REFERENCE

THE EFFECTS OF SEVERE WINTER WEATHER ON BRITISH BIRD POPULATIONS

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SUMMARY

(1) The effects of severe winter weather on bird populations in Britain were assessed using analyses of winter ringing recovery totals, winter wader population counts, and breeding population censuses and related to the severe weather of December 1981 and January 1982.

(2) Seventeen of the 19 representative species whose recovery totals were analysed showed greater winter mortality in Britain as the severity of the weather monitored at the ''statutory ban'' estuaries increased. Five of these increases (those for Oystercatcher, Redshank, Pied Wagtail, Wren and Robin) were statistically significant over the period 1967-1980. Evidence is presented to show that most of the other species would show stronger correlation between mortality and winter severity were the normal annual samples larger.

(3) Certain species are recovered abroad in greater numbers when severe weather prevails in Britain.

(4) The timing of increases in recovery rate (and therefore of mortality) is linked to the incidence of sustained glazing (or worse) conditions at the estuaries monitored.

(5) Recoveries received by the BTO for December 1981 have already almost quadrupled (relative to the 1967-1980 averages) for Redshank and Pied Wagtail and have nearly doubled for Robin and Song Thrush, despite an average delay of 17 days between the finding of a bird and the reporting letter reaching the BTO. More recoveries for these and other species are arriving daily and the final list for species affected by the severe weather will certainly be longer.

(6) The timing of mortality in December 1981 for various species was linked to the temporal pattern of the cold spells.

(7) Analysis of mid-winter wader population counts for 1973-1981 shows that, of the 16 species examined, four (Golden Plover, Grey Plover, Lapwing and Curlew) were less numerous the more severe the winter. Six other species (Oystercatcher, Sanderling, Ruff, Black-tailed Godwit, Bar-tailed Godwit and Greenshank) were probably also affected. Movement of birds out of Britain cannot be precluded as an explanation of these changes.

(8) The 1973-81 winter weather correlations were used to predict the probable effects of the 1981-82 weather on waders wintering in Britain. The results predict the following minimum decreases of large amplitude: Lapwing - 41 points, Sanderling - 25 points, Golden Plover - 18 points, Curlew - 16 points, Black-tailed Godwit - 14 points and Greenshank - 11 points (where 1973 levels were 100 points).

(9) Analysis of Common Birds Census and Waterways Birds Survey data for the period 1962-80 shows that breeding populations of at least twelve species (Lapwing, Skylark, Pied Wagtail, Grey Wagtail, Wren, Robin, Long-tailed Tit, Blue Tit, Goldfinch, Linner and Reed Bunting) depend on the temperature prevailing in the preceding winter, decreasing after a cold winter.

INTRODUCTION

The present report has been prepared at the request of the Nature Conservancy Council, Belgrave Square, with a two-fold remit:

a) to collate the evidence currently available as to the effects of the severe weather of December 1981 and January 1982 on British bird populations

and

b) to document the effect of winter weather in previous years upon British bird populations insofar as this can be assessed from the various monitoring schemes run by the British Trust for Ornithology under contract to the Nature Conservancy Council.

Given the short time available for the preparation of this report we have concentrated upon documenting the evidence available. We have made no attempt to relate our findings to the evidence available in the scientific literature.

MATERIALS AND METHODS

We have drawn extensively upon results from three surveys run by the BTO. The Ringing Scheme collects data as to the recoveries of previously ringed birds. Ringed birds are encountered again:

a) as controls, i.e. handled by other ringers

or

b) as recoveries, generally as birds found dead by members of the public (although occasionally injured birds or birds in unusual circumstances are reported).

As the numbers of controls received in any year will be a function of ringing effort, they have been ignored for the present purposes. The basic premise of the use of recoveries as an index of bird mortality in Britain is that the public act effectively as a random collector of dead birds. Recovery rates vary from species to species, so only within species trends are significant.

The second scheme drawn upon is the Birds of Estuaries Enquiry reported in Prater 1981. This scheme provides mid-winter (January) counts of birds on all major estuaries. It is thus possible to index the population level in a consistent manner from year to year (see Marchant 1981) for details.

The Common Birds Census and Waterways Bird Survey schemes of the BTO census breeding bird populations in Britain in farmland and woodland and along waterways respectively. Defined census plots are covered by volunteer observers during the breeding season and the mapped registrations provide an index of breeding densities of each species. As the scheme is conducted to consistent standards from year to year, the population index obtained reflects variation in bird densities.

In the present report data from these three schemes are related to prevailing weather conditions. The NCC monitors weather conditions in certain estuaries with a view to calling for voluntary or statutory band on wildfowling as conditions demand. Their criteria for such calls are respectively 7 and 14 successive days when more than half the estuaries surveyed report glazing or worse conditions at weather stations near each estuary. As a convenient shorthand such days would be referred to as "glazing days". The incidence of such glazing days by month and winter are extensively used in the present report, In addition, for analysis of breeding success by small land birds deviations from the long-term 30 year average of temperature in England and Wales have been used.

The analyses conducted here have sought correlation between bird population levels (or, in the case of breeding populations, changes in these populations) and the weather conditions prevailing in either individual months or in the winter as a whole. Such analysis is crude but the only one practical in the short time available in which to undertake the work.

RESULTS

1. Ringing Recovery Patterns 1967-1980

Ringing Effort

The rate at which recoveries of ringed birds are reported to the BTO is clearly likely to be influenced by changes in ringing effort: if more birds are ringed more birds are likely to be recovered, all else being equal. Table 1.1 indicated the ringing totals for various species over the period 1967-80. The selection of species is designed to reflect those for which significant weather effects are documented elsewhere in this report. It is clear from this table that there has been few major temporal changes in ringing effort over the period under review.

Since recoveries are being related to weather conditions each winter and not to date it is necessary to check that the ringing totals are not themselves correlated with weather conditions. Table 1.2 shows the correlation coefficients between the number of birds ringed each year and the amount of glazing in the winter at the end of that year. For no species is there a significant correlation. Thus the number of birds ringed each year has little effect of the number of recoveries in the subsequent winter. This argument ignores the fact that some birds will have mean expectations of life from ringing date of more than a year but for the present purposes it is safe to assume that the proportion of any cohort dying within one year, two years, three years, etc. from ringing is constant over time.

Temporal Pattern of Recoveries

Recovery totals vary with season and with year. For the present analysis daily totals of recoveries in the months December through February are tabulated for the period 1967-80 in Appendix 1. Summaries of these data for individual species are presented as Tables 1.3-1.21. The species in these tables were chosen to present a diversity of ecological backgrounds, thus providing a representative cross-section of how birds in Britain might be affected by cold winters. The number of recoveries annually from Britain within the period December-February for various species range from 1.8 (Lapwing) to 54.2 (Teal). Totals are particularly high for various species that are shot (Shag, Cormorant, Oystercatcher) but two thrushes (Song Thrush, Robin) also yield high totals. Few species show time trends across years, Sparrowhawk and Dunlin being noteworthy exceptions. For former is probably now more frequently recovered each year because of its increasing habit of coming in to artificial feeders in winter to prey on the birds feeding there (Glue in press). Species with low recovery rates include those found abroad (Lapwing) and those dying in habitats from which the corpses are unlikely to be discovered (Kingfisher).

An important point about the analyses to be presented below is that they are based exclusively on recoveries from within Britain. A number of species migrate from Britain at the onset of cold weather e.g. Lapwing, Song Thrush - and the effect of cold weather on these species will not necessarily be reflected in recoveries from Britain. Inspection of Tables 1.3-1.21 show that Irish recoveries and recoveries from continental Europe are much higher in some years than in others. These are without exception species which are known to move to the Contintent or to Ireland in the face of winter weather.

Some seasonal variation between-months is apparent in these tables but is not treated within this report.

Effect of Winter Severity of Recovery Totals

For the present analysis winter severity is assessed as the number of days with glazing conditions in the estuaries monitored for the purposes of voluntary and statutory banns on shooting. Monthly weather was assessed as the number of days on which half or more of these estuaries were subject to glazing. Weather over the winter as a whole is summarised as the sum of days with glazing for the four months November through February. The estuaries concerned are listed in Appendix 2. The dates on which more than half of these estuaries recorded glazing are indicated in Appendix 3. Table 1.22 summarises these data to provide monthly and annual glazing days for each year in the period under review.

Table 1.23 summarises the relationship between the annual recovery totals for 19 species with the incidence of glazing in the country as a whole. The table shows that two estuarine species yield recoveries closely coupled to the severity of the winter. Three small song birds, Pied Wagtail, Wren and Robin, are similarly strongly coupled. Other species show varying degrees of coupling to the severity of weather, with Cormorant and Song Thrush approaching statistical significance ($P < 0.10$ for these two species). Most of these recoveries are of dead birds, so that these results indicate that the species mentioned are significantly more likely to die in severe winters than in milder winters, mortality increasing with the severity of the winter. Figure 1.1 shows the relationship between the recovery totals and the occurrence of glazing for the five major species.

Positive correlations in Table 1.23 are fairly conclusively indicative of increased mortality with severe weather but absence of correlation does not necessarily imply the bird is not affected by severe weather. Figure 1.2 indicates a strong tendency for the size of the correlation established to be linked with the annual sample size of British recoveries for the months of December through February. That is, there is a tendency for those species with the larger samples of recoveries for each year to demonstrate the weather effects whilst those with smaller annual samples tend not to show any correlation. This strongly suggests tha other species in the sample might well show dependence on the weather to a statistically significant degree were larger annual totals available for them. (This does not preclude an effect of weather being demonstrated with longer runs of data in due course). It is worth noting that in Figure 1.2 it is the species generally regarded as susceptible to severe weather on account of their small size (Wren) or feeding habits (Pied Wagtail) that yield high correlations with small samples.

Finally, it may be noted that some of the species showing low correlations in Table 1.23 e.g. Lapwing - are known to migrate out of the country with the onset of cold weather. This is apparent in the data of Tables 1.3-1.21.

Timing of Winter Mortality

The idea that a statutory ban on wildfowl should be introduced following a 14-day period of sustained severe weather emerged in the course of the 1978-79 winter. Figure 1.3 examines the pattern of mortality in several species over the course of that winter. The data are summarised by seven-day periods and show that in most species the number of recoveries reaching the BTO increased either with the onset of sustained glazing or in the period shortly thereafter. Some delay in the appearance of mortality might be expected if the birds were able to live on existing fat reserves during the initial few days of severe weather but some delay must also be due to lapsed time between the death of the bird and the discovery of the body by members of the public. The figure thus indicates that the link between mortality and winter severity documented for the species in Figure 1.2 is timed even within the 1978-79 winter to the occurrence of sustained glazing.

