

**The breeding success of Dark-bellied
Brent Geese *Branta bernicla bernicla*
in 2006, as assessed in the UK**

Wildfowl & Wetlands Trust Report

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Goose & Swan Monitoring

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Summary

A total of 86,581 Dark Bellied Brent Geese *Branta bernicla bernicla* was aged at 23 estuaries and coastal areas in the UK between October 2006 and April 2007. The overall proportion of juvenile birds present was 2.07%, varying only slightly throughout the winter between 2.51% in October and 1.92% in March. Of the 434 broods recorded, the mean brood size per successful pair was 1.62 (± 0.04 s.e.). Following the high breeding success in 2005 (28.4%), 2006 was, as expected, a poor breeding season – the proportion of young was 26.3% lower than in 2005 and the lowest since 2000 (0.6%).

1 Introduction

Great Britain has long been a major wintering area for Dark-bellied Brent Geese *Branta bernicla bernicla*. The UK Government has a special responsibility to safeguard this population under various international directives, agreements and conventions (Stroud *et al.* 1990): it is listed on category B2b of the African-Eurasian Waterbird Agreement, Appendix II/2 of the EU Birds Directive and Appendix III of the Bern Convention. As part of ongoing surveillance in the UK, information is gathered on abundance and distribution of Dark-bellied Brent Geese wintering in Britain (e.g. Banks *et al.* 2006) and breeding success (age ratios and brood size) (e.g. Hall 2006), through which estimates of annual recruitment can be made.

2 Methods

For the twenty-second consecutive winter, experienced voluntary observers assessed the breeding performance of Dark-bellied Brent Geese. Young Brent Geese (those in their first winter) have obvious white edging to the wing coverts, which the adults lack. Using a telescope in good light conditions, ageing is feasible at distances of up to 400 m. To determine brood size, distinct groups composed of two adults and one or more young that could be recognised by behaviour or spatial separation from other geese, were regarded as a family. Data were collected between 8 October 2006 and 15 April 2007. Observers were asked to note the location, date, time and habitat for all observations and the size of flocks, number aged, total number of young and brood sizes, although not all information was provided for all samples. Sample sizes were variable and determined by flock size and field conditions.

Counters were encouraged to check flocks whenever possible and no emphasis was placed on obtaining a coordinated census that avoided double-counting. Therefore, counts conducted at the same estuaries on different dates will have undoubtedly recorded some birds more than once. In a few cases, it was necessary to exclude data from the final calculations in an attempt to reduce the likelihood of any pseudo-replication, although this only occurred for sites where the likelihood of replicated counts was high.

3 Results

Brent Geese were aged at a total of 157 localities within 23 estuaries or coastal areas on the English east and south coasts from Northumberland to Devon (Figure 1, Table 1).

Of the 272 flocks assessed, 15.1% were in October, the majority were in November (35.7%) decreasing to 19.9% in December through to 3.7% in March. Only one flock was aged in April (0.4%). A total of 86,581 geese was aged; an increase of 11.1% on the number aged during 2005/06 and 92.1% of the previous five-year mean. The largest numbers were aged at the North Norfolk Coast (20,684), the Thames Estuary (13,143) and Chichester Harbour (10,627), and between 5,500 and 7,400 individuals were aged at The Wash, the Crouch Estuary and The Solent. Sample sizes at all other estuaries and coastal areas were smaller than 5,000 birds. The overall proportion of young birds was 2.07% and, of the 434 broods recorded, the mean brood size was 1.62 (± 0.04 s.e.) young per successful pair.

