

Report to Nature Conservancy Council, South-west Scotland Region

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SURVEY OF FERAL GREYLAG GEESE IN SOUTH-WEST SCOTLAND 1988

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Summary

The population of feral Greylag Geese in south-west Scotland was the first to be established in Britain and Ireland. It is also the largest, with a total of 1469 birds in June 1988, about 10% of the total estimated for Britain and Ireland (13,700 in 1985-6).

The population is still centred around the area where birds were first released at Lochinch, near Stranraer. Three lochs there held large numbers of moulting birds and breeding adults with young in June, and the majority of birds during September. Other important sites identified were Castle Loch (moulting), Soulseat Loch (breeding), Loch Dornal (breeding and moulting), Loch Moan (breeding and moulting), and Loch Ken (breeding and wintering).

Although the proportion of young and brood size was similar to that found by Young (1972), the population has been slow to increase at 2.4% per annum. This is probably due to efforts to control the population; the number of feral birds in Britain as a whole is growing at 13% per annum. In addition feral Greylags in South-west Scotland are shot in season when they intermingle with wintering Icelandic Greylags which also visit the region.

The population of Greylags in South-west Scotland is now firmly established and will probably continue to flourish. Conflicts may arise with local farmers who may wish to control numbers, although the largest concentrations found are unlikely to cause much of a problem. Those at Lochinch feed on an estate with a sympathetic landowner, those at Castle Loch feed on marginal land, and the birds at Loch Ken feed in areas used by much greater numbers of Icelandic Greylags and Greenland White-fronted Geese.

The future of the feral Greylag population seems secure and control measures are likely to keep the population in check, rather than eliminate it.

Introduction

Greylag Geese (Anser anser), which bred over much of Britain in former times, were reintroduced to south-west Scotland in the early 1930s (Young 1973). The first birds to be released were reared from eggs and goslings from the native Greylag population on South Uist (Western Isles) and taken to Lochinch, near Stranraer (Dumfries and Galloway).

Through initial protection of the geese and further introductions, numbers increased. Young (1972) estimated a total population of 1160 Greylags during a survey of all wetlands in S.W Scotland in 1971. Owen and Salmon (1988) indicated that there was little recent information, but estimated that there were perhaps 1,500 birds in 1985-86.

Information on the population since the 1971 survey is restricted to a few sporadic and incomplete counts, mainly in September. The region is also visited by wintering Greylags of Icelandic origin from early October onwards and the two populations intermingle and are inseparable until the migrants leave in April.

The main aims of the present survey are as follows:

1. To make an accurate assessment of the feral Greylag population in Dumfries and Galloway.
2. To assess the impact of the feral as opposed to wild birds on local agriculture.
3. To enable a more accurate assessment of the migratory Icelandic population.
4. To gather incidental information on summering wetland birds in the lochs of Dumfries and Galloway.

Methods

Survey work was carried out during two periods, between 10 and 24 June and again in September 1988. Lakes were viewed from several vantage points so that in each case whole site was thoroughly covered.

During June, Greylags are either moulting or accompanying flightless young and at such time stay close to water in order to minimise predation risks. All waterbodies in S.W Scotland likely to hold Greylags at this time were visited to locate moulting and breeding flocks. For each site information was recorded on the following:-

- (i) number of adults, and whether they were attending young,
- (ii) number of non-breeders/failed breeders (i.e. those birds not attending young),
- (iii) numbers of young (counts of broods where discernible, or counts of creches),
- (iv) habitat:- presence of islands, and grazing quality (improved grassland, moorland, etc) for each site,
- (v) other birds seen.

During the September survey an attempt was made to locate the main post-breeding/moulting areas used by Greylags. All sites which had Greylags in June were visited, with the exception of Loch Moan and the Dornal Loch/Ochiltree. At this time, the following were recorded:-

- (i) total number of geese present,
- (ii) percentage young from samples in feeding flocks,
- (iii) type of foods at feeding sites,
- (iv) other birds seen.

Information was also gathered from local observers, farmers and estate workers.

Results

Population Size

During June 1988 a total of 82 sites (74 in Dumfries and Galloway and 8 in South Ayrshire) were visited (Fig 1). Greylags were found at 18 sites in June and 9 in September. The June figure includes 2 sites which were not visited but for which reports were received from other observers.

In September it was anticipated that the geese would be more concentrated and the survey was restricted to selected sites suspected to hold wintering birds.

Counts of total numbers of feral Greylags in June and September are shown in Table 1. Migrants from Iceland arrive in South-west Scotland in October so do not affect counts until after mid-September.

In June a total of 1469 Greylag was found. At this time of year the main concentrations were found at the following (numbers refer to Fig 1.): White Loch (1), Castle Loch (2), Loch Dornal (3), and Loch Moan (4). In September a total of 1189 (80% of June total) was found; then the main concentrations were at White Loch and at Loch Ken (5).

Table 1. Counts of feral Greylag Geese in S.W. Scotland in June and September 1988.

