

DANISH REVIEW OF GAME BIOLOGY Vol. 11 no. 1

Studies in Migration  
and Mortality of Common Snipe (*Gallinago gallinago*)  
Ringed in Denmark

by  
JØRGEN FOG

Med et dansk resumé:  
Trækforhold og dødelighed for dobbeltbekkasiner (*Gallinago gallinago*)  
ringmærket i Danmark

Резюме на русском языке.  
Условия перелета и смертность дупелей, *Gallinago gallinago*,  
помеченных кольцами в Дании

ISSN 0374 - 7344

COMMUNICATION NO. 156 FROM VILDTBIOLOGISK STATION  
Vildtbiologisk Station, Kalø, 8410 Rønde, Denmark  
1978

# DANISH REVIEW OF GAME BIOLOGY

The journal is published and distributed by the

Game Biology Station, Kalø, 8410 Rønde, Denmark

Each paper is issued separately and when a number of papers have appeared (comprising ca. 200 pages) these will be collected in a volume together with a table of contents. The price will be set separately for each volume. For volume 5-10 it is 50 Danish Kroner per volume.

Editor: Ib Clausager. – Assistant editor: Else-Marie Nielsen. – Russian summaries: Axel Mortensen. – Linguistic consultant: Dr. Robert Russel. – Printed by Clemens-trykkeriet, Århus.

## Vol. 1.

- Part 1. Holger Madsen: The species of *Capillaria* parasitic in the digestive tract of Danish gallinaceous and anatine game birds. pp. 1-112. 1945.
- Part 2. Marie Hammer: Investigations on the feeding-habits of the House-sparrow (*Passer domesticus*) and the Tree-sparrow (*Passer montanus*). pp. 1-59. 1948. M. Christian-  
sen and Holger Madsen: *Eimeria bucephalae* n. sp. (Coccidia) pathogenic in Golden-  
eye (*Bucephala clangula* L.) in Denmark. pp. 61-73. 1948.
- Part 3. Holger Madsen: Studies on species of *Heterakis* (Nematodes) in birds. pp. 1-43. 1950.  
F. Jensenius Madsen and R. Spärck: On the feeding habits of the Southern Cormo-  
rant (*Phalacrocorax carbo sinensis* Shaw) in Denmark. pp. 45-76. 1950.

## Vol. 2.

- Part 1. Holger Madsen: A study on the Nematodes of Danish gallinaceous game birds. pp. 1-126. 1952.
- Part 2. Johs. Andersen: Analysis of a Danish Roe-deer population (*Capreolus capreolus* (L.)) based upon the extermination of the total stock. pp. 127-155. 1953.
- Part 3. F. Jensenius Madsen: On the food habits of the diving ducks in Denmark. pp. 157-266. 1954.

## Vol. 3.

- Part 1. Johs. Andersen: The food of the Danish Badger (*Meles meles danicus* Degerbøl). pp. 1-76. 1954.
- Part 2. Carsten Pedersen: Cycles in Danish Vole populations. pp. 1-18. 1957.  
F. Jensenius Madsen: On the food habits of some fish-eating birds in Denmark. pp. 19-83. 1957.  
Johs. Andersen: Studies in Danish Hare-populations. I. Population fluctuations. pp. 85-131. 1957.
- Part 3. Third congress of the international union of game biologists. Transactions. pp. 1-166. 1958.  
Knud Paludan: Some results of marking experiments on Pheasants from a Danish estate (Kalø). pp. 167-181. 1958.  
Marie Hammer, M. Køie and R. Spärck: Investigations on the food of Partridges, Pheasants and Black Grouse in Denmark. pp. 183-208. 1958.

## Vol. 4.

- Part 1. Knud Paludan: Results of Pheasant markings in Denmark 1949-55. pp. 1-23. 1959.  
Knud Paludan: Partridge markings in Denmark. pp. 25-28. 1963.  
Mette Fog: Distribution and food of the Danish Rooks. pp. 61-110. 1963.
- Part 2. H. Strandgaard: The Danish bag record I. pp. 1-116. 1964.

*Continued cover page 3*

DANISH REVIEW OF GAME BIOLOGY Vol. 11 no. 1

Studies in Migration  
and Mortality of Common Snipe (*Gallinago gallinago*)  
Ringed in Denmark

by  
JØRGEN FOG

Med et dansk resumé:  
Trækforhold og dødelighed for dobbeltbekkasiner (*Gallinago gallinago*)  
ringmærket i Danmark

Резюме на русском языке.  
Условия перелета и смертность дупелей, *Gallinago gallinago*,  
помеченных кольцами в Дании

ISSN 0374 - 7344

COMMUNICATION NO. 156 FROM VILDTBIOLOGISK STATION  
Vildtbiologisk Station, Kalø, 8410 Rønde, Denmark  
1978

## CONTENTS

Migration .....	2
Introduction .....	2
Material and methods .....	3
Periods of trapping .....	3
Recoveries from Denmark .....	6
Recoveries from abroad .....	6
Mortality .....	9
Material .....	9
Estimation of mortality .....	9
Discussion of the required production .....	10
Dansk resumé .....	11
Резюме на русском языке .....	11
References .....	12

Author's address:  
Game Biology Station, Kalø,  
DK 8410 Rønde, Denmark

## Migration

### INTRODUCTION

The scientific reserve known as Vejlerne (57° 04' N, 09° 02' E) in north-western Jutland, Denmark, is a marshland of international importance as a breeding, moulting and resting area for waterfowl (Fog 1975). It is included in Project MAR (1962) and in the Danish list of wetlands in accordance with the Ramsar convention. Three study groups carried out research in the area concerning its productivity, land-use and management from 1967 till 1971 as part of the International Biological Programme, IBP, (MATHIESEN et al. 1969, MATHIESEN & FOG 1975).

