INTERNATIONAL WATERFOWL RESEARCH BUREAU

No. 10

WOODCOCK AND SNIPE RESEARCH GROUP

Newsletter

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# PROCEEDINGS

OF THE

# FIRST EUROPEAN WOODCOCK AND SNIPE WORKSHOP

EBELTOFT. DENMARK

24-26 APRIL 1979

INTERNATIONAL WATERFOWL RESEARCH BUREAU

# WOODCOCK & SNIPE RESEARCH GROUP

# NEWSLETTER

NUMBER FIVE DECEMBER 1979

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| PETER BICKFORD-SMITH | - | Great Britain | |
| IB CLAUSAGER | - | Denmark | |
| CHARLES FADAT | - | France | |
| JORGEN FOG | - | Denmark | |
| GRAHAM HIRONS | - | Great Britain | |
| HERIBERT KALCHREUTER | - | Federal Republic of Germany | |
| WERNER KEIL | - | Federal Republic of Germany | |
| VIDAR MARCSTROM | - | Sweden | |
| JOHN ROCHFORD | - | Ireland | |
| LENNART SAARI | - | Finland | |
| JOHN WILSON | - | Ireland | |

APOLOGIES WERE RECEIVED FROM

| | | |
|---|---|---|
| ALBERTO CHELINI | - | Italy |

EDITOR'S NOTE

Newsletter No. 5 will be issued in late 1979 provided sufficient contributions are received by September; otherwise they will form part of next year's Newsletter.

# OPENING SESSION

Brian Stronach opened the meeting and welcomed all the delegates to this the first meeting of the group. For the past four years the group Newsletter had played a valuable role in establishing links between woodcock and snipe research workers in the different countries and he hoped that this informal gathering would strengthen these links further.

The objects of the meeting were threefold -

FIRSTLY to report in general on the woodcock and snipe research being carried out in the different countries.

SECONDLY to report in more detail on the specific lines of research being pursued by the different delegates.

THIRDLY, and most importantly, to establish where future research priorities should lie, especially with regard to international co-operation. Members would be requested to co-ordinate and write up international aspects of the research.

Finally Brian Stronach thanked Ib Clausager and all his colleagues at Kalø for providing a venue and organising the meeting at such short notice. All delegates were thanked for coming.

## . NATIONAL REPORTS .

IRELAND: JOHN WILSON

Three woodcock research projects have been or are being carried out. B. Stronach (Forest and Wildlife Service) has concluded his research into the reproductive state of birds in early spring and has also completed some biometric analysis of age and sex and electrophoretic analysis of races.

J. Rochford (University of Dublin) is currently working on an electrophoretic analysis of races in the woodcock and also re-analysing all European ringing/recovery data. He has also carried out some work on the biometrics of sex.

J. Wilson (Forest and Wildlife Service) has been studying the breeding and wintering populations since 1976. Work on the breeding population has ceased but winter studies, including ringing, wing collecting and the use of radio telemetry will continue.

During the course of the research programme the open season for woodcock was shortened. The season is now from 1st November to 31st January.

On snipe two aspects of the species' biology have been examined. B. Stronach has carried out biometric studies of sex and N. Stronach (University of Dublin) has looked at food and food availability.

GREAT BRITAIN: GRAHAM HIRONS

The following work has been or is being carried out on woodcock:

M. Shorten has compiled and published an extensive literature review.

G. Hirons (Game Conservancy) has been employed on a grant since 1976 to work on aspects of the breeding and wintering ecology of the woodcock.

G. des Forges has carried out some studies on incubation and has published two papers on the subject.

P. Errington has carried out studies on roding and published a paper.

The Game Conservancy monitors the woodcock bag record as part of its

National Game Census and together with W.A.G.B.I. has carried out a wing survey since 1975/76.

On snipe, the only work recently carried out has been on the species general ecology at Sevenoaks, Kent by J. Swift (W.A.G.B.I.).

FEDERAL REPUBLIC OF GERMANY: HERIBERT KALCHREUTER

Woodcock are found only in low densities. In Hesse and Rhineland, in the west, 200 birds have been collected in spring and the following have been examined: Intestines (Berlicht), Stomach contents (Potts, Game Conservancy, Great Britain), Ectoparasites (Keil), Endoparasites, Pesticide levels - discontinued due to prohibitive costs. The skins, skulls and sterna have been taken for biometric analysis by Muller. Some work on prey availability is being carried out by a student.

There has been no recent work on snipe.

Comment:

B.S. Suggest contact should be made with R. Knowels (Great Britain) concerning work on parasites.

SWEDEN: VIDAR MARCSTROM

In Sweden all finance for game and wildlife research comes from the hunters. At present it is being channelled into research on Duck, Pheasant, Partridge, Hazel Hen and Moose, with no funds available for woodcock research. From 1956 to 1960 the spring hunting season for woodcock was closed and interest, among hunters, in woodcock dropped off. Since the reopening of a July season interest has renewed. This shows the importance of maintaining open seasons for game species.

In 1964 studies in the breeding season were begun. These included observation on the season and duration of roding, sonographic analysis of roding males, removal experiments, and the rearing of young from eggs in captivity to study behaviour. At present there is a wing collection

programme and occasional work by students.

There is no current snipe research. In 1978 P. A. Lemnell published a paper in Ornis Scan. on Capella media.

Comment:

G.H. Cambridge University expedition to Norway studied C. Media. It was agreed they should be encouraged to publish their findings.

DENMARK: IB CLAUSAGER

I. Clausager has been working on woodcock for over ten years, full time for five years until 1972 and continuing part-time since. The current work can be divided into two categories.

From the wing collection, which has continued with a break of only three years since 1969, the migration of woodcock through Denmark and the age ratio of the bag can be calculated. There is a very good response to the request for wings. In 1978/79 5,500 wings were returned which represents 20 to 25% of the total bag.

Some ringing is carried out around Kalø using ground traps and some 50 to 70 birds are marked each year. There is a 12 to 14% recovery rate, principally foreign. In all, more than 500 birds have been marked so far and there have been 50 to 55 foreign recoveries.

Very little work has been done on snipe. J. Fog has recently published a paper on snipe migration in N. W. Jutland from 1967 - 71. An analysis of the snipe bag for 1978/79 is to be published soon. In Denmark it is necessary for hunters to submit a bag return in order to obtain a licence to hunt the following season. The hunters (96%) make this return and when further information is sought there is also an excellent (85%) response.

Comment:

V.M. The same degree of co-operation from hunters is found in Sweden with woodcock but not other species.

L.S. The response to a request for wings is equally good in Finland,

200 wings are returned from a total bag of 500 to 1000 birds.

I.C. Consider the Finnish bag estimate too low. It is more likely 2000 birds.

FINLAND: LENNART SAARI

There are no extensive woodcock studies being carried out nor are there any specialist woodcock researchers in Finland. However, in conjunction with other fieldwork, observations on woodcock have been carried out on 250 days per year for the past five years.

E. Perttunen has just completed a review of all available Finnish woodcock data, which can be divided up as follows:

1. Timing of migration (observations from hundreds of active field ornithologists - this manpower could be used to collect much more information).

2. Analysis of ringing and recovery data. (1,268 birds have been ringed in 60 to 70 years. The recovery rate is 11.2%, 70% of these in their first year. The recovery areas have been looked at and a life table constructed giving life expectancies at different ages).

3. Breeding biology (including an analysis of habitat used and the season and timing of roding).

4. Population estimate (very difficult, will be discussed in full later).

5. Analysis of 140 Nest Record Cards.

6. Wing collection.

Similar work could be carried out on snipe but manpower and finance is lacking. The breeding population of snipe is larger and so the work would be easier.

FRANCE: CHARLES FADAT

Current woodcock research in France can be divided as follows:

1. Breeding studies.

The study area is 2000 to 3000 ha. within a 14000 ha. forest (Compeigne). Thirty-seven birds have been ringed, 22 as pulli found by using two dogs, and

fifteen adults trapped using nets and a decoy. Four birds (10%) have since been recovered in the same area suggesting a sedentary population. Radio telemetry studies are now being commenced.

2. Ringing and Migration studies.

These are carried out at a ringing station on the north coast near the mouth of the Somme. 3000 snares are set in a 1000 $m^2$ field. Of seven birds trapped there in February, 1978, four were retrapped in the same place in the autumn (including two birds trapped on the same night in February and retrapped together on the same night in the autumn). Of 66 birds trapped in autumn 1978, 12 were subsequently recovered within 10 km. and a further seven in France, that winter.

3. Wing collection.

GENERAL DISCUSSION

P.B-S. It would seem that financing for woodcock research is very bad in Great Britain when compared to other member countries.

B.S. Originally in Ireland woodcock research was not budgeted for. Instead it was carried out in conjunction with a mallard research project which was financed by the Forest and Wildlife Service and conducted under the aegis of the Agricultural Institute. Since transfer of B.S. to the Forest and Wildlife Service a full time research project has been approved and budgeted for. The work is carried out by John Wilson.

H.K. The same situation exists in Germany as in Great Britain.

V.M. Forestry people in Sweden consider wildlife in the same way even though hunting is now as profitable as timber production. The tradition is for timber production and until the authorities are convinced of the value of wildlife there will be very little finance for wildlife research. Only in the United States, where there is no long-established forestry tradition, is the wildlife research position better.

# SUMMARY REPORT ON ASPECTS OF THE BREEDING BIOLOGY OF THE WOODCOCK SCOLOPAX RUSTICOLA IN IRELAND. J. WILSON.

## Introduction:

A review of the available literature shows that there is a lack of factual information on the woodcock particularly in Ireland and in Europe generally. The breeding biology of the species is not clearly understood and the literature demonstrates the difficulties in obtaining adequate data on this aspect. On this basis the objectives of the project were purposefully broad and were principally concerned with relating the intensity of roding activity to the density of nesting females on two study areas, with determining whether the species was single or double-brooded, the relationship between the sexes, with documenting breeding habitat from finding nests and broods and with up-dating the species breeding distribution.

## Breeding distribution:

Since the first reported instance of breeding in 1826 the species spread rapidly to all counties by 1900. The Atlas of Breeding Birds in Britain and Ireland (1976) shows it as being widely but sparsely distributed. A series of questionnaires to all state forest centres and private woodland owners demonstrated that the full extent of the breeding range was still unrecorded. An analysis of the returns pointed towards the species' crepuscular and secretive behaviour as a major factor in this but also to the increasing availability of breeding habitat from large scale afforestation started in the early 1950's. Afforestation has strengthened local breeding populations and facilitated the spread of the species to previously non-breeding areas. This remains a very dynamic process due to continuing large-scale afforestation.

## Nests and Broods:

The locating of nests and broods using dogs (German pointers and spaniels)

proved exceptionally difficult with one study area being abandoned after the first season. The repeated coverage of areas showed that nests were missed regularly, i.e. broods found in previously searched areas. Nests located by dogs in the early stages of incubation (<5 days) were deserted, while others, mostly found accidentally or by forest workers, which were repeatedly visited to check on hatching dates, suffered severly from predation. In two seasons twelve nests, containing 47 eggs (average clutch size 3.9), and twelve broods were located. From these 47 eggs 42.6% were hatched, 14.9% were predated, 40.4% were deserted and 2.1% were infertile. Broods were never re-located. Desertion caused the greatest number of nest losses and accounts for the differences in hatching success between this sample and a larger sample in Britain (63.6% hatching success).

The period of peak egg-laying occurs within the first 15 days of April. The distribution of first-egg dates is very similar, though the peak period is somewhat later when compared with Britain and France. The absence of bi-modal distributions in all three instances suggests that double broods are an irregular occurrence and that rapid replacement of lost clutches (see p.14) is its normal strategy despite the length of the breeding season (February to July).

Nesting habitat:

Deciduous woodland, mostly sessile oak Quercus petraea, and scrub, consisting predominantly of birch Betula pubescens, makes up 5% of the study areas but contained 25% of the nests. Others were located within planted coniferous woodlands of scots pine Pinus sylvestris. The most important constituent of the nesting habitat appeared to be the field layer which in 67% of cases was of bilberry Vaccinium myrtilus with occasional woodrush Luzula sylvatica. Nests were also found in pine-needle litter with no field layer present and in the open on recently felled coniferous woodland areas.

Roding Activity:

The roding activity of unmarked birds was recorded principally over a defined observation area for part of two seasons and regularly for a third season (1976 - 78). Roding activity was also recorded, though to a much lesser extent, at other points within the main study area and in other woodlands around the country. The intensity of roding activity recorded at the main site is consistently high, though with variations from year to year, by comparison with other sites in Ireland and elsewhere, namely Britain, Germany and Sweden. Roding intensity has ranged from a mean of 7.6 observations (range 4 - 14) per evening in the last two weeks of February to 49.4 observations (range 33 - 60) in the last two weeks of June, whereafter it declines rapidly. If the periods at the onset and decline of roding activity are excluded roding intensity remains relatively constant for the intervening period. The variation in numbers of observations made per evening is directly related to the length of the roding period (range 18 - 98 minutes) which appears to be dictated by the weather conditions prevailing.

The regular observation of evening flights during the winter period and roding activity delimited three distinct types of paired or 2-bird flights often referred to as 'pursuit flights'.

1. Prior to the onset of roding activity (mid-February) silent 2-bird flights were observed with increasing frequency from the end of November, i.e. the peak arrival dates for wintering woodcock. During these flights one bird pursues another at tree top height, frequently engaging in intricate, often slow, tumbling movements, for short intervals at dusk while moving from diurnal woodland cover to nocturnal fields. In all observed instances (n = 34) calls have not been recorded. A radio-tagged bird has been seen to move from diurnal cover at dusk performing this flight in company with an unmarked bird in February. It returned alone the following morning but on two other occasions was observed to move directly to diurnal cover at dawn accompanied by another bird.

2. A similar type of 2-bird flight to (1) above but with two essential differences: (a) in the initial stages of the flight the pursuing bird calls repeatedly in the manner of an interacting roding male (see 3 below) and (b) the call changes to a twittering sound uttered, it would appear, by both birds and coincides with a slowing down of the tempo of the flight to such a degree that both birds have been seen to drop towards the ground. Occasionally two birds have pursued a third. These flights take place at dusk once roding activity has commenced and are rarely observed after the period of peak egg-laying at the beginning of April. This flight is interpreted as a male-female flight and offers an explanation for the small percentages of females which often occur in samples of spring shot birds. Observations to date suggest that these flights occur mainly where resident breeding populations, already showing breeding behaviour, and migratory birds intermix for short periods in spring. (A recently collected sample of spring woodcock by Dr. Keil in the Federal Republic of Germany contained 22.3% and 18.6% females in 1975 and 1976 respectively. (See page 43)).

3. A 2-bird flight in which two roding males react to each other's presence by coming together in a fast flying vociferous interaction which ends with both birds continuing their respective roding flights. As many as five roding males have interacted in this way.

Conclusions:

1. The application of conventional field techniques (i.e. use of dogs, recording observations of unmarked roding birds) have not succeeded in achieving the main objectives of the study. It has succeeded in providing a large amount of very general information on the species in Ireland which was not previously documented.

2. The woodcock continues to expand its breeding range in the country due to a continuing policy of afforestation.

3. Observations suggest that male and female woodcock perform a distinct, though previously apparently unrecorded, flight in the period before peak egg laying. This so far mainly occurs in areas where resident populations, exhibiting breeding behaviour, mix with a migratory population for short periods in spring.

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Discussion

V.M. From the roding observation rate it would seem that the density of birds in the study area was very high.

H.K. Was this simply a roding area? - such small areas exist in the Black Forest.

J.W. No. Roding birds were just passing through the area.

V.M. It is possible for one bird to circle a 300-500 ha. area in nine minutes.

It was agreed that nest finding was unsuccessful due to a lack of specially trained dogs. Very often location of nests leads to desertion, especially during the early part of the incubation period. Furthermore disturbance from daily visits often leads to predation.

H.K. There was 42% hatching success - was there any further pre-fledging loss?

J.W. Yes. Total success unknown.

L.S. In Finland an analysis of nest record cards showed a mean of 3.9 eggs/clutch: 3.6 successfully hatched and 3.4 young/brood. Of 175 eggs laid 94 hatched (53.7%). 67% of nests were successful. 21 nests produced no young. Of these 3 failed due to human causes, 5 were predated and 8 destroyed. The fate of the others unknown.

G.H. In Great Britain 12 nests were found without dogs and were visited daily. Of these two were deserted, two others failed (one definitely predated) and of 40 eggs 31 hatched (76.5%).

J.W. Refer to Morgan & Shorten 1974 (Bird Study 21(3):193-199).

V.M. Have you ever tried censusing in Autumn using beaters and dogs?

J.W. Yes, but without success.

V.M. Where are the birds then.

J.W. No one knows for certain but there is a traditionally held belief that they move onto heathland areas.

G.H. We have tried without success in Spring, not yet in Autumn.

B.S. Suggest wing moult taking place and birds stay close to ground - more difficult to flush. Seen bird flush and unable to fly well at this time of year, i.e. autumn.

J.W. Wing moult begins late July while still roding. Roding then ceases.

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# THE RODING BEHAVIOUR OF THE EUROPEAN WOODCOCK SCOLOPAX RUSTICOLA - AN ALTERNATIVE HYPOTHESIS.

G. HIRONS

## Introduction:

The biological meaning of roding behaviour is not well understood and there is no published information on whether the woodcock is polygamous or forms pair bonds.

Tester and Watson (1973) concluded from plotting the positions of interactions between roding birds and supposed outer flight paths of presumed (but unmarked) individuals that roding flights defined the boundaries of individual male's breeding ranges. Therefore, they proposed that roding flights should be considered as displays defining possible territories as previously suggested by Warwick and van Someren and this interpretation is now generally accepted. However, both Steinfatt and Nemetschek thought the display flights served chiefly to find females ready to mate, and Hirons, working on an area where some individuals were distinguishable by voice, found that their roding grounds overlapped. The aim of this paper, based on preliminary observations of woodcock fitted with radio-transmitters, is to confirm that roding areas are not exclusive and that the real purpose of the male woodcock's roding behaviour is to find or attract females with which to mate.

## Methods:

Roding behaviour was studied in a 171 ha., mainly deciduous, wood in north-east Derbyshire from March 3rd to July 8th 1978. Fourteen roding males were caught in mist-nets, most of them with the aid of a bantam decoy. One roding bird was marked with a patagial tag and ten equipped with 173 MHz. transmitters. Neither method of transmitter attachment, i.e. elastic harness or latex saddle, appeared to interfere with the birds' normal behaviour and woodcock fitted with transmitters have roded, mated and laid eggs.

The roding areas of different males were determined by accumulating through the season all observations of individually marked birds passing overhead. Observations were made throughout the wood mainly at the intersections of rides which allowed the largest view of roding birds. Even so, they could seldom be observed for more than a few seconds at a time from such places and so direct observations of radio-tagged birds were also made from the tops of trees and other vantage points. At high light intensities the flight paths could be plotted accurately over considerable distances by referring them to known landmarks. Even when light levels were too low to see the roding bird some information on the extent of roding grounds could still be obtained by gauging the strength and direction of the radio-signals alone. All observations were plotted on large-scale maps (scale 1:10560) of the study area. Diurnal locations were determined by triangulation, usually at ranges below 50 m.

Results:

Radio-tagged males did not maintain exclusive territories when roding or for feeding. Maps of the areas over which seven of the marked birds were observed to rode are shown in Fig. 1. Individual roding grounds overlapped consistently and ranged from 66 to 132 ha. in size (Table 1); much larger than the range of 6.02 to 12.75 ha. given by Tester and Watson. Furthermore the figures given in Table 1 are minimum estimates as birds may sometimes have roded unrecorded outside the areas shown. On the other hand, some birds did not fly over the whole of the area shaded in Fig. 1. every evening. For example on some days birds O and R roded only over the group of outlying woods 2 km. north-west of the main woodland area (see Fig. 1), on other evenings only over the main woodland area itself, and sometimes they roded over both woodland areas on the same evening.