Site	Grid ref	JUNE	SEPT
Loch Ree	NX103689	1	-
Penwhirn Reservoir	NX123697	15	-
White Loch	NX105610	511	910
Black Loch	NX112616	0	2
Soulseat Loch	NX101588	76	4
Loch Dornal	NX293761	128	-
Loch Ochiltree	NX317745	23	-
Loch Moan	NX347858	104	-
Loch Heron	NX272649	11	-
Whitefield Loch	NX235551	18	-
Castle Loch	NX285538	433	0
River Cree	NX3575	7	-
Bush Loch	NX610555	-	16
Loch Ken	(NX640782 (to 732645	42	122
Glentoo Loch	NX701625	0	19
Mossdale Loch	NX656711	7	0
Lochinvar	NX659852	23	-
Glenkiln Reservoir	NX845781	46	-
Auchenreoch Loch	NX820715	7	27
Loch Kindar	NX968642	4	-
Caerlaverock	NY052656	13	65
Kinmount Ponds	NY142685	0	25
TOTALS		1469	1190

- = not visited.

Number of breeding adults

Of the 18 sites where Greylags were recorded in June, breeding was confirmed at 16.

The minimum number of successfully breeding adults (Table 2) was estimated by counting the total number of adults accompanying young, regardless of whether these were pairs with individual broods or adults attending groups of young creches. This may be an underestimate since broods sometimes amalgamate and goslings of one pair taken over by another. 175 birds were classed as accompanying young, which is 15.7% of the adult population (adults were birds of 1+ years of age). This suggests a minimum of 88 successful pairs breeding in 1988. Of those birds attending young 64 were with broods and 111 were with creches.

The main breeding sites identified were White Loch (estimated 25+ successful pairs), Loch Dornal (21 pairs), Souseat Loch (10 pairs), Loch Moan (6 pairs), and Loch Ken (6 pairs).

Number of failed and non-breeders

Failed and non-breeding birds are known to form moulting concentrations (Young 1972) and birds considered to be failed- or non-breeders were found at 12 of the 18 sites where Greylags were present. Of these, 5 held 30 or more failed/non-breeders, or birds not accompanying young (Table 2).

Of the full-grown birds found in June a total of 940 were failed or non-breeders, 84.3% of the adult population.

Large concentrations of moulters were at White Loch, Loch Dornal and Loch Moan which are also important breeding sites, whereas Castle Loch was not an important breeding site (2 pairs with young) and held a large concentration of failed/non-breeders. Glenkiln Reservoir also had a reasonable number of failed/non-breeders, but only 3 pairs with young.

Number of young in June

A total of 354 young was located in June (Table 2). Of these 32 broods were identified, and a total of 133 young were found in broods (average brood size = 4.16 young). Brood sizes recorded in the field ranged from 1 to 9 young; those with 8 or more probably presented amalgamated broods.

Ten creches (where broods could not be separated) were found and a total of 221 young was found in creches (average creche size = 22.1 (11-56) young). A total of 111 adults accompanied creches so the number of young per 2 adults was 4.0, similar to the mean brood size. The implied assumption that adults with creches were successful breeders, made in calculating the number of successful birds (above) seems to be a reasonable one. Young formed 24% of the Greylag population in June 1988.

Table 2. Counts of breeding adults, non/failed breeders and young feral Greylag Geese in S.W Scotland in June 1988.

Site	Total no. adults	Adults with young	Failed/ non-breeders	Total young	Young in broods (number of broods)	Young in creches (number of creches)
L. Ree	1	0	1	0	0	0
Penwhim Res	4	4	0	11	0	11(1)
White L.	399	51	348	112	16(6)	96(5)
Soulseat L.	20	20	0	56	0	56(1)
L. Dornal	80	42	38	48	12(3)	36(2)
L. Ochiltree	10	4	6	13	13(2)	0
L. Moan	82	12	70	22	22(6)	0
L. Heron	4	2	2	7	7(1)	0
Whitefield L.	4	4	0	14	14(2)	0
Castle L.	428	4	424	5	5(2)	0
R. Cree	2	2	0	5	5(1)	0
L. Ken	20	12	8	22	0	22(1)
Mossdale L.	2	2	0	5	5(1)	0
Lochinvar	11	4	7	12	12(2)	0
Glenkiln Res	37	6	31	9	9(3)	0
Auchenreoch L.	2	2	0	5	5(1)	0
L. Kindar	4	0	4	0	0	0
Caerlaverock	5	4	1	8	8(2)	0
Totals	1115 adults	175 breeders	940 failed/ non-breeders	354 young	133 young in 32 broods	221 young in 10 crèches

Proportion of young in September

During September, sample counts were undertaken of the number of juveniles in feeding flocks at sites where it was possible to view the geese at a range of 300 metres or less (Table 3, note that the juveniles were not sampled at Caerlaverock until October).

Table 3. Proportion of young in September

Site	No. of Juvs	Sample size	Total present
White Loch	221	770	910
Loch Ken	7	43	122
Auchenreoch	5	27	27
Kinmount	5	25	25
Caerlaverock	15	71*	71
Totals	253 (27% juveniles)	936	

* Age sample in October when total had increased from the 65 in September (Table 1).

A total of 27% juveniles were found in September, close to the proportion in June (24%). It seems that juvenile mortality is low; even if all the geese missed in September were adults, juvenile mortality would only be 9% between June and September. Given this fact and that adult mortality is usually less than that of young, it seems clear that the 280 birds not accounted for in September were missed by the survey, probably because they were away from water and that juvenile mortality is even lower than this. In the earlier study juvenile mortality prefledging was also reported to be low (Young 1973).