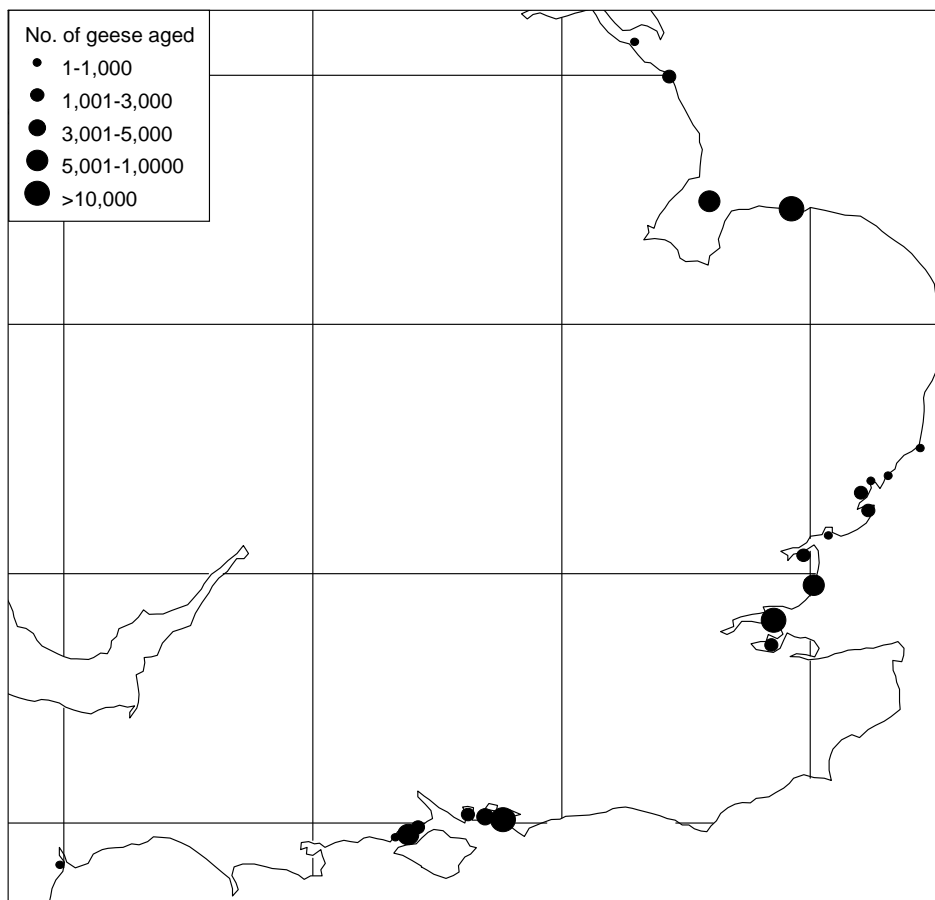


Figure 1. Sites at which Dark-bellied Brent Geese were aged during winter 2006/07. Geese were also aged at Lindisfarne, Northumberland (120), but this is not shown on the map.

Table 1. Numbers of Dark-bellied Brent Geese aged at UK estuaries and coastal areas in winter 2006/07 and the distribution of flocks across habitats.

