.72
Greenfinch	10	0.90 ± 0.54
Redpoll	22	1.18 ± 0.49
Reed Bunting	18	1.83 ± 0.69

Table 2 represents an attempt to determine the "mid-moult situation" in the various species. The number of growing feathers (those up to 66% grown, i.e. those in stages 2 and 3 – stage 4 was excluded because of differences in interpretation of the stage 4/5 borderline) was counted for all birds with an overall primary score of between 10 and 40 (10 and 35 in Finches and Buntings). Sample size and standard deviation are given.

Discussion

The moult of adult passerines usually begins immediately after breeding is completed. Some migratory species moult before leaving the breeding area, the time taken for their moult then often being relatively short. Non-migratory birds may take a longer time to complete the moult.

Blue Tit and Willow Tit have an early moulting season at Wicken, average starting date being in the first half of June. The calculated moult span is about 60 days, although retrap data on the two Blue Tits suggests longer. Flegg and Cox (6) gave a value of 70-72 days for Blue Tit primary moult; their report of the moulting season – commencing mid-June in the Midlands coincides with the Wicken data. Ginn (7) estimates 64 days for Willow Tit moult.

Wren and Dunnock show similarities to one another. Both commence their moult at the end of July, and take some 60-65 days to complete it. Ginn (7), for the national sample, calculates 54 days for the Dunnock and 61 days for the Wren; average starting date for both species being at the end of July.

The data for Blackbird and Song Thrush (Figure 1) show a very wide scatter, due to a great variation in the starting dates of moult for different individuals. The grouped data suggest that Song Thrushes moult faster than Blackbirds, as also reported by Snow (12). Snow's estimate for Song Thrush moult span was 50 days, close to that found for Wicken birds; his value for Blackbird was 85 days, while the Wicken values are 117 days (from retraps) or 66 days (from regression analysis). The faster moult of Song Thrushes might be because they renew more feathers simultaneously (Table 2), but the difference, with present sample sizes, is statistically insignificant.

Wicken Robins seem to differ from those analysed by Snow (12). He reported that moult started in the first half of July and lasted 50 days, but at Wicken moult starts on average in early June and requires 81-82 days.

Both migratory Warblers complete their moult very rapidly, in about 40 days, but at Wicken the Willow Warbler is about a month ahead of the Blackcap in its moult progress. Pearson (11) has given values of 30-35 days for Willow Warbler moult and 40-50 days for Blackcap moult, based on the national sample. Both species have a high average number of growing primaries in mid-moult (Table 2); this must contribute to the rapidity of their wing renewal.

The moult of Wicken Greenfinches, Redpolls and Reed Buntings is broadly similar to that reported for larger samples of these species by Newton (10), Evans (5) and Bell (3). The Redpolls, partial migrants, commence moulting late and complete the process in 50-60 days. The data (Figure 2) show little scatter and indicate a very homogeneous population. The pattern for this species is almost identical to that of the Northumberland population (5). The Greenfinch, non-migratory, apparently has a very slow moult rate, although the lack of high moult score data is a severe restriction on calculation. The estimate of 115 days is much longer than the 85 days reported by Newton (10). The scatter in the Reed Bunting data makes a valid comparison with Bell's results difficult; he reported (3) a moult span of 60 days, with an average starting date of July 18th.

Conclusion

Records already collected by the Group are sufficient to show the pattern of moult progress in several species. Further data will allow other species to be added to this list.

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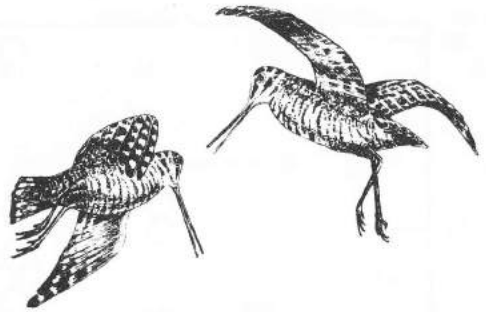


