



**Svalbard Barnacle Goose distribution around
the Solway Firth 2010-2011: Flock counts
from the Solway goose management scheme
area**

WWT Conservation Programmes Report

Author

Larry Griffin

June 2011

Published by:

The Wildfowl & Wetlands Trust

Slimbridge

Gloucestershire

GL2 7BT

Tel: 01453 891900

Fax: 01453 890827

Email conservation@wwt.org.uk

Reg. charity no. 1030884

This publication should be cited as:

Griffin, L. 2011. Svalbard Barnacle Goose distribution around the Solway Firth 2010-2011: Flock counts from the Solway goose management scheme area. Final Report to SNH. WWT, Slimbridge. 46 pp.

Contents

Executive Summary	v
1 Introduction	1
1.1 Objective	1
2 Methods	2
2.1 Management Scheme route counts	2
2.2 Coordinated Svalbard Barnacle Goose total population counts	2
2.3 Brood sizes and juvenile productivity of the Svalbard Barnacle Goose	3
2.4 Tide tables	3
2.5 SNH field code maps	6
3 Results	14
3.1 Barnacle Goose counts within the Management Scheme area	14
3.2 Pink-footed Goose counts for the Management Scheme area	25
3.3 Greylag Goose counts for the Management Scheme area	30
3.4 Canada Goose counts for the Management Scheme area	31
3.5 Whooper Swan counts for the Management Scheme area	32
3.6 Mute Swan counts for the Management Scheme area	34
3.7 Deliberate disturbance to geese in the Management Scheme area	34
3.8 Count section dates and times of coverage	35
3.9 Farmer liaisons regarding geese	35
3.10 Coordinated Svalbard Barnacle Goose population count totals	37
3.11 Brood size and juvenile productivity of the Svalbard Barnacle Goose	39
3.12 Leucistic Barnacle Geese	39
3.13 Other geese	40
3.14 Acknowledgements	40

Executive Summary

A total of 36 route counts were carried out in winter 2010-2011 within the Solway Barnacle Goose Management Scheme area. Flock counts were made for all goose and swan species encountered, with flocks assigned to fields by code. The times of day, the days of the week and the starting points at which the counts were conducted were varied as much as possible to avoid bias in when a section was surveyed. Instances of direct disturbance aimed at geese and of conversations with farmers were also noted. Data are also presented on the coordinated Solway population counts of the Svalbard Barnacle Goose and on brood size and productivity estimates for this population. The adopted total for this population wintering on the Solway was 35,900 geese (the mean of two counts that were within 10% of the maximum of 36,152 recorded, rounded up to the nearest 100), an increase of 3,000 birds on last winter's estimate of 32,900 geese. Brood sizes were quite large this winter at 2.5 goslings per family with a few large broods recorded (range 1-5 goslings; 65 families sampled), with an average juvenile productivity of 10.8% (range 5.6-21.5% young; 8,092 birds sampled) compared to 1.8 goslings and 5.1% young respectively for last winter. Compared to the four recorded last winter, there were at least six different leucistic Barnacle Geese recorded in winter 2010-2011 including a family group of three where one of the adults was leucistic.

1 Introduction

The Solway Firth is an internationally important site for a number of wetland bird species being a key site for the wintering Svalbard Barnacle Goose population. By mid-winter 100% of the population utilise five main sites around the Solway, with three of those being on the north side of the Firth, including Caerlaverock, Kirkconnell (Nith), and Southwick. This century with the growth of the population to just over 30,000 birds, the distribution has spread west towards the Outer Solway with geese now visiting the areas around Colvend and Auchencairn on a regular basis, with significant flocks at Wigtown in March and April.

The geese mainly feed within established nature reserves or within the Solway Barnacle Goose Management Scheme area, often choosing stubbles in early autumn and improved pastures and saltmarsh throughout the rest of the winter. SNH has run this management incentive scheme on the Solway since 1995 in order to integrate farming and goose grazing needs on areas of improved agricultural land. On land entered into the scheme, tiered payments are made to help cover the extra costs of managing for Barnacle Geese. Fields are classified as 'Feeding', 'Buffer' (which receive a tiered payment) or 'Scaring' (non-payment) zones depending in large part on the typical level of winter goose use. Controlled scaring is encouraged in the non-payment zone to try and keep the geese within the feeding or buffer zones.

1.1 Objective

The overall objective of the survey is to assess the distribution and abundance of the Svalbard Barnacle Goose and other goose and swan species on the fields and saltmarsh of the north side of the Solway Firth in relation to the Solway Barnacle Goose Management Scheme area.

2 Methods

2.1 Management Scheme route counts

As with previous surveys of the Scheme area, counts were carried out within a 6-day cycle and the starting points were varied to prevent counting any area at the same time of day, with count days spread evenly throughout the week including weekends. Geese and swans in larger flocks were counted in tens on a tally counter, while those in smaller flocks of <100 were counted individually. All flocks were mapped and coded according to the SNH convention on the field maps provided. Each day was broken down into four counting periods to cover the four main count areas, starting at first light with allowance made for weather conditions, e.g. geese tend to be slow to move off the roost during periods of frost as with those geese flighting off the Blackshaw Bank roost to utilise fields up the River Nith at Greenmerse and Kirkconnell. The time of arrival at each count section was recorded. Where significant numbers of geese moved during a count, the field the geese moved from and to was recorded with a “Comment” added within the Excel spreadsheet provided. Observations of leucistic geese have also been added.

As agreed with SNH, in a slight modification to the previous methodology in order to save costs and carbon miles, the data from the fortnightly census counts for the whole Solway from mid-winter and the weekly census counts for October and April were included as Scheme field counts. The count route repeated every 6-days covered areas to the east as far as Hurkledale and to the west as far as Colvend. Significant use of any fields outwith the intensive survey area was thus monitored via the census counts.

Areas where there are difficulties observing the fields from the road are well known as are the high vantage points which can be utilised to count them from. Otherwise approach on foot was adopted with prior permission being sought for access.

The presence and nature of any disturbance to the geese, intentional or otherwise, was noted using the SNH field code system provided.

Impromptu discussion with any landowners during the surveys was welcomed and a record of each conversation with a farmer regarding the geese was logged.

Care was taken in relation to biosecurity and disease prevention, and where access to fields was required there was compliance with any precautions required by the landowners, with gates being left as they were found.

Table 1 – Count sections covered within the counting periods.

Count Period 1	Count Period 2	Count Period 3	Count Period 4
Thwaite	Nith	Southernness	Colvend
Nith	Thwaite	Colvend	Southernness
Southernness	Colvend	Nith	Thwaite
Colvend	Southernness	Thwaite	Nith

As with last winter it soon became clear that the Priestside area was being fairly well used by the Barnacle Geese whereas the section from north of Ward Law covering the Quay Hill was not being used and was not surveyed on a regular basis although it was covered during the co-ordinated counts. In previous years the Priestside section has been dropped due to lack of goose use but this winter it was surveyed. During the co-ordinated counts of geese on the Solway, geese were recorded in the Auchencairn/Rascarrel area in mid-winter and from the end of February onwards significant numbers of Barnacle Geese began using the Wigtown area but this could not be economically covered via the route count budget.

2.2 Coordinated Svalbard Barnacle Goose total population counts

Each winter WWT has conducted total population counts of the Svalbard Barnacle Geese present on the Solway from arrival to departure. This involves a network of staff and volunteers counting the geese in survey sections within a one hour to two hour time period at the same time on the same day. There are usually weekly counts

during the arrival period in October and during the departure period in April/May, with fortnightly counts in the months between. This work is now part-funded by SNH under the current contract.

2.3 Brood sizes and juvenile productivity of the Svalbard Barnacle Goose

Each winter WWT carefully assesses the brood sizes and juvenile productivity of a large proportion of the Barnacle Geese from as many sites as possible on the Solway. The dates, land use types, and flock sizes used for sampling are varied as much as possible to avoid any bias in the average estimate obtained, as are the sampling units within the flocks as families with young can tend to associate at the edges of a flock particularly at the front. All observations were carried out by an experienced observer.

2.4 Tide tables

Tide tables are presented in the following figures for the months in which the geese were present in the Barnacle Goose Management Scheme area.

SEPTEMBER 2010 LAVER'S LIVERPOOL (Gladstone) TIDES
 All times shown are GMT - add one hour from 0100 28 March to 0100 31 October

		● New Moon		◀ First Quarter		☉ Full Moon		▶ Last Quarter				
		HIGH WATER				LOW WATER				SUN MOON		
		Morning		Afternoon		Morning		Afternoon		Rise	Set	
Date	Time	M	Ft	Time	M	Ft	Time	M	Ft	Rise	Set	
1 Wed	0251	8.0	26.2	1515	7.8	25.6	0936	2.8	9.2	2206	3.1	10.2
2 Thu	0346	7.6	24.9	1621	7.4	24.3	1030	3.2	10.5	2318	3.4	11.2
3 Fri	0506	7.3	24.0	1754	7.3	24.0	1154	3.4	11.2	0524	18.5	23.44
4 Sat	0643	7.4	24.3	1922	7.1	23.3	0057	3.2	10.5	0526	18.55	23.44
5 Sun	0804	7.9	25.9	2031	6.4	22.8	0219	2.7	8.9	1445	2.6	8.5
6 Mon	0905	8.6	28.2	2125	5.1	21.9	0327	1.9	6.2	1547	1.9	6.2
7 Tue	0955	9.2	30.2	2213	3.6	21.5	0427	1.2	3.9	1642	1.3	4.3
8 Wed	1040	9.6	31.5	2257	10.0	32.8	0518	0.6	2.0	1731	0.9	3.0
9 Thu	1123	9.9	32.5	2341	10.2	33.5	0606	0.3	1.0	1816	0.6	2.0
10 Fri	1156	9.0	29.5	2426	9.8	32.2	0649	0.2	0.7	1859	0.6	2.0
11 Sat	0074	10.2	33.5	2508	9.8	32.2	0730	0.3	1.0	1939	0.7	2.3
12 Sun	0106	9.9	32.5	2574	9.4	30.8	0809	0.8	2.6	2019	1.2	3.9
13 Mon	0148	9.4	30.8	2639	8.9	29.5	0886	1.4	4.6	2100	1.8	5.9
14 Tue	0233	8.7	28.5	2705	8.4	27.6	0924	2.2	7.2	2145	2.4	7.9
15 Wed	0324	8.0	26.2	2753	7.8	25.8	1011	2.9	9.5	2245	3.1	10.2
16 Thu	0434	7.3	24.0	2810	7.4	24.3	1119	3.5	11.5	0547	18.26	23.02
17 Fri	0607	7.0	23.0	2840	7.3	24.0	0012	3.4	11.2	1254	3.7	12.1
18 Sat	0737	7.2	23.5	2957	7.1	23.3	0143	3.3	10.8	1415	3.4	11.2
19 Sun	0841	7.6	24.9	3053	8.1	26.6	0255	2.8	9.2	1516	2.9	9.5
20 Mon	0926	8.1	26.6	3134	8.5	27.9	0348	2.4	7.9	1601	2.5	8.2
21 Tue	1001	8.4	27.6	3209	8.9	29.2	0428	2.0	6.6	1637	2.1	6.9
22 Wed	1031	8.7	28.5	3241	9.1	29.9	0502	1.8	5.9	1709	1.9	6.2
23 Thu	1100	8.9	29.2	3242	9.2	30.2	0531	1.6	5.2	1739	1.7	5.6
24 Fri	1128	9.0	29.5	3241	9.2	30.2	0600	1.5	4.9	1809	1.6	5.2
25 Sat	1156	9.0	29.5	0628	1.5	4.9	1840	1.6	5.2	0603	18.04	18.08
26 Sun	0011	9.2	30.2	1224	8.9	29.2	0658	1.5	4.9	1912	1.7	5.6
27 Mon	0040	9.0	29.5	1305	8.8	28.9	0728	1.7	5.6	1945	2.0	6.6
28 Tue	0112	8.8	28.9	1376	8.6	28.2	0759	2.0	6.6	2018	2.3	7.5
29 Wed	0147	8.5	27.9	1403	8.3	27.2	0832	2.4	7.9	2057	2.7	8.9
30 Thu	0230	8.1	26.6	1452	7.9	25.9	0912	2.8	9.2	2147	3.0	9.8