Estuary	Sample flocks			No. sites	Total aged	% young	Mean brood size	s.e.	Percentage distribution across habitats of aged samples				
	First	Last	n						Water	Intertidal	Marsh	Grass	Cereal
Alde-Ore Estuary	11 Nov	04 Jan	3	3	179	[8.94]				2.8	7.3		89.9
Beaulieu Estuary	19 Nov	25 Feb	6	3	1,344	0.52	1.00	0.00	16.2	29.8		54.0	
Blackwater Estuary	18 Oct	02 Mar	9	8	2,771	2.63	1.75	0.27		35.3		63.6	1.1
Chichester Harbour	08 Oct	17 Feb	32	18	10,627	1.29	1.65	0.10	11.5	15.6		59.6	13.3
Colne Estuary	15 Nov	06 Dec	4	3	198	[2.53]	1.25	0.25	85.4	4.0	10.6		
Crouch Estuary	19 Oct	27 Feb	8	5	5,528	4.43				0.8		84.7	14.5
Deben Estuary	20 Oct	20 Oct	1	1	2	[0]					100		
Exe Estuary	12 Nov	14 Jan	6	4	915	2.62				46.6		53.4	
Hamford Water	02 Nov	25 Jan	15	9	2,020	2.43	1.86	0.27	2.8	39.4	21.0	35.4	1.4
Humber Estuary	10 Nov	10 Nov	1	1	79	[0]				100			
Langstone Harbour	01 Nov	07 Jan	18	8	4,662	1.35	1.24	0.06		5.0		95.0	
Lindisfame	02 Dec	02 Dec	2	1	120	[1.67]	2.00	-					
Lymington Estuary	10 Nov	24 Feb	4	2	633	1.11	1.50	0.50	22.3	5.8		71.9	
Medway Estuary	28 Oct	19 Feb	12	6	1,101	2.36	1.67	0.67	22.1		60.7	17.2	
North Lincs Coast	13 Oct	03 Mar	10	6	2,800	2.68	1.35	0.22		4.9	22.8		72.3
North Norfolk Coast	15 Oct	15 Apr	51	32	20,684	1.64	1.88	0.14	7.1	4.2	4.1	42.0	42.6
Orwell Estuary	02 Jan	02 Jan	1	1	68	[1.47]			100				
Portsmouth Harbour	01 Nov	07 Jan	11	3	2,683	1.75	1.27	0.09				100	
Roach Estuary	03 Jan	03 Jan	1	1	1,800	1.22							100
Stour Estuary	24 Oct	16 Dec	26	23	2,327	3.35	1.92	0.18	4.3	30.0	<0.1	7.2	58.5
Thames Estuary	09 Oct	23 Oct	10	3	13,143	2.99	1.72	0.09		100			
The Solent	14 Oct	17 Feb	33	9	5,507	2.09	1.89	0.35	43.9	17.3		25.2	13.6
The Wash	29 Oct	13 Dec	8	7	7,390	0.93	1.57	0.22	2.5	6.0	55.3		36.2
Totals	08 Oct	15 Apr	272	157	86,581	2.07	1.62	0.04	7.3	24.2	7.8	37.8	22.9

Note:

Percentage young in square brackets are based on small sample sizes (fewer than 500 birds aged)

The average proportion of young present in flocks decreased during early winter from a peak of 2.51% in October to a low of 1.61% in December. It then increased in mid-winter, rising to 2.49% in February, before decreasing again in March (1.92%) (Table 2, Figure 2). Only one age assessment was made in April, which was of a single flock of 10 birds, which contained no young. The mean brood size of successful pairs varied very little during this time, peaking at 1.71 (± 0.08 s.e.) in October.

Table 2. The proportion of young and mean brood size of Dark-bellied Brent Geese in the UK during winter 2006/07.

Month	Proportion of young		Mean brood size		
	overall	n	Mean	s.e.	n
Oct	2.51	17,736	1.71	0.08	122
Nov	1.83	22,821	1.54	0.08	135
Dec	1.61	19,102	1.64	0.09	86
Jan	2.24	13,635	1.55	0.12	51
Feb	2.49	10,882	1.66	0.22	29
Mar	1.92	2,395	1.64	0.28	11
Apr	0	10	-	-	-
Total	2.07	86,581	1.62	0.04	434

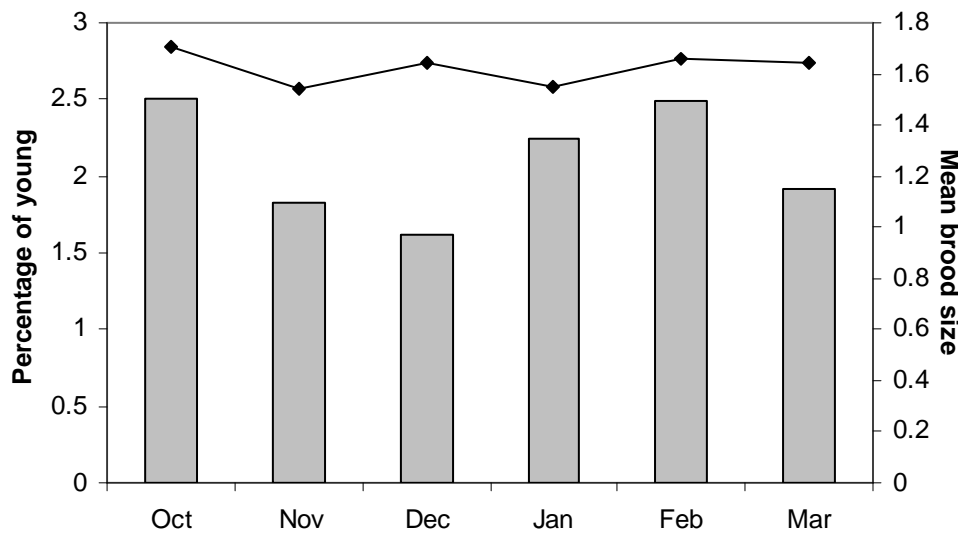


Figure 2. The proportion of young (columns) and mean brood size (diamonds) of Dark-bellied Brent Geese in the UK during winter 2006/07.