Other evidence against roding males being territorial was provided by many observations of more than one marked bird roding along the same flight paths on the same evening, sometimes less than a minute apart. There were

also several evenings when more than one roding male was caught at the same bantam decoy while others flew uncaptured overhead.

Daytime locations of the roding birds are plotted in Fig. 1 and again these provide no evidence of territoriality. Marked birds were often recorded in the same area, sometimes less than 30 m. apart.

There were several occasions during the breeding season when radio-tagged birds stopped roding, sometimes for up to a week or more (Table 1). Whenever this happened the marked male was found to be accompanying a second bird which it would always follow closely when the birds were flushed. Both birds could then be found every day no more than a metre apart and usually in the same small area to which they always returned. On two occasions nests were subsequently found in this same area after the male had begun roding again and so the other bird was presumed to be female. This was confirmed when a radio-tagged female lost her clutch and was accompanied 36 hours later by a radio-marked male. Similarly, a radio-tagged female was flushed with a second bird only 24 hours after losing her brood and then on several subsequent occasions before she relaid 12 days later.

There was no evidence that females were territorial. In April four clutches were found being incubated within 340 m. of each other, two being only 75 m. apart. The radio-tagged female that relaid did so 300 m. from the original site.

Discussion:

Although aggressive interactions occur frequently between roding male woodcock this does not prevent several males from displaying over the same area (Fig. 1). Also the flight paths of individual roding males are not always consistent from one evening to the next. Therefore roding flights apparently do not define territory boundaries. It seems more likely that the roding display serves to attract the attention of females. Radio-marked females flew comparatively seldom during the breeding season and the bantam method of capturing males demonstrates that roding birds are interested in

birds on the ground. Hoffman, Pay and Steinfatt all believed that the female utters an attractant call which is heard by the flying male and causes him to alight next to her. If this is so then, initially at least, mate choice may be the prerogative of the female.

Many fundamental aspects of the woodcock's breeeding biology are not well understood and it is not known whether females are double-brooded. However, as some of the radio-tagged males stopped roding for several periods during the breeding season (Table 1) it is possible that they mated with more than one female, and one male certainly spent time with two different females. None of the radio-marked males incubated or cared for young and at one nest studied only the (radio-tagged) female incubated. Therefore, any pair bond formed is probably only transitory.

My interpretation of these data is that roding male woodcock are probably successively polygynous but unlike other waders with polygynous mating systems male woodcock do not defend either an exclusive or specific area to which females are attracted and in which mating and/or nesting takes place. Instead, a male woodcock displays solitarily at dusk and dawn over a wide area until he finds a receptive female. Then, to ensure that he alone copulates with her, he remains with the female constantly until the clutch is laid before resuming his display flights.

Future work will look at the variation in the success of individual males in locating and mating with females and try to relate this to differences in individual roding performance.

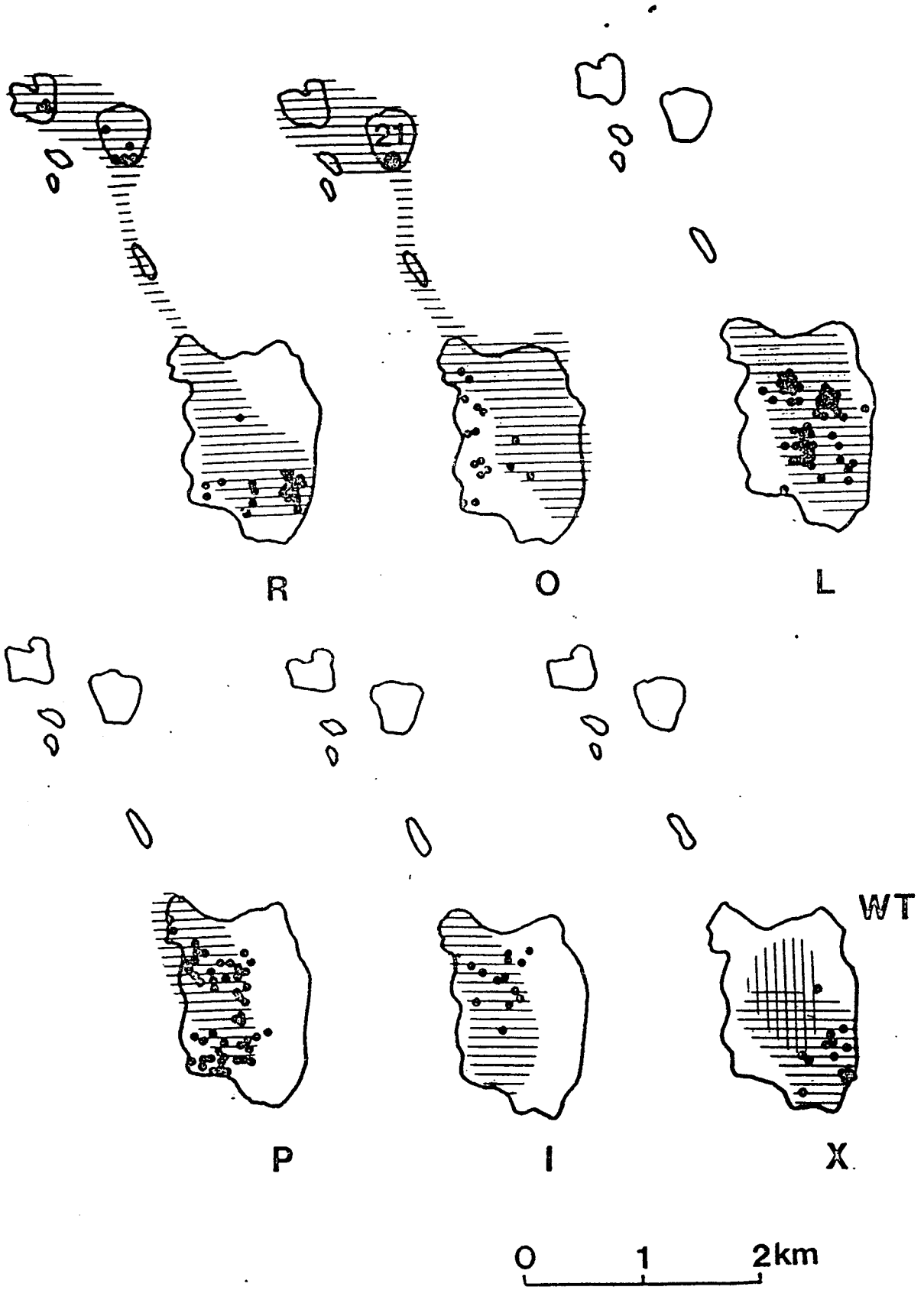


FIGURE 1. Roding grounds (shaded) and diurnal locations (filled circles) of seven individually marked male woodcock (code letters as in Table 1) at Whitwell Wood and nearby copses March - July 1978. Diurnal locations are the first fixes obtained each day. Bird WT was not radio-tagged but was identified while roding by a patagial tag: there were no diurnal observations of this bird.

TABLE 1. THE SIZE OF RODING GROUNDS AND NUMBER OF NON-RODING PERIODS RECORDED FOR SIX RADIO-TAGGED (AND ONE WING-TAGGED) MALE WOODCOCK IN WHITWELL WOOD, DERBYSHIRE MARCH-JULY 1978.

| Identifying letter | Period observed | Size of roding ground (ha) | No. and duration of non-roding periods (days) |
|---|---|---|---|
| I | 24 MARCH-24 MAY | 68 | NONE |
| L | 29 MARCH- 7 JULY | 126 | TWO (7,8) |
| O | 31 MARCH-30 MAY | 134 | NONE |
| P | 31 MARCH- 7 JULY | 61 | THREE(4,3,(3)[1]) |
| R | 17 MARCH-17 JUNE | 120 | TWO(1, at least 11) |
| X | 7 JUNE - 7 JULY | 66 | ONE (5) |
| (WT | 19 MARCH- 7 JULY | 43 | - ) |

[1] P's transmitter failed on the third day

Discussion:

V.M. Did males stop roding for any other reason than to mate with female?

G.H. No. When not roding always with female.

B.S. What about their feeding movements?

G.H. Initially flew to pastures at night but during breeding season from February onwards fed by day in wood and also in open areas after roding and stayed in wood all night.

G.H. commented cannot catch females. Females caught on nest or with brood

deserted. Definitely not territorial, can be quite close together.

J.W. In Ireland foresters tell of clumping of nests.

P.B.S. Likewise in Islay in the Outer Hebrides (Scotland).

On the basis of this work roding intensity cannot be used to measure density of woodcock. Birds move about too much even from wood to wood.

G.H. Birds rode for a maximum of 20 mins. during 1½ hours. Some are consistently early. All roding males caught last year were adults, this year one was first year but never seen again.

B.S. Found immature birds had larger testes. Obviously capable of breeding but inhibited by aggression of adults from roding.

V.M. 50% shot during roding in summer were 1st year.

G.H. Were immatures not simply replacing removed adults? Will try next year to remove all adults from a study area and induce immatures to rode.

V.M. May try to remove all roding adults from an area next season.

I.C. Perhaps immatures rode later in season?

G.H. No change observed.

J.W. In July 1 roding and 1 non-roding imm. caught in small area.

I.C. Is woodcock double-brooded?

G.H. Think not. Some females start first brood very late so it is worth while for male to rode all season. However females radio-tagged now, so should be able to prove one way or another. This year the season is already very late. Male stays with female until laying begins then leaves in search of another receptive female.

V.M. There is a traditional view that male, female + chicks remain together but has never been verified. Male + female often seen together by day but without chicks.

G.H. Think mating takes place in open.

J.W. Paired flights often observed before roding takes place - do

woodcock first pair off in winter?

G.H. Quite possible. In U.S. clutches have been found before roding or any display takes place.

I.C. Often two birds in one trap in winter.

J.W. Pairs caught in nets early in season (Feb./Mar.)

H.K. Could these not be siblings rather than male/female pairs?

J.W. Possibly but occurs more frequently as season progresses. During July 4 birds together in flight could have been female and brood on first flight.

B.S. Is study wood watched in winter?

G.H. Yes, but very few woodcock found there as habitat is not suitable - bleak, cold. Considerable site fidelity. Of 15 caught this week, 8 had been ringed last (7 ad/1 pull) year.

V.M. How long between eggs in clutch.

G.H. Approx. 7 days for a clutch. Many clutches not found until complete, does female cover incomplete clutches.

L.S. In Finland eggs in 1 clutch laid at daily intervals.

V.M. In Sweden on average longer than 1 day.

# WOODCOCK MIGRATION IN DENMARK

IB CLAUSAGER

In order to follow and analyse the autumn migration of the woodcock in Denmark, The Game Biology Station has since 1969, with the exception of 1972-74, collected information from sportsmen of woodcock bagged.

The results from the first years have been described in my paper entitled Migration of Scandinavian Woodcock with Special reference to Denmark.

During the 5th American Woodcock Workshop, in December 1974 in Athens, Georgia, European delegates held a small meeting to discuss problems and co-operation among woodcock scientists in Europe. It was decided to try to start up collections of wings in the different countries in order to look at migration and also production of young. In earlier years I had collected such material with success in Denmark, and it should be possible to do likewise in other countries.

In Denmark we restarted this work in 1975 and have continued since. The sportsmen are still very positive in their response and as you will see from Table 1 we receive quite a large number of wingfeathers. Forms and envelopes (post prepaid) for the return of primary feathers are distributed to 500 sportsmen and forest estates and advertisements are placed in hunting magazines.

We do not collect the complete wing, just the three outermost primaries. This is sufficient in Denmark, and probably also in countries where woodcock winter, but in Sweden, however, where the material is collected in July/ August it is preferable to have the whole wing, because other characteristics can be used, as the primaries are much worn and also because the primary moult can be studied.

In Finland the hunting season starts so early that not all birds have finished their primary moult and this has led to the wrong feathers being returned. Here likewise, the complete wing would be preferable.

Autumn migration normally begins in mid-October here in Denmark. Birds shot earlier in the season are probably Danish breeding birds. We normally have a peak in the beginning of November and then numbers decrease until the end of December.

However, the woodcock migration depends very much on the weather conditions, especially changes in temperature. Therefore an early cold spell north and east of Denmark, means that the first influx of birds may occur as early as the first half of October. On the other hand, a very mild autumn means that migration is delayed. If one looks at Figure 1 here, 1970 and 1976 appear as 'normal' years. In 1971 there are two peaks, the first as early as c. 20th October. In 1978 the migration was very late, with the peak in the last third of November and still quite a lot of birds still present in December.

The end of autumn migration also depends on the weather. If there is frost over a longer period the main part of the birds leave Denmark, but some always winter here and these birds seek out the least frozen areas, small streams, springs, etc.

Age distributions of the migrating birds.

From primary wear it is possible to age shot woodcock. In Denmark we have collected primaries since 1969.

The age ratio of the bag varies much, from 1.45 juv./ad. bird in 1976 to 2.73 juv./ad. in 1971. In my opinion the normal will be around 2.2 to 2.5 juv./ad. and the very low ratios in 1975 and 1976 were probably related to the very dry summers in those two years. Many birds probably lost their young because of food shortages and replacement of destroyed nests or second broods were not all produced.

If one looks at Figure 2, the age ratio appears high in the first part of the migration, it then goes down and in the last part of the migration the ratio rises again.

Only in the two years 1975 and 1976 did the decrease continue throughout

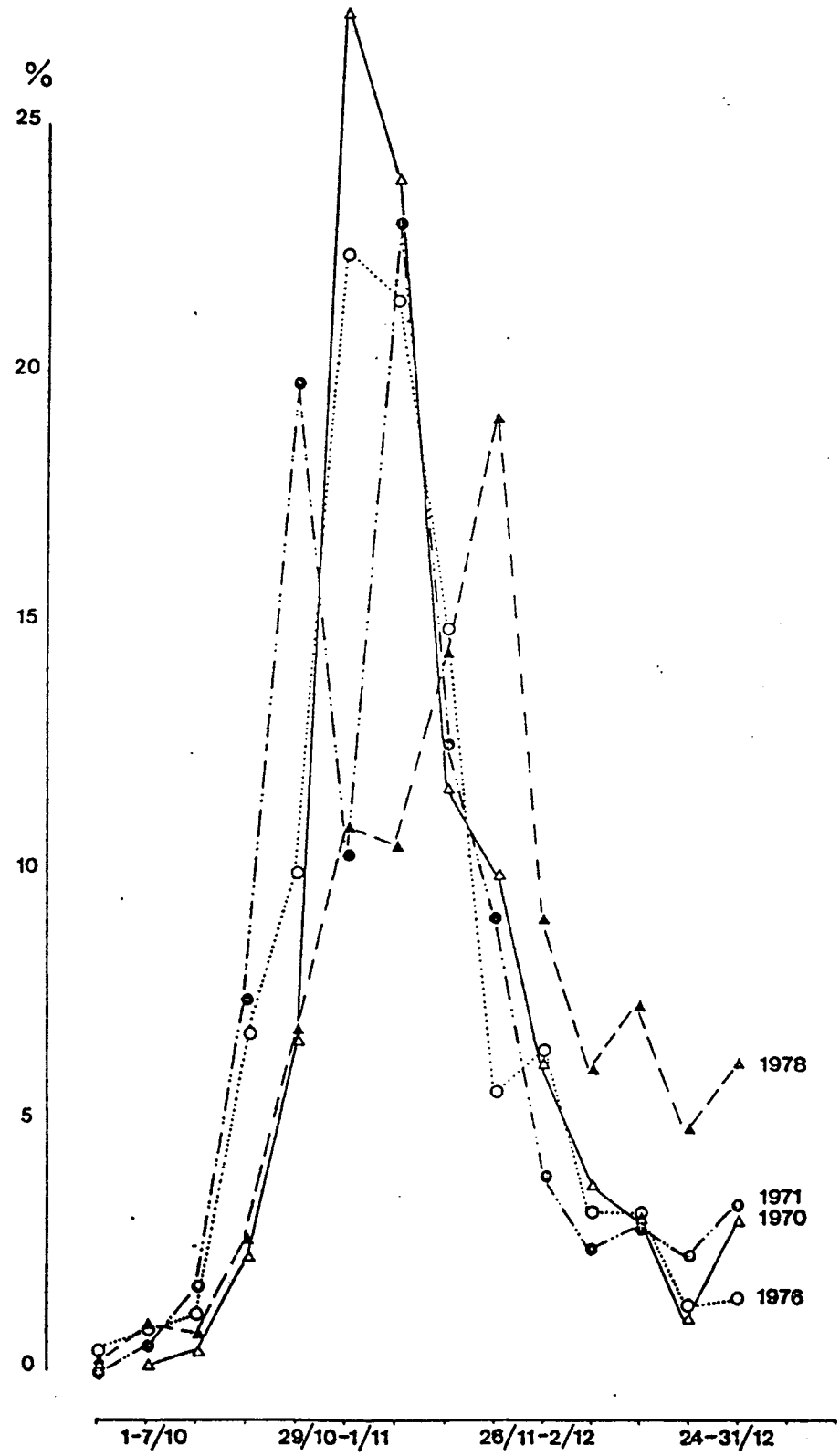


FIG. 1. Autumn migration of woodcock through Denmark as shown by hunting returns.

the entire open season. This may be interpreted as very few young having been fledged in the last part of the breeding season.

For the 1976 - 77 hunting season I have compared the Danish results with those from other countries.

The age-ratio in Denmark in this year was very low, 1.45. This was the case from most of the other countries as shown in Table 2.

The figures show very clearly that the young production was very low in most countries. In England and Ireland the age ratio was even lower than in Denmark. As I mentioned it was surely the extremely dry summer which caused this. The figure from Italy is higher, which is probably the result of most of the migrants to Italy having been derived from different regions to those which winter in France and the British Isles.

The Swedish age-ratio is derived from woodcock shot in July 1977. These are full-grown birds shot while roding at the end of the breeding season. It can be seen that the age ratio here is extremely low, only o.4 juv./ad. Juveniles here mean birds hatched in 1976 which means that they are about one year old. Adults are birds hatched prior to 1976. As the analysis of the autumn bag in Denmark and other countries showed very poor production it is not surprising that the Swedish figure is also very low.

My earlier analyses of the age composition of woodcock taken in spring, showed that the age-ratio at this time of the year was only half or even smaller than the corresponding figure from autumn.

The Swedish figure of o.4 fits very well with the Danish and British figures. In 1978 the Swedish figure was 0.9 juv./ad., and compared to the Danish figure of 2.58 from autumn 1977 we find nearly the same ratio between the figures as from the previous year. The Swedish sample was 769 in 1977 and about 900 in 1978.

I have also examined wings from birds shot early in the autumn for Finland, where the hunting season is from 10th September to 15th October. The age-ratio in 1977 fitted very well with the Danish figure for the same season, i.e.