This paper discusses the trapping and ringing of the Common Snipe (*Gallinago*

*gallinago*) in the area. 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 at localities in eastern Denmark by the Zoological Museum, Copenhagen.

Thanks are due to the owners of the area, in particular Mr. JØRGEN RASMUSSEN, and to the Nature Conservancy Council, for permission to work in Vejlerne. Mr. NIELS OTTO PREUSS is thanked for allowing the author to use unpublished data, as is Mr. TOMMY ASFERG for statistical aid.

MATERIAL AND METHODS

The Snipe is a common breeding bird in Vejlerne, but no population figures exist (FOG & KORTEGAARD 1973). It is numerous during migration, especially late summer and autumn. In the spring the area also plays an important role as a resting place, but far fewer birds occur than during the autumn.

During the 4-year period, 1968-1971, a total of 660 Common Snipe was ringed, comprising 649 during the months of July-November and 11 in April-May. All

birds were fully-fledged, and it was not possible to differentiate between local birds and migrants.

The majority of birds were trapped in types of the Clover-Leaf and the Lundy Wader traps, and a few in a duck-trap. By the end of 1977 a total of 64 Snipe (9.7%) had been recovered (Table 1). 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, 1968-1971, is shown in Fig. 1.

It is not to determine from these data whether the birds trapped in July and the first half of August are part of the local population, or whether migrants are beginning to occur. 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 1886-1957 (Fig. 2), suggests a limited

Year of ringing	No. ringed	Recoveries (retraps in brackets)	
		No.	%
1968	57	4 (0)	7.0 (0.0)
1969	291	28 (13)	9.6 (4.4)
1970	183	18 (4)	9.9 (2.1)
1971	129	14 (2)	10.9 (1.6)
<b>Total</b>	<b>660</b>	<b>64 (19)</b>	<b>9.7 (2.9)</b>

Table 1. The number of Common Snipe ringed at Vejlerne during 1968-1971, and recoveries, including retraps, obtained by December 31st, 1977.

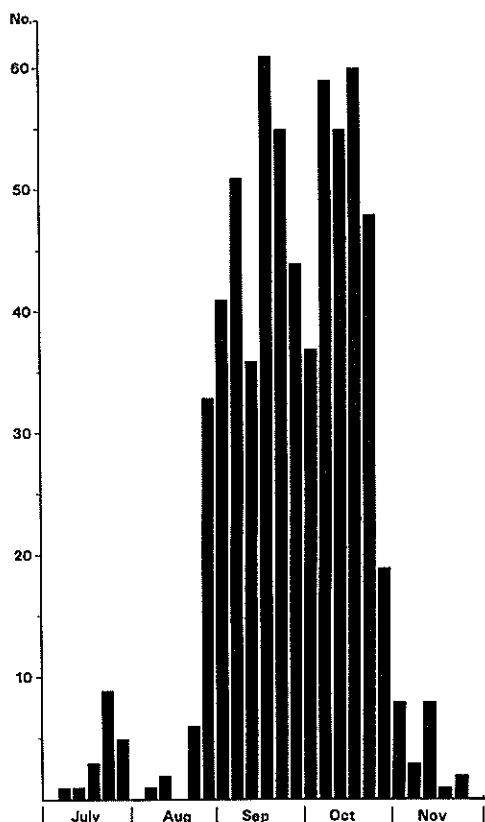


Fig. 1. The distribution in time of 649 Common Snipe trapped and ringed at Vejlerne 1968-1971. Months are divided into 5-day periods.

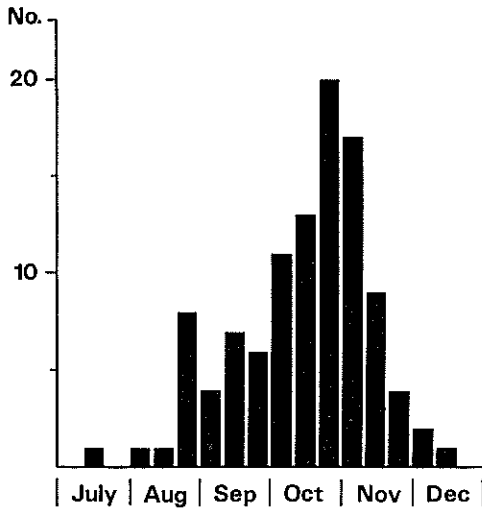


Fig. 2. The distribution in time of Common Snipe killed at lighthouses 1886-1957. Months are divided into 10-day periods. Based on HANSEN (1954) and PREUSS (unpublished).

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 Fig. 3. A comparison of Figs. 1, 2 and 3 suggests that the August catches at Vejlerne in fact contain migratory birds. BRAUN (1977) similarly found that the autumn migration of Snipe over Heligoland commences early August.

The number of birds trapped during 1968-1970 is shown in Fig. 4. Variations in the numbers trapped are due partly to changes in the water level with subsequent local movements of Snipe, and partly to waves of migration as also reported by BRAUN (1977) from Heligoland.

Snipe were trapped as late as November 23rd (Fig. 1). During the study period, 1968-1971, trapping was terminated on October 29th, November 23rd, October 28th and October 22nd, respectively.

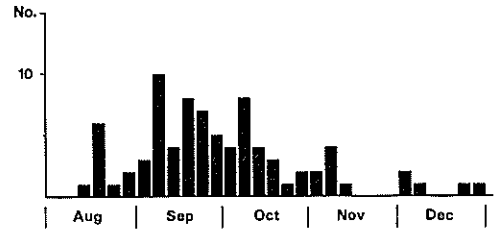


Fig. 3. The recovery dates of 81 Common Snipe ringed in Finland (22), Sweden (54), and Norway (5) 1957-1976. Months are divided into 5-day periods. The records are extracted from ringing reports.