During September 1988, Greylags were present at 9 sites in Dumfries and Galloway (Table 1). Geese were not present at 16 other sites visited. As expected the geese had concentrated at this time; the distribution of birds in September is shown in Fig 2.

Some of the moulting flocks and breeding birds move away from breeding sites in late summer. Young (1972) confirmed the existence of a moult movement from recoveries of birds ringed at moulting sites in the mid 1960s.

Counts in September 1988 also showed that post-moulting birds were mobile and that the population had re-distributed itself (compare Fig 1 and Fig 2). Numbers at White Loch had increased from 511 birds in June to 910 in September, at Loch Ken from 42 to 122, and at Caerlaverock from 13 to 65, with smaller increases at Glentoo Loch, Auchenreoch Loch, and Kinmount Ponds.

Numbers had certainly decreased at Soulseat Loch and at Castle Loch (the latter from 433 birds in June to none in September). Unfortunately it was not possible to visit Loch Moan or the Dornal/Ochiltree area. It is, however, known that birds leave Loch Moan after breeding or moulting (G. Shaw - pers. comm.). Counts and ringing recoveries of birds caught during moult at Lochs Dornal and Ochiltree in the 1960s showed that birds from these two sites moved in particular to Lochinch (23 km away) with 46% of recoveries from the Stranraer area (Young 1972). It seems improbable that this trend has changed and the increased number of birds at White Loch in September probably comprises a proportion of birds from the following areas:- Loch Dornal, Loch Ochiltree, Loch Moan (which has increased in importance as a moult site, probably of birds from Ochiltree - see under discussion), and presumably Soulseat Loch (1.5 km away) and Castle Loch (18 km away).

Birds present at Loch Ken in September may have originated from Lochinvar (12 km away) and possibly the Dornal/Ochiltree area (33 km away).

The nearest breeding and moulting sites from Caerlaverock are Glenkiln Reservoir (25 km away) and Loch Kindar (9 km away), but the autumn numbers at Caerlaverock and nearby Kinmount suggest that birds have come from further afield.

Information from this survey is compared with that reported by Young (1972) in Table 4. The population has increased from 880 birds in 1966 to 1469 in 1988, an increase of 2.4% per annum. This is considerably less than the 13% increase p.a. for flocks in Britain as a whole (Owen and Salmon 1988).

Table 4. Analysis of the population in the 1988 and previous surveys.

Year	Adults with young (%)	Failed/non-breeders (%)	Young (%)
1966	16	59	25
1968	21	54	25
1971	22	52	26
1988	12	64	24

1966,68,71 data from Young (1972)

Habitats used by feral Greylags

During moulting and breeding, Greylags use sites with islands in order to reduce predation of flightless birds, nesting adults and young. Ten of the 18 sites where Greylags were found in June had wooded islands. The percentage of breeders, non/failed breeders and young present at sites with or without islands is shown in Table 5. Breeding adults showed preference for sites with islands and all the main breeding sites except for Soulseat Loch had islands. Moulting non/failed breeders were also almost exclusively found at sites with islands.

Table 5. Usage of sites with islands by feral Greylags.

	Breeding adults	Failed/non breeders	Young
% birds at sites with islands	77	99	69
% birds at sites without islands	23	1	31

The feeding habitat categories for breeding and moulting birds were classified as "Good grazing" - predominately good quality agricultural land or mown parkland with little weed growth in field; or "Poor grazing" - predominately poor quality agricultural (rough grazing) with much growth of either Juncus spp., Calluna vulgaris or Bracken Pteridium aquilinum.

Sites with good grazing supported 78.5% of all breeding geese, and 42% of non-breeders, suggesting that good quality grazing is important to breeding birds and their offspring. The three main breeding sites (White Loch, Soulseat Loch and Loch Dornal) which held 69% of breeding adults and young were sites with good grazing available to geese.

Failed/non-breeders were found more or less equally at sites of good or poor quality grazing. This is probably because other characteristics of sites, such as size of water area and safety from predators are more important for moulting birds than just the quality of the forage. Generally geese feed little during the moult and have low energy demands since they are relatively inactive, they also to some extent use body reserves (Owen and Oglivie 1979). The three main moulting sites were, in fact, among the largest waters in the study area. White Loch (37% of non-breeders) had good grazing, whereas Loch Moan (7.4% of non-breeders) and Castle Loch (45% of non-breeders) were surrounded by low quality grassland.

During September the Greylag population is more mobile and birds can fly to feeding sites further away from water bodies. At this time of year those found were, except for those at Kinmount, feeding on better quality agricultural grassland.

Birds in the Stranraer area (White, Black and Soulseat Lochs) spent most of the day on areas of short grass, at the time not grazed by farm stock, and were noted on a grass field cut for silage about one and a half hours before roosting. At Bush, Glentoo, Ken and Auchenreoch Lochs all birds were observed feeding on grass which was also being grazed by cattle or sheep. At Caerlaverock the geese fed either on a field where the grass had been mown short or else on those grazed by cattle or cut for silage.

The only Greylags not feeding on grassland during the September survey were a group of 25 at Kinmount ponds; these were feeding on floating plants (White Water Lily Nymphaea alba and Pondweeds Potamogeton sp.). The Kinmount area has much agricultural land which is used as a feeding area for Pinkfeet in winter; the Greylags also presumably use this land later in autumn and winter.

Greylags in September are using better quality feeding areas than in June. None was found more than 1 km from an available water body suitable for roosting but some may have been missed because they were far away from water.

