SECTION II: TRUST RESEARCH 1958-59

Dr. G. V. T. Matthews, Assistant Director (Research) is in charge of the *Research Unit*. His principal research interests are in the experimental study of migration and navigation. H. Boyd, Senior Biologist, is responsible for ringing and population studies, other than the national Wildfowl Count scheme, organised by G. L. Atkinson-Willes. J. V. Beer works chiefly on pathology and photography. Dr. S. K. Eltringham is biologist-pilot. P. J. S. Olney conducts research on wildfowl foods. Dr. Janet Kear (appointed October, 1959) will work on feeding behaviour. Miss E. Temple Carrington is secretary to the unit. N. Phillips is laboratory assistant. W. A. Cook operates Borough Fen Decoy.

WILD GEESE AT THE NEW GROUNDS, 1958-59

European White-fronted Goose *Anser albifrons albifrons*

The first autumn record was of three on 28th September, 1958. Numbers increased slowly through October to 170 on 31st. There were rather fewer in November. An influx early in December brought the total to over 700 on the 9th. It remained at that level until after Christmas, then rose to 920 on 28th and 1200 on 29th December. No major change was then seen until early February, when numbers rose to 3200 on 5th, 3700 on 6th and by 14th reached 5000. This peak was not long sustained and by the end of February only about 3000 were present. During March gradual dwindling occurred

until 1000 were left on 21st. The great majority of these departed on the night of 21st and the remainder on the bright moonlit night of 22nd.

1958 seems to have been the worst breeding season for this Whitefront population for many years. The small flock in October included only 12% young birds; in December this rose very slightly to 13.6%, with a mean brood size of only 2.5, only 15% of the geese in adult plumage being parents. As the two previous years had been good for breeding this small proportion of parents was obviously due to the presence of many pre-breeders as well as to poor breeding success. In mid-February, when the flock was at a maximum, only 7.2% were first-winter birds, and the mean brood-size had dropped to 2.2.

After a late start due to the unsuitable condition of the ground, the first week of March was devoted to rocket-netting. Only one catch was made, but this was of 129 birds, the most of this species yet caught at one time. There were only 10 first-winter birds. The catch included four geese previously ringed at Slimbridge, in February 1958. Subsequently, in a week's intensive watch, 44 rings from the 1959 catch and 19 from 1958 were read, producing useful data on pair and family groupings. The Dutch are now ringing substantial numbers of Whitefronts and six of their birds were distinguished, the ring numbers of four being read. (See photograph on p. 170).

Four of the geese ringed on 9th March, 1959 were recovered within a few weeks. SWT 337 was found dead on 19th March near Assal, Niedersachsen, Germany (53°41′N, 9°26′E); 1007398 was shot on or about 30th March at Petkum, near Emden, also in Niedersachsen; SWT 364 was shot on 30th March at Borycz, Poland (51°12′N, 20°23′E); and SWT 370 was reported on 17th April from Chluderia, Poland (53°10′N, 22°00′E). These were the first recoveries we had had for five years in the period March—mid-April. They give a rather different impression of the earlier stages of the spring migration. The confirmation that our geese actually do stop in Poland is particularly valuable, though it is remarkable that it has taken seven years to obtain our first Polish recoveries. Does this imply that the kill in Poland is normally small, or has there hitherto been a disinclination to report rings?

Greenland White-fronted Goose *Anser albifrons flavirostris*

A first-winter bird, wearing a ring, was seen on 14th and 16th March, 1959. On the first occasion the observer (G. V. T. Matthews) was able to read the address on the ring—Zool. Museum, Copenhagen, Denmark—and the number 271698. Dr. Finn Salomonsen has told us that this was marked as a gosling at Sarqaq, Nugssuaq Peninsula, Jakobshavn District, N.W. Greenland (70°06′N, 52°08′W) on 1st August, 1958.

From 4th to 13th April, 1959 a single *flavirostris* accompanying a Lesser White-fronted Goose was seen in the area. This was definitely a second bird, having no ring.

Lesser White-fronted Goose *Anser erythropus*

At least two adults present in the late winter: one seen at times from 14th to 27th February, the second from 15th February to 21st March, 1959.

