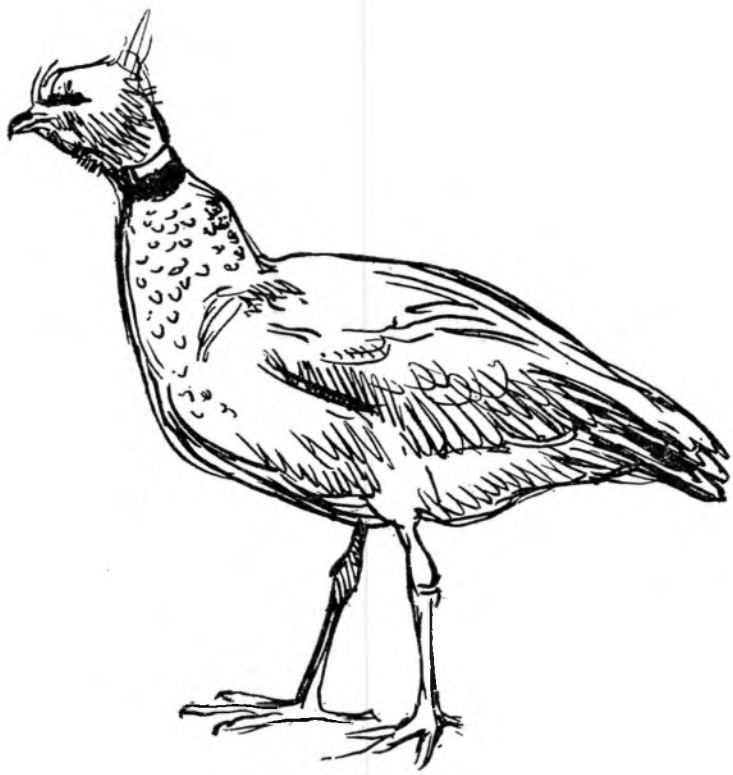
THE
THIRTEENTH ANNUAL REPORT OF

THE WILDFOWL TRUST

1960-61



HUGH BOYD AND PETER SCOTT

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THE WILDFOWL TRUST

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The collections of the Trust are at:

The New Grounds,
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The Waterfowl Gardens,
Peakirk,
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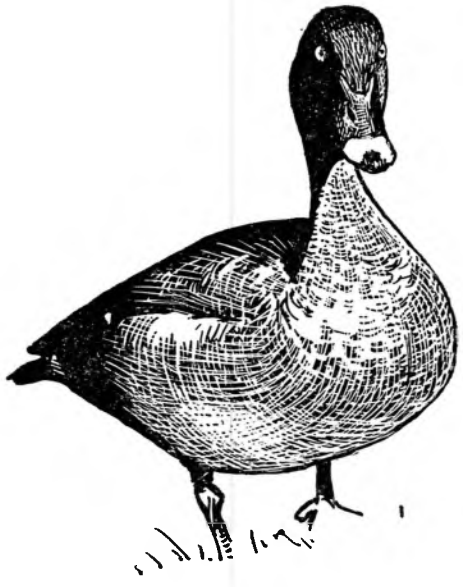

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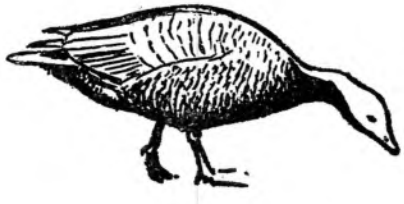
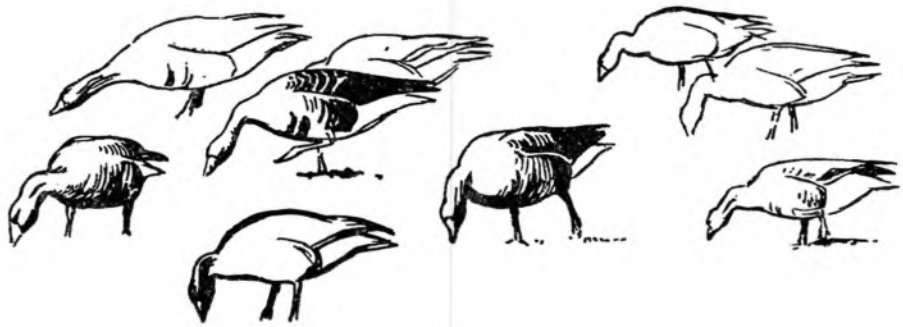




ANNUAL REPORT 1960-61

GENERAL

Royal Visit

On 22nd April, 1961 Her Majesty the Queen, H.R.H. the Prince Philip, Duke of Edinburgh (our President), H.R.H. the Prince of Wales, H.R.H. the Princess Margaret, Countess of Snowdon and the Earl of Snowdon, and H.R.H. the Princess Royal spent the morning looking at the Slimbridge Collection. A dismally wet day could not extinguish the interest and enthusiasm of the Royal party, nor the pleasure their visit gave.

Officers, Council and Committees

The Officers and Council of the Trust (as at 31st December, 1961) are shown on p. 2. Council Meetings were held on 3rd January, 22nd March, 20th June and 17th October. The Finance Committee met on 15th March, 5th June and 3rd October. The annual meeting of the Scientific Advisory Committee was held on 22nd March, 1961.

Annual General Meeting

The Fourteenth Annual General Meeting was held at the Royal Geographical Society on 10th May, 1961. The minutes of the meeting will be found at p. 175.

Annual Dinner

The Annual Dinner was held at the Park Lane Hotel on 10th May, 1961 His Royal Highness, the Prince Philip, Duke of Edinburgh, K.G., K.T., was in the chair and the other speakers were Mr. Peter Scott, C.B.E., D.S.C., The Rt. Hon. the Lord Reith of Stonehaven, P.C., G.C.V.O., G.B.E., C.B., T.D., D.C.L., and Mr. Frank Muir.

Gosling Party

The annual Gosling Party was held at Slimbridge on 22nd December, 1961 and included a lecture by Mr. James Fisher. It was attended by 110 Goslings.

Membership

Figures showing the membership of the Trust for the last four years are set out on p. 16. From these it will be seen that the decline over the

previous two years was halted and reversed in 1961 and that the increase of 756 during the year brought the total membership to well above its previous highest level. This improvement was chiefly due to the results of the appeal which Council made to Members in February, 1961 and the Trust is extremely grateful to those who helped by enlisting new Members, to those who increased their support by covenanting their subscriptions and to some 150 Associates, who converted to full membership. A roll of members as at 31st January, 1962 appears on pages 183 to 204.

Visitors

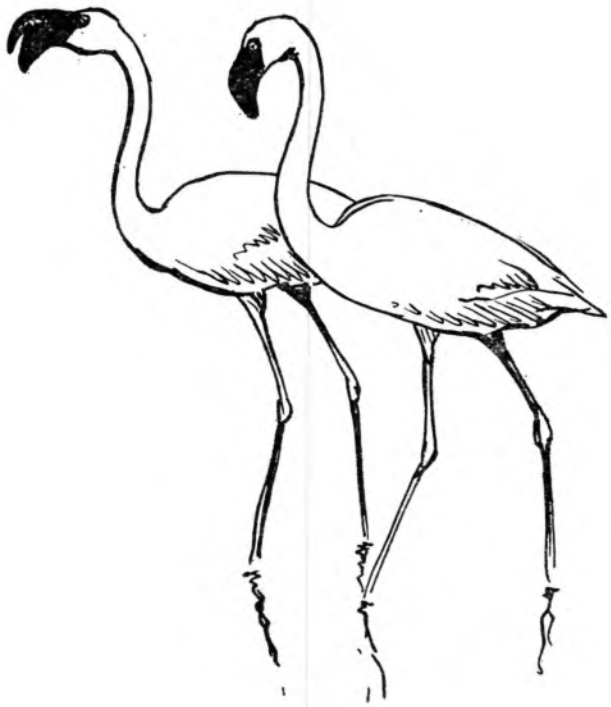
Increased publicity and a dry summer combined to make 1961 a record year for visitors to both the Trust's collections. The figures, with those for the previous three years, were:-

	1958	**1959**	**1960**	**1961**
Slimbridge ...	120,191	129,092	102,555	151,533
Peakirk ...	23,495	31,135	26,531	33,203
Total : ...	143,686	160,227	129,086	184,736

At the Annual General Meeting the Director was able to announce that the number of visitors to the two collections since 1946 had just passed the total of a million.

Finance

The accounts for the year ending 31st December 1960, are at page 180. The Trust's expenditure for the year exceeded its income by £1,020 and the deficit would have been over £5,000 if three repayments of tax on covenanted subscriptions had not been received instead of the usual one. This deficit was the reason for the Council's appeal to Members in February, 1961. The appeal received a most generous and heartening response in donations totalling £1,500 and in recruitment of new Members. In addition there was additional revenue in 1961 from the increased gate takings. This has enabled the Trust during the past year to meet increasing costs and to make a modest start on repayment of money which was lent it in its early days. It has not however produced any surplus which can be applied to essential development and the Trust is as much in need of financial support as ever before.



THE COLLECTIONS

The Grounds

Constructional work at Slimbridge included the construction of new aviaries at the north end of the Rushy Pen, the design of which enables a relatively large area of enclosed space to be available without having any supporting posts or poles in the way of full winged birds. Three of a proposed dozen aviaries are completed, each has a heated shelter together with an independent water supply. A new goose-watching hide has been constructed in the Rushy Pen which is of a more practical design than those on the Sea Wall. Agreement has been reached with the Berkeley Estate and our neighbour, Mr. O. W. Fisher, to move the Acrow Tower to the far corner of the spinney and include the ground approaching it from the Big Pen, to give a clear view of the Top and Bottom New Pieces and facilitate the public's view of the geese. It is also intended to erect a raised hide close to the Sea Wall in the Tack Piece and to fox-proof a twenty yard wide strip from the Rushy Pen to the proposed hide.

The Birds

The Collection has been enlarged to include two closely related families of birds—Screamers (Anhimidae) and Flamingos (Phoenicoptera). At present the former are represented by a pair of Crested Screamers, somewhat grotesque birds with large toes joined at the base by the remains of the web. They have a beak like gallinaceous birds. Although quite large, they are extremely light in weight, due to a number of subcutaneous air sacs.

The Flamingos are represented at Slimbridge by three species—the Greater and Lesser from the Old World, and the Chilean from South America. It is hoped to make a comprehensive collection of these striking birds and to acquire the other South American species.

The Breeding Season, 1961

S. T. Johnstone

WITH the aid of a dry and sunny April and May, a record of one hundred and six kinds of waterfowl nested at the New Grounds, and from these nearly a thousand birds of ninety two kinds were reared, representing eighty per cent of young hatched, the best result achieved at Slimbridge.

Twenty six Hawaiian Geese were reared and we are pleased to report that it is expected that most of these will be returned to the Hawaiian Islands during the summer of 1962.

Twenty four Ross's Geese, twenty one Emperor Geese, ten Red-breasted Geese and three Black Brant were produced in addition to the other more common geese.

The New Zealand Brown Duck laid a clutch from which two specimens were hatched and reared by a bantam. She hatched and reared three ducklings from a second clutch and then in October laid a third, from which two ducklings were hatched by incubator on 1st November. These have been reared during the winter indoors under infra red lamps.

The Hartlaub's Duck had their most successful season, rearing seven young, but the Spotted Whistling Duck deserted her nest and failed to lay a second time.

Under the direction of the American Wildlife Service, two female Laysan Teal were sent us from San Diego Zoo. This enabled us to increase our production of this species to sixteen birds and two specimens have been returned to San Diego in place of the birds received.

Three Hawaiian Ducks were reared but this unfortunately only balanced winter losses of this rare species. The Kerguelen Pintail experiment was carried a stage further, a duck being produced from a Kerguelen male and a female Kerguelen x Common Pintail.

The female South Georgia Pintail was crossed with a Chilean Pintail drake and six offspring reared. We have, however, now obtained a male South Georgia Pintail and so it is hoped to breed pure birds in 1962.

First breeding records for Slimbridge include Pink-footed Goose, Abyssinian Yellowbill, New Zealand Shoveler, South American Pochard and King Eider.

During the summer a new 'duckery' was constructed on waste ground at the north end of the Rushy Pen. Provision has been made for fifty broods, each of which has a clean water supply, the waste being carried away in a separate channel after leaving each pen. The water is fast flowing and we believe that the project will obviate any chance of epidemics amongst the young birds.

Breeding Analysis 1961 — Slimbridge

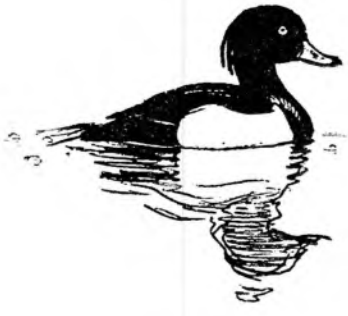
The species and races in this table and that for Peakirk are listed in the order used in Peter Scott's *A Coloured Key to the Wildfowl of the World* (1957). Entries in the column " reared by parents " are additional to those in " reared artificially." No details of eggs laid are given under " reared by parents " because in many cases the numbers laid and lost are not known.

Species and race	Reared artificially			Reared by parents
	Eggs Set	Hatched	Reared	
Magpie Goose	7	2	2	7
Spotted Whistling Duck	10	—	—	—
Fulvous Whistling Duck	25	12	10	30
Cuban Whistling Duck	4	—	—	3
Red-billed Whistling Duck			6	8
Black Swan				2
Mute Swan				2
Black-necked Swan				5
Bewick's Swan				2
Trumpeter Swan	6	—	—	—
Swan Goose	19	6	5	—
Yellow-billed Bean Goose	4	3	2	—
Pink-footed Goose	24	1	1	—
European White-fronted Goose	2	—	—	—
Greenland White-fronted Goose	6	—	—	—
Lesser White-fronted Goose	12	3	2	—
Western Greylag Goose	9	6	6	6
Eastern Greylag Goose	8	2	2	1
Bar-headed Goose	14	4	2	—
Emperor Goose	45	28	21	—
Lesser Snow/Blue Goose	9	3	3	—
Greater Snow Goose	26	10	8	2
Ross's Goose	40	24	24	—
Atlantic Canada Goose	—	—	—	5
Great Basin Canada Goose	—	—	—	5
Taverner's Canada Goose	—	—	—	2
Dusky Canada Goose	—	—	—	3
Hawaiian Goose	140	24	21	5
Barnacle Goose	12	7	7	11
Black Brant	8	3	3	—
Red-breasted Goose	19	10	10	—
Ruddy Shelduck	3	—	—	—
Cape Shelduck	19	10	7	—
New Zealand Shelduck	5	2	2	—
Common Shelduck	18	14	12	—
Ashy-headed Goose	4	—	—	—
Ruddy-headed Goose	5	—	—	—
Lesser Magellan Goose	7	2	1	2
Greater Magellan Goose	5	2	2	1
Cereopsis Goose	—	—	—	5
Andean Crested Duck	14	4	4	—
Marbled Teal	59	43	42	—
Cape Teal	39	26	20	4

Species and race	Reared artificially			Reared by parents
	Eggs Set	Hatched	Reared	
Versicolor Teal	32	18	7	—
Puna Teal	9	—	—	—
Bahama Pintail	56	37	33	—
S. Georgian x Chilean Pintail	10	7	6	—
Chilean Pintail	20	11	11	—
Northern Pintail	43	31	31	—
Chilean Teal	9	4	3	—
Sharp-winged Teal	4	—	—	—
Falcated Teal	7	4	4	—
Australian Grey Teal	4	1	1	—
Chestnut-breasted Teal	22	13	8	3
New Zealand Brown Teal	11	4	4	3
Hawaiian Duck	4	4	3	—
Laysan Teal	23	18	17	1
N. American Black Duck	6	2	2	—
Indian Spotbill	—	—	—	3
Chinese Spotbill	12	2	2	3
New Zealand Grey Duck	7	4	4	—
Australian Black Duck	14	—	—	—
Philippine Duck	12	7	5	7
African Yellowbill	25	12	2	—
Abyssinian Yellowbill	6	5	5	—
African Black Duck	6	1	1	—
Gadwall	16	12	12	—
European Wigeon	28	19	18	—
American Wigeon	10	4	4	—
Chiloe Wigeon	48	17	12	—
Blue-winged Teal	10	3	3	—
Argentine Cinnamon Teal	6	—	—	—
Northern Cinnamon Teal	27	16	14	—
Garganey	12	4	4	—
Argentine Red Shoveler	12	4	4	—
Cape Shoveler	27	10	9	—
New Zealand Shoveler	24	21	19	—
Common Shoveler	17	10	9	—
Ringed Teal	41	20	11	3
European Eider	8	5	3	—
King Eider	4	3	2	—
Red-crested Pochard	61	52	38	—
Rosy-bill	16	4	1	1
South American Pochard	10	7	4	—
African Pochard	11	5	4	—
Canvasback	13	11	9	—
European Pochard	8	4	4	—
Redhead	60	32	24	—
Common White-eye	21	14	11	3
Australian White-eye	31	26	24	—
Lesser Scaup	49	18	14	—
European Greater Scaup	5	1	1	—
Lesser Brazilian Teal	12	5	5	—
Mandarin Duck	18	11	9	—
Carolina	73	70	70	—
S. American Comb Duck	8	5	5	—
Hartlaub's Duck	—	—	—	7
Spur-winged Goose	7	—	—	—
Atlantic Harlequin Duck	1	—	—	—
Barrow's Goldeneye	9	1	—	—
European Goldeneye	19	11	5	—
Smew	7	—	—	—
Hooded Merganser	8	4	—	—
Red-breasted Merganser	24	1	—	—
Goosander	8	2	1	—
N. American Ruddy Duck	—	—	—	20

Breeding Analysis 1961 — Peakirk

Species and race	Reared artificially			Reared by parents
	Eggs Set	Hatched	Reared	
Fulvous Whistling Duck	25	0		
Black-necked Swan				4
Swan Goose	11	4	4	
Lesser White-fronted Goose	14	2	2	
Western Greylag Goose				16
Emperor Goose	5	4	2	
Bar-headed Goose	3	0		
Blue Goose	4	0		
Taverner's Canada Goose	5	2	2	
Dusky Canada Goose	4	2	2	
Hawaiian Goose	1	0		
Barnacle Goose	4	0		
Cape Shelduck				8
Common Shelduck	7	6	6	
Lesser Magellan Goose	5	0		5
Greater Magellan Goose	7	4	4	
Cereopsis Goose	4	3	2	
Marbled Teal	11	5	3	
Cape Teal	37	12	10	
Bahama Pintail	52	34	26	
Chilean Pintail	12	11	8	
Northern Pintail	12	6	4	
Chilean Teal	6	2	1	
Chestnut-breasted Teal	24	18	14	
N. American Black Duck	9	5	5	
New Zealand Grey Duck	8	8	5	
Philippine Duck	25	8	6	
African Yellowbill	8	0		
African Black Duck	10	7	7	
Gadwall	27	16	10	
European Wigeon	13	10	7	
American Wigeon	8	0		
Chiloe Wigeon	16	0		
Northern Cinnamon Teal	20	6	4	
Garganey	8	2	0	
Cape Shoveler	6	0		
Common Shoveler	22	22	20	
Red-crested Pochard	21	10	10	
Rosy-bill	6	3	3	6
Redhead	8	6	3	
Common White-eye	8	4	4	
New Zealand Scaup	11	0		
Tufted Duck	13	12	11	
Lesser Scaup	5	3	3	
European Greater Scaup	5	3	2	
Mandarin Duck	11	8	8	
Carolina Duck	68	35	28	
N. American Ruddy Duck				8



THE RESEARCH UNIT

THE Assistant Director (Research), Dr. G. V. T. Matthews, was in general charge of the research programme and also carried out work on orientation. The other members of the Unit, with their main interests, were H. Boyd (ringing programme, goose surveys, wader netting), G. L. Atkinson-Willes (wildfowl count organisation and refuge establishment), Dr. J. V. Beer (pathology), P. J. S. Olney (viscera analyses and habitat improvement), Dr. S. K. Eltringham (aerial surveys, swan census), Dr. Janet Kear, feeding behaviour and nutrition), M. A. Ogilvie (ringing assistant), Miss E. Temple Carrington (secretarial assistant), W. A. Cook (Borough Fen decoyman), N. Phillips (laboratory assistant).

Major General C. B. Wainwright, C.B., who operates the ringing station at Abberton, Essex, was assisted by R. King and (temporarily) R. Dennis.

Again the major part of the research programme was supported by grants from the Nature Conservancy. These were £9,775 for the year ending March 1961 and £11,959 for the year ending March 1962. For such support we are extremely grateful. The remainder of the running costs were met from the Trust's general funds and the Trust also provided headquarters accommodation and facilities in the collections and decoys.

Following on the previous bumper season the catch in the three main ringing stations slumped back (p. 14). Papers based on the analysis of ringing recoveries are at pp. 65 and 70. The orientation research was held back by the small catches but even so over a thousand birds were transported. The paper at p. 47 is actually based on the next season 1961/62 which was again a bumper one. Rocket netting was only used on waders (p. 14) but with good success. We were fortunate to be able to have a man in Greenland in the summer to help with the ringing of flightless Barnacle Geese (p. 53). Previously surveys had been made from the ground in November, 1960 and from the air in March, 1961 as part of the Trust's continued investigation of this species.

Other surveys were made in November, 1960 of Greylag Geese (30,000 for the British total) and Pink-footed Geese (48,000). These co-ordinated goose counts made by some 100 observers are proving very satisfactory ways of following population fluctuation from year to year. In all cases data on breeding success (from the age ratio and brood size) are accumulating. Encouraging results have been obtained in attempts to match weather conditions in high latitudes with breeding success to develop means of predicting the size of the autumn populations of geese.

A joint investigation with the British Trust for Ornithology into the numbers of Whooper Swans in Great Britain was made in the winter of 1960-61. A sample census of the Mute Swan was carried through in the spring, also in conjunction with the B.T.O. This was supported by partially overlapping surveys from the air. In all about two thirds of the Mute Swan population was covered, revealing that the sharp increase before 1955 had apparently tailed right off. This confirmed data from the monthly winter counts and had an important bearing on discussions of the control of this bird. Complementary to the survey of the swan was a greatly increased level of ringing through the encouragement, financial and otherwise, of amateur activity. The efforts of Dr. C. D. T. Minton deserve especial mention. Although ringing returns will take some years to bear fruit, it is already clear that the birds are experiencing a high level of mortality in their early, non-breeding years, sufficient to account for the levelling off of the population.

A reduction in the number of viscera sent in for examination to 421 was a reflection of a policy of asking particularly for inland-feeding ducks (shore feeders having been adequately covered). A paper on the Teal sample has been completed, while at p. 117 appears an account of the food habits of a hand-reared population of Mallard. Other papers and notes on feeding are at p. 122 and p. 168. Now that a thorough working knowledge has been obtained of the feeding activities of the commoner ducks, more attention is being given to the translation of such knowledge into practical management. The development of gravel pits is discussed at p.00. Many sites are visited and assessed for their potentialities as wildfowl refuges.

Complementary to the study of feeding in the wild are studies of the development of feeding behaviour, the functional anatomy of bill structure, the more exact determination of nutritional requirements and of the amount of food value that wildfowl can extract from various types of grain and vegetation. At the other end of the process dropping samples have been collected and analysed for their manurial value. All this basic work is relevant to effective work on the hoary problem of the amount of damage actually caused to agricultural interests by wintering wildfowl.

The birds that eventually die in the Collection are post-mortemed in our laboratory. Tuberculosis remains a problem, but aspergillosis and salmonellosis now appear to be under control. Full use of the various bits and pieces of the corpses is made in satisfying the requirements of anatomists. In particular, the already highly representative collection of tracheal bullae continues to expand, as does the skin collection.

Mr. R. A. Avery, working as a Ph.D. student in the Department of Zoology, University of Bristol has continued to make use of our facilities in his parasitological studies. In particular he has been examining the way in which parasite populations build up in the individual bird in the course of its life. Dr. C. J. F. Coombs is making some very interesting tests on the role played by day-length in determining the onset of nuptial plumage and gonad development.