2. The Recovery Situation for the Current Winter

Recovery Totals to Hand

Table 2.1 summarises the number of recoveries received for December 1981 to date (January 15th) and compares these with the long-term evidence for each species calculated over the period 1967-1980. The totals for December 1981 under-estimate the real figures because:

a) there are delays in finding dead birds, especially when the weather is severe and inhibiting to human traffic

b) postal delays occur between the despatch of the finding letter and its receipt by the BTO; these delays have been aggravated this year by weather conditions, by the recent rail strike and by Christmas.

c) ringing details have not yet been received for some birds which were recovered very soon after ringing; for these a request to the ringer issued with the ring concerned is necessary before even the species concerned can be identified in some cases.

Despite these problems Table 2.1 shows that for four species - Redshank, Pied Wagtail, Robin and Song Thrush - there has already been a substantial increase in the number of recoveries received for December as compared with the long-term average for this month. The implication is that many more birds of these species have died in the course of the weather experienced in December 1981.

For certain species the comparison presented in Table 2.1 is biased. This is particularly true in the case of quarry species such as Teal since the British Association for Shooting and Conservation (formerly WAGBI) called for a voluntary ban on coastal shooting on the 15th December and a statutory ban stopped all legal shooting from the 23rd December. Consequently the totals receoved to date contain a much smaller proportion of shot birds than have been included in the long-term average. Similar problems may affect the totals for other shot species.

The table thus suggests that several species have suffered significantly increased mortality in December 1981 as compared with previous years. Some idea of the extent of the under-estimate can be obtained from Table 2.2. which shows the delay between the date of recovery and the date of receipt of the reporting letter by the BTO. It should be clear that there is a substantial lag between recovery and the availability of the totals in any given period. For previous years, of course, the totals more closely reflect the real numbers of ringed birds dying and found subsequently.

If the lag documented in Table 2.2 is ignored, Figure 2.1 illustrates the time trend of recoveries in the course of December 1981. It is clear that the rate of recovery for Redshank and Oystercatcher and for Song Thrush, Robin and Pied Wagtail have increased significantly over the long-term average as the cold weather deepened. These figures will undoubtedly require up-dating as further recoveries are notified to the BTO. Nevertheless, they already indicate that mortality rose sharply as the severe weather deepened.

Summarising, the recoveries already notified to the Trust indicate substantially greater mortality amongst both estuarine and land birds, the mortality being particularly linked to the prolongation of severe weather. These estimates will need revision upwards as further recoveries arrive.

3. Effects of Severe Weather on Wintering Wader Populations

Wintering Wader Populations Trends

Wader populations in Britain have been monitored by the Birds of Estuaries Enquiry since the late 1960's (Prater 1981). Since 1973 it has been possible to index winter populations of 15 species by estimating population changes from year to year in estuaries censused in both pairs of years and constructing an index whose values were arbitrarily set to 100 in 1973 (Marchant 1981). Table 3.1 presents the index values for the 15 common wader species on British estuaries. The detailed trends within these populations have been adequately discussed by Marchant (1981) and will not be repeated here. The table summarises the information for ease of reference.

Influence of Winter Weather on Population Levels

A variety of studies, especially those of Mr. Peter Evans at Durham University and of Dr. J. Goss-Custard at ITE have shown that severe weather interferes with feeding by estuarine birds, subsequently leading to additional mortality amongst waders. Hence the present analysis sought to relate the population trends of Table 3.1 to severe weather at the estuaries. The weather data used were previously summarised as Table 1.22.

Table 3.2 summarises the extent of coupling between the January wader population levels and the weather prevailing in the course of the same winter. Since only nine years' data were available any species showing a correlation at $P < 0.10$ were considere in this table. A total of ten species showed coupling between population level and glazing days in particular months, four of them significantly so. Five of these species were linked to November temperatures, none to December conditions, four to January conditions, and one (Curlew) to February weather. (Of course, some of these species also show significant correlation with conditions in December or other months but at a lower level than indicated in Table 3.2). It should be noted that the Curlew correlation is actually between a January population level and the weather in the following February but this is probably an artefact of an overall relationship with winter conditions as a whole. Figure 3.1 shows the relationship between the population levels for Lapwing and for Curlew in relation to weather over the winter as a whole, confirming the depressive effect of severe weather on these birds. Table 3.3 summarises the predicted population changes expected on the basis of the available whole-winter regressions of population level on glazing, using the current cumulative glazing figures for 1981-82 to compute a difference from the 1980-81 population.

Summarising, for ten of the 16 wader species examined their mid-winter population levels showed indications of depression when extensive glazing was present on British estuaries. Population decreases of up to 41 per cent (Lapwing) are predicted for the majority of the species surveyed.

4. Effects of Severe Winters on Breeding Populations

Breeding Populations

The populations of many resident species in Britain have been monitored by the BTO's Common Birds Census Scheme since 1968 for farmland species and 1964 for woodland species. In addition the Waterways Birds Survey started in 1974 provides a monitoring of the breeding population of riparian species. Table 4.1 presents the population trends for resident species monitored by the CBC scheme and Table 4.2 does likewise for riparian residents. As with wader indices, the population trends have been extensively discussed elsewhere and will not be repeated here. Attention is, however, drawn to the effects of the cold winter of 1978-79, apparent in the population trends for many species and reviewed extensively by Cawthorne and Marchant (1980).

Influence of Weather in Winter

In the present analysis the effects of weather were tracked in the form of temperature over England and Wales as a whole, not merely via the glazing data for estuaries. Temperatures were assessed throughout in the form of deviations in each of the months November through February from the long-term 30-year average temperatures for that month. These variations seem likely to be of greater significance to populations of what are predominantly land birds than are the coastal conditions reflected in Table 1.22. The effects of these winter temperatures were assessed in the form of the population change amongst breeding birds of each species recorded by the CBC (or WBS) for each year. Since there is little evidence that the centres of breeding populations alter significantly from year to year any reduction in the extent of the breeding population certainly reflects some form of mortality which has operated since the previous breeding season. The only exception is likely to be with certain species such as Kestrel in which annual variation in the proportion of birds failing to breed is a significant factor in the species' population dynamics.

Table 4.3 shows that at least ten species showed significant correlation between the extent of population change and the temperature in at least one of the winter months examined. These figures are a minimal estimate of the number of breeding birds affected since it is known from other work that other species may show population changes influenced by various combinations of weather variables. Figure 4.1 illustrates some examples of these relationships, showing that each population index increases between breeding seasons if the intervening winter is mild and decreases if the intervening winter is cold. Such graphs allow prediction of the future breeding population on the basis of conditions during the intervening winter.

The Waterways Birds Survey is more recently started and is as yet subject to sampling problems. Even so, two of the 11 species surveyed show population depression with cold winter conditions. Changes in the riparian population of Pied Wagtail are significantl correlated with February temperatures ($r = 0.859$, $P < 0.05$) and similar changes in Grey Wagtail populations are correlated with January temperatures ($r = 0.895$, $P < 0.05$). Both these species therefore survive better if the winters are mild but decline if the winter temperatures are low.

DISCUSSION

The results presented in this report show that populations of many species wintering in Britain are adversely affected by the onset of cold weather. The evidence presented in the form of recovery totals indicates that mortality increases with the severity of winter, with peak mortality concentrating into periods when sustained glazing has been recorded in the estuaries monitored for statutory ban purposes. Analysis of the CBC and WBS population changes also implicates winter temperatures as limiting populations through mortality, with population depression occurring in the more severe winters and population increases getting larger following mild winters. The Birds of Estuaries analyses (Table 3.2, Figure 3.1) also document a reduction in British populations during severe weather on the estuaries, though here the possibility of movement abroad is not precluded in the same way as it is by recovery and breeding populations data. Together, however, the various data sets analysed confirm that severe winter weather has a significant depressive effect upon birds of a wide variety of species in Britain. Indeed, the effects of such weather are probably underestimated by the analyses presented since, as indicated in Figure 1.2 there is a tendency for correlations between mortality and winter severity to become stronger as the annual totals of recoveries from which they are assessed are larger.

An important finding of the present analyses is that weather recorded in the statutory ban estuaries (Appendix 2) is a successful predictor of the mortality eventually recorded amongst British bird populations. This means that the present monitoring scheme is actually a good predictor of the risks to bird populations at a time when it is not yet possible to assess those risks directly. As shown in Table 2.1 ringing recoveries are already beginning to detect increased mortality for several species, notably Redshank, Pied Wagtail and Robin, but for others for which weather effects have been documented in the present report (e.g. Oystercatcher, Lapwing) the number of recoveries received to date clearly lags behind the totals which can be eventually expected for this winter. Table 2.2 shows clearly the lag between the actual recovery of a ringed bird and its submission by the finder to the BTO. It may be noted in addition that the lag is likely to vary with species, being short for some of the commoner garden species but usually delayed in the case of birds in less populated habitats such as those of estuaries. In addition, as noted in the footnote to Table 2.1 many shooters frequently accummulate the rings from shot birds until the end of the year and submit them <u>en masse</u> to the Trust. These various delays vitiate the use of recovery reporting as recorded at the BTO as a fast predictor of population depressions.

On a rather larger timescale the recoveries received by the BTO ringing scheme clearly indicates that the 1981-82 winter has already been one of exceptional severity. Table 2.1 indicates that recoveries of Redshank and Pied Wagtail are already running at 3-4 times their average rate for a December, and recoveries of Robin and Song Thrush are both almost double their normal level. In addition, the total for Oystercatcher has already equalled the average winter even though the BTO will normally receive a considerable number of further recoveries in the next few weeks. Figure 2.1 shows how the build-up of recoveries progressed in the course of December and the first few days of January (the latter almost certainly under-estimated). It is quite clear that mortality amongst Redshanks and Oystercatchers has been running at well above normal levels. Much the same pattern is apparent in the three small land birds surveyed in Figure 2.1. Finally, although no direct evidence is yet to hand, it is clear from the predictions of Table 3.3 that mortality amongst other species can be expected. There can be no doubt that bird populations in Britain are already suffering exceptional mortality in the current severe conditions.

Table 1.1 Ringing Totals (birds ringed each year) for various species over the period 1967-80.

Species	67	68	69	70	71	72	73	74	75	76	77	78	79	80
							Year							
Redshank	1436	1516	1130	1611	1515	1363	2905	2913	3148	2539	2134	5120	5052	3017
Oystercatcher	3060	5242	4123	2407	2622	2727	2133	4266	3940	3403	4337	4772	3115	4636
Lapwing	1777	2256	2213	2094	2551	3179	3578	4236	3308	3684	3696	3900	3765	3890
Pied Wagtail	3570	3570	4292	4397	4506	4835	6512	5166	7599	8168	7768	7278	7370	8424
Robin	10186	10056	11088	10467	10754	12071	13418	12030	14457	21692	16228	15310	17359	18705
Heron	400	381	507	479	449	283	254	292	480	620	413	251	449	678
Teal	2633	2238	2658	1704	1790	1249	1182	907	983	1016	1035	1429	1214	914
Sparrowhawk	103	125	144	186	489	424	373	731	846	950	1103	1093	1002	1268
Kestrel	560	645	476	613	799	968	787	923	1073	1101	1175	1433	1169	1004
Dunlin	11578	9654	7346	7767	14794	13321	16982	15159	13994	15136	19230	16325	12963	15730
Wren	6216	6007	6370	6744	7869	9474	9741	10624	13220	11325	10845	11722	6922	11406
Great Tit	9613	9493	11642	14698	17809	16442	17135	16954	22451	20974	22656	24731	28382	35986
Song Thrush	13120	14149	15087	12088	11551	12685	11637	10735	12623	13554	12690	13487	13740	12979

Table 1.2 Correlation coefficient between ringing effort and winter severity (number of days with widespread estuary glazing November through February). (November and December in each ringing year, January and February in the following year).