This bird, a male, was apparently paired to an European White-front female. One, with a Greenland White-front, present from 4th to 13th April, 1959 was not certainly identified as either of these individuals.

In November, 1958, a full-winged adult from the collection joined the wild White-fronts for several weeks, but it eventually returned to the pens. [It has now been recaptured and pinioned].

Pink-footed Goose *Anser brachyrhynchus*

Six seen on 27th September, 1958 were the first in autumn. From 12th October further arrivals increased the total to a maximum of 42 on 18th. The autumn flock was not seen after 10th November, but a few small groups appeared later and flocks of 92 and 61 were seen on 30th and 31st December respectively. 45 were present on 3rd January, but thereafter only one was noted. This stayed until 19th March.

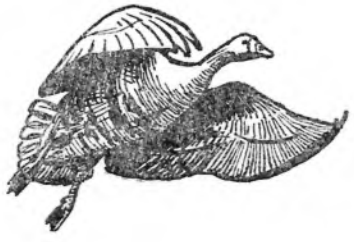
The autumn flock of 42 included 18 juveniles (43%) in 8 broods, 16 of the 24 birds in adult plumage being parents. No ringed birds were noticed. The transient flocks in late December and January were not examined critically.

[**Barnacle Goose** *Branta leucopsis*

Several were seen with the White-fronts at various times, but so far as could be made out all were full-winged birds from the collection].

Red-breasted Goose *Branta ruficollis*

An adult male was seen many times, between 24th January and 13th March, 1959. Two photographs appear on p. 169. This is the third to have been found at Slimbridge, and the sixteenth in Britain.



RINGING 1958-59

Duck Ringing

There were no major changes in the pattern of ringing, most of which continued to be done at the Trust Decoys at Slimbridge and Peakirk and the permanent trapping station at Abberton. The numbers ringed are recorded in Table I. The grand total of 4087 was substantially smaller than in the previous season, due chiefly to reductions of 1389 in the Teal caught at Abberton and of 997 in the Mallard caught at Slimbridge. These big changes show only too clearly that sustained catching efforts do not inevitably yield large catches, seasonal differences in the numbers of ducks available being of decisive importance.

Abberton, Essex — cage traps, operated by Major-General C. B. Wainwright, C.B., assisted by R. King.

This station has been the principal site of British Teal ringing since 1950. Large fluctuations in the Teal catch from year to year are normal. The decline in the number of Wigeon ringed, from 111 to 8, is notable, but less so than the increase in Shelduck from 7 to 37. The Shelduck shows signs of spreading inland in England, as it has recently done in Denmark, and Abberton is probably the most favoured inland locality at present. The history of these ringed birds promises to be unusually interesting.

Borough Fen Decoy, Northants — The decoyman W. A. Cook reports: The season opened on 20th August with a catch of 12 in the East pipe. During the summer three pipes had been completely rebuilt with metal hoops, four pipes were repaired with willow hoops and one pipe, the South, was left in an unworkable condition.

Of the new pipes, the East was disappointing in that the ducks were difficult to drive and frequently flushed out into the pond when shown over. On one occasion 35 were dogged into the pipe but only 6 captured, though the wind was S.E. and moderate. This reluctance was probably due to large trees on the left of and opposite the small end of the pipe.

The South East pipe, also of metal construction, was very successful and over 30% of the total catch were inveigled into this pipe. The dimensions of the S.E. pipe are: length 157 ft., width at mouth 24 ft., height at mouth 12½ ft. — this is about 2½ ft. higher than the original pipes built with wooden hoops.

TABLE I

Ducks Ringed 1958-59

	Abberton	Slimbridge	Borough Fen	Deeping Lake	Other Stations	Total
Shelduck ..	37	1	—	—	—	38
Pintail	—	4	—	10	1	15
Teal	751	7	145	33	176	1112
Mallard	277	647	1712	8	61	2705
Gadwall	2	—	—	8	—	10
Wigeon	8	—	1	17	—	26
Garganey ..	10	—	—	—	—	10
Shoveler	20	—	8	2	21	51
Pochard	3	—	—	24	—	27
Tufted Duck ..	2	—	—	56	1	59
Eider	—	—	—	—	34	34
Total 1958-59 ..	1110	659	1866	158	294	4087
Total 1957-58 ..	*2897*	*1704*	*1467*	*82*	*272*	*6422*