Among visiting scientists from overseas were A. M. Fallin (Toronto), D. A. Munro (Montreal), F. F. Barkalow (N. Carolina), G. Watson (Yale), D. S. McChesney (Cornell), D. R. Griffin (Harvard), J. Walker (Winnipeg), C. Bucheister (New York), A. L. Rand (Cape Town), W. Webb (Syracuse), A. Allouse (Baghdad), F. Richardson (Washington), A. de Vos (Ontario), W. R. Siegfried (Cape Town), D. Davenport (California), J. McNally (Victoria), R. Pough (New York). Those spending some time with us were P. A. Johnsgard who left in April, 1961 after eighteen months studying behaviour in the collection, E. Etemad (Teheran) and Miss G. Bracht (Seewiesen). A visitor we were very glad to welcome at last was H. Albert Hochbaum, Director of the Delta Waterfowl Research Station in Manitoba, with which we have long had close contacts. He was with us a month, including a conducted tour of marshes and research areas in England and southern Scotland.

Ringing 1961

Ducks. Though the ringing effort in 1960-61 was no less than in 1959-60 the number of ducks ringed fell from 9238 to 3553, the catch of Teal at Abberton being unusually low and the numbers of Mallard taken there and in the decoys at Borough Fen and Slimbridge being very substantially reduced. Major General C. B. Wainwright, at Abberton, again ringed more ducks than anyone else.

Ducks ringed 1960-61

Species	Abberton Essex	Borough Fen Northants.	Slimbridge Glos.	Other Stations	Total 1960/61	Total 1959/60
Shelduck ..	26				25	*23*
Pintail ..			8	1	9	*15*
Teal ..	795	125	8	46	974	*4455*
Mallard ..	444	1086	763	88	2381	*4508*
Gadwall ..	18	2	4	1	25	*21*
Wigeon ..	8	2	3	1	14	*92*
Garganey ..	21		1		22	*51*
Shoveler ..	19	9	3	5	36	*30*
Pochard ..	15		1	1	17	*13*
Tufted Duck	39		2	4	45	*29*
Scaup ..	1			2	3	*0*
Goldeneye ..				1	1	*0*
Total 1960/61	1386	1224	793	150	3553	
Total 1959/60	*4801*	*2820*	*1135*	*482*		*9238*

With the help of Mr. George Waterston, Mr. D. R. Anderson began to operate a cage trap at Duddingston Loch, Midlothian. The numbers taken there and by Miss E. A. Garden at Newburgh, Aberdeenshire, were however small and Scotland is still under-represented by ringed ducks.

Geese. No rocket-netting expeditions were made during the year. The only geese ringed were 7 Greylags caught by Mr. E. A. Maxwell on his farm in Dunbartonshire. This hiatus in goose ringing is only a temporary one. Our intention is to concentrate on catching Barnacles and Brent but there are some formidable practical, and especially political, difficulties to be overcome.

Swans. During 1961 the Trust undertook to pay the British Trust for Ornithology for all rings used on Mute Swans. The number ringed during 1961 is not yet known precisely but is well in excess of the 1,422 marked in 1960, prior to which year only 937 had ever been ringed. This great surge in swan ringing is bringing most interesting results. An outstanding contribution is being made by Dr. C. D. T. Minton with intensive marking of swans in a large area in Staffordshire. Other independent studies are being made by Mr. C. M. Perrins of the Edward Grey Institute, by the Cambridge Bird Club and by Dr. A. B. Watson.

A wild Bewick's Swan caught in the pens at Slimbridge on 2nd April, 1961 was the first to be ringed in Britain. It returned to spend most of the winter of 1961-62 at Slimbridge, in company with up to 20 others.

Miss E. A. Garden ringed three Whooper Swans on the Ythan estuary, Aberdeenshire.

Waders. In August 1961 the Wash Wader Ringing Group again used the Trust's rocket-netting equipment to catch 1888 waders of seven species in three catches in Lincolnshire. Dunlin again predominated, by accident rather than design. The most notable captures were 58 Bar-tailed Godwit. Only three foreign-ringed Dunlin were caught, compared with 15 in August, 1960 but there were no fewer than 43 recaptures of birds marked in the same area in the previous year. The technique is going to prove valuable in studying 'homing' to passage- and winter-quarters, but the main targets in future years will continue to be the species not yet caught in any numbers, particularly Knot, Bar-tailed Godwit and Grey Plover.

In September 1961 a Trust team joined Dr. E. White of Liverpool University to explore the possibility of catching Oystercatchers on the Dee estuary, Cheshire. After several disappointments one catch of 151 was made. A return to the area in October was prevented by bad weather, but it is clear that useful catches can be made there and at other places where Oystercatchers are numerous. In view of the interest in and controversy aroused by the feeding behaviour and increasing abundance of Oystercatchers, the Trust's research will help the Ministry of Agriculture, Fisheries and Food.

Our participation in wader ringing has been greatly helped by substantial financial assistance from Group Captain R. Smyth Pigott, who pioneered the use of rocket-nets in catching waders around 1950. In 1961 there seemed to be a danger that the work would be stopped by exhaustion of the supply of propellant but, thanks to the efforts of Lt.-Col. C. F. Tumber, O.B.E., this threat has now receded.

Wild Geese at the New Grounds 1960-61

European White-fronted Goose *Anser albifrons albifrons*

8 arrived on 27th September, 1960. Numbers increased rapidly to 277 on 1st October, and 420 on 2nd, then slowly to 520 on 18th and 600 on 28th, falling slightly in early November and remaining around 500 for most of that month. On 1st December there were over 700: no more arrived until 21st when the total reached 800. There were 990 on 11th January, 1961, 1500 on 18th, 2600 on 22nd and 3000 on 26th, then a drop to 2200 on 1st February, 2650 on 2nd, rising to 3300 on 14th and the season's maximum of 3500 on 22nd and 25th February. Numbers fell steadily thereafter and the last four were seen on 16th March. This was a return to the pattern of former years, when departure in early March was customary.

The proportion of young birds in October was 37.0%, well above average. By the end of January it had dropped to 25.3%, though it rose again with the later immigrants to 31.0% in early March.

No geese of the Greenland race *flavirostris* were seen in the season 1960-61.

Lesser White-fronted Goose *Anser erythropus*

One adult seen on 17th and 21st February, 1961.

Pink-footed Goose *Anser brachyrhynchus*

First seen 25th September, 1960: four, increasing to ten in the afternoon. On 27th September increased to 36, on 7th October to 53, on 13th to 100 and to 107 by 18th. During November the numbers seen were close to 110, with a peak of 117 on 30th. Over a hundred remained until 27th December and there were 80 on 30th, unusually late for so large a number at the New Grounds. In early 1961 the only records were of a single bird on 26th January and 2nd February and a party of seven on 14th and 15th February. The proportion of young birds in the autumn flock was high, about 40%.

Bean Goose *Anser fabalis*

One dark-bellied first-winter bird present from 28th September to 30th November, 1960. A different bird seen on 26th January, 1961.

Dark-bellied Brent Goose *Branta bernicla bernicla*

One first-winter bird seen from 1st October, 1960 to 7th March, 1961. An adult from 14th February to 6th March, 1961. Two birds of this race present 15th to 18th April, 1961.

ADMINISTRATION

STAFF

The senior members of the administrative staff are Brigadier C. E. H. Sparrow, O.B.E., M.C., Controller, Mr. E. A. Scholes, Secretary, and Mr. H. G. Gower, Bursar. Mr. D. Eccleston, Mr. C. M. Garside and Mrs. L. B. Scott are assistant secretaries. The hostel is under the management of Mrs. M. Knox, who has the help of Mrs. H. Cobb. Mrs. S. T. Johnstone is in charge of the Gate Houses and is assisted by Mrs. V. M. Hawkins, Mrs. E. Warren and Miss J. Price at the New Grounds and by Mrs. J. Prendergast at Peakirk.

MEMBERSHIP

Class of Membership	Jan. 1959	Jan. 1960	Jan. 1961	Jan. 1962
Life Members	157	184	229	298
Full Members	3206	3024	2813	3360
Associate & Parish	1475	1505	1590	1704
Junior Compounded ...	1	3	3	6
Gosling Members	315	331	254	296
Corporate Members	174	169	112	88
Contributors	24	28	28	34
	5352	5244	5029	5786

CLASSES OF MEMBERS

Life Members : Fifty guineas. Entitled to all privileges of Full Membership (see below) during life and exempt from payment of any subscription, excepting any sum being paid yearly under Deed of Covenant.

Full Members: Annual subscription £2. 2. 0d. Entitled to free access to pens and observation-huts at the New Grounds and at Peakirk, with one free guest, to one free copy of the Annual Report and of all Bulletins and to attend and vote at General Meetings.

Junior Compounded Members: Only persons under 21. One payment of £10. 10. 0d. Entitled to all privileges of Full Membership (as above) until attaining the age of 21. May then, if they wish, pay another 40 guineas and be elected Life Members.

Associate Members: Annual subscription 10/-. Entitled to free access to pens and observation huts and to free copies of all Bulletins.

Gosling Members: Annual subscription 7/6d. Limited to persons under 18. Entitled to free access to pens at the New Grounds, and at Peakirk. (With the aim of encouraging interest in Wildfowl among children, a system has been introduced of grades of Goslings, with appropriate distinguishing marks and promotion by recognition-test. Full particulars of this scheme are given in the separate leaflet available at the Gate Hut at Slimbridge or Peakirk).

Corporate Members: Annual Subscription 10/-. Limited to Educational Establishments, Youth Clubs, and bodies which are Members of the Council for Nature. Admission to the Trust's collections for Corporate Members is on payment for each member of the party of the entrance fee in force at the time of the visit. Members of corporate bodies in parties of not less than 10 nor more than 35 are entitled at times previously arranged with the Gate Houses to a conducted tour of the enclosures at the New Grounds or at Peakirk and to access to the observation hides at the New Grounds in the company of a warden. One free Annual Report, one copy of all Bulletins.

Contributors: Organisations, institutions and establishments which do not qualify for corporate membership, may become Contributors by subscribing not less than one guinea a year. Contributors receive one copy of the Annual Report and of every bulletin.

General Public: The grounds are open to the public daily (excepting Christmas Day). Visitors are admitted from 9.30 on weekdays (from 12 noon on Sundays) up to 6.30 p.m. during the period of Summer Time and up to half-an-hour before sunset during the rest of the year. Sunday mornings are reserved for members. Charges for admission: Slimbridge, Adults 3/6d., Children under 16 1/6d. Peakirk, Adults 2/6d., Children under 16 1/-.

Parties: Applications must be made well in advance in writing to Slimbridge or Peakirk. School parties can only be arranged when a Warden is available to show them round, and must not exceed one coach load (35-40 persons).

OBITUARY

The Council has learned with regret of the deaths of the following Members and Associates:

A. J. Annandale
J. T. Baron
Mrs. C. Biddell
Miss V. A. L. Bridgeman
Dr. Enid M. Browne
Lt.Col. H. G. Brownlow
Mrs. N. Chilton
Miss M. B. Clark
Sir George Cooper, BT.
Miss C. L. Corbett
J. M. Corin
D. Dandridge
Lt.Col. A. C. S. Delmege, M.C.
Major C. Druce
S. J. K. Eames
A. J. M. Fairbairn
A. F. Foote
P. Fraser
H. M. Green
Miss D. G. Griffin
J. G. Harrison
F. V. Hebard
Mrs. E. H. Hoare
Sir John Hobhouse, M.C.
Mrs. K. Hurst, O.B.E.
Captain R. T. Janson, R.N.V.R.
R. F. Jolley
H. S. Joyce
C. S. McCririck
C. R. Malcolm
F. G. Manvell
L. S. Manvell
D. J. Marling
Colonel H. Meynell
Miss M. Mirfin
H. O. Missenden, O.B.E.
Mrs. B. J. Ormen
D. L. Pattullo
Miss K. M. Pearson
Mrs. D. K. Percival
Miss N. K. Price
J. H. Pycroft
Mrs. M. M. Richards
Miss H. M. Rycroft
Major A. G. L. Sladen, M.C.
P. W. Thomas
The Lady Clementina Tottenham
H. B. Turner
Iolo A. Williams
Rev. M. W. Willson
Mrs. C. M. Wilson
W. Wilson
T. Wilton, C.B.E.
Major H. J. Wyld
F. G. Yeo

YEAR BOOK FOR 1961

WILDFOWL RESEARCH AND CONSERVATION IN EUROPE IN 1961

Introduction

National activity and international co-operation in problems of research and conservation have quickened in recent years. The purpose of the series of reports presented here is to show what has been happening in various parts of Europe. From an insular point of view this may be useful in putting the efforts of the Wildfowl Trust and other British organisations into the European setting from which they cannot properly be separated. From a wider viewpoint it may be helpful to have available a summary showing what research work is actively in progress and, in the field of conservation, to be able to see how far the problems of different countries are common ones.

The form of this symposium has been largely determined by the way in which it was provoked. A questionnaire was sent to authorities in 21 countries and elicited 13 replies, set out in a standard order, but differing greatly in length. We are very grateful for the help afforded by all the authors and correspondents whose names appear with their appropriate national accounts. It is hoped to deal with some of the outstanding omissions—the U.S.S.R., Poland and Germany—in a later Report.

International co-operation in the field of wildfowl conservation is achieved primarily within the wider activities of the International Council for Bird Preservation, which has active National Sections in 20 European countries. Since 1947 a subsidiary organisation of the I.C.B.P., the International Wildfowl Research Bureau (known until 1954 as the Research Institute) has been especially concerned with wildfowl problems. Dr. Edward Hindle, F.R.S., a member of the Wildfowl Trust Scientific Advisory Committee, was Hon. Director of the Bureau from its formation until the end of 1961. In the Bureau's Newsletter No. 12, published in December 1961, Dr. Hindle has given an account of the work accomplished by the I.C.B.P. and I.W.R.B. from 1936 to 1961. With the appointment of Dr. L. Hoffmann to succeed Dr. Hindle as Hon. Director, the headquarters of the Bureau have been transferred from London to the Station Biologique de la Tour du Valat, le Sambuc, Bouches du Rhone, France. With this move, Miss Phyllis Barclay-Smith, M.B.E., relinquished her onerous role of Secretary to the Bureau. The cause of wildfowl conservation has owed much to the efforts of Dr. Hindle and Miss Barclay-Smith.

There is a second organisation concerned with the co-operation of research, the International Union of Game Biologists. This is primarily an assembly of professional biologists and technicians concerned with all kinds of sporting animals, in which wildfowl specialists form only a minority. They have banded themselves into a " waterfowl working group." During 1961 it was agreed that, though the membership of this group differed somewhat from that of the working group of the I.W.R.B. set up in 1960, it would be economical and convenient for the two bodies to act as one in arriving at detailed plans for co-ordinated research projects. Examples of joint action were provided by meetings at the I.W.R.B. meetings in Paris in April, 1961

and again during the 5th Congress of the I.U.G.B. in Bologna in September, 1961, which resulted in agreed programmes for research on geese. The main barrier to progress in research on an international scale is certainly not difficulty in co-operating, but the acute shortage of wildfowl biologists, due largely to lack of funds.

Wildfowl Research and Conservation in Iceland

Finnur Gudmundsson

Museum of Natural History, Reykjavik

THE Icelandic section of the I.C.B.P. is the only organisation actively concerned in bird conservation, including that of wildfowl. Ringing and other research are organised by the Náttúrugripasafnid (Museum of Natural History).

Ringing. Large numbers of ducks have been ringed, nearly all at Myvatn, and Pink-footed and Greylag Geese have also been marked in useful numbers. But in recent years shortage of money and staff has led to a great reduction in ringing and the accumulation of much recovery material awaiting publication.

Other research. No censuses of breeding or wintering populations are being made at present. Arnthor Gardarsson has been making a study of the waterfowl populations at Myvatn for the last two years. He has been particularly concerned with the catching of ducks in fishing nets as a mortality factor.

Conservation. The bird-protection act which came into force on 1st January, 1955 has not required amendment in recent years. There is an open season for geese from 20th August to 31st October. For most ducks the open season is from 1st September to 31st October, with an extension to 29th February relating to the Mallard, Wigeon and Long-tailed Duck. Breeding colonies of the Eider are given extraordinary protection. The taking of duck eggs in Myvatnssveit and other areas where ducks breed in great numbers is permitted, with the rule that at least four eggs shall be left in each nest. This provision does not apply to eggs of the Shoveler or of swans and geese.

The most serious threats to wildfowl are presented by drainage schemes, overgrazing and the wild mink.

Wildfowl Research and Conservation in Finland in 1961

Pekka Grenquist

Game Research Institute, Helsinki

THE Game Research Institute of the Finnish Game Foundation receives government appropriations for investigations on game and fur animals in Finland. This financial aid is given annually through the Bureau of Fishing and Hunting Administration of the Ministry of Agriculture. Only about one-tenth of the money annually available for game research is used for investigations on ducks, geese and swans, corresponding approximately to the proportion of wildfowl in the total production of hunting in Finland.

Wildfowl investigations are also conducted by the zoology departments of the Universities of Helsinki, Turku and Oulu, by the State Veterinary Medical Institute and by independent researchers. Initiation and proposals for new investigations can be made, for example, by the Government Supervisor of Hunting, by the Government Inspector for the Protection of Nature, by the Finnish Sportsmen's League, by the Finnish League for the Protection of Nature and by the Ornithological Society as well as by other scientific societies in Finland.

A list of waterfowl studies carried out by the Institute and published in the years 1945-1957 was presented at the fourth Congress of the International Union of Game Biologists in the Netherlands in 1959 (Grenquist 1960) and some studies still in progress were reviewed even earlier, at the Congress of Game Biologists in Denmark in 1957 (Grenquist 1958).

Current research. The reproductive biology of a Velvet Scoter population in the outermost archipelago in the Gulf of Finland has been dealt with in several papers by J. Koskimies. Studies by M. Sirén on the Goldeneye in the inland lakes are being continued and supplemented by investigations on two Goldeneye populations in the southwestern archipelago by P. Grenquist and T. Ormio. J. Koskimies is conducting investigations on the bioenergetics of artificially-reared ducklings at the Evo Game Research Station. Since 1960 Miss K. Bassin has been studying the following reaction of the ducklings of Eider and Tufted Duck at the Zoological Research Station of Tvärminne. A paper by T. Lampio (1961) deals with the migration and breeding population of the Bean Goose in Finland, mainly on the basis of questionnaire data collected by the Game Research Institute and the Finnish Sportsmen's League. The question of overcrowding and its influence on reproduction is studied by P. Grenquist on some small islands in the outer archipelago.

Since the spring of 1960 migrating populations of Long-tailed Duck and Common Scoter have been studied by means of radar and their numbers estimated in the area of the Gulf of Finland (Bergman & Donner 1960, Bergman 1961). Yearly censuses of the breeding wildfowl populations, mainly on the basis of nest counts, have been conducted since 1948 by the Game Research Institute on more than 300 islands in six areas in the outer archipelago. Grenquist 1961). Yearly counts of adult birds, broods and ducklings have been made by the Institute in early August in two archipelago areas. Duck populations of more than 200 lakes in an area in southern Finland have been censused by P. Linkola between 1948 and 1960. Counts were based on males observed at the beginning of the breeding season (Linkola 1959, 1960, 1961).

The winter bird census organised annually by the Zoological Museum of the University of Helsinki since the winter 1956-57 has revealed a continuously increasing number of wintering Mallard in the cities, towns and villages in southern Finland. The Mallard is the only anatid species wintering regularly and in considerable numbers. About 5000 Mallard were counted in Helsinki in December, 1960. The ethology of reproduction of the wintering Mallard was studied by K. Raitasuo during the 1950s. I. Stén has carried out frequent counts of wintering Mallard in Helsinki since the latter half of the 1950s and investigated the changes in the population throughout each winter.

The eastern expansion towards the mainland of the breeding area of the Mute Swan in the southwestern archipelago is being followed with great interest (Tenovuo 1960, 1961). G. Bergman is studying the ethology of the seabirds in mixed colonies in the archipelago. Wildfowl are also included in the investigations carried out since 1949 by O. Hildén on the bird fauna of the island group Valassaaret in the Gulf of Bothnia.

Marking of birds with rings has been carried on since 1913 by the Zoological Museum of the University of Helsinki. Wildfowl have mainly been ringed as full-grown, some of the Mallard apparently as flightless juveniles. The Finnish Game Foundation commenced marking gallinaceous birds and wildfowl with wing tags in 1947. *Anas* species and Goldeneye have been marked mainly as pulli, and many nesting females of Velvet Scoter, Goldeneye, Eider and other diving ducks have also been marked with wing tags. The marking work, both with rings and wing tags, has from the beginning of 1962 been concentrated at the Zoological Museum of the University of Helsinki. The marking data from 1913 to 1961 are given in the table below (Rajala 1959 and Koivisto in writing, Nordstöm 1961 and by letter).

Numbers of wildfowl marked in Finland 1913-61

	Marked with rings			Marked with wing tags		
	1913-60	1961	Total	1947-60	1961	Total
Anas platyrhynchos	1821	26	1847	1117	149	1266
A. crecca	273	16	289	225	24	249
A. querquedula	3	—	3	10	3	13
A. penelope	99	1	100	88	—	88
A. acuta	188	—	188	108	1	109
A. clypeata	104	—	104	117	1	118
Anas sp.	17	—	17	195	6	201
Aythya marila	53	—	53	53	—	53
A. fuligula	296	2	298	104	22	126
A. ferina	17	—	17	10	11	21
Bucephala clangula	114	5	119	470	96	566
Clangula hyemalis	8	—	8	3	—	3
Melanitta fusca	203	—	203	222	18	240
M. nigra	9	—	9	5	1	6
Somateria mollissima	412	27	439	111	132	243
Mergus serrator	166	13	179	145	22	167
M. merganser	76	—	76	69	46	115
M. albellus	—	—	—	11	1	12
Anser anser	18	—	18	4	1	5
A. fabalis	18	—	18	16	4	20
A. erythropus	1	—	1	—	—	—
Cygnus olor	2	—	2	—	—	—
C. cygnus	11	—	11	—	—	—
Total	3909	90	3999	3083	538	3621

Conservation and legislation. All Finnish wildfowl species are considered to be huntable game. Conservation of wildfowl by total protection of a species, by the length of the open season and other shooting regulations as well as by any other means of game management has thus to be achieved under the conditions of the Hunting Law. The Bureau of Fishing and Hunting Administration at the Ministry of Agriculture supervises the practical applications of the Hunting Law. The opening and closing dates of the hunting seasons are issued annually by this bureau. When setting the seasons attention is paid to the population status reports of the Game Research Institute and to reasonable proposals of the Finnish Sportsmen's League as well as of other interested organisations.

In Finland the hunting rights belong to the land owner, who may often have part of his best wildfowl areas protected as a reserve. If the duck population of an originally suitable wildfowl area is threatened for any reason, or if those having the hunting rights have not been able to agree upon a necessary management programme, the Bureau of Fishing and Hunting Administration may take the initiative to enforce protection. It may also give its official opinion about proposals for protection. Protection is established by a resolution of the district government, generally for a three year period. Regrettably, there are no figures available of the total area of the wildfowl reserves described. The Bureau approves about ten proposals a year.

On the mainland the practical management work of wildfowl as well as of other game is carried out by 240 game management associations, whose activities are supervised by the state government. There are altogether 1600 private hunting clubs of the Sportsmen's League working under these associations. Financial aid is given by the state to both management associations and hunting clubs for law enforcement, information and practical management work. Wildfowl management has chiefly comprised feeding of wintering ducks, protecting areas for migrating geese and in about 40 per cent of the clubs setting out nest boxes for Goldeneye.

There are 43 waterfowl protection associations in the southern and south-western archipelago. These associations have to keep fairly large areas protected in order to have permission to shoot in spring. Their activities have been described in detail by Grenquist (1951). The reserves of these associations comprise roughly one half of the southern and south-western archipelago excluding the province of Åland. There are in Åland many associations with similar activities, but additionally there are many totally closed areas, the bulk of them leased by a private bird protection society, " Ålands Fågelskyddsförening." The associations and protected areas of Åland have been described by Nordberg (1951) and Bergman (1951). The executive authority regarding hunting and conservation in Åland belongs to the provincial government " Landskapsnämnden."

In Finland a district government may also establish protection of a wildfowl area under the Law of Nature Protection. In such cases initiative may be taken or an official statement given by the Government Inspector for the Protection of Nature, at the Department of Nature Protection, Forest Research Institute, Helsinki. The archipelago areas protected as wildfowl breeding grounds were described by Bergman (1951). According to the Government Inspector there were in 1961 23 protected wildfowl areas in the archipelago

with a total land and water area of about 267 sq.km. and on the mainland 3 protected bird lakes in total at least 22 sq.km.

