Research and conservation in Great Britain

The numbers and behaviour of geese in the Lothians and Berwickshire

WILLIAM BROTHERSTON

Summary

An account of the numbers and distribution of Pink-footed and Greylag Geese in south-east Scotland, based primarily on simultaneous counts at all the roosts in the area once or twice each autumn from 1955 to 1963, supplemented by less complete counts in 1950–54 and by the gathering of memory records from local residents extending back over 30 years. In recent years there have been peaks of about 12,000 Pinkfeet and 1,000 to 1,300 Greylags in the area in October or November.

Pinkfeet were most numerous in 1961 (14,000) and scarcest in 1963 (4,750). Local abundance is largely determined by the amount of food available, principally on stubble fields in autumn and grass in winter. Numbers before the 1939–45 War were at a lower level, the peak probably no more than 5,000. A shift from coastal to inland roosts during the War was due partly to disturbance but, more importantly, to improved mechanical agriculture in the upland area, with a substantial increase in crops of barley and oats and the rotation of grass as a crop.

Pinkfeet arrive from the middle of September, the main arrivals being usually in early October. A peak in numbers soon afterwards is usually followed after only a few weeks by radical changes in distribution with some emigration, the mid-winter population being no more than 5,000. Numbers increase again from the end of February, declining in April, with a final spring departure in the early days of May.

The feeding, roosting and flighting behaviour of both Pinkfeet and Greylags are described. Only one roosting station (Gladhouse) is used by large numbers of both Pinkfeet and Greylags, most of the latter preferring reservoirs not used by Pinkfeet. Greylags prefer grass to stubble and usually feed nearer their roosts than do Pinkfeet. Though still greatly outnumbered by Pinkfeet, Greylags have been more numerous in the last decade than in the period 1935–50.

The occurrence of small numbers of other species of geese is discussed.

Introduction – The attraction of goose watching

The special attraction which exists for many of us in watching wild geese is not hard to explain. They are large birds, moving, feeding and roosting in sociable flocks, are intelligent, generally noisy and superficially easy to watch as they conduct a large portion of their social activities in daylight of varying degrees. The bird watchers who are, or pretend to be, 'anti-goose' say that as a result too high a proportion of time is spent in the watching of geese instead of on watching equally interesting but less readily observable species and that watching lines of geese flying to roost against the light of a fading evening sunset in ever changing pattern may be a form of aesthetic enjoyment but is not bird watching in any proper sense.

It would be hard to deny that on many an occasion there is a considerable degree of aesthetic enjoyment in the watching of geese flight against the sky or that there is a great thrill in seeing and hearing a large flock pouring in a resounding mass towards the roosting loch or whiffling down upon it to the accompaniment of the reception clangour of the flocks already in. On the other hand geese form just one thread in the pattern of winter bird watching and if geese were the only birds which occupied the winter scene around the roosts they would be poor places to go to. It is in the contrast, the mixture, the interplay with the other birds and the animals wild and domestic that are all around and also are part of the scheme, that for me and almost all the other enthusiasts of whom I have knowledge, the real attraction lies. To see the duck flight out often just before the geese come in, with the accompanying quack of the Mallard and whistle of the Wigeon. To see the sheep move to their night quarters and the hare run across the field or moor. To watch the Curlew flight in to roost in earlier autumn and spring and hear rather than see the Lapwing and Golden Plover also come in to roost. To see the great hosts of gulls come flighting in as silent as the geese are noisy and in the spring to hear the songs of Curlew, Lapwing, Golden Plover and Snipe, the after dusk song and calling of the Skylark; the explosive calls and answering yaps of the cock and hen Red Grouse and possibly in the distance the rikkity cooing of a Blackcock lek or at the coast to have the different

pattern of the tides and the winter flocks of waders and duck with all their varied noises and lastly, as departure draws near, to hear the noise of the geese at the roost splashing in the water and the new range of notes telling that the third and most important pillar of goose psychology, that of spring fever and mating, is on the way; there lies the true draw of goose watching and anyone who avoids it is missing one of the finest parts of bird watching and with it the opportunity of obtaining information about a whole number of species at one particular portion of their daily life which probably otherwise would hardly be touched upon. 'But tae oor Geese!'

The position before 1939 and changes during the 1939-45 War

Before proceeding to consider the years covered by the review it is necessary to look briefly at the position in the Lothians and Berwickshire in the period before the 1939-45 War.

The main roost each winter in the Lothians proper was on the coast of East Lothian at Aberlady Bay. The whole level of the goose population in the area was then much lower than at present, with a peak autumn figure estimated at 1,500 to 2,500 for Aberlady (mainly Pinkfeet, but with small numbers of Greylag). At Tynninghame, the other coastal roost in East Lothian, geese were apparently occasional visitors, no more than a score at a time. There were also two smaller inland roosts one gauged at 200–300 birds at Fala Flow at the south-east corner of Midlothian and one of about 100 birds at Cobbinshaw at the south-west of Midlothian. In Berwickshire the only important roost was one at Hule Moss, with up to 2,000 birds at peak. There is also said to have been a roost at Coldingham Moor (J. Berry *The Status and Distribution of Wild Geese and Wild Duck in Scotland.* 1939, p. 38) but from local evidence this was certainly not in use immediately before 1939 and had not been used for at least 20 years before that. As Coldingham Moor was drained and ploughed up around 1946 and part of it has now been planted with trees, it seems certain that it will never be used in the future.

There does not appear to have been any regular use of any of the various reservoirs covered by these watches for roosting purposes in the decade before the 1939-45 War apart from the small use of Cobbinshaw. There had, however, for very many years – at least going back to 1910 and probably long before that – been a large scale migration of geese south through the Moorfoots each autumn. Mr. Robert Anderson, retired shepherd aged 65, who spent his whole boyhood and early and middle manhood in Leithen Water has said that: 'There was aye a big run through of geese each backend – at the time we were howkin' tatties. They cam' doon Leithen Water – as mony as there are noo. Ye couldnae aye see them ye ken.' He, however, has no memory of any noticeable past migration in the spring. According to Mr. John Douglas, a retired farmworker who lived for 77 years always in sight and sound of Fala Flow, 'There had aye been geese at Fala in the hunner's but we didna' pay the attention tae them then that they dae nooadays'. From other remarks by these two it looks as if there was an autumn passage from Aberlady and the Forth to the Solway, with few settling at Fala in the autumn but larger numbers settling in the area on their return passage, from February to April. So at this pre-War stage even if the geese never or rarely used all the present inland roosts these roosts were lying right beneath or near to an accustomed migration route of which all the landmarks were well known.

J. Kirke Nash (*The Birds of Midlothian,* 1935, pp. 151–152) gives specimen records from the notes of that outstanding field naturalist William Evans giving sightings of Pinkfeet passing over Edinburgh and area between the years 1884 and 1912. Six are records of hard weather passage, five of them eastward or westward presumably to and from the sea-coast roost of Aberlady and 'the Lanark moors'. There is only one record of autumn passage and two for spring.