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LAVER'S LIVERPOOL (Gladstone) TIDES **OCTOBER 2010**
 All times shown are GMT - add one hour from 0100 28 March to 0100 31 October

		● New Moon		◀ First Quarter		☉ Full Moon		▶ Last Quarter				
		HIGH WATER				LOW WATER				SUN MOON		
		Morning		Afternoon		Morning		Afternoon		Rise	Set	
Date	Time	M	Ft	Time	M	Ft	Time	M	Ft	Rise	Set	
1 Fri	0329	7.7	25.3	1600	7.6	24.9	1008	3.2	10.5	2301	3.2	10.5
2 Sat	0451	7.4	24.3	1732	7.5	24.6	1131	3.4	11.2	0613	17.49	22.46
3 Sun	0625	7.5	24.8	1859	7.9	25.9	0036	3.1	10.2	1307	3.2	10.5
4 Mon	0743	8.1	26.6	2007	8.5	27.9	0157	2.5	8.2	1422	2.6	8.5
5 Tue	0843	8.7	28.5	2102	9.2	30.2	0304	1.8	5.9	1524	2.0	6.6
6 Wed	0932	9.3	30.5	2150	9.7	31.8	0402	1.2	3.9	1618	1.4	4.6
7 Thu	1017	9.7	31.8	2234	10.0	32.8	0454	0.7	2.3	1707	1.0	3.3
8 Fri	1059	9.9	32.5	2318	10.1	33.1	0539	0.5	1.6	1752	0.8	2.6
9 Sat	1140	9.9	32.5	0622	0.5	1.6	1836	0.7	2.3	0628	17.30	09.04
10 Sun	0000	10.0	32.8	1221	9.7	31.8	0703	0.7	2.3	1917	0.9	3.0
11 Mon	0042	9.6	31.5	1302	9.4	30.8	0740	1.2	3.9	1957	1.4	4.6
12 Tue	0124	9.1	29.9	1343	9.0	29.5	0818	1.8	5.9	2039	1.9	6.2
13 Wed	0209	8.5	27.9	1428	8.4	27.6	0855	2.5	8.2	2124	2.6	8.5
14 Thu	0259	7.9	25.9	1523	7.9	25.9	0929	3.1	10.2	2221	3.1	10.2
15 Fri	0404	7.3	24.0	1633	7.5	24.6	1042	3.7	12.1	2340	3.4	11.2
16 Sat	0529	7.0	23.0	1756	7.3	24.0	1215	3.9	12.8	0640	17.14	14.48
17 Sun	0655	7.1	23.3	1912	7.6	24.9	0103	3.4	11.2	1335	3.6	11.8
18 Mon	0801	7.5	24.6	2011	7.9	25.9	0210	3.0	9.8	1435	3.2	10.5
19 Tue	0848	7.9	25.9	2057	8.3	27.2	0303	2.6	8.5	1521	2.8	9.2
20 Wed	0925	8.3	27.2	2134	8.7	28.5	0345	2.3	7.5	1600	2.4	7.9
21 Thu	0957	8.6	28.2	2209	8.9	29.2	0421	2.0	6.6	1635	2.1	6.9
22 Fri	1026	8.8	28.9	2241	9.1	29.9	0454	1.8	5.9	1708	1.8	5.9
23 Sat	1058	9.0	29.5	2313	9.1	29.9	0526	1.6	5.2	1742	1.7	5.6
24 Sun	1128	9.1	29.9	2345	9.1	29.9	0559	1.6	5.2	1817	1.7	5.6
25 Mon	1200	9.1	29.9	0632	1.6	5.2	1907	1.7	5.6	0657	18.54	17.37
26 Tue	0018	9.0	29.5	1233	9.0	29.5	0705	1.8	5.9	1928	1.9	6.2
27 Wed	0054	8.8	28.9	1309	8.8	28.9	0739	2.0	6.6	2006	2.2	7.2
28 Thu	0135	8.6	28.2	1352	8.5	27.9	0816	2.4	7.9	2049	2.5	8.2
29 Fri	0223	8.2	26.9	1445	8.2	26.9	0890	2.7	8.9	2142	2.8	9.2
30 Sat	0323	7.9	25.9	1551	7.9	25.9	0957	3.1	10.2	2254	2.9	9.5
31 Sun	0439	7.6	24.9	1712	7.9	25.9	1114	3.3	10.8	0709	18.42	14.03

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NOVEMBER 2010 LAVER'S LIVERPOOL (Gladstone) TIDES

		● New Moon		◀ First Quarter		☉ Full Moon		▶ Last Quarter				
		HIGH WATER				LOW WATER				SUN MOON		
		Morning		Afternoon		Morning		Afternoon		Rise	Set	
Date	Time	M	Ft	Time	M	Ft	Time	M	Ft	Rise	Set	
1 Mon	0002	7.8	25.6	1830	8.1	26.6	0015	2.7	8.9	1239	3.1	10.2
2 Tue	0115	8.2	26.9	1938	8.6	28.2	0120	2.3	7.5	1352	2.6	8.5
3 Wed	0116	8.7	28.5	2036	9.0	29.5	0235	1.9	6.2	1455	2.1	6.9
4 Thu	0107	9.1	29.9	2127	9.4	30.8	0334	1.4	4.6	1551	1.9	6.6
5 Fri	0154	9.4	30.8	2213	9.7	31.8	0426	1.1	3.6	1642	1.3	4.3
6 Sat	0337	9.6	31.5	2258	9.7	31.8	0513	1.0	3.3	1730	1.1	3.6
7 Sun	0419	9.7	31.8	2342	9.6	31.5	0557	1.0	3.3	1815	1.1	3.6
8 Mon	0505	9.3	30.5	2427	9.3	30.5	0637	1.2	3.9	1902	1.2	3.9
9 Tue	0625	9.3	30.5	2508	9.3	30.5	0716	1.6	5.2	1941	1.6	5.2
10 Wed	0749	8.9	29.2	2582	9.0	29.5	0754	2.0	6.6	2022	2.0	6.6
11 Thu	0849	8.4	27.6	2640	8.6	28.2	0830	2.6	8.5	2106	2.5	8.2
12 Fri	0925	7.9	25.9	2684	8.2	26.9	0911	3.1	10.2	2154	2.9	9.5
13 Sat	0930	7.5	24.6	2718	7.8	25.6	1000	3.5	11.5	2254	3.2	10.5
14 Sun	0936	7.2	23.6	2740	7.5	24.6	1112	3.8	12.5	0735	16.17	13.24
15 Mon	0950	7.1	23.3	2810	7.5	24.6	0007	3.3	10.8	1232	3.8	12.5
16 Tue	0900	7.3	24.0	2915	7.7	25.3	0108	3.2	10.5	1338	3.5	11.5
17 Wed	0757	7.6	24.9	3009	8.0	26.2	0206	3.0	9.8	1431	3.1	10.2
18 Thu	0642	8.0	26.2	3054	8.3	27.2	0254	2.7	8.9	1517	2.7	8.9
19 Fri	0521	8.3	27.2	3135	8.6	28.2	0338	2.3	7.5	1559	2.4	7.9
20 Sat	0357	8.6	28.2	3212	8.8	28.9	0417	2.1	6.9	1639	2.1	6.9
21 Sun	0311	8.9	29.2	3248	8.9	29.2	0455	1.9	6.2	1718	1.9	6.2
22 Mon	0106	9.1	29.9	3325	9.0	29.5	0533	1.7	5.6	1757	1.7	5.6
23 Tue	1142	9.2	30.2	0611	1.7	5.6	1838	1.7	5.6			

JANUARY 2011 LAVER'S LIVERPOOL (Gladstone) TIDES

● New Moon ◀ First Quarter ○ Full Moon ▶ Last Quarter																
HIGH WATER				LOW WATER				SUN		MOON						
Morning		Afternoon		Morning		Afternoon		Rise	Set	Rise	Set	Ph.				
Date	Time	M	Ft	Time	M	Ft	Time	M	Ft							
1 Sat	0624	8.2	26.9	2054	8.3	27.2	0241	2.4	7.9	1509	2.5	8.2	0828	1603	0553	1320
2 Sun	0921	8.6	28.2	2151	8.6	28.2	0343	2.2	7.2	1612	2.1	6.9	0828	1604	0657	1413
3 Mon	1012	8.9	29.2	2240	8.8	28.9	0437	2.0	6.6	1708	1.8	5.9	0827	1606	0748	1516
4 Tue	1057	9.1	29.9	2323	8.9	29.2	0524	1.9	6.2	1755	1.6	5.2	0827	1607	0827	1627
5 Wed	1137	9.3	30.5				0606	1.8	5.9	1837	1.6	5.2	0827	1608	0855	1740
6 Thu	0002	8.9	29.2	1214	9.3	30.5	0644	1.8	5.9	1914	1.6	5.2	0826	1609	0917	1854
7 Fri	0036	8.8	28.9	1248	9.2	30.2	0717	1.9	6.2	1947	1.7	5.6	0826	1611	0935	2005
8 Sat	0109	8.7	28.5	1322	9.1	29.9	0748	2.0	6.6	2017	1.9	6.2	0825	1612	0949	2115
9 Sun	0142	8.5	27.9	1357	8.8	28.9	0817	2.3	7.5	2045	2.1	6.9	0825	1614	1003	2224
10 Mon	0216	8.3	27.2	1433	8.5	27.9	0848	2.5	8.2	2116	2.4	7.9	0824	1615	1016	2332
11 Tue	0252	8.0	26.2	1512	8.2	26.9	0923	2.9	9.5	2152	2.7	8.9	0823	1617	1030	
12 Wed	0334	7.6	24.9	1557	7.8	25.6	1006	3.2	10.5	2237	3.1	10.2	0823	1618	1046	0042
13 Thu	0425	7.3	24.0	1654	7.4	24.3	1100	3.5	11.5	2337	3.4	11.2	0822	1620	1105	0152
14 Fri	0533	7.1	23.3	1807	7.3	24.0				1218	3.7	12.1	0821	1621	1130	0304
15 Sat	0652	7.2	23.6	1924	7.4	24.3	0057	3.4	11.2	1342	3.5	11.5	0820	1623	1202	0415
16 Sun	0803	7.6	24.9	2030	7.7	25.3	0212	3.2	10.5	1450	3.0	9.8	0819	1625	1247	0522
17 Mon	0910	8.1	26.6	2124	8.2	26.9	0313	2.8	9.2	1548	2.5	8.2	0818	1626	1346	0621
18 Tue	0948	8.6	28.2	2212	8.7	28.5	0407	2.3	7.5	1642	2.0	6.6	0817	1628	1459	0709
19 Wed	1013	9.1	29.9	2257	9.1	29.9	0457	1.8	5.9	1732	1.4	4.6	0816	1630	1622	0746
20 Thu	1110	9.5	31.2	2340	9.4	30.8	0544	1.4	4.6	1820	1.0	3.3	0815	1632	1749	0815
21 Fri				1200	9.8	32.2	0630	1.1	3.6	1906	0.7	2.7	0814	1633	1918	0838
22 Sat	0024	9.6	31.5	1242	9.9	32.5	0713	1.0	3.3	1949	0.5	2.0	0812	1635	2046	0857
23 Sun	0108	9.6	31.5	1326	9.9	32.5	0754	1.0	3.3	2030	0.7	2.3	0811	1637	2213	0915
24 Mon	0151	9.4	30.8	1410	9.7	31.8	0835	1.2	3.9	2112	1.0	3.3	0810	1639	2339	0932
25 Tue	0236	9.1	29.9	1456	9.3	30.5	0916	1.5	4.9	2154	1.5	4.9	0809	1641		0952
26 Wed	0324	8.6	28.2	1547	8.7	28.5	1001	2.0	6.6	2242	2.1	6.9	0807	1643	0104	1014
27 Thu	0411	8.1	26.6	1649	8.2	26.9	1057	2.5	8.2	2343	2.7	8.9	0805	1645	0226	1043
28 Fri	0500	7.7	25.3	1807	7.7	25.3				1210	2.9	9.5	0804	1647	0343	1120
29 Sat	0551	7.6	24.9	1933	7.6	24.9	0103	3.0	9.8	1339	3.0	9.8	0802	1648	0450	1207
30 Sun	0609	7.8	25.6	2049	7.9	25.9	0224	2.9	9.5	1502	2.7	8.9	0801	1650	0545	1306
31 Mon	0614	8.2	26.9	2147	8.2	26.9	0333	2.6	8.5	1610	2.3	7.5	0759	1652	0627	1413