The numbers of other geese noted during the survey are given in Appendix 1. The wintering flocks of most species visiting South-west Scotland clearly leave summering stragglers behind. There is also a scattering of exotics, domestic types and hybrids, presumably originating from captive stocks. The number of Canada Geese (*Branta canadensis*) is particularly noteworthy in an area in which their status was previously little known (Owen et al 1986).

The other wetland birds noted during the survey are in Appendix 2, listed by site. The sites where no wetland birds are recorded are also given.

Discussion

Population size and distribution

The slow rate of increase for this population in comparison with other groups probably results from the fact that they are exposed to shooting in autumn and winter. In many parts of England, the flocks have been established by wildfowling clubs who imposed moratoria on shooting while the flocks built up. In many parts voluntary bans by wildfowling clubs are still in operation. In south-west Scotland there may also be some control of breeding through egg collection or discouragement of nesting birds which may be practised on some estates. (Most of the feral flocks in England have been established from an initial stock set up from geese reared from eggs collected at Lochinch).

Greylag breeding success in 1988 was similar to that reported for the 1963-71 period (Young 1972), see Table 4. Neither the proportion of the population breeding nor the proportion of young in flocks are significantly different from those of the earlier study (Chi square test $P > 0.10$ in both cases). The brood size is also remarkably similar, an average of 4.1 (range 3.6-4.6 in different years) in 1963-71 and 4.16 in 1988. This suggests that density dependent effects have not yet begun to operate to reduce productivity. This conclusion is supported by the fact that the population has spread little from the areas it occupied in 1971.

South-west Scotland contains much suitable habitat for breeding Greylags and the main factor which is limiting and will limit the spread of the birds in future is the direct action of man, through shooting and egg collecting.

We have confirmed that the population is still rather small, comparable in size to the native population of the Outer Hebrides from which it arose. Since it is a reintroduction, after presumably being eradicated by man in relatively recent times, and since the native population is itself small, (and shot and persecuted by farmers) there seem to be good grounds for the maintenance of the population in south-west Scotland at at least its present level.

Impact on agriculture

There are regular complaints from farmers in south-west Scotland that Greylags cause damage to grasslands and studies on the extent of this damage have been carried out (South-west Scotland College of Agriculture). The complaints intensify in spring and applications are regularly made and granted for licences to shoot the geese.

The extent of movement during the winter is not known, but Greylags are rather sedentary in general, even during periods of severe weather (Owen et al 1986). It seems likely therefore, that once established in their autumn haunts the flocks move only short distances.

Even accounting for the birds which may not have been located in September, there seem to be few grounds for complaint from any area other than that surrounding Lochinch. Breeding Greylags disperse in March and laying is at the end of that month and in early April (Young 1972). This diminishes again the impact of feral flocks in the important spring growing period.

It seems therefore that with the possible exception of Lochinch, the impact of the feral Greylags on local agriculture is negligible.

Size of the migratory population.

In recent years south-west Scotland has held in the region of 8,000 Greylags in winter, out of an Icelandic population of 100,000-150,000. Although making a sizable contribution (20%) to the local flocks, feral birds within the range of migratory Greylags (Scotland, N. Cumbria and Northumberland) are of negligible importance and come well within the counting errors of the November censuses. It seems reasonable therefore, that as has been the practice, feral birds are disregarded when considering the dynamics of the Icelandic birds.

Other birds in the waters of South-west Scotland.

These surveys have contributed substantially to the knowledge of the summering birds in the region. Of particular note are the increasing number of Canada Geese and the large number of Cormorants on some of the lochs.

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Appendix 1. Other Geese

Other geese found during the survey are listed below.

Pink-footed Goose -

24 Pink-footed Geese were found in June (1 at White L, Lochinch, flock of 22 flying adults at Cults L, Lochinch, 1 at Soulseat L.).

2 Pinkfeet were at White L, Lochinch in September.

Bean Goose -

1 Bean Goose was present at Winterseugh Farm, near Kinmount in September in a flock of Canada Geese.

Bar-headed Goose -

An adult Bar-headed Goose was present at White L, Lochinch in both June and September.

Barnacle Goose -

1 adult was present in June at Loch Dornal and was possibly paired to a Canada Goose.

Canada Goose -

Pair at White Loch in Sept.

A total of 362 Canada Geese were found in June as follows:-

87 adults + 31 young	- White Loch, Lochinch
25 adults + 10 young	- Loch Dornal
1 adult	- Castle Loch
1 adult	- Loch Ken
38 adults moulting	- Glenkiln Reservoir
2 adults (1 pair)	- Milton Loch
21 adults + 4 young	- Loch Kindar
12 adults moulting	- Colvend Lochs
4 adults + 1 young	- Kinmount Ponds
110 adults + 16 young	- Kelhead, Kinmount

In September 609 Canada Geese were found (71 at White L(Lochinch), 5 Loch Ken, 186 Kinmount Ponds, 182 at Winterseugh Farm(Kinmount), 165 Lochmaben Lochs).

Hybrid Geese

In June 1 hybrid Greylag x Canada was found at Lochinch. In September 6 hybrid Greylag x Canada (including one brood of 3 almost fledged young) and 1 hybrid Barnacle x Canada were found at Lochinch.