Then during the 1939-45 War the whole coastline of the Firth of Forth became an armed camp with guns, searchlights and sirens along its entire length and on the islands, and the geese appear to have largely deserted the coastal roosts and gone inland, building up at Hule Moss and Fala, from Fala spilling over to Gladhouse and building up at Cobbinshaw and also taking up quarters at Threipmuir, Harperrig and Baddinsgill. Exact dates for this occupation have not been obtained but there seems no doubt that the large scale transfer of the Aberlady roost to Fala/Gladhouse must have taken place quite early in the War period.

In addition to the disturbance at the actual coastal roosts, the area around Drem and East Fortune which had previously been a usual feeding ground of the geese was usurped for use as aerodromes: and as is well known the aeroplane, particularly in its slow-flying forms, is one of the chief abominations of all geese. At the same time there was a decrease of disturbance at many inland sites. For example, some reservoirs were protected places and grouse moors were less shot.

Another result of the War was a revolution in the agriculture of the upland farms in the area, leading to a major increase in goose food supply. With the financial help of subsidies and good prices coupled with the ever greater use of mechanised implements land that had been under grass for long years was brought back to profitable and regular cultivation resulting in greatly increased acreages under oats and then, in the post-War period particularly, barley also. (In 1939 the area under crops and fallow in the counties of Berwick, East Lothian and Midlothian was 147,900 acres. This had risen to 172,500 acres in 1962, despite a slight reduction in Midlothian from 39,500 to 39,250 acres, due to losses of good land for building purposes.) In addition more use was made of fertiliser so that the corn crop obtained from any given area was much heavier. Grass also was turned over and became a regular crop in the rotation in a fashion that had not been thought of before the War. The result was that during the War years the geese had stubbles and fresh grass close to their much expanded or new inland roosts: and as in the post-War years the changed use of the upland farms has largely continued so has the ready-to-roost supply of suitable feeding for the geese. Here then with little doubt lies a large part of the explanation for the continued use of these inland roosts by the geese on a major scale in the post-War years – the other part lying in the fact that in some of them at least they have found themselves more free from human disturbance by shooting, etc. than at the sea-coast roosts of Aberlady and Tynninghame. The remarkable increase in the popularity of wildfowling since the War, and the increased mobility of foreshore shooters are relevant.

Because of the dearth of information about the pre-1939 period one can only speculate on the source of the great increase in population from the pre-1939 surmised peak arrival level of about 5,000 to the 1955-1963 average level of 11,000-12,000. From the figures for 1955 to 1963, natural increase would not by itself appear to be anything like a sufficient cause for this rise during the 1939-45 period. A partial shift from the Tay area caused by the same War-time disturbance and a partial stay behind of birds that had previously flown over direct to the Solway, which was also disturbed by aerodromes, seem the likeliest explanations.

History of the watches

By 1950 regular wildfowl counts were being carried out at most of the recognised habitats with in particular D. G. Andrew and R. W. J. Smith making those at Gladhouse and Gavin Mills those at Fala. My own observations in 1951 and 1952 led to the conviction that the two goose stations of Fala Flow and Gladhouse were related and interdependent and that the figure for the roosting population at each had to be noted side by side and together to enable any accurate consideration as to numbers or trends to be arrived at. When this point of view was put to fellow members of the Scottish Ornithologists Club and in particular to the watchers at Gladhouse and Fala there was at once whole-hearted support for the project of a simultaneous watch at Fala and Gladhouse with further watch stations at suitable points on the usual flight line between the two and the first such watch was held on 1st November, 1952 (with supplementary watches on 8th and 9th November), and repeat watches limited to Fala and Gladhouse and in between were held on 31st October, 1953 and 27th November, 1954.

The success of these watches led to expansion of the watch to cover all the known major roosts of the Lothians area including Berwickshire. The first general watch was held on 12th November, 1955. In 1956 the Watch Reservoir near Longformacus in Berwickshire which had been completed in 1955 was added in, and in 1960 the area at Libberton/Carnwath (which is a daytime feeding area probably based on a number of roosts and not a true roosting station like the others) was brought in because it was thought that it might possibly derive from and be linked to the by this time much decreased Cobbinshaw roost. When the first National Goose Check was held on 12th-13th November, 1960, the Lothians area check was by pre-arrangement held on the evening of 12th November and the results fitted in to the wider check. This arrangement has been repeated in each subsequent November, with a preliminary check in the Lothians area in October to try and get the distribution of the Pinkfeet population at its peak after first arrival and before more general dispersal.

All who have attempted goose counting will appreciate that a measure of discrepancy must be expected but all practical care has been taken by the counters involved in the series discussed in this review. As a result the accuracy of the picture put forward is considered to be sound.

The population of the Pink-footed Goose (*Anser brachyrhynchus* Baillon)

The two species of geese making up the winter population of the Lothians area are Pinkfeet and Greylag, with the latter species making up rather less than 10% of the

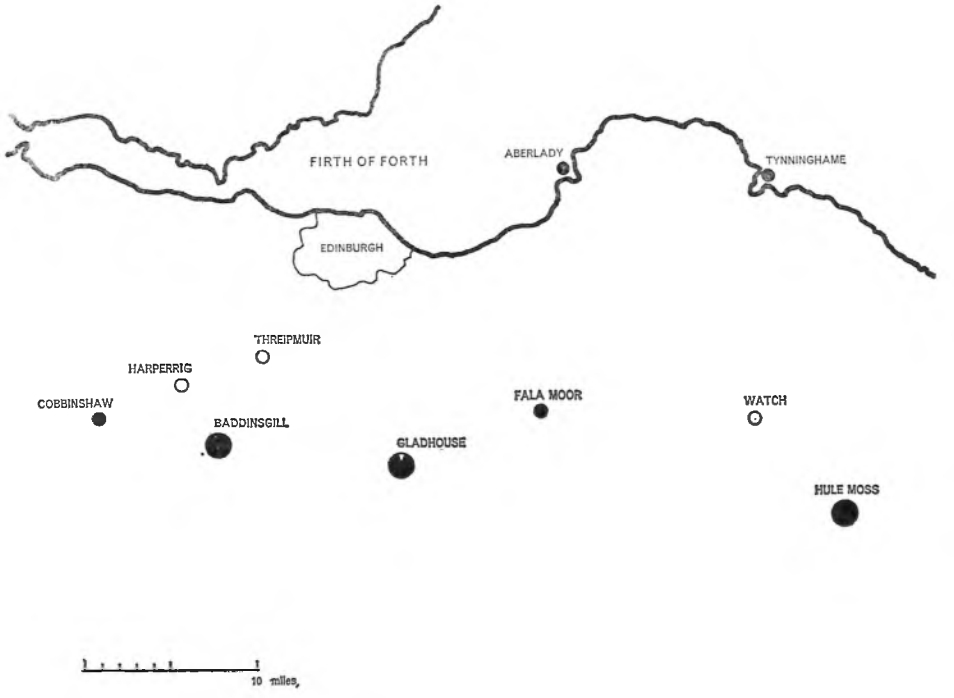

Figure 1. Goose roosts in the Lothians and Berwickshire.
Large circles – roosts with over 1,000 geese in autumn; small circles – fewer than 1,000. Solid circles – roosts used almost exclusively by Pink-footed Geese; open circles – Greylag roosts. Both species regularly occur at Gladhouse Reservoir.

total. The arrival dates of the two species are different, the roosting stations more often than not are different and, whilst they do feed together in the same fields, even there they very much tend to group separately with very seldom true admixture on the ground and never (if one can use that word of geese) in flight. Because of the overwhelming preponderance of Pinkfeet the main part of the remarks that follow relate to that species. The Greylag population is dealt with separately.