The Department of Nature Protection is in close co-operation with the Finnish League for the Protection of Nature. For instance, since the winter of 1957-58 keepers have been arranged and maintained in about 10 localities in different parts of the country for Whooper Swans delayed in their autumn flight and endangered by the winter.

It may be mentioned with satisfaction that wildfowl breeding populations have been increasing during the last decade. The numbers of wildfowl in archipelago reserves have about doubled since 1951 (Grenquist 1961). The duck populations of inland lakes have also increased, Mallard as much as the wildfowl populations of the archipelago on the average (Linkola 1961). Obviously these changes can to a considerable extent be ascribed to organised hunting, to less intensive spring shooting in the archipelago, and to the achievements of both game management and nature protection in evidently favourable climatic conditions. From the Finnish point of view oil death and winter shooting in the Baltic and North Sea areas seem to be the severest obstacles to wildfowl conservation.

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Wildfowl Research and Conservation in Sweden in 1961

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Organizations concerned in research and conservation

INVESTIGATIONS on wildfowl in Sweden are carried out by several institutions. In 1956 the Zoological Department of Nordiska Museet and Skansen started an ecological research programme on different species of vertebrates, which were of interest not only from biological viewpoints but also from economic angles, because these species constantly, or at least very often, are said to cause considerable damage to what is considered to be the property of man. Geese are accused of damaging crops, Mute Swans of feeding on fish and Eagles of preying on important game species, which man would like to monopolize for himself. Such was the background to the selection of species for ecological research. The Nordiska Museet and Skansen has also worked for many years on the ecology of vertebrates living in the Scandinavian mountain chain (mainly on the Swedish side from northernmost Swedish Lapland to northern Dalecarlia). Since ducks and geese are important factors in Scandinavian sub-alpine and alpine habitats much work has been concentrated on these species.

Other institutions working on wildfowl are the Svenska Jägareförbundet (The Swedish Sportsmen's Association) and the Sveriges Ornitologiska Förening (The Swedish Ornithological Society). While the former organization has studied the populations of the Greylag Goose *Anser anser* living along the Baltic coast and the reproduction of Mallard *Anas platyrhynchos,* the latter has chiefly dedicated its work to counts during the migration periods.

Organizations dealing with the conservation of wildfowl are the following: Kungl. Svenska Vetenskapsakademien (The Royal Swedish Academy of Sciences), which through its Committee of Conservation of Nature is responsible for the scientific approach to different problems of conservation as well as the scientific maintenance and administration of the National Parks. The Committee also organizes investigations in vast areas which are threatened by exploitation, as, for example, for hydro-electric purposes.

The Kungl. Domänstyrelsen (The Royal Board for Crown Lands) acts as co-administrator of the National Parks and has the direct supervision of these areas as well as of a large number of other nature reserves. The Board also annually submits to the Government proposals concerning close times for birds and mammals after having consulted the other organizations mentioned.

The Svenska Naturskyddsföreningen (The Swedish Society for Conservation of Nature) is officially charged to deal with all matters regarding the conservation of Sweden's nature. As to the birds the society co-operates closely with The Royal Swedish Academy of Sciences and The Swedish Ornithological Society. The latter organization's main activities are research and conservation and it is responsible for the Ottenby Bird Station on Öland as well as for the regular counts of waterfowl migrating through the Kalmar Sound. These counts are done from Skäggenäs on the Swedish mainland.

The Swedish Section of the International Council for Bird Preservation is composed of the Swedish Sportsmen's Association, the Swedish Ornithological Society and the Swedish Society for Conservation of Nature.

As ducks and geese belong to the most vulnerable species of birds (hunting pressure, oil pollution, water regulations for hydro-electric purposes, drainage

of habitats and so son) most activities in the field of ornithological conservation work in Sweden deal with wildfowl.

Ringing activities

The ringing of ducks and geese has hitherto not been very successful in Sweden. Attempts made at the Ottenby Bird Station have failed, but in 1960-61 ducks spending the autumn and winter on the waters of Stockholm and Örebro have been ringed. On 18th September, 1961 an experimental duck decoy, based on the model in function at Station Biologique de la Tour du Valat in Camargue, France, was opened (Edberg 1961). The result was that, up to 10th December, 1961, 410 Mallards were captured and ringed (Edberg *in litt.*). This work was done by Mr. Ragnar Edberg, head of the Ottenby Bird Station. The idea is to build a similar decoy system at Ottenby, where ducks in large numbers gather during the summer and autumn migrations.

Mute Swans *Cygnus olor* and Mallards spending the winter in the open waters of Stockholm were ringed during the winters 1955-1961. These activities were organized by Mr. Olle Mauritzsson assisted by members of Sveriges Fältbiologiska Ungdomsförening (Youth Society for Field Biology of Sweden). Up to and including the season 1960-1961, 621 Mallards and 521 Mute Swans have been ringed.

The Swedish Sportsmen's Association's marking of Mallards in 1959 and 1960 covered 3,088 birds, which were raised in captivity and introduced at several localities in Central Sweden. There are 189 recoveries of these ducks, 72% from Sweden, 17% from Denmark, 4% from Germany, 4% from Great Britain and so on (Höglund in press). These figures show practically no differences from those based on wild Mallards in Sweden (cf. Olsson 1961).

Other species ringed by the same institution in 1959-1960, as well as the total numbers of ringed waterfowl since 1945 are according to Höglund (in press) as follows:

Species	Ringed birds			Recoveries		
	1959	1960	Total 1945-60	1959	1960	Total 1945-60
Anas platyrhynchos	2179	909	6487	129	67	388
A. crecca	38	—	186	4	1	22
A. querquedula	—	—	13	—	—	—
A. penelope	2	—	59	—	—	7
A. acuta	2	—	82	—	—	8
A. clypeata	—	—	77	—	—	5
Aythya marila	—	—	66	—	—	1
A. fuligula	16	1	170	1	—	5
A. ferina	—	—	42	—	—	—
Bucephala clangula	183	56	1306	27	25	157
Clangula hyemalis	—	—	6	—	—	—
Melanitta fusca	8	—	149	—	—	3
M. nigra	—	—	2	—	—	1
Somateria mollissima	191	113	749	29	26	94
Mergus serrator	2	—	74	—	—	4
M. merganser	14	1	232	2	1	19
M. albellus	1	—	2	—	—	1
Tadorna tadorna	22	—	113	1	—	4
Anser anser	68	15	228	13	10	33
A. albifrons	—	—	2	—	—	—
A. erythropus	—	—	10	2	—	3
A. fabalis	—	—	12	1	—	3
Branta leucopsis	1	—	7	—	—	—
B. canadensis	55	27	111	—	14	15
Cygnus olor	13	—	107	—	—	3
C. cygnus	—	—	10	1	1	1

From the Naturhistoriska Museet in Gothenburg the following figures are available (Fontaine, 1960):

Species	Ringed birds 1959	Ringed birds 1911-1959	Recoveries 1911-1959
Anas platyrhynchos	39	1.243	146
A. crecca	—	55	5
A. querquedula	—	—	—
A. penelope	—	1	—
A. acuta	—	122	13
A. clypeata	4	91	15
Aythya marila	2	31	11
A. fuligula	21	58	5
A. ferina	3	15	1
Bucephala clangula	7	37	5
Melanitta fusca	—	41	4
M. nigra	—	1	—
Somateria mollissima	8	468	109
Mergus serrator	4	45	4
M. merganser	—	34	7
Tadorna tadorna	11	63	—
Anser anser	—	111	14
A. fabalis	—	2	2
Branta canadensis	1	1	1
Cygnus olor	2	165	44
C. cygnus	—	18	6

From the Naturhistoriska Riksmuseet in Stockholm only the number of birds ringed during the period 1913-1949 and the years 1951 and 1960 are available (Sten Österlöf *in litt.*):

Species	Ringed birds 1913-1949	Ringed birds 1951	Ringed birds 1960
Anas platyrhynchos	1568	83	752
A. crecca	96	3	7
A. querquedula	8	—	—
A. penelope	3	—	6
A. acuta	57	3	27
A. clypeata	48	—	54
Aythya marila	12	—	—
A. fuligula	144	8	36
A. ferina	32	—	5
Bucephala clangula	154	26	61
Clangula hyemalis	1	—	—
Melanitta fusca	48	—	1
M. nigra	4	1	—
Somateria mollissima	84	30	10
Mergus serrator	26	3	2
M. merganser	51	5	15
Tadorna tadorna	29	1	16
Anser anser	43	—	24
A. fabalis	15	—	—
Branta canadensis	6	—	19
Cygnus olor	58	8	311
C. cygnus	18	—	1

The Nordiska Museet and Skansen has only ringed a limited number of *Anatidae*, mainly individuals which were nesting in freedom at the Skansen,

the Zoological Garden of Stockholm. The figures covering the period 1954-1961 are the following:

Species	Ringed birds 1954-1961	Recoveries
Anas platyrhynchos	2	—
A. strepera	5	—
A. penelope	2	—
A. acuta	2	—
A. clypeata	2	—
Aythya marila	2	—
A. fuligula	10	—
A. ferina	8	—
Tadorna tadorna	25	—
Anser anser	23	5
A. albifrons	8	—
A. erythropus	16	—
A. fabalis	15	—
Branta leucopsis	16	1
Cygnus olor	62	11

Censuses. In 1960 the Nordiska Museet and Skansen in co-operation with the Swedish Sportsmen's Association and the Swedish Royal Airforce organised an inventory of the Barnacle Geese *Branta leucopsis*, which rest along the coasts of Gotland during the spring migration. The result of this count has been published by Boyd (1961). In 1961 a census of the Greylag Goose was started in the archipelago of Norrbotten, organized by the local game warden Rune Almqvist of the Swedish Sportsmen's Association. The inventory will be continued in 1962.

During the winter 1961-1962 a census of the Long-tailed Duck *Clangula hyemalis* wintering in the seas along the Swedish coasts was organised by the Nordiska Museet and Skansen and the Swedish Society for Conservation of Nature. This scheme is a part of an international inventory on the Baltic Sea and the North Sea, promoted by the International Wildfowl Research Bureau and based on a proposal from Sweden.

Studies of particular species

Other inventories have been made in connection with the ecological investigations mentioned at the beginning of this article and they need some more comments. During the first six years of field work concerning the ecology of particular vertebrates and organized by the Nordiska Museet and Skansen five species of wildfowl have been involved. They are the Bean Goose *Anser fabalis*, the White-fronted Goose *A. albifrons*, the Barnacle Goose, the Canada Goose *B. canadensis*, and the Mute Swan. A similar scheme is under preparation and concerns the Greylag Goose.

The investigations on the ecology of wintering Bean Geese and White-fronted Geese were carried out in Scania, southernmost Sweden, in co-operation with the Zoological Institute of the University of Lund. The ecological field work was begun in 1956 and was finished in 1960 by Mr. Gunnar Markgren, who during certain periods was assisted by other people. Simultaneously Mr. Sven Mathiasson and his team studied the migratory movements of the two goose-species above Scania. Previously Professor Erik Dahl had been interested in the taxonomy of the population of *Anser fabalis* occurring in Scania during the winter, an essential aspect for a thorough understanding of

the geographical origin of the Scanian geese. His research on this topic continued as a third line of the goose investigations. Important results have been obtained and will be published in *Acta Vertebratica* as three separate papers by Dahl, Markgren and Mathiasson.

Long-term investigations on the grazing activities of Barnacle Geese along the coasts of Gotland were initiated in the spring of 1961. This species is accused of competing seriously with the sheep and is said to cause considerable damage during the periods the geese spend in these areas in spring and in autumn. Mr. Anders Bjärvall is working on this subject.

The increase of the introduced Canada Goose in Blekinge has been followed by increasing protestations from farmers, who state that the species is damaging their crops. Therefore, a long-termed study of this goose has begun at the end of 1961. Mr. Björn Nilsson is responsible for the field work.

Also in 1956 ecological research on the Mute Swan started in two different areas along the Baltic coast, one in Blekinge, south-eastern Sweden, the other in Östergötland. The selected areas represent brackish water localities, where dense populations of *Cygnus olor* occur. The ecological investigations have followed several lines of research: botanical, ichthyological, bacteriological, population dynamics, nutritional biology, and so on. Aerial counts in co-operation with the Royal Swedish Air Force were made every month during several years. The main work in Blekinge was carried out by Mr. Björn Berglund, while Mr. Viking Olsson was in charge of the research in Östergötland. In addition special studies were made by Professor Hans Luther, Professor Wilhelm Rodhe and Mr. Gunnar Sellerberg. The results will be published in Acta Vertebratica as five separate papers by Berglund, Luther, Rodhe, Olsson and Sellerberg.

Since the increase of the Mute Swan in Europe has been much discussed during the last years in relation to the consequences it may have on the environment, it is perhaps of interest to give here a preliminary summary of the investigations on this species and their results in Sweden.

Continuous analyses of bottom vegetation changes were made in fixed squares in depths of water between 0.3 and 1.5 metres. During the five years of observations few vegetation changes have been noted but ecological successions may be represented. In no cases were changes found to have any connection with the grazing intensity of the swans. In particular the vegetation-free bottoms for which the swans had been blamed were found to represent a stage in the natural vegetation succession. The most important factor is in fact ice erosion followed by wave erosion. (Similar conclusions were reached in Polish investigations on the southern coast of the Baltic).

Estimations of the food consumption of swans have enabled calculations to be made of their effect on the bottom vegetation in relation to the productivity of the constituent plants. Consumption was found to represent an exceedingly small part of production.

Water samples for pollution control were taken seven times in a year from four localities with swan populations of 50-200 and also at two localities not visited by swans. Only small differences were found in ionic composition, pH, nitrate-nitrite-nitrogen concentrations. No correlations with the numbers of swans were found.

Bacteriological investigations covered agar and coliform bacteria and faecal streptococci. While swans probably do cause some alterations in the

bacteriological condition of the water, tidal interchange of water prevented any demonstrable pollution correlated with swan density.

Even locally it did not seem that swans had any effect on spawning of fish. Variations in fish populations are on a large scale and have quite different causes, such as changes in the hydrographical conditions.

A total of 51 swans were killed within Blekinge in 1959 for examination of their visceral contents. 19 were killed at the end of March (mainly in the outer archipelago), 13 at the end of April (in the inner archipelago and at the spawning time for pike and perch), 13 at the beginning of June (fish eggs still present) and 6 at the beginning of August. 95-100% of the stomach contents consisted of plants grazed from the submarine meadows. Animal matter occurred in very small amounts and apparently by accident. No fish eggs or fry were found. Parallel investigations were made in Östergötland by analysing swan droppings. These also showed that the food consists almost completely of vegetable matter. No shrimp remains were found in any of the stomachs examined. Variations in the frequency of shrimps are in all probability dependent on changes in the hydrographical conditions.

The Swedish investigations have not found any evidence that concentrations of swans are in any way harmful to coarse fishing interests.

Major difficulties hindering wildfowl conservation

The major difficulty hindering wildfowl conservation in Sweden has for many years been oil pollution. Every winter discharges of waste oil by ships cause heavy losses among the populations of ducks wintering in the Baltic Sea, especially those of *Clangula hyemalis*. The latest catastrophe of this kind took place in January 1962. Also the hunting pressure on ducks is considerable. All investigations on mortality factors in Fenno-Scandian *Anatidae* carried out hitherto indicate that human hunting is the dominating death cause (cf. Koskimies, 1956, Olsson, 1960). Even if the percentage of ducks killed by hunters is not entirely representative for a population chosen at random, it is sufficiently high to show that hunting is the primary mortality factor.

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Wildfowl Research and Conservation in Denmark in 1961

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THE following three governmental organisations are involved in wildfowl studies: The Game Biology Station, Kalö (G.B.S.) (ringing and field studies), Naturfredningsrådet (field studies), and Zoological Museum, Copenhagen (ringing). In addition private groups concern themselves with wildfowl occasionally, but there is no permanent organisation with this particular field of activity.

Ringing. Activity in 1961 is shown in tabular form:

	Zoological Museum *	Game Biology Station	Total
Mute Swan	64	—	64
Greylag Goose	61	107	168
Dark-bellied Brent Goose	—	30	30
Pale-bellied Brent Goose	—	1	1
Shelduck	21	20	41
Mallard	1158	613	1771
Teal	87	339	426
Wigeon	8	—	8
Pintail	1	—	1
Shoveler	30	4	34
Red-crested Pochard	38	—	38
Common Pochard	41	—	41
Tufted Duck	31	—	31
Common Eider	103	5	108
Common Scoter	—	1	1
Red-breasted Merganser	1	2	3
Total	1644	1122	2766

* The data on the ringing activity of the Zoological Museum were kindly supplied by stud. mag. N. O. Preuss.

Unfortunately, no information is available on the age groups of birds ringed by the Zoological Museum. Among the 107 Greylag Geese ringed by the Game Biology Station 39 were yearlings and the remainder flightless adults. We have now ringed a total of 910 individuals of this species and the resulting 182 recoveries will be published in the near future.

The 31 Brent were ringed along the perimeter of Jordsand, a small island in the tidal area off the SW coast of Jutland. The captures were made in flight-nets, 4 m. high, 24 m. long and with 19 cm. mesh size (knot to knot); they were suspended vertically between $\frac{3}{4}$″ galvanized iron pipes 6′ high. We were taught the method by old wildfowlers who had used it until it was prohibited by the present Game Act of 1931, but, unfortunately, it proved to be less efficient than we had hoped.

All Mallard ringed by the G.B.S. were hand-reared birds released in various parts of the country (cf. J. Fog, 1958, *Danske Vildtundersøgelser* No. 8). The Teal were caught in a duck decoy on Fanø, an island off the SW coast of Jutland. Here the G.B.S. has restored one of the old duck decoys with a view to ringing activity. It was in the very same place that Hans Chr. Mortensen ringed the first Teal and Pintail during the years 1907-10. The duck decoy is not yet fully restored, hence we hope to increase the number of captures a good deal.

During recent years the G.B.S. has only ringed few Eiders but some older data have just been analyzed and sent to the press. This material, as well as that contributed by the Zoological Museum, consists of adult females taken on the nest.

Breeding studies. In 1954 the Danish breeding population of Mute Swan was censused (Paludan & Fog, 1956, Danske Vildtundersøgelser No. 5). We had then 750 pairs, but the population has much increased since. An unpublished census of breeding Eiders runs to 3000 pairs. These are the only attempts to census breeding populations in recent years.

Winter numbers. The wintering populations are at present only being studied to a very limited extent. Although continuous counts have been made through several years in the Nature Reserve Tipperne in Ringkøbing Fjord, W. Jutland, this activity, carried out by the Naturfredningsråd, does not cover the winter months (cf. Hans Lind, 1956, *Dansk ornith. For. Tidsskrift,* 50). At the G.B.S. observation point on Jordsand counts of Brent, Shelduck, and Eider have been made during the last two years. A Danish-Swedish group of ornithologists (Birger Jensen, Gunnar Markgren and Sven Mathiasson) organized a census of White-fronted and Bean Geese in the autumn of 1960; the census will be published in Vår Fågelvärld (Sweden), but, unfortunately, it has not been planned to continue this work.

Conservation. In connection with the fact that the G.B.S. is often called upon to inspect areas where crop damage is claimed to have taken place an experiment was made in 1961. It was attempted to assess the extent of damage caused by the very large flocks of Pink-footed Geese foraging in grass fields in the early spring. Comparison with fenced plots did not enable us to demonstrate significant damage; but since the extent of damage may be subject to variation between years it has been planned to repeat the experiments in 1962.

During 1961 no changes have taken place in the nature reserves which affect wildfowl, but all over the country smaller areas are being drained, a feature which is likely to reduce the breeding possibilities for ducks. Two large reclamation projects are worth mentioning. The plans concerning Ulvedybet in the Limfjord will, when carried out, deprive migrating ducks of a very important resting place; and reclamation of the Skernå estuary, on the east coast of Ringkøbing Fjord, W. Jutland, will destroy an important breeding area.

The problem of oil pollution, which in recent years has called for some optimism, proved very serious again during the winter 1961-62; several cases of extensive pollution have been reported from the Baltic and the Kattegat, and several thousand diving ducks have succumbed. As far as is known at present Eiders and Long-tailed Ducks have suffered in particular.

In 1961 no changes in game legislation to affect wildfowl have been introduced except that, as in several previous years, the shooting season for surface feeding ducks did not commence until 15th August (instead of 1st August). In this connection it should be mentioned that a committee has been set up to draft a new Game Act.

Wildfowl Research and Conservation in Norway

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Stavanger Museum

THE State Game Research Bureau is actively interested in research and conservation affecting ducks, geese and swans. This includes ringing of the birds, and ringing is also carried out by the Stavanger Museum, our main ringing centre.

Ringing is on a very small scale. The ringing of pulli is forbidden, but some ducks are caught as full-grown young. Only 38 ducks were ringed in 1961 with the Stav. Mus. rings; for the Game Research Bureau figures are not yet available, but they used to be equally small. In 1961 Mr. Hj. M-K. Lund succeeded in catching nearly 90 adult Greylags, moulting and flightless birds. He has also had certain success with catching adult Eider Ducks. This ringing will be continued. Expeditions by British students ringed nearly 600 geese in Spitsbergen some years ago, with our rings. For 1962 an Oslo University students' expedition to Spitsbergen also plans to ring geese.

Population studies. Early in 1961 a census was made by Mr. Lund of the wintering population of Whooper Swans. The results will soon be published. Other censuses have been made only occasionally and locally.

Conservation. A bay, Landekilen, and a fiord, Skogsfjorden, at Mandal, a town in the extreme south of the country, have been declared a reserve for waterfowl. This will provide a refuge for ducks being chased in the open season along the coast outside, but the breeding pairs are few.

Drainage of moors and lakes continues all over the country, and the increased regulation of rivers and lakes for hydro-electricity is also dangerous.

Oil pollution does not seem to be very important with us, except after occasional shipwrecks. Also, oil pollution seems to affect the Alcidae more than ducks.

Wildfowl Research and Conservation in Estonia

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THE organisation which deals with waterfowl conservation and research in Estonia is the Nature Conservancy Board, attached to the Council of Ministers of the Estonian SSR. It is assisted in its labours by the State Game Inspection Office of the Ministry of Agriculture. The Tartu Sporting Club also concerns itself to some extent with the scientific study of waterfowl. But this field is investigated on a far broader scale at the Matsalu National Park, which has been specially set up for purposes of waterfowl conservation and research. Sea birds (particularly the Eider) are studied at the Vaika National Park on the west coast of Saaremaa Is. This reserve celebrated its fiftieth

anniversary in 1960, and thoughout the whole of its existence it has been engaged in the study and protection of the Eider.

Ringing. Pulli of the ducks and geese are at present marked in Estonia partly with rings (in the case of the adult individuals), and partly—more particularly during recent years—with wing marks, both of which are derived from the Moscow ringing scheme. In the past three years a beginning has been made with the trapping and ringing of breeding female ducks (especially Velvet Scoters) in their nesting haunts in the Matsalu National Park. Up to 1000 ducks (both adults and young) are ringed in Estonia in the course of the year, together with a few dozen geese (all Greylags, from Matsalu Bay). The main species ringed are the Mallard, Shoveler, Tufted Duck and Velvet Scoter. As yet, ringing has not been extended to cover migratory ducks and geese.

Breeding studies. Full and accurate censuses of ducks and geese are made every summer in their breeding haunts at Matsalu. On the islands here well-nigh 100% of the nests are traced and registered. Equally exhaustive observations are carried out at Vaika, which is an archipelago of small rocky islets. The chief species nesting here are the Eider, Velvet Scoter, Goosander and Red-breasted Merganser. Our ornithologists have arrived at the conclusion that the only possible way to form an accurate estimate of the duck population during the breeding season is to find and count the nests. In this laborious work we have been widely assisted by students and schoolchildren.