A NEW APPROACH TO MOULT STUDIES

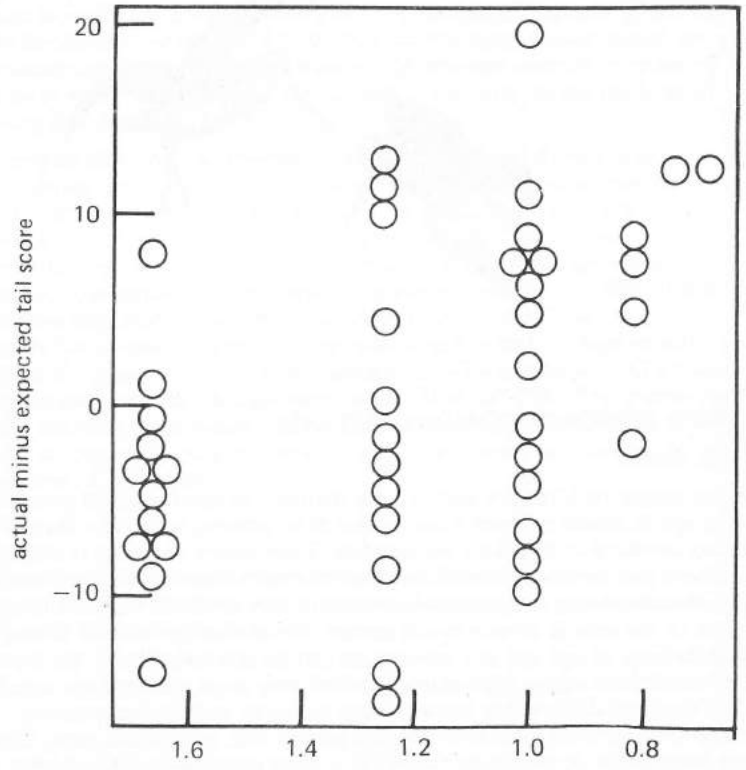
R. E. Green

Many passerine birds are particularly difficult to catch in mist nets when they are in moult because they reduce their activity when the feather tracts involved in flight are incomplete. Even where a species is a common resident the numbers of birds handled in moult may be relatively small (1). It is therefore not surprising that very few birds are handled twice or more in the course of one moult period. While average rates of moult for populations or age and sex sub-groups can be estimated from the data collected from many individuals handled only once during their moult 3, a study of differences in moult rate between individuals requires recaptures of birds within one moult period and, as we have seen, these are infrequent. It would be helpful if it were possible to estimate the rate at which a bird is moulting simply by catching it once during its moult.

In the Bullfinch the rate of growth of individual primary feathers has been found to vary little between birds 2 and most of the variation in the rate of progression of primary score seems to involve differences between birds in the number of active primaries in growth at any one time. Assuming the rate of primary growth to be constant we can obtain an index of the rate of primary moult by calculating the mean difference in length between adjacent actively growing primaries. The mean difference in length of the growing feathers will decrease with increasing moult rate if birds which moult faster are doing so by shedding old feathers faster. Unfortunately we cannot use this method on the other tracts of flight feathers since the growth rates of the individual feathers in them have been shown to vary greatly 2.

We can, however, assess the progress of the moult in other flight feather tracts by, for example, examining how far the moult of a bird's tail has proceeded relative to the population mean of the tail score for birds with the same primary score. We can thus class any bird as being "ahead" or "behind" on its tail or secondary moult by reference to its primary score.

Figure 1 Progress of tail moult and the rate of primary growth in the Bullfinch



In Figure 1 the extent of progress of tail score of Bullfinches relative to that expected from their primary score is plotted against an index of their rate of primary moult (i.e. the mean growing primary length difference in moult score points). There is a tendency for birds moulting their primaries slowly to be behind on their tail moult. However knowing the progress of tail or secondary moult relative to that expected given the primary score does not tell us anything about the rate of moult of these tracts. A bird which is "behind" on tail moult might have a low rate of progression of tail score or it may simply have delayed the onset of tail moult relative to primary moult.

Some of the feathers of most birds show an indistinct regular barring. Table 1 shows the extent of occurrence of this barring on the different flight feather tracts of a sample of adult Sedge Warblers. The bars are called growth bars and are produced at the rate of one every 24 hours.

Table 1 Frequency of occurrence of growth bars on Sedge Warbler flight feathers

	feather tract			
	primaries	secondaries	tertials	tail
percentage of birds showing growth bars	15	75	95	100