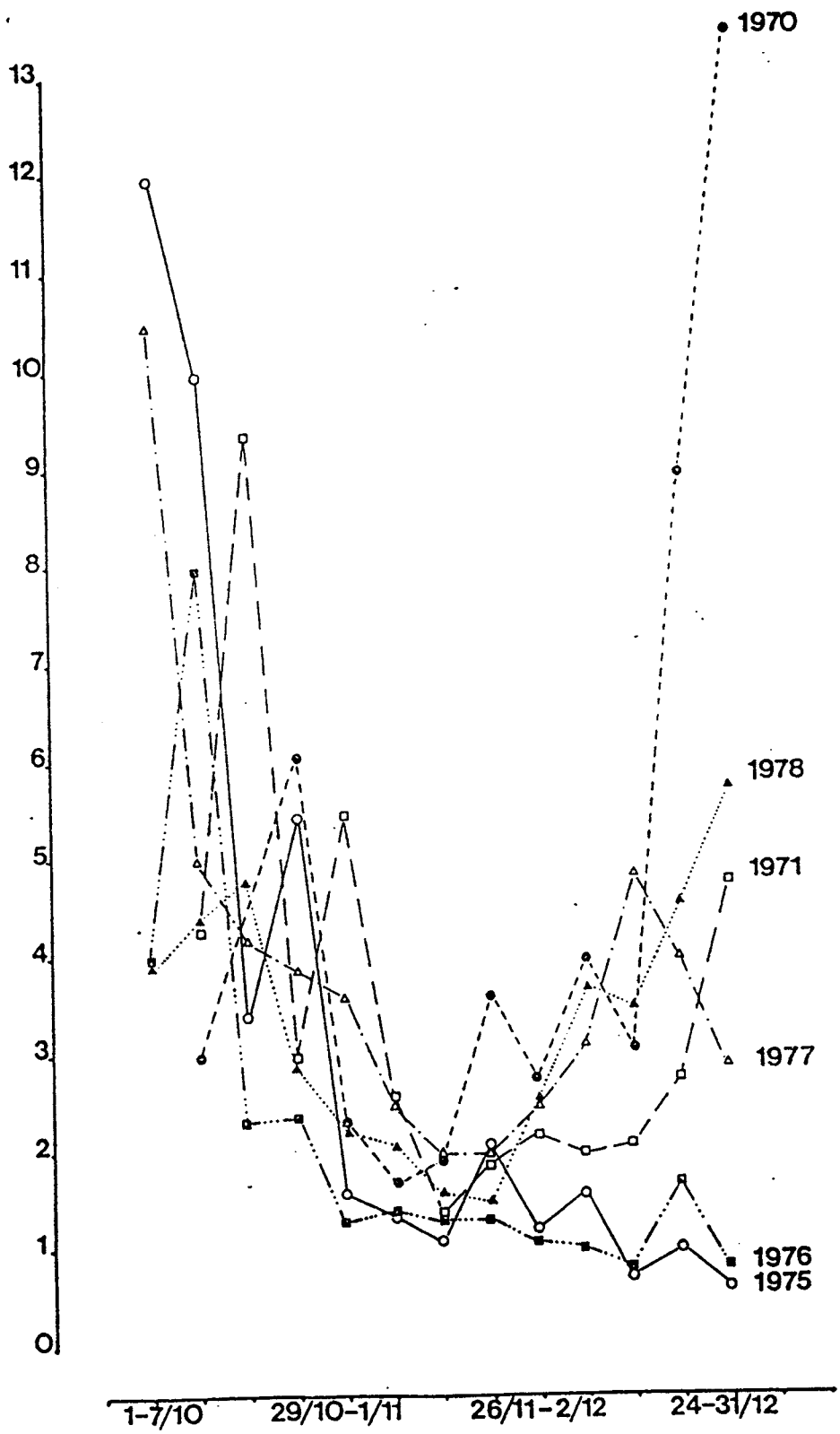


Fig. 2. Variation in the Juvenile/adult ratios throughout the season in Denmark.

Finland 2.4, Denmark 2.6. In 1978 there was also agreement between the figures. Among this material, however, there were some wings which were difficult to age, because only the three outermost primaries instead of the whole wing was sent. In all cases the Finnish figure is between 2.0 and 2.5, the Danish figure is 2.4. The Finnish sample was 113 in 1977 and 200 in 1978.

You can see that comparisons can be made from the different materials and I feel it would be a good idea to continue with wing collections if it were possible to get someone to handle all the material from the countries which are collecting, so as to analyse the data for the entire breeding, migration and wintering area.

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TABLE 1. AGE RATIO IN DIFFERENT YEARS OF WOODCOCK TAKEN IN DENMARK

| PERIOD/YEAR | 1970 | 1971 | 1974 | 1975 | 1976 | 1977 | 1978 |
|---|---|---|---|---|---|---|---|
| 24-30 SEPT | - | - | - | △ | △ | 1.0 | - |
| 1-7 OCT | △ | △ | - | 12.0 | 4.0 | 10.5 | 4.0 |
| 8-14 OCT | 3.0 | 4.3 | | 10.0 | 8.0 | 5.0 | 4.4 |
| 15-21 OCT | | 9.4 | 4.0 | 3.4 | 2.3 | 4.2 | 4.8 |
| 22-28 OCT | 6.1 | 3.0 | | 5.5 | 2.4 | 3.9 | 2.9 |
| 29 OCT - 4 NOV | 2.3 | 5.5 | | 1.6 | 1.3 | 3.6 | 2.3 |
| 5-11 NOV | 1.7 | 2.6 | | 1.4 | 1.4 | 2.5 | 2.1 |
| 12-18 NOV | 1.9 | 1.4 | 1.6 | 1.1 | 1.3 | 1.9 | 1.6 |
| 19-25 NOV | 3.6 | 1.9 | | 2.0 | 1.3 | 2.0 | 1.5 |
| 26 NOV - 2 DEC | 2.8 | 2.2 | | 1.2 | 1.1 | 2.5 | 2.5 |
| 3-9 DEC | 4.0 | 2.0 | 2.1 | 1.6 | 1.0 | 3.1 | 3.7 |
| 10-16 DEC | 3.1 | 2.1 | | 0.7 | 0.8 | 4.9 | 3.5 |
| 17-23 DEC | 9.0 | 2.8 | 2.9 | 1.0 | 1.7 | 4.0 | 4.6 |
| 24-31 DEC | 13.5 | 4.8 | | 0.6 | 0.8 | 2.8 | 5.8 |
| 24 SEPT - 31 DEC | 2.55 | 2.73 | 2.22 | 1.62 | 1.45 | 2.58 | 2.37 |
| NO. OF WINGS | 1007 | 932 | 193 | 466 | 2379 | 3514 | 5670 |

△ No wings from the adult birds during this period

TABLE 2. AGE RATIO IN DIFFERENT COUNTRIES OF WOODCOCK TAKEN IN 1976/77 SEASON

| COUNTRY | JUV/AD |
|---|---|
| DENMARK | 1.45 |
| ENGLAND | 0.90 |
| IRELAND | 0.63 |
| ITALY | 2.10 |
| FRANCE | 1.53 |
| SWEDEN (JULY 1977) | 0.40 |

Discussion:

B.S. Were there initial problems in obtaining a bag return from all hunters?

I.C. Initially yes but interest and success has built up over years.

H.K. The age ratio of 5 young/adult female appears rather high.

I.C. 1975 summer was very dry, late broods possibly lost accounting for lower young/adult ratio.

J.W. then showed pattern of movement as shown by ringing in Ireland. Pattern was similar to Denmark: Nov. peak - levelling off - peaking before departure. Likewise with age ratio from wings: more imm. early in season and more imm. in 1978/79 season. See Tables 1 and 2 below.

I.C. Also examined Swedish and Finnish wings and obtained ratios similar to Denmark.

G.H. Why is Italian ratio so high? Could it be that heavy shooting pressure there causes high 1st year mortality and consequently reduces the chance of any bird returning as an adult in subsequent years?

I.C. Perhaps but maybe Italian wintering birds come from further east and the different climate might affect the age ratio.

V.M. Hunting methods may produce different age ratios.

G.H. Driven and efficient shoots get most of adults and imm. producing a high ad:imm ratio in future years.

It was agreed that a wing collection must be continued on an international level. B.S. asked I.C. to co-ordinate this but due to pressure of other commitments he declined.

WOODCOCK WING COLLECTIONS AND DISSECTION DATA FROM IRELAND: JOHN WILSON

TABLE 1. WOODCOCK WING COLLECTION 1978/79 INCLUDING DISSECTION DATA

| PERIOD | ADULTS | IMMATURES | AD:IMM | AD♀:IMM | ♂:♀ |
|---|---|---|---|---|---|
| NOVEMBER | 50 | 105 | 1:2.10 | | |
| DECEMBER | 254 | 274 | 1:1.07 | | |
| JANUARY | 364 | 410 | 1:1.13 | | |
| UNKNOWN | 220 | 232 | 1:1.05 | | |
| TOTALS • | 888 | 1021 | 1:1.15 | 1:2.56(57)° | 1:1.05(80) |

•Data incomplete for 1978/79 season.

°Figures in parenthesis indicate sample size.

TABLE 2. SUMMARY OF WOODCOCK WING COLLECTION DATA 1975/76 to 1978/79 INCLUDING DISSECTION DATA

| WINTER PERIOD | AD:IMM | AD♀:IMM | ♂:♀ |
|---|---|---|---|
| 1975/76 | 1:0.55 (1359) | 1:1.10 (332) | 1:1.07 (513) |
| 1976/77 | 1:0.63 (1355) | 1:1.80 (183) | 1:1.16 (281) |
| 1977/78 | 1:0.76 (1534) | 1:1.39 (79 ) | 1:0.83 (119) |
| 1978/79 | 1:1.15 (1909) | 1:2.56 (57 ) | 1:1.05 (80) |

## THE IMPACT OF HUNTING ON WOODCOCK POPULATIONS: HERIBERT KALCHREUTER

The woodcock is an important game bird throughout its European and American range. In addition much of our knowledge of the life history of this bird, so difficult to observe, can only be obtained by examining shot birds. Therefore it is necessary to consider the impact of hunting on the populations.

Figure 1 shows the hunting seasons in European countries. They more or less coincide with the occurrence of the birds during migration. Some countries have a separate spring season for roding birds.

Figure 2 shows the distribution of ringing recoveries and more or less reflects the seasons. 33% were reported from Great Britain, 23% from Ireland, 23% from France and the rest from 17 other countries.

In contrast to North America where they know that 1.7 m. woodcock are shot annually our kill statistics are very incomplete as Table 1 shows. Data would be very desirable from the British Isles, Italy and Greece, where definitely quite a number of woodcock are shot. According to the data obtained so far, more than 2.5 m. woodcock are shot in Europe annually.

But how does this affect the populations? Ninety per cent of the ringing recoveries are of birds shot which might mislead one to assume that hunting is by far the most important mortality factor. But this can only be calculated by comparing the total number of birds ringed with that of those recovered (see Table 2). The recovery rate in Europe is only about 10.5%, similar to that in America (about 9.4%). The killing rate might be about twice as high, considering birds lost and rings not reported. The remaining birds have suffered natural mortality and have not been found because of their cryptic colouration and woodland habitat.

Next question: Does the 10.25% annual mortality caused by shooting increase the overall mortality? To answer this it is necessary to calculate the latter as shown in Table 3. Though derived from shot birds (there are not enough recoveries of birds found dead), it seems to represent, more or less, the overall mortality in the population. The results for other waders and

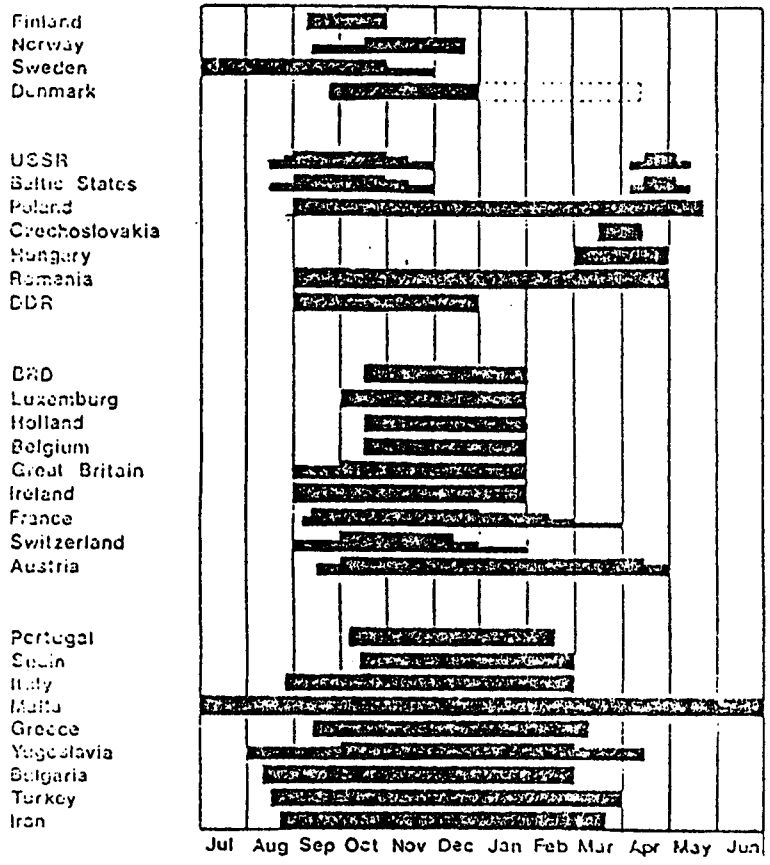


FIG. 1. Hunting seasons in European countries (different regulation with a country shown by the width of band). In Denmark the spring season has been closed.

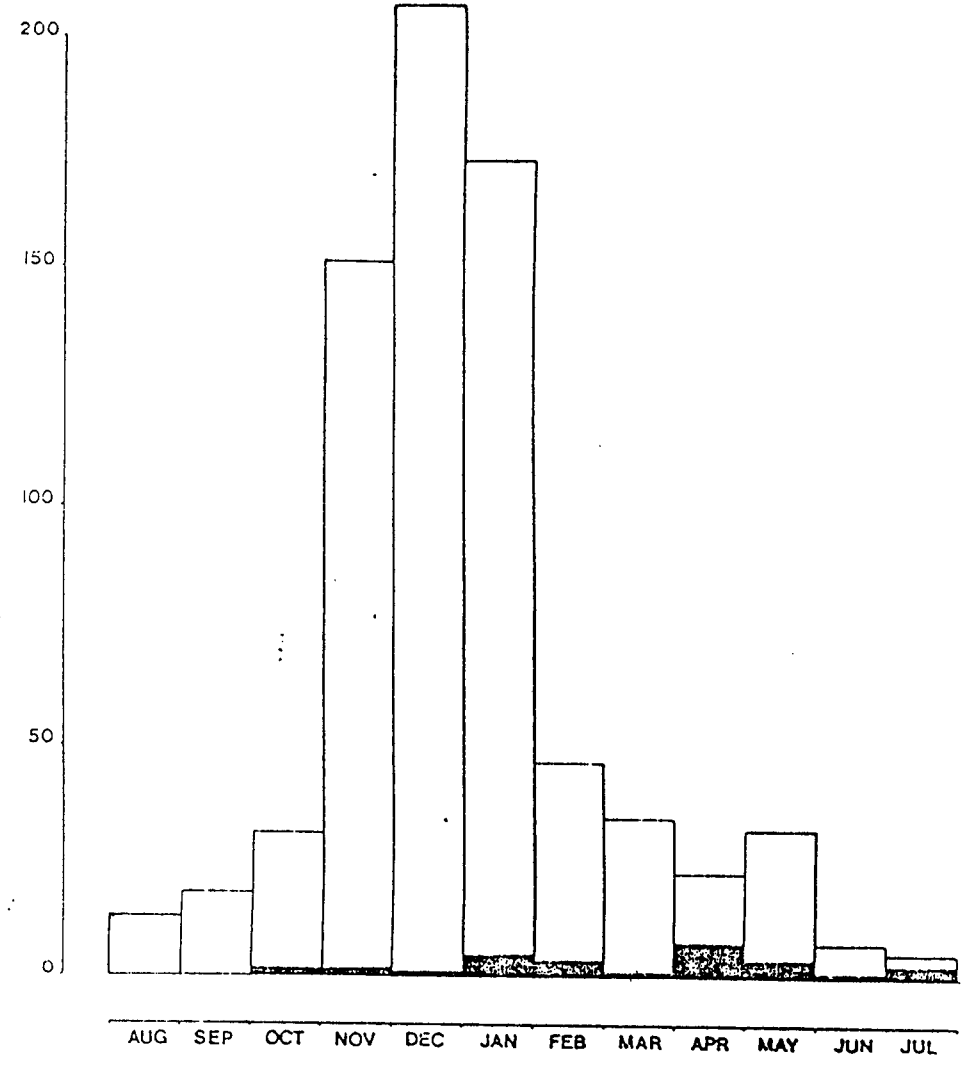


FIG. 2. Season distribution of recoveries of ringed woodcock; shot - white; found dead - black.

shorebirds strongly supports this assumption:

1. For the Common Snipe Capella gallinago and the Lapwing Vanellus vanellus for example the mortality tables calculated are almost the same for birds shot and those found dead.
2. The increase in mortality according to the length of the migration route (Table 3) is also obvious in species that are not hunted.

These facts alone suggest that hunting mortality is not addative but compensatory. Secondly, even in areas with a high hunting pressure (see Table 2) the killing rates are still considerably lower than the corresponding mortality rates of Table 3. And from observations on other species at lower trophic levels, artificial killing can only reduce population size, if it exceeds the rate of deaths from natural causes. Figure 3, showing a steady population of Scolopax minor in spite of increased hunting is an impressive example of compensatory mortality.

It is more understandable now why the woodcock was unaffected by centuries of shooting. They even began increasing their breeding populations in the British Isles, then in the Netherlands and Denmark in the last 150 years and now in Finland, also the population is increasing despite heavy hunting pressure in their French winter quarters.

In some countries there is a spring hunting season for roding males, which forever leads to quarrels with conservationists, principally because the woodcock's breeding biology is not properly understood. For the following reasons this method of harvesting is unlikely to have any impact:

1. Usually very few birds are shot in this season (see Figure 1 and Table 1) and 90% or more are males. If hunters only shoot croaking birds they are shooting exclusively males.
2. Shot males are quickly replaced from a standby population of subdominant males, even in relatively high numbers as was found in Sweden (see Fig. 4), with Scolopax minor in America and will be tested for now in several European countries.