Winter censuses. We tackled the problem of studying the wintering population for the first time in the winter of 1960-61. Fortnightly counts were made on more than thirty bodies of water from the end of October till the beginning of April. A survey of the results obtained will appear in the next issue of the *Communications of the Baltic Commission for the Study of Bird Migration.*

Special studies. Intensive studies of the Greylag Goose, Mallard, Pochard, Tufted Duck, Shoveler and Velvet Scoter are in progress in Matsalu Bay. Researches are conducted both by the local staff and by workers of the Institute of Zoology and Botany attached to the Estonian Academy of Sciences. A selection of the results is to be published in our *Ornitoloogiline Kogumik III* (Articles on Ornithology, III). Over 150 pairs of the Greylag Goose nest in the Matsalu Bay. This is the largest colony of the species in the Baltic area, and has provided one of our research workers with a subject for his degree thesis.

The Eider, which is the most numerous of the breeding ducks at Vaika, with as many as 500 pairs, has also been made the object of special investigation.

Conservation. Provisions have been made for the creation of several new wildfowl reserves in 1961, and steps have been taken to prohibit shooting of the Brent Goose all the year round. One of the major problems facing wildfowl conservation in Estonia is the gradual loss of natural habitats as a result of the steady encroachment of cultivated areas. Oil pollution is undoubtedly a serious factor in reducing the number of sea birds.

Wildfowl Research and Conservation in the Netherlands in 1961

by

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Introduction

THE country of the Netherlands is small, but for wildfowl research and conservation very interesting. Numerous inland waters: lakes, broads, rivers, canals, fens, minor waters and marshland cover about 300,000 ha. (1160 sq. miles). That is about 8% of the 3,600,000 ha " land " of the Netherlands. In addition more than 150,000-250,000 ha of coastal waters (along the North Sea coast, in the Waddensea (with tidal flats) and the Delta-area) and the IJsselmeer-area of about 250,000 ha are also of great importance for wildfowl. More than 20% of the total 4,110,000 ha of the Netherlands, land, Waddensea and IJsselmeer included, are wildfowl habitat.

The Netherlands therefore holds large populations of wildfowl all the year round. The Mallard *Anas platyrhynchos* has the most numerous breeding population with, roughly estimated, more than 500,000 breeding pairs. The Shoveler *Anas clypeata,* the Garganey *Anas querquedula* and the Teal *Anas crecca* are also breeding in rather large numbers (each species however with less than 10,000 breeding pairs). Less numerous (under 500 pairs) or even rare are Pintail *Anas acuta,* Wigeon *Anas penelope,* Gadwall *Anas strepera* and Tufted Duck *Aythya fuligula.* Pochard *Aythya ferina* and Red-crested Pochard *Netta rufina* are rare breeders, as is the case with the wild Mute Swan *Cygnus olor.*

In autumn and in spring hundreds of thousands and probably more than a million ducks of all species, tens of thousands of geese and thousands of swans stay for shorter or longer periods in the Netherlands. When winters are not severe, which is often the case due to the maritime climate (mean temp. in January 1°C) great numbers of duck, geese and swans are wintering in the Netherlands.

It is not astonishing therefore that a great many ornithologists, sportsmen and biologists in the Netherlands are interested in wildfowl and their ways.

Several institutes are dealing with wildfowl research and much is done for the conservation of important breeding areas, resting places and foragegrounds in the wintering grounds.

Research Institutes

Wildfowl research is done mainly in three institutes : I.T.B.O.N., R.I.V.O.N. and Het Vogeltrekstation. Wildfowl research is for all three institutes only a part of their tasks.

The Department for Game Research of the I.T.B.O.N. (Instituut voor Toegepast Biologisch Onderzoek in de Natuur = Institute for Biological Field Research in Nature), Kemperbergerweg 11, *Arnhem,* does research on wildfowl problems connected with shooting. The institute is governmental and related to the Ministry of Agriculture and Fisheries.

The R.I.V.O.N. (Rijksinstituut voor Veldbiologisch Onderzoek ten behoeve van het Natuurbehoud = State Institute for Nature Conservation Research), Soestdijkseweg 33 N., *Bilthoven,* is as far as wildfowl is concerned dealing with the conservation of rare and threatened species and their habitats. It is a governmental institute, part of the State Forestry Service, but financed by the Ministry of Education.

The "Vogeltrekstation" (= Bird Ringing Institute), c/o Rijksmuseum voor Natuurlijke Historie, Raamsteeg, *Leiden,* has, in addition to other research work on migration the task of administering all bird ringing activities in the Netherlands. This institute distributes bird rings, keeps the records and works up the recoveries. When ringing results are needed for wildfowl research the Vogeltrekstation produces the basic data, e.g. for the I.T.B.O.N.

Conservation organisations

Concerned with conservation of wildfowl and wildfowl habitats are:

A. *Governmental*
   1. *Ministry of Agriculture and Fisheries*
      a) Dept. of Wildlife Management (Directie Faunabeheer) in The Hague. Dealing with "shooting law," shooting licences. Advised by a "Shooting Council"—part of the money from the "Shooting Fund" is used for wildfowl conservation.
      b) State Forestry Service. This Service manages a great number of State Nature Reserves. Several of them are very important wildfowl reserves.
      The Dept. for Nature Conservation of the State Forestry Service is very active in wildfowl conservation not only managing wildfowl reserves, but also advising in regional planning, reclamation and drainage schemes, etc. This Department cooperates very closely with the
   2. *Ministry of Education* which also has a Department for Nature Conservation advised by a Council for Nature Conservation with two Commissions of Experts which are active in the field of wildfowl conservation whenever necessary: the Scientific Commission and the Fauna Preservation Commission.

B. *Private organisations*
   The most important are:
   a) *Vereeniging tot behoud van Natuurmonumenten in Nederland* (= Society for the Conservation of Nature Monuments in the Netherlands), Amsterdam. This Society owns and manages many important wildfowl reserves.
   b) *Nederlandse Vereniging tot Bescherming van Vogels* (=Netherlands Society for the Protection of Birds), Amsterdam. This society manages also a number of important wildfowl breeding grounds and wintering areas in the Netherlands.

c) *Koninklijke Nederlandse Jagersvereniging* (= Royal Netherlands Shooting Society). This organisation is cooperating closely with other organisations and the institutes mentioned previously.

C. *International organisations*
Two institutions in the Netherlands are active in the field of wildfowl conservation not only on a national basis, but also on an international level.
a) *Nederlandse Commissie voor International Natuurbescherming* (= Netherl. Commission for International Protection of Nature), Amsterdam.
b) *Netherlands Section of the International Council for Bird Preservation, Amsterdam.*

Ringing research

The ringing of ducks and geese is in the Netherlands mainly organised by the I.T.B.O.N. (Arnhem). The ringing is accomplished through the co-operation of the following institutions and persons.

A. Het Vogeltrekstation, Leiden: rings and administration.

B. Dept. for Wildlife management (Min. of Agr.), 's-Gravenhage: licenses for catching outside the shooting season.

C. Dept. for Nature Conservation State Forestry Service (Utrecht) State Nature Reserves. The decoymen are trained to assist in research work. Catching for ringing purposes is a part of their job.

D. Private persons, for instance decoymen, goose-netters and netters of Golden Plover, who catch ducks and geese for ringing. With the exception of the decoymen they are paid for that by the I.T.B.O.N.

E. Interested ornithologists ring ducks privately. This last category is mainly ringing pulli. In the decoys almost without exception only full-grown birds are caught, including individuals from the breeding population and passing migrants.

Occasionally flightless adults are caught. This is done on some occasions in the State Nature Reserve " Het Zwarte Meer " near Genemuiden, an important haunt for moulting ducks.

The geese without exception are caught by goose-netters. These netters were originally catching for the market but nowadays mainly for the research. They are paid per goose by the I.T.B.O.N. from funds of the " Shooting fund."

The numbers of each species ringed up to the end of 1960 were: Mallard 30,018, Teal 23,494, Garganey 2,658, Pintail 3,200, Wigeon 4,579, Gadwall 289, Shoveler 1,680, Tufted Duck 174, Pochard 445, White-eyed Pochard 2, Greylag Goose 1, Whitefront 2,150, Bean Goose 718, Pinkfoot 46, Barnacle 211, Shelduck 213.

In 1961 nearly 8,600 ducks, about 1,500 geese and 22 swans were ringed. Mallard 1,857, Teal 3,807, Garganey 278, Pintail 1,395, Wigeon 761, Gadwall 36, Shoveler 316, Tufted Duck 45, White-eyed Pochard 1, Greylag Goose 1, White-front 1,190, Bean Goose 176, Pinkfoot 34, Barnacle 86, Shelduck 9.

The great numbers of ducks ringed in the decoys have produced so many recoveries that the ringing scheme was scarcely able to deal with them. For this reason the number of Mallard ringed was reduced in 1960 and 1961 and from

1962 no more Mallard and Teal will be ringed until analysis of the recoveries has shown this to be necessary. The recoveries—over 6,500 Mallard and 4,000 Teal—have now been put on punched cards and analysis is in progress.

Inventories and censuses

Censuses of breeding population are made by R.I.V.O.N., focussing on rare species and their habitats. In 1961 R.I.V.O.N. worked especially on censuses of Red-crested Pochard, Shelduck *Tadorna tadorna,* Eider Duck *Somateria mollissima* and the Mute Swan. Attention was also given to other censuses already in progress of breeding populations of Tufted Duck, Pochard. White-eyed Pochard *Aythya nyroca,* Pintail, Wigeon and Gadwall.

Inventories of migrating and wintering populations are also made by both institutes, also in close co-operation. I.T.B.O.N. organises in the Netherlands fortnightly wildfowl counts from August-April, especially of ducks. The counts of I.T.B.O.N. started in 1948 with the international wildfowl counts organised by the International Wildfowl Research Bureau (I.W.R.B.), since 1958 co-ordinated with the Wildfowl Working Group of I.W.R.B. and the International Union of Game Biologists (I.U.G.B.). I.T.B.O.N. counts are made on 23 count waters. R.I.V.O.N. organises these counts in about 18 State Nature Reserves. All species of ducks are counted.

The counts of geese are organised separately from the counts of ducks. This is done because the important haunts for duck and geese are not the same. The counts are organised and made by R.I.V.O.N. as a part of its conservation programme, because the feeding-grounds of the big flocks of wild geese in the Netherlands are very restricted in number and in acreage and several of them are seriously threatened by reclamation and drainage. The counts are made once a month from September to April on about 30 localities by 20-25 counters.

Intensive studies

Intensive studies were made by I.T.B.O.N. concerning the Mallard and Teal (population dynamics, reproduction rate, migration, etc.). As in other years, an intensive study is being made of the catches of the duck decoys which are still catching for the market. The 1960-61 season showed rather low catches (an average of 1,700 ducks per decoy), whereas 1961-62 was a very good season (2,900 ducks per decoy). 90% of the bay consisted of Mallard.

R.I.V.O.N. made intensive studies concerning the migration, feeding behaviour, daily rhythm, etc. of Brent Geese *Branta bernicla,* Barnacle Geese *B. leucopsis,* White-fronted Geese *Anser albifrons* and Pinkfeet *A. brachyrhynchus.* Research was also done on crop damage in grasslands by Pinkfeet in winter and by Greylag Geese *A. anser* in autumn and spring.

In 1961 a special study was made by R.I.V.O.N. of the damage due to the rapidly increasing populations of half-wild Mute Swans. This study was made in the Prov. of Zuid-Holland, where the population of Mute Swans is estimated at 800-900 pairs. Wild Mute Swans are not breeding in this area.

In 1961 a special study of the numbers of migrating Common Scoters *Melanitta nigra* passing the Dutch coast started on the island of Terschelling. This study originated from the study of the consequences of oil pollution of the sea. As in former years the numbers of oiled birds along the North Sea coast were counted in 1961. This is a part of a programme which is planned to continue until 1968.

Important advances in wildfowl conservation

Some important advances made in 1961 were:

a) Added to the list of ducks, geese and swans which may not be shot: Long-tailed Duck *Clangula hyemalis*. This list now includes: Common Scoter, Velvet Scoter *Melanitta fusca*, Goosander *Mergus merganser*, Red-breasted Merganser *M. serrator* and Smew *M. albellus*, Shelduck, Eider Duck, Brent Goose, Barnacle, Canada Goose and all three swans.

b) Several important wildfowl habitats were declared new reserves:

1. *State nature reserves*
   In 1961 about 30 wildfowl reserves were added to the already existing 78. These new reserves cover a total area of about 1,767 ha. Among them are 8 duck decoys.
2. The *"Vereniging tot Behoud van Natuurmonumenten in Nederland"* also enlarged its wildfowl reserves in 1961 by at least 6 localities with a total area of about 200 ha.

Difficulties hindering wildfowl conservation

Although there are many wildfowl reserves in the Netherlands and the number is increasing every year and much is done for wildfowl conservation in general, there are some difficulties worth mentioning. The major difficulties hindering wildfowl conservation in the Netherlands are at present: reclamation, drainage, industry and recreation.

Reclamation and drainage, particularly in reallotment schemes, are threatening seriously one of the most important haunts of more than ± 15,000 Barnacle Geese near the Lauwerssea. This area is threatened when the dike will be built, which will cut off the Lauwerssea from the Waddensea. The marshy lands near Beetsterzwaag where about 10,000 Whitefronts and hundreds of Barnacle Geese winter regularly is threatened by drainage schemes. Other haunts, nearly as important, in Gaasterland and in Lemsterland, where Greylag, Pinkfoot, Whitefront and Barnacle often stay in great numbers are threatened in the same way. In the province of Zeeland also some important geese haunts are in danger because of reallotment schemes.

Other threats for wildfowl conservation are the planned reclamation of the southern part of the Dollard in the province Groningen and the reclamation of the " Verdronken-Land van Saaftinge " in Zeeland.

The Deltaworks in the south-west of the country have already brought some unfavourable changes and will bring more in the near future, especially because the tidal movements in the Hollands Diep and the Haringvliet will be stopped and the water will become fresh. This is inevitable however.

Some important wildfowl habitats have been lost in recent years because of the establishment of industry in the area. This happened in the nature reserve " de Beer " near Hoek van Holland as a part of the " Europoort " - project of Rotterdam. The wildfowl area of the Zuid Sloe, east of Vlissingen in Zeeland, is threatened in the same way because Vlissingen is extending its industry into this area.

Another danger for wildfowl habitats is the establishment of recreation-centres. One of the most interesting wildfowl areas in the south of the Netherlands has lost a great deal of its wildfowl population in this way.

Although the oil pollution of the sea causes the death of many thousands of seabirds every year along the Dutch coast, the oil pollution of the Dutch coast is not worse than in other countries.

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Wildfowl Research and Conservation in Belgium

Count Lippens

THE Institut Royal des Sciences Naturelles de Belgique is responsible for organising wildfowl conservation, aided by the very active association " Les Reserves Naturelles et Ornithologiques de Belgique."

Ringing. Duck ringing is largely concentrated at one decoy at Meetkerke, near Bruges, which I have run since 1956. From 1956 to 1961 I have ringed at Meetkerke about 12,000 Mallard *Anas platyrhynchos,* 3,500 Teal *A. crecca,* 475 Garganey *A. querquedula,* 450 Wigeon *A. penelope* and 50 other ducks. A few Teal, Garganey and other ducks are also ringed in March and April in another decoy near Dixmude.

Censuses. No extensive and regular wildfowl counts are made. In 1961 a breeding census of Shelducks *Tadorna tadorna* found 120 pairs in the country.

Conservation. There were no changes in legislation during 1961. The open season lasts from 21st July to 28th February. Shelducks, swans, Barnacles and Brent are protected by law at all times. There are only two commercial decoys left in Belgium and no new ones may be created.

Several new reserves were created in different parts of the country by the association. Most of the 18 reserves secured by " Les Reserves Naturelles et Ornithologiques de Belgique " in its ten years of life are of importance to wildfowl. They have brought about an enormous increase in the numbers of ducks breeding in Belgium.

Wildfowl Research and Conservation in N. Ireland in 1961

J. V. Bateman

THERE does not exist in Northern Ireland at the moment any central organisation actively engaged on wildfowl research and conservation. The situation, it is hoped, will be remedied if a Nature Conservancy is established as a result of a Government committee set up to examine the whole question of nature conservation in Northern Ireland.

The country is an attractive wintering area for many species of duck, with its large sealochs and inland lakes. A number of relatively successful wintering censuses have been carried out in recent years and efforts are being made to broaden the scope and increase the frequency of these censuses. Due to a variety of circumstances the data for 1961 are very incomplete.

Three species of geese normally winter in the area—Brent, Greylag and Greenland Whitefront, and while the numbers of Brent have risen steadily the reverse is the case with the Greylag and Whitefront. An extensive drainage scheme carried out on the River Quoile is having an appreciable effect on the Downpatrick Marshes and the numbers of geese wintering there.

Large flocks of Whooper Swans spend the winter on the sealochs and inland waters all over the country but only small numbers of Bewick's Swans are seen.

No wildfowl refuges as such exist and there are no established facilities for trapping and ringing wildfowl. The need for both is realised and it is hoped that in the near future both deficiencies will be remedied.

Wildfowl Research and Conservation in France in 1961

Francis Roux

(*C.R.M.M.O. — Paris*)

THE interest taken in France in various aspects of the biology of the Anatidae and in problems posed by their conservation has greatly developed in the last ten years, thanks, in the first place, to the activity of the Station Biologique de la Tour du Valat in the Camargue. This private institution, directed by its founder M. Luc Hoffmann, carries on methodical investigations on the migrations, ecology and population dynamics of the ducks which nest, pass through or winter in the Camargue and the French Mediterranean region.

Ringing. To 31st December, 1961 the Station had ringed 40,608 ducks of twelve species, as shown in the following table:

	pull.	full-grown	Total
Anas platyrhynchos	254	4854	5108
A. crecca		31971	31971
A. querquedula		1822	1822
A. strepera	42	181	223
A. penelope		17	17
A. acuta		64	64
A. clypeata		319	319
Netta rufina	22	159	181
Aythya marila		4	4
A. fuligula		754	754
A. ferina		142	142
A. nyroca		3	3
Total	318	40290	40608

These figures represent almost the entire ringing of wild ducks carried out in France. In the rest of the country the only ducks ringed are Mallard hand-reared for re-stocking wildfowl reserves or some private shoots.

Conservation. The Union des Federations Départementales Côtières des Chasseurs (U.F.D.C.C.) is the only national organisation actively concerned with questions directly affecting the protection of wildfowl. Comprising the officers of sporting organisations in 28 départements, under the presidency of M. de Coniac, the Union tries to promote in these départements measures to safeguard waterfowl, particularly by the creation of suitable reserves and by stricter regulation of shooting. It was responsible for the formation of the French section of the International Wildfowl Research Bureau and the national wildfowl census organisation. The Union sponsors for this purpose a network of observers, largely recruited from shooters and gamekeepers, working chiefly in coastal regions. The information received is assembled in Paris at the headquarters of the C.R.M.M.O.

However, since this network is not complete enough to cover all the suitable wildfowl haunts even within the coastal départements, various ornithological groups* are undertaking duck counts in their respective areas of activity. The Station Biologique de la Tour du Valat is doing the same for the birds wintering in the Camargue. These observations, precise and at regular

*Groupes des Jeunes Ornithologistes, Paris; Centre d'Etudes Ornithologiques de Bourgogne, Dijon; Centrale Ornithologique Lyonnaise, Lyon; Société Morbihannaise d'Ornithologie et de Protection de la Nature, Vannes.

intervals, are going to complete those of the national census, but it must be admitted that wildfowl counting on a national plan is only just beginning. (For example, up to the present, there are no quantitative data on the breeding population of the Mallard in France—regrettable ignorance in a country where this population, largely sedentary, experiences the maximum shooting pressure).

Among studies being made on the effects, direct and indirect, of shooting on waterfowl should be mentioned those carried out in the Camargue in the last four years on lead-poisoning of ducks. By systematic fluoroscopy of birds caught alive, M. Hoffmann has established that the rate of lead poisoning of ducks is three times higher in the Camargue than in the U.S.A. The same examinations also enable him to follow the evolution of shooting pressure on wildfowl in the Camargue.

There have been no major recent changes in French legislation affecting waterfowl. Swans are the only Anatidae given absolute protection. But: 1) the creation of a reserve on the islets of the Golfe de St. Malo, decided in 1961, assures the continuation of one of the few breeding stations of the Shelducks on the Atlantic coast; 2) the 3000 or so Brent Geese living under protection in the Réserve du Golfe du Morbihan comprise about one half of the population wintering on the French coast. Elsewhere, the refuges of la Pointe d'Arçay (Vendee) and the Bassin d'Arcachon (Gironde) are regularly used by Brent.

The protection of Anatidae is not, however, as great as it ought to be in France, where at the present time the number of " wildfowlers " represents nearly 50% of the total in Europe. As it is impossible for them to oppose the constant increase in the number of fowlers, the efforts of sporting authorities are aimed at: a) limiting the length of the open season; b) prohibiting some methods which are too deadly, such as shooting from motor-boats or punts and the use of large-calibre weapons; c) increasing the number of reserves and refuges. The U.F.D.C.C. plays the predominant part in these activities.*

In addition to the direct menace of overshooting, the accelerated rate of disappearance of their biotopes threatens the conservation of water-birds. Large drainage and water-control projects are planned in several parts of France which, in view of their nature and position, are of European importance in the " wildfowl migration system." Among those threatened with radical transformation by the drainage programme anticipated in the next few years are:

1. La Baie de l'Aiguillon (Vendée): 3000 hectares (7400 acres) of mud-flats, some thousands of hectares of polders, one of the principal wintering haunts of wildfowl on the Atlantic coast, undoubtedly one of the major stopping-places in the " European wildfowl migration system."

2. La Brière (Loire-Atlantique), a vast group of *Phragmites-beds* and peat bogs unique in France and an important breeding centre for water-birds.

3. Les Marais de Redon (Morbihan), one of the last wintering places of the White-fronted Goose in our country.

Comparable works, though less extensive, have already been completed at the expense of the Marais Vernier in the estuary of the Seine and of the Marais des Echets in the Lyons region. Everywhere there are other small

*In 1961 the U.F.D.C.C. published a small book which is not only an account of existing reserves for water-birds but which also includes a valuable exposition of the aims to be pursued.

losses of lakes and marshes, coastal and interior, of local interest. Repeated from one place to another, the disappearance of small habitats risks consequences quite as disastrous for the welfare of water-birds as those resulting from the drainage of a vast marshy region of national or international fame.

We know that in some European countries oil pollution of the sea constitutes a grave danger to some Anatidae. It is not so important in France, because the Atlantic coastal waters are relatively less polluted than those of the Baltic or North Sea, while the French coasts are little frequented by ducks that winter at sea (with the exception of Common Scoters and Red-breasted Mergansers). Even so, though only in a minor way, the danger exists and causes concern to the Conseil Supérieur de la Chasse, which has appointed the President of the U.F.D.C.C. to represent it on the Commission Nationale de la Pollution.

Wildfowl Research and Conservation in Portugal

Geoffrey M. Tait

THERE are no organisations concerned with the conservation of wildfowl in Portugal, where people are very little interested in birds. The places where ducks and geese are to be found, such as the wide stretches of the Tagus above Lisbon, the Aviero marsh 40 miles south of Oporto and Setubal Bay, are so extensive and lacking in cover that few people bother to try shooting ducks. Though shorebirds and waders are much less plentiful than thirty years ago, this is not due to over-shooting in Portugal—the birds no longer arrive in such quantities. The shooting season is from 15th August to 15th March. The Tagus above Lisbon is the only regular haunt of geese and there are not many.

Mallard and Teal are common breeding ducks. Dr. Santos Junior rings about twenty Mallard a year at Golega, a swamp in the Tagus valley. They are caught when young or when flightless. The principal contribution to ringing studies in Portugal is the author's unofficial organisation for the reporting of recoveries of birds ringed in other countries, enlisting the help of provincial correspondents of every newspaper in the country. This produces 150-200 recoveries a year, including a small proportion of ducks.

Wildfowl Research and Conservation in Switzerland

A. Schifferli

Schweizerische Vogelwarte Sempach

IN Switzerland there is no state-controlled organisation concerned with wildfowl research and conservation. The Schweizerische Vogelwarte Sempach, a private institute, has recently been investigating the migratory behaviour of the Mallard *Anas platyrhynchos,* the most abundant breeding duck in the country. The Vogelwarte has carried out a successful re-stocking experiment with Mallard in Tessin, where they had become scarce as a breeding species because of heavy shooting pressure.