Only the three first dates indicate a greatly reduced number of Snipe. In 1971 the traps were removed on October 22nd, in spite of the fact that Snipe were still present, the last being seen on November 18th.

It is a general impression that the last Snipe leaves the Vejlerne area at the start of the first actual frosty weather. This view is confirmed by comparing the de-

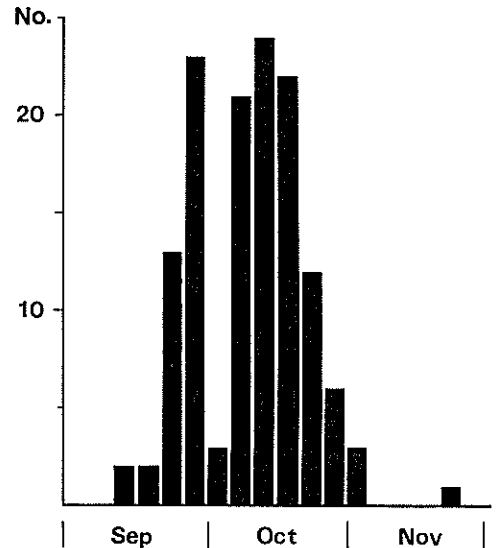


Fig. 5. The distribution in time of 132 Jack Snipe trapped and ringed at Vejlerne 1968-1971. Months are divided into 5-day periods.

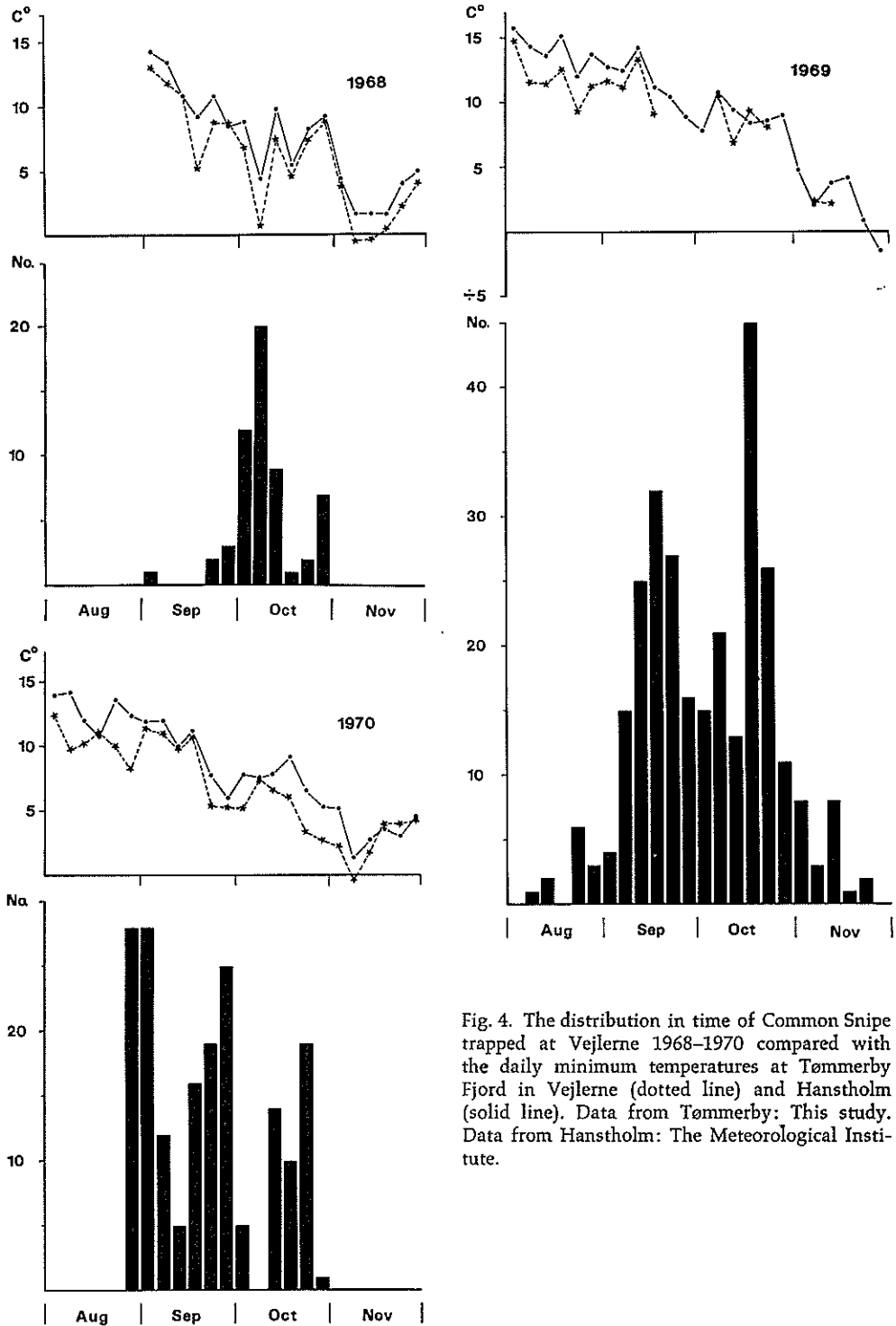


Fig. 4. The distribution in time of Common Snipe trapped at Vejlerne 1968-1970 compared with the daily minimum temperatures at Tømmerby Fjord in Vejlerne (dotted line) and Hanstholm (solid line). Data from Tømmerby: This study. Data from Hanstholm: The Meteorological Institute.

parture of birds each year with minimum temperatures from the study area and from the nearby Hanstholm (Fig. 4).

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 first sightings during the study period varied from March 18th to April 8th.