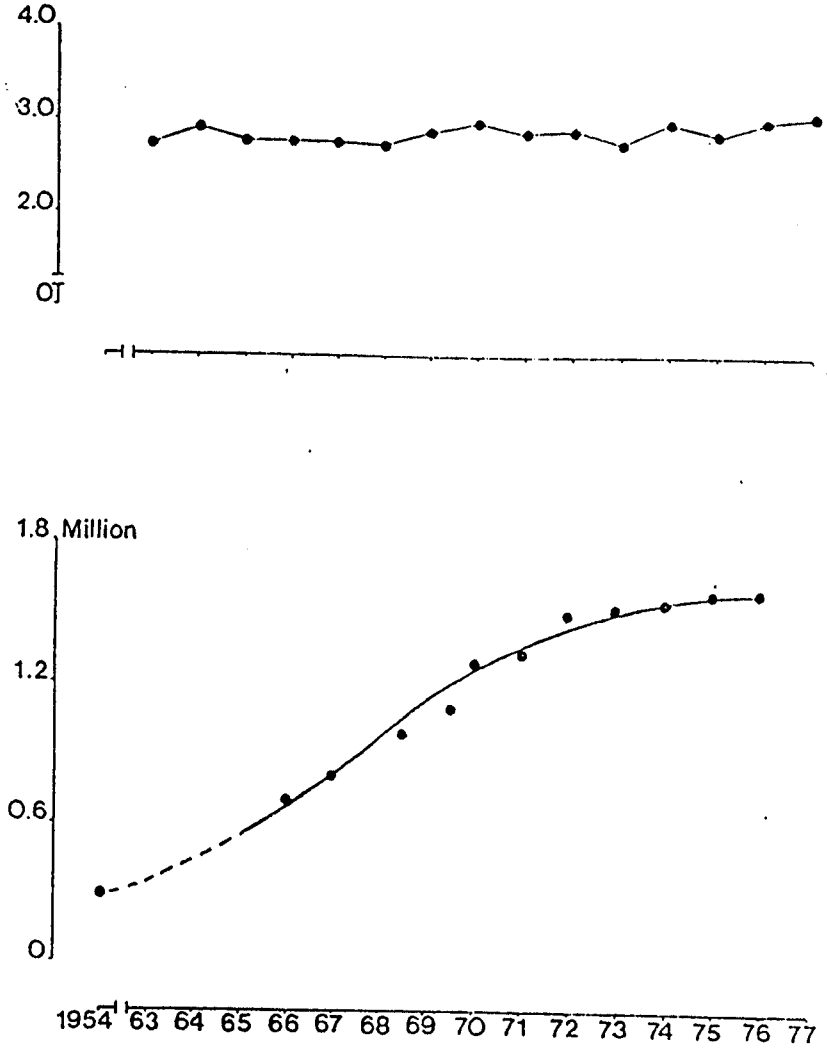


FIG. 3. Index of abundance of Scolopax minor (upper) and number killed annually (lower)

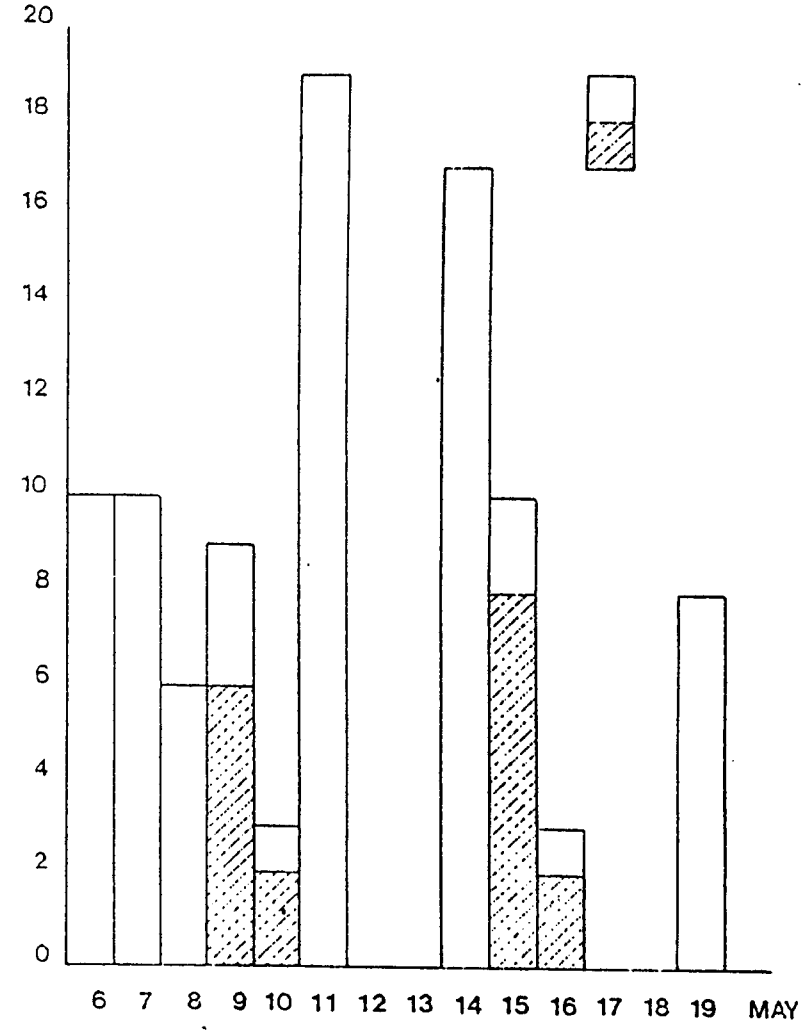


FIG. 4. Number of woodcock observed roding (white) and number of roding males shot (hatched), Marcstrom (1974)

3. The woodcock is an extremely polygamous bird. So productivity is not decreased if absolute numbers of males are reduced. In one study area in Virginia the highest number of broods were found in a year when the least number of males were present.

4. Obviously males suffer highest mortality not in winter but during their arrival at the breeding range. The uneven sex-ratio of Scolopax minor is probably formed at that time and Figure 2 shows more birds found dead in April than in any other month. Social stress and competition for scarce food in inclement weather might cause high mortality and allow hunting to be fairly compensatory.

Taking these facts into consideration it is no longer surprising that banning or starting this kind of harvesting has never had any visible effect on the population.

Reference: Kalchreuter, H. (1979): Die Waldschnepfe. Verlag Dieter Hoffman, Mainz. pp 158.

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Discussion:

B.S. How meaningful are 80 years ringing results?

H.K. The majority are post W.W. II so fairly good.

B.S. How do we encourage the ringing of woodcock.

L.S. In Finland special ringing permits to interested ornithologists for woodcock alone might help.

I.C. Reckon specialists required to find chicks. Little success with forestry helpers even though they came upon many.

J.W. Radio telemetry will make nest and brood finding easier.

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TABLE 1. ESTIMATED NUMBER OF WOODCOCK SHOT IN EUROPEAN COUNTRIES

| COUNTRY | NO. SHOT | |
|---|---|---|
| British Isles | ? | |
| France | ca. 1.500.000 | (FADAT, pers. comm.) |
| Belgium | 15.000 | |
| Netherlands | 2.000-5.000 | (GLUTZ et al. 1977) |
| Luxembourg | 4.000 | (GLUTZ et al. 1977) |
| Spain and Portugal | 40.000 | |
| Italy | ? | |
| Greece | ? | |
| Yugoslavia | 8.500 | |
| Romania | ? | |
| Hungary | 800 | |
| U.S.S.R. | ca. 1.000.000 | |
| Czechoslovakia | 5.900 | |
| Poland | 13.000 | (W.S.R.G. Newsletter 1977) |
| B.R.D. | 25.000 | |
| D.D.R. | ? | |
| Austria | 5.000 | |
| Switzerland | 2.000 | |
| Denmark | 30.000 | |
| Sweden | 7.000 | (MARCSTROM 1976) |
| Norway | 10.000 | |
| Finland | 500 | |

TABLE 2. NO. OF WOODCOCK RINGED AND RECOVERED - EUROPEAN (VIZOZO 1974) AND AMERICAN (ARTMANN 1975 and 1976)

| COUNTRY | RINGED | RECOVERED | RECOVERY RATE % | | FROM | TO |
|---|---|---|---|---|---|---|
| BRITISH ISLES | 6,088 | 485 | 8.0 | | 1909 | 1972 |
| SWEDEN | 1,079 | 145 | 13.5 | ) | 1911 | 1971 |
| NORWAY | 331 | 35 | 10.6 | ) 12.9 | 1914 | 1971 |
| DENMARK | 249 | 44 | 17.7 | ) | 1891 | 1972 |
| FINLAND | 879 | 103 | 11.7 | ) | 1919 | 1971 |
| U.S.S.R. | 284 | ? | ? | | ? | 1954 |
| POLAND | 70-80 | 1 | - | | | |
| NETHERLANDS | 690 | 127 | 18.4 | | 1911 | 1970 |
| BELGIUM | 155+ | 39 | 25.2(?) | | 1929 | 1973 |
| FRANCE | 66 | 19 | 28.8 | | 1955 | 1970 |
| GERMANY | 549 | 60 | 10.9 | | 1909 | 1973 |
| SWITZERLAND | 121 | 13 | 10.8 | | 1911 | 1971 |
| EUROPE (except U.S.S.R. and Poland) | 10,207 | 1,070 | 10.5 | | | |
| ATLANTIC POPULATION | 24,371 | 1,924 | 7.9 | | | |
| CENTRAL POPULATION | 33,062 | 1.267 | 3.8 | | 1960-1975 | |
| NORTH AMERICA | 57,433 | 3,191 | 5.6 | | | |
| | | | 9.4 | | (Ringing data up to 1972, Recovery data up to 1975) | |

TABLE 3. EUROPEAN WOODCOCK POPULATION LIFE CHART.

dx = no. of recovered birds, divided by age.
lx = no. of those woodcock still alive at the beginning of the year, in relation to the total no. of birds recovered, as the original size of the population.
m = dx/lx·100 Mortality rate.
n = 1/m

| Age (1 August – 31 July = 1 year) | Finland and Baltic States I | | | Sweden and Norway II | | | England and Scotland III | | |
|---|---|---|---|---|---|---|---|---|---|
| | dx | lx | m(%) | dx | lx | m(%) | dx | lx | m(%) |
| 1 | 73 | 101 | 72 | 104 | 154 | 67 | 129 | 239 | 54 |
| 2 | 15 | 28 ) | | 30 | 50 ) | | 47 | 110 ) | |
| 3 | 7 | 13 ) | | 9 | 20 ) | | 25 | 63 ) | |
| 4 | 2 | 6 ) | 54 | 4 | 11 ) | | 15 | 38 ) | |
| 5 | 3 | 4 ) | | 3 | 7 ) | 52 | 9 | 23 ) | |
| 6 | 1 | 1 ) | | 2 | 4 ) | | 6 | 14 ) | |
| 7 | | | | 1 | 2 ) | | 2 | 8 ) | 39 |
| 8 | | | | | 1 ) | | 1 | 6 ) | |
| 9 | | | | 1 | 1 ) | | 1 | 5 ) | |
| 10 | | | | | | | | 4 ) | |
| 11 | | | | | | | 1 | 4 ) | |
| 12 | | | | | | | 2 | 3 ) | |
| 13 | | | | | | | 1 | 1 ) | |
| m ø | | | ø 61 | | | ø 62 | | | ø 46 |
| N | 101 | 153 | | 154 | 250 | | 239 | 513 | |
| n. | | 1.8 | | | 1.9 | | | 2.5 | |

## WINTERING WOODCOCK STUDIES IN CORNWALL: PETER BICKFORD-SMITH

My principal interest is in woodcock shooting in the southwest of England, but a realisation of the lack of knowledge of this crepuscular species led me to take an interest in its ecology. The following work was carried out in the winter of 1978/79 in co-operation with Dr. Graham Hirons.

Our primary aim was to discover why migratory woodcock favour the south-west tip of England. (It was difficult to know precisely how many were involved as there are no compulsory game returns. Figures from the National Game Census organised by the Game Conservancy and based entirely on voluntary information were interesting but incomplete as there were but 38 returns from western England compared to 107 from East Anglia alone).

Our secondary aim was to discover whether the birds were sedentary or transient, over what area they ranged and their feeding habits.

Our tertiary aim was to discover the origin of the birds wintering in Cornwall. (There have been only six recoveries of foreign woodcock in Cornwall since 1912. I think it is therefore safe to assume that our birds are coming from an area where little ringing is carried out, perhaps the Baltic States of Estonia, Latvia and Lithuania.)

Out study area in south west England was on the largest pena penninsula in Europe. This land mass, jutting out into the sea, must be attractive to migrating woodcock. The agriculture is predominantly stock-farming with many pasture fields. There is a small amount of woodland in sheltered valleys and a lot of scrubland with willow, alder, gorse, and rhododendron, where most of the birds are found and also heathland, with Juncus, Molinia and a scattering of heather and gorse.

Twenty-one birds were caught and ringed and of these, five were fitted with radio transmitters, giving a total of 114 transmitter days between January 16th and February 16th. The birds were sedentary, remaining very loyal to their diurnal coverts and nocturnal feeding grounds, so much so, that 'Monica' was recorded in one particular bush on 27 days, and on 7 nights in the

same place on the feeding grounds. All five birds flew to and from their feeding grounds within a 50 to 70 minute period after sunset and a 20 to 30 minute period before sunrise, precise timing and the amount of activity depending on weather, particularly cloud conditions. On reaching the pasture fields there was always immediate activity for about 40 minutes while the birds fed. This was confirmed by shooting a bird, 70 minutes after sunset (about ten minutes after reaching the field), which was still feeding, and, on collection, there were earthworms in its beak and throat. Two birds shot 20 minutes later had finished feeding and were roosting (we found that birds invariably roosted facing into the wind, sheltered either by a tussock of grass or a hollow in the ground) and their stomachs were greatly distended but there was no food in the proventriculus. Birds shot later in the night had full but undistended stomachs, which led us to consider that they were roosting to digest.

In all cases birds chose pasture fields as their feeding grounds. These were invariably old pastures with tussocks of cocksfoot grass. Two of the best fields had stock in them and it was quite common to find birds within ten metres of grazing animals.

Hard weather disturbed the birds and they were restless throughout the night. At such times they flew out to feed earlier and by day could often be found in ditches where there was unfrozen ground but there was no proof of diurnal feeding. There was no evidence of territoriality as birds were often flushed in twos and threes on the feeding grounds.

Future work will include disturbance experiments to record the bird's reactions to being flushed, more radio-telemetry investigations into feeding habits and timing, correlated with a larger shot sample and, most important, more trapping and ringing in an effort to discover the origin of the birds.

Conclusion: 1. Woodcock favour Cornwall for its frost free, invertebrate rich, pastures.

2. Wintering woodcock are not territorial.

3. Birds show an incredible fidelity to diurnal sites, contrary to the local traditional beliefs.

TABLE 1 DATA FOR FIVE BIRDS STUDIED WITH RADIO TRANSMITTERS

| CODE NAME | | MONICA | MARTIN | SIMON | ZENA | PLUS HARRIS |
|---|---|---|---|---|---|---|
| SEX | | ♀ | ♂ | ♂ | ♀ | ♂ |
| DATE CAUGHT | | 16.12.78 | 30.01.79 | 27.01.79 | 16.01.79 | 16.01.79 |
| NOTES | | - | RETRAP | - | - | - |
| STUDY PERIOD | FROM | 16.01.79 | 30.01.79 | 30.01.79 | 17.01.79 | 17.01.79 |
| | TO | 16.02.79 | 16.02.79 | 16.02.79 | 07.02.79 | 14.02.79 |
| NO. OF DAYS | | 31 | 17 | 17 | 21 | 28 |
| DATE LOST | | 26.02.79 | 10.03.79 | 26.02.79 | 07.02.79 | 14.02.79 |
| REASON LOST | | Battery failed | Migrated | Migrated | Predated | Harness failed |
| NO OBSERVATIONS | DIURNAL | 31 | 12 | 11 | 15 | 15 |
| | NOCTURNAL | 29 | 10 | 7 | 15 | 17 |
| DISTANCE TRAVELLED | GREATEST | 221 m. | 483 m. | 116 m. | 1014 m. | 262 m. |
| | SHORTEST | 30 m. | 91 m. | 102 m. | 181 m. | 48 m. |
| FITTED WITH BEACON LIGHT | | NO | YES | YES | NO | NO |

## SELECTION OF HABITAT AND RODING BEHAVIOUR OF WOODCOCK IN FINLAND: LENNART SAARI

Systematic studies of the selection of habitat and roding behaviour of the woodcock were carried out on an island in the southwestern Finnish archipelago (60°17'N 21°56'E) in 1977-78 by Eero Perttunen and the present author. Less regular observations have been made in the area since 1966.

The total land area of the island is 1555 ha. of which deciduous forests comprise 24.4 ha.

The habitat from which woodcock were flushed has been recorded from 1973-78. Fifty-two observations were made in 1973-76, 60 in 1977 and 86 in 1978 totalling 198 observations in all.

The observations from 1976-78 can be summarised as follows:

| Month | Deciduous Forest | Mixed Forest | Coniferous Damp | Coniferous Dry | Marshland | Fields | Meadows | Others | N. |
|---|---|---|---|---|---|---|---|---|---|
| Mar-Apr | 26 | 9 | 4 | 8 | - | 2 | 1 | 1 | 51 |
| May-June | 23 | 17 | 8 | 3 | 1 | 3 | 2 | 3 | 60 |
| July-Aug | 14 | 4 | 1 | 1 | - | - | 1 | 1 | 22 |
| Sept-Oct | 23 | 6 | 5 | - | - | - | 1 | 1 | 36 |
| Nov-Dec | 2 | 1 | 5 | - | - | - | - | - | 8 |
| Σ | 88 | 37 | 23 | 12 | 1 | 5 | 5 | 6 | 177 |
| % | 50 | 21 | 13 | 7 | 1 | 3 | 3 | 3 | |

The importance of the deciduous woods is clearly seen.

The distance at which woodcock flushed during 1978 varied with the season.

| Month | $\bar{x}$ | Range | N |
|---|---|---|---|
| Mar-Apr | 17 m. | 2-30 m. | 25 |
| May-June | 12 m. | 2-30 m. | 30 |
| July-Aug | 14 m. | 7-17 m. | 4 |
| Sept-Oct | 8 m. | 1-16 m. | 24 |
| Nov-Dec | 7 m. | 6- 8 m. | 3 |

On rough estimate there were 57 roding males in the study area in 1977 and 55 in 1978.

Roding intensity was observed from 1972 to 1978. From 1972 - 76 roding observations were made on 166 days totalling 786 sightings, in 1977 on 80 days totalling 968 sightings and in 1978 on 58 days totalling 530 sightings.

The earliest roding observation dates from 31.03.1975 and the latest from 10.08.1972. In dry summers roding activity stops at the beginning of July but in wet ones it stops at the end of July or beginning of August. After mid-May roding begins regularly before sunset, peaking some minutes after it. At midnight and sunrise roding activity is much less.

Literature:

Perttunen, Eero (1979): /The migration, breeding biology and hunting of the Woodcock (Scolopax rusticola) in Finland/ Finnish only, unpublished thesis, University of Helsinki, 87 pp.

Discussion:

B.S. The deciduous woodland appears very important for woodcock. Is this habitat in any danger?

L.S. Yes, most of the deciduous woods have been removed and this particular wood is due to be cut down also.

B.S. Is there any possibility of making representations to the forestry authorities to save some deciduous woodland?

L.S. Perhaps, but it would have to be done very tactfully.

B.S. Could the shorter distances at which birds flush in autumn be related to a reluctance to fly while in wing moult.

V.M. To test the validity of counts of roding males as an index of the population, why not try to test this and other indices by removing all the roding males.

## A REPORT ON THE WOODCOCK INVESTIGATIONS IN HESSE AND RHINELAND-PALATINATE, (FEDERAL REPUBLIC OF GERMANY): WERNER KEIL

In co-operation with the forestry administration of Hesse and Rhineland-Palatinate investigations were initiated into the following:

1. The influence of spring hunting on the population of migrating woodcock in the uplands of the two regions.
2. Recording the migration and breeding biotopes in selected forestry districts.
3. A study of the population dynamics during the breeding season.
4. The influence of forestry practice on the migration and breeding biotopes.
5. The development of possible methods for protection of migration and breeding biotopes in the uplands (Woodcock Biotope Management).

In connection with the research programme two special studies were carried out by the University of Giessen, concerning gut contents of shot birds and the food availability in the migration areas. The proposed analysis of pesticide levels in woodcock could not be carried out as the costs were prohibitive (each analysis would cost about DM 250,—).

During the first two years we discovered that it was not possible to carry out the complete programme within three years. Other research programmes had to be carried out and therefore our personal capacity was overcharged.

The forest districts in which the research is carried out were selected on the basis of two criteria:

1. Topographical situation in the uplands.
2. Bags for the last 20 hunting seasons.

In Hesse we selected six, and in Rhineland-Palatinate ten forest districts, for the research programmes. Besides these 16 areas, a private forest administration joined the scheme.

The foresters were instructed to send dead woodcock to our institute together with details of shooting (location, time, weather conditions, behaviour of the birds, number of birds observed, etc.). Altogether we received, during 1975 to 1978, from four hunting seasons, 200 woodcock. From

the birds we took the following data: weight, body length, wing span, wing length, upper mandible length, lower mandible length, tail length and tarsus length. We also examined the ectoparasites. After this the birds were refrigerated for further analysis.

Meanwhile birds from the 1975 and 1976 hunting seasons were analysed. It was found that there were 23.3% females and 76.7% males (ten females and 33 males). Of the females, 60% (six birds) were killed in April. In the 1976 season there were 18.6% females and 81.4% males (13 females and 57 males). One bird was not examined (destroyed by shot).

The number of females in the spring hunting season, given in literature is much lowerthan our results (6.7% Bettmann; Kalchreuter).

The average weight of the males was 297.5 g (1975 - 284. 0g: 1976 - 304.5g). The females were an average of 320.6 g. (1975 - 311.4 g.: 1976 - 327.6 g.). The maximum weight of a male was 329.2 g. in 1975 and the minimum was 231.9 g. in the same year (variation 97.3 g.). Among the females the maximum weight was 371.0 g. and the minimum 240.5 g., both in 1975 (variation 131.4 g.).