The pattern of arrival

While there are variations in detail from year to year, the broad pattern of arrival in the Lothians area each autumn remains the same (Table I). The first few small parties are seen around 14th to 18th September flying in from the north over the Moorfoot Lammermuir range. Almost none stop and some, if not most, head south for the Solway marshes. About the last week of September there is larger scale traffic with the majority again passing on to the south but an 'advance guard' of a few hundred settling in to roost and feed at Fala/Gladhouse in Midlothian with a similar 'advance guard' at Hule Moss in Berwickshire. Finally, around the second week of October comes the big arrival and invasion with an equal number or more passing on to the south. Again the main passing-through traffic in the Lothians heads on for the Solway. The general build-up at Hule Moss takes place earlier than at Fala/Gladhouse and it is thought to be linked with the Humber estuary rather than the Solway.

On more than one occasion I have been fortunate enough to be present in the Fala/Gladhouse area when the big arrival from the north was taking place in clear weather. Under these conditions the geese come in on a fairly broad front at around the 2,000 to 2,500 foot level or in parties of 30, 40, 70 or more flying in loose changing V formation, obviously orientating themselves on the landmarks of Caerketton, Gladhouse Reservoir (particularly) and Fala Moor in the case of those parties which pass on and through to the south. Even although Aberlady Bay is not much used at the first main arrival period it appears to form a visual landmark in the southward movement.

Population changes from October to May

It is at this stage at mid-October that within a week or so the hill stations of Fala/Gladhouse and Hule Moss reach their peak population and the other hill stations of Baddinsgill and Cobbinshaw/Libberton /Carnwath get occupied in force. Then,

Table I. Notes on the arrivals and population build-up of Pink-footed Geese in the Lothians area, 1952-63

	first seen	*first seen at roost*	*major flights through*	*main arrival*	*peak*
1952	17 Sep.	21 Sep.	27 Sep.	28 Sep.	5 Oct.
1953	28 Jul. (sp.?)	27-30 Sep.	3-4 Oct.	10 Oct.	18 Oct.
1954	17 Sep.	18 Sep.	26 Sep.	2 Oct.	14 Oct.
1955	13 Sep.	23 Sep.	27-28 Sep.	29 Sep.	mid-Oct.
1956	8 Sep.	29 Sep.	4-5 Oct.	6 Oct.	6-13 Oct.
1957	3 Sep.	26 Sep.	29-30 Sep.	3 Oct.	19 Oct.
1958	23 Sep.	27 Sep.	11-12 Oct.	12-13 Oct.	26 Oct.
1959	10 Sep.	3 Oct.	17-18 Oct.	18 Oct.	25 Oct.
1960	18 Sep.	25 Sep.	7-9 Oct.	11-12 Oct.	15 Oct.
1961	17 Sep.	30 Sep.	12-13 Oct.	13 Oct.	21 Oct. (11 Nov.)
1962	11 Sep.	17 Sep.	8-9 Oct.	10-13 Oct.	13 Oct.
1963	17 Sep.	26 Sep.	27-28 Sep. (very small)	27-28 Sep.	5 Oct.

Table II. Numbers of Pink-footed Geese in autumn at Fala Flow and Gladhouse Reservoir, 1950-54

		Fala Flow	*Gladhouse*	*total*
1950	28-29 Oct.	700	1,200	1,900
	11-12 Nov.	250	2,000	2,250
1951	21 Oct.	1,500	450	1,950
	28 Oct.	530	2,500	3,030
	7 Nov.	?	about 5,000	
	11 Nov.	1,750	1,300	3,050
	18 Nov.	200	1,300	1,500
	autumn peak possibly over 6,000			
1952	19 Oct.	?	4,000	
	26 Oct.	1,500	2,700	4,200
	1 Nov.	100	4,700	4,800
	8 Nov.	3,100	1,220	4,320
	9 Nov.	1,000	3,320	4,320
	10 Oct.	2,850	?	
1953	31 Oct.	1,500	4,000	5,500
1954	26 Sep.	500-1,000		
	2 Oct.	*c.* 2,500		
	14 Oct.		4,000	
	16 Oct.		1,500	
	24 Oct.	1,250	50	1,300
	6 Nov.		2,500+	
	21 Nov.	*c.* 5,000		
	27 Nov.	2,800	2,200	5,000

unless the food supply situation in the hill areas is particularly abundant – as it was in 1961 when a gale in September shook the standing barley – after a bare fortnight to three weeks at the most, the population at the main hill stations dips sharply at first and then more or less slowly, the rate without much doubt depending on the comparative plenty of food. Some of the loss in the Midlothian area would appear to be from the high upland stations of Fala/Gladhouse to Aberlady and perhaps also to Baddinsgill and Cobbinshaw/Libberton/Carnwath but the main loss is by onward movement to the south. A similar sharp fall within the same few days is usually experienced at Hule Moss.

By the middle or end of December there is usually another sharp decline in the population of the upland areas – that of the Fala/Gladhouse area usually being reduced in January to 700-800; though this figure has shown a tendency to increase in the last year or two. If real hard weather comes this basic flock moves down to the coastal stations of Aberlady and Tynninghame, coming back to the upland area as soon as the weather eases up.

The situation at Hule Moss is similar but the decline to a winter population of 1,500 to 2,500 is less steep no doubt because of the 'fatter' arable areas accessible from that roost. It is however apparently much more liable to be 'shut down' by frost and for longer periods than Fala/Gladhouse. No synchronised count of the roosting stations has been attempted for the bottom population period around mid-January but it might be put at 3,500 to 5,000 birds.

Then, depending on the severity of the winter, a gradual upward trend in population commences in February and continues with or without weather setbacks through March into April, about the middle of which the spring peak population is reached. Again overall figures are not available to give an accurate picture but it is a reasonable guess that the population is both considerably lessened, with a spring peak of around 8,000 birds, and is mainly centred in the upland hill stations. In contrast with the autumn, Fala is used much more than Gladhouse in the spring.