The proportion of young within individual flocks varied from 0% to 62.5% (Figure 3). Over half the flocks assessed (60.7%, n=165) held less than 2% young, with 80 of these containing no young at all, and 27.2% (n=74) contained 2-5% young. As the proportion of young increased, the number of flocks within each class decreased considerably, reflecting the overall low proportion of young recorded: 27 flocks (9.9%) held 5-15% young; and only 6 flocks contained over 15% young, the upper classes representing 0.7% (n=2), 1.1% (n=3) and 0.4% (n=1) of the overall total, respectively.

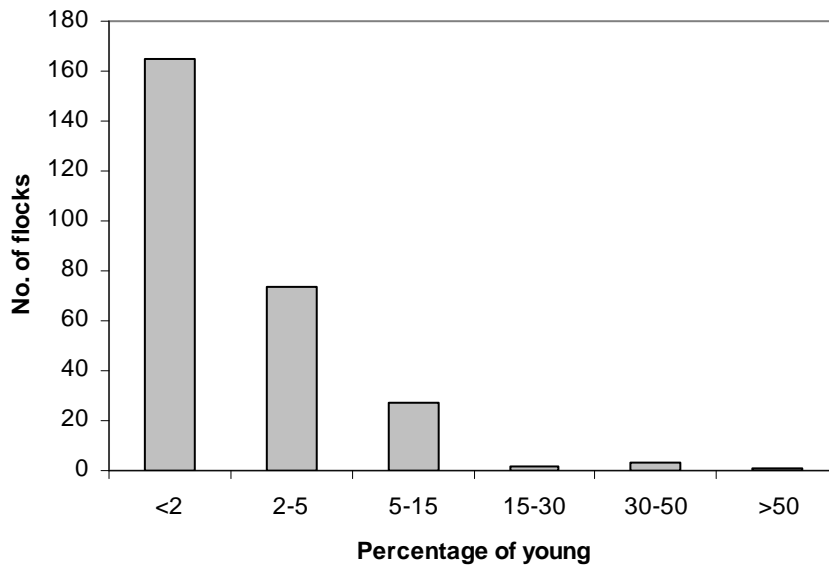


Figure 3. Frequency distribution of the proportion of young in individual flocks (n=272) of Dark-bellied Brent Geese in the UK during winter 2006/07.

The proportion of young varied slightly across flock size, ranging from 1.85% young, observed in flocks of 1,000-1,999 geese, to 2.8% young, recorded in a single flock of greater than 5,000 birds (Figure 4). Mean brood size was fairly consistent across flock size categories, varying between 1.79 (\pm 0.18 s.e.) in flocks of 1,000-1,999 birds, to 1.52 (\pm 0.07 s.e.) in flocks of 500-999 birds.