In 1976 the following weights were found:

males: maximum 354.0 g., minimum 225.5 g., variation 128.5 g.

females:maximum 370.5 g., minimum 275.0 g., variation 95.5 g.

The ovaries from woodcock, shot in April, were advanced in growth. We observed the same result in testes growth. Therefore we concluded that during the hunting season in April many birds were killed from the local breeding population. The analysis of woodcock from 1977 and 1978 may prove this view. From the records we found that where a hunter shot two birds at one time (called a 'Doublette') one was a male and the other a female.

Using forestry records we recorded the type of trees present, their age and density, the analysis of the soil, and the hydrological conditions. We have not yet completed our analysis of the records but even so we are able to say that the typical migration biotope has characteristic points. We have to look after the age of the treestand, the presence of small brooks or wet

areas, some old trees between the younger ones etc.

The investigation programme had its greatest difficulties in recording and analysing the breeding population in the forest districts. We gave the foresters record forms to be filled in after woodcock observations. But the success was very low. The behaviour of the birds during the breeding season gave the foresters little chance to observe them. For this reason we were unable to estimate the breeding population, its dynamics or habitat requirements.

The final reason for our investigations is the support of a self-sustaining woodcock population in the uplands of the Federal Republic of Germany. We hope to develop models for woodcock management. The woodcock is in our opinion an 'indicator-bird species' for forests in Central Europe. The woodcock is also a species on the 'Red List', but without any knowledge of the real density of the species. For all these reasons we need better and more detailed information about the woodcock. We hope to make more progress on the subject after finishing our programme.

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Discussion:

B.S. Is the 'Red List' you mention the IUCN Red List of endangered species?

W.K. No. It is a German Red List.

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## WOODCOCK REPRODUCTIVE ACTIVITY IN FEBRUARY IN IRELAND: BRIAN STRONACH

An investigation to measure Woodcock's February reproductive activity was undertaken between 1972 and 1977.

One thousand woodcock were shot in February, they were sexed, aged and their gonads were measured and extracted.

Two methods of measuring breeding activity were used -

(1) multiplying the length and the breadth of the testes giving the breeding activity index (B.A.I.)

(2) sectioning the testes and recording the stage of spermatogenesis.

The females showed no activity and only 4 of the males were fully active, showing bunches of active sperm. At the end of February there was an increase in the number of birds showing higher stages of spermatogenesis.

Birds during this month were not considered reproductively active.

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Discussion:

B.S. Can birds with large, well developed testes, migrate?

J.F. Yes. Such birds have been shot in Denmark on migration.

H.K. Similarly in Germany.

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## (POPULATION GENETICS OF THE WOODCOCK: JOHN ROCHFORD

There is a considerable degree of interest, in Ireland, in the proportion of our native breeding woodcock in the wintering (hunted) population, as opposed to migrant birds of British or Scandinavian origin. A sample of birds from Scandinavian and Irish breeding stocks, together with a large sample of the Irish wintering population are being examined electrophoretically in an attempt to distinguish distinct breeding populations. If successful it should then be possible to separate the components of the wintering population. Variations of 21 enzymes have been examined and work is now concentrating on seven which give indication of working well.

In conjunction with this work, ringing recovery data for all of western Europe is being reviewed).

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# WINTERING SITE FIDELITY OF WOODCOCK SCOLOPAX RUSTICOLA - A PROGRESS REPORT:

JOHN WILSON

## Introduction

The woodcock's period of winter residence can be determined for many European countries. There remains, however, a paucity of information on the species actual distribution, abundance and behaviour during these periods of residence. A few reliable records support the assumption that the same winter quarters are constantly visited but "winter quarters" is not specifically defined, i.e. whether the term is applied at a local, regional or national level. In North America a similar situation prevails with regard to Philohela minor.

This report summarises a preliminary analysis of (1) retrap data obtained at four ringing sites over a period of four winters (one site for five winters) and (2) the results from the initial application of radio-telemetry at one of these sites.

## Winter Trapping

(a) Trapping Methods -

Mist nets and drop-traps are used to catch and retrap woodcock. The ringing sites are well roaded, planted, coniferous woodland areas not exceeding 300 ha. in size. The mist-netting technique has been described in W.S.R.G. Newsletter No. 2: 20 - 21. The drop-trap, described by Bub (1972), is set singly or in groups of two to five in openings close to but behind the first row of trees at the woodland edge, i.e. at road-sides, edges of paths, ride-lines and turntables.

(b) Results -

The main influxes of woodcock occurred between 9th November (1975/76) and 26th November (1978/79) although many earlier dates of arrival are mentioned. These birds are present in the country until late February or early March. They may be supplemented by further influxes during the course of the winter period if there are severe weather conditions in Britain and Europe.

The numbers of woodcock ringed and retrapped, including multiple retraps,

during the winter periods (Nov. to Mar.) 1974/75 to 1978/79 are summarised in Table 1. Variations which occur in the winter totals of ringed birds reflect changes in annual abundance as well as changes in the habitat brought about by forest operations, namely thinning and pruning. A total of 420 ringed woodcock yielded 72 individual recaptures (17.1% retrap rate) or 94 retraps altogether if multiple retraps are included. Single retraps were most numerous (88%) but some individuals have been retrapped four times over a period of three winters.

The distribution of all retraps in relation to each winter period's ringed total is shown in Table 2. (Individuals retrapped in more than one winter period are included). Forty-eight per cent of the retraps occurred within the same winter period of which 83% were retrapped within 20 days of initial capture. Retraps in subsequent winter periods decline from 37% in the second winter to 2% in the fourth winter.

A comparison of the month of ringing against the month of retrapping in subsequent winters (Table 3) shows that the month of retrapping is not influenced by the month of initial ringing. (The actual ratio of birds retrapped in the month of initial ringing to those recaptured in other months is 10:36 which is identical with the theoretical ratio of 9.2:36.8 (no significant difference). The same can be shown for each individual month of ringing but the sample sizes are too small to be statistically significant.

Inter-trap distances were computed for 63 retraps and are summarised in Table 4. The greatest distances between net sites ranged from 800 to 1200 m. (av. 1000 m.) in the four study areas while the average movement of retrapped birds was less than 100 m. (range 0 - 595 m.). Same winter retraps tend on average to be retrapped closer to the initial trap site than those retrapped in the second winter.

All recorded movements are well within the limits of possible intertrap movement.

(d) Discussion -

Comparative data on the wintering site fidelity of woodcock in Europe is not available though the major part of the hunting literature pertaining to Ireland and other countries supports the idea of constant movement in response to changing weather conditions. Recent winter ringing in France shows mainly a local pattern of distribution for retraps (same fields) and recoveries (<10 km) (see p.6 ). A breeding population in England is showing high breeding site fidelity amongst males. In North America a winter retrap rate of 2.1% was recorded for Philohela minor.

Trapping operations, mostly confined to roads, ride-lines and paths do not cover all alighting points within the study areas, e.g. gaps in the canopy through which birds can alight or the woodland perimeter which usually adjoins agricultural land. Even though the overall retrap rate is high the question must be posed as to how many additional ringed birds return without being retrapped?

Woodcock are retrappable within the same winter period and over a number of winter periods in areas less than 300 ha. in size. The month of ringing does not appear to influence the month of retrapping in subsequent winters suggesting that birds which return are available throughout the winter period. This, together with a tendency for birds to be retrapped close to the original ringing site, again either during the same or subsequent winter periods, suggests either a preference or selection for portions of the study area.

My interpretation of these data is that relatively undisturbed (i.e. not hunted) wintering woodcock populations are quite specific in their selection of diurnal habitat and will remain faithful to these small areas through a winter period or for successive winter periods. Many areas have an unlimited choice of landing sites, many of which cannot be worked by the techniques employed here, thus providing the opportunity for ringed birds to return unnoticed.

Future work will look at the selection of diurnal and nocturnal habitats and related movements of individually radio-tagged birds. The initial results from this aspect are presented below.

Radio-telemetry

(a) Methods -

Three woodcock mist-netted at dawn were equipped with 173 M. Hz. "woodcock" transmitters. An elastic harness is attached to the base of each transmitter and a small plastic foam pad glued over the harness attachment point and along the body of the transmitter. The transmitters are placed between the wings on the birds' backs and secured by looping the elastic harness around and across the breast and knotting it.

The woodcock were released on average 60 m. from their capture sites and flew 20 to 90 m. along a forest road before alighting in adjacent woodland cover. The birds were monitored intensively for three to five days and thereafter for two to three hour intervals at dawn and dusk. Birds which did not attempt to fly by the second evening after release were flushed the following morning to observe whether the transmitter package was hampering flight. All movements were noted on maps of the study area.

(b) Habitat -

The eventual study area was delimited by the movements of the birds. The habitat composition of the area is outlined in Table 5.

(c) Results -

Details of the three radio-equipped woodcock are given in Table 6. Observations of the three radio-equipped birds in flight showed that after a 1 - 2 day adjustment period the transmitter packages did not appear to affect flight by comparison with untagged birds. During this adjustment period bird 2 remained relatively motionless within woodland cover for a 33 hour period before moving directly to a nocturnal field, while birds 1 and 3 each utilised a clearfelled area adjoining their diurnal cover ( 50 - 100 m. distant) for two consecutive nights directly after release.

The choices of diurnal and nocturnal locations for all these birds are illustrated in relation to the predominant habitat types in Figs. 1, (a), (b) and (c) The distances moved, i.e. crepuscular movements and movements related to diurnal

and nocturnal locations, are summarised in Table 7.

All birds almost exclusively used young (20 - 30 years), planted, coniferous woodland as diurnal cover, except bird 3 for a short period of six days when it was located, within a narrow streamside strip of scrub birch and alder with bramble, 2.3 km. from its release point. The bird remained close to this point for that entire period. This is in contrast to its subsequent movements where it adopted, in common with the other two birds, regular movements between the main woodland block and specific pasture fields.

Only occasionally were the birds monitored on winter barley fields. In two instances this was associated with the use of a spring and flush area on nights with sub-zero temperatures (-4°C to -6°C). Otherwise use of these extensive areas was restricted to brief stops on flights to and from diurnal cover.

The monitoring of the birds in diurnal cover prior to the dusk exodus or after arrival at dawn showed continuous but limited directional movement (<50 m) for periods up to an hour or for longer periods during intensively cold weather with snow ( -3°C to -4°C). Untagged birds were tracked in light snow within the woodland for distances of 60 to 70 metres. One bird flushed in the early afternoon had been probing systematically close to the leeward bases of successive coniferous trees. Nocturnal movements were similar in relation to the use of pasture fields except during severe frost or heavy snow when the birds tended to move about restlessly from field to field though always in the vicinity of their usual pasture fields. In most instances the following dawn showed that the birds had settled in or close to their favourite pasture fields. Bird 3 changed its nocturnal position twice moving 550 m. and 800 m. to fields it had already frequented. This bird also changed its diurnal location by 550 m. four days before it disappeared.

(d) Discussion -

The radio-telemetry programme was only applied to three birds and for a limited part (26th Jan. to 11th Mar.) of the winter period. Within this period the birds showed particular attachment to small areas of diurnal cover and bird

no. 3 exhibited a tendency to change both its nocturnal and diurnal locations on a local basis (up to 2.3 km.). Each bird used a particular group of pasture fields at night and they were to be found in specific parts of these field during frost and/or snow, i.e. at springs or in ditches. Only occasionally were the birds recorded on winter barley fields despite the fact that these fields comprised 37% of the study area. The coldest spell of weather since 1962 - 63 (freezing conditions with gale force winds depressed temperatures to between -10°C and -14°C at night) was recorded during the monitoring phase of birds 1 and 2 but did not alter their established crepuscular pattern of movements. Snow covered fields did induce frequent short flights in their vicinity for up to 3 or 4 hours after dusk which probably signify searches for suitable feeding locations.

The retrap and radio-telemetry data presented shows the woodcock as being extremely faithful both to areas of diurnal cover and groups of nocturnal fields. Local movements, whatever their cause or purpose, are also a feature of winter behaviour. This evidence is in direct contrast to the many accounts of the fickle behaviour of the species during the hunting season, particularly the many references to the influential effect of prevailing weather conditions.

Future work will involve monitoring a larger number of radio-tagged birds through the whole winter period and monitoring the effects of controlled disturbance on radio-tagged birds.

Reference: von Bub, H. (1972). Luscinia 41: 302 - 305.

DISCUSSION

H.K. How does site fidelity fit in with the theory of loop migration? Do the birds move about much in winter or remain sedentary?

J.W. Birds in this study area move little in winter.

I.C. From the findings I published in 1974 relating to the migration of Scandinavian woodcock I would question the loop migration theory. The fact that spring shooting is or has been carried out extensively in southern Europe on the supposed return route and not in the

British Isles could explain away the theory.

B.S. Concerning your work with radio-telemetry did cold weather alter the movement pattern?

J.W. To an extent, yes. Snow caused some disruption in choice of feeding ground. Some birds flew from field to field before finding somewhere to feed.

B.S. Therefore, perhaps the complete pattern might be different in a more normal season.

G.H. Not really. Last winter, which was more normal, in Whitwell the pattern was very similar.

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TABLE 1 . TOTAL NUMBERS OF WOODCOCK RINGED AND RETRAPPED FOR THE WINTER PERIODS 1974/75 to 1978/79

| WINTER PERIOD | TOTAL RINGED | RETRAPPED | | | | TOTALS |
|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | |
| 1974/75 | 17 | 2 | - | 1 | - | 3 (17.6%) |
| 1975/76 | 102 | 24 | 5 | - | 2 | 31 (30.4%) |
| 1976/77 | 134 | 14 | 5 | 1 | - | 20 (14.9%) |
| 1977/78 | 77 | 12 | 1 | - | - | 13 (16.9%) |
| 1978/79 | 90 | 4 | 1 | - | - | 5 ( 5.5%) |
| TOTALS | 420 | 56 | 12 | 2 | 2 | 72 (17.1%) |

TOTAL NUMBER OF INDIVIDUALS RETRAPPED = 72

TOTAL NUMBER OF RETRAPS = 94

TOTAL NUMBER OF SUCCESSFUL INDIVIDUAL CAPTURES = 514

TABLE 2 . THE SEASONAL OCCURRENCE OF ALL RETRAPS IN RELATION TO EACH WINTER PERIOD'S RINGED TOTAL FROM 1974/75 to 1978/79

| WINTER PERIOD | TOTAL RINGED | RETRAPS 1974/75 | 1975/76 | 1976/77 | 1977/78 | 1978/79 | TOTALS |
|---|---|---|---|---|---|---|---|
| 1974/75 | 17 | 1 | 1(1)▽ | 2 | - | - | 4(1) |
| 1975/76 | 102 | | 16(1) | 15(4) | 5 | 2 | 38(5) |
| 1976/77 | 134 | | | 10(1) | 9 | 4(2) | 23(3) |
| 1977/78 | 77 | | | | 8 | 6 | 14 |
| 1978/79 | 90 | | | | | 5(1) | 5(1) |
| TOTALS | 420 | 1 | 17(2) | 27(5) | 22 | 17(3) | 84(10) |

▽ Indicates birds retrapped twice in the same season

TABLE 3 . COMPARISON OF THE MONTH OF RINGING AGAINST THE MONTH OF RETRAPPING IN SUBSEQUENT WINTERS

| MONTH OF RINGING | TOTAL RINGED▽ | TOTALS RETRAPPED IN NOV. | DEC. | JAN. | FEB. | MAR. | TOTAL |
|---|---|---|---|---|---|---|---|
| NOVEMBER | 67 | 2 | 2 | 3(2) | 2(1) | - | 9(3) |
| DECEMBER | 58 | 1 | 3 | 2 | 3 | - | 9 |
| JANUARY | 67 | 2 | 3 | 1 | 2 | 1 | 9 |
| FEBRUARY | 99 | 7(1) | 2 | 2(1) | 2 | - | 13(2) |
| MARCH | 39 | 2 | - | 1 | 1 | 2 | 6 |
| TOTALS | 330 | 14(1) | 10 | 9(3) | 10(1) | 3 | 46(5) |

▽ Excluding 1978/79 monthly ringing totals.

TABLE 4. DISTANCES FROM ORIGINAL TRAP SITE FOR 63 WOODCOCK RE-TRAPPED AT FOUR STUDY AREAS

| | LOCATION | NO. OF RETRAPS▽ | RE-TRAP DISTANCES (m) AVERAGE | RANGE | SAME SEASON | SUBSEQUENT SEASONS 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|
| ALL RE-TRAPS | WICKLOW 1 | 26 | 98.5 | 0-383 | 71.3 (15)□ | 90.7 (8) | 200.0 (1) | 282.5 (2) |
| | MAYO 2 | 20 | 157.7 | 20-595 | 94.5 (10) | 221.0 (10) | - - | - |
| | MAYO 3 | 8 | 86.3 | 30-230 | 93.7 ( 4) | 85.0 ( 2) | 55.0 (1) | 90.0 (1) |
| | CLARE 4 | 9 | 39.4 | 0-190 | 26.3 ( 4) | 76.6 ( 3) | 10.0 (2) | - - |
| | TOTALS | 63 | 107.3 | 0-595 | 78.0 (33) | 145.0 (23) | 68.7 (4) | 218.3 (3) |
| ADULTS | WICKLOW 1 | 12 | 97.6 | 0-383 | 64.5 ( 6) | 80.2 ( 5) | - - | 383.0 (1) |
| | MAYO 2 | 10 | 171.0 | 30-595 | 112.5 ( 4) | 210.0 ( 6) | - - | - - |
| | MAYO 3 | 5 | 63.0 | 30-140 | 48.3 ( 3) | 85.0 ( 2) | - - | - - |
| | CLARE 4 | 5 | 63.0 | 0-190 | 52.5 ( 2) | 190.0 ( 1) | 10.0 (2) | - - |
| | TOTALS | 32 | 109.7 | 0-595 | 72.5 (15) | 144.3 (14) | 10.0 (2) | 383.0 (1) |
| IMMATURES | WICKLOW 1 | 14 | 99.3 | 15-200 | 75.8 ( 9) | 108.3 ( 3) | 200.0 (1) | 182.0 (1) |
| | MAYO 2 | 10 | 144.5 | 20-550 | 82.5 ( 6) | 237.5 ( 4) | - - | - - |
| | MAYO 3 | 3 | 141.7 | 55-230 | 280.0 ( 1) | - - | 55.0 (1) | 90.0 (1) |
| | CLARE 4 | 4 | 10.0 | 0-40 | 0 ( 2) | 20.0 ( 2) | - - | - - |
| | TOTALS | 31 | 106.4 | 0-550 | 81.0 (18) | 146.1 ( 9) | 85.0 (2) | 136.0 (2) |

▽INCLUDES MULTIPLE RE-TRAPS IN WHICH DISTANCES ARE MEASURED FROM ORIGINAL TRAP-SITE

□FIGURES IN BRACKETS INDICATE SAMPLE SIZE

TABLE 5 . COMPOSITION OF MAJOR HABITAT TYPES

| HABITAT TYPE | AREA (Ha.) | % of TOTAL AREA |
|---|---|---|
| Woodland | 230 | 29 |
| Clearfelled woodland | 32 | 4 |
| Winter Barley | 293 | 37 |
| Pasture | 237 | 30 |
| TOTALS | 792 | 100 |