Unless specially good food conditions due to a plenitude of young grass prevail, the peak population at Fala/Gladhouse (4500 to 5000+) is reached and passed very rapidly, even within a week. The numbers then diminish to around 2,000 strong, which departs for the north about the very end of April or first few days of May. Small detachments of up to 100 or so pass through the hill stations for the next week or two, obviously using the known routes and 'transit camps'. And then the calls of the geese are not heard again until the next September – only four months away.

The numbers of Pinkfeet in October and November, 1950-63

With this background it is possible to review the figures contained in Tables II to V. As from 1950 to 1954 the figures available are confined to Fala and Gladhouse (Table II) it is not possible to assess with accuracy the peak population figures for the whole area for these years. Nevertheless from the fact that the Fala/Gladhouse peak Pinkfoot population figures remained around the 5,000 mark from 1951 to 1958 it is possible legitimately to surmise that peak population figures for the whole area in 1952, 1953 and 1954 were very similar to those in the years 1955, 1957, and 1958. Indeed it can also be said that 1953 was a better than average year as 5,500 Pinkfeet were counted at Fala/Gladhouse on 31st October and 6,000 at Hule Moss on 24th October. The significance of the low numbers in 1950 is uncertain because, although there were only 150 Pinkfeet at Hule Moss on 12th November, there had been as many as 10,000 at that roost on 8th October.

Turning to a review of the figures for the whole area for the years from 1955 to 1963 (Tables II and IV), with the requisite additions incorporated to arrive at the peak population figures (Table V) the remarkable fact appears that, although the distribution of the population differed from year to year and the actual date of the peak also varied slightly, the Pinkfoot population remained fairly constant at about 11-12,000.

1956, the first of three years in this series to differ materially, showed a temporary drop in the peak Pinkfoot population to around 9,600. One possible explanation lies in the fact that 1956 was apparently a bad breeding season. Another that is perhaps more likely in the light of the lack of variation between the peak population of 1955 and 1957 is that the peak at Fala/Gladhouse was over so quickly that it was not recorded properly, as apparently happened in 1951. In this connection it should be noted that the actual count of 9,030 on 3rd November was higher than counts in some of the other years made at about the same date.

The autumn of 1961 was unusual in that for the only time in the series the area population showed an increase from its peak arrival level of 12,100 at the watch on 21st October to 14,000 at the watch on 11th November due to the specially good food supply position in that year.

The last year, 1963, was the third to differ materially. During the quite exceptionally hard winter of 1962-63 the Pinkfoot population which remained in the area in January and February was centered at Aberlady where it varied from 200 up to over 2,000 and at Tynninghame where 700-800 were seen on one occasion. But as soon as the weather opened up at the beginning of March the Pinkfeet showed remarkable speed in returning to their upland haunts and resuming their normal pre-migration spring ways.

In the autumn of 1963 there was a quite unusual arrival pattern in the area with heavy in-come from the east or north-east direction following the great gale on Thursday 26th September, and after almost none of the usual flight-through from the north to the Solway and preliminary build-up – the primary reason apparently being a blizzard in Iceland on 24th-25th September. The peak arrival population was then assessed at some 10,000 comparing with the 1962 peak arrival figure of 12,200 or over, the difference being reasonably attributable to casualties resulting from the 1962-63 winter.

Table III. Counts of Pink-footed Geese in the Lothians area in November, 1955-63

roost	*1955 12th*	*1956 3rd*	*1957 16th*	*1958 8th*	*1959 14th*	*1960 12th*	*1961 11th*	*1962 10th*	*1963 9th*	*mean*
Fala Flow	750	–	900	10	270	600	50	2,430	450	600
Gladhouse	2,700	3,750	2,550	3,450	2,000	680	4,670	2,200	4,850	2,980
Aberlady	380	100	10	700	2,360	1,400	250	680	1,380	810
Tynninghame	700	–	150	–	1,000	–	–	–	–	–
Watch Res.	(†)	–	–	–	150	–	–	–	–	–
Hule Moss	1,410	3,200	5,130	4,370	1,100	3,700	3,800	3,500	200	2,930
Harperrig	–	–	–	–	–	–	–	–	10	–
Cobbinshaw	2,120	1,500	1,050	500	2	–	270	130	–	620
Baddinsgill	510	480	900	1,000	530	300	5,000	1,450	1,600	1,530
total (to nearest hundred)	8,600	9,000	10,700	10,000	7,400	6,700	14,000	10,400	8,500	9,500
Libberton/Carnwath	–	–	–	–	–	1,700	580	4,150	1,850	–

none seen at Threipmuir reservoir.
† reservoir completed 1955.

At the watch held on 19th October the population had reduced to 4,750 the lowest autumn level yet recorded in the area, although there was plenty of food available. But by 9th November when the National Watch was held the area population had increased again to 8,500, i.e. a not abnormal figure for the time of year indicating again a resumption of their more usual ways.

An explanation of the steady increase in the peak Pinkfoot arrival figures at Fala/Gladhouse from 1957 to 1961, viz.: 1957 5,000+; 1958, 5,760; 1959, 6,880; 1960, 8,100; and 1961, 8,600, is needed. From the fact that the area population remained comparatively constant during these years it appears likely that the increase was due to changed distribution within the area rather than 'drawing' from another area, the possible conclusion being that Fala/Gladhouse was becoming the main centre for first arrival and subsequent dispersal in the area as a whole, that is to say, serving a function very similar to what Loch Leven used apparently to do on an even larger scale for many years. In 1962, the peak of very brief duration, was again 8,600 but in 1963, already noted as an abnormnal year, it fell to 5,000.

Table IV. Counts of Pink-footed Geese in the Lothians area in late October, 1961-63.

roost	*1961 21st*	*1962 20th*	*1963 19th*
Fala Flow	2,300	170	250
Gladhouse	4,500	5,200	1,560
Aberlady	4	40	630
Hule Moss	4,200	3,500	250
Cobbinshaw	150	40	60
Baddinsgill	950	1,850	2,000
total	12,100	10,800	4,700
Libberton/ Carnwath	700	480	810

none seen at Watch, Harperrig and Threipmuir reservoirs or at Tynninghame.

In contrast with the comparatively small range of variation in the peak population figures during the period of these watches, there is a larger range of variation in the numbers counted at the various November watches (Table III). As will be seen the range is of over 7,000 with a low of 6,700 in 1960 contrasting with a high of 14,000 in the immediate next year of 1961. There is practically no doubt but that these wide variations in population level are related to the food supply available in the area at the time of the watch. It is of course obvious that in a year of quite good food supplies in the area one or more of the major Pinkfoot feeding areas elsewhere in Britain may be even better and so attract more of the total goose population. So also in a year of comparatively poor food supply this area could be relatively better than others and con-

Table V. Estimated size of arrival peak population of Pink-footed Geese in autumn in the Lothians area, 1955-63

		autumn peak in Lothians
1955		12,100
1956		9,600
1957		12,100
1958		11,400
1959		11,300
1960		12,600
1961		12,100*
1962		12,200
1963		10,000
	mean	11,500

* increased to 14,000 on 11th November, 1961.

tinue to hold the geese. It should be remarked that there is no close correlation between the numbers of Pinkfeet counted in the Lothians area in autumn and the total numbers in Britain in November reported by Boyd (1963, *Wildfowl Trust 14th A.R.*, p. 88).