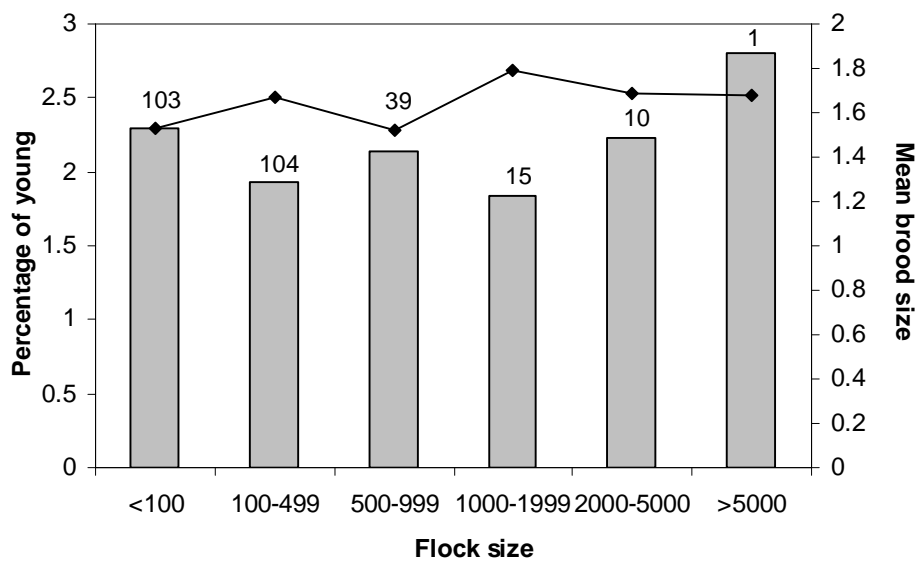


Figure 4. The proportion of young (columns) and mean brood size (diamonds) of Dark-bellied Brent Geese in the UK in flocks of different size during winter 2006/07 (sample sizes are given above columns).

Geese were recorded in five main habitat types: water, intertidal (including *Enteromorpha* spp., *Ulva* spp. and *Zostera* beds), saltmarsh, grass/pasture, and cereal fields, including stubble and oilseed rape (Figure 5). The majority of geese (37.8%) were aged in grass fields, while 24.2% were aged on intertidal habitats and 22.9% in cereal fields. The fewest birds were aged on water (7.3%) and saltmarsh (7.8%).

Intertidal habitats supported the highest proportion of young (2.38%), followed by grass (2.23%) and cereals (1.90%). Mean brood size was greatest in flocks found on water (1.93 young per successful pair, ± 0.24 s.e.), although this habitat held the lowest proportion of young (1.42%), with the lowest in those birds aged in grass fields (1.42, ± 0.06 s.e.).

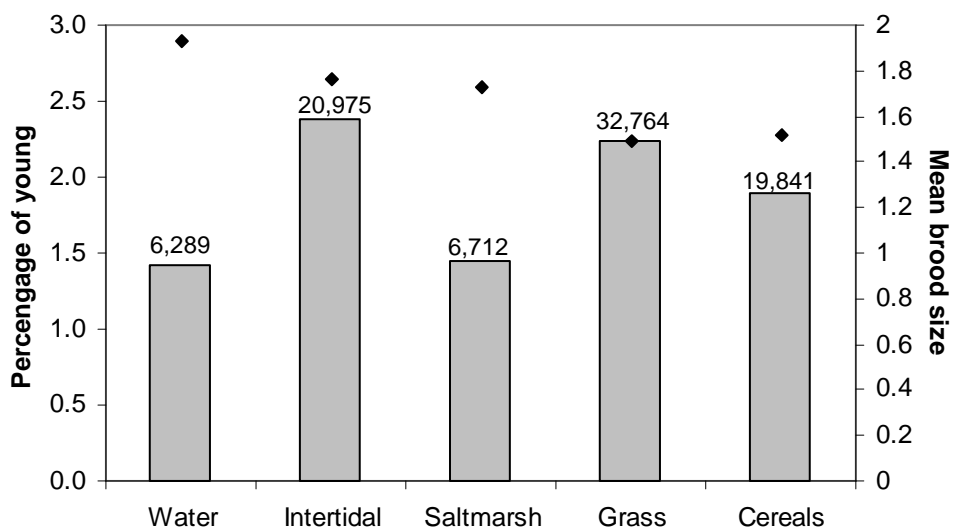


Figure 5. The proportion of young (columns) and mean brood size (diamonds) of Dark-bellied Brent Geese in the UK recorded in different habitat groups during winter 2006/07 (sample sizes are given above columns).

4 Discussion

Following a successful breeding season in 2005, productivity data received from wintering sites in the UK indicate that 2006 was a poor breeding year for Dark-bellied Brent Geese. Notably fewer broods were observed (434) compared with 2005 (1,284) (Hall 2006) reflecting the poor breeding success, with nearly 30% of the flocks assessed containing no young. The mean brood size per successful pair was also lower than in the previous year. Following the gradual increase of the previous five years, the proportion of young in 2006 dropped to its lowest since 2000, the mean brood size following a similar pattern, falling to the lowest recorded since 1995. Preliminary information from other wintering areas in western Europe also suggest a poor breeding year, with the possibility that flocks consisted of approximately 1% first-winter birds (B.S. Ebbinge pers. comm.).