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LAVER'S LIVERPOOL (Gladstone) TIDES FEBRUARY 2011

● New Moon ◀ First Quarter ○ Full Moon ▶ Last Quarter																
HIGH WATER				LOW WATER				SUN		MOON						
Morning		Afternoon		Morning		Afternoon		Rise	Set	Rise	Set	Ph.				
Date	Time	M	Ft	Time	M	Ft	Time	M	Ft							
1 Tue	1004	8.7	28.5	2233	8.5	27.9	0430	2.2	7.2	1703	1.9	6.2	0757	1654	0658	1525
2 Wed	1046	9.0	29.5	2311	8.8	28.9	0515	1.9	6.2	1745	1.6	5.2	0756	1656	0722	1638
3 Thu	1122	9.2	30.2	2344	8.9	29.2	0553	1.7	5.6	1821	1.5	4.9	0754	1658	0741	1750
4 Fri	1155	9.3	30.5				0626	1.6	5.2	1853	1.4	4.6	0752	1700	0757	1901
5 Sat	0015	8.9	29.2	1227	9.3	30.5	0655	1.6	5.2	1921	1.5	4.9	0751	1702	0811	2010
6 Sun	0044	8.9	29.2	1257	9.2	30.2	0723	1.7	5.6	1947	1.6	5.2	0749	1704	0824	2118
7 Mon	0113	8.8	28.9	1328	9.0	29.5	0751	1.8	5.9	2012	1.8	5.9	0747	1706	0838	2227
8 Tue	0142	8.6	28.2	1359	8.7	28.5	0820	2.1	6.9	2041	2.0	6.6	0745	1708	0853	2336
9 Wed	0212	8.3	27.2	1430	8.4	27.6	0851	2.4	7.9	2112	2.4	7.9	0743	1710	0910	
10 Thu	0245	8.0	26.2	1506	8.0	26.2	0927	2.8	9.2	2149	2.8	9.5	0741	1712	0932	0046
11 Fri	0325	7.6	24.9	1554	7.5	24.6	1011	3.2	10.5	2238	3.3	10.8	0739	1714	1000	0156
12 Sat	0423	7.2	23.6	1704	7.2	23.6	1115	3.6	11.8	2354	3.6	11.8	0737	1716	1038	0303
13 Sun	0549	7.0	23.0	1836	7.1	23.3				1252	3.6	11.8	0735	1718	1128	0405
14 Mon	0721	7.3	24.0	2000	7.5	24.6	0130	3.4	11.2	1418	3.1	10.2	0733	1720	1232	0457
15 Tue	0833	7.9	25.9	2103	8.1	26.6	0245	2.9	9.5	1524	2.5	8.2	0731	1722	1349	0539
16 Wed	0927	8.5	27.9	2154	8.7	28.5	0345	2.3	7.5	1623	1.8	5.9	0729	1724	1514	0612
17 Thu	1014	9.1	29.9	2239	9.3	30.5	0439	1.7	5.6	1715	1.1	3.6	0727	1726	1643	0638
18 Fri	1058	9.7	31.8	2322	9.7	31.8	0528	1.1	3.6	1803	0.6	2.0	0725	1728	1814	0659
19 Sat	1141	10.0	32.8				0614	0.7	2.3	1848	0.2	0.7	0723	1730	1944	0718
20 Sun	0005	9.9	32.5	1223	10.2	33.5	0657	0.5	1.6	1930	0.2	0.7	0721	1732	2114	0737
21 Mon	0047	9.9	32.5	1306	10.1	33.1	0738	0.5	1.6	2009	0.4	1.3	0719	1734	2242	0757
22 Tue	0129	9.6	31.5	1348	9.8	32.2	0817	0.8	2.6	2048	0.8	2.6	0716	1736		0819
23 Wed	0211	9.3	30.5	1432	9.3	30.5	0856	1.2	3.9	2127	1.5	4.9	0714	1738	0009	0846
24 Thu	0256	8.7	28.5	1521	8.6	28.2	0939	1.8	5.9	2212	2.2	7.2	0712	1739	0130	0921
25 Fri	0349	8.1	26.6	1623	7.9	25.9	1033	2.5	8.2	2312	2.9	8.5	0710	1741	0241	1006
26 Sat	0459	7.6	24.9	1746	7.3	24.0	1148	3.0	9.8				0707	1743	0340	1102
27 Sun	0627	7.4	24.3	1921	7.3	24.0	0039	3.3	10.8	1325	3.1	10.2	0705	1745	0426	1206
28 Mon	0753	7.6	24.9	2039	7.6	24.9	0209	3.2	10.5	1452	2.8	9.2	0703	1747	0501	1316

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MARCH 2011 LAVER'S LIVERPOOL (Gladstone) TIDES

All times shown are GMT - add one hour from 0100 27 March to 0100 30 October

● New Moon ◀ First Quarter ○ Full Moon ▶ Last Quarter																
HIGH WATER				LOW WATER				SUN		MOON						
Morning		Afternoon		Morning		Afternoon		Rise	Set	Rise	Set	Ph.				
Date	Time	M	Ft	Time	M	Ft	Time	M	Ft							
1 Tue	0859	8.1	26.6	2133	8.1	26.6	0321	2.8	9.2	1558	2.3	7.5	0701	1749	0527	1428
2 Wed	0947	8.5	27.9	2215	8.4	27.6	0415	2.3	7.5	1646	1.9	6.2	0658	1751	0647	1539
3 Thu	1026	8.8	28.9	2249	8.7	28.5	0457	1.9	6.2	1724	1.6	5.2	0656	1753	0604	1649
4 Fri	1101	9.1	29.9	2319	8.9	29.2	0531	1.7	5.6	1756	1.5	4.9	0654	1755	0619	1758
5 Sat	1130	9.2	30.2	2348	8.9	29.2	0601	1.5	4.9	1824	1.4	4.6	0651	1757	0633	1907
6 Sun				1201	9.2	30.2	0629	1.5	4.9	1850	1.4	4.6	0649	1759	0646	2015
7 Mon	0010	9.0	29.5	1230	9.2	30.2	0657	1.4	4.6	1915	1.4	4.6	0647	1801	0701	2124
8 Tue	0044	8.9	29.2	1300	9.0	29.5	0725	1.5	4.9	1942	1.6	5.2	0644	1802	0718	2233
9 Wed	0112	8.7	28.5	1328	8.8	28.9	0754	1.8	5.9	2011	1.9	6.2	0642	1804	0738	2343
10 Thu	0139	8.5	27.9	1358	8.5	27.9	0826	2.1	6.9	2041	2.2	7.2	0640	1806	0804	
11 Fri	0210	8.2	26.9	1433	8.1	26.6	0859	2.5	8.2	2115	2.7	8.9	0637	1808	0837	0050
12 Sat	0240	7.9	25.9	1519	7.7	25.3	0940	2.9	9.5	2200	3.1	10.2	0635	1810	0921	0152
13 Sun	0347	7.4	24.2	1626	7.2	23.6	1039	3.3	10.8	2309	3.5	11.5	0632	1812	1017	0247
14 Mon	0500	7.1	23.3	1800	7.1	23.3				1210	3.4	11.2	0630	1814	1126	0332
15 Tue	0641	7.3	24.0	1930	7.5	24.6	0051	3.4	11.2	1345						

2.5 SNH field code maps

A field code system has been used by SNH to cover all of the fields within the Management Scheme area typically used by the geese. These are the codes used in the results tables. Where geese were recorded in an uncoded field, the coding was extended in a logical and consecutive manner. The figures are ordered in a sequence from east (Priestside area) to west (Colvend area).

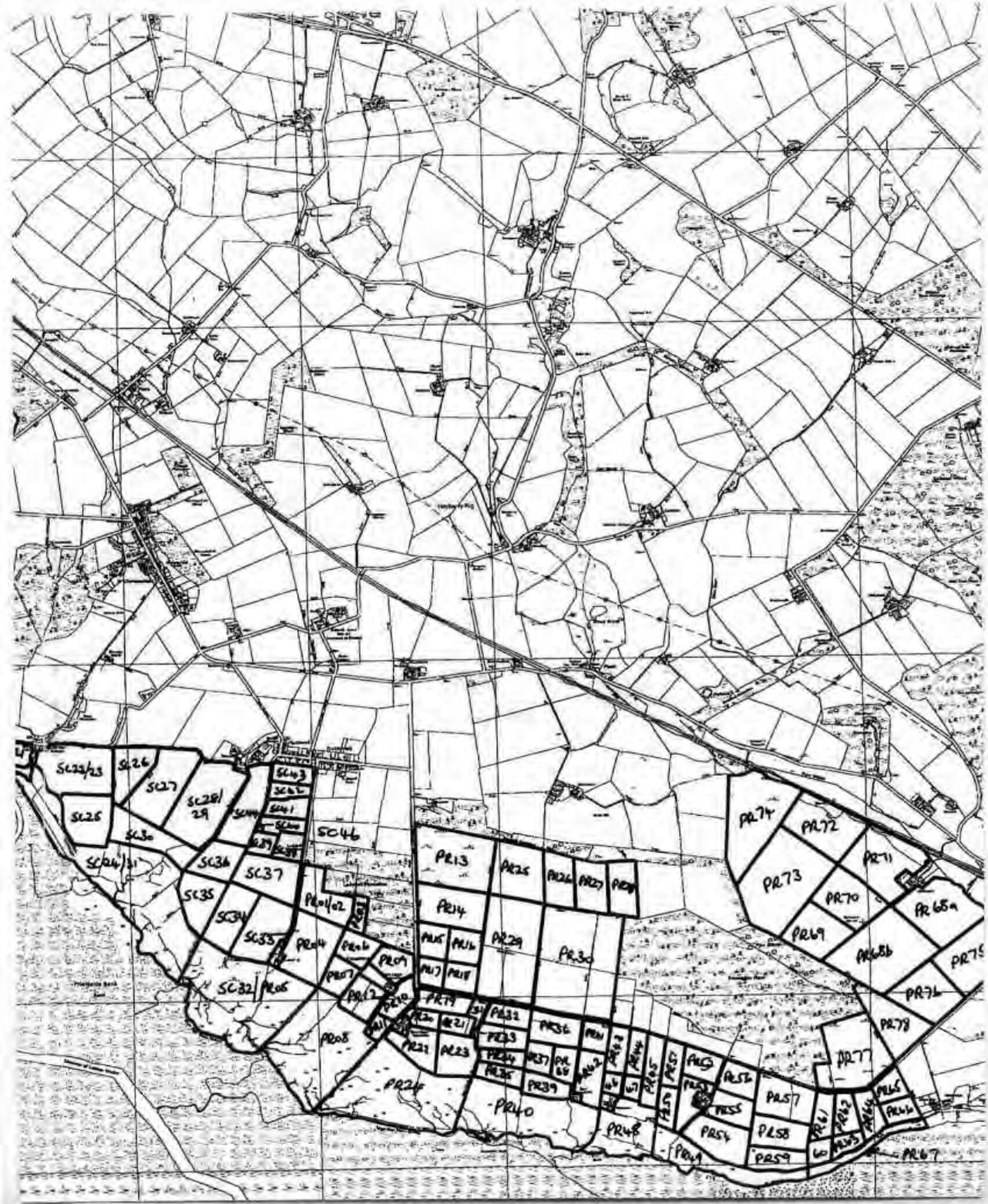


Figure 3. Field codes for the Priestside/Hurkledale/Thwaite area of the Goose Management Scheme.



Figure 4. Field codes for the Powhillon/Stanhope/Longbridgemuir area of the Goose Management Scheme.