Together with other nature- and bird-preservation organisations, especially the Schweizerischen Landeskomitee für Vogelschutz, the Vogelwarte has

helped to draft proposals for revision of the federal laws governing hunting and bird-protection. Some years ago the Schweizerische Bund für Naturschutz bought up the shooting rights on and around the shores of the Klingnauer-Stausee. This has almost completely stopped shooting on this lake, which in winter holds up to 8000 dabbling- and diving-ducks.

The revision of the federal laws for shooting and bird-protection will, when put into effect, shorten the open season for ducks, the end of the season being brought forward from 28th February to 31st January. At the same time, " Entenkanonen " of an internal diameter greater than 23.4 mm. (about 11/12ths of an inch) will be forbidden. These amendments of the shooting laws have already been approved by the Standerat (cantonal councils). The Nationalrat will decide on them in March, 1962. It is likely that both new changes in the law will be confirmed.

Duck-ringing in Switzerland has been almost entirely of Mallard. For the most part these have been ducklings reared by the Vogelwarte, the remainder being caught in cage-traps on the Sempachersee. Trapping is not continuous, mostly from late summer until spring. The numbers ringed in 1959 were 295 (83 ducklings and 212 trapped when full-grown) and in 1960 361 (215 ducklings, 146 trapped).

The Vogelwarte organises field-ornithologists taking part in the international monthly wildfowl count scheme. At present the scheme is operated by our collaborator Herr H. Leuzinger, who has replaced Dr. D. Burckhardt. Detailed results are published in *Der Ornithologische Beobachter*.

Ducks are now losing their breeding biotopes because of soil improvement works. On the other hand new artificial impoundments are providing new living quarters for them. Attempts are being made to control shooting on these new reservoirs.

Wildfowl Research and Conservation in Hungary

A. Keve
Madártani Intezet, Budapest

THE organisations concerned with research and conservation directly affecting ducks, geese and swans are the Hungarian Council of Protection of Nature, the Section of Hunting of the Chief-Directory of Forestry and the Hungarian Institute of Ornithology.

Ringing. No trapping of full-grown ducks is carried out at present. In 1961 ringing was confined to about 30 pulli of *Anas strepera*. In previous years *A. platyrhynchos, A. querquedula, A. clypeata, Aythya nyroca* and *A. ferina* had been ringed.

Censuses. Hungary does not take part in the international wildfowl count scheme because, especially in the eastern part of the country, such immense numbers of ducks and geese occur as migrants — swans appear only occasionally — that a census would need many good observers. We do not have them and so cannot produce a realistic census. As part of our ecological studies of migration each year four synchronised observations by 30-40 watchers are made on water- and shore-birds, including ducks and geese. These observations are made in April and September-October and exact numbers are recorded in the detailed notes.

Special studies. In addition to the ecological studies of migrants, the food of ducks is being investigated by B. Kovacs, Assistant Professor of Zoology in the Agricultural High School at Debrecen.

Conservation. There were no important alterations in legislation in 1961. The open season for ducks is from 1st August to 31st December; the Ruddy Duck *Oxyura leucocephala* is fully protected. For geese, the season extends from 1st September to 15th April; the Greylag *Anser anser* is wholly protected. Swans are also protected, but visit Hungary so seldom that this is of little importance.

We have no new major difficulties in conservation. Rice-fields and fish-culture lakes are continually increasing and make good habitats for ducks and geese on migration and in summer, though the large marshes which form the best breeding areas are being reduced.

In Conclusion

IF THE foregoing reports are looked at as a whole some valuable points emerge. In the field of conservation, it seems clear that legislation restricting shooting and other forms of destruction is now fairly severe. Continued reduction of "shooting pressure," where this may be found necessary, is likely to call for improvements in the enforcement of existing legislation and for self-education and restraint by wildfowlers, rather than for further extensive restrictions. The threat of oil pollution is still widespread and wildfowl enthusiasts must join with the many other interested people in supporting the international campaign for the elimination of this menace by the prohibition of discharge of waste oil at sea.

The pressure on wildfowl exerted by the continued loss of wetlands, offset to some extent by the construction of new reservoirs, cannot be relieved in any simple way. It calls for constant vigilance, for the early detection of major threats, and for dogged but not unreasonable resistance to changes which are unnecessarily harmful. Though this is certainly an international problem, shortly to be discussed at a full-scale European conference, it is also one about which it is possible for those people whose concern is primarily local to protest most effectively.

The picture of research activity is a patchy one. There is still a paucity of sustained studies of breeding groups which are essential to the understanding of population problems. The only large-scale duck ringing has been carried out in areas visited in winter or on passage and is in consequence relatively unrewarding, since recoveries in summer are not numerous enough to determine the breeding origins of winter visitors with useful precision. A recent decision to suspend the ringing of Mallard and Teal in the Netherlands until the results of earlier ringing have been worked out is evidence of an awareness that mere quantity is not enough. Re-direction of the ringing effort is a matter of concern in several countries.

There is no shortage of important and fascinating problems for investigation but where are the people to carry them out? There are fewer than forty biologists in the whole of Europe able to give a substantial part of their time to research on wildfowl. This is not enough. Yet, in relation to the work that has to be done, the need for more workers is even more urgent in the practical application of research, in education and the other tasks of conservation.

Tests of the possible social significance of 'nonsense' orientation

G. V. T. Matthews

Summary

To test whether 'nonsense' orientation was concerned with the reassembly of a scattered flock, large numbers of Mallard were released in groups of varying sizes.

Groups proceeded N.W. rather more strongly and directly than single birds and over a certain size the groups tend to break up. This argues against the orientation behaviour being group-seeking.

Single birds released to the north of, but close to, the roosting site still showed N.W. orientation, indicating that regaining the roost is not of paramount importance. The question of the importance of landmarks to the individual would repay further investigation.

Introduction

On release Slimbridge-caught Mallard *Anas platyrhynchos* mostly fly off between north and west. Matthews (1961) termed this 'nonsense' orientation. since it was far from clear why it was adopted regardless of season or time of day, of sex or age, of the release point's topography or bearing from Slimbridge. One tentative suggestion was that such behaviour would tend to hasten the reassembly of a flock after it had been scattered. Thus if individual birds, finding themselves alone, fly in one direction and come down (as they do) on the first body of water encountered, they are more likely to reform a flock than if they scattered in all directions. In a highly social species flock maintenance could be an important consideration, giving selective value to behaviour that tended to foster it.

On this hypothesis it would be expected that the urge to fly in a " reassembly direction " would be lessened if the birds were released in groups. Such extravagant use of birds became possible in the 1961-62 season when embarrassingly large catches were being made. A second test of the hypothesis would be to release single birds to the north of and within sight of the resting area from which they had been taken. Again if rejoining the flock was of paramount importance the north west orientation should disappear.

Methods

Mallard were caught at the duck decoy at Slimbridge, Gloucestershire in September, October, December and January and at the decoy at Borough Fen, Northamptonshire in September and October. At that time of the year the population sampled at Borough Fen also has strong north west orientation tendencies, though these are less marked later in the season (Matthews, in press). Tests were carried out when an abundance of birds were being caught so that only in one case (M.140) were they kept waiting in the large aviaries at Slimbridge for any time. Transport and observational methods were as detailed in Matthews (1961). Birds released in groups were tossed up together by several helpers or ejected from a quick-release basket. If a group split up in flight the largest component was followed to vanishing point using 16 x 40 binoculars.

Five different release points were used:-

Coln St. Dennis	—	Slimbridge	bears 254°	24 miles
		Borough Fen	bears 048°	90 miles
Lutton	—	Borough Fen	bears 231°	19 miles
Deeping St. Nicholas	—	Borough Fen	bears 187°	6 miles
Madley	—	Slimbridge	bears 137°	28 miles
Beverstone	—	Slimbridge	bears 305°	9 miles

Group releases at each point were matched for comparison by releases of single birds. These were not usually on the same days, since there was a limit on the number of birds that could be carried in the vehicle and on the number of observations that could be made without eye strain and observer fatigue. In all cases releases were in good sunny conditions and winds were as similar as possible in matched releases. In this connection a N.E. wind is equivalent to a S.W. one, both being beam on to the ' nonsense ' direction.

Single releases were also carried out at:-

Crowland — Borough Fen bears 203° 2½ miles
Morton — Borough Fen bears 156° 11 miles
Little Hale — Borough Fen bears 174° 21 miles

Results

Group releases

The following were the releases carried out, those with Borough Fen birds being marked (*).

Table 1

Group size	Ref.	Date	Release Point	No. of birds	No. of groups	Wind direction & strength
Single	M.15	28.11.59	Coln	28	—	Nil
	M.54*	18.10.60	Lutton	23	—	SSW 2/3
	M.140	18.1.62	Coln	15	—	WSW 1
	M.82*	24.8.61	Deeping	35	—	NE 2
	M.27	22.3.60	Madley	30	—	ESE 2/1
	M.147	8.2.62	Beverstone	28	—	N 2
Two	M.90a	9.9.61	Coln	36	18	Nil
	M.98*	16.9.61	Coln	36	18	SW 3/4
	M.96*	15.9.61	Lutton	34	17	SW 4
Three	M.90b	9.9.61	Coln	39	13	SW 2
	M.138	13.1.62	Beverstone	3	1	W 4
	M.140	18.1.62	Coln	30	10	WSW 1
Four	M.97*	15.9.61	Deeping	20	5	SW 3
	M.99	18.9.61	Madley	40	10	E 1/2
	M.134	9.1.62	Beverstone	4	1	SSW 2
	M.136	10.1.62	Beverstone	4	1	WSW 3
Five	M.93*	12.9.61	Deeping	35	7	SW 3
	M.134	9.1.62	Beverstone	45	9	SSW 2
Six	M.93*	12.9.61	Deeping	6	1	SW 3
	M.103	2.10.61	Madley	36	6	SSE 2
	M.136	10.1.62	Beverstone	36	6	WSW 3
Seven	M.138	13.1.62	Beverstone	35	5	W 4
				598	128	

The final bearings at which groups or single birds were lost to sight are represented in Figure 1 as 5° blocks in the series of scatter diagrams a-f. It is immediately clear that releasing birds in groups does *not* break down their N.W. orientation tendency. Indeed the opposite appears to be true, the grouped releases showing less spread than do the single birds. This impression may be quantified by determining the mean deviation of bearing from the median (that bearing having half the readings on either side). The black fan in the centre of each diagram represents this measure of spread; the more open the fan the wider the scatter. It is also of interest to consider the deviations according to group size. This has been done in Table 2, from which it emerges that increasing group size does not lead to less scatter, the big difference being between the single birds and groups of any size.

Figure 1. Final bearings of Mallard released singly or in groups.
Each 5° block represents one bird or group. The centrifugal line is the direction of home. North is uppermost. The central fan represents the mean deviation from the median.

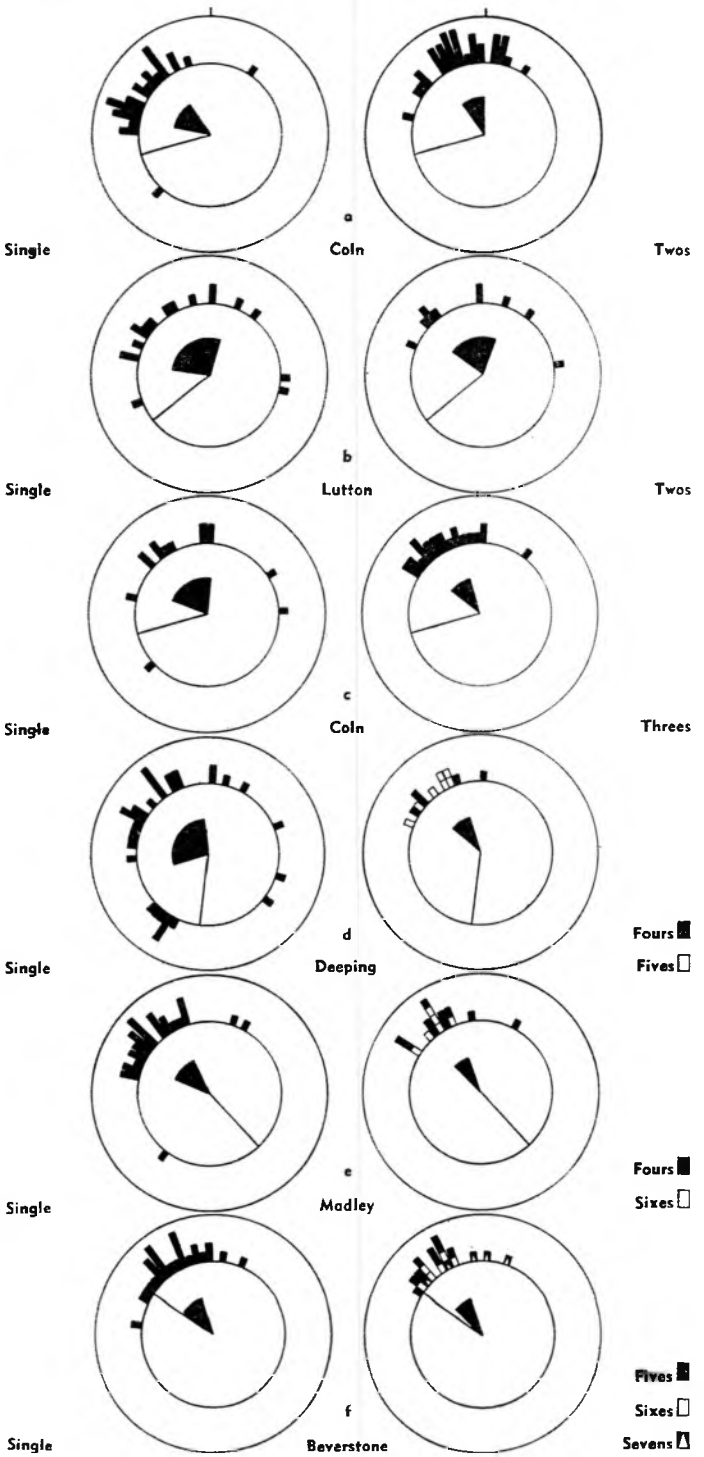


Table 2

Group size	No. of Final Bearings	Median	Mean Deviation	Mean Time in sight	Mean Difference 30″/Final bearing	No. of Groups lost intact
Single	147	319°	33°	3m.25s.	50°	—
Two	43	342°	22°	3m.45s.	29°	43
Three	24	330°	19°	4m.00s.	39°	12
Four	17	328°	19°	3m.55s.	37°	5
Five	16	326°	13°	2m.40s.	36°	2
Six	13	326°	17°	3m.40s.	19°	4
Seven	5	352°	19°	4m.05s.	29°	1
All Groups	118	342°	19°	3m.40s.	32°	—

Observing the birds after release it was clear that not only were the final bearings closer together than in the case of single birds but that the groups showed much less wavering in their flight. The fifth column in Table 2 shows the mean time for which single birds or groups were observed after release. The groups were in sight for slightly longer on the whole but for nothing like so long as their greatly increased visibility would have suggested. The implication is that they flew away more directly (and perhaps faster) than single birds. Intermediate bearings were taken at 30 second intervals. The next (sixth) column of Table 2 gives the mean differences between the bearing at 30 seconds after release and that at which the bird or group was lost to sight. These confirm that grouped releases flew more directly than single birds. Again, the size of the group on release appeared irrelevant.

The main point on which different group sizes varied from one another was that of cohesion. The right-hand column of Table 2 records the number of groups that were still intact when lost to sight. Here it may be noted that the number of final bearings for single birds and two-bird groups is less than that released (Table 1) by the number that landed within sight or were lost prematurely. All the larger groups provided good vanishing points at a distance and in full flight. But the larger groups were clearly much less stable. Whereas every two-bird release remained together (whether the ducks released were of the same or opposite sexes), only half the trios did so and for the larger groups cohesion was the exception rather than the rule. Of course these observations should not be used to comment on normal flock behaviour. The group ejected from the basket does not necessarily consist of friends and relations even though in many cases they were caught on the same day. From the point of view of orientation behaviour the important thing to the duck appears to be that it should have a flying companion. They then get down to the business in hand of flying north west as quickly as possible.

These observations may also be useful in planning experiments. Where it is expected that two samples of birds will show small deviations from each other, after differing treatment, it may be more rewarding to release them in twos. Only half the observations will be obtained but they will show less scatter and statistical analysis is more likely to discriminate between them.

Short distance releases

Although we can now be confident that reassembly of a flock in the air is not the purpose of ' nonsense ' orientation, it is just possible that reassembly at a suitable roosting place might be its end. When Mallard are released at the

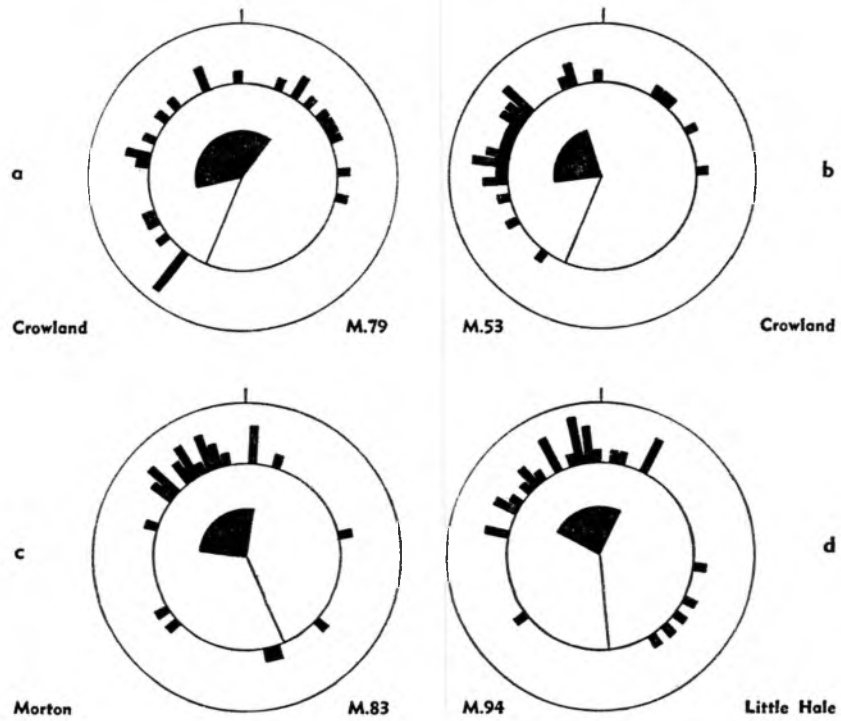
edge of the 14 acre Borough Fen decoy wood they usually drop into the decoy pool and do not fly off in any direction. Similar behaviour is also observed at Slimbridge, though with the estuary only half a mile distant the latter is often preferred. (The main roosting ground on it lies south of west, though mud is available all round to NNE). The following releases at short distances ($2\frac{1}{2}$, 6, 11 and 21 miles) north of Borough Fen were therefore carried out, in sunny conditions.

Table 3

Ref.	Date	Release Point	No. of birds	Wind
M.79	22.8.61	Crowland	31	NW 3/4
M.53	17.10.60	Crowland	30	SW 1/0
M.82	24.8.61	Deeping	35	NE 2
M.83	25.8.61	Morton	37	WSW 3/4
M.94	13.9.61	Little Hale	38	WSW 2/1

The final bearings are represented as scatter diagrams in Figure 2a-d, except that for M.82 which has already been shown at Figure 1d. The scatter for Crowland at 2a is wide (deviation 70°) but with a strong northwesterly wind this would be expected at any release point. The 'tail' of bearings close to the direction of the decoy suggests that these birds were returning to it. But it is remarkable that more did not do so, even though they must have been familiar with the surroundings and visibility was good. Fig. 2b is of a release at the same point in nearly calm conditions but with poorer visibility, 2 to 3 miles, which might have prevented direct view of the decoy. In this case

Figure 2. Final bearings of Mallard released at short distances from home



there is no bunch of birds on the 'home' bearing. The scatter (deviation 40°) and orientation are quite normal. Rather further away, at 6 miles (Fig. 1d) the release had a wider scatter (deviation 50°) and again a group of bearings suggests that some birds may have recognised the approximate home direction and were flying in it. But they are very much in the minority. Continuing in a northerly direction over the flat expanse of the Fens, the next release sites at 11 miles (2c) and 21 miles (2d) gave closely comparable results, with deviations of 41° and 44° and only a sprinkling of bearings to the south.

It should be stressed that observations of flight lines and ringing recoveries show that Mallard roosting at Borough Fen range widely when foraging, as far as the Wash coast twenty miles away. We can say, therefore, that the N.W. orientation remains when Mallard are released in areas with which they should be familiar and that it is not primarily concerned with a reassembly at a roosting place. As a few birds apparently turned homeward, further investigation by releases in other parts of the Fens is required. It may indeed be the case that Mallard do not give landmarks first attention on release. On the other hand learning of such landmarks may perhaps be a slow process.

Acknowledgments

I am grateful to Mr. W. A. Cook for catching the birds at Borough Fen and for helping in their release and to Mr. M. A. Ogilvie for similar assistance at Slimbridge. The experiments were carried out while holding at the Wildfowl Trust a post financed by the Nature Conservancy. The facilities and encouragement afforded by these bodies is sincerely acknowledged.

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The ringing of Barnacle Geese in Greenland in 1961

R. Marris & M. A. Ogilvie

Summary

A SMALL expedition spent July and August 1961 in Jameson Land, East Greenland. The main object was the ringing of Barnacle Geese. 450 adult and 119 young Barnacle Geese were ringed, and a further 40 birds, previously ringed in the same area in 1955, were recaught. Six Pink-footed Geese were also marked. The last geese were ringed on 4th August and, though more geese were seen, including many Pinkfeet, their moult was over and none were caught.

The equipment and techniques used, including coloured neck bands, are briefly described. The birds caught were sexed and weighed. Estimates were made of the total numbers of the two species of geese in the areas visited and suggestions are put forward concerning the distribution of breeding and non-breeding birds between the two major valleys. Breeding success was very poor, except in Enjørningens Dal and Fleming Dal, where fewer predators were seen than elsewhere.

Notes on the status and breeding of other birds are given. A film record and a collection of plants were made.

Introduction

In the summer of 1955 a Cambridge expedition ringed 299 Barnacle Geese *Branta leucopsis* and 11 Pink-footed Geese *Anser brachyrhynchus* in Jameson Land, central east Greenland. A return to the area was planned for 1958, with the approval of the Greenland Department of the Danish Government. As a result of a kind offer by the Norsk Polarinstitutt in Oslo, stores and some equipment were carried on the M.S. Polarbjørn (which later foundered in the coastal ice) to the Norwegian hunting station at Antarctic Havn early in August, 1957. Stores were sent in advance so that a party could travel on foot to the ringing areas from Mesters Vig airstrip, near Noret, early in July, when the geese become flightless. Early arrival is essential and cannot be achieved by sea because polar pack ice delays the arrival of ships and winter ice prevents the use of small boats in the fjords.

The 1958 programme had to be postponed because transport by air for the members could not be obtained. In 1961 another expedition was assembled and space was bought on aircraft chartered by a Leicester University expedition, the Junior Mountaineering Club of Scotland expedition and Nordisk Mineselskab A/S.

The primary aim of the 1961 Cambridge East Greenland Expedition was to catch and ring Barnacle Geese and to estimate the size of the local population and its breeding success. Supplementary objectives were observations on, and the capture of, Pink-footed Geese, observations on other bird and animal life, and the collection of plants.

The 1961 Expedition consisted of Dr. R. Marris (leader), G. C. G. Argent, A. B. Hall, A. H. F. Webbe (8th to 26th July only), D. Marris (26th July to 14th August only) and M. A. Ogilvie. R. Marris had been a member of the previous expedition to the same area in 1955.

G. Argent and R. Marris made a collection of botanical specimens, now in the British Museum (Natural History). Lists of species of flowering plants and mosses are being prepared for the Greenland Department, for study in Denmark. A 16 mm. colour ciné-film record was made of the habitats, the catching technique and the marking methods. It includes close-up shots of a herd of Musk-oxen *Ovibos moschatus*. A. B. Hall has prepared a special report on observations of the Musk-ox in Jameson Land.