Amongst the ebb and flow of numbers at the various roosts several trends can be made out. The recent increase in the number of Pinkfeet found at Aberlady Bay (to as many as 5,000 resident in late November and early December, 1962) is a welcome vindication of the declaration of a Local Nature Reserve here in 1952. At that time the Bay had almost ceased to be used by geese. The other coastal roost, at Tynninghame, continues to be used only infrequently during the shooting season, presumably because it is so much disturbed.

Another roost that has greatly increased in importance is that at Baddinsgill reservoir. At first sight the increase at Baddinsgill seems likely to be associated with the decline, almost to nothing, at the heavily-disturbed Cobbinshaw reservoir but recent evidence suggests that this is also closely related to events in Lanarkshire.

Roosting and feeding

The twin foundations of goose living, in the winter period, are roosting and feeding. When reasonably undisturbed in their uneasy co-existence with the human and in particular the agricultural community round about, the geese fly to roost either from their feeding grounds or from their resting stations any time from near sunset until an hour or so after it but more usually within the period from half an hour to an hour after sunset when the daylight is fading to a minimum. This must be of choice and not of necessity because geese can on occasion be found flying to roost in conditions of practically total darkness so far as the human eye is concerned. Almost the only times when this ability appears to be used are when the particular roost concerned has become dangerous through extensive shooting. At such times they might navigate by the stars if visible, although sheets of water and silhouetted landmarks must be better seen with what fractional light is available from the vantage point of a goose in flight than from on the ground.

The only time when the navigating ability of the geese breaks down is in mist and this seems fully as much due to confusion of their system of flock call communication as to loss of sight. It follows that in misty weather the geese prefer to feed close to their roosting station. Also when heavy rain or hail comes on when they are ready to fly in they will postpone their flight, or even come down at an in-between rest station, and resume when the blast is over.

At periods when the moon is of any extent and is riding in the night-time sky geese are to be heard flying to and from the roost throughout the night. At such times, either when there has been interference by shooting at the roost or the geese are hungry, they are liable to stay out at the rest station or fields until all hours of the night and only come in to the roost when it pleases them. At Fala and also apparently at Hule Moss the geese from time to time do not come into the roosting water but stay out on the moor all or most of the night, apart from the periods of full moon. As found at Fala this happens, except during special disturbed conditions, first when the small advance guard has just arrived in late September or early October and second, at times when the pond is about to freeze over – a fact that the geese can apparently sense accurately beforehand.

The actual method of flight into the roost varies slightly according to the locality but in the upland roosts it is frequently prefaced by the arrival and flight over the roosting water of one or two separate single geese. On occasion these may fly right in and settle on the water. More often they may return to the direction from whence they came. Then, if there is no disturbing element to be seen near the roost, after a short pause there is a babble of geese to be heard from the rest stations or fields where the goose flocks are located, followed by the chorus of those in flight. According to the spread of the rest-stations or feeding fields in come the geese in loose formation in sections and flocks small and large, the larger the flock the bigger the clamour. These fly in over the water turning upwind

if necessary to do so and then as often as not whiffle down to the pond or loch beneath. If the pond is small and the flock large it is on occasion necessary for a large part of them to circle round 'waiting on' until the first part of the flock has settled before they too can come in. After the first geese are in, the later flocks and sections fly in without any of the hesitation that may have been displayed by the first arrivals. On the other hand if there is some interference at or near the roosting water (such as a human seen near it) at the time the single geese have flown over the area, then after their withdrawal there is a delay of half an hour or more so that the geese come in in very much poorer visibility than normal. At first when the geese come in to roost there is usually a great clamour, redoubled whenever a fresh detachment comes in, with greeting calls from the new arrivals and in answer from the water beneath. Then some time after the last detachment comes in the noise settles down to a constant 'chimmer' or great hum broken only by occasional strident calls (which sound as if coming from the commanders of the flock) varied by occasional squeaks or grunts.

R. W. J. Smith points out that at larger sheets of water, such as Gladhouse, scouting by single birds before the main arrival is unusual, while a moving human body at the edge does not usually deter the birds from alighting well out in the centre of the water.

When the water is frozen over, the geese will quite normally roost standing upon the ice. Under suitable conditions the treading of their feet upon the ice to keep them from freezing to it can be heard, with a sound rather like rain falling on a corrugated iron roof. At such times it has been found possible to arrive at a roughly accurate estimate of the roosting goose population of the night before by counting the castles of fresh goose dirt left behind on the ice. That these are usually the product of one pile per bird has been shown by the accompanying single hollow in the ice (lying in suitable anatomical proximity) caused by the tramping or resting feet of the bird, the appearance of which also has been noted under the special conditions of air temperature which allow the ice to be melted by the feet of the bird. These observations apply to a roost on a comparatively small area of frozen water in the centre of an open moor. Dr. J. Berry remarks that it is unusual for geese to sleep for long periods 'on their feet', particularly on ice or snow. As observed by him under more secure conditions when geese settle down to sleep their feet are tucked up into their flank feathers and the bird rests on its well insulated 'tummy'.

At daybreak or before there is renewed babble and with first light out the geese fly in sections small or large to the fields chosen as feeding grounds. There, if the field is known and conditions are undisturbed, the first section or flock settles usually as near the centre as possible after circling round several times and several 'failed' attempts to settle before they actually do so. Thereafter if the field supplies good feeding the build-up is rapid with the succeeding flocks or detachments settling in much more rapidly. If, however, the initial section is making a first approach to a new field or conditions at the known field have already been disturbed, the approach is even more cautious and scary. On a field that one day has only a few geese, say 50, the next day there may be many more, 500 to 1,000, and by the next 2,000 to 3,000, and there seems no doubt that they are able to communicate the news that there is a good food supply in a certain field to their brethren. That this knowledge can be spread over a wider area than that served by the immediate roosting station is the only legitimate deduction from the incursion of geese into the area in seasons such as the autumn of 1961 when the food supply was specially good. (Incidentally this habit of rapid build-up in an approved feeding field gives a very ready parallel for rapid build-up at an approved roost.)