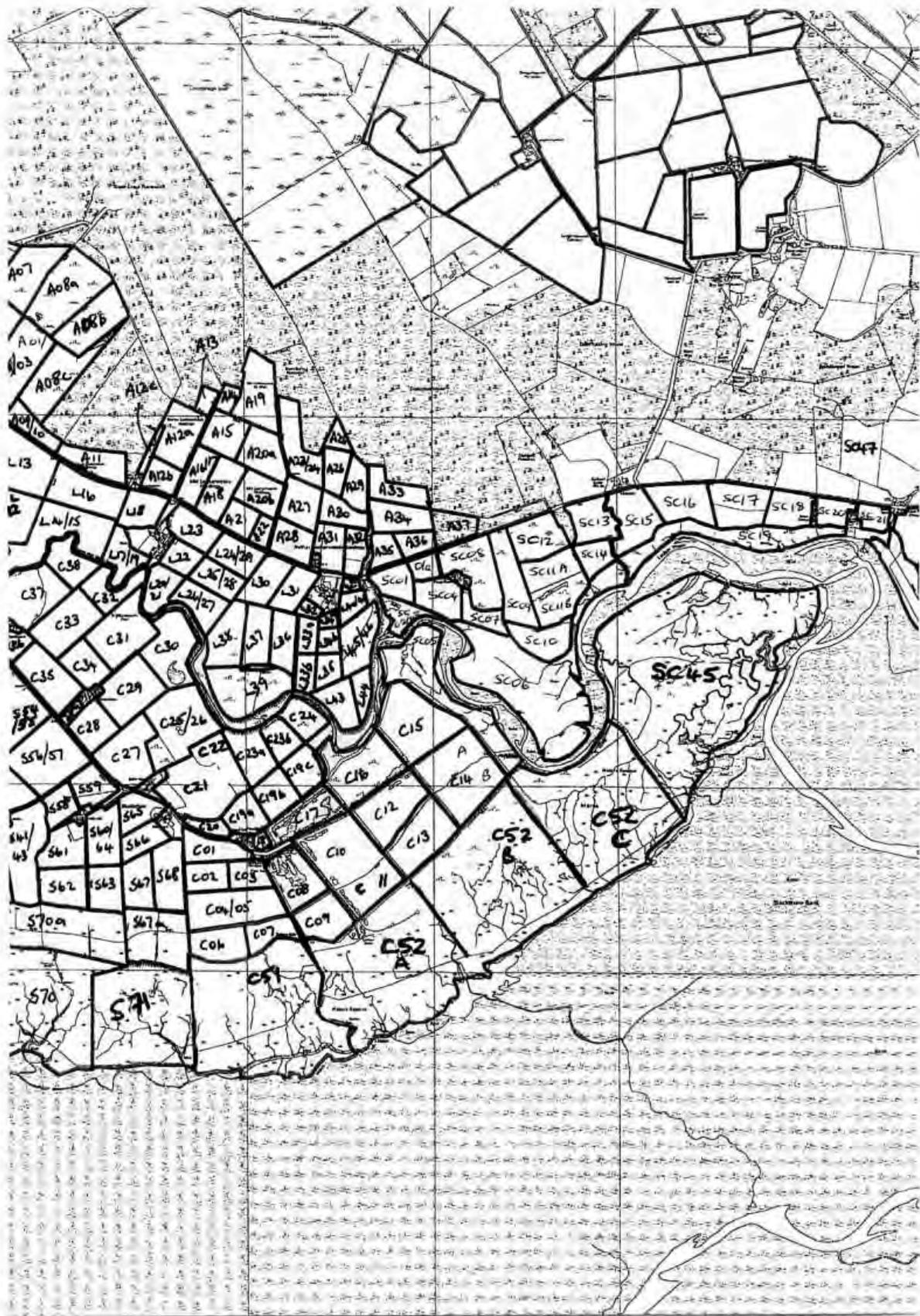


Figure 5. Field codes for the Caerlaverock/Nether Locharwoods area of the Goose Management Scheme.

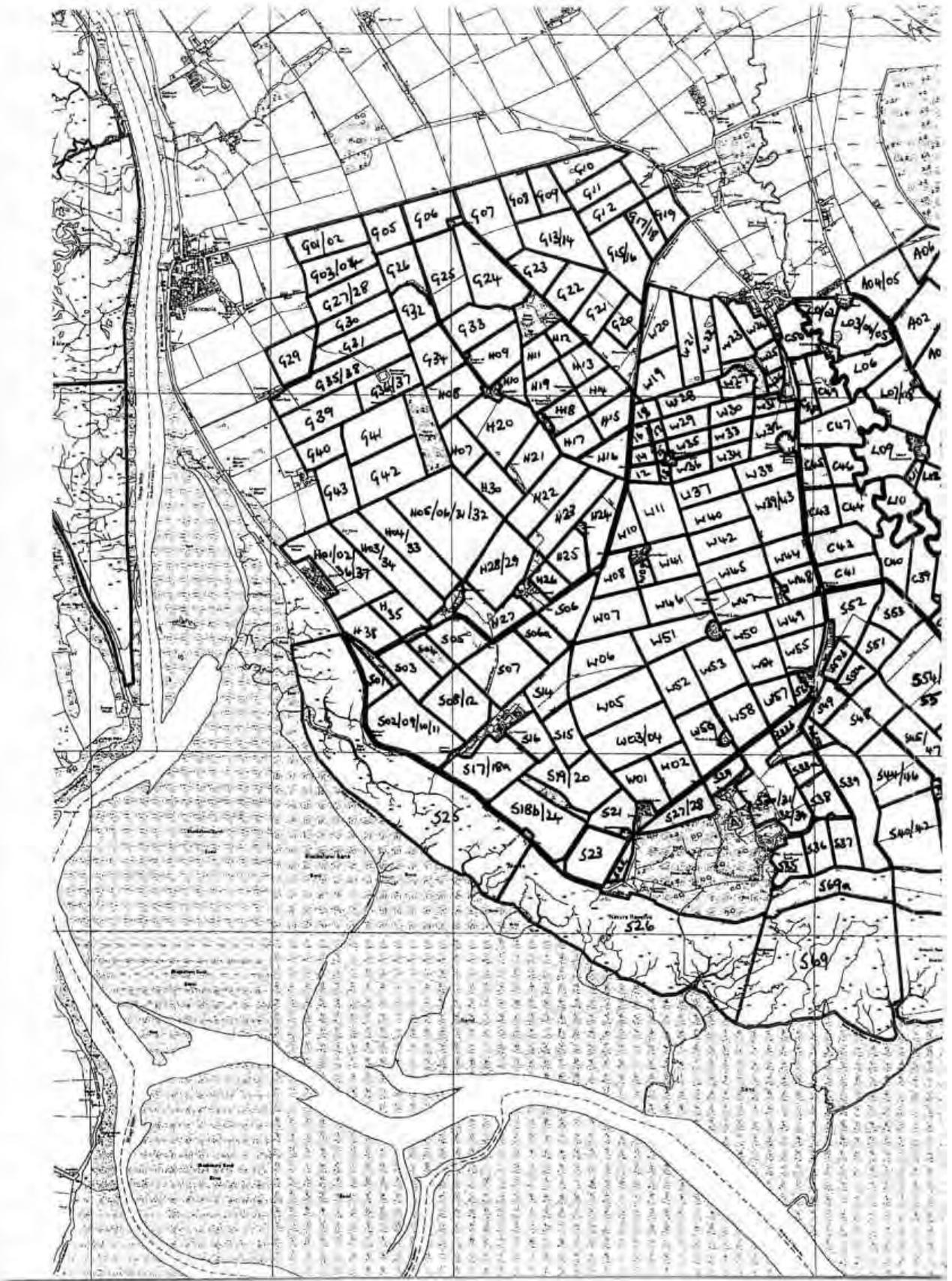


Figure 6. Field codes for the Lantonside/Ward Law area of the Goose Management Scheme.

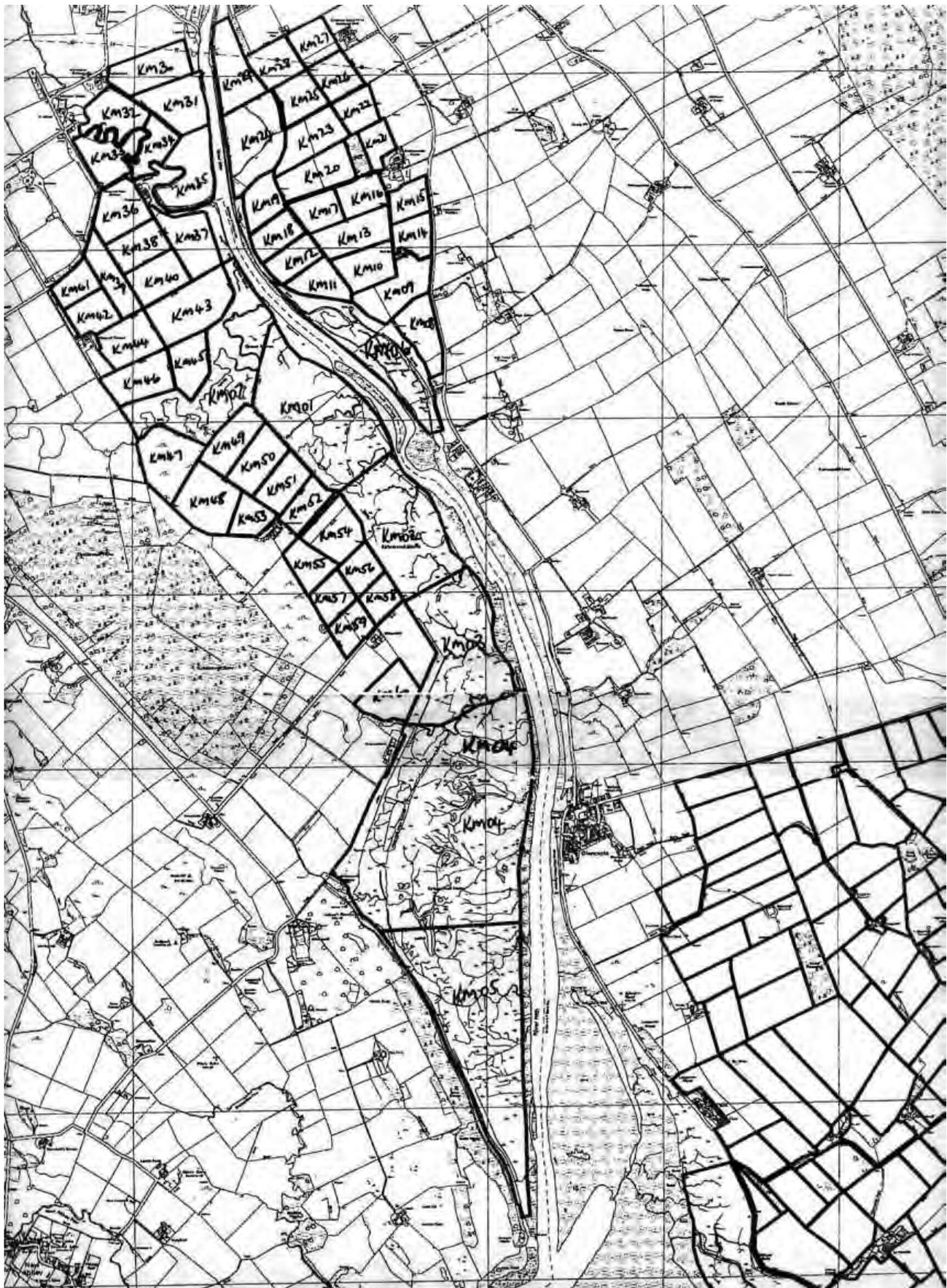


Figure 7. Field codes for the Kelton/Greenmerse/Kirkconnell area of the Goose Management Scheme.



Figure 8. Field codes for the Carsethorn/Southernness area of the Goose Management Scheme (new field codes in areas used by the geese more regularly since 2008-2009 are shown highlighted).