The Jack Snipe, *Limnocryptes minimus*, is not a breeding bird in Denmark but occurs as a common migrant. During the study period, 1968–1971, a total of 132 of this species were trapped at Vejlerne (Fig. 5). The Jack Snipe arrives later than the Common Snipe during the autumn migration.

RECOVERIES FROM DENMARK

Of all the Snipe ringed, 23 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 one ring was found on a severed leg. These recoveries all occurred during the year of ringing. Only 3 were recovered (shot) from elsewhere in Denmark, 2 in the year of ringing and one 4 years later.

RECOVERIES FROM ABROAD

The geographical and monthly distribution of the 29 recoveries from abroad is shown in Fig. 6 and Table 2. Of the 29 recoveries 7 are found in the year of

Country of recovery	Month of recovery									Total
	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	
Denmark		3	10	3						16
British Isles		1	1	1	1	4		1		9
Holland			1							1
France			1	2	1	4				8
Spain			1		1	3				5
Portugal					1					1
Morocco					1		1			2
Italy					1					1
USSR	1								1	2
<b>Total</b>	<b>1</b>	<b>4</b>	<b>14</b>	<b>7</b>	<b>5</b>	<b>11</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>45</b>

Table 2. Recoveries of Common Snipe, ringed at Vejlerne. Retraps are omitted.

Country of recovery	Place of ringing	
	Eastern Denmark	Vejlerne
USSR	2	2
Finland	1	–
Sweden	7	–
Norway	2	–
British Isles	42	9
W Germany	1	–
Holland	10	1
Belgium	6	–
France	110	8
Spain	22	5
Portugal	9	1
Italy	4	1
Morocco	3	2
Algeria	2	–
<b>Total</b>	<b>221</b>	<b>29</b>

Table 3. Foreign recoveries of Common Snipe ringed in eastern Denmark by the Zoological Museum, Copenhagen, and at Vejlerne by the Game Biology Station, Kalø.



ringing, 12, 3, 1, 2, 1, 1 and 2 in the following years.

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. The two recoveries from the USSR show that

birds from Russia pass through the Vejlerne area; one bird was found dead in Estonia on April 26th, while the other was shot near Okulovka in the Novgorod area on August 18th.

The general picture emerging from Fig. 6 does not differ much from that in Fig. 7, which comprises recoveries of Snipe

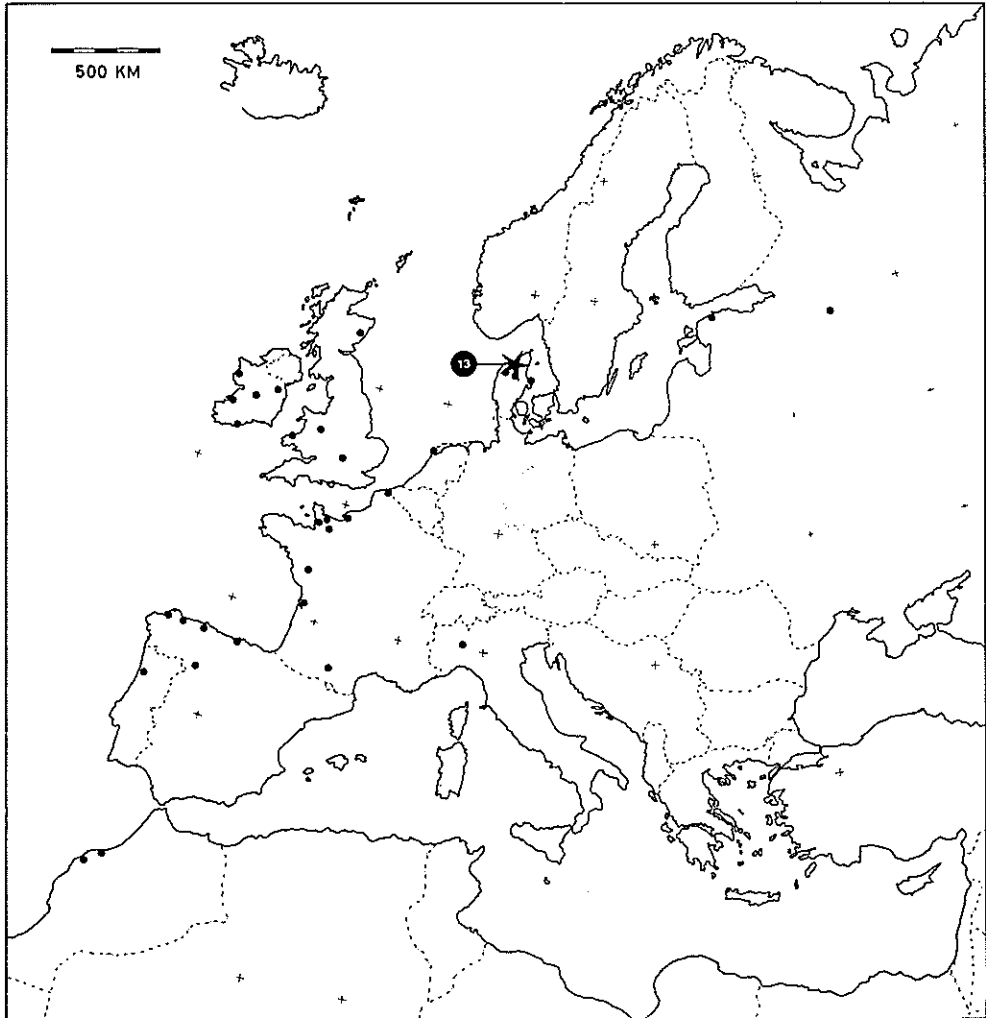


Fig. 6. Recoveries of Common Snipe ringed at Vejlerne.