In April, 1958, I acquired a puppy to train as a decoy dog. He is of doubtful ancestry and has been called a Peakirk Terrier for want of a more definite pedigree. I have named him Piper, the traditional name for a decoy dog. He is foxy in appearance with white feet and a white tip to his collie-like tail. The existing decoy dog, Bob, trained by the late Billy Williams, was a black Labrador which I felt was too big for the job. The theory was that Piper, looking like a natural predator, a fox, would induce more ducks into the pipes. I actually tried Bob and Piper under identical conditions and while the ducks followed Piper well into the pipe they failed to follow Bob more than two hoops down.

Piper was first worked 2nd September and 14 ducks were caught as the result of his efforts. The number of duck on the pond built up to a peak of 1,800—2,000 from 12th September to 14th October and then slowly receded, reaching a semi-resident population of about 500 until the frost in early January. The hard spell started 4th January. The ice was broken each morning and I fed the West pipe in a lead of clear water 20 yards into the pond. This resulted in three catches of 5, 29 and 30. After 8th January the ice was two inches thick and the ducks had left for the open gravel pits and river. The hard frosts continued until 10th February when the ice was practically solid—I chipped a hole in the centre of the pond and measured five inches of ice. There was very little rain and no wind during the next two weeks and the ice was still present up to 24th February, by which time most of the migratory ducks had moved away. The total catch of 103 during February and March made a disappointing finale to the season, in which altogether 1866 ducks were caught.

Recaptures in 1958/59 totalled 181, including one Slimbridge-ringed bird 944906—ringed 19.12.57; one Abberton—940116—ringed 17.9.57; one Belgian—2H5083—ringed Meetkerke, near Bruges, 51.14N, 3.09E, on 28.7.57; one Finnish—H26158—ringed Pori, S.W. Finland, 61.30N, 21.45E, on 14.8.58; and one hand-reared bird carrying a W.A.G.B.I. ring.

Of the 181 recaptured 15 were caught twice after being ringed and 7 caught three times. 2 ducks were caught and ringed before lunch and recaptured feeding later the same day. On 4th November 4 Mallard were recaptured in the West pipe having been ringed at that pipe the previous afternoon.

Seasons in which recaptured ducks were first ringed at Peakirk

	1958/59	1957/58	1956/57	1955/56	1954/55	Total
1958 Sept.	13	1	–	–	–	14
,, Oct.	24	5	–	–	–	29
,, Nov.	49	9	–	–	–	58
,, Dec.	34	6	1	–	–	41
1959 Jan.	17	2	–	–	–	19
,, Feb.	3	1	–	–	1	5
,, Mar.	11	1	2	–	1	15
Total ..	151	25	3	0	2	181

The absence of recaptures of birds ringed during 1955/56 is probably due to the small number (352) ringed that year.

A good hide is necessary to enable one to see into all the pipes A site was selected on the point between the North and North East pipes and a Canadian-type log hut was built. This was near the site of an earlier hide built by Mr. Scott in 1932. The advantages of this position are that the prevailing S.W. wind enables it to be approached safely on more days than any other, and that it is possible to see into five of the eight pipes.

Much of the thick undergrowth was cut away from the East and South-West pipes, 170 big trees being cut and moved from the decoy. Many of the poplars were over 90 feet high and the trunks contained 240 cubic feet of timber. A large number, however, were hollow and their limbs rotten. No doubt many of these trees would have crashed to the ground during the next few years had they not been felled. Much of the elder and hazel on the points between the pipes was thinned and cut down to 3 or 4 feet. Before cutting this growth the pond appeared to be surrounded by a solid green wall 30 feet high. Now the pond looks much bigger I hope the ducks will feel safer, resulting in easier and bigger catches. Unfortunately it has not been possible to complete the removal of all the timber which has had to be felled in order to improve the duck-catching efficiency, so that the decoy will not be looking its best until after next summer.

The South pipe was built with metal hoops of similar dimensions to the South East pipe built in 1958. This South pipe has been a good Teal pipe in the past, probably due to the position of the reed bed. The Teal still winter in the district in quantity though I am at a loss to think why they ceased to frequent the decoy pond in catchable numbers.