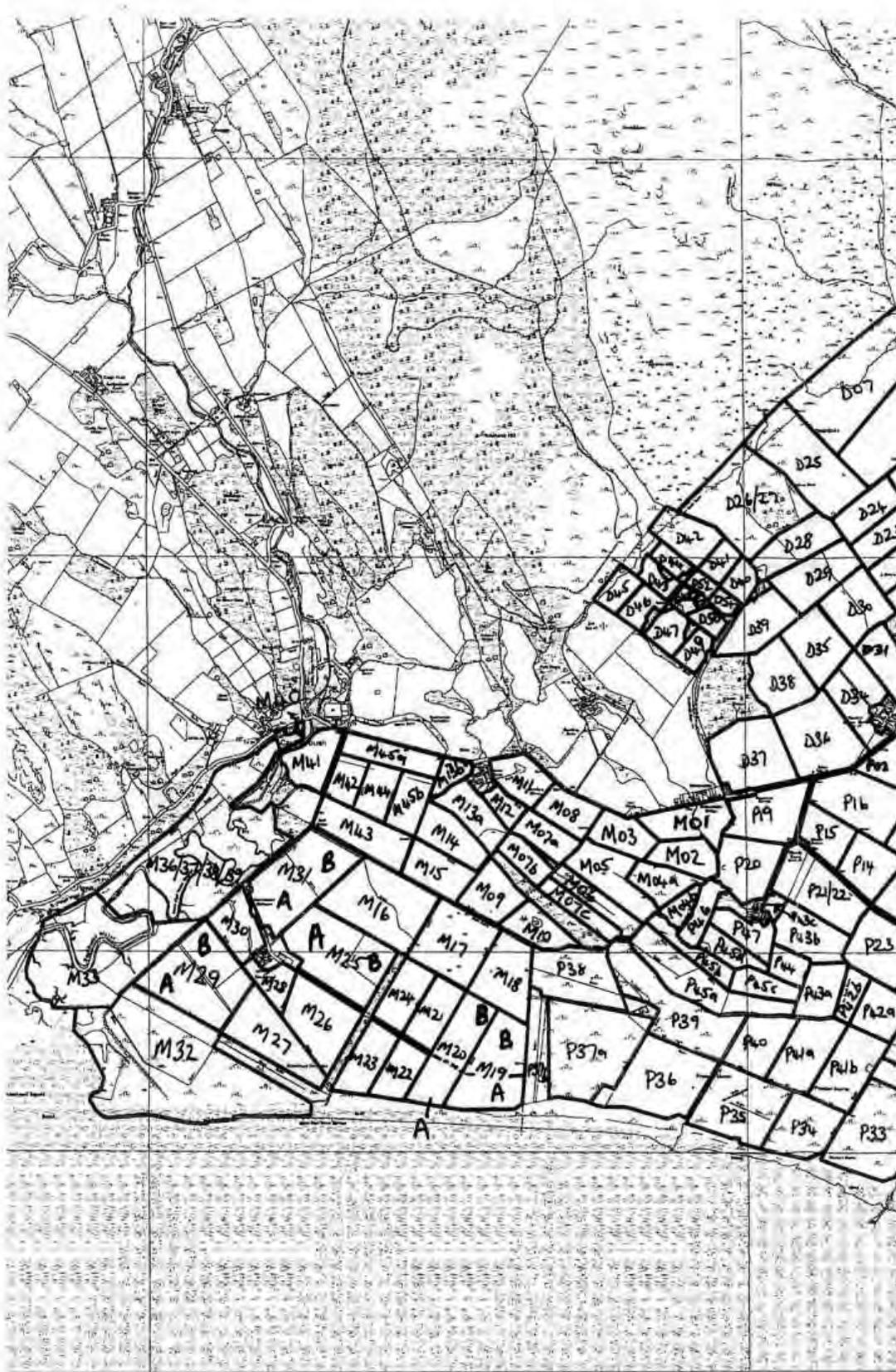


Figure 9. Field codes for the West Preston/Cowcourse/Mersehead area of the Goose Management Scheme.



Figure 10. Field codes for the Boreland of Colvend/Glenstocken area of the Goose Management Scheme.

3 Results

3.1 Barnacle Goose counts within the Management Scheme area

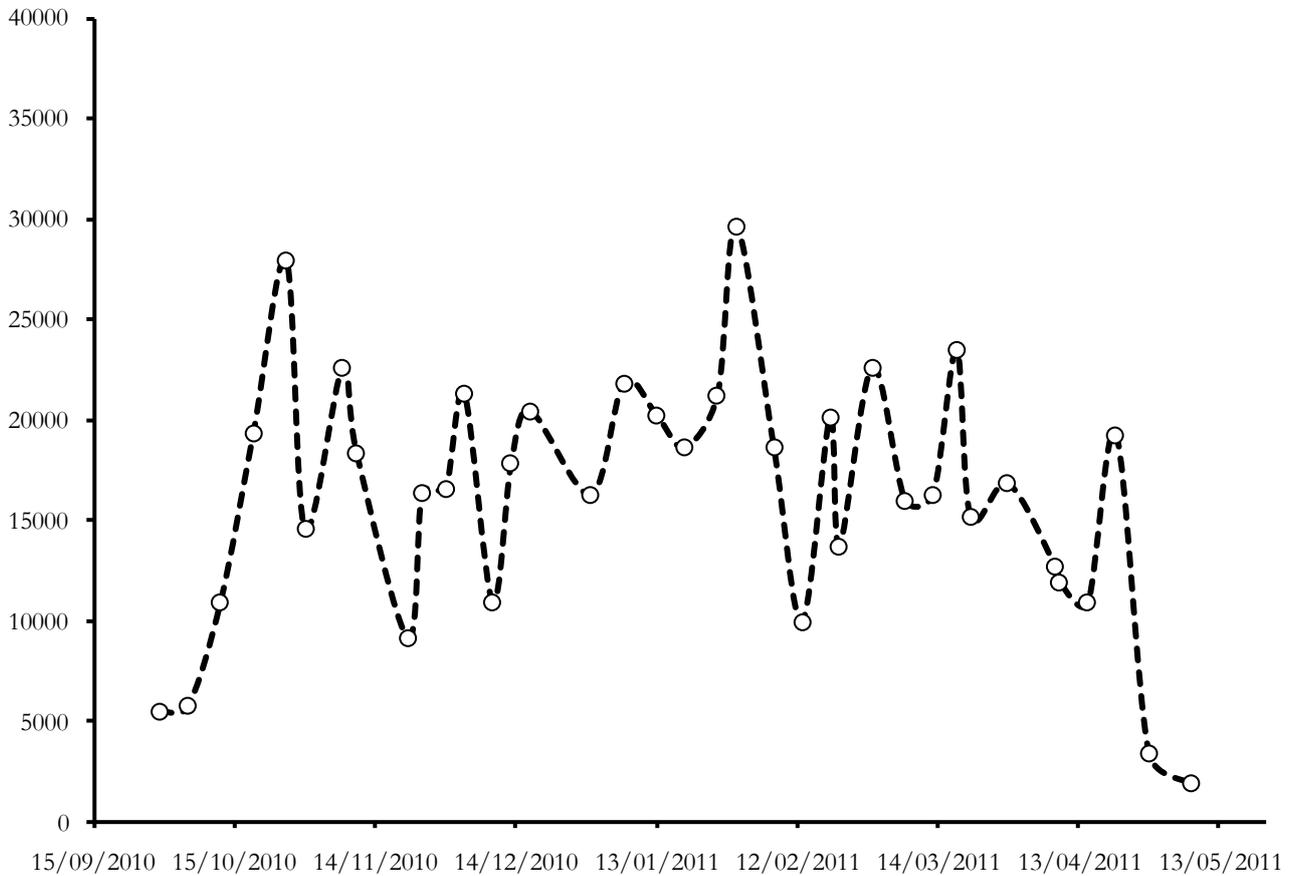


Figure 11. Svalbard Barnacle Goose route count totals within the Management Scheme area.

Some totals are greater than those recorded during coordinated census counts of the Solway population because double counting of flocks that move between fields often occurs over the course of a route count; the methodology does not seek to remove this bias as the aim is to record the numbers of geese using individual fields. Fluctuations in goose numbers within the Scheme area also occur due to the effect of high tides pushing geese off low lying saltmarsh areas on the south side of the Solway and due to geese dispersing mid-winter after peak arrival to foraging areas outside the Scheme.

The mean number of geese recorded during the counts was 16,149 (21,571 in 2009-2010) ranging from a minimum of 3,396 at the end of the season on 28 April 2011 (3,710 on 26 April 2010) - at a time when many of the geese have departed to Norway or are staging on Rockcliffe Marsh in Cumbria prior to departure - up to a maximum of 29,649 (33,380 in 2009-2010). In an exceptional movement, nearly 2,000 geese returned to Caerlaverock from Rockcliffe Marsh on 7 May 2011 after a thunderstorm in the evening, the birds remaining for a few days before commencing their migration or moving back to Rockcliffe. Overall within the Scheme area there tends to be a decline in goose use as food resources within the area are depleted by the end of January. In winter 2010-2011 there was lower goose use of the Scheme areas from mid-November until mid-December due to the prolonged freezing conditions with the geese mainly occurring in fringe areas and different fields to usual.

Flock sizes and field distribution of the Barnacle Geese within the Management Scheme area are given in Table 2.

Table 2. Svalbard Barnacle Goose flock sizes recorded during the Management Scheme route counts.

	29/09/10	05/10/10	12/10/10	19/10/10	26/10/10	30/10/10	07/11/10	10/11/10	21/11/10	24/11/10	29/11/10	03/12/10	09/12/10	13/12/10	17/12/10	30/12/10	06/01/11	13/01/11	19/01/11
A01/03										2		820					15		
A04/05																			
A15																			
A16/17																			
A18															360				
A20b																			
A21															80				
C01				2570											460			192	80
C02																		590	
C03																			
C04/05				1440			780	1220										1960	
C06																			810
C07					80														130
C08							20		30	640							180	70	280
C09																			
C10/11			600	2630				10	1550							610	330	1150	
C12					40			3100											
C13	4800		2110	380			2600	1430											
C14			200				3630												
C15				30			210		770					3440					
C16							40		30	10									
C17									20	10							65		13
C19a						40	1120		50					640					23
C19b							1550	1630		10									
C19c								1630											
C20					50														220
C21/22																			
C23a																			
C23b																			
C24																			
C25/26								1300		460									
C27										2910									2550
C29										80									
C30			10	510			1360	520	1000						1590				
C31																			
C34																	1360	12	
C40																			
C41																	210		
C51/S71		860	155		5000	4000		570	90				26		30	2000	690	2640	280
C52		500		180	4500	590								210	240	250	1060	1250	400
Corbelly/Overton											2000	2920	4400				6		
Drumburn Merse												850						160	
D12														1000					
D38																	1200		
G05			32																
H01/02/36/37												220							
H28/29				700															

P30												1300							
P31																		210	
P32																		470	
P33																			620
P34																	6		
P35			50															580	70
P36																			
P37a											40								60
P39					1200	38										200			
P40		860						450										580	
P41a			2700	2400				450											
P41b			2700					450											370
P42a							1450		1830	260									283
P42b																			190
P43a				670				1700				580							
P43b								2170				220							
P44				230															
P45a							880		520	350									1440
P45b																			
P45c									650										
P45d																			
P46										212									
P47				710					200										
PR04																			45
PR08																			820
PR24																			90
PR33																			
PR38																			
PR52																			
PR56																			
PR58																			
PR59																			
PR68a												3400	3420						
PR68b													290	1680					
PR70																			
PR71																			
PR72													1600						
PR74													1600						
R08												1180							
R10								850											
R13										400									1230
R14										320									
R21													600					800	
R24												3130							
R26												200							
S02/09/10/11																			680
S06a																			2610
S07																			860
S14																			1960
S15																			170

Svalbard barnacle goose distribution around the Solway Firth 2008-200910-2011

S18b/24									614										
S23																		2480	
S25		520				610													
S26			92					250											
S30/31/32/34										5									
S39								1530			2380								
S40/42																			
S45/47																			
S48																			
S50a																			
S51																			
S53																			
S54/55		60																	
S56/57																			
S58																			
S59																			
S60/64																			
S65																		380	
S66					120					140					310		1120		
S67					1030												930		
S67a										30									2550
S68		130			2800											1170			
S69					400	350										1760			
S70					250	1500									2000	680	50		
SC04																			
SC05																			
SC06		10			1860														520
SC07																			
SC16		480						200											
SC17		110																	
SC18																			
SC20																			
SC25										1120			730		140				
SC26															2810				
SC27															1500				
SC28/29												2060			30				
SC30															2490				
SC32/PR05																			
SC36																			
SC45		1000	760		4600	540					2800								1370
W05											540								
W07																			
W52											720								
Total	5470	5700	10901	19310	27920	14523	22590	18340	9111	16332	16547	21265	10926	17819	20446	16253	21826	20217	18585

Table 2. Continued.