Appendix 2. Counts of other wetland birds seen

Loch Connell (NX018683) - no islands, good grazing.
10th June

Mallard	- 57
Mute Swan	- 2 (pairs)
Coot	- 22
Common Tern	- 11 (inc. 3 nests)
Black-headed Gull	- c.60 (inc. 10 nests)
Oystercatcher	- c.10 pairs
Redshank	- 6 pairs
Lapwing	- 40

Loch Ree (NX103698) - no islands, poor grazing.
11th June

Mallard	- 7
Teal	- 7 (F + 5 young, also 1F)
Short-eared Owl	- 1

Lochnaw (NX993632) - 1 wooded island, no grazing.
10th June

Mute Swan	- pair + 2 young
Herring Gull	- c.80

Black Loch, Lochinch (NX112616) - 2 wooded islands, good grazing.
11th June

G.C. Grebe	- 3
Heron	- 3
Mallard	- 29
Red-breasted Merganser	- 2
Black-headed Gull	-260 adult + 3 young
Common Sandpiper	- 1
Moorhen	- 1

13rd Sept

Cormorant	- 3
Heron	- 2
Mallard	- 47
Coot	- 1
Moorhen	- 1

Penwhirn Reservoir (NX123697) - no islands, poor grazing.
11th June

Cormorant	- 1
Mallard	- 13 (F + 5 young, also 7 adults)
Teal	- pair
Tufted Duck	- pair
Also	- Common Gull, Lesser Black-backed Gull, Redshank.

White Loch, Lochinch (NX105610) - 1 wooded island, good grazing.
11th June

Heron	- 8 (inc. 6 nests)
Great Crested Grebe	- 7 (inc. 1 nest)
Cormorant	- 1
Mallard	- 93 (inc. 6 nests)
Tufted Duck	- 37
Red-breasted Merganser	- 8
Shelduck	- 13 (inc. pair + 9 young, also 1 pair)
Moorhen	- 1
Black-headed Gull	- 30 nests + 45 young
Arctic Tern	- 42 (? nesting)
Little Tern	- 1
Common Sandpiper	- 4

13rd/4th Sept

Great Crested Grebe	- 5
Little Grebe	- 1
Cormorant	- 3
Heron	- 4
Shelduck	- 3 (juvs)
Mallard	- 920
Teal	- 3
Wigeon	- 12
Pintail	- 1
Shoveler	- 1
Pochard	- 17
Tufted Duck	- 30
Coot	- 12
Moorhen	- 7
Greenshank	- 1

Cults Loch(Lochinch) (NX120605) - 1 grass island, good grazing.
11th June

Great Crested Grebe	- 1
Mallard	- 15 (inc. F + 2 young)
Shelduck	- 2
Black-headed Gull	- 70 adult, 15 nests, 12 + young

14th Sept

Mallard	- 4
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Airds Marsh (NX095095) - no islands, reedbeds.

14th Sept

Little Grebe	- 1
Mallard	- 33
Teal	- 2
Coot	- 7
Moorhen	- 1
Kestrel	- M

Loch Maqillie (NX098595) - no islands, good grazing.

11th June

Tufted Duck	- 1
Red-breasted Merganser	- 4
Shelduck	- 1
Coot	- 2
Oystercatcher	- 6

14th Sept

Little Grebe	- 4 (pair + 2 juvs)
Mallard	- 19
Tufted Duck	- 30
Coot	- 13
Moorhen	- 5

Soulseat Loch (NX101588) - no islands, good grazing.

11th June

Mallard	- 11 (inc. F + 8 young)
Red-breasted Merganser	- 2
Mute Swan	- 6 (pair + 4 young)
Cormorant	- 1
Heron	- 1
Coot	- 6

14th Sept

Little Grebe	- 1
Tufted Duck	- 23
Mute Swan	- 5 (pair + 3 young)
Coot	- 9
Moorhen	- 2

Loch Maberry (NX286750) - 7 wooded islands, poor grazing.
15th June

Cormorant	- 2
Mallard	- 14 (inc. F + 6 young)
Teal	- 10
Dunlin	- 1
Common Sandpiper	- 4
Short-eared Owl	- 2

Loch Ochiltree (NX317745) - 6 wooded islands, good grazing.
15th Jun

Heron	- 1
Cormorant	- 1

Loch Moan (NX347858) - 4 grass islands, poor grazing.
15th Jun

Tufted Duck	- 4
Teal	- 2
Mallard	- 8 (inc. F + 3 young)
Cormorant	- 5
Black-headed Gull	several hundred

Loch Ronald (NX265643) - no islands, poor grazing.
14th Jun

Teal	- 3
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Loch Heron (NX272649) - 1 wooded island, some good grazing.
14th June

Mallard	- 5
Coot	- 1 (? nest)

Eldrig Loch (NX253694)

14th June

Black-headed Gull	- 44 (? nests)
Common Gull	- 2

Barhapple Loch (NX260591) - no islands, poor grazing.
12th June

Mallard	- 4 (F + 3 young)
Teal	- 8 (F + 7 young)
Moorhen	- 1
Redshank	+
Lapwing	+

Dernaglar Loch (NX263582) - grass island, poor grazing.

12th June

Common Gull	- 14 adults, 3 nests
Lapwing	- 2
Redshank	- 1

Whitefield Loch (NX235551) - no islands, poor grazing.