Deeping Lake, Lincs. — operated by D. Dandridge.

Though the catch here was numerically small it was again of remarkable diversity. The traps could not be used for long periods. because Mr. Dandridge was ill, so that the doubling of the previous season's catch to a total of 158, of 8 duck species, was a satisfactory achievement.

Berkeley New Decoy, Slimbridge — operated by divers persons.

The Slimbridge ringing figures are disappointingly low. The most interesting development of catching technique here was the use of a stuffed fox and stuffed stoats as substitutes for a decoy dog. The models were quite effective, but further experiments are needed. They have the advantage of being usable by anyone, whereas a dog usually only works well for one person.

Orielton Decoy, Pembroke — operated by R. M. Lockley and R. Greenslade.

The number of ducks using the Decoy continued to be small in comparison with its former abundance. The most notable event of the season was the use of the last of the historic series of Orielton rings, made before the war.

Newburgh, Aberdeenshire — Miss E. A. Garden reports:

Early in 1958 two Abberton-type traps were placed at the Meikle Loch of Slains. During the autumn the shooting tenant complained that one trap

interfered with the shooting, so it has now been re-erected in a slightly different position. The other trap was not a success, being wrongly sited. It only caught one Teal and several Coots. Towards the end of the year it was moved to the Cotehill Loch and during November and the first few days of December four Teal and five Mallard were caught, one Mallard drake coming to the trap every day for a week. I then had to abandon trapping for the rest of the season. In 1959-60 I hope the traps at the Meikle and Cotehill Lochs will produce better results. Another trap is being put up at the shallow pools at the north end of Forvie Moor, which is a very good place for Teal.

A large tidal trap on the Ythan estuary near the mill at Newburgh only caught 5 Mallard. Despite baiting with both grain and mussels no Eiders were caught. It was therefore moved further upstream, to the island Inch Geck, where I hope it will catch Wigeon.

The floating Eider trap, which started off quite well in 1957, failed completely in 1958-59. I am at a loss to understand the reason for this. 26 Eiders were caught by rocket net, in an experimental firing by the Trust netting team early in October, when large numbers frequent the estuary.

The total number of wildfowl ringed in the district in 1958-59 was 55, comprising 6 Mute Swans, 34 Eiders, 10 Mallard and 5 Teal. The Teal produced two interesting recoveries: a female ringed 25th September, 1958 was shot on 15th January, 1959 on the Downpatrick Marshes, N. Ireland; and a male ringed on 29th October, 1958 was killed at Grand Couronne, Seine-Maritime, northern France, on 21st February, 1959. One of the Mute Swans was found dead at the Loch of Strathbeg, 25 miles north, a year after ringing. One Mallard was shot locally.

Abbotsbury, Dorset

The ancient and well-known decoy at Abbotsbury, operated by Mr. Fred Lexster for the Earl of Ilchester, is not a Trust responsibility, but the ducks caught in late winter are marked with Trust rings, continuing the tradition of ringing at Abbotsbury begun in 1937. The numbers marked at Abbotsbury have never been large, but have yielded some remarkable recoveries.

Other duck ringing

Small numbers of Mallard were ringed in Cheshire, by Mr. R. C. Green; in Somerset; and in Sutherland. Twenty young Shovelers were marked on the shore of Loch Lomond, Dunbartonshire, in May 1959. Mr. E. A. Maxwell plans to develop a ringing station near Loch Lomond.

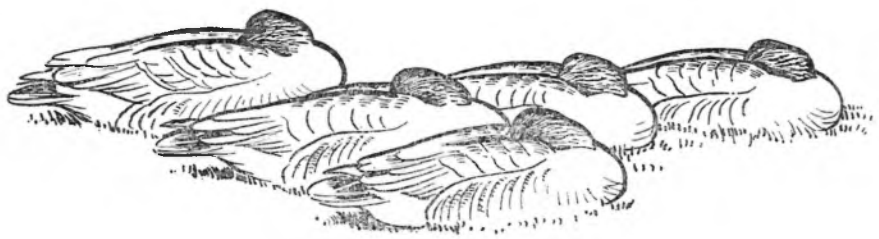
No ringing was possible at **Ludham**, Norfolk in 1958-59.