While the advance guard of geese may feed on such young grass as is available until the oat and barely fields are free of stooks and standing corn, as soon as such fields are in stubble the geese take to feeding upon them. In the main the food obtained is the shaken ears and heads of oats and barley but with the short stemmed barley grown specially for cutting with the combine harvester, and also with oats, has now come the practice of 'under sowing' a clover grass mixture to follow for use as soon as the cutting has been completed. To some extent this green crop is also eaten, and the risk of damage to it whether by eating or trampling is one of the main causes of complaints from the farmer. At times of peak population before the harvest has been generally cleared or at times of late harvest with the oats still uncut, geese will come down in fields which still are covered partly or mostly with stooks and even perch on the stooks, although this is most unusual.

Eating of frosted potatoes on cleared fields is unusual in the upland country and more usual in the coastal area, probably because potato-growing in the upland country is on a small scale.

From January onwards feeding is almost entirely on grass and in the upland area the rapidity of the growth of the return popu-

lation and its existence at a higher level for a longer or shorter period before the late April decline depends on the coming and continued growth of young grass. So the geese come into direct competition with park sheep for the supply of grass at just that period of the year when the park lambing in the upland area is coming or has begun, the usual dates for its commencement being 14th to 21st March. In a year when the grass supply is short there may well be considerable inroads by the geese into the fields visited by the flocks – usually the best – and it is at such a time in my opinion that there is the biggest danger of real damage to the farmers whose fields are affected and the greatest cause for legitimate complaint by them.

In the upland part of the area the question of possible damage to young winter wheat after 'brairding' does not arise as almost no winter wheat is grown. If the geese are feeding in the low-lying part of the area at the appropriate period it can, however, be quite a serious matter.

Rest stations and parking-out stations

The simplest relationship of roosting station to feeding ground is when the food supply field is located within short range of a roosting station which is a comparatively large and undisturbed sheet of water, such as Gladhouse. Then if the feeding birds have had enough or are scared off the supply field they simply fly back to the loch and rest upon its waters or shores. More often in this area the geese are feeding two or three miles or more away from the roost or alternatively the latter is a comparatively small sheet of water, such as Fala Pond or Hule Moss. In such cases the geese in the uplands adopt areas of moor or rough ground as resting stations from which to fly to and from the food supply fields, and at the end of a day they may just as often fly to the roost from these resting stations as from the feeding fields. The siting of these rest stations appears to be a marriage of convenience between proximity to the food supply field and security from interference – this last leading to the choice of a site in the centre of a wide stretch of moor or near the summit of one of the rounded hills in the area.

Geese engaged in what had appeared to be perfectly normal evening roost-bound flight may drop down and settle to rest on a piece of moor ground lying beneath their route to the roosting station. Then after a pause they resume their flight and so arrive at the roosting station in much poorer (and safer) light than would have been the case if they had gone straight on.

The special resting stations for want of a better term I have called 'Parking Out Stations' and in one form or another they have been a feature of the behaviour pattern in the Fala/Gladhouse area ever since their existence was discovered as a result of the first goose watch in 1952. Indeed Fala Moor and the hills near it may often function during the autumn more as a large scale rest station and parking-out station for Gladhouse roost-bound geese than as a night roost on Fala Pond. This has been especially true of the later years covered by these watches.

Similar resting stations are regularly used in Lanarkshire and in most parts of Scotland where Pinkfeet feed at long distances from their roosts.

Linkage of goose roosting stations

The linkage which clearly exists among the various goose roosting stations falls to be considered both as it affects those within this area and also those outside. The special case of Fala/Gladhouse has already been noted. As already seen they apparently derived in their present form from Aberlady Bay and there is frequent flighting, particularly from Fala, to Aberlady Bay to be seen, apart from the transfer of the 'basic flock' to the coast in hard weather already referred to. Interchange between Fala and Hule Moss has been noted on a number of occasions, particularly among arrivals in spring, and in 1961-62 movement was clearly observed as between Baddinsgill and Gladhouse. The roosting flight to Baddinsgill several times has taken place from part of the Libberton/Carnwath feeding area. That there must be a definite connection between Aberlady and Tynninghame is evident from their juxtaposition. Perhaps also there is a connection between Tynninghame and Hule Moss, though this has not been directly noted, perhaps because of the present disuse of Tynninghame.

As regards wider linkage, the southbound flight from Gladhouse/Fala evidently making straight for the Solway marshes has already been referred to. Northbound traffic along the same route in reverse is also often clearly visible, not only in spring but also sometimes in autumn, as at the time of the Solway storm in 1961 and when there is an easing up of hard weather in the winter months.

From Fala also geese can quite frequently be seen, usually in the spring, setting out from nearby hills and making direct for Loch Leven with just comfortable time for them to flip in there about the half hour after sunset. Similarly geese can sometimes be seen setting out taking a line that would bring them to the lower Tay estuary.

Even without the more positive proof supplied by the Wildfowl Trust ringing and colouring of geese there would appear to be little doubt of the constant comings and goings of some part of the goose population both between roosting stations that are near to one another and those that are more distant.

That geese can convey to one another news of food as well as of disturbance appears a legitimate deduction from their local behaviour; coupled with the constant interchange this appears to be the probable explanation of their build-up in an area with a specially favourable food supply.

The Greylag population

Greylags form very much the minor part of the goose population in the area and because of that fact the considerable differences between their behaviour and that of the Pinkfeet tend to get overlooked.

In the pre-1939 period it seems clear that the only population of Greylag wintering in the area was that of say 200-300 roosting at Aberlady Bay with the Pinkfeet. During the War a removal inland and increase parallel to that of the Pinkfeet evidently took place with a population appearing at Gladhouse which can reasonably be surmised to have been the successor to that which had previously wintered at Aberlady. R. W. J. Smith notes that 'by 1948 at least 600 Greylag were firmly established at Gladhouse and in the next two seasons big numbers started to appear first at Threipmuir and then at Harperrig'.

Greylags arrive much later than Pinkfeet in the area, the first few usually being seen about the middle of October and it is not until about the end of that month or the first few days of November that they are fully in. It is fortunate that these watches were almost always held at a time when the Greylag were fully in, except in 1960 when they did not all arrive until after the check on 12th November.

In the years from 1955 to 1963 the total count of the autumn population for the area (Table VI) as found in the November watches has varied between 400 in 1960 and 1,750 in 1957 but has generally been in the region of 1,000 to 1,300. From the figures for Gladhouse in 1948-54 (Table VII) it seems likely that the area total was of the same order in that region in 1951, 1952 and 1953 and below it in 1948-50 and in 1954. The variation in the numbers of Greylags throughout the winter has not so far been studied in detail but there would appear to be a possible pattern of some further increase in late November/early December and of decline thereafter. Greylags depart from the area about a month before the Pinkfeet, the final leaving taking place around the beginning of April.

A rise in the late autumn population which took place in 1962 and 1963 should be noted. In 1962, after the first winter storm on 17th November, the flock at Threipmuir and Harperrig, as usual mainly based on Threipmuir, built up to some 1,200.