Species	correlation coefficient
Redshank	0.361
Oystercatcher	0.043
Lapwing	0.021
Pied Wagtail	0.060
Robin	0.085
Heron	-0.058
Teal	0.098
Sparrowhawk	0.098
Kestrel	0.144
Dunlin	-0.190
Wren	-0.429
Great Tit	0.145
Song Thrush	0.351

none significant

Table 1.3. Winter recoveries of Cormorant between January 1967 and December 1980 tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

Winter	British				Irish				Abroad			
	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	13	6	-	-	1	0	-	-	2	5	-
67-68	8	10	4	22	3	3	6	12	1	0	1	2
68-69	16	27	8	51	3	7	4	14	12	9	5	26
69-70	9	21	20	50	5	12	11	28	9	6	3	18
70-71	6	22	7	35	6	11	0	17	10	7	3	20
71-72	2	12	24	38	3	8	4	15	2	4	5	11
72-73	14	13	12	39	6	7	2	15	3	1	2	6
73-74	4	11	13	28	4	16	6	26	4	2	4	10
74-75	10	17	15	42	7	15	0	22	5	4	2	11
75-76	19	10	18	47	4	4	4	12	5	3	2	10
76-77	11	15	20	46	5	4	5	14	2	3	1	6
77-78	16	11	11	38	6	4	4	14	3	5	1	9
78-79	14	22	22	58	3	9	6	18	6	3	4	13
79-80	9	13	5	27	7	4	5	16	8	3	2	13
80-81	5	-	-	-	5	-	-	-	5	-	-	-

Table 1.4. Winter recoveries of Shag between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	9	12	-	-	1	1	-	-	0	1	-
67-68	6	7	9	22	0	1	0	1	1	1	0	2
68-69	9	12	8	29	0	9	1	10	3	1	0	4
69-70	16	33	34	83	1	2	4	7	1	0	0	1
70-71	12	11	8	31	2	4	2	8	0	0	1	1
71-72	6	12	21	39	1	5	7	13	0	0	0	0
72-73	13	14	8	35	3	5	1	9	0	0	2	2
73-74	12	34	33	79	0	32	17	49	1	1	0	2
74-75	16	14	12	42	1	1	3	5	0	0	1	1
75-76	15	11	31	57	0	0	2	2	0	0	0	0
76-77	12	22	39	73	0	2	0	2	0	1	0	1
77-78	20	17	19	56	2	1	6	9	4	0	0	4
78-79	20	33	17	70	13	14	8	35	0	0	2	2
79-80	20	24	23	67	5	8	4	17	0	2	0	2
80-81	15	-	-	-	7	-	-	-	0	-	-	-

Table .5. Winter recoveries of Heron between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	1	0	-	-	0	0	-	-	0	0	-
67-68	4	5	7	16	0	0	0	0	2	0	0	2
68-69	4	3	7	14	0	0	0	0	1	0	1	2
69-70	10	17	8	35	0	0	0	0	2	1	0	3
70-71	5	10	6	21	0	0	0	0	2	0	0	2
71-72	6	8	6	20	0	0	0	0	0	0	0	0
72-73	2	6	6	14	0	0	0	0	0	0	0	0
73-74	10	13	6	29	1	0	0	1	0	2	0	2
74-75	5	2	4	11	1	0	0	1	0	0	0	0
75-76	8	5	4	17	0	0	0	0	0	1	0	1
76-77	9	13	6	28	1	0	0	1	1	0	0	1
77-78	1	4	6	11	1	1	0	2	0	0	0	0
78-79	3	6	13	22	0	1	3	4	0	0	0	0
79-80	3	5	14	22	1	0	1	2	0	0	0	0
80-81	6	-	-	-	0	-	-	-	0	-	-	-

Table 1.6 Winter recoveries of Teal between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	30	7	-	-	16	2	-	-	14	3	-
67-68	47	37	6	90	1	1	0	2	8	12	1	21
68-69	30	37	15	82	13	8	1	22	15	5	17	37
69-70	39	69	9	117	4	19	1	24	9	17	5	31
70-71	20	30	2	52	8	9	0	17	9	3	3	15
71-72	11	16	1	28	4	9	0	13	1	4	0	5
72-73	13	18	1	32	5	11	0	16	0	4	1	5
73-74	16	13	1	30	2	2	0	4	3	2	0	5
74-75	4	6	1	11	3	5	0	8	1	1	0	2
75-76	25	26	9	60	10	11	0	21	1	2	3	6
76-77	21	22	3	46	2	10	0	12	7	2	2	11
77-78	35	21	6	62	1	5	0	6	5	2	2	9
78-79	24	15	3	42	4	5	0	9	3	4	7	14
79-80	21	20	11	52	4	7	0	11	1	2	1	4
80-81	23	-	-	-	5	-	-	-	0	-	-	-

Table 1.7. Winter recoveries of Sparrowhawk between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	0	0	-	-	0	0	-	-	0	0	-
67-68	1	1	1	3	0	0	0	0	0	0	0	0
68-69	0	3	1	4	0	0	0	0	0	0	0	0
69-70	0	2	2	4	0	0	0	0	0	0	0	0
70-71	1	1	0	2	0	0	0	0	0	0	0	0
71-72	1	1	3	5	0	0	0	0	0	0	0	0
72-73	5	1	2	8	0	0	0	0	0	0	0	0
73-74	0	8	10	18	0	0	0	0	0	0	0	0
74-75	6	4	5	15	0	0	0	0	0	0	0	0
75-76	4	5	1	10	1	0	0	1	0	0	0	0
76-77	5	4	7	16	0	1	0	1	0	0	0	0
77-78	10	8	5	23	0	0	0	0	0	0	0	0
78-79	8	3	11	22	1	1	0	2	0	0	0	0
79-80	10	6	12	28	1	0	0	1	0	0	0	0
80-81	5	-	-	-	1	-	-	-	0	-	-	-

Table 1.8. Winter recoveries of Kestrel between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	5	4	-	-	1	0	-	-	0	0	-
67-68	6	7	4	17	0	0	0	0	0	0	0	0
68-69	10	5	9	24	0	0	1	1	1	0	1	2
69-70	6	5	1	12	0	0	0	0	0	0	0	0
70-71	8	4	5	17	0	0	0	0	0	0	0	0
71-72	10	9	8	27	0	0	0	0	1	0	1	2
72-73	9	4	5	18	0	0	0	0	1	1	1	3
73-74	6	7	9	22	0	0	1	1	1	1	0	2
74-75	9	7	11	27	0	0	0	0	1	1	0	2
75-76	15	10	11	36	0	0	0	0	0	1	0	1
76-77	12	5	11	28	1	0	0	1	3	0	0	3
77-78	7	9	7	23	0	0	0	0	2	1	1	4
78-79	13	9	12	34	0	1	0	1	0	0	2	2
79-80	15	12	8	35	1	0	0	1	1	3	1	5
80-81	5	-	-	-	0	-	-	-	0	-	-	-

Table 1.9. Winter recoveries of Oystercatcher between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data priot to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	5	10	-	-	0	0	-	-	2	1	-
67-68	8	9	11	28	1	0	1	2	0	0	1	1
68-69	4	12	17	33	0	0	0	0	3	0	1	4
69-70	2	14	13	29	0	0	0	0	0	1	1	2
70-71	9	10	9	28	0	0	0	0	2	1	1	4
71-72	6	6	8	20	0	0	0	0	2	1	1	4
72-73	4	9	10	23	0	0	0	0	0	0	1	1
73-74	47+	25+	41+	113	0	0	0	0	0	1	1	2
74-75	23+	10	8	41	0	0	2	2	2	0	2	4
75-76	3	6	5	14	0	0	0	0	1	1	2	4
76-77	9	19	10	38	3	1	1	5	2	0	1	3
77-78	8	7	17	32	1	0	1	2	2	1	0	3
78-79	3	20	39	62	0	1	1	2	3	1	2	6
79-80	9	22+	13	44	0	0	0	0	0	2	2	4
80-81	6	-	-	-	1	-	-	-	2	-	-	-

+ These totals are inflated by recoveries of birds shot during culls.

Table 1.10. Winter recoveries of Lapwing between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	1	0	-	-	0	0	-	-	9	0	-
67-68	0	0	0	0	0	1	1	2	2	3	5	10
68-69	0	1	0	1	0	0	1	1	5	1	1	7
69-70	0	0	0	0	2	2	0	4	3	8	2	13
70-71	1	1	0	2	0	0	0	0	3	10	4	17
71-72	0	0	1	1	0	1	1	2	0	3	1	4
72-73	2	0	0	2	0	0	0	0	1	0	0	1
73-74	1	2	0	3	0	0	1	1	2	1	1	4
74-75	0	2	0	2	0	0	0	0	1	0	0	1
75-76	2	0	1	3	0	2	1	3	0	1	2	3
76-77	0	0	2	2	2	4	0	6	0	2	1	3
77-78	1	2	1	4	0	2	2	4	0	0	0	0
78-79	0	0	1	1	1	5	1	7	6	19	2	27
79-80	0	2	0	2	0	0	0	0	0	4	0	4
80-81	0	-	-	-	0	-	-	-	0	-	-	-

Table 1.11. Winter recoveries of Dunlin between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	3	0	-	-	1	0	-	-	1	0	-
67-68	2	5	2	9	0	0	0	0	2	0	0	2
68-69	5	1	0	6	0	0	0	0	3	2	0	5
69-70	3	1	0	4	0	2	0	2	3	5	0	8
70-71	0	3	2	5	1	0	0	1	2	1	1	4
71-72	1	2	1	4	0	0	0	0	1	0	0	1
72-73	0	0	1	1	0	0	0	0	1	2	0	3
73-74	1	7	5	13	0	0	0	0	1	1	1	3
74-75	0	4	7	11	0	0	0	0	3	2	2	7
75-76	1	0	5	6	2	1	0	3	0	1	2	3
76-77	5	6	2	13	0	0	0	0	1	1	1	3
77-78	3	9	11	23	0	1	0	1	1	3	3	7
78-79	1	8	16	25	1	0	0	1	0	1	2	3
79-80	3	4	10	17	1	1	0	2	2	1	1	4
80-81	8	-	-	-	0	-	-	-	0	-	-	-