TABLE 6 . DETAILS OF THREE RADIO-EQUIPPED WOODCOCK

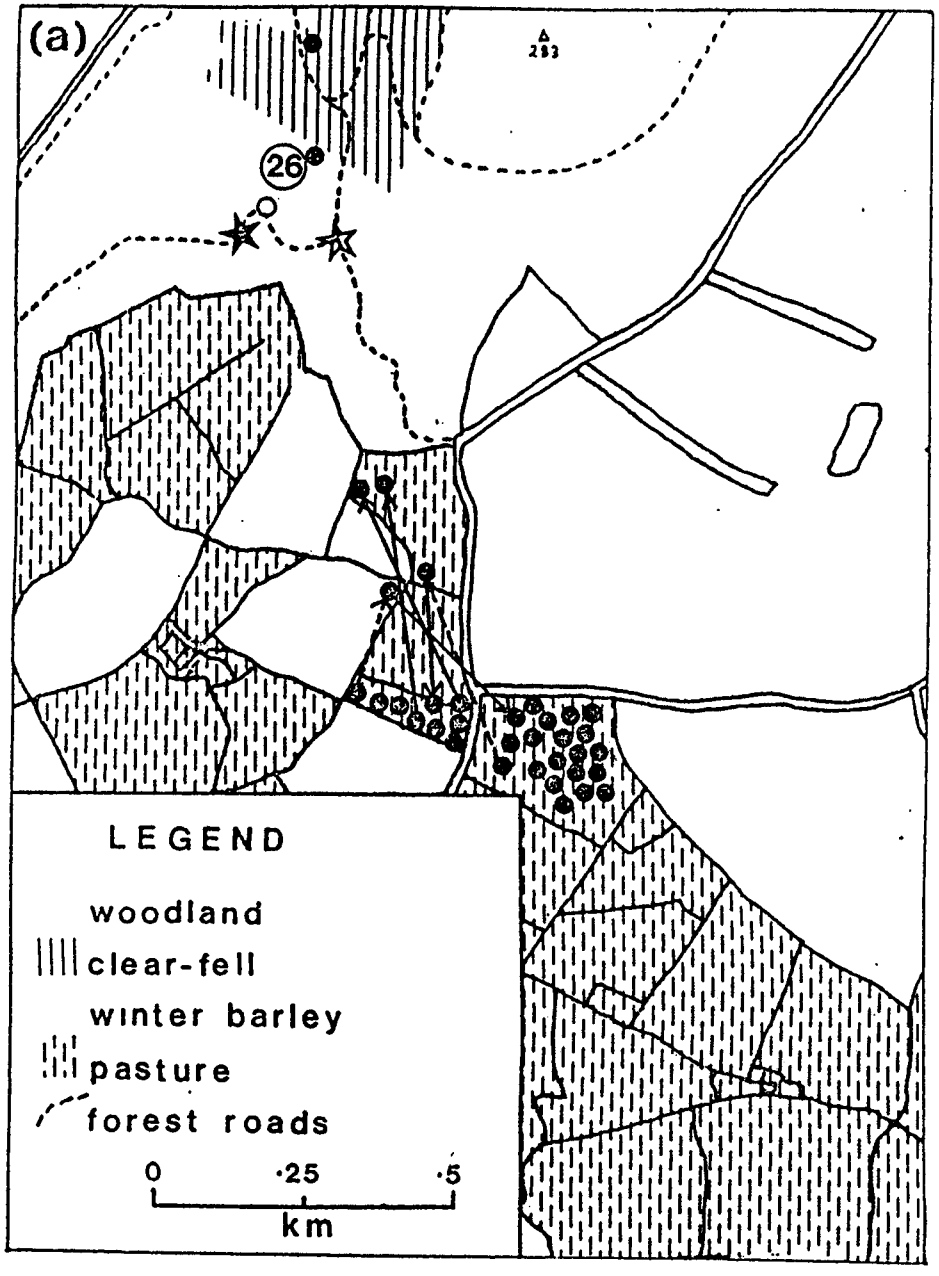
| Woodcock | Age | Wt. Grms. | Bill mm. | Tail mm. | Date of Release | Days Monitored |
|---|---|---|---|---|---|---|
| 1 | ? | 370 | 72 | 84 | 26-1-79 | 29▽ |
| 2 | Imm. | 340 | 74 | 78 | 30-1-79 | 17▽ |
| 3 | Ad. | 285 | 73 | 84 | 21-2-79 | 19□ |

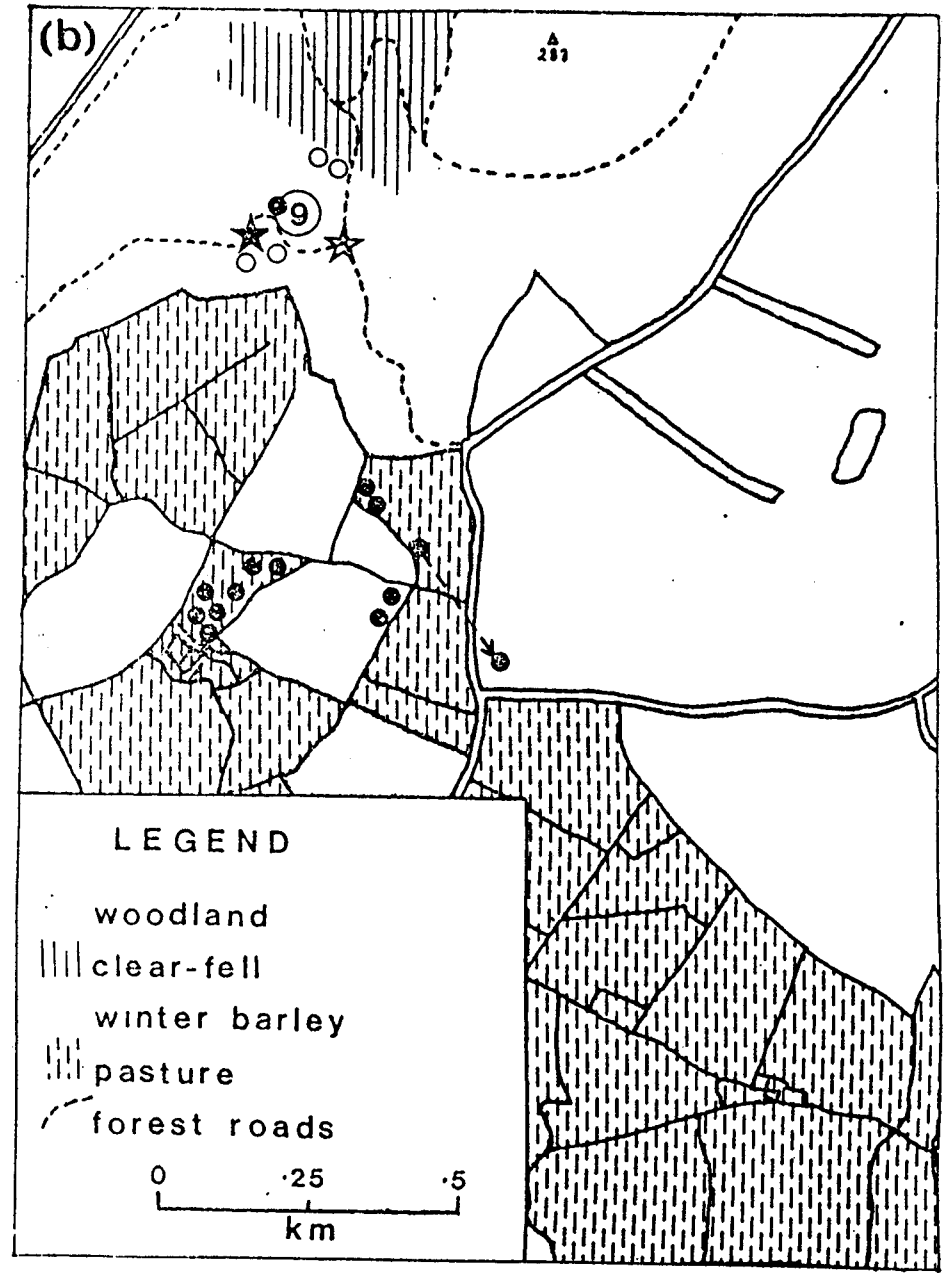
▽ battery failure

□ a retrapped bird (24-1-78) 15 m. from original trap site (Migrated?)

TABLE 7 . AVERAGE MOVEMENTS OF RADIO-TAGGED WOODCOCK

| | Crepuscular (m.) | Range (m.) | Diurnal (m.) | Nocturnal (m.) |
|---|---|---|---|---|
| Bird 1 | 1300 | 15-1550 | < 50 | 470 |
| Bird 2 | 750 | 650- 900 | < 50 | 50 |
| Bird 3 | 2254 | 0-3050 | < 50 | 880 |


(a)
26
LEGEND
woodland
clear-fell
winter barley
pasture
forest roads
0 ·25 ·5
km


(b)
9
LEGEND
woodland
clear-fell
winter barley
pasture
forest roads
0 ·25 ·5
km

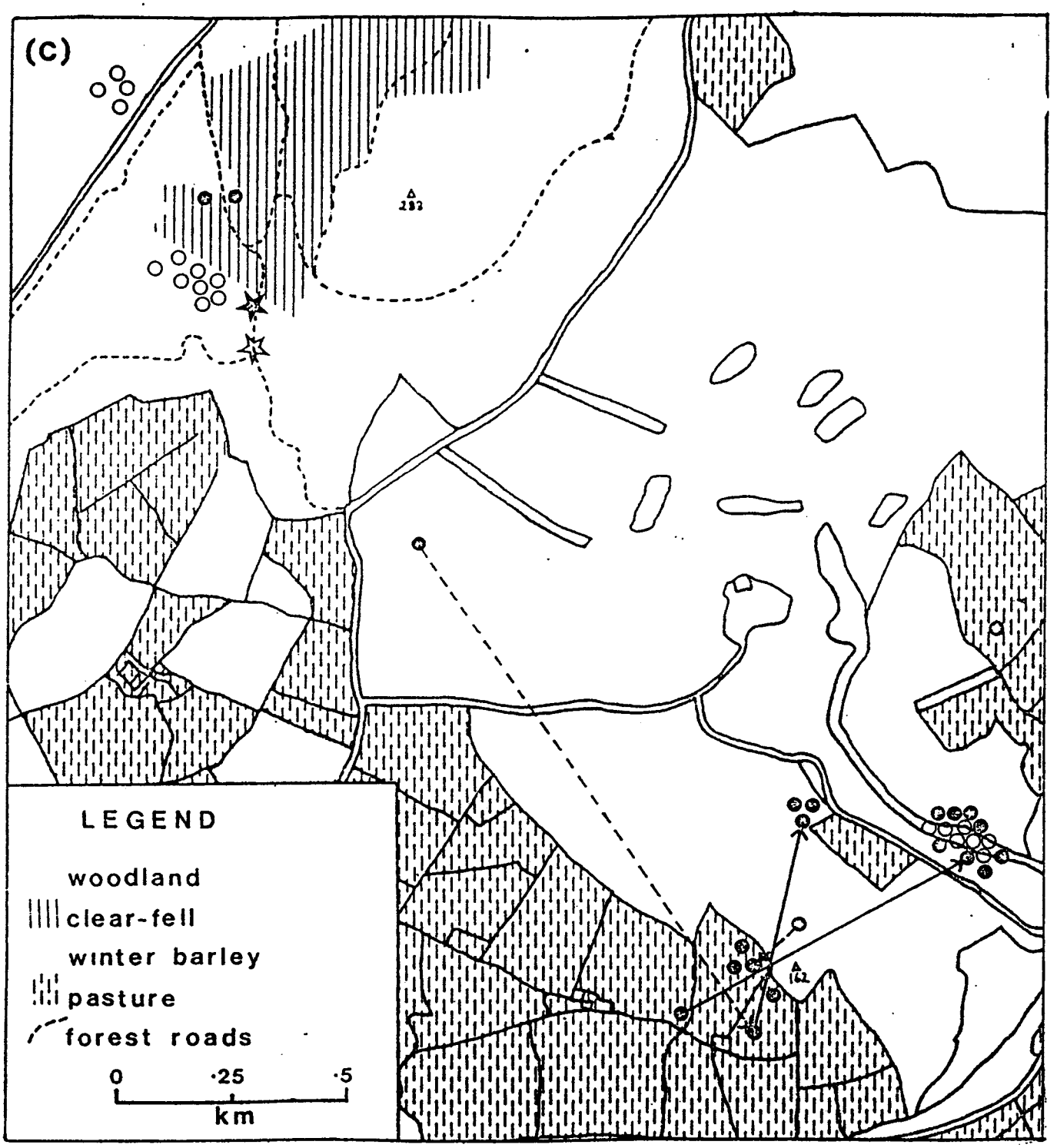



Fig. 1(a), (b) and (c). Diurnal ○ and nocturnal ● locations for woodcock number 1, 2 and 3 respectively, also showing capture locations ☆, release points ☆, monitored crepuscular movements at dawn and dusk---→ and un-monitored changes in nocturnal locations ⟶.

# DIET OF THE WOODCOCK SCOLOPAX RUSTICOLA IN FRANCE, STUDIED ON THE BASIS OF STOMACH CONTENT ANALYSIS:

Y. FERRAND, C. FADAT & J. MARTINEL, WOODCOCK SECTION O.N.C., PARIS, FRANCE. (Presented by C. Fadat).

## 1. Material and Methods.

The contents of 286 stomachs, collected from 1976 to 1978, were available, the majority of which (264) came from 5 main regions of France (see map Figure 1), and a sample of 63 stomachs collected in 1978/79 from a single forest (Freau) in Finistere (Brittany). The stomach contents had been preserved in alcohol. They were analysed by eye and with a binocular magnifying glass.

The date and place of origin was available for all the samples but the time of taking was only known for a portion (especially from Freau). The sex and age was also known for the majority of the birds.

## 2. Overall Results

### 2.1. Results in general -

The percentages given refer to the presence of the different items identified and not to their relative abundance. These are shown in Tables 1 and 2 for the five regions, excluding the west, which is the subject of a special study, without distinguishing the sex and age of the birds.

Figure 2 shows graphically the different regional variations and their percentages. It is seen notably that animal and plant material was present in 86% and 90% respectively of the stomachs which were not empty. Most of the food items were present in small numbers (1 - 2) but certain ones (Diptera larvae) were present in numbers from 10 to 30 and in 3 stomachs we found more than 50 Polygonum seeds.

Coleoptera were the principal items of animal material (40%) whereas lumbricids were present in a very small percentage (7%). The following important regional variations were noted:

- Coleoptera were at a maximum percentage in spring.
- Lumbricids were absent in the southwest - sandy soil predominates

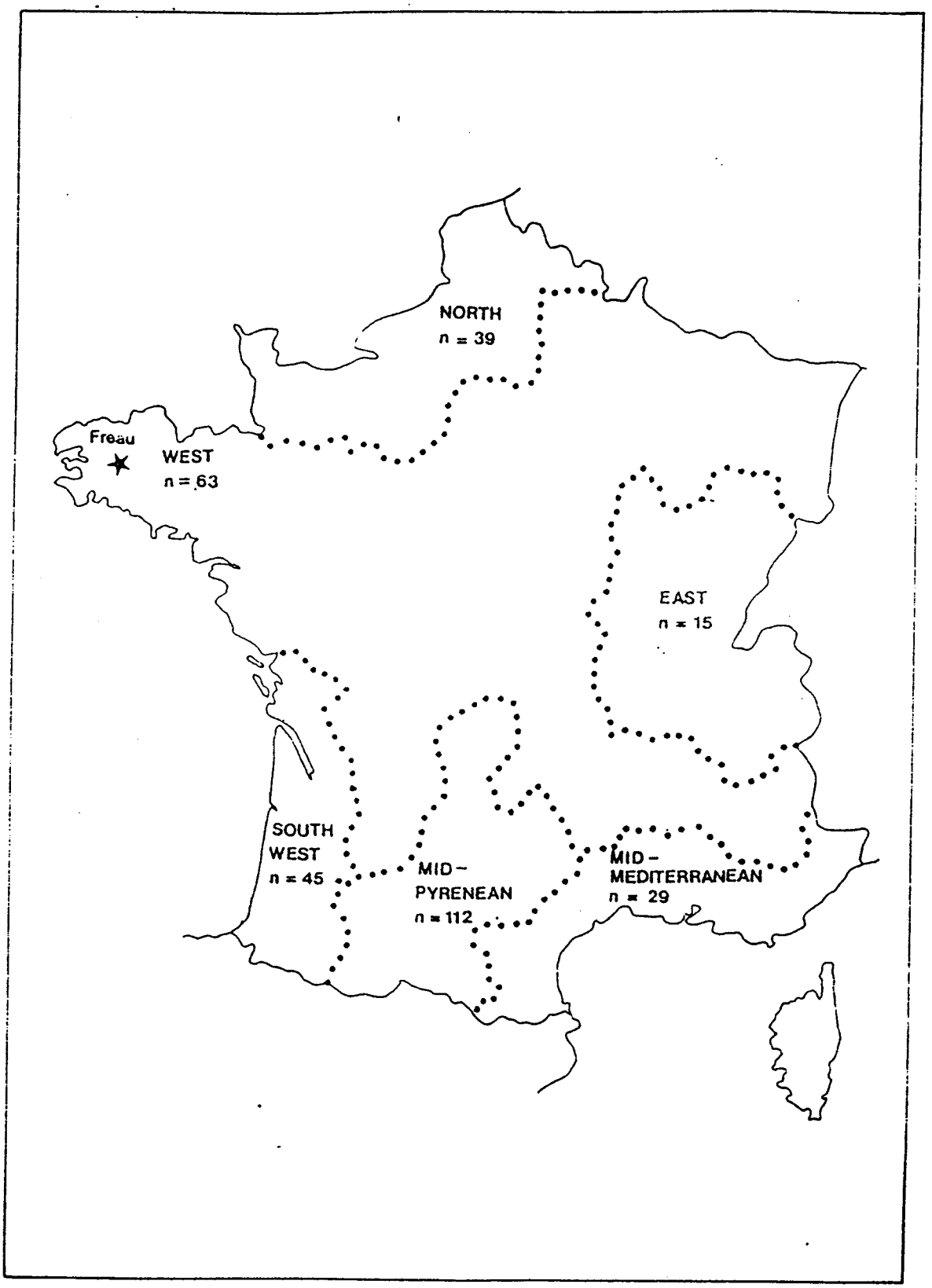



Fig 1. Map showing the principal regions of France from which samples were obtained for the stomach content analysis.

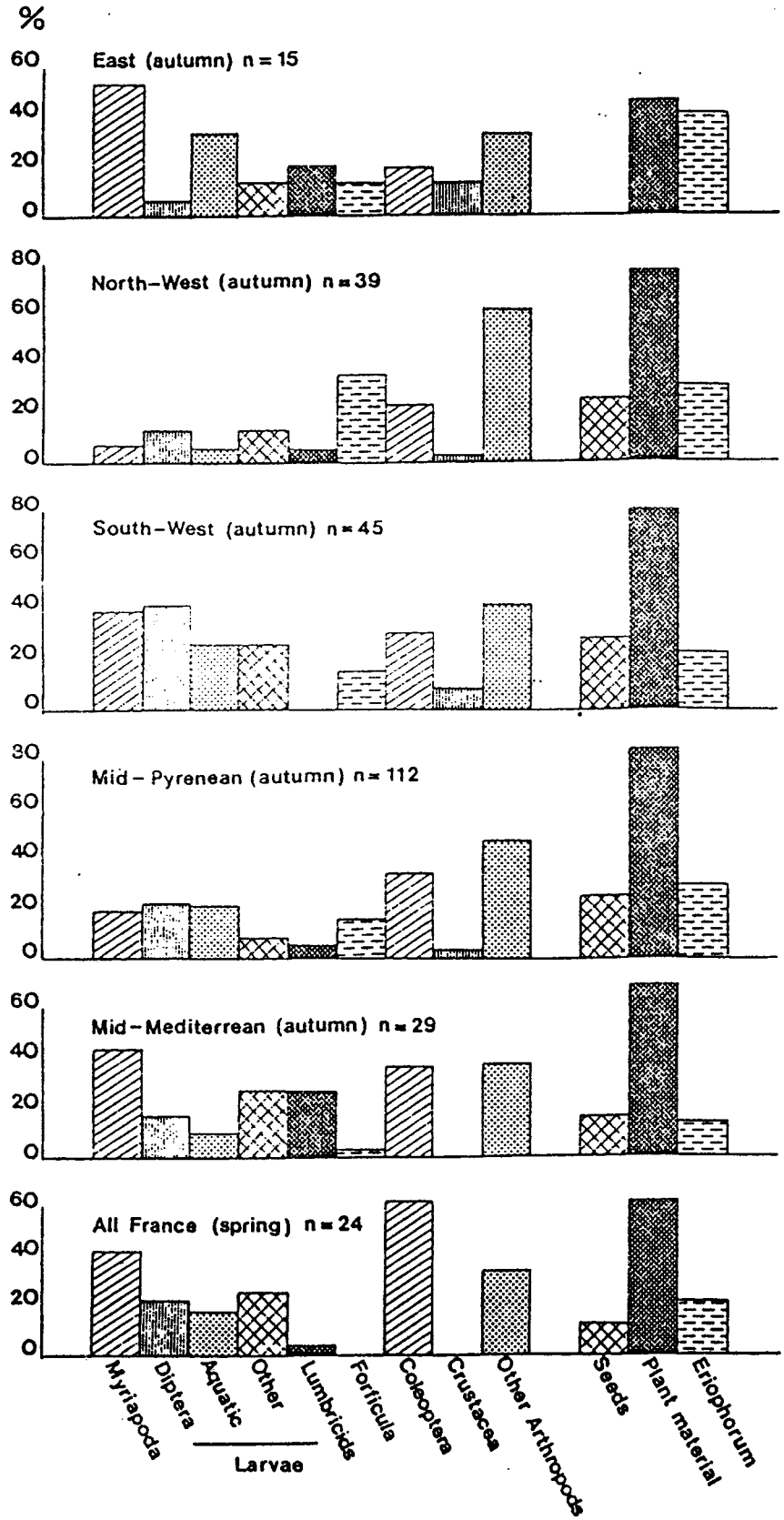



Fig 2. Analysis of the contents of woodcock stomachs from different regions of France.

explaining perhaps their absence in the soil - and are at their maximum presence in the mediterranean region despite its very dry climate.