The breeding success of Dark-bellied Brent Geese has previously been shown to follow a three-year cycle of good, poor and variable success (Dhondt 1987), and is greatly influenced by interactions between lemming abundance, predator pressure and other factors such as weather. In 2006, reports from monitoring stations along the Taimyr and Yamal Peninsulas in Russia indicated that lemmings were rare or absent on the breeding grounds – a predictable crash following the exceptionally high numbers recorded the previous year – and although not all outposts recorded the presence of Arctic Foxes, predators at the Gydan Peninsular were reported to be numerous (Soloviev & Tomkovich 2007). According to the cycle, the poor breeding season in 2006 was to be expected, however, between the mid 1990s and 2005, whilst there was still considerable annual variation in breeding success, the pattern shifted away from a predictable three-yearly cycle, and there were fewer than expected good breeding seasons. This suggests that the connection between rodent abundance and breeding success may no longer function in the same way, or that rodent abundance is no longer following such a predictable pattern. Although in the most recent two years a poor breeding season has followed a notable high, it is still unclear whether there has been a return to a more predictable cycle.

The recent reduction in the number of good breeding seasons has resulted in a decline in the population size of approximately 30%, both nationally and internationally (Banks *et al.* 2006, Wetlands International 2006), leading to the species being listed as ‘Vulnerable’ according to European Red List criteria (Birdlife International 2004). Although the excellent breeding season in 2005 was very encouraging, alone this is unlikely to have any significant effect on the population trend or status. An increase in the frequency of breeding seasons where the proportion of young birds is greater than mortality (15%; Summers & Underhill 1991) is likely to be needed for this to occur.

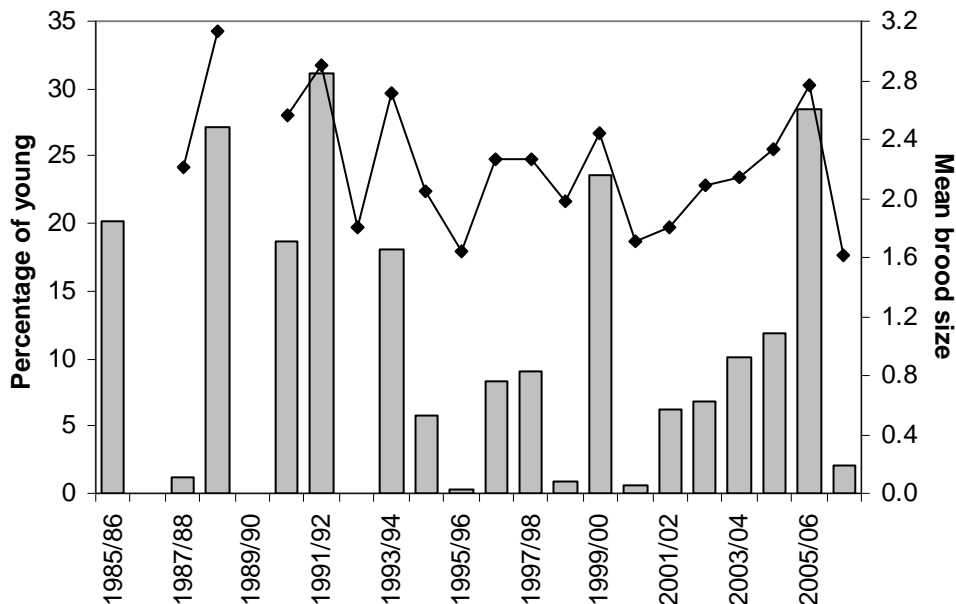


Figure 6. The proportion of young (columns) and mean brood size (diamonds) of Dark-bellied Brent Geese recorded in the UK, 1985/86-2006/07.

5 Acknowledgements

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