Table 1.12. Winter recoveries of Curlew between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	1	1	-	-	0	1	-	-	1	0	-
67-68	0	3	2	5	0	1	0	1	0	0	0	0
68-69	2	2	0	4	0	1	0	1	0	0	1	1
69-70	4	2	0	6	0	0	0	0	1	0	0	1
70-71	3	1	0	4	0	0	0	0	0	1	0	1
71-72	3	6	1	10	0	0	0	0	2	0	0	2
72-73	3	3	0	6	1	0	0	1	0	0	1	1
73-74	1	3	3	7	0	0	0	0	0	0	0	0
74-75	1	5	1	7	0	0	0	0	0	0	0	0
75-76	3	3	3	9	2	0	0	2	0	0	0	0
76-77	4	1	0	5	1	0	0	1	0	0	0	0
77-78	2	3	3	8	0	0	0	0	0	0	0	0
78-79	4	5	5	14	0	0	0	0	0	2	0	2
79-80	3	7	2	12	0	0	0	0	0	0	0	0
80-81	2	-	-	-	0	-	-	-	0	-	-	-

Table 1.13 Winter recovering of Redshank between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	5	1	-	-	0	0	-	-	0	0	-
67-68	2	7	1	10	0	0	0	0	0	0	1	1
68-69	3	2	2	7	0	0	0	0	0	0	1	1
69-70	4	11	2	17	0	0	0	0	1	1	0	2
70-71	2	7	1	10	1	0	0	1	2	0	1	3
71-72	5	2	4	11	0	0	0	0	0	0	0	0
72-73	3	7	3	13	0	0	0	0	0	0	0	0
73-74	6	11	3	20	0	1	0	1	0	0	0	0
74-75	2	7	2	11	1	1	0	2	0	0	0	0
75-76	5	15	16	36	0	0	0	0	1	0	2	3
76-77	12	25	8	45	0	1	0	1	1	0	0	0
77-78	9	9	17	35	0	0	0	0	0	2	1	3
78-79	10	30	49	89	0	2	1	3	0	0	1	1
79-80	6	7	1	14	0	0	0	0	0	1	0	1
80-81	5	-	-	-	0	-	-	-	0	-	-	-

Table 1.14. Winter recoveries of Kingfisher between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	0	0	-	-	0	0	-	-	0	0	-
67-68	1	1	1	3	0	0	0	0	0	0	0	0
68-69	1	1	1	3	0	0	0	0	0	0	0	0
69-70	0	0	2	2	0	0	0	0	0	0	0	0
70-71	1	2	0	3	0	0	0	0	0	0	0	0
71-72	1	1	0	2	0	0	0	0	0	0	0	0
72-73	0	2	3	5	0	0	0	0	0	0	0	0
73-74	1	4	2	7	0	0	0	0	0	0	0	0
74-75	0	0	2	2	0	0	0	0	0	0	0	0
75-76	4	5	5	14	0	0	0	0	0	0	0	0
76-77	2	4	3	9	0	0	0	0	0	0	0	0
77-78	1	2	1	4	0	0	0	0	0	0	0	0
78-79	2	2	2	6	0	0	0	0	0	0	0	0
79-80	1	0	0	1	1	0	0	0	0	0	0	0
80-81	1	-	-	-	0	-	-	-	0	-	-	-

Table 1.15. Winter recoveries of Pied Wagtail between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

Winter	British				Irish				Abroad			
	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	5	5	-	-	0	0	-	-	1	1	-
67-68	5	16	3	24	0	0	0	0	1	1	0	2
68-69	1	4	6	11	0	0	0	0	2	0	1	3
69-70	6	11	8	25	0	0	0	0	2	0	0	2
70-71	3	10	3	16	0	1	0	1	3	1	2	6
71-72	4	2	7	13	0	0	0	0	1	0	2	3
72-73	3	6	4	13	0	0	0	0	0	1	1	2
73-74	7	4	9	20	0	0	0	0	0	0	2	2
74-75	1	1	6	8	0	0	0	0	1	1	1	3
75-76	5	9	24	38	0	0	0	0	1	1	1	3
76-77	9	13	11	33	0	1	0	1	0	0	0	0
77-78	6	9	23	38	0	0	0	0	0	0	3	3
78-79	7	32	26	65	0	2	0	2	1	1	0	2
79-80	2	16	6	24	0	0	0	0	0	1	0	1
80-81	10	-	-	-	1	-	-	-	1	-	-	-

Table 1.16 Winter recoveries of Wren between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

Winter	British Dec	British Jan	British Feb	British Total	Irish Dec	Irish Jan	Irish Feb	Irish Total	Abroad Dec	Abroad Jan	Abroad Feb	Abroad Total
1966-67	-	2	2	-	-	0	0	-	-	0	0	-
67-68	3	9	4	16	0	0	0	0	0	1	1	2
68-69	3	2	5	10	0	0	0	0	0	0	0	0
69-70	1	1	5	7	0	0	0	0	0	0	0	0
70-71	1	1	0	2	0	0	0	0	0	0	0	0
71-72	3	2	6	11	0	0	0	0	0	0	0	0
72-73	2	2	7	11	0	0	0	0	0	0	0	0
73-74	4	2	5	11	0	0	0	0	0	0	0	0
74-75	4	2	1	7	0	0	0	0	0	0	0	0
75-76	4	2	9	15	0	0	0	0	0	0	0	0
76-77	3	8	2	13	0	0	0	0	0	0	0	0
77-78	2	2	6	10	0	0	0	0	0	0	0	0
78-79	1	12	16	29	0	0	0	0	0	0	0	0
79-80	1	5	2	8	0	0	0	0	0	0	0	0
80-81	4	-	-	-	1	-	-	-	0	-	-	-

Table 1.17. Winter recoveries of Robin between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

Winter	British				Irish				Abroad			
	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	18	16	-	-	0	0	-	-	4	0	-
67-68	25	23	16	64	0	2	1	3	0	0	1	1
68-69	7	13	22	42	0	0	0	0	1	1	1	3
69-70	10	11	17	38	1	0	0	1	1	2	0	3
70-71	16	17	8	41	1	0	2	3	5	3	1	9
71-72	8	9	10	27	0	0	0	0	1	0	0	1
72-73	7	13	21	41	0	1	0	1	0	1	0	1
73-74	18	8	15	41	0	0	1	1	1	0	0	1
74-75	12	8	11	31	0	1	0	1	2	0	2	4
75-76	13	22	20	55	0	0	2	2	0	0	1	1
76-77	17	23	13	53	1	0	0	1	2	2	0	4
77-78	21	10	23	54	0	0	0	0	2	2	2	6
78-79	20	32	16	68	1	0	0	1	0	1	0	1
79-80	8	21	16	45	0	0	2	2	0	1	0	1
80-81	13	-	-	-	0	-	-	-	1	-	-	-

Table 1.18 Winter recoveries of Song Thrush between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	15	10	-	-	0	1	-	-	5	1	-
67-68	9	11	15	35	0	0	0	0	7	2	0	9
68-69	5	18	39	62	0	0	1	1	3	4	2	9
69-70	11	9	16	36	0	1	1	2	4	5	2	11
70-71	5	19	17	41	0	0	0	0	8	11	5	24
71-72	10	9	17	36	0	1	0	1	1	2	2	5
72-73	14	11	19	44	0	3	0	3	3	3	4	10
73-74	15	7	16	38	0	0	0	0	5	3	2	10
74-75	0	8	7	15	0	0	0	0	0	2	1	3
75-76	5	9	27	41	0	0	2	2	2	1	4	7
76-77	11	9	15	35	2	0	1	3	4	7	1	12
77-78	11	10	27	48	1	0	0	1	2	2	4	8
78-79	4	22	21	47	0	1	0	1	3	16	0	19
79-80	3	12	14	29	0	0	0	0	3	5	4	12
80-81	6	-	-	-	0	-	-	-	5	-	-	-

Table 1.19. Winter recoveries of Blue Tit between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	27	40	-	-	0	0	-	-	0	0	-
67-68	24	36	29	89	0	0	0	0	0	0	0	0
68-69	17	24	34	75	0	0	0	0	0	0	0	0
69-70	16	24	43	83	0	0	0	0	0	0	0	0
70-71	15	27	29	71	0	0	0	0	0	0	0	0
71-72	29	27	32	88	0	0	1	1	0	0	0	0
72-73	27	40	44	111	0	1	0	1	0	0	0	0
73-74	23	26	45	94	1	0	0	1	1	0	0	1
74-75	28	41	54	123	1	0	0	1	0	0	0	0
75-76	41	48	56	145	0	0	1	1	0	0	0	0
76-77	27	27	44	98	0	0	0	0	0	0	0	0
77-78	30	44	69	143	0	0	0	0	0	0	0	0
78-79	27	47	62	136	0	0	0	0	0	0	0	0
79-80	32	49	49	130	0	2	0	2	0	0	0	0
80-81	40	-	-	-	0	-	-	-	0	-	-	-

Table 1.20. Winter recoveries of Great Tit between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	6	6	-	-	0	0	-	-	0	0	-
67-68	7	5	6	18	0	0	0	0	0	0	0	0
68-69	4	5	4	13	0	0	0	0	0	0	0	0
69-70	4	10	7	21	0	0	0	0	0	0	0	0
70-71	5	8	3	16	0	0	0	0	0	0	0	0
71-72	7	15	14	26	0	0	0	0	0	0	0	0
72-73	6	8	12	26	0	0	0	0	0	0	0	0
73-74	8	13	10	31	0	0	0	0	0	0	0	0
74-75	8	12	16	36	0	0	0	0	0	0	0	0
75-76	18	14	13	35	0	1	0	1	0	0	0	0
76-77	1	8	7	16	1	0	0	1	0	0	0	0
77-78	10	15	15	40	1	0	0	1	0	0	0	0
78-79	15	17	13	45	0	0	0	0	0	0	0	0
79-80	4	10	12	26	0	0	0	0	0	0	0	0
80-81	8	-	-	-	0	-	-	-	0	-	-	-

Table 1.21. Winter recoveries of Reed Bunting between January 1967 and December 1980, tabulated by month of recovery and by region of recovery. Data prior to 1967 were not analysed whilst data for the ringing year 1981 are still being received.