- The large number of myriapoda in the east and their very small number in the northwest.
- The almost total absence of seed in the east.
- The very small percentage of forficula in the Mediterranean region.

2.2. Discussion.

In considering the importance of the percentages shown, the nature of the items must be considered, for example chitin and cellulose are less digestible than larvae and lumbricids and are therefore, perhaps, recorded excessively.

In addition, the stomach contents were not all obtained within 12 hours of death and digestion may have continued.

Having said this, some of the regional differences observed are less significant.

The case of lumbricids is particularly interesting, and their relative scarcity (except in the Mediterranean region) contradicts the accepted belief that they are the preferred food of the woodcock. Only in a few rare cases were they the number one item present, and never more than 50%.

In spring and sometimes in autumn in certain regions, sight appears to be the essential means of detecting prey, whereas in autumn the sense organs of the bill are used. The Coleoptera in fact are on the surface of the soil rather than at depth and are undoubtedly seen rather than sensed, unlike the larvae and myriapoda.

2.3. Conclusions from the general results.

Thus, the importance can be seen, of plant items which should not be considered as survival food but as permanent constituents of the woodcock's diet.

In relation to animal prey items, the lumbricids and crustacea (isopoda) are among the less well represented groups.

The regional variations of the other food items show that the woodcock is capable of adapting to their relative abundance.

## 3. Results specifically relating to the west.

### 3.1. Purpose

The large number of stomachs from the mid Pyrenean region (n = 112) allowed us to look for differences between the diets of males and females. In 1976-77, in fact a great variation of the sex ratio was observed throughout this region, the males being more numerous in the north of the region and the females in the south at the same time. But not one difference appeared from the analysis of stomach contents. This is not to say that they do not exist as regional variations emerged, the north being more mountainous and colder than the south (which is lower in altitude and warmer).

We therefore thought it necessary to reduce the geographical variation to a minimum and to compare the stomach contents of males and females killed in the same forest, noting carefully the location and time of their death, to see if there are differences in the choice of ecological niches.

It was possible to do this during the 1978-79 hunting season in an established forest in Brittany (Freau-Finistere) for which a study agreement was signed between the National Forestry Office and the National Hunting Office, which made provision for a detailed examination of the hunting scene by representatives of the ONC. One of us, Y. Ferrand, was present during the entire hunting season and carried out all the work and analysis which follows.

### 3.2. Results.

The samples were taken and examined as for the other regions. The percentages indicate the presence of a given item, out of the total number of stomachs examined.

Table 3 and Figure 3 give the results for all males and females and show that the main trophic items, found in the other regions, are present here with Coleoptera and Forficula dominating. However, the separation of males and females gives the following results:

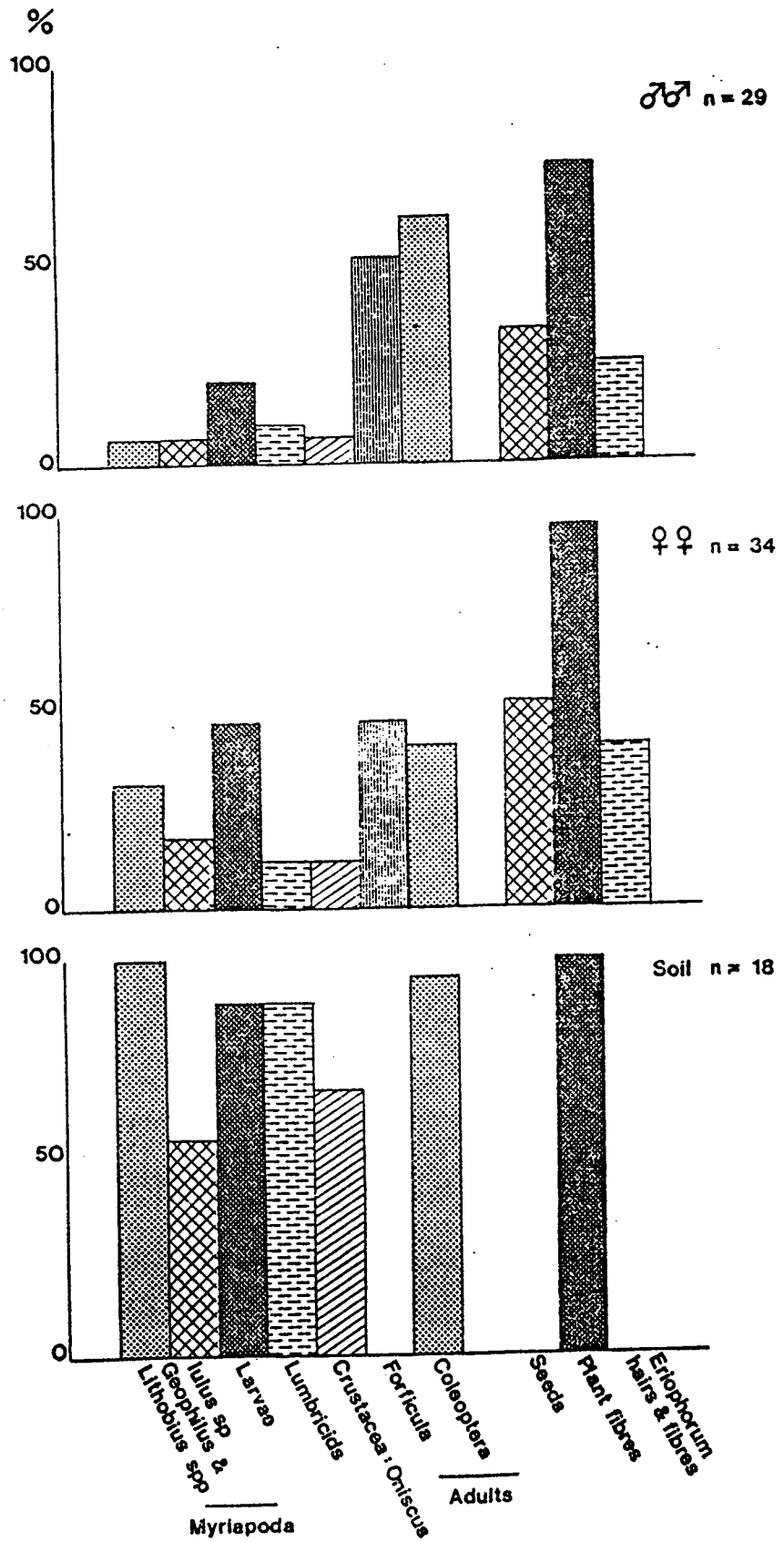



Fig. 3. Analysis of the contents of woodcock stomachs and available prey from the Forest of Freau.

| | Coleoptera + Forficula | all larvae | myriapoda▽ |
|---|---|---|---|
| ♀♀ | 65% | 58% | 29% |
| ♂♂ | 96% | 21% | 7% |

The differences, especially in the numbers of larvae and myriapoda contained in the stomachs of males and females, are significant ($X^2$=4.79 and 6.48 respectively).

Likewise, concerning the plant material, the following differences can be observed:

| | detatched plant fibres | seeds□ | root fibres and fluff intermixed |
|---|---|---|---|
| ♀♀ | 41% | 52% | 52% |
| ♂♂ | 25% | 33% | 75% |

Therefore, the stomachs of females contain more larvae, myriapoda, seeds and plant fibres, than those of the males.

The analysis of 18 soil samples, approximately one meter square by 10 cm. deep, taken from the principal sites at which the birds were shot, gave the results shown in Table 4 and Figure 3. They show that the trophic elements, found in the stomachs are therefore abundant, except for the forficula which are totally absent. One can ask if their mobility prevented their capture during sampling or whether they had been eaten elsewhere than where the birds were shot. In fact, the forficula especially are found in the stomachs in an advanced state of digestion (only the cerques are present) which leads us to suppose that they were perhaps eaten over a long period, for instance, during the night, since the birds were chiefly killed in the morning (66%).

3.3. Ecology of males and females.

The geographical locations where the birds were shot allow us to see that the females are chiefly found in the bottoms or on the slopes of the valley while the males are mainly on the plateaus, between the valleys.

| | Valleys | Plateaus |
|---|---|---|
| ♂♂ | | 23 |
| ♀♀ | | 9 |

The differences in these numbers are significant ($X^2 = 16.74$, ddl = 1).

We find again what has been shown before on a larger scale in different regions of France (Ch. Fadat 1975 - 77), i.e. the males are more numerous than the females at altitude.

Also we find that the males are not present at the same times as the females, the variations of their percentages are as follows:

| | | | |
|---|---|---|---|
| November | 1978 | 8% | (n = 12) |
| December | 1978 | 59% | (n = 27) |
| January | 1979 | 50% | (n = 14) |
| February | 1979 | 56% | (n = 10) |

The females are more numerous at the beginning of the season, as has been found elsewhere, in different regions of France.

4. General Conclusion

Apart from the facts described in the partial conclusions, which we will not repeat here, these results underline the essential differences, as shown at Freau, between the diets of males and females and in the same way that differences exist between the choice of diurnal haunts, i.e. the females eat more larvae and myriapoda than the males and are found in the valleys and on the slopes of valleys which are damper than the plateaus where the males are found in greater numbers and during a later period.

It is possible that the drought of the summer and early autumn 1978, very noticeable throughout France and especially at Freau, increased the differences in location of the soil fauna, and caused the observed differences in diet to be shown. In fact, during a period of normal rainfall, it is logical to suppose that larvae are distributed in a more regular fashion through the soil even on the plateaus, thus allowing the females to feed almost everywhere. This will be verified in future years.

However, it appears that the females have a greater dietary requirement than the males - a greater necessity for proteins - and that their bill, statistically longer than that of the males is an adaptation for feeding on larvae and myriapoda, which are found deeper than the coleoptera and forficula, for example.

But the remarks concerning the forficula, perhaps eaten at night, show us that other food items are possibly taken during that period and therefore a part of the woodcock's feeding behaviour is perhaps unrecorded. The studies using radio-telemetry will doubtlessly fill this gap.

Finally, so few adults (20%) were shot at Freau that it has not been possible to compare the diets of immatures and adults.

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▽ Geophilus spp. and Lithobius spp. together.

□ The principal plant families of which seeds were found in the stomachs:

| | |
|---|---|
| Ranunculaceae (Ranunculus) | Cyperaceae (Carex) |
| Chenopodiaceae (Atriplex) | Juncaceae (Juncus) |
| Polygonaceae (Polygonum, Rumex) | Cruciferae (Abiaria) |
| Papilionaceae (Jesse) | Rosaceae (Rubus) |
| Euphorbiaceae (Euphorbia) | |

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TABLE 1 OVERALL RESULTS OF THE FOOD OF THE WOODCOCK (OCTOBER TO MARCH) BASED ON THE ANALYSIS OF THE CONTENTS OF 286 STOMACHS TAKEN IN VARIOUS REGIONS OF FRANCE IN 1976, 77 AND 78.

| FOOD ITEM | | NO. OF STOMACHS IN WHICH PRESENT | NO. OF EXAMPLES | % PRESENCE N/286 | |
|---|---|---|---|---|---|
| Coleoptera | (adults | 65 | 91 | 23 ) | |
| | (larvae of Elateridae | 40 | 62 | 14 ) | 40% |
| | ( Dytiscus | 7 | 8 | 2.4) | |
| Myriapoda | (Chilopoda | 51 | 70 | 18 ) | 28% |
| | (Diplopoda | 29 | 37 + X | 10 ) | |
| Diptera | (Larvae | 53 | 132 | 18.5) | 23% |
| | (Adults | 13 | 38 | 4.5) | |
| Aquatic larvae | | 51 | 74 + X | | 18% |
| Orthoptera | (Forficula | 42 | 60 | 15 ) | 16% |
| | (Others | 3 | 6 | 1 ) | |
| Other larvae | | 46 | 53 + X | | 16% |
| Lumbricids | | 20 | 22 + X | | 7% |
| Crustacea: Isopoda | | 11 | 12 | | 4% |
| Herniptera | | 6 | 6 | | 2% |
| Aracnida | | 3 | 3 | | 1% |
| Chitinous debris | | 135 | X | | 47% |
| Seeds | (Polygonaceae | 23 | 190 | 8 ) | |
| | (Junaceae | 18 | X | 6 ) | |
| | (Cruciferea | 11 | 13 | 4 ) | 23% |
| | (Papillionaceae | 6 | 6 | 2 ) | |
| | (Others | 8 | 42 | 3 ) | |
| Plant Fibres | | 32 | X | | 11% |
| Rootlets | | 18 | X | | 6% |
| Fruit Stones | | 6 | 6 | | 2% |
| Fine plant remains | | 217 | X | | 75% |
| Eriphorum seed heads | | 78 | X | | 28% |

TABLE 2. PERCENTAGE OF FOOD COMPONENTS IN THE STOMACH CONTENTS OF WOODCOCK, DIVIDED BY REGION AND SEASON FROM A TOTAL SAMPLE OF 264.

| PERIOD | OCTOBER TO JANUARY | | | | | MARCH |
|---|---|---|---|---|---|---|
| REGION | English Channel Coast (1) | East (2) | Mediterranean Coast (3) | Central Pyrenees (4) | South-west (5) | All Regions |
| No. of stomachs in each region (rough figures) | 39 | 15 | 29 | 112 | 45 | 24 |
| Coleoptera (adults / larvae of Elateridae / Dytiscus) | 23 / - / - → 23% | 13 / 6 / - → 19% | 10 / 24 / 3 → 37% | 19 / 13 / 2 → 34% | 26 / 20 / 4 → 30% | 37 / 25 / - → 62% |
| Myriapoda (Chilopoda / Diplopoda) | - / 7 → 7% | 33 / 20 → 53% | 27 / 17 → 44% | 15 / 4 → 19% | 31 / 8 → 39% | 17 / 25 → 42% |
| Diptera (larvae / adults) | 13 / - → 13% | 6 / - → 6% | 7 / 10 → 17% | 16 / 6 → 22% | 40 / 2 → 42% | 17 / 4 → 21% |
| Aquatic larvae | 5% | 33% | 10% | 21% | 26% | 17% |
| Orthoptera (Forficula / Others) | 33 / 2 → 35% | 13 / - → 13% | 3 / - → 3% | 15 / 1 → 16% | 15 / - → 15% | - / - → -% |
| Other larvae | 13 | 13 | 27 | 8 | 26 | 25 |
| Lumbricids | 5 | 20 | 27 | 5 | - | 4 |
| Crustacea: Isopoda | 2 | 13 | - | 3 | 8 | - |
| Hemiptera | - | - | 3 | 1 | 6 | - |
| Aracnida | - | - | 3 | 1 | 2 | - |
| Chitinous debris | 61 | 33 | 38 | 47 | 42 | 33 |
| Seeds (Polygonaceae / Juncaceae / Cruciferae / Papilionaceae / Others) | 7 / - / - / - / 18 → 25% | - | 10 / - / - / - / 6 → 16% | 13 / - / - / 1 / 11 → 25% | 2 / - / - / 2 / 24 → 28% | - / - / - / - / 12 → 12% |
| Plant Fibres | 15 | 26 | 6 | 10 | 8 | - |
| Rootlets | 2 | 6 | 10 | 8 | 8 | 4 |
| Fruit Stones | - | - | - | 2 | - | 8 |
| Fine Plant Remains | 77 | 46 | 69 | 84 | 80 | 62 |
| Eriophorum seed heads | 30 | 40 | 14 | 29 | 22 | 21 |

Example: During the period of October to January the sample from the English Channel Coast is of 39 stomach contents. In these 39 stomach contents the percentage presence of-Coleoptera is 23%; that of Myriapoda 7% etc.

TABLE 3. PERCENTAGE PRESENCE OF FOOD ITEMS IN THE STOMACH CONTENTS OF WOODCOCK KILLED IN THE FOREST OF FREAU (FINISTERE) (n = 62 STOMACHS) FROM NOVEMBER 1978 to FEBRUARY 1979 INCLUSIVE. THE SEXES ARE NOT DISTINGUISHED IN THIS TABLE.

| FOOD ITEM | | NO. OF STOMACHS IN WHICH PRESENT | | % PRESENCE | |
|---|---|---|---|---|---|
| COLEOPTERA | (Carabidae | 7 | | 12% | |
| | (Staphylinidae | 4 | | 7% | |
| | (unidentified | 19 | | 32% | 60% |
| | (larvae of Elateridae | 4 | | 7% | |
| | ( Fenebrionidae | 3 | | 5% | 27% |
| | (unidentified larvae | 1 | | 2% | |
| MYRIAPODA | (Geophilus sp. | 3 | 12 | 25% | |
| | (Lithobius sp. | 4 | | | |
| | (Julus sp. | 3 | 15 | | |
| DIPTERA | (larvae of Phagionidae | 4 | | 7% | |
| | ( Tipulidae | 3 | | 5% | 20% |
| | ( Calliphoridae | 1 | | 2% | |
| | (unidentified larvae | 6 | | 10% | |
| ORTHOPTERA: Forficula | | 21 | | 36% | |
| : Lumbricidae | | 4 | | 7% | |
| Crustacea : Oniscus sp. | | 2 | | 3% | |
| NO ANIMAL MATERIAL | | 9 | | 15% | |
| COMBINED PLANT MATERIAL | | 56 | | 90% | |

TABLE 4. ANALYSIS OF 18 SOIL SAMPLES TAKEN FROM THE MAIN SITES AT WHICH THE WOODCOCK WERE SHOT

| COMPONENT OF SOIL FAUNA | NO OF SAMPLES IN WHICH PRESENT | % PRESENCE |
|---|---|---|
| Coleoptera (all spp.) | 17 | 94% |
| Myriapoda Geophilus sp. | 14 | 78% |
| Lithobius sp. | 15 | 83% |
| Julus sp. | 10 | 56% |
| Polydescus sp. | 2 | 11% |
| Glomeris sp. | 1 | 6% |
| Oniscus | 12 | 67% |
| Various larvae (mostly diptera) | 16 | 89% |
| Orthoptera: Forficula | 0 | 0 |
| Annelida: Lumbricidae | 16 | 89% |

## REQUESTS MADE TO THE I.W.R.B. WOODCOCK RESEARCH GROUP

We would like all members of the group, who examine wings, to note the two following characters:

1. The state of the greater (secondary) wing-covert moult (completed, not completed, or not begun).

   It is logical to suppose that birds which have not completed this moult (or not begun) in October and November, and a few in winter, have been born later than those which have completed it. Given that woodcock nesting in the Nordic countries do so later than those nesting in western or central Europe, one can assume that young with incomplete wing-covert moult are of Nordic rather than central European origin. There is here, perhaps, a method for identifying approximately the proportions of different populations, which winter in the countries of western Europe.