12th June

Cormorant	- 1
Mallard	- 6
Teal	- 1 F - distraction display (? nests)
Coot	- 1

Bush Loch (NX610555) - 1 grass island, good grazing.

7th Sept

Mute Swan	- 2 (adults)
Mallard	- 2

Castle Loch (NX285538) - 12 wooded islands, poor grazing.

13th June

Great Crested Grebe	- 6
Cormorant	- 30 adult + 10 nests
Mallard	- 43
Tufted Duck	- 23
Red-breasted Merganser	- 12
Arctic Tern	- 1
Herring Gull	- 60
Common Sandpiper	- 2
Hen Harrier	- M

6th Sept

Great Crested Grebe	- 6
Cormorant	- 2
Mallard	- 2
Red-breasted Merganser	- 5

Mochrum Loch (NX301530) - 10 wooded islands, poor grazing.
13th June

Cormorant	-400 adults + 200 nests
Mallard	- 35 (inc. F + 3 young)
Tufted Duck	- 2
Red-breasted Merganser	- 2
Snipe	- 1
Lesser Black-backed Gull	- pair
Common Gull	- pair

6th Sept

Cormorant	- 2
Mallard	- 5

Black Loch (NX302545) - no islands, poor grazing.
13th June

Cormorant	- 1
Herring Gull	- 25

Fell Loch (NX310553) - no islands, poor grazing.
13th June

Teal	- 5
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Elrig Loch (NX323491) - 1 grass island, poor grazing.
12th June

Mallard	- 1 +
Red-breasted Merganser	- 1

Clugston Loch (NX345575) - no islands, poor grazing.
13th June

Common Sandpiper	- 1
Oystercatcher	- 2
Lapwing	- 3
Common Gull	- 8

Loch Trool (NX410799) - 3 wooded islands, poor grazing.
16th June

Goldeneye) 1 brood of each species reported, not found on visit.
Goosander)

Loch Dee (NX469791) - 2 wooded islands, poor grazing.
16th June

Common Sandpiper - 1

Clattering shaws Loch (NX545770) - no islands, poor grazing.
16th June

Mallard - 1

Loch Grannoch (NX541700) - 1 wooded island, poor grazing.
17th June

Mallard - 38 (inc. F + 5 young)
Teal - 9 (inc. F + 6 young)
Tufted Duck - 13
Black-headed Gull - 60 (inc. nests + young)

Loch Skerrow (NX605680) - 5 wooded islands, poor grazing.
17th June

Mallard - 4 (F + 3 young)
Black-headed Gull - 40 (nesting)
Common Gull - 4 (nesting)
Common Sandpiper - 3

Loch Mannoeh (NX664608) - no islands, poor grazing.
18th June

Tufted Duck - 9
Mute Swan - pair (deserted nest)
Coot - 1
Curlew - 2
Oystercatcher - 5
Common Sandpiper - 1

Bargatton Loch (NX692629) - no islands, good grazing.
18th June

Common Sandpiper - 2
Lapwing - 40
Oystercatcher - 2

12th Sept

Nil wildfowl/waders.

Glentoo Loch (NX701625) - no islands, good grazing.
18th June

Mallard - 3

12th Sept

Nil wildfowl/waders - see geese.

Loch Ken (NX640782 to 732645) - 6 islands, good grazing.
19th June

Great Crested Grebe	- 21 (inc. broods 2,3,3)
Mallard	-110 (inc. broods 2,3,3,3,4,4,5,7,8)
Teal	- 6
Wigeon	- 10
Shoveler	- 4 (F + 3 young)
Tufted Duck	- 1
Red-breasted Merganser	- 17 (inc. F + 7 young)
Goosander	- 16 (inc. F + 6 young)
Shelduck	- 5 (F + 4 young)
Mute Swan	- 12 (inc. F on 5 eggs, pair + 2 young)
Whooper Swan	- 2 (adults)
Coot	- 3
Moorhen	- 5 (inc. 1 juv)
Common Sandpiper	- 3
Ringed Plover	- 3
Lapwing	- 46 (inc. pair + 2 young)
Oystercatcher	- 20
Redshank	- 18 (inc. 2 broods of 2 young)
Snipe	- 6
Black-headed Gull	-230 adults + 167 young
Little Gull	- 1
Common Tern	- 1

11th and 13th Sept
(max for each species)

Black-necked Grebe	- 1
Little Grebe	- 4
Heron	- 2
Mallard	-164
Teal	- 41
Wigeon	- 24 +
Pintail	- 8 +
Pochard	- 5
Tufted Duck	- 1
Goosander	- 2
Mute Swan	- 17 (pair + 2 young, pair + 2 young + 9 adults)
Coot	- 7
Moorhen	- 1

13th Sept
(incomplete cover)

Erncrogo Loch (NX745675) - 2 grass islands, good grazing.
20th June

Great Crested Grebe	- 2
Mallard	- 28 (inc. broods 2,3)
Tufted Duck	- 11
Pochard	- 3
Mute Swan	- pair + nest
Coot	- 5
Moorhen	- 2