	British				Irish				Abroad			
Winter	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total	Dec	Jan	Feb	Total
1966-67	-	1	1	-	-	0	0	-	-	0	0	-
67-68	1	2	2	5	0	0	0	0	0	0	0	0
68-69	0	0	4	4	0	0	0	0	0	0	0	0
69-70	1	1	1	3	0	0	0	0	0	0	0	0
70-71	3	3	0	6	0	0	0	0	0	0	0	0
71-72	1	1	1	3	0	0	0	0	0	0	0	0
72-73	1	0	0	1	0	0	0	0	0	0	0	0
73-74	2	4	3	9	0	0	0	0	0	0	0	0
74-75	0	3	2	5	0	0	0	0	0	0	0	0
75-76	2	6	7	15	0	0	1	0	0	0	0	0
76-77	2	2	2	6	0	0	0	0	0	0	0	0
77-78	0	5	4	9	0	0	0	0	0	0	0	0
78-79	0	8	7	15	0	0	0	0	0	0	0	0
79-80	2	3	4	9	0	0	0	0	0	0	0	0
80-81	1	-	-	-	0	-	-	-	0	-	-	-

Table 1.22. Incidence of glazing days at statutory ban estuaries (see Appendix 2) by month and year.

Winter	November	December	January	February	Winter
1966-67	0	3	9	2	14
1967-68	1	9	8	12	30
1968-69	1	10	2	18	31
1969-70	7	11	7	15	40
1970-71	0	6	6	4	16
1971-72	7	1	5	2	15
1972-73	6	2	4	9	21
1973-74	7	7	2	1	17
1974-75	0	1	1	3	5
1975-76	2	3	7	4	16
1976-77	1	18	15	4	38
1977-78	7	1	10	16	34
1978-79	5	9	26	18	58
1979-80	0	7	10	0	17
1980-81	0	1	5	7	13

Table 1.23 Correlations between winter recovery totals and severity of winter for various species. Species totals include all birds of the species recovered in Britain, December through February. Winter severity was indexed as number of days with glazing (see text) at half or more of the "statutory ban" estuaries, totalled over November through February.

Species	Correlation coefficients
Cormorant	0.532+
Shag	0.363
Grey Heron	0.316
Teal	0.457
Sparrowhawk	0.151
Kestrel	-0.026
Oystercatcher	0.081 (0.900)** b
Lapwing	-0.327
Dunlin	0.473
Curlew	0.206
Redshank	0.721**
Kingfisher	0.091
Pied Wagtail	0.746**
Wren	0.655**
Robin	0.660*
Song Thrush	0.488+
Blue Tit	0.063
Great Tit	0.110
Reed Bunting	0.258

a + P 0.10 * P 0.05 ** P 0.01

b In three winters (1973-74, 1974-75 and 1979-80) the totals for this species were inflated by recoveries of ringed birds shot during culls. The figure in brackets gives the correlation obtained after excluding the data for these three years.

Table 2.1 Comparison between the average number of ringing recoveries for December for 1967-1980 with the number <u>so far received</u> for[a] December 1981.

SPECIES	Mean number[b]	1981	
Cormorant	10.2	8	
Shag	13.7	13	
Grey Heron	5.4	4	
Teal[+]	23.5	11	
Sparrowhawk	4.0	3	
Kestrel	9.4	5	
Oystercatcher[++]	10.1	11	
Lapwing	0.5	2	
Dunlin	2.4	1	
Redshank	5.3	23	NB major increase
Kingfisher	1.1	0	
Pied Wagtail	4.9	17	NB major increase
Wren	2.6	2	
Robin	13.9	22	NB major increase
Song Thrush	7.8	13	NB major increase
Blue Tit	26.9	19	
Great Tit	7.5	7	

\+ A quarry species whose recoveries are often delayed until the end of the shooting season.

++ The means for Oystercatcher were calculated from 11 not 14 years because birds were culled in the other three winters.

a For all species a considerable proportion of the December 1981 recoveries are probably still in the post (at January 15).

b Averaged over 1967-1980.

Table 2.2 Relationship between date of receipt of recovery report letters at the BTO offices and the median finding date for the recoveries thus reported. Mean lapse = 17.4 days.

Papers date 1981	Median finding date	Median lapse days
December 11	November 14	27
December 14	December 2	12
December 15	December 7	8
December 16	November 14	32
December 17	December 5	12
December 18	November 27	21
December 21	December 9	12
December 22	December 3	19
December 23	December 16	7
December 24	December 5	19
December 29	December 18	11
December 30	December 13	17
December 31	December 2	29

Table 3.1. Mid-winter population indices for British and Irish waders 1973-1981

Species	1973	1974	1975	1976	1977	1978	1979	1980	1981
Oystercatcher	100	123	126	152	160	147	156	177	186
Ringed Plover	100	125	117	143	116	134	124	123	151
Golden Plover	100	96	127	127	75	99	34	35	73
Grey Plover	100	140	160	161	189	99	145	191	171
Lapwing	100	175	166	236	119	106	31	89	180
Knot	100	121	74	83	86	61	112	80	100
Sanderling	100	101	196	199	109	51	96	143	102
Dunlin	100	125	112	113	105	80	84	82	79
Ruff	100	113	80	44	46	90	28	51	39
Black-tailed Godwit	100	90	83	52	43	21	22	27	27
Bar-tailed Godwit	100	19	107	108	115	103	150	207	143
Curlew	100	135	143	136	96	85	87	111	113
Spotted Redshank	100	54	67	70	63	84	34	35	18
Redshank	100	103	111	125	97	78	92	92	91
Greenshank	100	95	101	136	99	101	84	123	148
Turnstone	100	130	124	145	150	140	143	139	127

Note: January index values were arbitrarily set to 100 for 1973.

Table 3.2 Waders whose mid-winter (January) populations are depressed by estuarine glazing[a] at various times during that winter. Based on Estuary Enquiry indices 1973-1981.

Species	Month of maximum correlation	Correlation coefficient[b]
Oystercatcher	November	-0.582
Golden Plover	January	-0.696*
Grey Plover	November	-0.849*
Lapwing	January	-0.701*
Sanderling	November	-0.629
Ruff	January	-0.641
Black-tailed Godwit	January	-0.651
Bar-tailed Godwit	November	-0.593
Curlew	February	-0.737*
Greenshank	November	-0.587

a Glazing is indexed as the number of days per month on which half or more of the estuaries monitored for ststutory ban purposes exceeded ground condition 3.

b Because of the small sample size (n=9) all correlations significant at $P < 0.10$ or better are shown. Asterisk indicate $P < 0.05$.

Table 3.3 Predicted changes in wader populations according to their weather sensitivities. Predictions are based on whole winter glazing correlations and the deviation of the 1981-82 winter conditions from those of 1980-81. Changes as index points.

Species	Change
Oystercatcher	3.7
Ringed Plover	- 1.9
Golden Plover	-17.9
Grey Plover	- 5.1
Lapwing	-41.3
Knot	3.4
Sanderling	-25.0
Dunlin	- 5.8
Ruff	- 8.4
Black-tailed Godwit	-14.3
Bar-tailed Godwit	7.4
Curlew	-16.1
Spotted Redshank	- 1.8
Redshank	- 5.7
Greenshank	-11.0
Turnstone	6.2

Table 4.1. Common Birds Census values for farmland and for woodland populations of various resident species, 1962-80. "Special" indicates indices computed from pooled habitat samples for scarce species.

	Year																		
Species	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Mallard Farmland	82	57	81	101	100	129	164	166	209	178	193	17[illegible]	204	188	245	239	253	235	242
Sparrowhawk													100	124	98	182	201	201	195
Kestrel			52	70	100	124	162	135	135	127	151	164	153	155	131	151	151	151	126
Red-legged Partridge Farmland	135	124	97	114	100	108	99	86	83	127	105	96	91	88	126	178	175	145	157
Partridge Farmland	194	158	131	137	100	99	88	86	82	108	93	75	80	87	108	141	127	94	85
Pheasant Farmland	68	73	85	87	100	88	92	99	104	111	105	100	124	124	132	116	106	110	102
Moorhen Farmland	126	50	87	90	100	102	118	137	139	137	144	126	123	114	117	105	111	103	129
Lapwing Farmland	196	87	90	103	100	116	140	148	167	129	134	132	146	134	139	153	149	143	138
Stock Dove			75	80	100	108	160	185	234	240	249	255	306	337	389	403	496	592	620
Collared Dove								27	43	57	100	138	160	216	308	353	377	379	401
Little Owl		82	128	109	100	129	140	112	98	109	104	137	103	120	152	101	140	146	176
Tawny Owl		61	85	100	100	108	127	146	142	145	149	127	130	128	155	140	99	112	124
Green Woodpecker Woodland					100	128	146	154	138	141	138	154	156	165	144	129	129	137	133
Gt.Sp. Woodpecker Woodland				110	100	102	100	108	105	113	121	178	181	185	221	233	261	263	263
Skylark Farmland	88	72	92	102	100	109	112	102	96	105	106	108	111	109	121	123	116	100	112
Wren Farmland	140	31	47	73	100	158	173	173	165	194	258	307	328	351	257	254	272	155	234
Wren Woodland			57	69	100	144	147	139	118	150	199	239	252	274	207	206	230	122	192

Table 4.1 cont....

Species	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Dunnock Farmland	59	56	78	99	100	100	102	93	92	97	107	108	114	124	112	102	100	92	89
Dunnock Woodland			78	93	100	108	115	105	105	110	117	114	116	113	109	105	101	92	90
Robin Farmland	60	53	77	91	100	107	111	98	94	98	112	115	119	128	111	109	95	8	96
Robin Woodland			91	97	100	109	110	110	101	104	114	116	123	124	122	125	122	113	128
Blackbird Farmland	69	57	90	101	100	103	108	110	105	104	104	99	104	100	97	93	90	80	82
Blackbird Woodland			80	91	100	97	101	105	98	101	108	97	108	109	106	98	98	90	96
Song Thrush Farmland	112	48	81	100	100	121	127	128	121	121	128	116	126	128	110	98	81	69	71
Song Thrush Woodland			81	91	100	97	101	103	90	92	91	84	86	79	73	69	63	56	57
Mistle Thrush Farmland	130	32	56	95	100	113	138	139	111	115	123	118	143	135	136	131	122	109	117
Mistle Thrush Woodland				95	100	101	114	102	102	99	115	111	113	134	132	145	124	124	133
Long-tailed Tit Farmland					100	142	155	107	141	168	175	227	241	243	155	168	176	94	130
Long-tailed Tit Woodland				76	100	129	124	124	108	127	162	230	212	177	146	156	168	98	141
Marsh Tit Woodland				105	100	104	94	84	88	83	74	78	69	60	77	76	74	61	69
Coal Tit				88	100	118	132	159	141	187	206	251	257	258	266	273	267	223	253
Blue Tit Farmland	66	65	97	107	100	103	109	108	113	127	127	132	139	144	132	137	132	123	132
Blue Tit Woodland			100	103	100	104	108	105	106	109	114	113	121	126	125	132	123	114	125
Great Tit Farmland	60	62	87	101	100	95	98	91	100	121	133	136	132	133	122	134	129	119	140
Great Tit Woodland			84	102	100	94	98	96	92	98	107	101	100	104	105	115	123	111	119
Nuthatch Woodland				107	100	86	97	81	80	102	92	100	75	98	110	145	127	122	123
Treecreeper Farmland					100	100	134	179	183	218	226	231	269	265	232	241	270	143	157
Treecreeper Woodland				90	100	105	118	114	105	139	143	124	151	139	130	164	149	122	129
Jay Woodland				103	100	90	83	87	92	88	92	76	84	94	89	101	81	86	88

Table 4.2. Waterways Birds Survey indices for resident riparian species. Index arbitrarily set to 100 in summer 1974.