Five members of the expedition flew from Reykjavik, in Iceland, to the Mesters Vig airstrip on 8th July. After initial double back packing from Mesters Vig to Antarctic Havn, Flexurdal and Henrik Møllers Dal, goose-catching drives were made in the vast expanse of lower Ørsteds-Dal between 16th and 20th July. From 21st to 27th preparations for the next phase were made. While A. H. F. Webbe, *en route* for Mesters Vig and Iceland, returned to Antarctic Havn with Malcolm Ogilvie, the others took stores to the shore of inner Fleming Fjord below Rhætelv. The arrival of David Marris on 25th July was delayed a day by fog at the airfield. Four of us returned with additional stores and, after moving up Ørsteds-Dal to the foot of Alldays Dal and a goose-drive further up valley on 29th, we all set out over the pass to the camp in Fleming Fjord.

Three successful drives in Enjørningens Dal and Fleming Dal[1] between 31st July and 4th August preceded a long trek through S. W. Jameson Land, via Fegins Elv, Hall Bredning, Schuchert Flød and, finally upper Ørsteds-Dal, where we arrived on 12th August. David Marris then returned by way of Horsedal to Noret, leaving for Iceland on 14th.

In the final phase G. Argent and R. Marris visited Fleming Dal, Passagen, Carlsberg Fjord, Klit Dal, upper Ryders Elv (Hurry Fjord), and the mountain plateau to the north of Dusens Bjerg and crossed Jameson Land before returning via Hall Bredning to join Hall and Ogilvie, who divided their time between Fleming Fjord and Mesters Vig, to transport gear back to the airstrip. Hall, who had become ill, flew to Iceland on 7th September.

The fine ' heat-wave ' weather that lasted from our arrival until the third week in August, with only one short period of a rainy and two overcast days, then began to break up. The last ten days were a mixture of snow storms and fine days. This coincided with the moving of our gear back to the airfield, but we were not seriously hampered, though the upper parts of the Oksedal pass went under a foot of snow overnight. We flew out on 9th September, sharing a plane with the Leicester expedition, Danish staff and tourists from Iceland.

Acknowledgements

The generous personal help, advice and encouragement of Dr. Finn Salomonsen of the Universitetets Zoologisk Museum, Copenhagen, on behalf of the Greenland Ringing Scheme, has been given since the commencement of our Barnacle research in 1955. All ringing records and subsequent recoveries have passed through his hands. Dr. A. Melderis has given valuable assistance by naming botanical specimens at the British Museum (Natural History) colected in both 1955 and 1961.

For other help we are most grateful to the Norsk Polarinstitutt, the Danish staff at Mesters Vig airstrip, Herr V. Brinch of Nordisk Mineselskab A/S, and Messrs. J. Giæver, C. G. M. Slesser and C. H. Liddiard, Drs. Søren Richter, Lauge Koch, A. L. Washburn and his colleagues, Christian Vibe and nearly sixty people in Iceland and the British Isles who have helped to obtain information of geese ringed in Jameson Land.

Although the expedition was organised and financed at the personal expense of its members it could not have been undertaken without the loan

[1]It is understood that in a map shortly to be published by the Danish Government, Fleming Dal will be called Pingels Dal. The Norwegian name is retained because it has been used in reporting recoveries of ringed geese. (Ed.).

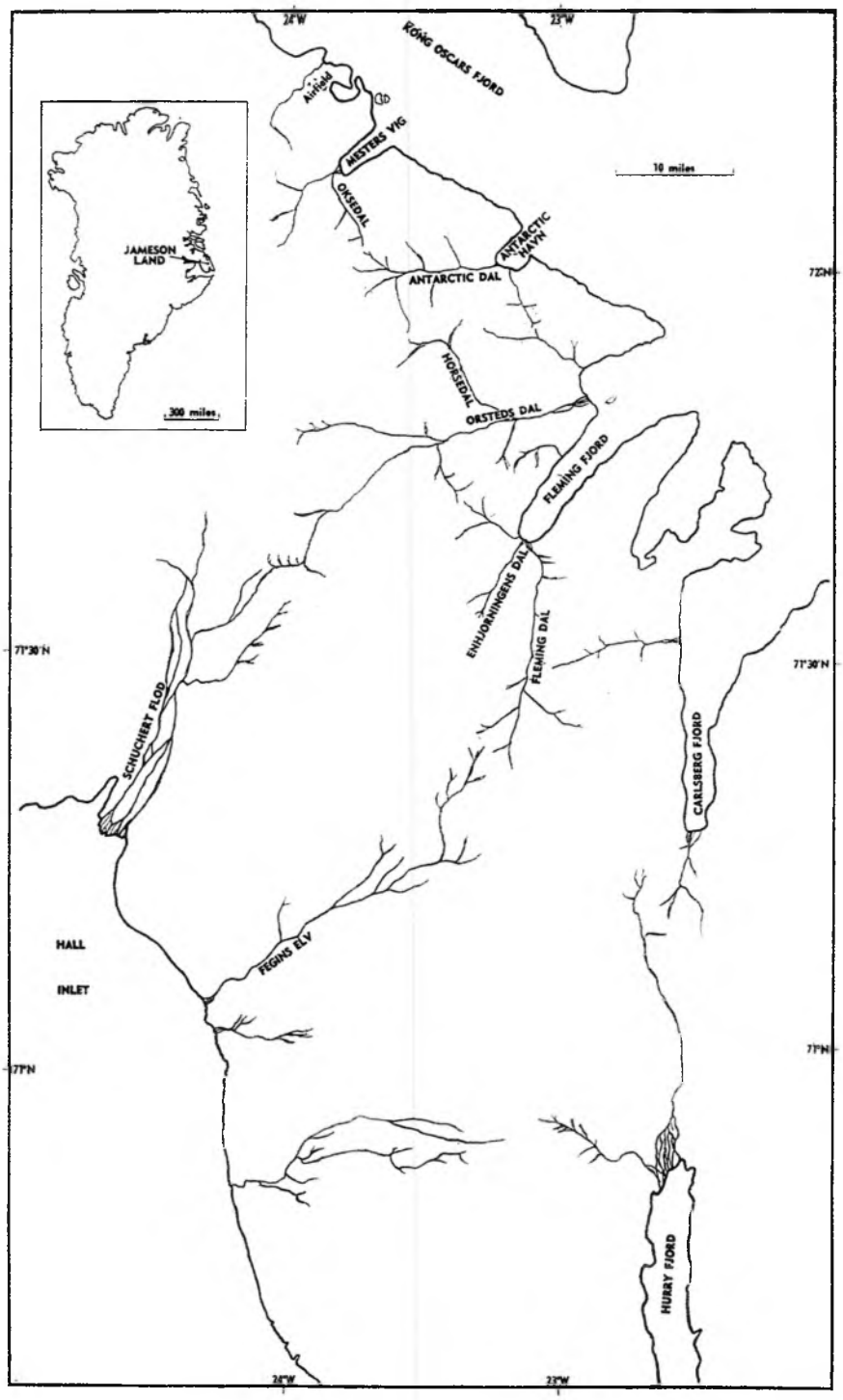
and donation of some equipment and generous benefactions of a number of business organisations. One of the authors (M.A.O.) is indebted to the Wildfowl Trust for the opportunity to take part.

Topography

In the mountainous northern part of Jameson Land, movement is restricted to the valleys and the passes connecting them. The mountains are mostly 3-4000 ft. in height and form steep or nearly perpendicular walls to the U-shaped glacial valleys. The valleys where we caught geese were Ørsteds-Dal, and the two valleys leading into the head of Fleming Fjord, Enjørningens Dal and Fleming (Pingels) Dal. With the exception of Schuchert Fløđ, Ørsteds-Dal is the largest valley of the region, about 30 miles long, and three miles wide in the lower half of its length. This lower part is a flat plain of heather, tundra, bog and sand desert. The braided channels of the river are about half-a-mile wide for the last five miles and pass between sand and shingle banks. When we were there the river was fordable at about waist deep, though there were signs that during the spring thaw most of the valley goes under water. In the heather and tundra there are several pools, the largest about an acre. Around these pools, and on either side of the numerous small tributaries entering the river from the mountain wall, the ground is very boggy, forming quite extensive areas of marsh, much liked by Dunlin and Sanderling as a breeding habitat. Higher up the valley, the river runs in a fairly narrow bed, and the banks are drier and slope towards the foot of the mountain wall. Fleming Dal and Enjørningens Dal join at the mouth to form a large area very similar to the lower reaches of Ørsteds-Dal, but the valleys narrow quickly as they climb back from the fjord, with the rivers running in steep-sided gorges.

The connecting valleys are mostly quite narrow, with steep and very stony floors and little vegetation. The rivers running in these smaller valleys alternate between a gorge and wide shingle outwash plains. The only birds in these barren valleys are the ubiquitous Snow Bunting and a few Ringed Plover.

The southern part of Jameson Land is a complete contrast, with low hills and heather-clad ridges undulating gently down to the shores of Hall Inlet. The vegetation on the southward facing slopes is quite luxuriant compared with the bleaker valleys of the north. This area has a relatively warm dry continental type of summer climate with relatively little cloud cover. Hall Bredning is a branch of Scoresby Sound, claimed to be the largest fjord in the world. While we were walking along the shores of it, we never tired of looking across the water to our left, for the panorama of icebergs in the Inlet was breath-taking, with pieces of ice of all sizes and shapes gleaming blue and white in the bright sunlight. They stretched from the head of the Inlet a few miles to the north, past and behind us as far as the eye could see. They had come from glaciers in Nord Vest Fjord. The river currents in the water tend to drift the ice away to the south and then east to the sea, but the winds of the past weeks had held it back, and many of the largest bergs had run aground at the mouth of the Schuchert River which runs in at the head of the Inlet. The variety of shapes and sizes was infinite, from square-edged plateaus perhaps 150 feet high and many acres in area, to jagged slices with ' wedding cake ' decorations, to pointed and scalloped spires and pinnacles towering above low flat pancakes, barely awash. The noise of these ice giants grinding and crashing together was like a continuous thunder storm rumbling away day and night.


24°W
23°W
KONG OSCARS FJORD
Airfield
MESTERS VIG
10 miles
OKSEDAL
ANTARCTIC HAVN
ANTARCTIC DAL
72°N
JAMESON LAND
300 miles
HOESEDAL
ORSTEDS DAL
FLEMING FJORD
ENHJORNINGENS DAL
FLEMING DAL
71°30'N
SCHUCHERT FLOD
CARLSBERG FJORD
HALL
INLET
FEGINS ELV
71°N
HURRY FJORD
24°W
23°W

Just inland from the shore are many pools, some covering an acre or more, with much bog and marsh round them. In the very dry summer of 1961 many of the smaller pools were dried up, leaving patches of brighter green vegetation.

Catching Operations

Equipment and method

Our equipment, which had to be packed on our backs together with our stores, was simple. We carried one inflatable rubber dinghy, one single-seater Lilo Kayak, and two nets—one of Bridport Industries Ltd. No. 3 nylon netting, $\frac{1}{2}$" square mesh, 60 yards long x 4ft. wide with a cord along each edge; another similar but 30 yards long in No. 2 nylon netting corded top and bottom.

In the field the nets were attached with twine to holes on $4\frac{1}{2}$ ft. tubular aluminium poles set about 5 yards apart, with extra poles set in the central section forming the catching pen. The nets and poles were carried in two rolls, ready for quick erection. After use the nets were cleaned, checked and rerolled.

Normally the nets were erected on dry ground near water with two arms about 30 yards long set at an obtuse angle with a central " cul-de-sac " three or four yards wide and deep as a catching pen. Sometimes there was time to double back spare netting for use at the end of a drive to close the pen but on other occasions one of the arms was used. Bamboo poles were placed between the aluminium ones to strengthen the nets. Twice sacking was draped over bamboos to act as scarecrows and help direct the geese towards the nets.

The Samoyed method used to capture the geese was essentially the same as that previously described by Goodhart, Webbe & Wright (Goose ringing in Vest-Spitsbergen 1954. *Wildfowl Trust Annual Report* 7 : 170-6. 1955; and elsewhere).

Goose Drives

16th July. Our first goose catch was at the basalt exposure on the north side of lower Ørsteds-Dal. On the valley side of the rocks lay a group of ponds which can be approached in dead ground from Henrik Møllers Dal where we had camped. Two Barnacle flocks were sitting on the banks; one flock of broodless adults and the other, by another pond, contained goslings. One man went round on each side and the flocks sought refuge on the ponds and joined together, the goslings swimming astern. Once the two of us were guarding the possible escape routes across the valley to the main river or to the fjord, the remaining three put up the nets on a slope a short distance from one of the ponds in view of the geese. On one side were the rocks and on the other was a patch of late snow and ice. When all was ready the drive began. A family party of two adults and three goslings made good their escape across the tundra. We closed on one of the ponds and directed the birds slowly to the nets. As the flock left the water one adult winged away and before the pen was closed eight more took flight on the slope in front of the nets. It is probable that had we set the nets on level ground a few of the flying birds would have been netted. None of the birds captured could fly and only four flying adults were seen in the next few days. The birds stood quietly in the pen with numerous mosquitoes settling on them. Mosquitoes had been abundant for some time and continued so for a few more days. We marked 85

adults and 7 goslings; one more unmarked adult escaped from the pen. A similar catch was made in the same place in 1955 when the water level in the ponds was higher. The summer of 1961 was early and dry.

18th July. Having moved camp across lower Ørsteds-Dal, we made a second catch of 98 adult Barnacles, including 32 from the first catch. This round up took longer as the birds were first seen at the mouth of the river and long encircling movements had to be made to bring them up the river and on to a pool. A mirage added to our difficulties. At the crucial moment Webbe appeared running from dead ground and so the flock was halted on the raised beach terrain near the river; it now stood at the centre of a triangle of three of us who moved it on to a small pond. The nets were moved and re-erected by the pond. Once the flock had been ringed, it was driven for a short distance down the valley to avoid recapture in subsequent catches.

19th July. Hall found a flock of 20-25 unmarked adults on a small pond close to the mountain that forms Kap Seaforth. Three of us tried unsuccessfully to surround the pond and the flock escaped up the talus slope nearby. One bird was caught by hand and another ringed in 1955 was seen. Next we tried unsuccessfully to get about 100 unringed Pinkfeet and Barnacles off the Ørsted River and on to the largest pond on the south side of lower Ørsteds-Dal. We had set out for the drive before it was discovered that a flock of Barnacles was already near the pond. Later we tried to catch this flock, but an aluminium pole broke and we lost all but 10 of 55 adults, including three Pinkfeet. A most disappointing day.

20th July. We made up for this by catching 86 birds, again all adults, and including only 5 recaptures. They were on the other (north) side of the valley where there were few ponds on which to concentrate the flock and it was some time before we could get the birds to go on to a tiny pool not 20 yards square, and hold them there while the nets were brought and erected. All the poles held on this occasion and by this round-up we brought our ringing total up to 250 geese, including 23 recaptures from 1955.

29th July. Before leaving Ørsteds-Dal, the preparations for the next phase of our field work completed, a drive was made for some miles up-valley from a trapper's 'overnight' hut below Alldays Dal. A sweep high up the left side of the valley encircled a large flock of 60 Barnacles below a rocky rapid, but all but six adults and one gosling could fly and were lost during the drive down stream to the nets. 12 Pinkfeet and 30 Barnacles escaped up-stream; after a short drive it was decided not to give chase because at least sixteen of the Barnacles could fly and there were no goslings. Two Pinkfeet from a flock of non-flying adults were caught in the river by hand and another recovered bearing a British Museum ring.

Only 23 Barnacle goslings, eight of which were marked, had been found in the valley. It was realised that if catchable geese were to be found in inner Fleming Fjord then breeding adults with goslings would have to be present as they had been in 1955. The climb, for eight hours fully loaded, up and over the Alldays Dal pass brought us to our camp below Rhætelv at the head of Fleming Fjord—a journey relieved by the presence of a number of herds of Musk-oxen.

31st July. Enjørningens Dal: a flock of Barnacles including young goslings was soon discovered in a marshy depression a mile or so up-river from the outwash. One of us forded the river and made a long sweep through hillocks up the left side of the valley. Outflanked, the flock turned down-stream

to a place where the river bends and flows under a thirty foot cliff formed by a raised beach. This natural feature enabled four men to drive 27 adults and 14 goslings off the water with ease into the nets where they had been positioned on the bank behind and below the raised beach. Only two adults which flew evaded capture, including one bird banded in Ørsteds-Dal. Another recaptured bird, marked on 16th July, also flew on release. The upper valley, which was not searched, was not inhabited by geese in 1955.

1st August. From our camp we set out across the mouth of Enjørningens Dal into lower Fleming Dal, reassembling on the high ground beneath the mountain divide overlooking the river delta, which is nearly a mile wide at this point at this time of year and flows in numerous braided channels between sand banks and small islands. While David Marris crossed the river at low tide, clearing the delta area and raised beach, hillocks, and ponded tundra of several flocks on the left bank, the nets were set on an island on the inner bend of the river near the right some way up-stream. Several hundred yards above this the valley opens out into a wide plain; a large rocky outwash beyond the hillocks on the left giving way to bog and sand flats, and the main river flowing below the escarpment of the mountain divide. The main flocks had concentrated quietly in this area and others, outflanked from the left two miles or so further up-stream, came to join them; only one small flock escaped.

This phalanx of Barnacles, some 300 of them, was headed by two of us towards the nets. Some individual birds took to the wing, but the majority of those obviously able to fly seemed to find refuge in the size of the flock now advancing from the sand flats. The final stage of the drive, perhaps half-a-mile, was exciting but it became tense during the last hundred yards. These were critical moments. A false move and the geese that could fly might disrupt and panic the flock. Finally, a vertical bank on one side to guide them, the nets beyond with the far wing spread to the water's edge, and Sandy Hall plus camera and tripod blocking the stream, the geese were surrounded and ushered on to the bank. Two adult Pinkfeet led the way and the nets held whilst the pen filled to capacity. As the gate closed the flock turned and, for some hectic seconds, seemed about to force its way out again, but only a gosling and adult, both previously ringed the day before, escaped. It was 8 p.m.; after a photographic interlude and 4½ hours' ringing, we finally left the nets and returned for a well-earned sleep.

308 geese had been netted, including 3 adult Pinkfeet, and 42 repeats. 163 adult and 83 gosling Barnacles were ringed; and 17 recaptures reringed—14 from a similar drive at the same site on 6th August 1955. One unmarked adult flew from the pen, as did more than 50 others on release—some probably for the first time since moulting. The capture of adult geese capable of flight in flocks containing goslings is common, but in this case many broodless adults had been in separate flocks.

During ringing a separate pen was made for goslings which were always marked first.

On 3rd August another Barnacle ringed in Fleming Fjord in 1955 was seen in lower Fleming Dal.

4th August. Fleming Dal is divided into two by a long basalt gorge. In the upper valley we found and caught 35 adult and 13 gosling Barnacles. The presence of this flock was initially masked by flying birds which remained while the others ran off into dead ground. This behaviour often complicates

drives and flightless geese can be overlooked. Another flock of some 70 flying birds was also disturbed and this was later seen to contain a number ringed in the lower valley.

The later journeys

After continuous rain on 5th August, on 6th we moved from our camp near the Fleming Dal pass through the mountain divide, down a steep gorge and out into the lower-lying regions bordering Hall Bredning known to be a breeding place of Pinkfeet. We spent six days here searching for geese. We knew it would be too late to capture non-breeding Pinkfeet but hoped to find Barnacles with goslings. Though we saw several flocks of both Barnacles and Pinkfeet, they were all on the wing again. There were no young birds in these flocks. We saw only two family parties of Pinkfeet with two young in each on the inland ponds between Fegins Elv and Depot Elv, a breeding place discovered in 1955. We caught and ringed one of these goslings but the others evaded capture. Many old feathers round the edges of the pools we passed indicated that these were the moulting places of plenty of geese. To catch them, especially as there were few young in the flocks, would have needed a much earlier arrival in the area, earlier in fact than we could have managed having tackled the geese in the north as well.

On 12th August flocks of 80 Pinkfeet and 30 Barnacles were outflanked in upper Ørsteds-Dal but every bird could fly. Neither there nor a few days later in Klit Dal (Hurry Fjord) were any goslings seen.

Marking

The Barnacle Geese were marked in three different ways: with a numbered aluminium ring; with a coloured plastic ring of the spiral type used on poultry; and with a coloured neck band of $\frac{1}{2}$ inch PVC tape. The aluminium rings, presented to us by the Greenland Ringing Scheme, bear the address of the Zoologiske Museum, Copenhagen. The 40 Barnacles first ringed in 1955 and recaptured by us had their old rings replaced by new ones.

Neck bands have been in use in America for some years. An eight-inch length of tape $\frac{1}{2}''$ wide and 1/24″ thick is placed round the neck and one end of the strip passed through a hole in the opposite end and pulled to a point at which a notch in each edge of the tape locks it in place, to form a collar round the bird's neck with two short tails (see photograph, p. XXIII). These neck bands were used to discover by observation whether Barnacles from one breeding area in Greenland go to a particular winter haunt in Scotland or Ireland, and whether they move about during the winter. Different colours were used to distinguish birds from the various catching areas.

Table I. Summary of Barnacle catches and ringing, July-August, 1961.

Date	Ringed		Recaps	Repeats	Total Catch		
	Ad.	Pull.	from 1955		Ad.	Pull.	Total
16th July	76	7	9		85	7	92
18th July	62		4	32	98		98
19th July	9		2		11		11
20th July	73		8	5	86		86
29th July	6	1			6	1	7
31st July	26	15		1	27	15	42
1st August	163	83	17	42	207	98	305
4th August	35	13			35	13	48
	450	119	40	80	556	133	689

Only six Pinkfeet were ringed, with numbered and with coloured plastic rings. This was because we saw only about 50 in lower Ørsteds-Dal in July and we were unsuccessful in manoeuvring some of them off the river on 19th July. On 20th July they were too far away to be rounded up with the Barnacles. The Pinkfoot flocks which we saw later were, with two exceptions, broodless and had regained the power of flight. One two year old male Pinkfoot, ringed as a juvenile in Kinross, Scotland by the Wildfowl Trust in October 1959, was recovered from a flock of broodless adults in lower Ørsteds-Dal.

Observations

Table II shows that only in the two valleys leading into the head of Fleming Fjord did the Barnacles breed with any great success, while the Pinkfeet did badly in all the places covered. Fegins Elv, where failure was complete, is known to be an important breeding area for Barnacles.

Table II. Maximum numbers of geese seen in Jameson Land, July-August, 1961

Locality	Barnacles		Pinkfeet	
	adults	goslings	adults	goslings
Noret, near airstrip	100	6	15	—
Mesters Vig	30	—	32	—
Antarctic Havn	40	4	72	10
Ørsteds-Dal	450	23 (8 caught)	300*a*	—
Fleming Fjord (Enjørningens Dal + Fleming Dal)	450	111 (all caught)	200*a*	15
Fegins Elv	250	—	3	—
Hall Inlet (pools and river estuaries) ..	50-220*b*	—	450-730*b*	4+
Paselv	10	—	—	—
Klit Dal	90	—	56	—

Notes: *a* these figures include influxes in mid-August.
b observations by different parties do not tally for this region, which extends from inner Depot Elv to Schuchert Flød.

Additional records:

1. The west side of the Schuchert Delta was not visited but many Pinkfeet were heard calling there.
2. On 4th September 82 Pinkfeet were seen migrating from the north over Antarctic Havn, at 2,500-3,000 ft.; and on 5th September 50 Pinkfeet were migrating from the north at 3,000 ft. over Oksedal.

It is possible that the geese of Fleming Dal and Enjørningens Dal should be joined with the birds of Ørsteds-Dal instead of comparing the breeding success of the two areas. The two regions are separated by a mountain barrier some 6-8 miles wide, or else by a sea journey of some fifteen miles round the intervening peninsula. That this was not too much even for a gosling was demonstrated by the recapture in Fleming Dal on 1st August of one ringed near the mouth of Ørsteds-Dal on 16th July. It was judged to be one to two weeks old when ringed and sometime in the next fortnight it had crossed the three-mile wide valley of Ørsteds-Dal, and swum or walked the fifteen miles round the point and up Fleming Fjord to its head. At least eight and possibly twelve other birds ringed in Ørsteds-Dal were seen in Fleming Dal ten days to a

fortnight later. It is therefore suggested that most of the geese breed in Fleming Dal, and that failed breeders, or non-breeders from there, move to Ørsteds-Dal to moult, joining with those birds already breeding or trying to breed there.