26/01/11	30/01/11	07/02/11	13/02/11	19/02/11	21/02/11	28/02/11	07/03/11	13/03/11	18/03/11	21/03/11	29/03/11	08/04/11	09/04/11	15/04/11	21/04/11	28/04/11	07/05/11	Total	
																		837	A01/03
				4														4	A04/05
					90													90	A15
											8							8	A16/17
																		360	A18
				220														220	A20b
																		80	A21
	210			610	220	140	35			12								4529	C01
		110		1900					1180	180								3960	C02
	45	60				8		100		170								383	C03
210	1460			3380	290	1770		1470	820	105		130						15035	C04/05
											35							845	C06
			320						310									840	C07
	2650			80	310	85	72	1130			620		370		107	1		6645	C08
		170	180		30		1490											1870	C09
510		410	310	980	920	3100		150		870	460		1340		4740			20670	C10/11
		40	90						260						190			3720	C12
		210		380					1790			390	530		2310			16930	C13
									130				550					4510	C14
1950	1820			490	370	30				2100		30	270		87			11597	C15
260						20			6	530	31							927	C16
20	1600			60	100		17											1905	C17
					130	30							210					2243	C19a
					140	170												3500	C19b
					750			1280				330						3990	C19c
		12	760															1042	C20
1030	1820	40	170										540					3600	C21/22
1320			220					470	1540									3550	C23a
	1250																	1250	C23b
25	1250	410																1685	C24
																		1760	C25/26
		690					540					660						7350	C27
		70	300		1210				720	680								3060	C29
45	950				210	1960	850		1870	730	700		220		1930			14455	C30
			1310		580					1710								3600	C31
			20		390													1782	C34
		42				110		430										582	C40
		60																270	C41
150	470	190		1600							535	720	220	1150				21376	C51/S71
620	150	90	200	410	2400	210						210	150	530		165	1880	16195	C52
																		9326	Corbelly/Overton
			580					270										1860	Drumburn Merse
																		1000	D12
																		1200	D38
																		32	G05
																		220	H01/02/36/37
																		700	H28/29
																		80	H35

Svalbard barnacle goose distribution around the Solway Firth 2008-200910-2011

																		4520	JP02
																		3500	JP16
	1																	396	JP48
	40																	40	JP49
																		563	JP51
								150		1810	20							4430	KM01
										600	270							3506	KM02
									2460	800	610	190						6965	KM03
1180			280			2400						50			140			7727	KM04
						9									95			614	KM05
95						150				1130	200				2			2552	KM06
							970	25										995	KM08
							20											20	KM09
			370			290				80		60						2955	KM10
	2920	110				640									220			4970	KM11
																		6	KM13
																		30	KM17
										30								1950	KM18
																		60	KM20
																		180	KM24
																		820	KM31
																		190	KM35
																		210	KM46
																		270	KM47
										290								290	KM49
																		150	KM50
			170															930	L09
																		90	L12
							28											28	L16
																		2350	L25/28
2210																		2210	L30
970																		970	L36
1380			160															1540	L37
470																		515	L38
							70											70	L43
																		85	LB36
	1670		50															2822	M01
										680					210			890	M05
																		310	M09
																		25	M12
							370											845	M13a
																		60	M15
400							810											2005	M15
150										190			24	80				1994	M16
																		280	M17
																		1850	M18
																		3800	M19
							120											450	M20
										90				50				350	M20
7										200					55			110	M21
																		60	M22
																		40	M23
																		150	M23

11		72				10						50				2443	M24	
	730	2		10		280	100	770	440		154	100	200		1500		6426	M25
		48	270				400				386			250			3522	M26
		124									630		20		70		3339	M27
			170														360	M28
				680													4088	M29
											1						183	M30
180		190	210	130							130						3470	M31
											85			80			2105	M32
	430		420	580							44	250	750				6234	M33
																	1000	M36/37/38/39
	70																320	M41
		90															90	M42
600																	700	M43
		32															32	M44
																	1290	M45a
																	280	M45b
									8								8	N10
								3									3	N16
																	260	N17
																	62	N23
																	40	N24
																	1440	N25
																	80	N26
										25							203	N28
																	40	N30
	2380																2380	N32
																	860	N39
																	90	N40
	840																1660	N43
	280																540	N44
																	1750	N46
																	1390	N47
			50														760	N51
																	785	N52
		70															3050	N53
		130															130	N55
																	35	P06
500																	500	P07
			310														1440	P09/12
	1150																3300	P10
	1150										4250						7320	P11
		95															2655	P19
	7								3100		1830						6447	P20
1700											200						6300	P21/22
																	5830	P23
1500								1460									6179	P24
70		950	100														2910	P25
								70									70	P26
																	1300	P30

		390																2870	S23
				380	380									390				2280	S25
		810	610											2000				3762	S26
																		5	S30/31/32/34
85																		3995	S39
											180							180	S40/42
						260							780					1040	S45/47
											1370							1370	S48
						25												25	S50a
		1160				550				570				420				2700	S51
		1160	1060			990				170								3380	S53
		1540						270		80		1120						3070	S54/55
		210										850						1060	S56/57
						420												420	S58
		45																45	S59
						810												810	S60/64
												60						440	S65
		30																1720	S66
		30								20			270					2280	S67
																		2580	S67a
	10	30							2430	1510			300					8380	S68
			640		120									2030				5300	S69
			820	1600														6900	S70
					130													130	SC04
1010		30																1040	SC05
		990			1090								350		1850			6670	SC06
					1200													1200	SC07
																		680	SC16
																		110	SC17
														45				45	SC18
			120															120	SC20
																		1990	SC25
																		2810	SC26
		1760																3260	SC27
																		2090	SC28/29
		860																3350	SC30
				610											30			640	SC32/PR05
2550																		2550	SC36
		360			570	1740	140	860		120		940	400	250				16450	SC45
									1480									2020	W05
					560													560	W07
																		720	W52
21208	29649	18622	9940	20106	13710	22585	15974	16272	23454	15132	16799	12700	11890	10867	19234	3396	1880	597499	

3.2 Pink-footed Goose counts for the Management Scheme area

Pink-footed Goose counts are very variable as the extent to which geese remain in the area tends to be very weather and crop dependent. Typical peak times include the autumn as geese arrive back from Iceland into the UK and from February to April as birds from further south in the UK move north again. During the December Icelandic Grey Goose Count co-ordinated by WWT, record numbers of Pink-footed Geese were recorded on the Solway due to deep snow elsewhere further northeast in their range in Scotland.

Table 3. Pink-footed Goose flock sizes recorded during the Management Scheme route counts.

	29/09/10	05/10/10	12/10/10	19/10/10	26/10/10	30/10/10	07/11/10	10/11/10	21/11/10	24/11/10	29/11/10	03/12/10	09/12/10	13/12/10	17/12/10	30/12/10	06/01/11	13/01/11	19/01/11
A01/03										560		5460					220	50	
A04/05																			
A16/17																			
A18																			
A20b																			
A21															45				
A34																			
C04/05										75									
C10/11			1																
C13	2																		
C27																			30
C39																			
C40																			
C41																8	55		
C46											520								
C52																			
Corbelly/Overton												100							
Drumburn Merse												200							
D59																			
G05		35	1475			3													
H01/02/36/37												380							
H28/29				60															
H35												400							
JP02					30							100							
JP10/11																			3
JP17																			
JP18																	580		
JP21									72										850
JP44																150			
JP48													34			10	110		
JP49																			
JP51													400						
JP52																			
KM01																			
KM02																			

KM04																			
KM06																			
KM08																			
KM09																			
KM10											2280						750		
KM11																			
KM13										110									
KM17																			
KM18																			
KM20															150				
KM31										1250									
KM32																			
KM33																			
KM34																		95	
KM35																			
KM37	410																		
KM38																	160		
KM39	230																		
KM49																			
L01/02																			
L09																			
L12																		1100	
L16																			
L25/28																			200
L30																			
L36																	2		
L38																		70	
M16	250	400	120																
M17		280																	
N10																			
N16																			
N21																			
N37															204				
N39	510	470							450										860
N40																190			
P09/12																			
P11																			
P35			25									10							
P43b																			
PR16																			
PR36																			
PR38																			
PR45																			
PR51																			
PR52																			
PR56																			
PR58																			
PR59																			
PR68a																			1100
PR68b																			

Svalbard barnacle goose distribution around the Solway Firth 2008-200910-2011

PR69																				
PR70																				
PR72											500									
PR73																				
PR74																			800	
S25		710			1500															
S30/31/32/34									121											
S39						50														
S44/46																				
S45/47																				
S48																				
S50a																				
S51																				
S52																				
S53																				
S54/55																				
SC06																				
SC16											6	18								
SC22/23												15	107	70			90			
SC27											30									
SC28/29											110									
SC45																				90
W05																				
W40																	2000			
W51																				
W52											90									
Total	1402	1895	1621	60	1530	53	0	0	193	1085	1970	10676	467	311	265	2358	1217	3728	1170	

Table 3. Continued.

26/01/10	30/01/11	07/02/11	13/02/11	19/02/11	21/02/11	28/02/11	07/03/11	13/03/11	18/03/11	21/03/11	29/03/11	08/04/11	09/04/11	15/04/11	21/04/11	28/04/11	07/05/11	Total	
		70																6360	A01/03
				450														450	A04/05
											176							176	A16/17
				9						50								59	A18
				70														70	A20b
				15						70								130	A21
		13																13	A34
																		75	C04/05
																21		22	C10/11
																		2	C13
																		30	C27
				20														20	C39
						320		110										430	C40
	7	280																350	C41
																		520	C46
													65			200	60	65	C52
										520								620	Corbelly/Overton
				210														410	Drumburn Merse

Svalbard barnacle goose distribution around the Solway Firth 2008-200910-2011

																		2290	N39
																		190	N40
			160															160	P09/12
										1								11	P11
																		25	P35
								45										45	P43b
		3																3	PR16
								230										230	PR36
								280										280	PR38
								10										10	PR45
										80								80	PR51
								300										300	PR52
								30										30	PR56
											380		340					720	PR58
								340										340	PR59
930																		2030	PR68a
				60														60	PR68b
	130																	130	PR69
																480		480	PR70
																		500	PR72
							730											730	PR73
	2000																	2800	PR74
																		2210	S25
																		121	S30/31/32/34
																		50	S39
																10		10	S44/46
							250											250	S45/47
																60		60	S48
							55											55	S50a
										110								110	S51
		90																90	S52
		30								80								110	S53
								420		90								510	S54/55
																30		30	SC06
																		24	SC16
																		282	SC22/23
																		30	SC27
																		110	SC28/29
																		90	SC45
								210	230									440	W05
							1000											2000	W40
																		1000	W51
																		90	W52
930	3359	738	710	1974	970	3355	420	2760	1050	1800	1187	564	145	570	51	202	60	50846	Total

3.3 Greylag Goose counts for the Management Scheme area

Small numbers of Greylag Geese were recorded within the Scheme area, most records occurring on the ponds and fields at WWT Caerlaverock or nearby. Post-moult flocks build up in this area during the late summer, with numbers declining from a few hundred to less than ten over the course of the winter. Numbers were probably boosted this year in December by birds which may have been Icelandic in origin and perhaps displaced to the Solway along with the Pink-footed Geese due to the prolonged freezing conditions and deep snow further northeast in Scotland.

Table 4. Greylag Goose flock sizes recorded during the Management Scheme route counts.

	29/09/10	05/10/10	12/10/10	19/10/10	26/10/10	30/10/10	07/11/10	10/11/10	21/11/10	24/11/10	29/11/10	03/12/10	09/12/10	13/12/10	17/12/10	30/12/10	06/01/11	13/01/11	19/01/11	
A01/03												6								
C14					10															
C15					46															
C16															6					
C17													7	20	8	40	25			
C24																				
Drumburn Merse																	50			
G05		42	13																	
JP48													2							
M43																			4	
SC16													5							
SC22/23													92	128	160					
SC27												50								
SC28/29															70					
Total	0	42	13	0	56	0	0	0	0	0	0	56	106	128	256	8	90	29	0	

26/01/10	30/01/11	07/02/11	13/02/11	19/02/11	21/02/11	28/02/11	07/03/11	13/03/11	18/03/11	21/03/11	29/03/11	08/04/11	09/04/11	15/04/11	21/04/11	28/04/11	07/05/11	Total	
																		6	A01/03
																		10	C14
																		46	C15
																		6	C16
	1																	101	C17
30																		30	C24
																		50	Drumburn Merse
																		55	G05
	3																	5	JP48
																		4	M43
																		5	SC16
																		380	SC22/23
																		50	SC27
											37							107	SC28/29
30	4	0	0	0	0	0	0	0	0	0	37	0	0	0	0	0	0	855	Total

3.4 Canada Goose counts for the Management Scheme area

Small numbers of Canada Geese were recorded within the Scheme area, most records occurring on the ponds and fields at WWT Caerlaverock or nearby. As with the Greylag Geese with which they often associate in mixed flocks, post-moult flocks build up in this area during the late summer, with numbers declining from a few hundred to less than ten over the course of the winter.