Species	1974	1975	1976	1977	1978	1979	1980
Mute Swan	100	138	146	123	142	139	139
Mallard	100	109	120	123	114	113	132
Moorhen	100	107	122	114	121	101	112
Coot	100	97	117	109	135	133	164
Kingfisher	100	81	103	80	67	51	75
Grey Wagtail	100	111	117	97	90	60	60
Pied Wagtail	100	107	99	99	86	71	88
Dipper	100	99	97	92	96	89	95
Reed Bunting	100	113	109	102	101	91	83
*Little Grebe	100	116	110	146	141	133	x
*Shelduck	100	106	73	92	92	87	x
*Tufted Duck	100	100	100	110	139	130	x
*Oystercatcher	100	96	112	119	135	146	x
*Snipe	100	85	78	69	82	62	x
*Curlew	100	93	97	99	109	108	x
*Redshank	100	93	104	111	126	104	x

* Scarce species on WBS plots, monitored until 1979 by including data from riparian territories on Common Birds Census maps. Practice, now suspended, to be reviewed in the light of the recent large increase in the number of WBS plots surveyed.

x Major changes in relative proportion of habitats sampled for these species took place in 1980.

Table 4.3 Species whose breeding populations in Britain are significantly depressed following low-mid-winter temperatures. Data from Common Birds Census scheme 1962-1980, primarily for farmland populations.

Species	Month of maximum sensitivity[a]	Correlation coefficient[b]
Lapwing	January	0.568
Skylark	February	0.636
Pied Wagtail	January	0.558
Wren	February	0.656
Robin[c]	February	0.610
Long-tailed Tit	February	0.557
Blue Tit	February	0.623
Goldfinch[d]	February	0.499
Linnet	February	0.648
Reed Bunting	January	0.515

[a] Comparing data for November, December, January and February.

[b] Correlation between percentage population change between two successive summers and temperature in the stated intervening month. Temperatures were expressed as deviations from the 30 year averages for England and Wales. All coefficients are significant at P 0.05 or better.

[c] Woodland population.

[d] Pooled woodland/farmland population.

Figure 1.1 Number of ringing recoveries received each year in relation to weather conditions. Recovery totals are for Britain only and for December through February each winter. Weather is assessed as number of days with glazing or worse conditions at monitored estuaries (see text). Data for 1967-1980.

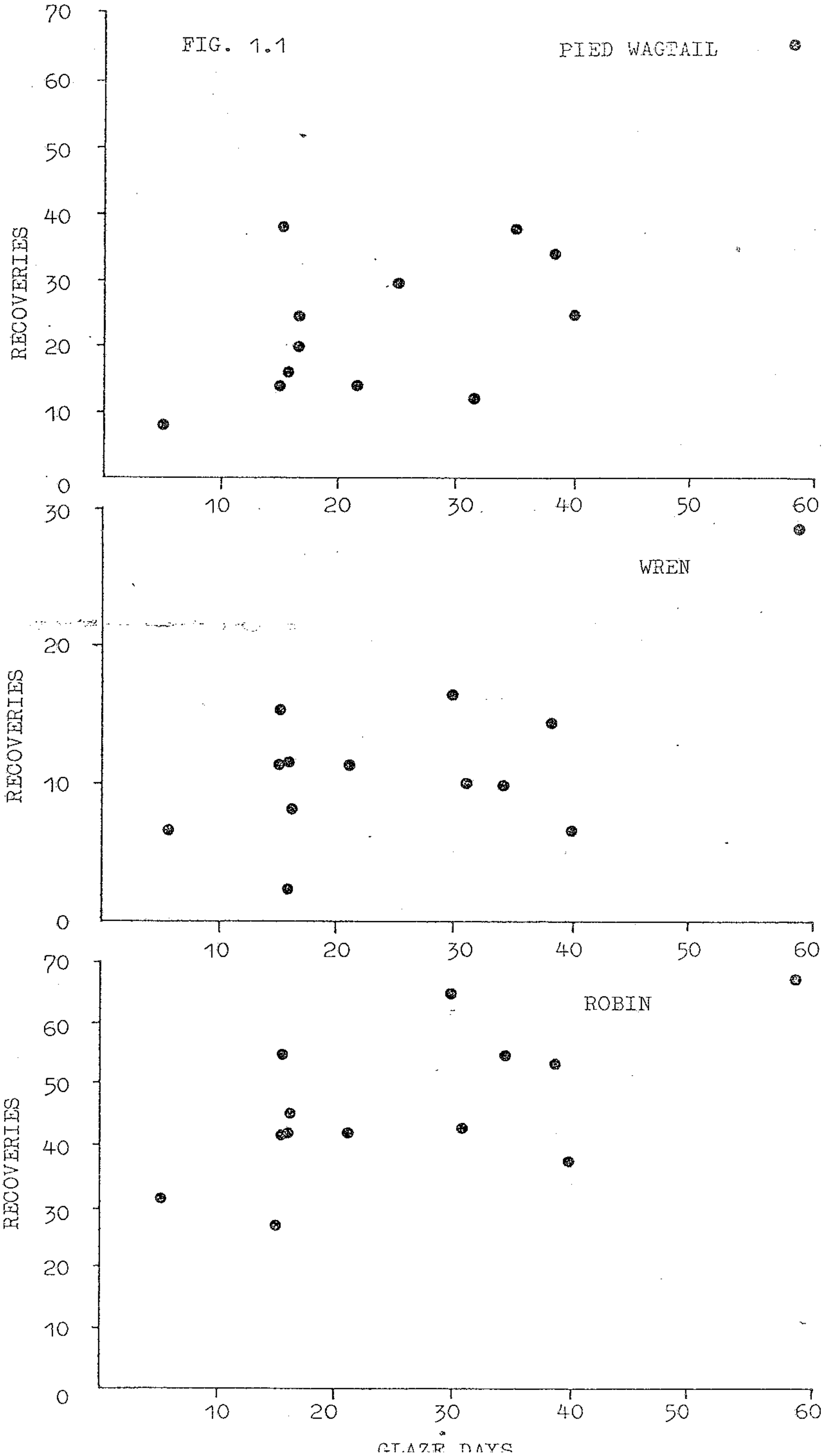


FIG. 1.1
PIED WAGTAIL
WREN
ROBIN
RECOVERIES
GLAZE DAYS
0
10
20
30
40
50
60
70

FIG 1.1

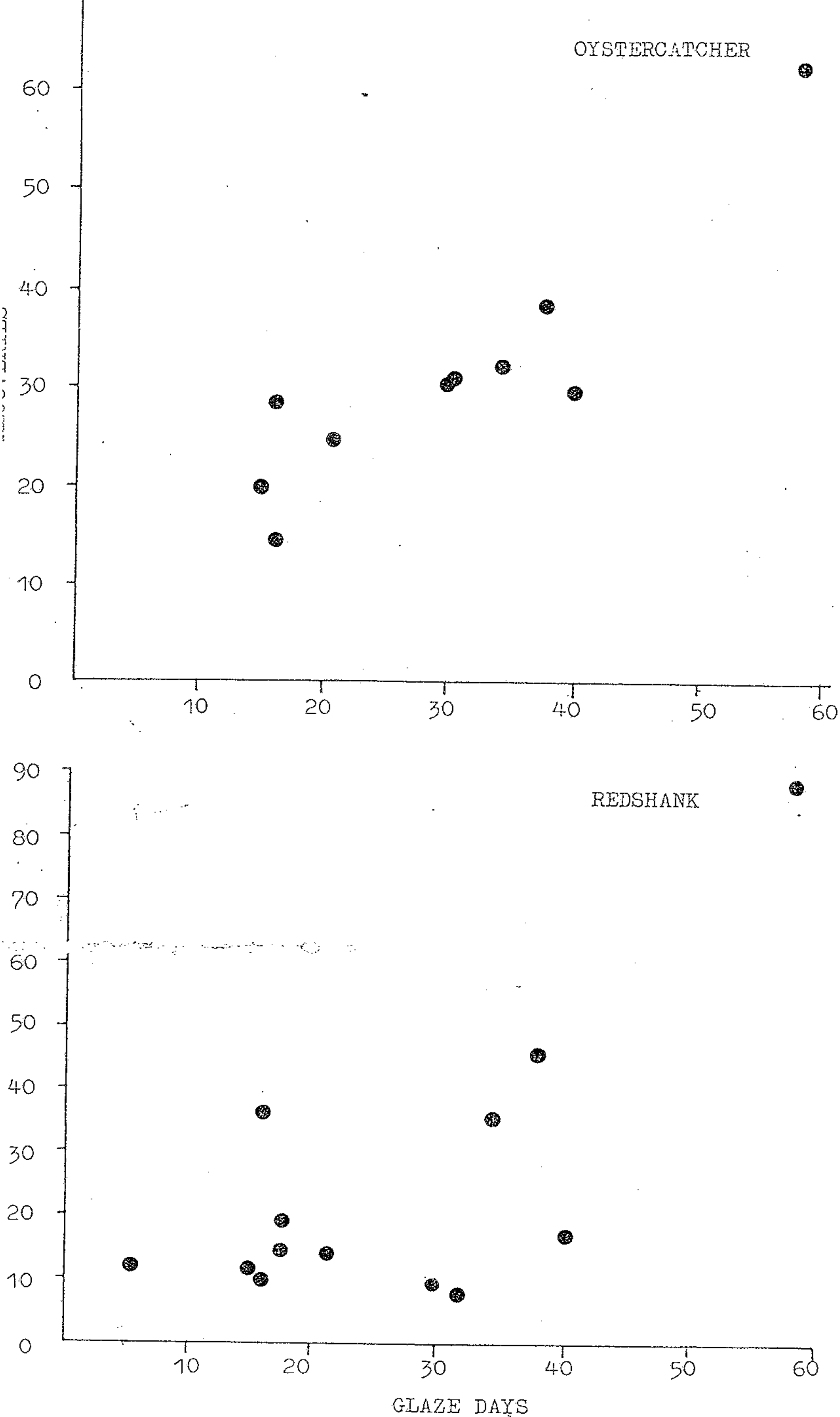

OYSTERCATCHER
70
60
50
40
30
20
10
0
10
20
30
40
50
60
REDSHANK
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
GLAZE DAYS