Large numbers of non-breeding Pinkfeet have been seen in Jameson Land in previous years, as well as in 1961. Pinkfoot goslings were found in lower Fleming Dal for the first time. It is believed by some people that Jameson Land is like Hochstetters Forland in North-East Greenland, where many of the non-breeding Pinkfeet have been discovered to be sexually immature (pre-breeders) by Alwin Pedersen, a member of Danish expeditions led by Dr. Lauge Koch.

Weights

All adult geese and a sample of goslings were weighed, using a spring balance sensitive to 1/10 lb. The range of weights of adult Barnacles was 3.3-5.3 lbs. (1.50-2.40 kg.) for 256 males and 3.0-4.9 lbs. (1.36-2.23 kg.) for 234 females. (The birds were sexed by cloacal examination). Table III gives the mean weights of adult Barnacles in lower Ørsteds-Dal and Fleming Dal with Enjørningens Dal.

Table III. Mean weights (in kg.) of flightless adult Barnacle Geese caught in Jameson Land, July-August, 1961. Sample sizes given in parentheses.

	Males	Females
Ørsteds-Dal 16th-20th July	1.93 (132)	1.70 (111)
Fleming Dal 31st July-4th August	2.10 (123)	1.84 (118)

Adult Barnacles in the two flocks caught on 16th July tended to weigh more than those caught on 18th-20th July. 18 Barnacles weighed as adults in 1955 were weighed on recapture and some showed weight changes as great as the differences in the mean weights for adults in the valleys in 1961. A full discussion of these results will be included in an account of the weights of Pinkfeet, Barnacles and Pale-bellied Brent in the Arctic which is in preparation.

The Barnacle goslings in Fleming Dal were larger than those in Enjørningens Dal. The parents of the latter goslings had probably laid their eggs not less than two weeks after most of the breeding adults caught in Fleming Dal for the first time on 1st and 4th August. The goslings caught in Ørsteds-Dal on 16th July had probably hatched at much the same time as those in Enjørningens Dal. Such a difference in laying and hatching dates could be of critical importance in breeding success. A. B. Hall is trying to find out whether any particular meteorological peculiarities of the spring and early summer of 1961 can be associated with the poor breeding success of Barnacles in Jameson Land.

Other birds seen

No species new to Jameson Land were seen.

RED-THROATED DIVER, *Colymbus stellatus*

Several pairs seen throughout the area. One pair had two young on a pool near the mouth of Mesters Vig on 16th August. These were seen again nearly fledged on 6th September. Six pairs were seen in one day in southern Jameson Land on pools near the shore of Hall Inlet.

LONG-TAILED DUCK, *Clangula hyemalis*

Females with young were seen in Ørsteds-Dal, seven young on 26th July, and Fleming Fjord, five and four young on 15th August. 16 females were seen in a flock in Ørsteds-Dal on 18th July and five in Fleming Fjord on 31st July. Moulting flocks were seen in Hall Inlet: 200, 100, 50 and 50 on 9th August and a further 50 on 10th August.

KING EIDER, *Somateria spectabilis*

Three females were seen in Ørsteds-Dal on 18th July. Moulting birds were seen in Hall Inlet, 12 on 8th August and a further 24 on 9th. Two females with eight half-grown young were observed in Mesters Vig on 24th August.

RED-BREASTED MERGANSER, *Mergus serrator schiøleri*

A single female was seen in Antarctic Havn on 13th July.

GYR FALCON, *Falco rusticolis*

A single adult, of the pale phase, was observed near the airfield on 25th August.

ROCK PTARMIGAN, *Lagopus mutus captus*

A female and three young just able to fly were surprised near the head of Flexurdal on 15th July. One of the young was caught and wing-tagged.

RINGED PLOVER, *Charadrius hiaticula hiaticula*

A very common breeding bird preferring the stony upper slopes of the valleys or the sandy and shingly shores of the fjords. Many juveniles were seen on the wing in August.

TURNSTONE, *Arenaria interpres*

Small parties, up to six, were seen in Ørsteds-Dal, southern Jameson Land and near the airfield. There was no evidence of breeding.

KNOT, *Charadrius canutus*

Four pairs were seen in upper Ørsteds-Dal on 29th July. One pair had two nearly fledged young, one of which was run-down and ringed, and a second pair had a single fledged young. All these birds were on the drier tundra slopes away from the marshy areas. Two adults were seen in southern Jameson Land on 8th August and a single bird near the airfield on 16th August.

DUNLIN, *Calidris alpina arctica*

A common breeding bird of the marshy areas of the main valleys and in southern Jameson Land. A flock of about 60 adults was feeding on the shore of Fleming Fjord on 2nd August. Some young were seen during August.

SANDERLING, *Crocethia alba*

Rather less common than Dunlin, but a few pairs present in all suitable marshy habitats. Flocks of 17 on 9th August and 41 on 10th August were seen in southern Jameson Land. At least two families of young were found in Ørsteds-Dal before the end of July.

LONG-TAILED SKUA, *Stercorarius longicaudus pallescens*

Parties of up to 29 were seen in Ørsteds-Dal in July and 27 on 6th August in Fegins Elv. Groups of four to ten were more usual. These birds probably took a heavy toll of juvenile waders in Ørsteds-Dal and Flexurdal during July. It was not a " Lemming year," which probably accounts for our failure to find evidence of breeding by skuas and the Snowy Owl. No skuas or gulls were seen in Fleming Dal and Enjørningens Dal.

ARTIC SKUA, *Stercorarius parasiticus*

Seen only in southern Jameson Land where there were single birds on 7th and 9th August and three on the 8th. All birds seen were adults of the pale phase.

GLAUCOUS GULL, *Larus hyperboreus*

Up to seven were seen in all the fjords visited. All were adults and there were no signs of breeding.

ARCTIC TERN, *Sterna macrura*

Up to eleven seen in Mesters Vig and twelve in Hall Inlet. A single downy young was being fed by its parents on a small rock in a pool beside Hall Inlet on 8th August.

SNOWY OWL, *Nyctea scandiaca*

Single birds only seen in Ørsteds-Dal, Rhætelv, Antarctic Dal and Enjørningens Dal. No evidence of breeding.

RAVEN, *Corvus corax principalis*

Single birds in Ørsteds-Dal and near the airfield, a pair of Mesters Vig at the end of August, and a pair and one juvenile beside Fleming Fjord from 13th to 16th August. A party of eleven was seen near the shore of Hall Inlet on 9th August.

WHEATEAR, *Oenanthe oenanthe leucorrhoa*

Pairs in Flexurdal and Alldays Dal in July. Females with three and two juveniles in Fegins Elv in early August and a family party of six beside Mesters Vig at the end of August.

ARCTIC REDPOLL, *Carduelis flammea hornemanni*

Single birds in Antarctic Dal and Henrik Møller's Dal in July. Family parties in Horsedal on 27th July, Alldays Dal on 31st August and in Antarctic Dal and near the airfield in early September.

SNOW BUNTING, *Plectrophenax nivalis*

Very common in narrow valleys and along the shores of fjords, but not in low-lying areas nor in southern Jameson Land. Flocks began to gather in late August and 100+ were seen together in Antarctic Dal on 3rd September and 150+ near the airfield on 8th September. Most family parties seen in August had two to four young.

The movements of Shoveler ringed in Britain

M. A. Ogilvie

Summary

SHOVELER breeding and bred in Great Britain tend to move south in autumn and winter, some travelling as far as south-west Spain, the Camargue and central Italy. Few seem to be wholly sedentary. No clear case of abmigration has been found. Ringing in autumn and winter in southern England and Wales reveals differences in the movements of Shoveler caught from August to October and those caught from November to February. While recoveries in winter of birds from both groups show a mainly southerly scatter like that of the breeding birds, the winter-ringed birds have provided a relatively large proportion of recoveries around the Baltic and east into the U.S.S.R. This suggests that winter visitors and passage-migrants from the north-east tend to arrive in England quite late. Shoveler are probably most numerous in England in March, but hardly any have been ringed at that time so that the movements of these late-winter and spring visitors are not yet understood.

Introduction

The account of the distribution and migrations of British Shoveler *Anas clypeata* given in Witherby *et al* (1939) was based, of necessity, on observational evidence alone. More recent accounts, such as that of Bannerman (1958), have done little to improve the picture. This is not hard to understand because the Shoveler, though widespread, is a strangely elusive species, not often found in large numbers and frequently evading the mesh of the Wildfowl Count scheme. The contribution that ringing can yet make to knowledge of Shoveler movements is small, because the species is even harder to catch than it is to count. To 31st December, 1960 only 515 had been ringed in Great Britain, a small fraction of the number present here at any one time and dangerously few to represent all the Shoveler that have occurred in the last twenty-five years, within which almost all the ringing has been done. Yet this very small catch has yielded no less than 143 recoveries, 27.7% of the birds marked, so that the recoveries give a very good picture of the fate of the ringed sample. Two earlier accounts of British-ringed birds have been published: Thomson (1941) had only seven recoveries to report, while Boyd (1957) illustrated nine recoveries in summer (April to August). Both authors also made use of recoveries in Britain of birds ringed abroad. The present paper is restricted to British ringing and is primarily concerned with a comparison of the movements of native and immigrant Shoveler.

The small numbers of Shoveler ringed abroad and recovered in Britain do not importantly affect this comparison since the much larger class of ducks ringed here in mid-winter is effectively equivalent to them. The only European countries in which more Shoveler have been ringed than in Britain are the U.S.S.R. and the Netherlands. Perdeck and Taapken (1961) have illustrated recoveries of Dutch-ringed immigrants, which resemble British immigrants in their behaviour. Russian results, reported by Treyus (1957) and Vinokurov (1961), though of great importance in any consideration of Shoveler movements on a continental scale, are largely irrelevant to this study, because nearly all ringing in the U.S.S.R. has been in places outside the range of British-visiting Shoveler.

I am indebted to Mr. R. Spencer, Ringing Officer of the British Trust for Ornithology, for giving me access to records at the Bird Ringing Office.

Summer ringing

Full-grown Shoveler ringed during May, June and July have been assumed to be British breeding birds. The recoveries of these birds (12) and of the pulli (15) ringed in this country show a marked southward movement (Figure 1).

The number of places where Shoveler have been ringed in summer is few. All the full-grown birds and 7 of the pulli recovered were marked at Abberton Ringing Station, Essex. The other recoveries of pulli are of birds ringed at Southport, Lancashire; Gladhouse Reservoir, Midlothian; and on the Isle of Man. At these three places the one or two broods concerned were ringed on a single occasion. The sample, though small, is quite informative and recoveries from the different ringing localities fit into the same pattern. There is, however, a great need for more ringing of British-bred Shoveler to help fill in the picture of their winter distribution.

Table I. Recoveries of Shoveler ringed in Britain.

	Month of recovery												
Country	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Great Britain	1	1		1	2	8	5	4	5	14	3		44
Ireland					1	2	2	5	3	3	1		17
Holland	1				4	4	6	1	1				17
France					3	2	1	2	2	4	8	7	29
Spain						1			1	1	1		4
Portugal												1	1
Italy										1		2	3
Germany					1					1			2
Denmark					3	1	3	1					8
Poland					1								1
Sweden					1								1
Finland					1								1
U.S.S.R.	2	6			5	2							15
Total	4	7	—	1	22	20	17	13	12	24	13	10	143

Autumn and winter ringing

The ringing of Shoveler in autumn and winter has been carried out mainly at Slimbridge, Gloucestershire and Orielton, Pembrokeshire, most of the latter being between 1935 and 1940 and from 1946 to 1950, with smaller numbers at Abberton; Abbotsbury, Dorset; Borough Fen Decoy, Northants; and nearby Deeping Lake.

Twelve recoveries are of birds ringed between September and January and recovered within fifty miles of the place of capture during the same season. These are not illustrated, though included in Table II (opposite).

Overseas recoveries show a clear distinction between birds ringed between August and October, and those ringed from November to February (Figure 2). Recoveries of both autumn- and winter-ringed Shoveler show a winter distribution similar to that of the summer birds. There are distinct movements out of the country both west into Ireland and also south and east to the Low Countries and France and thence to the Iberian Peninsula, the southern coast of France and northern Italy. There is only one recovery from Russia of an autumn-ringed bird.

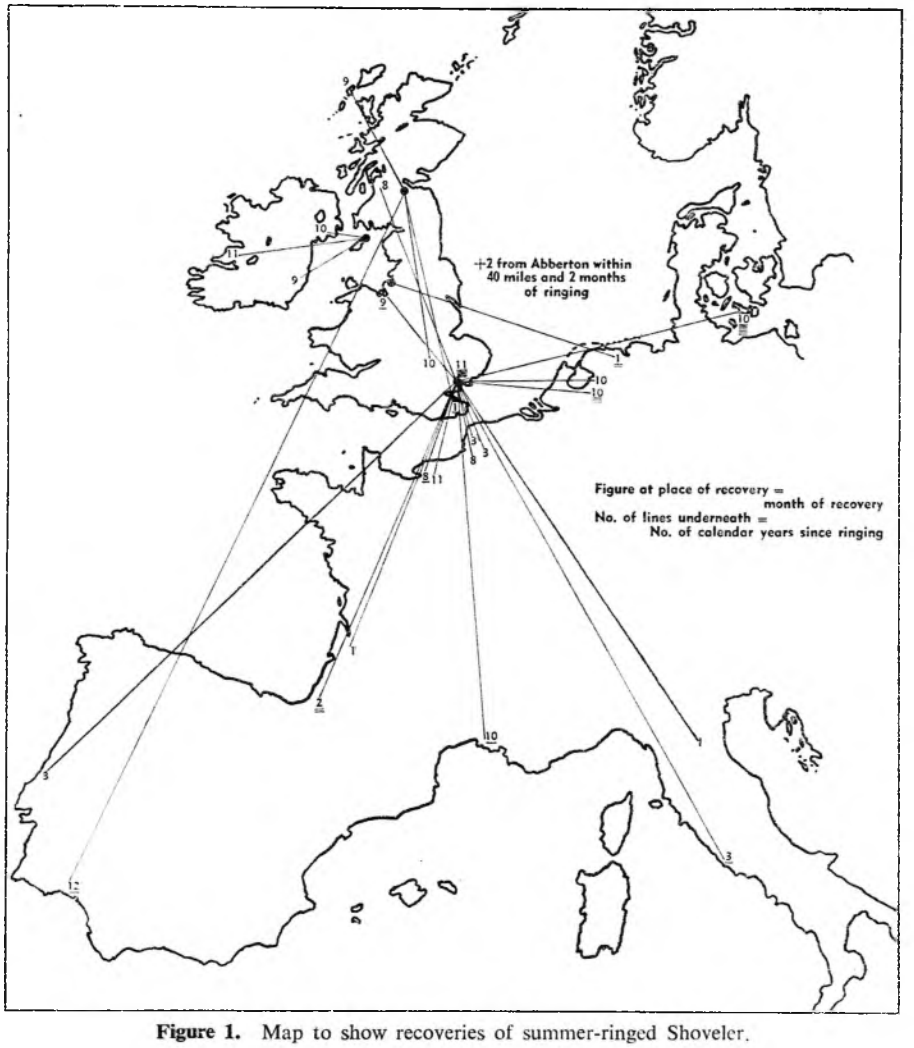


Figure 1. Map to show recoveries of summer-ringed Shoveler.

Table II. Recoveries of Shoveler ringed in Britain.

Country of recovery	Month of ringing												
	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Great Britain	3	1	5	2	2	4	2	3	16	6			44
Ireland	1			3	3	2	3	1	3		1		17
Holland			1	1	3	5			3	4			17
France		2	3	3	4	6	2	3	4	1		1	29
Spain	1		1		1		1						4
Portugal			1										1
Italy				2						1			3
Germany		1									1		2
Denmark	1	1							3	2		1	8
Poland								1					1
Sweden										1			1
Finland								1					1
U.S.S.R.						1		1	8	4	1		15
Total	6	5	11	11	13	18	8	10	37	19	3	2	143

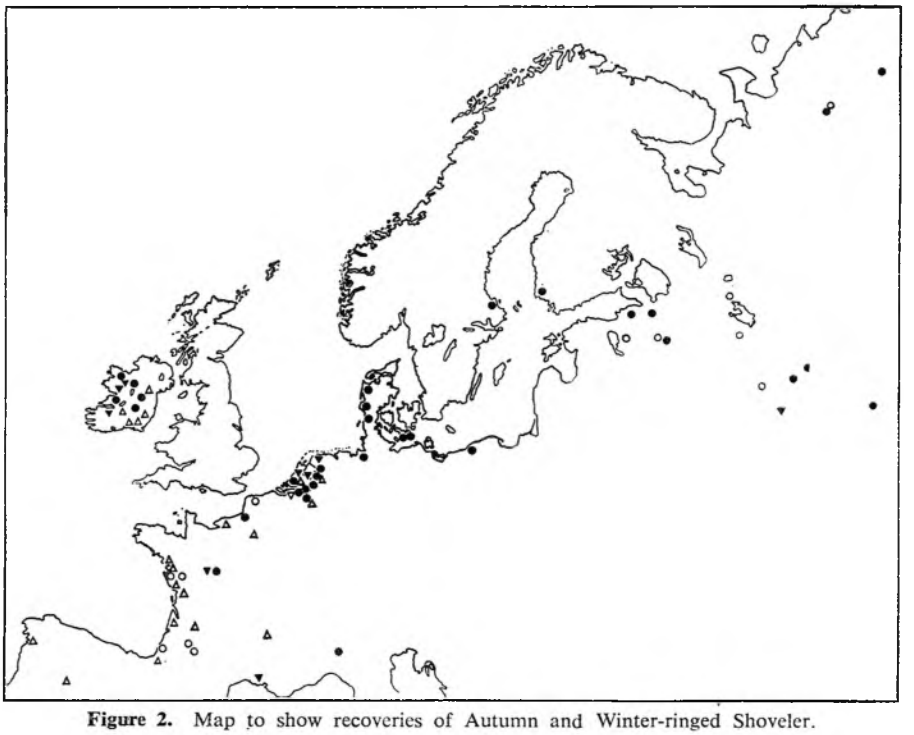


Figure 2. Map to show recoveries of Autumn and Winter-ringed Shoveler.

Δ Ringed Aug.-Oct. Recovered same season
▼ Ringed Aug.-Oct. Recovered subseq. season
O Ringed Nov.-Feb. Recovered same season
● Ringed Nov.-Feb. Recovered subseq. season

In strong contrast the winter-ringed birds have provided several summer recoveries in Russia, indicating that a Russian-breeding population arrives in Britain comparatively late in the year. This is confirmed by recoveries in early autumn in Finland, Sweden and Denmark of birds ringed in previous winters in Britain.

In Figure 2 it is shown that of the nine recoveries in France of birds ringed in winter, six are during the season of ringing, indicating that these were passage migrants through Britain and not birds choosing different wintering places in subsequent years.

A tendency to return to or remain in the same place on passage or in winter is shown by nine recaptures of birds at the ringing place between one and three years after the season of ringing. Three of these were ringed in summer and autumn and may be birds resident in the area, the others were all ringed in the winter and are much more likely to have left the area during each summer. The 12 first season recoveries within 50 miles of the ringing place form some slight basis for the supposition that Shoveler, having arrived at their winter quarters, remain there until the spring.

Discussion

An increase in the number of summer recoveries from the nine used by Boyd (1957) to 34 has not led to any major change in the outline of the

summer range of our winter visitors, nor has recent ringing done more than fill in the sketch of winter distribution that could have been made five or ten years ago. The value of this amplification is not in doubt, but the lack of novelty raises the question of what ringing of Shoveler in the future should try to achieve. The case for ringing of breeding birds is strong. Even though the pattern of their dispersal may be known any evidence that can be found to amplify the meagre knowledge of our native population is important. The value of continued marking of passage-migrants is less clear, but it is worth drawing attention to a particular gap in our knowledge. It has long been obvious, and has been quantitatively shown by Atkinson-Willes (1956), that Shoveler are most numerous in England in February and March. Yet Table II shows that the number of recoveries of birds ringed at that time is extremely small so that hardly anything is known of the origin of these immigrants. This is of considerable interest, because recoveries of Dutch-ringed birds show that relatively large numbers are found in the south of their range, especially in Italy, in March. The interpretation of recoveries in late winter and spring is of course complicated by differences in the beginning of the close season in different countries so that ringed ducks are relatively unlikely to be heard of in Britain or Holland in March. It would be useful to make special efforts to catch Shoveler at this time, to provide recaptures as well as newly-ringed birds.

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First-autumn dispersal of hand-reared Mallard

Hugh Boyd & Jeffery Harrison

Summary

RECOVERIES of young Mallard in their first season are used to compare the dispersal of hand-reared and of wild ducks in Britain. The only important difference is in the proportion of birds moving away from the point of release: hand-reared birds are less likely to travel far than wild ones. This favours the building-up of local populations by the use of hand-reared birds.

Introduction

One of the most interesting recent developments in wildfowl conservation in Britain has been the growing enthusiasm for the duck-rearing scheme of the Wildfowlers' Association of Great Britain and Ireland, W.A.G.B.I. Since 1954, 20,055 Mallard have been reared, ringed and released by associated individuals and wildfowling clubs. Rearing of Mallard for shooting is no new thing: the novelty of the W.A.G.B.I. scheme is in its co-operative nature, the extensive use of rings, the deliberate intention in releasing on to reserves to add to breeding stocks rather than to provide immediate sport, and the frequent use of release areas which are not strictly private and artificially fed. It is still too early to assess the long-term value of the scheme in increasing and invigorating the British breeding population. The short-term benefits and some results from the ringing have been described by Harrison and Butt (1961) and Harrison (1961). The purpose of this short additional paper is to discuss one aspect of the releases, the dispersal of young birds in their first autumn and winter, and to compare in this respect the performance of hand-reared and wild Mallard. Two questions are asked: To what extent do young ducks move away from their release point and is dispersal concentrated in any particular direction?

W.A.G.B.I.-reared Mallard are usually released at about eight weeks old, shortly before being able to fly. Some results of releases of hand-reared Mallard on some private estates at various times and places during the last fifty years are available for comparison. Ringing of wild ducklings has been on a smaller scale and for comparative purposes it has seemed proper to include a number of juveniles caught when able to fly, but only in the months April-July, for it is likely that captures in August include immigrants from places far removed from the ringing station. W.A.G.B.I. releases have been made at many points in Britain and the earlier hand-reared samples were also widely scattered (see Table II). The 'wild' sample is, by contrast, almost entirely restricted to birds marked at Abberton, Essex by Major General C. B. Wainwright, and at the Slimbridge, Gloucestershire, decoy of the Wildfowl Trust, with a few others scattered from Midlothian to Somerset.

Extent of movement from the release point

Table I summarises the 'direct' recoveries of W.A.G.B.I.-reared Mallard, defined as those birds killed in the year of their birth and release or in January and February of the next calendar year. The proportion reported killed in their first season is 4.9%. This is a low direct recovery-rate for ducks ringed in Britain. The number of recoveries offering evidence of

dispersal is very much smaller still, even when the qualification for movement is put as low as 10 miles, a distance frequently exceeded in many areas by Mallard on daily feeding-flights. The average proportion of known wanderers is 9.7 per 1000 released.

Table I. Direct recoveries and dispersal of hand-reared Mallard released by W.A.G.B.I., 1954-61.

Year	Total released	Direct recoveries		Direct recoveries more than 10 miles from release point		
			% of released	total	per 1000 released	% of recoveries
1954 ..	110	—	—	—	—	—
1955 ..	403	13	3.2	4	9.9	30.8
1956 ..	911	34	3.7	3	3.3	8.9
1957 ..	1311	55	4.2	15	11.4	27.2
1958 ..	1361	53	3.9	10	7.4	18.9
1959 ..	3413	213	6.2	47	13.8	22.1
1960 ..	5278	198	3.8	31	5.9	15.6
1961 ..	7268	409	5.6	83	11.4	20.3
	20,055	975	4.9	193	9.7	19.9

The behaviour of hand-reared Mallard released privately in earlier years (Table II) is evidently similar in that few wanderers were reported.

Table II. Direct recoveries and dispersal of hand-reared Mallard released on private estates before 1950.