2. The length of the first (outermost) long primary, the feather being plucked out, straightened and flattened along a ruler (the measurement given to the nearest mm).

   In France, one finds a gradient of this measurement. In birds killed in the north and east, this feather is statistically longer than in those killed in the south-west and west.

From other areas, it would be desirable if sex and age-ratios were expressed as a percentage of males and immatures, so that their confidence intervals can be stated. Reports giving the ratio of males per female or immatures per adult do not allow this calculation to be made. It is most important to see if the observed differences in sex and age-ratios are significant or not.

## STUDIES IN MIGRATION AND MORTALITY OF COMMON SNIPE RINGED IN DENMARK: JORGEN FOG

### MIGRATION

Introduction:

Research into productivity, land use and management was carried out at Vejlerne in north-western Jutland, Denmark from 1967 to 1971 as part of the International Biological Programme. This paper discusses trapping and ringing of Common Snipe there. Times of trapping are compared with the occurrences of Snipe killed at lighthouses and with snipe ringed abroad and recovered in Denmark. Results are compared with recoveries of snipe ringed in eastern Denmark.

Material and Methods:

During the four-year period, 1968 to 1971, a total of 660 common snipe were ringed, comprising 649 during the months of July to November and 11 in April/May. All birds were fully fledged. By the end of 1977 a total of 64 snipe (9.7%) had been recovered. If retraps within the ringing area are excluded, the recovery figure is 45 (6.8%); of these 16 (2.4%) were recovered in Denmark and 29 (4.4%) abroad.

Periods of Trapping:

The distribution in time of the 649 snipe trapped and ringed during the summer and autumn 1968 - 71 is shown in Figure 1. Around August 20th, an increase in the number of trapped birds strongly suggests the arrival of snipe from elsewhere. The number killed at lighthouses throughout Denmark from 1886 to 1957 (Figure 2) suggests a limited migration from the beginning of August, and a considerable migratory activity from the last third of this month. The distribution in time of snipe ringed in Norway, Sweden and Finland and recovered in Denmark is shown in Figure 3. All of this suggests that the August catches at Vejlerne contain migratory birds. It has been shown that autumn migration of snipe over Heligoland commences in early August. Variations in the number of birds trapped throughout the season are due partly to changes in the water level with subsequent local movements, partly to waves of migration. Snipe

were trapped as late as November 23rd. It is a general impression that the last snipe leaves the Vejlerne area at the start of the first actual frosty weather. The number of snipe trapped during the spring (11) is too small to be of any help in evaluating the extent and timing of this migration. The jack snipe, Limnocryptes minimus, occurs as a common migrant. A total of 132 were trapped at Vejlerne during the study period.

Recoveries from Denmark:

Twenty-three snipe were retrapped within the study area, 20 during autumn and spring in the year of ringing, 2 after one year and 1 after two years. Two of the retraps were later recovered from Denmark and two from abroad. In the Vejlerne area, 12 of the ringed snipe were shot and another ring found, all during the year of ringing. Three were recovered elsewhere in Denmark.

Recoveries from abroad:

Twenty-nine snipe were recovered abroad. If the limited data obtained reflect the actual situation, the most important winter quarters for snipe ringed at Vejlerne are the British Isles, Northern and Western France, Northern Spain and Morocco. Two recoveries from Russia show that birds from Russia pass through the Vejlerne area. The general picture does not differ much from that which comprises recoveries of snipe ringed in eastern Denmark. It has previously been found that Scandinavian and northern European populations of snipe migrate towards west, west-south-west and south-west while those from eastern Europe migrate mainly to Italy. All our data appear to fall within the category of snipe from Scandinavia and northern Europe.

MORTALITY

Material:

Using recoveries until December 31st 1977 the adult mortality of common snipe is estimated and discussed. In the period 1949 to 1975 the Zoological Museum ringed 3688 snipe of which 306 (8.3%) were recovered. The Game Biology Station ringed 660 individuals during 1968 to 1971 of which 45 (6.8%) were recovered. Ninety per cent of the recoveries were of birds shot.

Estimation of Mortality:

In estimating the mean adult mortality only birds recovered as shot are included. The 146 snipe recovered during the year of ringing are omitted, as division into first year birds and older is impossible. In Table I the first age group includes those birds killed during the calendar year after ringing, the second age group the following year and so on. According to Haldane the survival is calculated to be $\hat{s} = 0.529 \pm 0.028$, and consequently the mean adult mortality is 47.1 ± 2.8%. A chi-square test was applied to check the hypothesis that mortality is independent of age, the mean annual survival being constant during the period 1949 to 1977. The estimate for $\hat{s}$ was used in calculating the expected frequencies and the fit to the observed frequencies was very good ($x^2 = 3.05$, p 70%).

Discussion of the Required Production:

With an annual adult mortality of about 50%, the population of adult birds on January 1st will thus comprise 50% individuals hatched in the previous breeding season, and 50% raised earlier, if a constant population is to be maintained. As the material appears to show that the mortality is the same in all age groups, it may be assumed that this age distribution is also applicable in the population at the beginning of the breeding season. The common snipe is mature at one year old. The mean clutch size was 3.89 in England with 2.2 young hatched per nest. There was little evidence for second clutches other than repeats. However, the actual production of young per nest must be higher, because of replaced nests. In the English material 41% of the clutches were lost. Assuming that 2 young hatch per replaced nest the total mean would be approximately 3 young per pair annually. This assumption allows for a mortality rate of 67% during the first 12 months if a balance is to be maintained between production and mortality in the population.

TABLE 1. RECOVERIES OF COMMON SNIPE DIVIDED INTO AGE-CLASSES.

| Age Class | No. Recovered | Age Class | No. Recovered |
|---|---|---|---|
| 1 | 84 | 8 | 0 |
| 2 | 41 | 9 | 0 |
| 3 | 21 | 10 | 0 |
| 4 | 13 | 11 | 0 |
| 5 | 2 | 12 | 2 |
| 6 | 4 | 13 | 0 |
| 7 | 2 | Total | 169 |

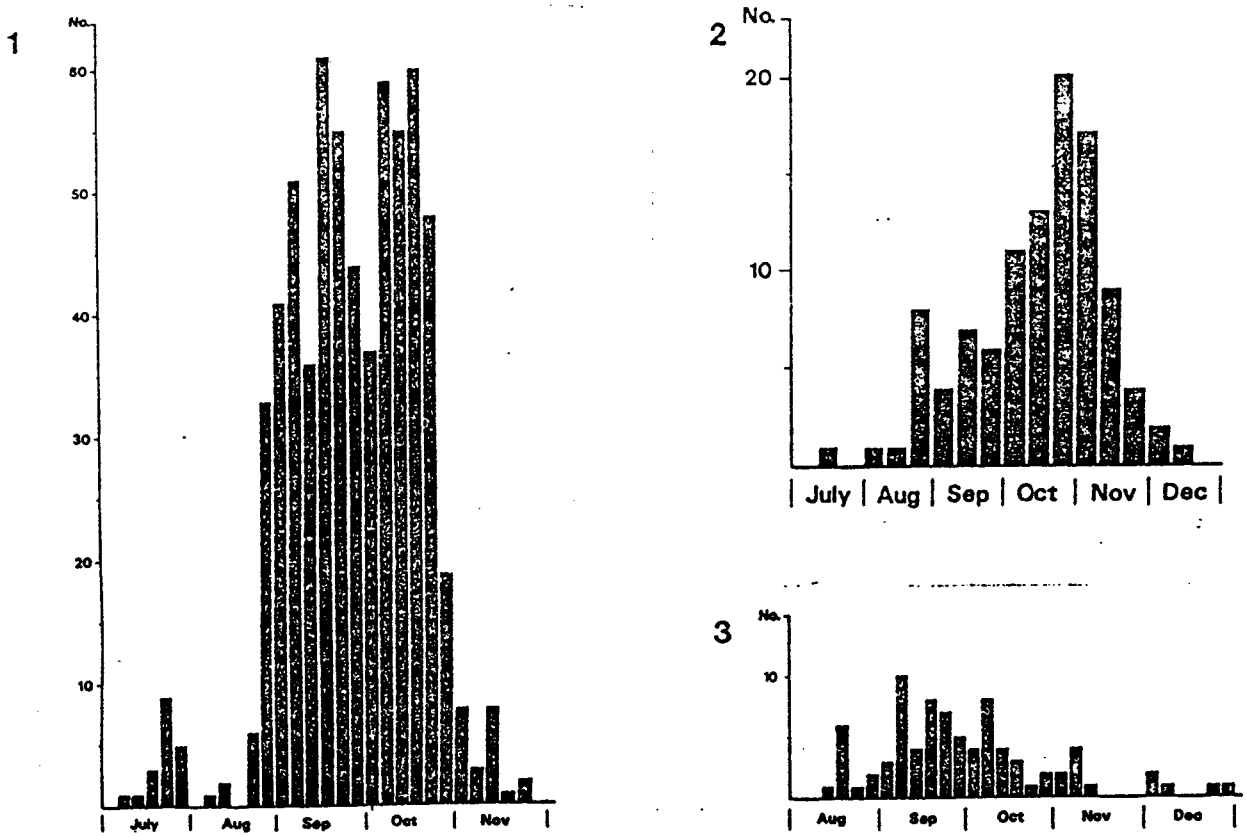


Fig. 1. The distribution in time of 649 Common Snipe trapped and ringed at Vejlerne 1968-71. Months are divided into 5-day periods.

Fig. 2. The distribution in time of Common Snipe killed at light-houses 1886-1957. Months are divided into 10-day periods.

Fig. 3. The recovery dates of 81 Common Snipe ringed in Finland(22), Sweden (54) and Norway (5), 1957-1976. Months are divided into 5-day periods.

## AN ECOLOGICAL STUDY OF THE COMMON SNIPE AT SEVENOAKS, KENT: JOHN SWIFT (SUMMARY OF CONCLUSIONS PRESENTED BY B. STRONACH)

The annual number of counts of snipe in Kent exceeding 100 individuals published in the Kent Bird Reports, have increased from 9 and 12 in the winters 1973/73 and 1973/74 respectively, to 23 and 25 in 1974/75 and 1975/76. This is thought to reflect an increase in the numbers of snipe migrating through Kent.

All snipe in Kent in autumn, winter and spring probably have continental origins and destinations.

The arrival of snipe at Sevenoaks is encouraged by North Easterly winds and their departure is hastened by frost.

The first snipe arrive at Sevenoaks in late July. Peak numbers occur during December, with an average of all December counts made at dusk on the Snipe Bog being 85.9 ± 30.3 (1 standard deviation). A maximum count of 160 occurred in December 1977.

Numbers of snipe decline gradually after December until late March when all have departed.

Dispersal from the Snipe Bog and Sand Bank during the day commences in November and becomes increasingly extensive as winter advances.

The efficiency of mistnetting did not decrease as the study progressed although the numbers of snipe caught decreased for other reasons.

The percentage annual loss of rings (mortality of snipe) was 47.7 ± 9.16% (95% Conf. limit) which is not significantly different from Boyd's (1962) figure of 48.3 ± 5.65 (S.E.).

The fidelity of individual snipe to Sevenoaks as a migration stopping-place or wintering haunt is extremely high, although the time of arrival may vary.

A gradual increase in body weight occurs in autumn and early winter. Average weights increase from 102.72 ± 2.66 gms. (95% Conf. limit) in September to 115.71 ± 1.47 gms. in December. Weights decrease to 108.00 ± 2.83 gms. in March.

The diet of snipe included relatively large proportions of small oligochaetes and coleoptera during the period of autumn migration. In later months Lumbricids

and Tipulids predominated.

The emetic, potassium antimony tartrate, used in the diet study may have killed some of the snipe.

Simple surveys of favoured foods demonstrate that a choice of feeding is open to snipe. They can feed on either small and abundant or large and scarce invertebrates. A simple calculation shows that in the former case a snipe would take 1.8 hours per day to satisfy its basal metabolic requirement, whereas in the latter instance 5 hours is required.

Observations of behaviour show that most (90%) snipe were feeding at dawn, only 64% were feeding at mid-day and 76.1% just before dusk.

Feeding took place mainly after dusk in winter and during the day in the autumn migration period.

The snipe adopted different strategies in order to obtain sufficient food at different times, namely autumn migration (August - October), early winter (November - mid-December), late winter (mid-December - mid-February) and spring migration (mid-February to March), although sudden cold weather caused short term tactical responses and/or loss of physical condition.

The availability of sites in the Study Area at different times is closely linked to the behaviour strategy adopted. Altering these sites artificially in the manner described was probably the reason that Sevenoaks has supported an increasing number of snipe since 1972.

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DISCUSSION:

J.F. Are there one or two broods per year. Tuck and others consider that late clutches are replacements or those of immature birds. What does J.S. feel?

B.S. J.S. does not know. Breeding studies at Martinmere became impossible due to a high level of desertion after trapping of females. Are second or resit clutches smaller?

J.F. It is possible there are second clutches but as yet there is no proof.

L.S. In Finland, snipe normally nest in May. Nests found in August with

fewer (maybe 2) eggs could be replacements or those of immature birds but I would consider some to be genuine second clutches.

B.S. In western Ireland snipe may nest anytime from April to July.

J.F. Even if second broods were produced occasionally they would not be very significant in population or mortality studies.

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SEX DETERMINATION IN SNIPE: BRIAN STRONACH

For a study of population dynamics it is almost essential to have a non-destructive method of sex determination. Discriminant analysis to differentiate the sexes was conducted on data from 550 snipe using the following variables: weight, length and width of outer tail feather, lengths of central tail feather, bill and wing. Two time periods were used, September to November and December to January, because while adult and immature can easily be distinguished in the former period this is not always possible in the latter due to the wing covert moult. A combination of the first four variables was the most successful and gave probabilities of misclassification from .15 to .24. In the study of snipe populations these results can be successfully applied.

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ECOLOGICAL STUDIES OF SNIPE IN WESTERN IRELAND: NIEL STRONACH (presented by B. Stronach)

B. Stronach reported that an ecological study of the common snipe had been carried out in western Ireland in the autumn and winter of 1978 by N. Stronach. A section of this work, concerning the availability of prey species in selected feeding areas, has been written up and submitted as a thesis to the University of Dublin. It was shown that Diptera (larvae and pupae) and oligochaetes were the most abundant and bulky prey available and cow pats held greater densities of prey items than soil. The remainder of the work concerned food habits and an investigation of gut morphology.

In addition the mechanosensory apparatus of the bills of both snipe and woodcock was studied using the scanning electron microscope.

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# CLOSING SESSION

## DISCUSSION ON FUTURE RESEARCH ACTIVITIES

1. Census Methods.

It was agreed that a strong effort should be made to produce a reliable census technique for woodcock.

L.S. stated that June Transects had been used in Finland to census many bird species including woodcock but, especially in the latter case, they did not give a very good estimate of population size. Attempts are now being made to survey night-active birds but the details are unknown. This would give an index of relative density.

B.S. pointed out that different areas and workers faced different problems. Whereas in Finland there was only a breeding population to be censused, in Cornwall where P.B-S. was working there was only a wintering population while other areas held both.

P.B-S. stated that counts from driven coverts were not satisfactory as all birds were not flushing. Likewise bag records were unsatisfactory as an index of abundance.

G.H. said that there are two measures of the population, an index of abundance and the absolute density.

B.S. held that an index was most important and easiest to obtain but that we should have some way of relating such an index to the absolute density.

L.S. agreed that an index, such as that obtained from a Line Transect or Roding Male Count, similar to the "Singing Male Count" used in North America, was better than nothing.

V.M. agreed and believed it would be possible, in a defined study area such as the island on which L.S. was working, to relate indices such as the Line Transect, Roding Male Count and others, to the absolute density by first calculating the indices and then shooting-out all the birds.

G.H. agreed that this might work for a breeding population but questioned

its feasibility for a wintering one.

J.W. said that he would try to do the same at Towerhill, his study area in the west of Ireland, in winter. He considered, however, it necessary to know how mobile or sedentary wintering woodcock are. For instance would there be rapid replacement of birds shot-out.

Both G.H. and P.B-S felt that there would be, as there was continuous movement throughout the winter in Cornwall.

J.W. asked whether this was local or long-distance movement. Were birds simply aggregating in the best areas in cold weather.

V.M. then asked if, in a transect of a forest area, the number of birds flushed was in proportion to those present, and secondly whether it was possible to kill all birds in an area of 100 to 200 ha?

In answer to the second question J.W. said that about 35% of birds flushed were shot depending on the distance at which they flushed which in turn depends on weather conditions and P.B-S. felt it would be impossible to shoot all the birds in such an area as all would not flush.

G.H. felt that a winter census might succeed in giving an index but that earlier methods, such as good Bag Returns, might also work.

B.S. requested the members, J.W., G.H., L.S. and C.F. in particular, to continue in their efforts to get a measure of local abundance.

2. Wing Collections.

G.H. questioned the value of wing collection and asked what, if anything, could be learned from them.

J.W. felt that they provided some indication of recruitment into the population.

H.K. agreed but believed that they were of value only if correlated with weather conditions, as in the United States, and that each country collecting wings should endeavour to correlate their data with climatic data.

V.M. considered it better to concentrate on areas for which good climatic, migrational and other data was available rather than collect wings from a larger

area. All current data has been analysed locally but he felt it should be gathered together and reviewed internationally.

B.S. requested H.K. to become international co-ordinator of the wing-collection scheme and H.K. agreed.

FILM

V.M. proposed that the group should consider the production of a film on the woodcock in Europe. He already has some footage on Roding and Breeding behaviour and felt such a film would be good publicity. There was considerable interest and several people agreed to help produce material and finance. Suggestions for material and a photographer should be sent to V.M. who will look into the matter further and report back to the group.

NEWSLETTER

It was agreed that the Newsletter was an important and useful publication and should continue to be published annually. J.W. will produce the next issue in late 1979.

NEW CO-ORDINATOR

B.S. tendered his resignation as group co-ordinator. He proposed I.C. as the new co-ordinator, because of his considerable work on the woodcock and the central location of Denmark.

I.C. regretted that, because of pressure of work, he could not accept the position.

B.S. then proposed H.K. and after consideration H.K. agreed to become the new group co-ordinator.

NEXT MEETING OF THE GROUP

After considerable discussion it was agreed that the next meeting of the group should be held in September 1981 somewhere in the British Isles, either at Fordingbridge, the Game Conservancy headquarters in Great Britain, or Avondale in Ireland. If necessary, the meeting can be brought forward to September, 1980. Only active workers should be asked to attend and the southern European countries should be encouraged to send delegates.

NORDIC WILDLIFE COMMITTEE

I.C. reported that a meeting of Nordic delegates had taken place during the conference and decided the following:

1. To continue the wing collection in all member countries for the 1979/80 hunting season.

2. That, in a study area somewhere in Finland, an experiment should be carried out to relate the 'Roding Male Count' index with absolute density by removing all the birds.

3. That a Radio Telemetry programme should be set up in Sweden or Finland to investigate roding behaviour in large forests and compare it with that in small woods in the British Isles.

4. To try to catch roding males using decoys. Denmark will provide all nets.

CLOSING REMARKS.

B.S. felt that the first meeting of the group had been very useful and informative. He thanked H.K. for taking over as group co-ordinator and wished him well in the future. In closing he thanked I.C. and his assistants for handling all the arrangements for the conference.

The meeting then adjourned.