FIGURE 1.2

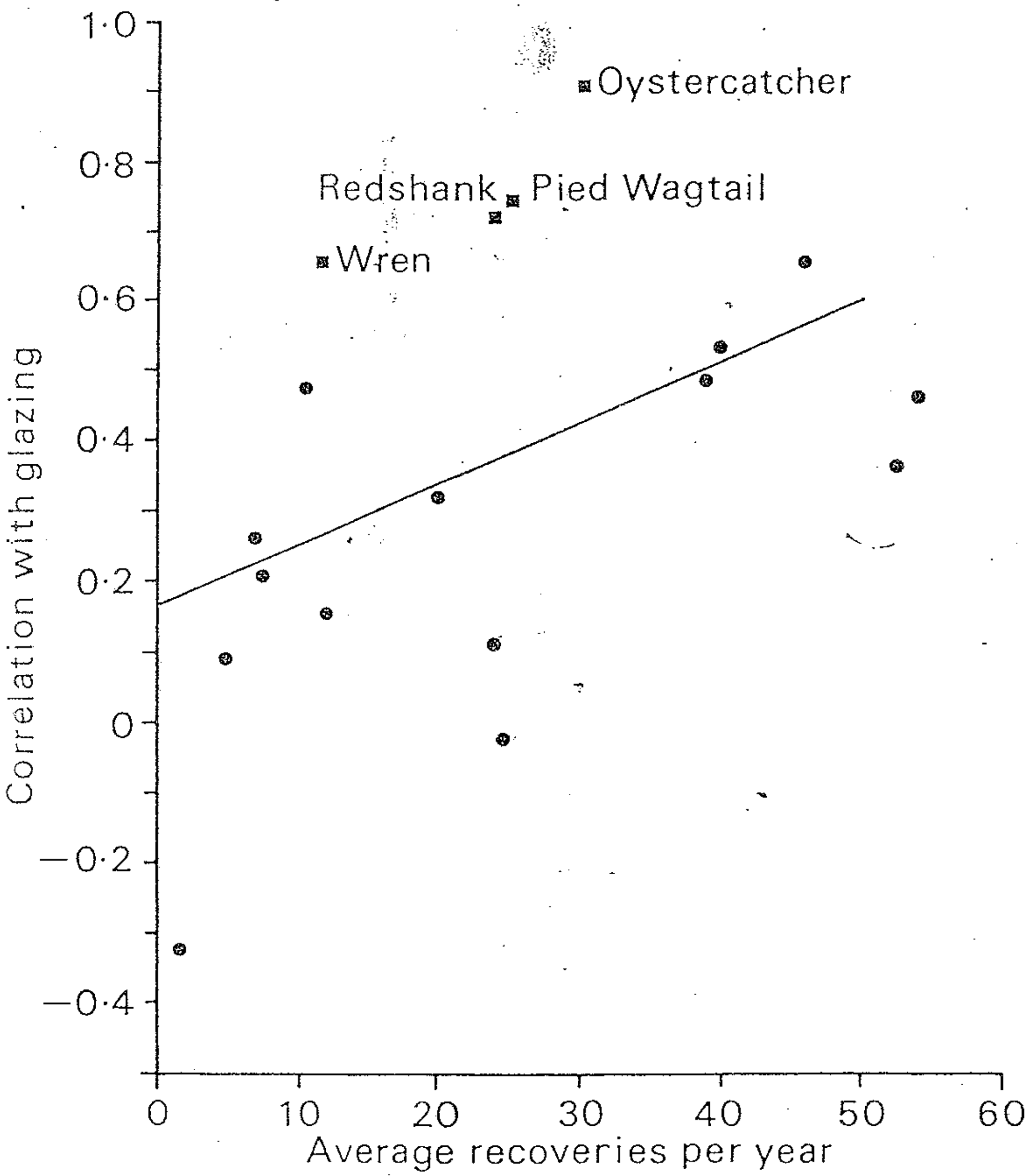

Oystercatcher
Redshank
Pied Wagtail
Wren
1·0
0·8
0·6
0·4
0·2
0
−0·2
−0·4
Correlation with glazing
0
10
20
30
40
50
60
Average recoveries per year

Figure 1.2 Correlation of recovery totals with winter weather (see Figure 1.1 for details) in relation to the size of the annual sample of recoveries received for the species over the winter 1967-1980. Named species are those with significant correlation despite their small samples (see text). The datum for Blue Tit ($y = 0.063$, $x = 106.2$) has been omitted because of high intensive trapping of this species at artificial feeders in severe weather. The regression line shown is

$$y = 0.166 + 0.009 \qquad r = 0.462,\ P < 0.05$$

Figure 1.3 Timing of winter recoveries of various species during the severe winter of 1978-79. The shaded histogram shows the incidence of glazing (see text) by seven-day periods from 1 December. The other histograms show recoveries as ratios with average numbers in the corresponding week over 1967-1980 as a whole. The general similarity of the patterns of recoveries and glazing is apparent.

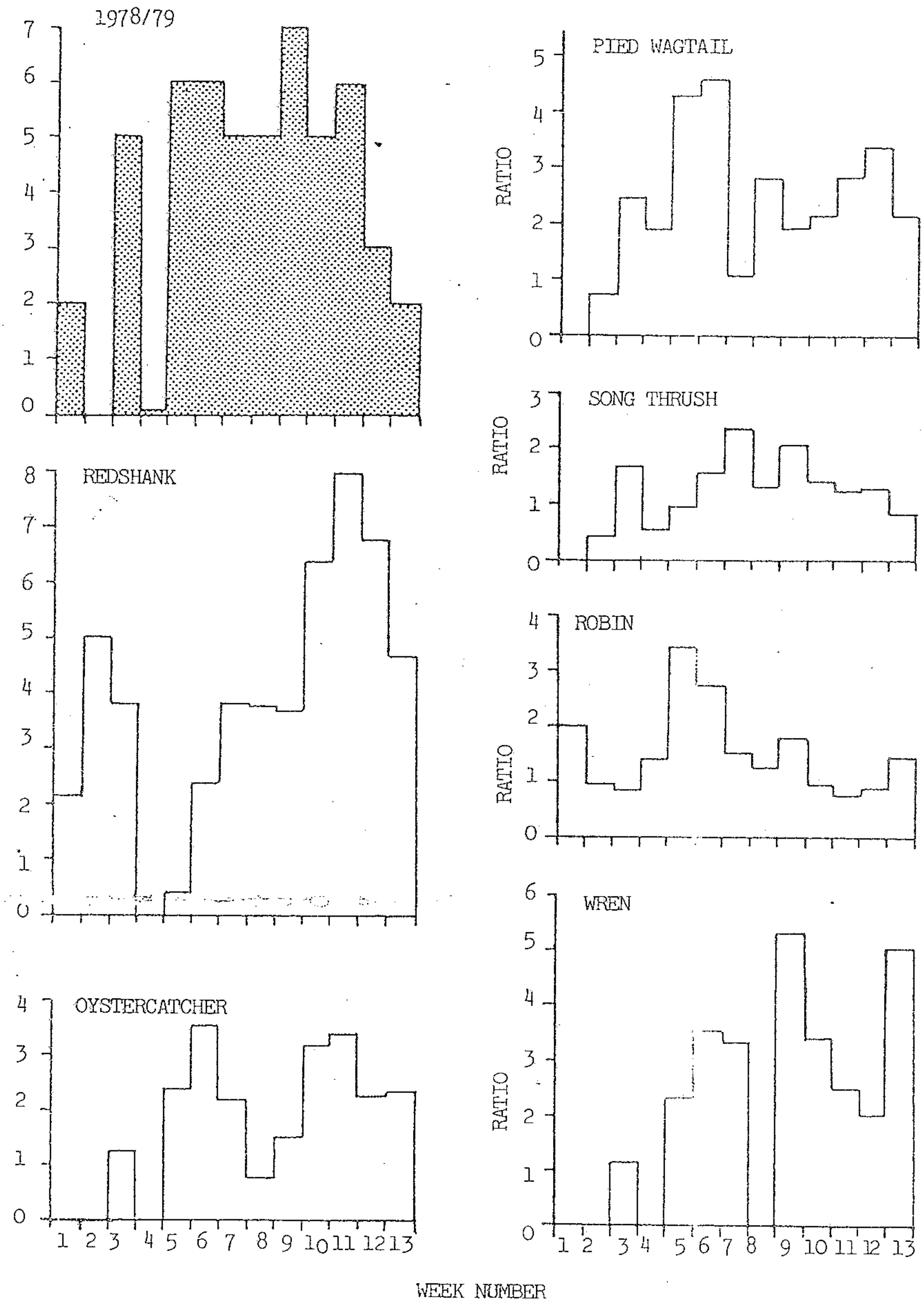

1978/79
REDSHANK
OYSTERCATCHER
PIED WAGTAIL
SONG THRUSH
ROBIN
WREN
RATIO
WEEK NUMBER

Figure 1.3

Figure 2.1 Comparison of recoveries from Britain so far (15 January 1982) received with weekly means for the years 1967-1980 as a whole.

* Years with culls omitted from the averages, so 11 years and not 14 years are covered.