sample size 20

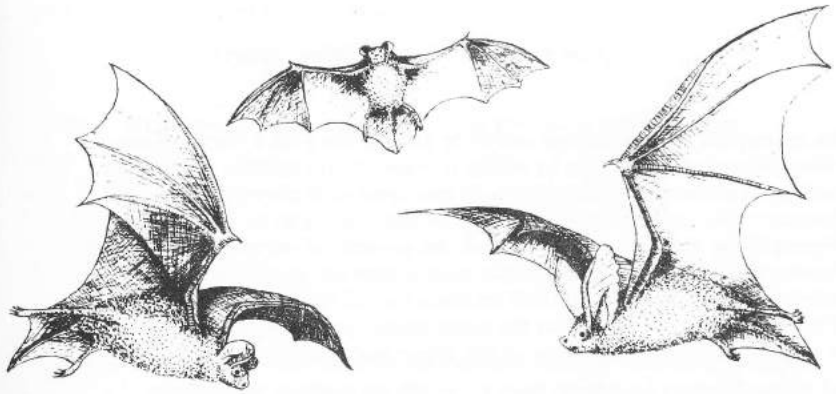
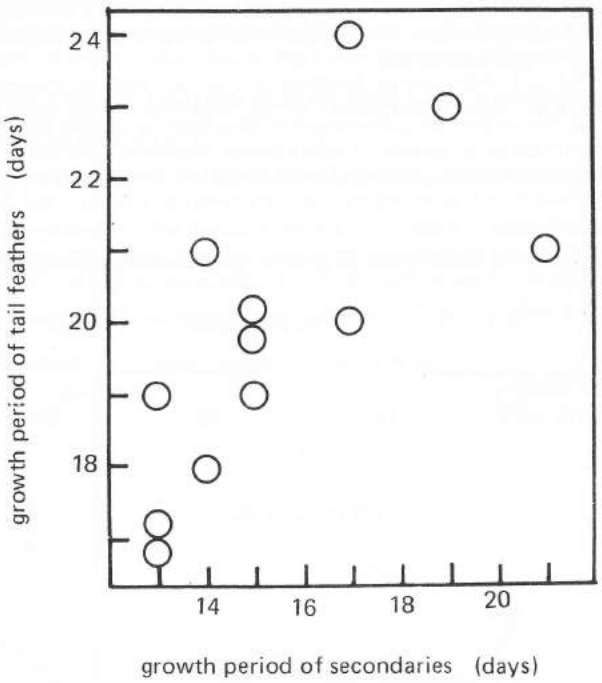


Figure 2 Rates of feather growth in the secondaries and tail of Sedge Warblers



Measurement of the average width of growth bars on a feather gives a direct measure of the rate at which it grew. By measuring growth bar widths in different feather tracts of the same bird the relationships between the rates of feather growth in the tracts can be investigated. In Figure 2 the average time taken for the growth of individual secondary feathers, (obtained by growth bar measurement), is plotted against the average growth time of the tail feathers for 12 non-moulting Sedge Warblers. It can be seen that the birds which grew the feathers in one tract quickly also grew those in the other tract quickly.

If measurements of growth bars are made on birds in moult then combination of the information on the number of feathers in moult and the growth bar widths should permit the estimation of rates of moult for all the flight feather tracts.

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ESTIMATION OF BIRD POPULATIONS

R. E. Green

Since 1970 the Group has mist netted regularly in an area of 6-7 ha. at the north-eastern corner of the Fen. The methods of netting and the timing of visits have been standardised to provide information on year to year changes in the bird populations of the area. The sites are described and the methods and results discussed in previous Reports (1,2). In 1974 standardised trapping proceeded in the normal way and in addition a mapping census and nest searching were carried out to obtain other types of information on the bird population. Ten census visits were made in April, May and June. The positions of all birds seen during a standard walk covering the whole of the area were noted and plotted on a map together with notes on their activities. At the end of the season the accumulated information was examined and an estimate was made of the number of singing males and pairs of each species in the area. The numbers of adult birds of each species caught at each of the four standard mist netting sessions were examined. The catch of unringed adults of most species on the last session of the season was small (Table 1) and while this may be due in part to changes in catchability associated with moult it seems that most of the resident adults in the population were handled during the course of the season. This conclusion is supported by the proportion of birds greater than one year old which already carried rings put on in previous seasons (Table 2).

Table 1. Numbers of birds handled for the first time in the season

May	June	July	August
172	123	45	36

Table 2. Numbers of fully adult birds handled for the first time in 1974

	total full adults handled 1974	number ringed previous to 1974
Blue tit	4	4
Blackbird (male)	7	6
Bullfinch	24	19

Table 3 shows the mapping census estimate of the number of pairs of each species together with the numbers of male and female adults caught during the season or, where the sexes are not separable, the total number of adults handled divided by two. Mapping estimates were not made for the semi-colonial Reed Warbler. Trapping data was not included for Tree Sparrows which roosted in the area.

