



The breeding success of Dark-bellied  
Brent Geese *Branta bernicla bernicla*  
in 2007, as assessed in the UK

**Wildfowl and Wetlands Trust Report**

Author

**Colette Hall**

**July 2008**

© Wildfowl & Wetlands Trust/Joint Nature Conservation Committee

All rights reserved. No part of this document may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission of the copyright holder.

This publication should be cited as:

Hall, C. 2008. *The breeding success of Dark-bellied Brent Geese Branta bernicla bernicla in 2007, as assessed in the UK.* Wildfowl & Wetlands Trust Report, Slimbridge.

This report was produced under the Goose & Swan Monitoring Programme (GSMP). This programme monitors numbers and productivity of geese and swans in the UK during the non-breeding season. GSMP is organised by the Wildfowl & Wetlands Trust (WWT) on behalf of WWT and the Joint Nature Conservation Committee.

**Wildfowl & Wetlands Trust**

Slimbridge  
Gloucestershire  
GL2 7BT

Tel 01453 891900  
Fax 01453 890827  
Email [monitoring@wwt.org.uk](mailto:monitoring@wwt.org.uk)

Reg. charity in England & Wales, no. 1030884,  
and Scotland, no. SC039410

**Joint Nature Conservation Committee**

Monkstone House  
City Road  
Peterborough  
PE1 1JY

Tel 01733 562626  
Fax 01733 555948  
Email [communications@jncc.gov.uk](mailto:communications@jncc.gov.uk)



**Goose & Swan Monitoring**

# CONTENTS

Summary	iv
1 Introduction	1
2 Methods	1
3 Results	2
4 Discussion	7
5 Acknowledgments	8
6 References	9

## SUMMARY

A total of 84,361 Dark Bellied Brent Geese *Branta bernicla bernicla* was aged at 22 estuaries and coastal areas in the UK between October 2007 and April 2008. The overall proportion of juvenile birds present was 10.97%, varying throughout the winter between 8.68% in October and 13.11% in March. Of the 1,063 broods recorded, the mean brood size per successful pair was 2.57 ( $\pm 0.04$  s.e.). Following the successful year in 2005 (28.44% young) and the poor year in 2006 (2.03%; the percentage of young for 2006 was recalculated following the inclusion of late data, previously reported as 2.07%), productivity in 2007 could be classed, as expected, as 'variable'. This suggests breeding success is returning to a more predictable pattern following a shift away from the three-yearly cycle of good, poor and variable success previously shown to occur in Brent Geese.

# 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 (eg Musgrove *et al.* 2007) and breeding success (age ratios and brood size) (eg Hall 2007), through which estimates of annual recruitment can be made.

# 2 METHODS

For the twenty-third 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 juveniles that could be recognised by behaviour or spatial separation from other geese, were regarded as a family. Data were collected between 4 October 2007 and 25 April 2008. 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 174 localities within 22 estuaries or coastal areas on the English east and south coasts from the north Lincolnshire coast to Devon (Figure 1, Table 1).

Of the 341 flocks assessed, 22.0% were in October, the majority were in November (31.7%) decreasing to 23.5% in December through to 6.7% in February. Only seven flocks were aged in March (2.0%) and four in April (1.2%). A total of 84,361 geese was aged; a decrease of 2.6% on the number aged during 2006/07 and 97.4% of the previous five year mean. The highest numbers were aged at Langstone Harbour (15,931), Thames Estuary (15,482) and North Norfolk Coast (10,793), and between 7,200 and 9,110 individuals were aged at Chichester Harbour, Blackwater Estuary and The Wash. Sample sizes at all other sites were smaller than 4,000 birds, with fewer than 500 individuals aged at nine sites. The overall proportion of young birds was 10.97% and, of the 1,063 broods recorded, the mean brood size was 2.57 ( $\pm 0.04$  s.e.) young per successful pair.