Loch Lurkie (NX730708) - no islands, no grazing.
20th June

Little Grebe	- 1
Tufted Duck	- 6
Moorhen	- 2

Loch Patrick (NX787707) - no islands, good grazing.
22nd June

Mallard	- 4
Coot	- 7 (inc. 2 young)
Oystercatcher	- 14
Lapwing	- 26

Colvend Lochs (NX8555) - 1 island, good grazing.
24th June

Mallard	- 22
Coot	- 1

Carlingwark Loch (NX763614) - 3 wooded islands, little good grazing.
17th June

Mallard	- 53 (inc. F + 5 young)
Tufted Duck	- 1
Mute Swan	- 54 (3 pair with young: broods 4,6,7 also 31 moulting adult)
Coot	- 17

9th Sept

Cormorant	- 2
Mallard	- 60
Tufted Duck	- 7
Mute Swan	- 92 (inc. broods; 2,4,5, also 2 orphans)
Coot	- 18
Common Tern	- 1

Dow Lochs (NX374718) - no islands, reedbeds.
14th June

Mallard - 2

Threave Wildfowl Refuge (NX738635 to 735612) - river with good surrounding grazing.

18th June

Mallard - 5 (F + 4 young, + single young)
Teal - 23
Mute Swan - 17 (adults)
Snipe - 1
Redshank - 26
Oystercatcher - 3
Lapwing - 9

10th Sept

Little Grebe - 9
Cormorant - 2
Heron - 3
Mallard - 131
Teal - 115
Wigeon - 1
Pochard - 1
Goosander - 13
Mute Swan - 3 (adults)
Coot - 10
Moorhen - 2
Curlew - 19
Lapwing - 70
Lesser black-backed Gull - 1
Common Gull - 30
Black Tern - 1

Mossdale Loch (NX656711) - no islands, poor grazing.
18th June

Mallard - 3

13th Sept

Mallard - 1

Kendoon Loch (NX610905) - no islands, poor grazing.
20th June

Common Gull - 9
Black-headed Gull - 1
Oystercatcher - 4

Loch Urr (NX760845) - 1 grass island, good grazing.
22nd June

Cormorant - 1
Black-headed Gull -400 + (nests seen)

Corsock Loch (NX752755) - no islands, some good grazing.
22nd June

Cormorant - 1
Mallard - 2

Milton Loch (NX845715) - 1 grass + 1 stone island, good grazing.
23rd June

Great Crested Grebe - 1
Mallard - 9
Goldeneye - 3
Mute Swan - 47 (moult flock)
Black-headed Gull -100
Coot - 1

14th Sept

Mallard - 8
Pochard - 15
Tufted Duck - 41
Mute Swan - 21 (adults)
Coot - 12

Auchenreoch Loch (NX820715) - 1 wooded island, good grazing.
23rd June

Cormorant - 1
Mallard - 26 (inc. broods 1,3,6,8)
Tufted Duck - 14 (F + 7 young, also 5 M and 1 F)
Mute Swan - 26 (5 pairs: broods 1,2,3,5,5)
Coot - 15 (inc. broods 2,2)
Moorhen - 3

14th Sept

Mallard - 29
Tufted Duck - 4
Goldeneye - 1
Mute Swan - 26 (24 adult, 2 young)
Coot - 4

Glenkiln Reservoir (NX845781) - 1 wooded island, poor grazing.
22nd June

Mallard - 19

Loch Arthur (NX904689) - no islands, good grazing.
22nd June

Shelduck - 7 (adults)

Loch Rutton (NX898730) - no islands, good grazing.
22nd June

G.C. Grebe - 1
Mallard - 30
Tufted Duck - 3
Shelduck - 7 (adults)
Mute Swan - 1
Coot - 9

Loch Kindar (NX968642) - 2 wooded islands, good grazing.
23rd June

Cormorant - 3
Mallard - 4
Mute Swan - 31 (pair + 3 young, 1 imm, 25 adult)
Moorhen - 2 (1 adult + 1 juv)

Kinmount Ponds (NY140688 to 142685) - no islands, little good grazing.
24th June

Mallard - 2
Moorhen - 1

15th Sept

Mallard -220
Moorhen - 1

Kelhead Quarry (NY145693) - no islands, good grazing nearby.
24th June

Mallard - 1

15th Sept

Mallard - 6
Moorhen - 1

Dormont Pond (NY108752) - 2 wooded islands, no grazing.
24th June

Mallard - 1
Coot - 1

Broom Pond (NY145744) - 2 wooded islands, good grazing.
24th June

Moorhen - 1

Boyton Loch (NX467054) - 1 wooded island, reedbeds.
20th June

Mallard - 1

Loch Macatterick (NX440915) - several stone islands, poor grazing.
20th June

Teal - 1
Common Sandpiper - 2

Loch Riecawr (NX435935) - 3 stone islands, poor grazing.
20th June

Black-throated Diver - pair + 2 young
Common Gull - 2
Common Sandpiper - 3

Other sites visited but no other wetland birds recorded

Dindinnie Reservoir NX022606 - no islands, poor grazing.
Knockquahassen L. NX020594 - no islands, poor grazing.
Logan House L. NX102432 - no islands, poor grazing.
Drumlandford L. NX280775 - no islands, poor grazing.
L. Crongart NX281825 - no islands, poor grazing.
L. Goosey NX300825 - 1 wooded island, poor grazing.
Garwhacchie L. NX345690 - no islands, poor grazing.
Black L. NX280655 - no islands, poor grazing.
Barfad L. NX325662 - 2 wooded islands, poor grazing.
L. Dornal NX293761