Goose Ringing

The Pinkfoot-netting expedition in October 1958 yielded a total catch of 2167 in ten firings. Though over a thousand fewer than the record catch of 1957 this was the second largest annual sample yet obtained. The recovery-rate of Pinkfoot rings has been lower in recent years than in the early part of the study, largely because ringed geese are no longer novelties, but recoveries and recaptures together are providing an instructive picture of the

continuous changes in distribution in Britain in winter, as well as data on annual survival.

A week after the nets had been laid in a field near the Trust headquarters, a catch of 129 Whitefronts was made on 9th March, 1959. This was our biggest catch of Whitefronts, which are more difficult to concentrate in a small area than are Pinkfeet (record catch 490) or Greylags (218). Four geese ringed at Slimbridge a year earlier were recaptured, but no Dutch-ringed ones were caught though six were seen during the winter.



Pinkfeet

Swan Ringing

161 Mute Swans were ringed at Abberton during the season, half of them in two nights in August—using a brilliant spotlight to dazzle the birds. Most of the others were caught by day in the reed beds. In the autumn many of the Abberton swans were affected by a helminth infestation coupled with a food shortage and their later history promises to be of unusual interest.

Small numbers of Mute Swans were also ringed in Gloucestershire, Somerset and Aberdeenshire. Our concern has been to develop a method of large-scale capture suitable for use on major concentrations, to supplement the marking of families and small groups which is being done by several B.T.O. registered ringers in various parts of the country. The use of lights at night showed promise but is not satisfactory since it requires a powerful boat (which must be large enough to produce transport problems), is unsuitable for work in estuaries and attracts public attention in an undesirable way.

AERIAL SURVEYS

THE first full season of aerial surveys conducted by the Wildfowl Trust was 1957-58. Much of the flying was exploratory and a large part of the funds set aside for this project was spent in visiting Canada to observe the aerial surveys carried out there by the U.S. Fish and Wildlife Service. With this experience behind us we hoped to establish the practicability of aerial surveys in this country on a firm basis in 1958-59. Unfortunately our efforts were seriously curtailed in the winter by the exceptional sequence of bad weather which allowed flying on only 50 of 151 days between November and March. However, about 158 flying hours were spent on survey in the twelve months from September 1958 to August 1959—a satisfactory total considering that flying did not begin until the end of November. The time was divided between a number of surveys which are considered in more detail below.

The first task attempted was a census of the wintering population of Greylag Geese in Scotland which required nearly 20 hours flying in November, 1958. This was followed by a survey of Barnacles and Brents in Ireland during March, 1959 taking 27½ flying hours. A shorter flight to count the Brents on the east coast of England in February, 1959 utilised another 4½ hours. A further Greylag survey was made in the early summer, but this time we were interested in the size of the breeding population of resident geese in mainland Scotland. The survey, flown in May and June 1959, took about 28 flying hours.

The rest of the flying was carried out from our home base at Staverton Airport near Gloucester with an Auster VD of the Cotswold Aero Club. Much of this flying has been concerned with a study of the population of Shelduck in Bridgwater Bay which is the only known moulting area used by substantial numbers in this country. Up to the end of November 1959 twenty flights (totalling nearly 44 hours) had been made over the Bay. These surveys were not devoted exclusively to Shelduck and other commitments were fulfilled during the flights.

Details of Aerial Surveys flown

Greylags

The results of the Greylag survey flown in November 1958 were published in the last Annual Report (H. Boyd. 1959. Greylag Geese in Britain in Winter. *W.T. 10th Annual Report*: 43-58) though more properly the study falls into the period covered by this report. The beginning of the survey coincided with the onset of foggy weather and it proved impossible to fly our aircraft from Bristol to Scotland where the survey was to begin. Consequently a last minute change of plan was made and we completed the survey with an aircraft hired from Airwork Ltd., at Perth. Flying conditions in Scotland were good but the fog persisted for most of the time in England. This and other experiences later in the winter have convinced us that the best policy is to hire an aircraft as close to the centre of operations as possible.

The same aircraft, an Auster Aiglet, was used for the summer survey. This survey, which is described elsewhere in this report (pp. 103-106) took us over the Highlands of Sutherland and Ross and Cromarty and into

Caithness. Most of the flights were made from Inverness (Dalcross) Airport, which is the nearest airfield to the N.W. Highlands. A base on the West Coast would have been most useful, especially on those days when we were unable to cross over from the east because of cloud covering the high ground.