Table 5. Canada Goose flock sizes recorded during the Management Scheme route counts.

	29/09/10	05/10/10	12/10/10	19/10/10	26/10/10	30/10/10	07/11/10	10/11/10	21/11/10	24/11/10	29/11/10	03/12/10	09/12/10	13/12/10	17/12/10	30/12/10	06/01/11	13/01/11	19/01/11	
C08																				
C17										6			56		30	60	40	90		
Drumburn Merse																	30			
G05		40																		
KM15																				
M16																				
M17						10														
M25						48														
PR16																				
S54/55		70																		
SC26																				
Total	0	110	0	0	0	58	0	0	0	6	0	0	56	0	30	60	70	90		0

26/01/11	30/01/11	07/02/11	13/02/11	19/02/11	21/02/11	28/02/11	07/03/11	13/03/11	18/03/11	21/03/11	29/03/11	08/04/11	09/04/11	15/04/11	21/04/11	28/04/11	07/05/11	Total	
	75																	75	C08
	20	40																342	C17
																		30	Drumburn Merse
																		40	G05
							1											1	KM15
						2		6										8	M16
																		10	M17
																		48	M25
		15																15	PR16
																		70	S54/55
							1											1	SC26
0	95	55	0	0	0	2	2	6	0	0	0	0	0	0	0	0	0	640	Total

3.5 Whooper Swan counts for the Management Scheme area

The Scheme area and fields at its fringe especially around WWT Caerlaverock, Kelton and Thwaite generally hold up to 500 whooper swans throughout the winter, with numbers increasing gradually as the swans arrive from Iceland up to mid-November and decreasing rapidly at the end of March as birds head north on migration. Some flocks occurring on fields outside the Scheme area are noted as comments on the Excel database but do not contribute to the totals given in Table 6.

Table 6. Whooper Swan flock sizes recorded during the Management Scheme route counts.

	29/09/10	05/10/10	12/10/10	19/10/10	26/10/10	30/10/10	07/11/10	10/11/10	21/11/10	24/11/10	29/11/10	03/12/10	09/12/10	13/12/10	17/12/10	30/12/10	06/01/11	13/01/11	19/01/11
A01/03										75							20	20	
C08			17	19	50				1		50			1		22			
C09																	7		
C10/11																5		10	
C16					5														
C17			46	5		50	119	105	93	40	50	98	223	152	160	280	260	205	28
C19a																			
C24																			238
C29																10			
C30																			
C33																			
C41														2					
KM01																			
KM06																			
KM11																			
KM12						18				98									
KM13											68								
KM15														24					
KM22															130				
KM23								18				80							
KM33														16					
KM50					15	2													
L13																			6
L23																			
L36																		4	
L43																			
PR06						5													
PR09																			
PR16																			
PR74																			
PR76																		15	
S39						11	43			4									
SC16																			
SC22/23													8	156					
SC26												2							
SC27									63	83	50	175			26				
SC28/29												10		80					
SC30																			
SC34					50														
SC36																			
SC37						60													

Svalbard barnacle goose distribution around the Solway Firth 2008-200910-2011

SC41																			
SC44																			
Total	0	0	63	24	120	146	162	123	157	300	218	365	231	351	396	317	306	241	266

26/01/11	30/01/11	07/02/11	13/02/11	19/02/11	21/02/11	28/02/11	07/03/11	13/03/11	18/03/11	21/03/11	29/03/11	08/04/11	09/04/11	15/04/11	21/04/11	28/04/11	07/05/11	Total	
																		115	A01/03
	250	5		210			20	120	10		4	19	4				1	802	C08
																		7	C09
																		15	C10/11
																		5	C16
200	30	20	212	30		110	207	60	125	155	3		1	2	1	1		3071	C17
					228													228	C19a
20		180																438	C24
																		10	C29
						23						10						33	C30
			12	25														37	C33
					92													2	C41
		8		50				150	16			5						92	KM01
																		229	KM06
							109											109	KM11
																		116	KM12
																		68	KM13
																		24	KM15
																		130	KM22
																		98	KM23
																		16	KM33
										130								147	KM50
					30	35												71	L13
			7															7	L23
																		4	L36
			60															60	L43
																		5	PR06
4																		4	PR09
25	18	6		30														79	PR16
	15							14										29	PR74
																		15	PR76
																		58	S39
	1																	1	SC16
																		164	SC22/23
							149			61								212	SC26
										34	22	68						521	SC27
								130		50	157	146	165		18			756	SC28/29
										48								48	SC30
																		50	SC34
														99				99	SC36
																		60	SC37
				45		60												105	SC41
										37								37	SC44
249	314	219	291	390	350	228	485	474	151	515	186	248	170	101	19	1	1	8177	Total

3.6 Mute Swan counts for the Management Scheme area

Mute Swans mainly occur on the ponds at WWT Caerlaverock with scattered pairs elsewhere.

Table 7. Mute Swan flock sizes recorded during the Management Scheme route counts.

	29/09/10	05/10/10	12/10/10	19/10/10	26/10/10	30/10/10	07/11/10	10/11/10	21/11/10	24/11/10	29/11/10	03/12/10	09/12/10	13/12/10	17/12/10	30/12/10	06/01/11	13/01/11	19/01/11	
C08				26	38											3				
C16					3															
C17	14	25	29	38	8	40	42	38	45	26	50	40	48	42	38	65	52	50	60	
C52		2																		
L13																			2	
M17						2														
M25						2														
P45c																				
PR74																				
Total	14	27	29	64	49	44	42	38	45	26	50	40	48	42	38	68	52	52	60	

26/01/11	30/01/11	07/02/11	13/02/11	19/02/11	21/02/11	28/02/11	07/03/11	13/03/11	18/03/11	21/03/11	29/03/11	08/04/11	09/04/11	15/04/11	21/04/11	28/04/11	07/05/11	Total	
	5			40				10				4	2		2	2		132	C08
							2											5	C16
60	55	70	65	30	60	55	37	20	25	30	24	19	15	29	20	22	17	1403	C17
																		2	C52
																		2	L13
																		2	M17
																		2	M25
									2									2	P45c
														2				2	PR74
60	60	70	65	70	60	55	39	30	27	30	24	23	17	31	22	24	17	1552	Total

3.7 Deliberate disturbance to geese in the Management Scheme area

Records of disturbance activities specifically directed towards the geese were as follows within the Management Scheme area:

- From mid-January 2011 through to April 2011 gas guns were variously deployed in four scaring zone fields at Netherwood Mains (KM10, KM13 , KM17 & KM18) to deter Pink-footed Geese and Barnacle Geese; when coupled with spinning face scarers as in KM13 and KM17 these seemed more effective;
- During January and February 2011 a gas gun was noted at West Preston (P31) in a scaring zone field, this was deployed to scare Barnacle Geese from a crop of kale that the birds had started exploiting rather exceptionally during the freezing conditions and due to snow cover of their normal feeding pastures;
- Two barrels were noted in the buffer zone Lands field (S39) from March to April;

- Gas guns noted elsewhere such as at Preistside (PR09 & PR16) plus flags and scarecrows elsewhere were thought not necessarily to be directed towards goose scaring;
- At Boreland of Colvend a large wind turbine was installed and operational on the hilltop field just east of the farmhouse (R25) by 19 February 2011; it will be interesting to see what, if any, effect this has on goose use of the surrounding scaring zone fields in this area at the fringe of the wintering goose distribution.

3.8 Count section dates and times of coverage

Table 8. Survey dates and times for the Management Scheme route count sections.

	Wednesday	Tuesday	Tuesday	Tuesday	Tuesday	Saturday	Sunday	Wednesday	Sunday	Wednesday	Monday	Friday	Thursday	Monday	Friday	Thursday	Thursday	Thursday
	29/09/10	05/10/10	12/10/10	19/10/10	26/10/10	30/10/10	07/11/10	10/11/10	21/11/10	24/11/10	29/11/10	03/12/10	09/12/10	13/12/10	17/12/10	30/12/10	06/01/11	13/01/11
Thwaite	11:00	11:00	12:30	11:30	15:30	08:30	13:30	16:30	14:30	12:00	16:30	14:00	13:30	14:30	14:30	n.c.	15:00	16:00
Nith	09:00	09:00	10:30	09:00	17:00	10:30	11:30	15:00	11:30	10:00	14:30	09:00	12:00	12:30	09:30	14:00	08:30	14:00
Southernness	10:00	10:00	10:00	17:00	11:00	13:30	10:00	10:00	10:30	10:00	09:30	12:00	10:30	11:00	11:00	14:30	11:30	09:00
Colvend	n.c.	10:00	10:00	10:00	10:00	15:30	08:30	11:30	09:15	11:00	13:00	10:30	08:30	09:30	10:30	n.c.	14:00	11:00

Wednesday	Wednesday	Sunday	Monday	Sunday	Saturday	Monday	Monday	Monday	Sunday	Friday	Monday	Tuesday	Friday	Saturday	Friday	Thursday	Thursday	Saturday
19/01/11	26/01/11	30/01/11	07/02/11	13/02/11	19/02/11	21/02/11	28/02/11	07/03/11	13/03/11	18/03/11	21/03/11	29/03/11	08/04/11	09/04/11	15/04/11	21/04/11	28/04/11	07/05/11
09:00	12:30	16:30	11:30	13:45	17:00	10:00	09:30	09:00	17:30	14:00	10:00	13:00	10:30	12:00	11:00	13:00	10:30	09:00
08:30	09:00	15:00	09:30	11:15	15:30	08:00	08:30	10:00	18:30	08:00	08:30	11:00	08:00	10:00	09:00	11:00	09:00	08:00
11:30	11:30	11:00	11:15	10:00	15:30	n.c.	17:30	14:00	09:00	09:30	10:30	09:30	08:30	15:00	12:00	14:00	11:00	10:00
10:30	10:00	09:30	10:00	09:00	17:30	10:00	16:30	10:00	11:45	11:00	10:00	09:00	10:00	n.c.	n.c.	n.c.	n.c.	n.c.

In summary, these dates represent coverage on seven Mondays, five Tuesdays, five Wednesdays, five Thursdays, five Fridays, four Saturdays and five Sundays, giving 36 counts in total.

On 30 December 2010, thick fog prevented counts in the Thwaite and Colvend areas, as it did with the Priestside area on 13 January 2011 when full coverage of the Colvend area was also hampered by a low cloud base and heavy rain. On 29 March 2011, fog prevented an early start to the count.

3.9 Farmer liaisons regarding geese

As counts were conducted within the Scheme area, any significant conversations about goose numbers with the farmers were noted. Sometimes these were on days on which a count was not being conducted. All conversations were about goose numbers and whether or not the counts being conducted gave a good representation of what the farmer's impression of field use was like; generally the farmers felt that the counts gave a good representation of what was happening on their fields and were mainly happy with them, with a few fields due to the nature of the count sampling methodology proving more contentious. On 13 March 2011 it was interesting to note that Stephen Roan at Boreland of Colvend (where the wind turbine had been installed in February) felt as though geese had not used his fields for a month or so. Farmers engaging in conversations about geese are noted in Table 9.

Table 9. Records of conversations with farmers regarding goose activity in the Scheme area.