Eldirg L.	NX352665 - no islands, poor grazing.
L. Hempton	NX546546 - no islands, poor grazing.
White L.	NX358435 - no islands, poor grazing.
L. Fleet	NX560698 - no islands, poor grazing.
L. Whinyeon	NX624656 - 1 grass island, poor grazing.
Lochenbreck L.	NX642656 - no islands, poor grazing.
Woodhall L.	NX665688 to 675665 - no islands, good grazing.
Carsfad L.	NX605860 - no islands, some good grazing.
Earlstown L.	NX613830 - 1 island, good grazing.
Lochinvar	NX659852 - no islands, poor grazing.
Dornell L.	NX703658 - no islands, no grazing.
L. Doon	NX016480 to 925482 - many stone islands, poor grazing.
L. Gower	NX445935 - no islands, poor grazing.
L. Muck	NX512007 - no islands, poor grazing
Moss Roddick L.	NX632815 - no islands, poor grazing.
L. Roan	NX743692 - no islands, good grazing.
Black L.	NX728719 - no islands, poor grazing.

Note: All visited June only except Woodhall (June + September).

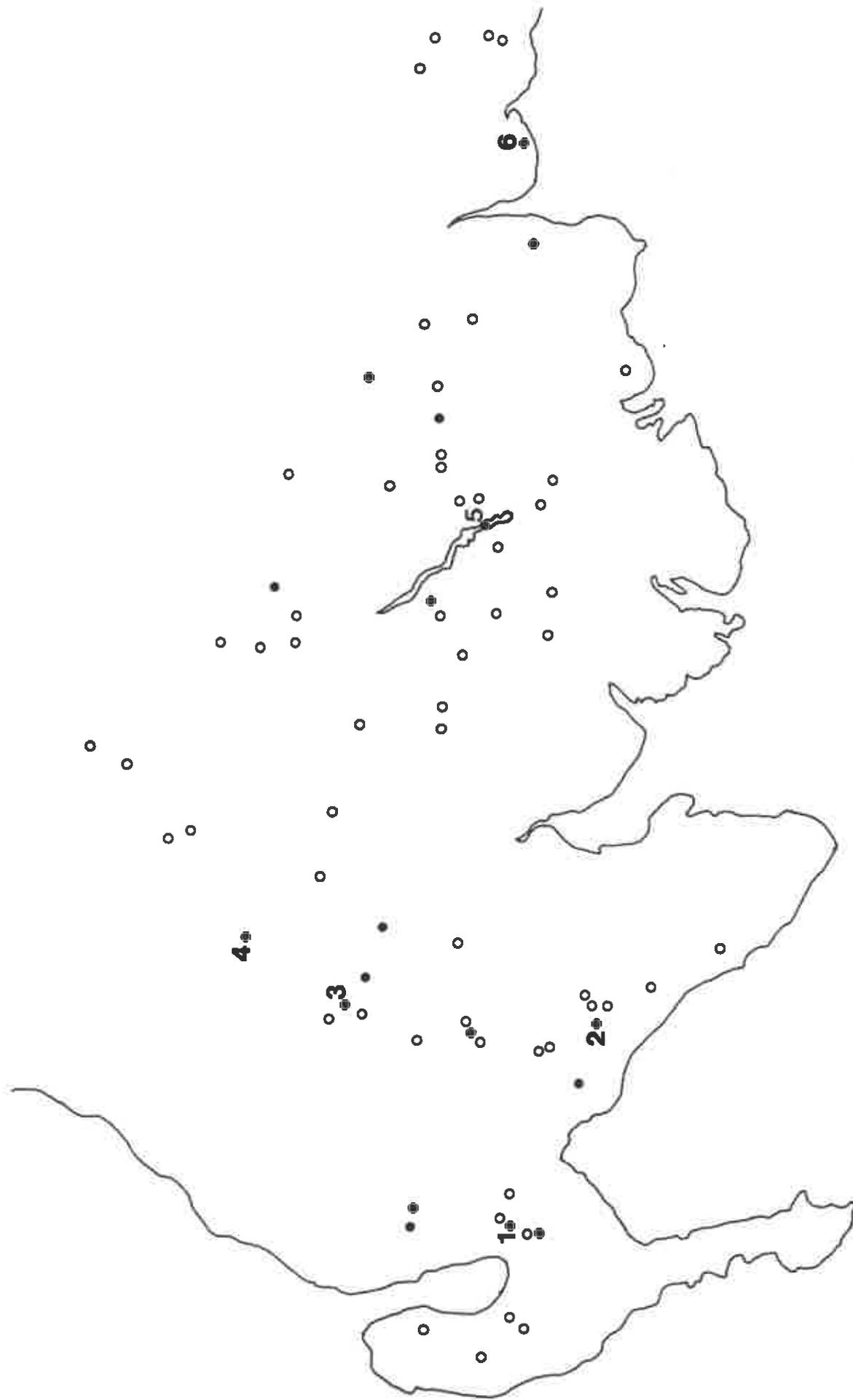


Figure 1. The sites in South-west Scotland visited in June 1988. Filled circles - Greylag Geese Present. Open circles, no geese found. Numbers refer to sites where concentrations were found.
 1. White Loch (Lochinch), 2. Castle Loch, 3. Loch Dornal, 4. Loch Moan.



Figure 2. Distribution of goose flocks in September. Filled circles - geese present, open circles - visited but no geese.
5. Loch Ken, 6. Caerlaverock.