Table 3. Estimates of bird populations

	mapping	trapping		
		females	males	total/2
Great Tit	3	2	4	
Blue Tit	6	8	8	
Willow Tit				3
Long-tailed Tit	3	2	2	
Treecreeper	1			1
Wren	12	5	8	
Song Thrush	8	12	10	
Blackbird	8	7	18	
Robin	8	7	11	
Reed Warbler		13	26	
Sedge Warbler		1	10	
Blackcap	7	7	1	
Garden Warbler	2			1
Lesser Whitethroat	4			4
Willow Warbler	7	8	9	
Chiffchaff	1			1
Goldcrest	1	0	1	
Spotted Flycatcher	3			6
Dunnock	12	13	19	
Greenfinch	3	1	2	
Goldfinch	1	9	8	
Linnet	6	3	1	
Redpoll	4	12	7	
Bullfinch	8	18	27	
Chaffinch	5	4	1	
Yellow hammer	2	0	0	
Reed Bunting	7	8	8	
Tree Sparrow	2			

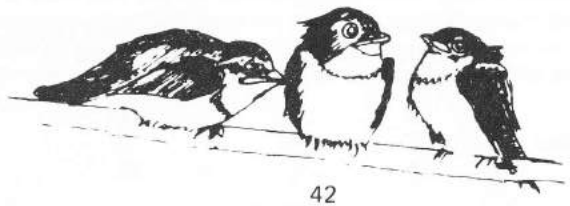
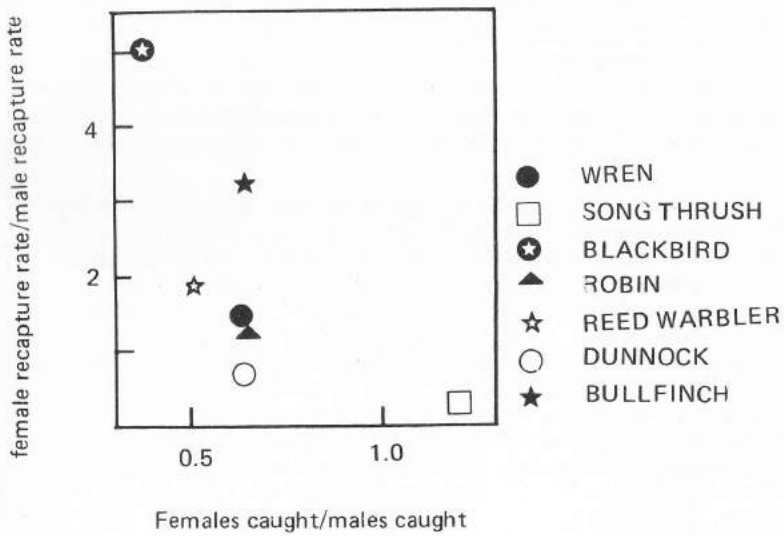


Figure 1 Relationship between sex ratio of trapped birds and relative recapture rates



Of the nineteen species which can be sexed by plumage, brood patch or wing length, the number of adult females caught in the season is within one of the mapping estimate of the number of pairs in nine cases. The number of adult males trapped is within one of the mapping estimate in only three cases. In nine species in which there is a considerable disparity between the sexes in the numbers trapped, the number of females is closer to the mapping estimate than the number of males in six cases. Of these nine species three show an excess catch of females while the other six show an excess of males. Assuming a 1:1 sex ratio, the numbers of the sexes trapped might differ due to sex differences in behaviour affecting catchability, (for example a foraging height difference), or to differences in home range or the proportion of wandering birds of the sexes. If one sex has a larger home range than the other then more of its individuals will be within the catchment area of the nets. We can distinguish these possibilities by examining the recapture rates of the sexes. If males are more catchable than females they should also be recaptured at a higher rate. On the other hand if they have a larger home range or if the population contains a larger proportion of wandering individuals then the recapture rate should be lower than that for females. In Figure 1 the ratios of the recapture rates for the two sexes are plotted

against the sex ratio in the catch for the seven species with sufficient rehandlings to permit analysis. It would appear that where an excess of one sex is trapped its recapture rate is lower than for the other sex. This supports the hypothesis that an excess of one sex is produced by more birds of that sex visiting the trapping area, perhaps because of a larger home range.

In many cases the population estimates from mist netting and mapping agree closely. Notable exceptions are Spotted Flycatcher, Goldfinch, Linnet, Redpoll and Bullfinch in which mapping gave a much lower estimate than trapping. Bullfinch and Spotted Flycatcher have very quiet songs and can easily be overlooked on a mapping census while Goldfinch and Redpoll feed over large areas outside their small breeding territories (3) and therefore many more birds must visit the trapping area than nest there.

Linnets were underestimated by trapping but nets were not set in their open nesting area and it is notable that none of the Yellow Hammers nesting there were caught either. The fact that few Wrens were caught relative to the mapping estimate is not explicable at the moment.

Conclusion

Mapping census estimates and trapping estimates agree fairly well for many species, especially if the number of adult females trapped is taken as the trapping estimate of the number of pairs. It appears that the disparity between the numbers of the sexes trapped is due, at least for some species, to differences in home range or the proportion of wandering birds.

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