29/09/10					
05/10/10					
12/10/10					
19/10/10	Jack Graham				
26/10/10					
30/10/10					
07/11/10	Steven Murray's wife	Stuart Brown			
10/11/10					
21/11/10					
29/11/10					
03/12/10					
09/12/10					
13/12/10					
30/12/10					
06/01/11					
13/01/11					
19/01/11					
26/01/11					
30/01/11	Steven Murray	Stuart Brown	Jack Graham	Alastair Martin	Alastair Wylie
07/02/11					
13/02/11	Alastair Wylie	Jim Kirkland			
19/02/11					
21/02/11					
28/02/11					
07/03/11					
13/03/11	Steven Roan				
18/03/11					
21/03/11	Jim Kirkland				
29/03/11					
08/04/11					
09/04/11	Jim Kirkland				
15/04/11					
21/04/11					
28/04/11					
07/05/11					

3.10 Coordinated Svalbard Barnacle Goose population count totals

Table 10. Coordinated Svalbard Barnacle Goose population count totals for the Solway 2010-2011.

Count section	29/09/2010	05/10/2010	12/10/2010	19/10/2010	26/10/2010	10/11/2010	24/11/2010	03/12/2010	17/12/2010	19/01/2011	26/01/2011	07/02/2011	21/02/2011
Annan to Gretna	0	0	0	0	0	0	0	0	0	0	0	0	0
Ruthwell to Cummertrees	0	0	0	0	0	0	1120	7060	6970	90	550	2730	0
Longbridgemuir	0	0	0	0	0	0	0	0	0	0	0	0	0
Caerlaverock	3250	2400	3840	13550	14870	10840	6760	820	3060	11163	7705	7359	12130
Kirkconnell & Ward Law	0	520	124	700	150	0	770	3725	5660	2649	1275	2730	1690
Mersehead to Airds Pt	670	2030	6850	9850	12850	6650	7280	9980	2806	4963	5908	4853	6830
Caulkerbush to Rascarrel	0	0	0	0	515	1470	1330	600	5170	1540	1000	900	700
Dundrennan to Wigtown	0	0	0	0	0	0	125	n.c.	0	n.c.	n.c.	80	420
Rockcliffe Marsh	800	1000	1900	11450	7735	10000	6250	n.c.	2160	8090	7000	n.c.	4090
Burgh Marsh	0	0	0	0	0	0	2000	n.c.	250	400	1500	920	250
Bowness to Grune	0	0	9	90	32	2840	3120	n.c.	4400	3500	3789	1550	3525
Total	4720	5950	12723	35640	36152	31800	28755	22185	30476	32395	28727	21122	29635
Notes				1	2			3				4	5

07/03/2011	21/03/2011	08/04/2011	15/04/2011	21/04/2011	28/04/2011	04/05/2011	06/05/2011	08/05/2011	09/05/2011	11/05/2011	21/05/2011	Count section
0	0	0	0	0	0	0	0	0	0	0	0	Annan to Gretna
1960	350	0	395	0	0	0	0	0	0	0	0	Ruthwell to Cummertrees
0	0	0	0	0	0	0	0	0	0	0	0	Longbridgemuir
3144	10457	6990	5960	11214	166	0	0	1880	1265	223	0	Caerlaverock
2070	1500	1216	532	0	0	0	0	0	0	0	0	Kirkconnell & Ward Law
8800	2825	4494	3980	8020	3230	36	0	0	0	0	0	Mersehead to Airds Pt
40	0	0	0	0	0	0	0	0	0	0	0	Caulkerbush to Rascarrel
488	1230	650	n.c.	n.c.	n.c.	0	0	0	0	0	0	Dundrennan to Wigtown
8170	3020	9610	11380	10740	12500	17000	12000	5000	4000	6500	44	Rockcliffe Marsh
300	0	150	0	1700	800	0	0	0	0	0	0	Burgh Marsh
4150	1510	2960	5030	1100	70	220	0	0	0	0	0	Bowness to Grune
29122	20892	26070	27277	32774	16766	17256	12000	6880	5265	6723	44	Total
				6					7			Notes

Notes: ¹ Mersehead count is the mean of the two counts for dates either side; ² Not a totally co-ordinated count due to very poor weather in some sections causing delay with some large flocks counted under poor visibility conditions so total should be treated with caution; ³ No count in some sections due to thick snow and ice; ⁴ Strong wind and rain in some sections, Rockcliffe Marsh too flooded for safe access; ⁵ Visibility poor in Wigtown area so Baldoon not surveyed; Mersehead count was mean of the two counts for dates either side; ⁶ Bad heat haze made counting difficult in Bowness to Grune section; ⁷ Rockcliffe count was a quick estimate from remote position.

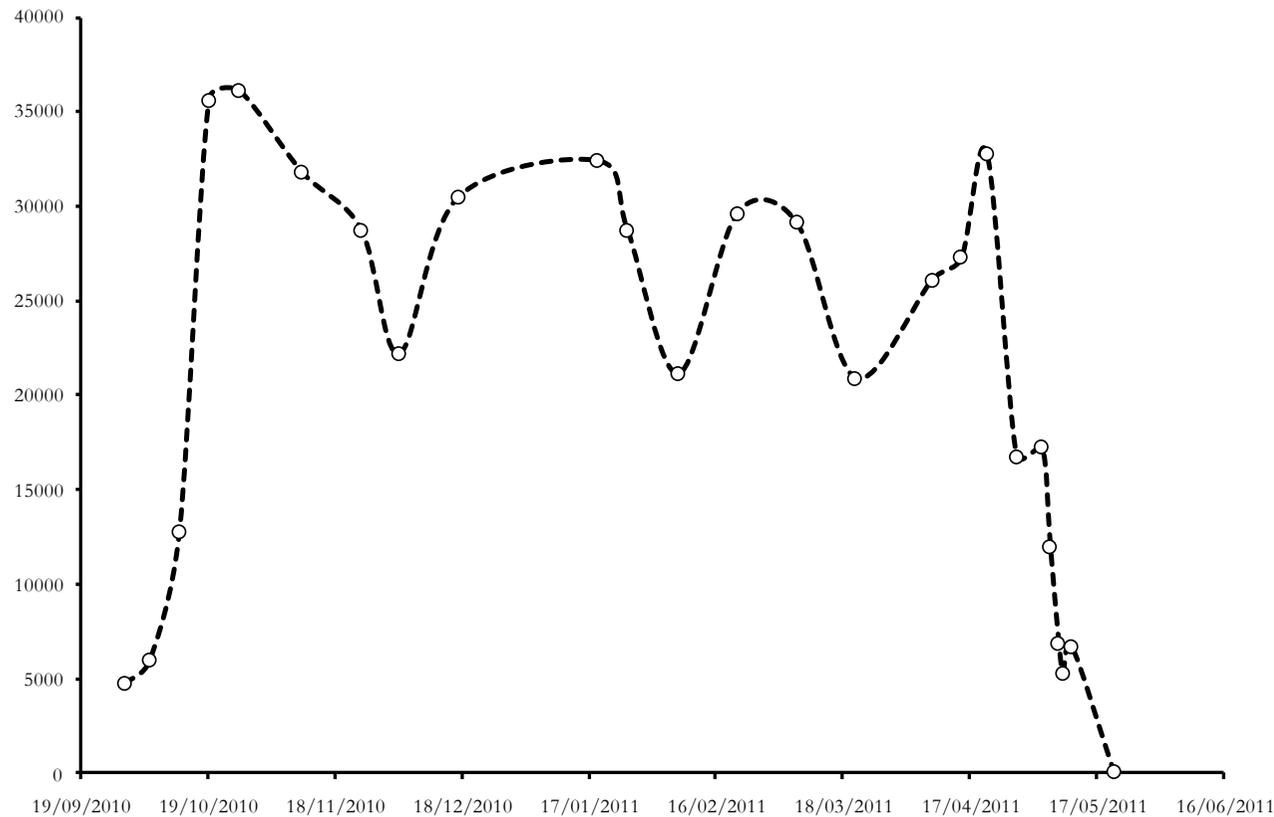


Figure 12. The total population of Svalbard Barnacle Geese recorded on the Inner Solway from September 2010 to May 2011.

Total population counts of Svalbard Barnacle Geese rose rapidly on the Inner Solway from 4,720 on 29 September 2010 to 35,640 on 19 October 2010 (Table 10; Figure 12). The numbers recorded then fluctuated as in previous years mainly in relation to count visibility conditions and goose dispersal. Due to this count variation, with possible inaccuracies and increased chances of double-counting for the reasons outlined in the 'Notes' above, an adopted count total for the population is usually derived by averaging those counts within 10% of the maximum recorded during the winter. In 2010-2011 the counts of 35,640 on 19 October and 36,152 (the maximum count recorded) on 26 October, fulfil this criterion and are thus averaged to produce **an adopted population total of 35,900 Barnacle Geese** (rounded up to the nearest 100; compared to 32,900 in 2009-2010).

3.11 Brood size and juvenile productivity of the Svalbard Barnacle Goose

Table 11. Brood size and juvenile productivity for Svalbard Barnacle Geese on the Solway 2009-2010.

Date	Flock Size	Sample Size	Total Juvs	Field	Crop	Brood of 1	Brood of 2	Brood of 3	Brood of 4	Brood of 5	Brood of 6	Single Juvs	% juvs	Obs
28/09/2010	385	385	58	O5	pasture								15.1	LRG
07/10/2010	1480	1135	68	OM1	merse	2	4	4	3	2			6.0	LRG
07/10/2010	2350	855	48	O7	pasture	3	11	5	4				5.6	LRG
25/10/2010	2860	1500	144	O8	pasture	5	7	6	2				9.6	LRG
25/10/2010	4600	810	70	A8	pasture								8.6	LRG
25/10/2010	380	310	30	O4	pasture	1	2	2	1	1			9.7	LRG
30/10/2010	1450	405	30	V6	pasture								7.4	LRG
01/11/2010	910	415	42	A8	pasture								10.1	LRG
24/11/2010	1110	555	67	E1	pasture								12.1	LRG
29/11/2010	1360	260	47	T12	pasture								18.1	LRG
29/11/2010	3130	469	101	KF44	pasture								21.5	LRG
03/12/2010	820	718	112	N1b	pasture								15.6	LRG
07/01/2011	280	275	55	X118	pasture								20.0	LRG
Total		8092	872											
Overall juv%			10.8			Brood size totals:								
						11	24	17	10	3	0	Total broods	65	
						Number of juveniles per brood size category:								
						11	48	51	40	15	0	Max %juvs	21.5	
												Total juvs	165	
												Mean brood	2.54	

The juvenile productivity of the Svalbard Barnacle Goose observed in flocks sampled on the Inner Solway from September 2010 to January 2011 from Eastpark in the east to Colvend in the west ranged from 5.6% to 21.5% (1.8% to 11.8% in 2009-2010) with a mean of 10.8% young for n = 13 flocks with 8,092 geese sampled (5.1%; n = 18 flocks; 14,423 geese sampled in 2009-2010). Across the same area, the total number of broods sampled was 65, with a mean family size of 2.5 young (1.8 young, n = 99 in 2009-2010) being recorded per family (range 1-5 young; range 1-3 young in 2009-2010).

3.12 Leucistic Barnacle Geese

A minimum of six leucistic Barnacle Geese was inferred from the fact that three white birds were recorded in separate flocks in the Rockcliffe area on 19 October 2010 at the same time as a single leucistic bird at Caerlaverock. The three birds at Rockcliffe may have included a Ross's Goose which was seen in later surveys and did not include the family group containing three leucistic birds (plus a normal parent and a normal juvenile) often seen later in the season as a tight unit in the Newton Marsh area.

3.13 Other geese

From 21 September 2010 throughout the winter, a Ross's Goose was often noted on the WWT Caerlaverock reserve, at Thwaite or in the Rockcliffe area. Other geese of note recorded during the counts included a juvenile Light-bellied Brent Goose seen at Eastpark in October 2010. A single small Canada Goose of the *hutchinsii* type was reported from Kirkconnell Merse in March 2011.

3.14 Acknowledgements

Thanks go to Mike Carrier and Bob Jones for conducting census counts in the Rockcliffe/Burgh Marsh area, Dave Blackledge for counts covering the Bowness to Grune route, Marian & Dave Rochester for covering the Borgue to Wigtown route, David & Hilary Hawker for covering Kirkcudbright to Rascarrel, Peter Williams for covering Rascarrel to Sandyhills and Dave Fairlamb for covering the Southwick area to Drumburn. Counts in the Caerlaverock area were also made by Mike Youdale and Brian Morrell.