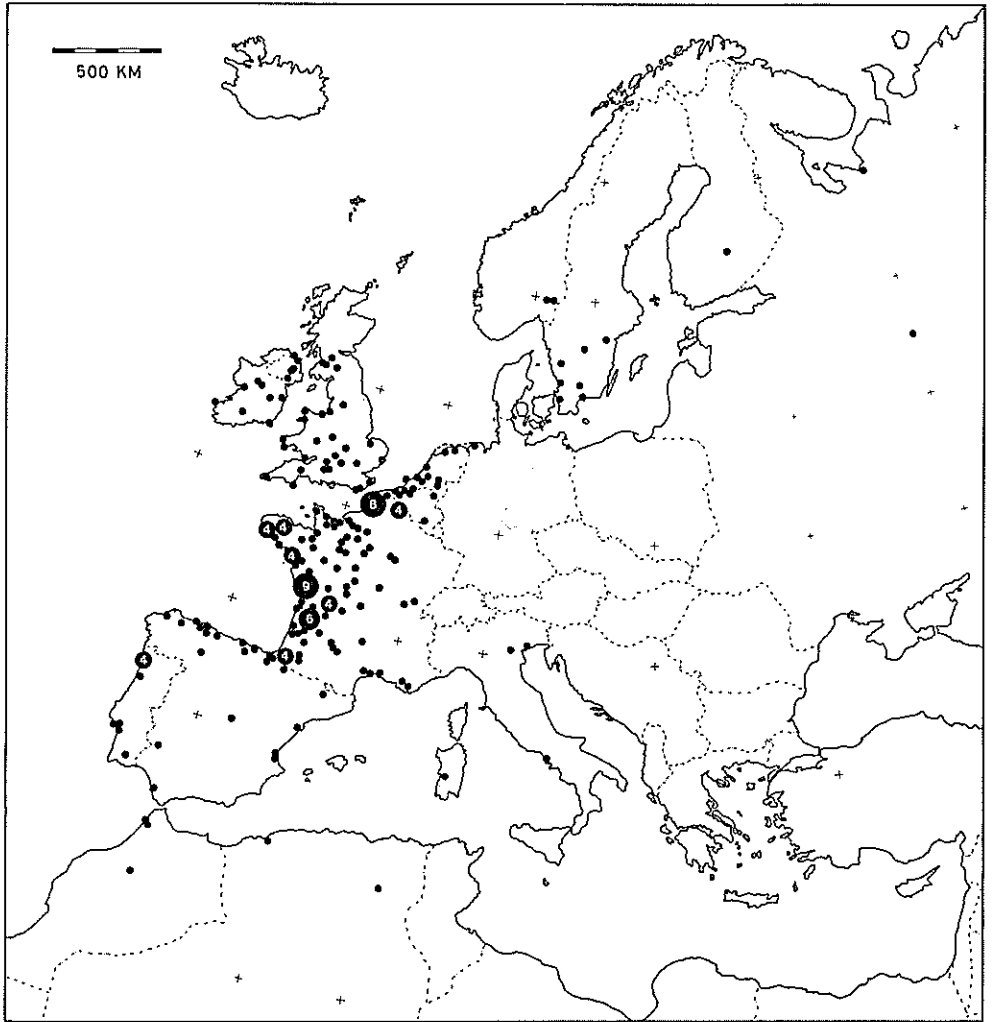


Fig. 7. Recoveries from abroad of 209 Common Snipe ringed in eastern Denmark by the Zoological Museum, Copenhagen.

ringed in eastern Denmark (mainly on the island of Amager) by the Zoological Museum, Copenhagen. NØRREVANG (1959) analysed recovery data of Snipe ringed in several European countries and found that the Scandinavian and northern European populations migrate towards west, west-

south-west and south-west; Snipe from eastern Europe migrate mainly to Italy, which may become their winter quarters. Both sets of data (Figs. 6 & 7 and Table 3) appear to fall within NØRREVANG's category of Snipe from Scandinavia and northern Europe.

## Mortality

## MATERIAL

Using recoveries from the Zoological Museum and the Game Biology Station until December 31st 1977, the adult mortality of the Common Snipe is estimated and discussed.

Reported as	No.	%
Shot or found wounded	315	90
Found dead	29	8
Killed by bird of prey	3	1
Severed leg with ring	2	1
Hit wires	1	
Ring found in owl-pellet	1	
Total	351	100

Table 4. Causes of death.

In the period 1949–1975, the Zoological Museum ringed 3,688 Snipe, of which 306 (8.3%) were recovered, either as shot (7.5%) or dead from other causes (0.8%). The Game Biology Station ringed 660 individuals during 1968–1971, of which 45 (6.8%) were recovered, either as shot (6.2%) or dead from other causes (0.6%). Table 4 illustrates the causes of death, 90% being reported as shot; probably some of the birds included in the group »found dead« were in fact shot. If retraps are excluded in a similar material from Belgium, then 93% were recovered as shot, and 7% as »found dead« (DHONDT & VAN HECKE 1977).

## 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 5 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 (1955), the survival is calculated to be  $\hat{s} = 0.529 \pm 0.028$ , and consequently the mean annual adult mortality is  $47.1 \pm 2.8\%$ .

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 1949–1977. The estimate for  $\hat{s}$  was used in calculating the expected frequencies, and the fit to the observed frequencies was very good ( $\chi^2 = 3.05$ ,  $P > 70\%$ ).

The adult mortality among Common

Snipe ringed in England was  $51.9 \pm 5.4\%$  (BOYD 1962), no changes in the decades from before 1920 to 1958 being recorded. The estimate of the mean annual mortality (including birds recovered in the year of ringing) of Snipe in Belgium was 56.7% (shot birds) and 52% (birds found dead). The mortality in the first 12 months was 62% (DHONDT & VAN HECKE 1977). These figures must be a little higher than actual figures, as in the calculation, ringing figures up to 1969 are included without correction for expected future recoveries. In the second year, mortality was 53%, and the mean for the following years 45%; the difference between first year mortality (62%) and the latter value of 45% is significant. The adult mortality for the Wilson Snipe (*Gallinago g. delicata*) ringed in North America was  $50.2 \pm 5.8\%$  (TUCK 1972).