Then in 1963 after the watch on 9th

Table VI. Numbers of Greylag Geese in November in the Lothians area, 1955-63

roost	*1955 12th*	*1956 3rd*	*1957 16th*	*1958 8th*	*1959 14th*	*1960 12th*	*1961 11th*	*1962 10th*	*1963 9th*	*mean*
Fala Flow	50	–	–	–	–	–	–	2	–	–
Gladhouse	430	500	800	300	300	25	240	280	280	350
Watch Res.	?	16	40	69	23	95	210	290	180	115
Hule Moss	50	–	8	–	–	–	–	–	–	–
Harperrig	420	200[a]	–	400	650[b]	30	–	45[d] +700	440	240
Threipmuir	200	240[a]	900	250	185	250[c]	420	150	400	390
Cobbinshaw	30	15	–	–	–	–	–	–	–	–
Baddinsgill	–	20	–	–	–	–	–	–	–	–
total (to nearest ten)	1,180	990	1,750	1,020	1,160	400	870	1,470	1,300	1,120

none recorded from Aberlady Bay or Tynninghame.

(a) 375 at Harperrig and 300 at Threipmuir on 4th November, 1956.
(b) on 15th November, 1959; none reported 14th.
(c) 390 on 13th November, 1960.
(d) evidence obtained later showed that some 700 failed to come in to roost at either Harperrig or Threipmuir at this watch and that the joint population at that data was about 900.

Table VII. Numbers of Greylag Geese at Gladhouse Reservoir in autumn, 1948-54

1948	30 October	350
	28 November	230
1949	23 October	50
	20 November	235
1950	5 November	80
	26 November	150
1951	28 October	450
	11 November	450
	18 November	500
1952	25 October	200 (at Fala)
	1 November	650
	9 November	500
	16 November	500
1953	31 October	500
	8 November	500
1954	24 October	400
	21 November	300
	27 November	100

November the number of Greylag at Threipmuir built up to an even higher level than in 1962 and Craigie Tait assessed them at 1,700-1,800 on Saturday, 14th December. The number then based on Gladhouse was about 500 making together the highest area total yet noted in the period without reference to any other possible populations (e.g. it is known that there were still some at the Watch Reservoir on 14th December, though not how many).

Perhaps also connected with this unusually high population level for the area it is understood that during later November and early December, 1963 up to more than 200 Greylag frequented Portmore Loch some 2½ miles S.W. of Gladhouse and roosted there for at least part of the time, i.e. separately from those at Gladhouse. This was the first year in which this is known to have occurred.

Comparison of Tables III and VI reveals that there is almost complete segregation of the two species so far as roosting is concerned, except at Gladhouse. In Midlothian, Greylags are normally the only geese to be found roosting at Threipmuir and Harperrig and in Berwickshire they have adopted the new Watch Reservoir as their own since it first became available in 1956, segregating out almost entirely for roosting purposes from the Pinkfeet at Hule Moss. When the Pinkfoot population is first at its peak a party of Greylag may rest with the Pinkfeet on the Moor at Fala, yet only three or four times in all the years from 1952 can I remember having seen a small party come down to roost with the Pinkfeet on the pond.

As observed in the Fala/Gladhouse area, Greylag appear to be much more predictable in their behaviour than the Pinkfeet as well as being less 'skittery' and to spend much more time at the reservoir and in the fields near its side. They appear to have a greater preference for feeding on grass as compared with stubble which may account for their tendency to remain near the reservoir side. When feeding beside Pinkfeet they do so at a more leisurely and sedate pace, tending to stay in the one area of ground and not feed forward rapidly a short flight over the heads of the geese in front, in the way the Pinkfeet do. Though they are often to be seen feeding in the same fields as the Pinkfeet, almost invariably they form groups of their own within or at the edge of the large flock of Pinkfeet.

In a general flight Greylags almost always form their own separate section and can be picked out by voice and shape. Under at all reasonable conditions, differentiation between the two species becomes reasonably easy with practice. The difference in the normal call notes is often the easiest and best distinction. After listening through these years I personally would say that I would almost never mistake the 'farmyard' calls of Greylag for Pinkfeet but I still on a few occasions have some difficulty with a certain special 'gangling' call given by Pinkfeet when this species, as does happen at the odd time, does not give itself away by indulging in the variations from its much larger vocabularly.

'Jokers in the pack'

This is the apt name which Sir Robert Erskine-Hill of Quothquhan gives to the odd members of other species which turn up from time to time in the otherwise uniform flocks of Pinkfeet and Greylag, or to the special variations of these species such as leucistic Pinkfeet. Whilst in theory denouncing chasing after rarities as 'scalp collecting', in practice when one of these specialities turns up in a flock of say 1,000 Pinkfeet I find myself paying as much attention to the one as to the other 999, somewhat to the detriment of proper watching of the behaviour of the flock as a whole. Nevertheless these special occurrences are only of value if after a time it is found that there is in fact a regular appearance of small numbers of the particular species or if they can be used to give guidance as to the movements of the flock in which they are caught up.

The outside species that has most frequently been observed with the Pinkfoot flock is the Barnacle Goose (*Branta leucopsis* (Bechstein)) which has been seen practically every year since the general watches began in 1955. Though the majority of observations are of 1 or 2 birds only, parties of 4 to 8 have been seen on several occasions retaining their own grouping

within the Pinkfoot flock. Barnacle Geese are frequently seen passing over the area on their way to the Solway in autumn, and less often returning north in spring, these being the geese that breed in Spitsbergen. Whether the Barnacles living in the area are stragglers from this passage or whether they are Greenland-breeders caught up in Pinkfeet in Greenland or Iceland is not yet clear.

One or two Greenland Whitefronts (*Anser albifrons flavirostris* Dalgety & Scott) have been seen at Gladhouse in a number of years, usually in association with the Greylag and more often juveniles than adults. Isolated records also exist for European Whitefront (*A. a. albifrons* (Scopoli)) and Bean Geese (*A. fabalis*) and on one occasion of a Light-bellied Brent (*Branta bernicla hrota* (O. F. Müller)) inland. Two records for a single Greater Snow Goose (*Anser caerulescens atlanticus* Kennard) and a single Blue Snow Goose (*A. c. caerulescens* (L.)) are referred to below.

With very few exceptions the firm records for Bean Geese are from Tynninghame and from Hule Moss, where small parties have been seen on a few occasions, and it is just possible that there is an annual movement of a small number of this rare species which touches this eastern corner of the area from time to time.

Brent Geese, of the Dark-bellied race (*B.b. bernicla* (L.)) were a regular feature of the Aberlady scene in pre-1939 days until the species was hit by the *Zostera* grass disease which decimated their food supply. In recent years small parties of both races of this species have been seen at Aberlady on several occasions for varying periods and it is to be hoped that it will make a comeback.