Barnacles

The Irish survey of Barnacles was made with an aircraft and pilot hired from Skycraft Services Ltd., Dublin, as it proved impracticable to fly an aircraft over from England. The survey, from 3rd to 15th March, 1959, took 27½ flying hours and covered the coast between Down and Waterford as well as much of the coast and most of the islands of Galway, Mayo and North Donegal. Although incomplete (2330 Barnacles were seen in 12 places) the survey was of great value in paving the way for further work in Ireland, in particular a census of Barnacle Geese in December, 1959.

Brents

Sixteen of the twenty-two known haunts of the Pale-bellied Brent in Ireland were visited during the survey described above, and small flocks were seen in two places where Brent had not previously been reported. The number of birds seen was 970, neither of the two major wintering places (Tralee Bay and Strangford Lough) being searched.

The single survey of the Dark-bellied Brent in eastern England was made after four plans for earlier flights had had to be abandoned because of bad weather. These surveys can only be made at week-ends, when the several military firing ranges in the search areas are inactive, and this restriction further reduces the chance of completing a successful census. The main areas searched lie between Ipswich and Southend in Essex and along the coast of Lincolnshire and Norfolk from Skegness to Blakeney Harbour. On an earlier attempt at the survey we flew from Staverton to Ipswich, only to be confronted next day with misty weather which continued for 15 days during which the visibility did not lift above a mile. This, together with low cloud, effectively prevented the survey as well as a return to Staverton. Subsequent surveys have been made with aircraft hired from Ipswich and Skegness Flying Clubs. On 21st and 23rd February, 1959, 7200 Brent were found along the shore from Southend to Skegness.

Shelduck

As the Bridgwater Bay moulting area is almost on our doorstep we have taken the opportunity of investigating the number of birds found there and in contiguous areas of the Bristol Channel during the moulting period. The results of our first season's work, which showed a maximum of 3300 birds in early September, are discussed elsewhere in this report (pp. 107-117). They have revealed some interesting features calling for further investigation. The ease with which routine flights can be made over the area has shown that an aircraft is the most efficient tool for tackling this type of problem.

Miscellaneous Flights

We had hoped to develop a technique for investigating the breeding population of ducks through a transect system similar to that employed in North America. However, it became apparent after a few flights in Shropshire, Gloucestershire and Somerset that the density of ducks was much too low or their distribution too discontinuous to permit the use of this sampling method, which requires a fairly uniformly distributed population.

Another promising use of aerial survey seemed to be flights up and down the course of rivers (which are not adequately represented in the 'waters' of the National Wildfowl Count Scheme). Test flights were made not only to collect information on distribution but also to test our consistency in returning similar figures for the two legs of the flight. For the latter purpose they were extremely helpful. But the use of rivers by ducks was found to be so limited that sampling extensive enough to add a useful amount of information to the Counts would be disproportionately expensive.

Duck counts on reservoirs were found to be a more difficult proposition. With practice, some progress has been made, particularly in counting breeding ducks on the North Somerset reservoirs. These surveys, made during the Shelduck flights, were compared with counts from the ground, usually made on the next day. The ground/air comparisons showed good enough agreement to justify the belief that this type of aerial survey is valuable in areas where ground counts are not available. Counts of ducks on heavily-populated lakes and reservoirs outside the breeding season give a fair picture of the total numbers present but are, not surprisingly, less reliable for individual species than thorough counts from the ground. On some large estuaries, however, aerial counts are better in both respects.

Finally we have used an aircraft for a limited number of photographic sorties to test equipment and films and on one occasion to get a 'goose's-eye' view of the Dumbles for a film which is being made about our local Whitefronts. Our experience has shown very clearly that in British conditions photographic recording of wildfowl numbers is so difficult and unreliable that it must be subordinated to direct observation.

WILDFOWL FOOD RESEARCH

P. J. S. Olney

THAT there is some sort of relationship between population size and density and the quality and quantity of food available and consumed is obvious, but the extent of this relationship is rarely known and then only when a detailed study of a particular species has been made. For most conservation work it is of fundamental importance to know how far food can be a limiting factor.