DISCUSSION OF THE REQUIRED PRODUCTION

With an annual adult mortality of about 50%, the population of adult birds on January 1st (the beginning of the first age-group in Table 5) 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 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 (TUCK 1972). MASON & MACDONALD (1976) found that the mean clutch size in England was 3.89, with 2.2 young hatched per nest (both successful and failed). They found little evidence for second clutches, other than repeats. TUCK (1972) states that references in literature seem to refer to replacement clutches rather than second clutches. However, the actual production of young per pair 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 main-

tained between production and mortality in the population.

Year of ringing	No. re-covered	Year of ringing	No. re-covered
1949	1	1963	10
1950	10	1964	9
1951	20	1965	2
1952	1	1966	8
1953	3	1967	7
1954	4	1968	3
1955	2	1969	12
1956	5	1970	17
1957	4	1971	5
1958	5	1972	2
1959	7	1973	0
1960	14	1974	2
1961	6	1975	2
1962	8		
		Total	169

Age-class	No. re-covered	Age-class	No. re-covered
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

Table 5. Recoveries of Common Snipe divided into year of ringing and into age-class. The age-class follows the calendar year.

## Dansk resumé

### Trækforhold og dødelighed for dobbeltbekkasiner (*Gallinago gallinago*) ringmærket i Danmark

Vildtbiologisk Station har 1968–1971 ringmærket 660 dobbeltbekkasiner i Vejlerne, Nordvestjylland. Indtil udgangen af 1977 var 45 eller 6,8 % gemeldt som døde, nemlig 2,4 % fra Danmark og 4,4 % fra udlandet. I Vejlerne aflæstes yderligere 19, som ikke senere er gemeldt på anden måde. Inkluderer disse, er gemeldingsprocenten 9,7 (Tabel 1).

Fangsttidspunkterne afspejler nogenlunde trækets forløb (gennemsnitsforholdene ses af Fig. 1). De første trækgæster kommer om efteråret ca. 20. august, fuglenes mængde er størst i september og oktober, og de sidste fugle ses i november. Fig. 4 viser årsfangsterne 1968, 1969 og 1970 og døgnets minimumtemperaturer ved Tømmerby Fjord i Vejlerne og ved Hanstholm. Figuren bekræfter det almene indtryk, at de sidste dobbeltbekkasiner det givne år forlader Vejlerne, når den første egentlige frostperiode sætter ind.

Fig. 2 og Fig. 3 viser henholdsvis tidspunkterne for fund af fyrfaldne dobbeltbekkasiner i Danmark og for genfund i Danmark af fugle mærket i lande mod N og NØ. Også disse figurer giver indtryk af trækgæsters ankomst i august, især i denne måneds sidste tredjedel. Figurene viser yderligere, at dobbeltbekkasiner andre steder i Danmark kan forekomme så sent som i december.

Om foråret er der kun fanget 11 fugle, så materialet afspejler ikke trækets forløb. I 1969–1971 så man de første fugle mellem 18. marts og 8. april.

Fig. 5 viser den tidsmæssige fordeling af 132 enkeltbekkasiner (*Limnocyptes minimus*), fanget i Vejlerne 1968–1971.

Fig. 6 og Tabel 2 antyder, at England, Irland, Nord- og Vestfrankrig, Nordspanien og Marokko rummer de vigtigste vinterkvarterer for de dobbeltbekkasiner, der er mærket i Vejlerne. To fund i USSR antyder gennemtræk af russiske fugle. Til sammenligning viser Fig. 7 udenlandske fund af dobbeltbekkasiner mærket af Zoologisk Museum i Østdanmark. De forskelle på materialerne, der ses af Tabel 3, giver ikke anledning til konklusioner, da materialet fra Vejlerne talmæssigt er spinkelt.

Genmeldinger af Zoologisk Museums mærkninger af 3.688 dobbeltbekkasiner i årene 1949–1975 og af Vildtbiologisk Stations 660 er benyttet til beregning af den årlige dødelighed. Det anvendte materiale, der er på 351 stk., omfatter de fugle, der pr. 31. december 1977 er gemeldt som døde (Tabel 4).

Den gennemsnitlige årlige dødelighed blandt voksne dobbeltbekkasiner er beregnet til  $47,1 \pm 2,8$  %. Genmeldinger fra mærkningskalenderåret er udeladt. Dødeligheden synes at have været konstant i perioden 1949–1977 og ens for de forskellige aldersgrupper.

Med en årlig voksendødelighed på ca. 50 % må bestanden ved yngletidens begyndelse rumme 50 % individer udrugget foregående ynglesæson og 50 % ældre fugle, hvis bestanden skal forblive uændret.

### Резюме на русском языке.

#### Условия перелета и смертность дупелей, *Gallinago gallinago*, помеченных кольцами в Дании

Станция Исследования Биологии Дичи с 1968 по 1971 г. пометила кольцами 660 дупелей (*Gallinago gallinago*) в заповеднике Вейлерне в Северозападной Ютландии. До конца 1977 г. о 45 или 6,8% из них получены возвраты, указывающие, что они были убиты, а именно 2,4% в Дании и 4,4% за границей. В Вейлерне кроме того считаны метки 19 особей, о которых не получено возвратов другим образом. Включая последних, процент возвратов составляет 9,7 (Табл. I).

Времена ловли приблизительно отражают

ход осеннего перелета (Фиг. I). Первые перелетные гости прибывают осенью около 20 августа, численность птиц наиболее высока в сентябре и октябре, а последние птицы наблюдаются в ноябре. Фиг. 4 показывает годовые ловли 1968, 1969 и 1979 годов и суточные минимумы температуры у Тёммерби-фиорда и Ханстхольма. Фигура подтверждает впечатление того, что последние дупели в отдельные годы покидают Вейлерне, когда начинается первый настоящий период морозов.