Place and date of release	Total released	Direct recoveries		Direct recoveries more than 10 miles from release point		
			% of released	total	per 1000 released	% of recoveries
Lancashire 1911-12	80	35	43.7	1		
Norfolk, 1912	40	18	45.0	0		
Cheshire, 1925-28	100	77	77.0	0		
Norfolk, 1936-39	340	126	37.0	0		
Ross-shire, 1938-39	380	90	23.7	1		
total	940	346	36.8	2	2.1	0.6
Perthshire, 1925-34	not known	55		5		9.1
Slimbridge, Glos., 1948-49	152	6	4.0	1	6.6	(16.7)

There is a striking difference between the direct recovery-rates of the first five samples in Table II and those of the W.A.G.B.I. birds. This is very largely due to the fact that these ducks were subjected to heavy local shooting soon after release in contrast to the birds released by W.A.G.B.I. The only entry in Table II giving a direct recovery-rate of the same low order as that for W.A.G.B.I. birds is that for the Mallard released at Slimbridge in 1948 and 1949 in order to build up a 'lead' in the decoy.

Young wild Mallard behave differently (Table III), a much higher proportion being found at a distance from the point of capture. (The Gloucestershire sample specifically excludes many young ducks caught in the years 1959-61 which were released away from Slimbridge). There is a marked difference in the apparent behaviour of the wild ducks in Essex, where

shooting near the ringing station is heavy, and in Gloucestershire, where many of the marked birds are known to have remained within an area where there is little shooting. Even the Slimbridge birds, however, show a higher proportion of wanderers than the hand-reared birds from the same place (though both recovery samples are small) and those released by W.A.G.B.I.

Table III. Direct recoveries and dispersal of young wild-caught Mallard ringed in England, 1952-61 (ringing from April to July only).

Where ringed	Total ringed	Direct recoveries		Direct recoveries more than 10 miles from release point		
			% of ringed	total	per 1000 ringed	% of recoveries
Gloucestershire	133	7	5.3	2	15.0	22.9
Essex	500	57	11.4	15	30.0	26.3

Directions of dispersal

Given the points of release and recovery the direction of movement between the two can be found. Although there is no reason to assume that the journey has been made in a single flight, it may be argued that if any tendency to move in a standard direction exists this should be apparent in the distribution of the recoveries. Matthews (1961) has shown that in experiments in which Mallard were released in unfamiliar country they tended to fly off heading between north and west, irrespective of the relative positions of the points of capture and release. This N.W. heading is only apparent under clear skies or light overcast, the birds flying off in all directions if the sky is heavily clouded, and so must be a form of astronomical orientation. Subsequent recoveries of experimentally-transported ducks show that the N.W. direction of movement is not long sustained, the places where the ducks were eventually found being scattered more or less at random with respect to the points of release and origin.

Table IV. Directions of dispersal of hand-reared and wild Mallard, as determined by bearing of recovery-point from release-point, for direct recoveries showing movement greater than 10 miles. The W.A.G.B.I. birds tabulated here are limited to those recovered outside the county where they were released.

Direction of movement	Hand-reared ducklings		wild-caught
	W.A.G.B.I.	others	
N	6	2	2
NE	10		4
E	8	3	2
SE	10	4	1
S	10	2	3
SW	5	1	3
W	9	2	3
NW	8	1	3
total	66	15	21

Thus there is no *a priori* reason to expect recoveries to show directional grouping. The scatter of directions obtained (Table IV) is remarkably uniform, for both wild and hand-reared Mallard. It is true that eleven of the

fifteen direct recoveries of W.A.G.B.I. ducks overseas are grouped between ENE and SSW, but this reflects the distribution of land in relation to short sea crossings rather than any directional tendency. Apparently British Mallard rarely make long non-stop flights (of more than 100 miles or so). They are thus most unlikely to be encountered in the relatively distant countries of Iceland and Greenland to the north-west, while the high density of shooters as well as ducks in Holland and France increases the likelihood of British birds being found across the English Channel.

Harrison (1961) has pointed out that the behaviour of ducks released by W.A.G.B.I. in 1959 and 1960 seemed to differ. The proportion of birds recovered at a distance in 1960 was very low (see Table I). In 1961 the proportion of known travellers was again similar to that in 1957-59. Harrison suggested that the exceptionally wet weather of 1960 provided a good acorn crop and a late and difficult cereal harvest offering excellent local feeding and discouraging dispersal.

Though the numbers of recoveries are too small to form a basis for any detailed argument, it is perhaps worth noting that in 1959-60 all five overseas recoveries were in Holland; in 1960-61 there were three in Holland and one in Eire; and in 1961-62 none in Holland, one in Eire, one in the Isle of Man and four in France.

It had seemed possible that ducks released in different parts of the country might behave in different ways, but the recoveries so far give no indication of any significant variations in the directions or distances of dispersal.

Practical significance of results

These findings are largely negative: hand-reared birds do not behave differently from wild ones because neither do anything in particular. The one detectable difference is that hand-reared birds are less likely to move far. This is important because it shows that releases result in bigger stocks in the immediate vicinity.

What has still to be proved is whether the breeding performance of released birds is as good as that of wild ones. If so, then the value of the W.A.G.B.I. release scheme should be considerable. It is difficult to obtain evidence of the breeding success of released ducks on a large scale, though results reported by the Dorset Club for 1960 and 1961 are very encouraging, showing an output of fledged young per breeding pair well above the average reported from studies of wild birds in England and Holland. There is a great need for similar detailed following-up by clubs elsewhere.

Acknowledgements

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We are indebted to Mr. R. Spencer (Ringing Officer) and the Bird Ringing Committee of the British Trust for Ornithology for permission to make use of ringing and recovery data in the files of the B.T.O., including the older records originally contributed to the scheme operated by the late H. F. Witherby. Major General C. B. Wainwright, C.B., has kindly allowed us to make use of unpublished records from his ringing station in Essex.

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The migrations of wild geese in France*

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Summary

FRANCE is only a secondary wintering place for grey geese (*Anser* sp.). No more than 3000 stay, except during severe winters.

Population of *A. anser* which winter in south-west Spain, about 10,000 birds, migrate through France on a line approximately NE-SW. The geese may stop temporarily during this journey, especially at the end of winter.

A.a.albifrons winters locally in the north-west, near the Channel and Atlantic coasts; *A.fabalis* subsp. in the north-east; and *A. anser* between the estuaries of the Loire and Gironde.

6,000 to 6,500 *Branta b.bernicla* winter on the French coast from Cotentin to the Arcachon Gulf, concentrated especially in the Morbihan Gulf. Their migrations are strictly maritime.

When cold weather strikes mid-Europe and the coastal areas around the North Sea, it brings to France large populations of the species mentioned (mainly the *Anser* group) and some *A.brachyrhynchus*. The other European geese only occur exceptionally.

Because wild geese offer fewer attractions to shooters in France than to those in other European countries, their migrations in France are still imperfectly known and researches in this field are less advanced than they are in Great Britain, the Netherlands or the Scandinavian countries. In the present state of our knowledge, it is difficult to give more than a rough sketch of the situation. It must be emphasised, above all things, that France is on the margin

*Translation of a paper "Coup d'oeil sur les migrations des Oies sauvages en France" presented to the Fifth Congress of the International Union of Game Biologists in Bologna in September 1961, reproduced with the permission of the author and the Congress Committee.

of the regular wintering areas of the majority of European species of wild geese and that although some of them occur here regularly they do so only in small numbers, except in spells of very cold weather.

Making use of the information scattered in the ornithological and sporting literature, bag records, reports of French correspondents of the I.W.R.B. and personal observations, it is possible to outline the major features of goose migration in France.

There are three distinct types of movement: 1) seasonal passages of those birds which cross the country, stopping more or less, either on the way to their regular winter quarters in SW Europe or North Africa (post-breeding migration), or to their breeding places (pre-breeding migration); 2) movements of populations regularly wintering in France; 3) occasional " invasions " due to spells of severe cold in mid-Europe and the countries around the North Sea.

1. The first type is exemplified by the movements of the populations of Greylag Geese *Anser anser* wintering in the southwest of the Iberian Peninsula and the north of Morocco (Tangier). These birds, for the most part coming from Scandinavia and northeastern continental Europe, cross our country on each migration, and especially in autumn, following a diagonal NE-SW. Their passage is apparent on a small scale in September and regularly in October-November, in Picardie as well as further to the east in the Ardennes and the Argonne. It becomes more obvious in the maritime regions, from Poitou to the Pays Basque, the flights being concentrated near the coastline. Flocks of geese stay temporarily in these places when feeding conditions and their security seem favourable to them. Such stopping-places are reported in the plain lying between the rivers Scarpe and Escaut, in the middle valley of the Somme, and those of the Oise, Aisne and Marne; further south, up to the confluence of the valleys of the Loire and Allier, in the marshy region of Berry (Brenne), and the valleys of the Vienne and Charente. These migrants reach the Atlantic coast between the Baie de l'Aiguillon and the estuary of the Gironde, where the vast extent of the polders and saltings, close to the sea, invite them to remain for some time. But it is rare, at the present time, for the Greylags to remain at one place for more than a week. Their onward migration seems to be carried out speedily and at a great height.

Some actually follow a less direct route which leads them along the coasts of the Manche as far as Contentin where they turn away SSW over Haute Bretagne. Their passage is noticed in the estuary of the Loire in October.

The left wing of the post-breeding migration streams, probably involving birds of less northerly origin, reaches France by the valleys of the Moselle and Rhine, rejoins those of the Saone and Doubs, at the confluence of which concentrations are sometimes seen. The birds then fly rapidly over the Massif Central in a south-westerly direction to reach the basin of the Garonne and from there cross the Pyrenees.

Towards the end of the winter, often starting from early January, the pre-breeding movement begins to become visible. It spreads from the neighbourhood of the Atlantic up to the estuary of the Loire, into the interior of the country and even, for a minority, into the Bas-Languedoc. It is most often in February that Greylags are reported in the western Mediterranean regions, as far as the Camargue: but they do not stay there much. On the other hand

more or less lengthy stays are made regularly around the estuary of the Gironde, in Charente-Maritime and the Marais Poitevin, as well as in certain spots in the Massif Central (Puy de Dôme). In February-March the Greylags, having moved through the west turn their flight north-eastwards, beginning from the Loire estuary and passing through the coastal regions of the Manche, while other units move on a broad front, without a definite route, towards Belgium and Germany. Bretagne and the Massif Alpin remain outside these movements in autumn as at the end of winter.

No one knows exactly the numbers of Greylags which pass through the country. Since these migrations do not take place along one particular route but develop simultaneously on several wide fronts, censuses prove impossible. But we know from another source (J. A. Valverde) that 8000 geese spend the winter in the Marismas of the Guadalquivir, and that these must represent much the largest part of the population wintering in Spain. Thus it seems reasonable to put the minimum number of Greylags crossing France at 10-12,000.

Bean Geese *Anser fabalis* subsp. are likewise known to winter, though in much smaller numbers and less regularly, in the same places as the Greylags—the Marismas and Tangier. These birds cross France and no doubt do so by the same routes. But they are, most often, not distinguished from the Greylags with which they associate. It seems, however, that their movements occur in a more easterly zone, involving also the south-east of the country, for they are reported in October-November in Savoie and the Dauphine, and even in Corsica. Perhaps they move, in this case, as parts of the populations wintering in Italy, or of those which reach Algerie.

2. Among the species normally wintering in France the White-fronted Goose *Anser a. albifrons* must be given first place. Flocks of Whitefronts, varying considerably in size from one year to another, visit from November to February-March several well-defined localities in the north-western quarter of the country. Unlike the other species of grey geese, these birds show a marked attachment to their feeding-grounds and, if the ecological conditions remain unchanged, return faithfully to them. Their haunts are distributed around Cotentin and the Bretonne Peninsula. These are, in the north, the Carentan Marshes and the polders of the Baie des Veys as well as the polders of the Baie du Mont-St. Michel and, in the south, the marshes of Redon (on the borders of the departments of Ille-et-Vilaine, Morbihan and Loire-Atlantique) and the Loire estuary.

Another haunt formerly existed at the mouth of the Seine, but drainage and cultivation of most of the wetlands of this region, as well as increased shooting pressure, have forced the Whitefronts to abandon it: they now stop there only very briefly. The same danger threatens the Redon marshes where it is probable that the geese will not stay for much longer.

The various contingents of Whitefronts come to their wintering grounds along the coast of the North Sea and the Manche. They may stop on the way at the mouths of the valleys of the rivers Canche, Authie and Somme, in the estuary of the Seine and at the mouth of the Orne. Arriving at Cotentin, the migrants head SSW towards the Baie de Mont-St. Michel, where they aggregate with other groups, to proceed south, flying over Haute Bretagne to reach the Loire estuary. The Redon marshes are exactly on their path. They do not pass round the point of Bretagne.

Up to the present few connected observations have been made in the various haunts named and it is difficult to estimate their respective populations. It is though, nevertheless, that the total number of Whitefronts having wintered in France during the past five years has been less than 1000.

The Bean Goose *Anser fabalis* subsp. is also a regular winter visitor and several flocks are found locally in the north-east of the country. More unstable than the Whitefront their winter stay in France is characterised by erratic wanderings more or less affected by food supplies and the relative security of their surroundings. Two regular haunts are known: the upper valley of the Sarre near the lakes of Stock and Gondrexange, in Lorraine (300-600 birds) and the Der lakes region in Champagne (very variable numbers). There are some other places which the geese visit each winter without staying any length of time: the valley of the Aisne between Rethel and Vouziers, the Ried to the north of Strasbourg, the Langres plateau, the valleys of the Saône and Allier. But some small groups range widely all over the Rhine valley, Champagne and as far as the Massif Central.

Some Greylags *Anser anser* are likewise seen in December, January and February in the west of France in small numbers (generally less than 500). The only important zones for these winter residents are the Loire estuary and the Aunis coast, from the Bay de l'Aiguillon to the Gironde estuary, between which they come and go continually.

We have more precise information about Brent Geese. Only the Dark-bellied form *Branta b. bernicla* winters on the French coast. They rarely appear before the end of October or the beginning of November, although small migrating groups can be seen in the Pas-de-Calais as early as the first week in September. As is normal for this shore-dwelling species migration is strictly over the sea and all the birds wintering on the Atlantic seaboard pass round Finistere. Their winter haunts are for the most part around the Bretonne peninsula, from Contentin to the Loire estuary, the main ones being the Iles Chausey archipelago and the Baie de Paimpol to the north and the Morbihan Gulf in the south. South of the Loire only four other places are known: the Baie de Bourgneuf, the Baie de l'Aiguillon, the eastern shore of the Ile d'Oléron and the Arcachon Basin. No other places are known along the whole coast between Dunkerque and the Cotentin.

The numbers of these species, which had diminished disturbingly between 1930 and 1950 have since increased appreciably, especially last winter (1960-61). At the present time there is an average of 1000 Brent in the various haunts on the north Bretagne coast, several hundred between Brest and Lorient, nearly 3000 in the Golfe du Morbihan, 300 in the Baie de Bourgneuf, some hundred along the Charente Maritime coast and 1000-1500 in the Bassin d'Arcachon, in all 6,000 to 7,000 birds.

3. Each drop in temperature coming unexpectedly in winter in the British Isles, Belgium, the Netherlands or north Germany leads to the arrival in France of flocks of wild geese driven from their normal wintering places. If the cold spell is prolonged and accompanied by heavy snowfall in those countries, these movements may assume the character of a massive exodus: France then acts as an emergency wintering area for the birds. This was the case in February, 1956, when there were exceptional numbers of geese in many parts of the country: probably over ten thousand.

The Pink-footed Goose *Anser brachyrhynchus* is certain to appear in such circumstances in Picardie, Normandie and as far as the Loire estuary. In February-March, 1956 there were 19 recoveries of birds ringed in Spitzbergen (H. Holgersen, 1956). It seems likely that the Pinkfeet which reach as far as the Manche and Atlantic coasts all belong to the population normally wintering on the Danish and Friesian coasts, not to the British stock: no birds ringed in Scotland (or in Iceland) have yet been recovered in France.

Greylag, Bean and White-fronted Geese also come with the Pinkfeet, their distribution being determined by their ecological preferences and food requirements. But it is always the places habitually used by wintering birds which have the greatest concentrations: the Carentan marshes, the Baie de Mont-St. Michel and the Loire estuary have notably larger flocks of White-fronts, while the Greylags increase in the Vendee and Charente-Maritime and the Beans in the east and centre of the country.

It goes without saying that in these large movements some mixing takes place and the different species flock together. Thus it is not possible to assign to each a dispersion zone or a strictly defined line of passage.

Other European species of geese appear in France in hard winters, though only rarely, if not accidentally: the Lesser Whitefront *Anser erythropus,* Barnacle *Branta leucopsis* and, even less often, the Red-breasted Goose *Branta ruficollis.*

Protection

For most shooting men in France geese are, in normal times, an exceptional quarry and very few of them can pride themselves on having killed many. At the regular wintering places, some shooters harry the birds hard without, very often, doing anything other than increasing their wildness and keeping them on the move. But in this way they are helping the gradual desertion of strongholds already very few in number.

Shooting pressure becomes much more dangerous for the geese in cold spells such as that of February, 1956. The birds, dispersed and urged on by hunger, lose their caution and become extremely vulnerable. The losses inflicted in such circumstances will seriously reduce the stocks if they are repeated frequently. Fortunately in 1957 the hunting authorities in France had a law promulgated which allows shooting to be suspended in each department in the event of any natural disasters: fires, floods, prolonged frosts, etc. Thanks to this measure the regrettable massacres of the winter of 1956 ought never to recur.

However, to ensure the continued wintering of geese in France specific reserves need to be created. At present there are only coastal reserves: that of the Golfe du Morbihan holds about 3000 Brent Geese, say half the population of the French coast. Increase of such reserves grows more urgent as the vast tracts favouring the stay of wildfowl are rapidly reduced by drainage and cultivation of large marshy grasslands and saltings formerly used for raising cattle.

The Goosander and Red-breasted Merganser in Scotland

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Summary

THE spread of the Goosander and the Red-breasted Merganser in Scotland is reviewed and their present breeding distribution is described. The Goosander occurs on the upper reaches and small tributaries of rivers, while the Red-breasted Merganser occurs mainly on sea lochs and firths and on the lower reaches of rivers, except in the case of the larger river systems, where it occurs far inland. During the autumn, winter and early spring the Goosander is found on the lower reaches of rivers and on lochs and reservoirs, while the Red-breasted Merganser occurs in very large flocks in the firths and estuaries. The population density of Goosanders on some northern Scottish rivers in summer is of the order of two to three birds per ten miles.

The feeding methods of the two species are described. Their enemies are noted, man being much the most important. Reasons for the Goosander becoming a breeding species in this country after 1870 are briefly discussed. The present methods of control have caused little change in their distribution. A study of the birds' feeding behaviour and migrations would be of great value in assessing their importance as salmon predators.

Introduction

The distribution and dramatic spread of the Goosander *Mergus merganser* and the Red-breasted Merganser *M. serrator* in Scotland since the end of the last century has been referred to periodically. Harvie-Brown and Buckley (1887, 1892 and 1895) speak of the Goosander, first recorded as a breeding species in Scotland in 1871, as "being one of the most rapidly advancing amongst the breeding species of Anatidae in Scotland." Further mention is made of the rapid extension of its breeding range by Harvie-Brown and Macpherson (1904) and Harvie-Brown (1906). Millais (1913) describes its spread and Baxter and Rintoul (1922) review the distribution of both species in Scotland and draw attention to a similar rapid increase in the distribution of the Red-breasted Merganser.

The latter species, although a resident in this country for centuries, exhibited a marked change in its status about 1890, some years after the colonisation of Scotland by the Goosander. Berry (1939) and Baxter and Rintoul (1953) both describe in detail the distribution of both species and note further extensions in their breeding range since the publication of earlier records. Although mention is made of the control of both species in the interests of freshwater fisheries (Baxter and Rintoul, 1922 and 1953; Jackson, 1937 and Berry, 1939) no assessment has been made of their present distribution after a period of years during which control has been attempted. The purpose of this paper is to summarise recent information and observations on the numbers and seasonal distribution of Goosanders and Red-breasted Mergansers. And an account of an investigation of their food and the effects of their diet on salmonid fisheries will be published separately.

Distribution

The distribution of the Goosander and Red-breasted Merganser in Scotland is shown in Figures 1 to 4. The figures showing the breeding distribution (1 and 2) have been compiled from (1) records given by Baxter and Rintoul (1922 and 1953), Berry (1936 and 1939) and Venables and Venables (1955); (2) the nest record scheme orgainsed by the British Trust

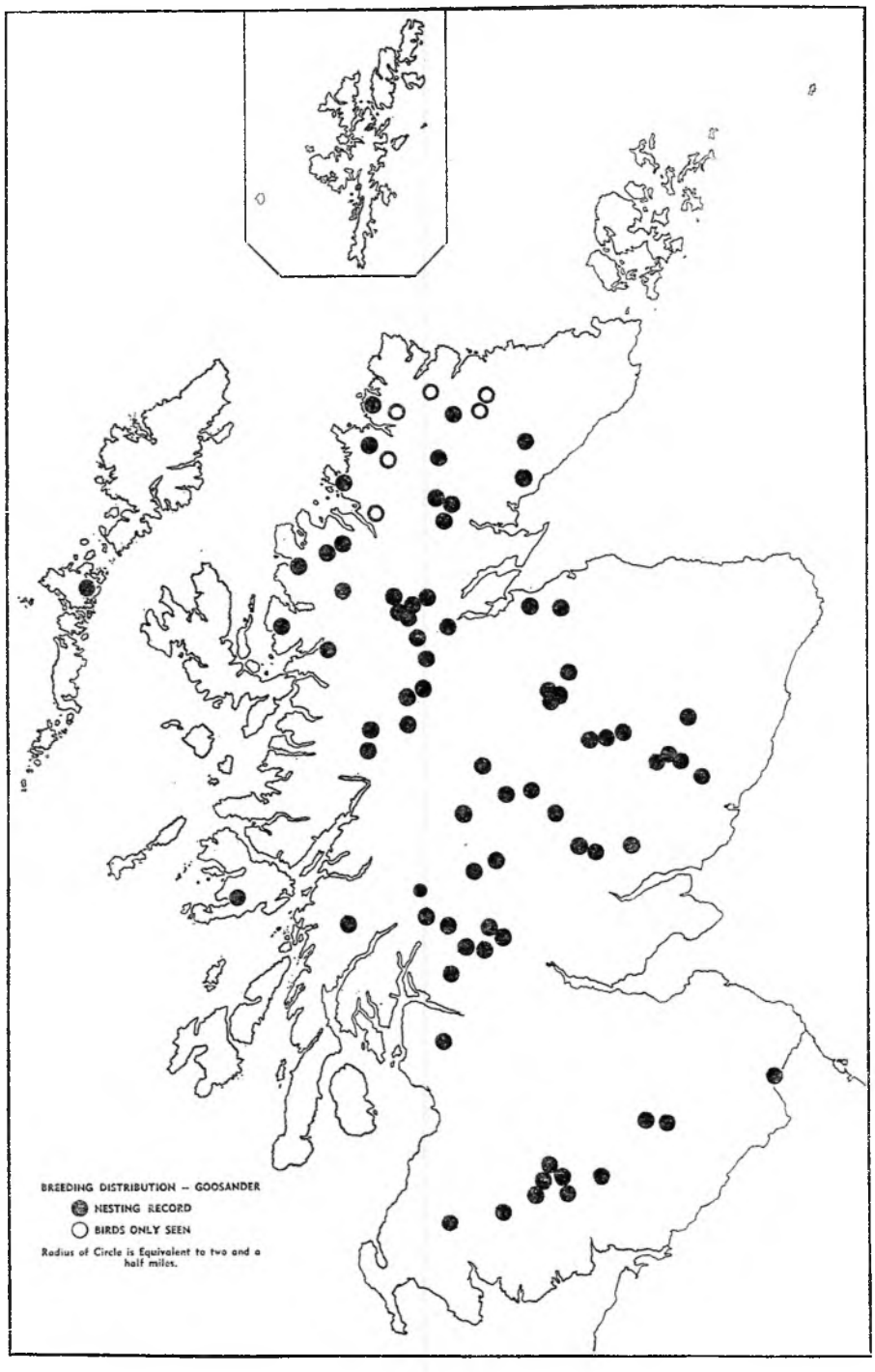
BREEDING DISTRIBUTION — GOOSANDER
NESTING RECORD
BIRDS ONLY SEEN
Radius of Circle is Equivalent to two and a half miles.

Figure 1