In 1954 a dead Snow Goose which had been shot was found at Gladhouse by the Water Keeper Mr. John Watt and after careful examination by Kenneth Williamson was pronounced to just fall within the measurements of the Greater race (*atlanticus*). In the winter of 1959-60 a single bird of large size and outstanding appearance and which would appear to be clearly a Greater Snow showed up with one Pinkfoot flock at Libberton/Carnwath and about the same time that winter there also appeared there a Blue Snow Goose, which however mainly consorted with a separate Pinkfoot flock. In the winters of 1960-61, 1961-62 and 1962-63 the Blue Snow Goose reappeared at Libberton/Carnwath and each time stayed with a Pinkfoot flock throughout the season.

By contrast what was almost certainly the same Greater Snow Goose as had been seen at Libberton/Carnwath the year before appeared at Fala from 15th to 23rd October, 1960, was thereafter seen at Hule Moss on 13th November, was thereafter reported as seen at Dumfries and then early in January, 1961, from the Tay before it appeared at Fala once again where it was based from 9th February to 4th March. The last record was from Loch Spynie in Elgin on 27th March, 1961. On 13th October, 1961, what must again have been the same bird was seen at Ladyside/Heriot flying south with Pinkfeet at 1.15 p.m. and to touch down at Caerlaverock on the Solway at 3.30 that same afternoon. Then it appeared at Gladhouse on 11th November and was based there till 2nd December but on 19th December was seen once more at Libberton/Carnwath in which general area it remained till mid-April. It seems possible that the Blue Snow Goose which has remained faithful to the same area for four entire winters typifies one brand of Pinkfoot behaviour as representing the flock with which it is bound up and that the Greater Snow Goose with its much more roving history typifies another brand of behaviour as representing the section of Pinkfeet to which it is attached.

As reported by R. W. J. Smith, Canada Geese (*Branta canadensis* (L.)) in flocks of 30–40 and single birds have been noted as appearing at Gladhouse, Coldingham and the estuary of the Tyne but only in the summer months. In the absence of any known local colonies apart from 5 pairs lately introduced at Mellerstain it is not known from where they derive, although the recent demonstrations of a 'moult-migration' between Yorkshire and the Beauly Firth (see p. 71) may provide an answer. There is also a record of 3 from Aberlady Bay on 1st January 1952.

One or two leucistic geese are often to be seen in the Pinkfoot flocks in the area and, while these are not always possible to re-identify with certainty because of the existence of several of them, the presence of one in a flock of some 500 Pinkfeet once helped (10th November, 1957) to identify the specific movement of the flock to Aberlady Bay from the Fala area, from which direction it was seen to arrive and join the 300 already at the bay.

A melanistic Pinkfoot was seen in the Wester Middleton/Esperston area in April 1963, which was a member of a flock then roosting at Gladhouse. As this colour variant is much rarer than the leucistic any further sighting of such a bird would be of considerable interest.

Thanks to helpers

The information obtained from these goose watches at the various roosts spread

over 'the Lothians area' as defined for these purposes could not possibly have been obtained without the willing aid of a large number of helpers, drawn in most cases from the ranks of the Scottish Ornithologists' Club. Sometimes the watches were perforce carried out in bad weather conditions and often the watchers at a particular roost or watching site saw few or no geese themselves. It is easy to say on paper that a nil return is as important as to have seen 3,000 geese but this is just not true from the point of view of the particular watcher concerned. Nevertheless quite a few of the helpers have shown themselves willing for punishment of this particular brand and it is due to the help of all the watchers concerned and especially to those who have put up with the difficult stations often for several years on end that it has been possible to achieve this very corporate effort. A list of these watchers is appended. The considerable thanks of the S.O.C. and of myself to them all.

List of watchers

D. Anderson, D. R. Anderson, D. G. Andrew, J. Ballantyne, W. Birrell, T. Boyd, Mrs. H. F. Brotherston, A. Bryson, J. W. Cameron, A. Charleston, G. D. Cheyne, S. Clark, A. Cowieson, C. N. Cowper, J. Crawford, W. Douglas, Sir Robert Erskine-Hill, J. N. Fergusson, Miss W. N. Flower, D. R. Grant, F. Hamilton, M. Henderson, Miss N. Henderson, Miss B. C. L. Johnston, M. R. Jones, E. Larkins, Mrs. A. Lister, J. Lister, Col. W. Logan Home, D. Long, A. McCaskie, Miss J. McDiarmid, A. MacDonald, K. S. MacGregor, A. M. Mackenzie, A. Macmillan, J. Malone, A. Miller, G. Mills, Miss A. Munro, J. Munro, W. Murray, D. Pringle, I. Rae, C. P. Rawcliffe, Miss E. Robertson (Mrs. J. Munro), A. Ross, P. Russell, G. L. Sandeman, A. Scott, P. Slater, A. Smith, R. W. J. Smith, J. Stewart, R. S. Craiton, Miss O. T. Thompson, J. Thow, I. Waddington, C. Walker, R. Walker, J. Watt, T. Weir, K. Williamson, J. Young, L. Young.

So far as I know this list is reasonably accurate but it may be that I have omitted one or two names and, if so, my apologies and thanks to those concerned.

This review has been checked over by a number of people who have helped me to fill in various blanks and to rectify some of the mistakes that appeared in the first draft. My special thanks are due to all of them for their assistance in assuring that the review, like the watches, is also very much a corporate production. In particular here I have to thank D. G. Andrew, Dr. J. Berry, H. Boyd, A. Cowieson, Major the Hon. Henry Douglas Home, A. Macdonald, K. S. MacGregor, W. Murray, R. W. J. Smith, G. Waterston, the late Mr. J. Watt.

In addition to thanking all those who have actually taken part in these watches, special thanks are due to all the various landowners upon whose properties they have taken place: the Earl of Stair, Lady Marjorie Dalrymple and Major the Hon. Colin J. Dalrymple (Fala Flow); the Earl of Rosebery (Gladhouse and Carvald Farm); the Dundases of Arniston (Gladhouse and Esperston Moor); A. D. Elliot, Esq., of Kettelshiel (Hule Moss); the Marshalls of Baddinsgill (Baddinsgill); the Berwickshire Water Department (The Watch Reservoir); the Crown Commissioners (Aberlady and Tynninghame); the Edinburgh Corporation Water Department (Gladhouse, Harperrig and Threipmuir); the British Transport Commission (Cobbinshaw).

Our very considerable thanks are also due to the representatives of these landowners on the ground, namely the gamekeepers and water keepers for the courtesy and understanding with which they have always dealt with us when engaged in this 'diversion' and also for their patience on those occasions when by oversight we have not given them as much foreknowledge of our presence as we should have done.

Finally, of the outside helpers I wish to thank in particular Mr. Joseph Dobie Anderson and Mr. Robert Anderson, shepherds at the Garvald Farm, by Heriot, and Mr. Robert Walker, farmer at Middleton Mains, Heriot, whose joint provision of records of autumn flights through and arrival has been of major assistance.