Фиг. 2 показывает распределение по временам года дупелей, погибших налетая на мажки в Дании, а Фиг. 3 – возвраты из Дании о птицах, помеченных кольцами в Норвегии, Швеции и Финляндии. Эти фигуры также дают впечатление того, что перелетные гости прибывают в августе, особенно в последней трети этого месяца. Фигуры кроме того показывают, что дупелей в других местностях Дании можно встретить и позднее, даже в декабре.

Фиг. 5 показывает распределение по временам года 132 болотных курочек (*Limnocryptes minimus*), пойманных и помеченных кольцами в Вейлерне с 1968 по 1971 г. Первые были пойманы в середине сентября, последние в ноябре.

Весной в Вейлерне поймано только 11 дупелей. С 1968 по 1971 г. первые особи наблюдались между 18 марта и 8 апреля.

Фиг. 6 и Табл. 2 показывают возвраты из за границы о дупелях, помеченных в Вейлерне. Две встречи в С.С.С.Р. указывают на возможность перелета через Данию советских птиц. Для сравнения в Фиг. 7 и Табл. 3 показаны встречи за границей дупелей, помеченных кольцами Зоологическим Музеем Копенгагена в Восточной Дании, предпо-

чительно на острове Амагер. Оба материала содержат значительное количество возвратов из Франции, Британских Островов и Испании.

Возвраты с 1949 по 1975 г., касающиеся 3.688 дупелей, помеченных кольцами Зоологическим Музеем, и 660, помеченных Станцией Исследования Биологии Дичи, использовались для вычисления годовой смертности. Использованный материал, составляющий 351 особей, охватывает тех дупелей, которые по возвратам до 31 декабря 1977 г. были встречены мертвыми (Табл. 4.).

Средняя годовая смертность взрослых дупелей по вычислениям составляет  $47.1 \pm 2.8\%$ . Возвраты из годов, в которых птицы были помечены, не приняты в учет. Кажется, что смертность в течение периода с 1949 по 1977 г. держалась постоянной, и была одинакова для всех возрастных групп.

При годовой смертности взрослых особей, равной около 50%, следует считать, что 50% популяции в начале периода выводки должна состояться из особей, выведенных в предыдущем сезоне выводки, и 50% из птиц старшего возраста, если популяция должна остаться постоянной.

## References

- BOYD, H., 1962: Mortality and Fertility of Charadrii. – Ibis 104: 368–387.
- BRADN, H.-G., 1977: Auftreten und Durchzug der Bekkasine (*Gallinago gallinago*), Doppelschnepfe (*Gallinago media*) und Zwergschnepfe (*Limnocryptes minimus*) auf Helgoland. – Ornithologische Mitteilungen, 29 (10): 205–208.
- DHONDT, A. A., & VAN HECKE, P., 1977: An analysis of Belgian ringing recoveries of the Common Snipe: Movements and survival. – Le Gerfaut 67: 83–99.
- FOG, J., 1975: Mehrfachnutzung eines dänischen Feuchtgebietes »Vejlerne« (Nordjütland). – Schriftenreihe für Landschaftspflege und Naturschutz, Heft 12: 69–76.
- FOG, J., & KORTEGAARD, L., 1973: Ynglefugle i Vejlerne omkring 1971 (The breeding birds in the marshland Vejlerne, Northwest-Jutland). – Flora og Fauna 79 (1): 15–22.
- HALDANE, J. B. S., 1955: The Calculation of mortality rates from the ringing data. – Acta XI Congress Int. Ornith.: 454–458.
- HANSEN, L., 1954: Birds killed at lights in Denmark 1886–1939. – Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening 116: 269–368.
- MASON, C. F., & MACDONALD, S. M., 1976: Aspects of the breeding biology of the Snipe. – Bird Study 23: 33–38.
- MATHIESEN, H., FOG, J., & DAHL, J., 1969: Productivity, use and management of wetlands. – International Biological Programme, Progress Report 1968 Scandinavian Countries, Denmark, Finland, Norway, Sweden: 6–7.
- MATHIESEN, H., & FOG, J., 1975: Productivity, use and management of wetlands. – International Biological Programme, Final Report Scandinavian Countries, Denmark, Finland, Norway, Sweden: 146–153.
- NØRREVANG, A., 1959: The migration patterns of some waders in Europe, based on the ringing results. – Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening 121: 181–222.
- PROJECT MAR, The Conservation and management of temperate marshes, bogs and other wetlands, 1962: IUCN Publications. New series nos. 3 and 5.
- TUCK, L. M., 1972: The Snipes. – Canadian Wildlife Service. Monograph Series – number 5. 428 pp.

- Part 3. Jørgen Fog: Dispersal and Survival of Released Mallards. (*Anas platyrhynchos* L.). pp. 1-57. 1964.  
Jørgen Fog: The Mallards from the Estate of Kongsdal. pp. 61-94. 1965.  
P. J. H. van Bree, Birger Jensen, L. J. K. Kleijn: Skull Dimensions and the Length/Weight Relation of the Baculum as Age Indications in the Common Otter. pp. 97-104. 1966.  
Helge Walhovd: Reliability of Age Criteria for Danish Hares (*Lepus europaeus* Pallas). pp. 105-128. 1966.

Vol. 5.