FIGURE 2.1

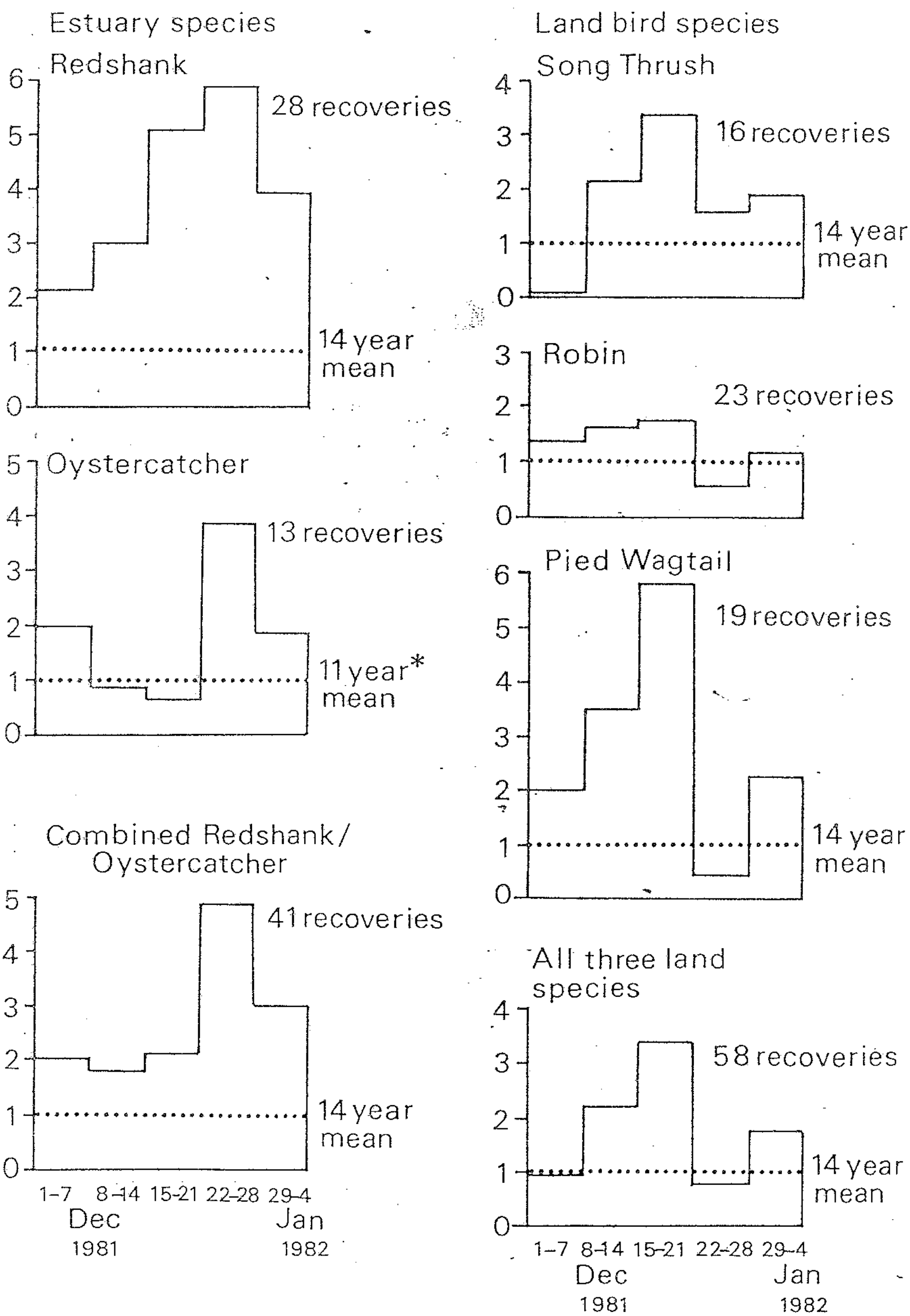

Estuary species
Redshank
28 recoveries
14 year mean
Oystercatcher
13 recoveries
11 year* mean
Combined Redshank/ Oystercatcher
41 recoveries
14 year mean
1–7
8–14
15–21
22–28
29–4
Dec 1981
Jan 1982
Land bird species
Song Thrush
16 recoveries
14 year mean
Robin
23 recoveries
Pied Wagtail
19 recoveries
14 year mean
All three land species
58 recoveries
14 year mean
1–7
8–14
15–21
22–28
29–4
Dec 1981
Jan 1982

Figure 3.1 Relationship of mid-winter population index for Lapwing and Curlew and the incidence of glazing (see text) at British estuaries during 1973-1981.

FIGURE 4.1 a

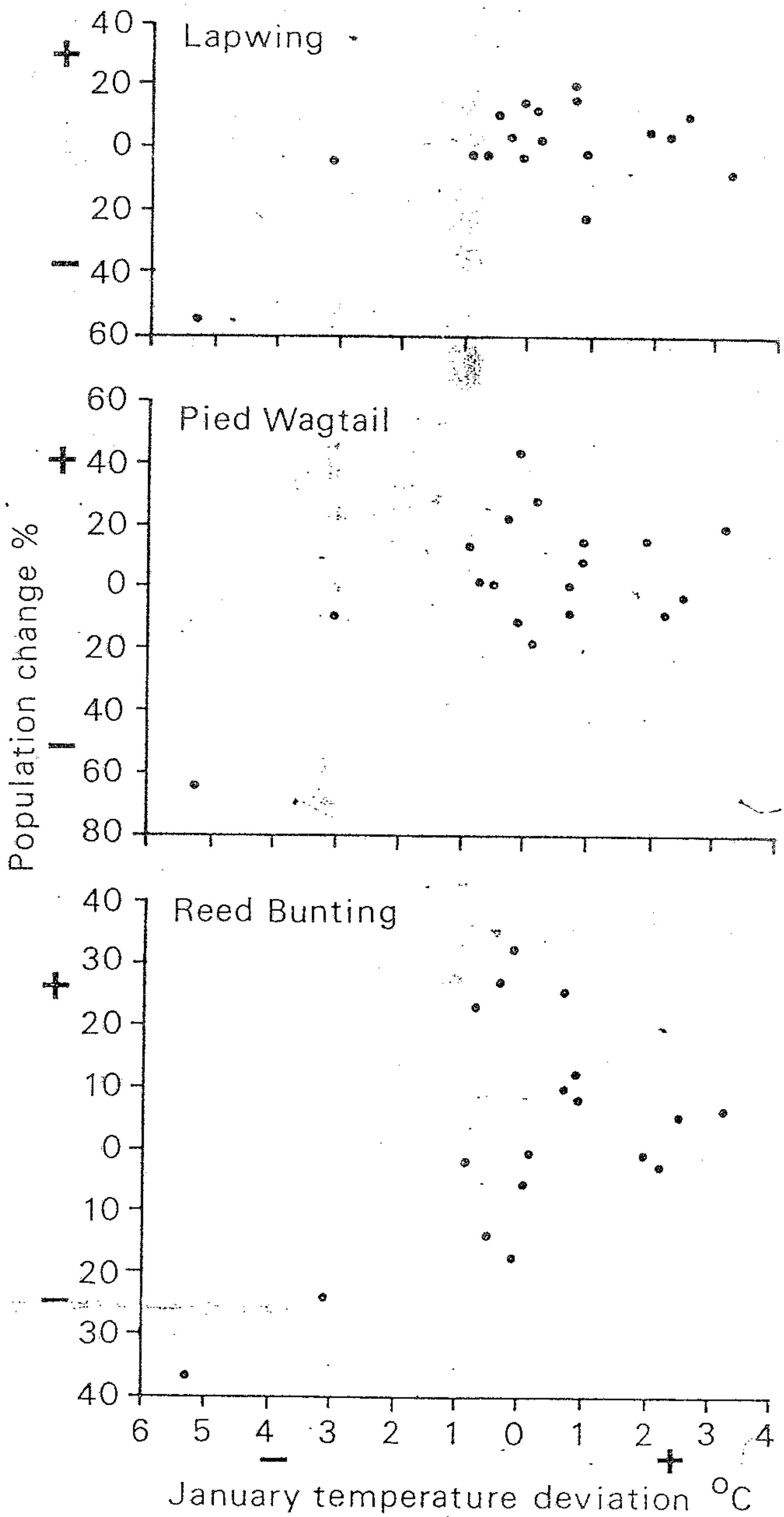
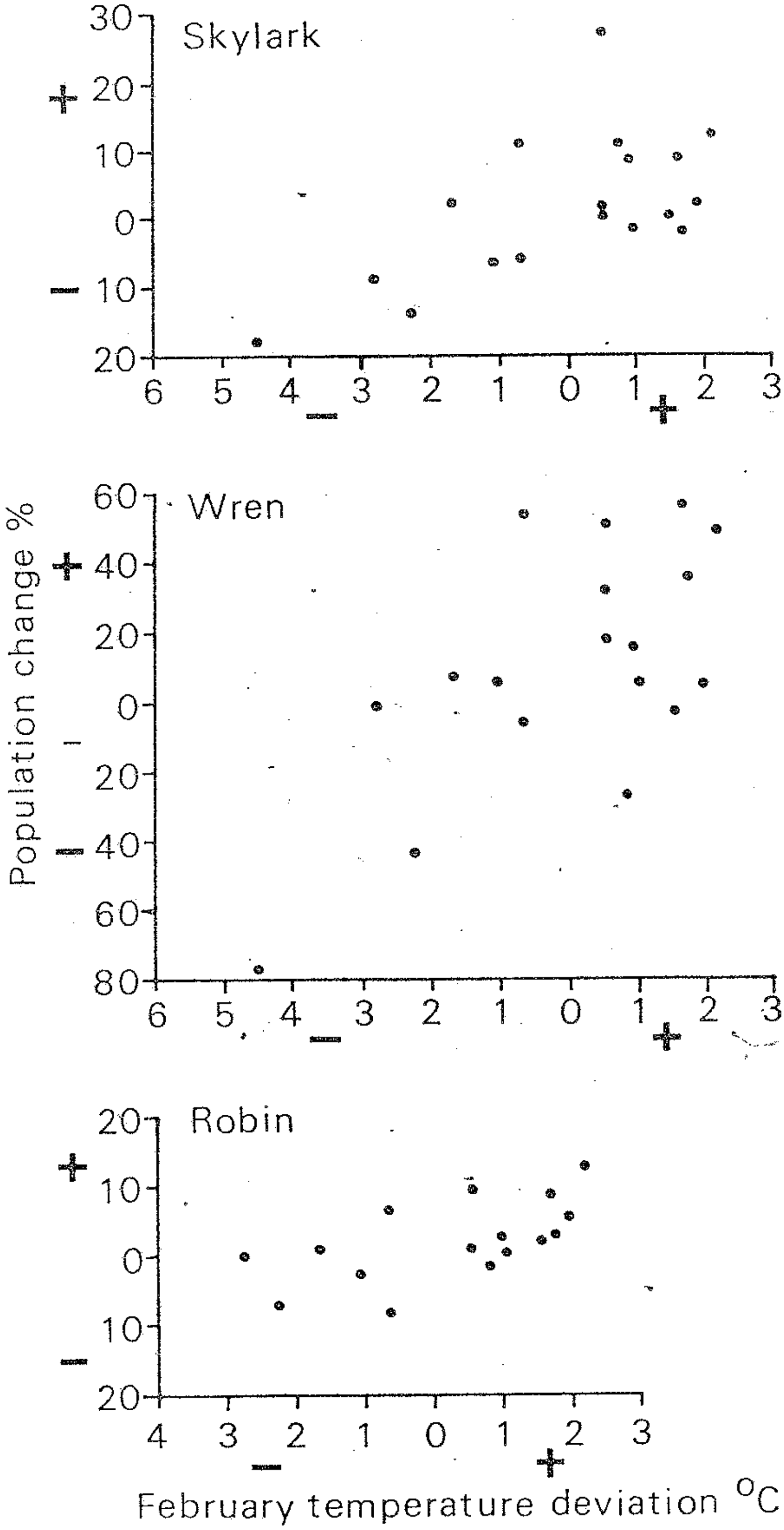

Lapwing
Pied Wagtail
Reed Bunting
Population change %
January temperature deviation °C
40
20
0
20
40
60
80
30
10
6
5
4
3
2
1
0
+
−

Figure 4.1 Population changes recorded in the Common Birds Census for various species in relation to temperature in an intervening winter month. Temperatures are expressed as deviations from the 30-year averages for England and Wales. The month used is that of tightest coupling between population change and the monthly mean temperature deviation.

FIGURE 4.1 b


Skylark
Wren
Robin
Population change %
February temperature deviation °C