Since 1957 the Wildfowl Trust has been carrying out a study of the food and feeding habits of various British wildfowl. This report is a summary of the work involved up to date. Some of the problems entailed in a study of this sort have already been reviewed in previous papers (*Wildfowl Trust Ninth Annual Report*, pp. 47-51, 1958; and *Bull. B.O.C.* 80, pp. 33-5, 1960). Most of the work has been based on stomach analyses and field observations, correlated where possible with floral and faunal surveys of the areas involved. Approximately 1500 viscera have been received for analysis since the scheme began in 1957. These have been collected by clubs affiliated to the Wildfowling Association of Great Britain and Ireland and by a number of individuals. Instructions as to the removal and preservation of the viscera, since described by Harrison (p. 135 of this Report), were sent to each collector. As the viscera were received at the Trust a standard procedure was adopted. They were numbered in sequence by areas and their particulars entered on a record card. The contents of the oesophagus, proventriculus and gizzard were then removed and sorted into inorganic and organic material, the volume of each being expressed as a percentage of the total volume. The organic material was then separated into plant and animal food and where possible each specific item was expressed as a percentage of the total organic volume. Any item of less than 0.05 ml. was referred to as a trace only. The number of each species was also recorded. As far as possible each item was identified to specific level. With some of the material this was not always feasible, either because digestion had proceeded too far or because diagnostic keys are not yet available.

It should be emphasised that this survey was only possible during the shooting season (between 1st September and 31st January inland, extending to 20th February on the foreshore) on birds not on the protected list, and it must therefore be accepted as incomplete.

The three most commonly shot duck in this country, the Mallard (*Anas p. platyrhynchos*), Teal (*Anas c. crecca*) and Wigeon (*Anas penelope*) have provided the main bulk of the material. For these three species 476, 440 and 387 viscera have been collected. Much smaller numbers of Pintail (*Anas a. acuta*), Shoveler (*Anas clypeata*), Tufted Duck (*Aythya fuligula*) and Pochard (*Aythya ferina*) have been received and these at the moment can only provide an index of the foods taken. Examples of the first three species have been received from a wide variety of areas of differing ecological types, and in future publications each habitat will be considered separately. Though the largest numbers have been of birds shot over saltmarsh areas, many have come from inland waters. There are examples from water meadows, rivers, reservoirs, lakes, smaller bodies of water and from a number of flight ponds. As is to be expected, within the same species there are differences in the food

taken depending on where the birds were feeding and on the time of year. Where practicable, botanical surveys of the areas involved have been made in order to show what sort of food is available and the preferences, if any, of the birds concerned.

Once the food habits of a particular species and what food is available are known, then any necessary conservation measures can be planned. Experimental plantings of species of known food value have been started in Kent. Six plant species whose seed was known to be taken by Mallard and Teal in that district were planted in the ' virgin ' soil created by brickwork excavations, part of which is now a wildfowl refuge. The species used were Persicaria (*Polygonum persicaria* L.), Water-pepper (*Polygonum hydropiper* L.), Amphibious Bistort (*Polygonum amphibium* L.), Knotted Persicaria (*Polygonum nodosum* Pers.), Marestail (*Hippuris vulgaris* L.) and Bur-reed (*Sparganium erectum* L.).

Some supplementary information has been gleaned from the viscera examination. For example, of all the Mallard examined so far, approximately 7% contained *ingested* lead pellets and it has been shown experimentally in America that 70% of adult Mallard with only *one* lead pellet will die of lead poisoning, if they are feeding on a diet of wild seeds (see p. 126 of this Report).

Occasionally birds are shot in which whole seeds are found down to the rectum, apparently undamaged. The question whether they are still viable or not has obvious botanical importance, for in this way some plant species may be spread from area to area. Experiments are being conducted to test the viability of such seeds.

It is important in a survey of this sort to know how long it takes for food to be digested. Using methylene blue as an indicator it was found that in adult Mallard feeding on a corn mixture, mainly Barley, the rate of food passage averaged $2\frac{3}{4}$ hours. Details of these experiments will be published later.

In order to facilitate the identification of wildfowl foods a reference collection of plant and animal material is being accumulated and housed at the Trust.