- No 1. Mette Fog: An Investigation on the Brent Goose (*Branta bernicla*) in Denmark. 40 pp. 1967.  
No 2. Jørgen Fog: List of Recoveries in Denmark of Birds Banded Abroad and Handled through the Game Biology Station 1955-1964. 44 pp. 1968.  
No 3. Poul Valentin Jensen: Food Selection of the Danish Red Deer (*Cervus elaphus* L.) as Determined by Examination of the Rumen Content. 44 pp. 1968.  
No 4. Birger Jensen: Preliminary Results from the Marking of Foxes (*Vulpes vulpes* L.) in Denmark. 8 pp. 1968.  
No 5. Anders Holm Joensen: Wildfowl Counts in Denmark in November 1967 and January 1968 - Methods and Results. 72 pp. 1968.  
No 6. Birger Jensen and Lise Brunberg Nielsen: Age Determination in the Red Fox (*Vulpes vulpes* L.) from Canine Tooth Sections. 16 pp. 1968.  
No 7. Holger Madsen: Sexing Day-old Game Pheasant Chicks. 8 pp. 1969.

Vol. 6.

- No 1. Inge Hoffmeyer: Feather Pecking in Pheasants - an Ethological Approach to the Problem. 36 pp. 1969.  
No 2. Mette Fog: Studies on the Weasel (*Mustela nivalis*) and the Stoat (*Mustela erminea*) in Denmark. 14 pp. 1969.  
No 3. Mette Fog: Haunts in Denmark for White-fronted Goose (*Anser albifrons*), Bean Goose (*Anser fabalis* non *brachyrhynchus*) and Pink-footed Goose (*Anser fabalis brachyrhynchus*). 12 pp. 1971.  
No 4. Jørgen Fog: Survival and Exploitation of Mallards (*Anas platyrhynchos*) Released for Shooting. 12 pp. 1971.  
No 5. F. Abildgård, Johs. Andersen & O. Barndorff-Nielsen: The Hare Population (*Lepus europaeus* Pallas) of Illumø Island, Denmark. A Report on the Analysis of the Data from 1957-1970. 32 pp. 1972.  
No 6. Ole Barndorff-Nielsen: Estimation Problems in Capture-Recapture Analysis. 22 pp. 1972.  
No 7. H. Strandgaard: An Investigation of Corpora lutea, Embryonic Development, and Time of Birth of Roe Deer (*Capreolus capreolus*) in Denmark. 22 pp. 1972.  
No 8. Anders Holm Joensen: Oil Pollution and Seabirds in Denmark 1935-1968. 24 pp. 1972.  
No 9. Anders Holm Joensen: Studies on Oil Pollution and Seabirds in Denmark 1968-1971. 32 pp. 1972.

Vol. 7.

- No 1. H. Strandgaard: The Roe Deer (*Capreolus capreolus*) Population at Kalø and the Factors Regulating its Size. 205 pp. 1972.

Continued cover page 4

Vol. 8.

- No 1. Ib Clausager: Age and Sex Determination of the Woodcock (*Scolopax rusticola*). 18 pp. 1973.
- No 2. Hans Jørgen Degn: Systematic Position, Age Criteria and Reproduction of Danish Squirrels (*Sciurus vulgaris* L.). 24 pp. 1973.
- No 3. Birger Jensen: Movements of the Red fox (*Vulpes vulpes* L.) in Denmark Investigated by Marking and Recovery. 20 pp. 1973.
- No 4. Anders Holm Joensen: Moulting Migration and Wing-feather Moulting of Seaducks in Denmark. 42 pp. 1973.
- No 5. Palle Uhd Jepsen and Anders Holm Joensen: The Distribution and Numbers of Goldeneye (*Bucephala clangula*) Moulting in Denmark. 8 pp. 1973.
- No 6. Palle Uhd Jepsen: Studies of the Moulting Migration and Wing-feather Moulting of the Goldeneye (*Bucephala clangula*) in Denmark. 23 pp. 1973.
- No 7. Helen Grue & Birger Jensen: Annular Structures in Canine Tooth Cementum in Red Foxes (*Vulpes vulpes* L.) of Known Age. 12 pp. 1973.
- No 8. Ib Clausager: Migration of Scandinavian Woodcock (*Scolopax rusticola*) with special Reference to Denmark. 38 pp. 1974.

Vol. 9.

- No 1. Anders Holm Joensen: Waterfowl Populations in Denmark 1965-1973. A Survey of the Non-breeding Populations of Ducks, Swans and Coot and their Shooting Utilization. 206 pp. 1974.

Vol. 10.

- No 1. Anders Holm Joensen, Niels-Ole Søndergaard and Ebbe Bøgebjerg Hansen: Occurrence of Seals and Seal Hunting in Denmark. 20 pp. 1976.
- No 2. Helen Grue: Non-seasonal Incremental Lines in Tooth Cementum of Domestic Dogs (*Canis familiaris* L.). 8 pp. 1976.
- No 3. Helen Grue & Birger Jensen: Annual Cementum Structures in Canine Teeth in Arctic Foxes (*Alopex lagopus* (L.)) from Greenland and Denmark. 12 pp. 1976.
- No 4. Palle Uhd Jepsen: Feeding Ecology of Goldeneye (*Bucephala clangula*) during the Wing-feather Moulting in Denmark. 24 pp. 1976.
- No 5. Anders Holm Joensen and Ebbe Bøgebjerg Hansen: Oil Pollution and Seabirds in Denmark 1971-1976. 31 pp. 1977.
- No 6. Boguslaw Fruziński: Feeding Habits of Pink-footed Geese in Denmark during the Spring Passage in April 1975. 11 pp. 1977.
- No 7. Anders Holm Joensen: Statistics of Duck Hunting in Denmark 1966-1976. 20 pp. 1978.
- No 8. Birger Jensen & Darrell M. Sequeira: The Diet of the Red Fox (*Vulpes vulpes* L.) in Denmark. 16 pp. 1978.
- No 9. Anders Holm Joensen: Hunting of Divers, Grebes, Cormorants, and Auks in Denmark in 1975/76. 20 pp. 1978.