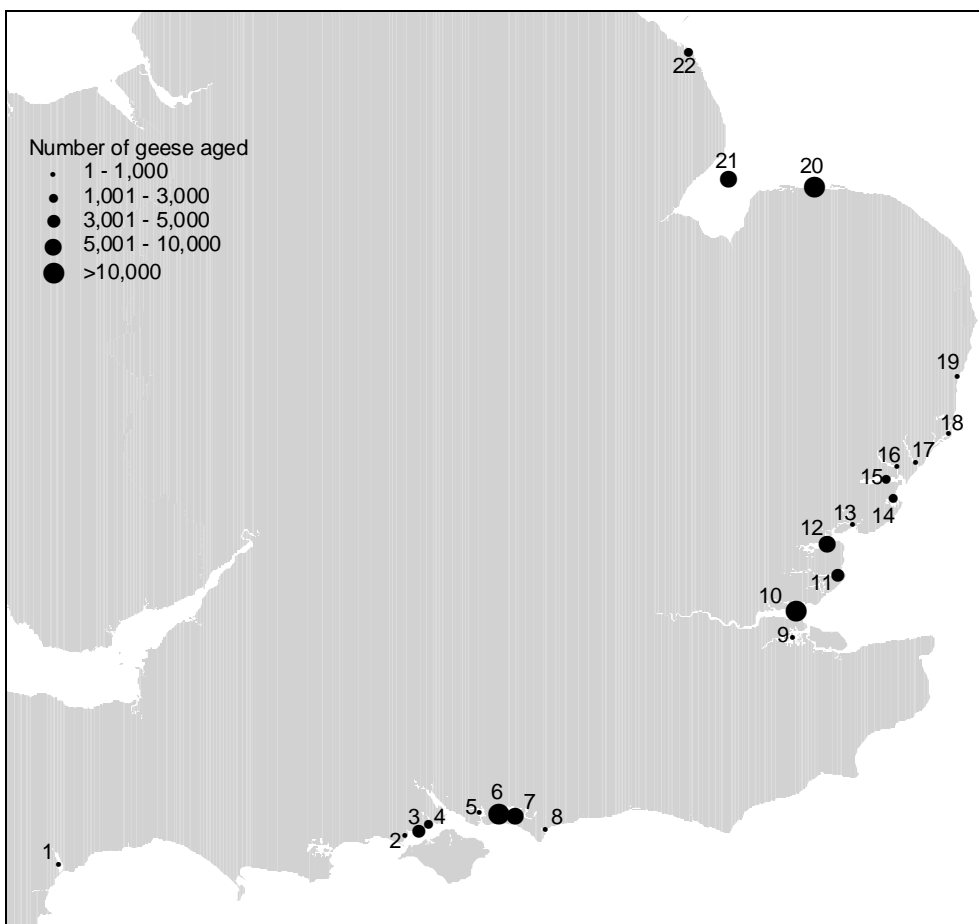


Figure 1 Sites at which Dark-bellied Brent Geese were aged during winter 2007/08. See Table 1 for key to sites.

Table 1 Numbers of Dark-bellied Brent Geese aged at British estuaries and coastal areas in winter 2007/08 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
1 Exe Estuary	21 Oct	16 Jan	3	3	482	[6.64]				70.95		29.05	
2 Lymington Estuary	29 Dec	29 Dec	1	1	67	[50.75]			100				
3 The Solent	19 Oct	01 Feb	23	7	3,908	8.60	2.65	0.29	51.28	31.06			17.66
4 Beaulieu Estuary	14 Oct	10 Feb	11	4	2,082	14.07	2.77	0.20	10.04	7.35		82.61	
5 Portsmouth Harbour	23 Nov	23 Nov	1	1	11	[36.36]	5.00	1.00				100	
6 Langstone Harbour	11 Oct	28 Feb	87	33	15,931	10.60	2.72	0.08	20.86	25.00		51.39	2.75
7 Chichester Harbour	10 Oct	24 Jan	37	19	9,106	10.60	2.25	0.07	35.12	8.56		44.93	11.39
8 Pagham Harbour	26 Oct	26 Oct	1	1	28	[14.29]	4.00	0.00	100				
9 Medway/Swale Estuaries	08 Oct	13 Jan	6	5	350	[7.14]	2.86	0.51		97.71		2.29	
10 Thames Estuary	04 Oct	24 Oct	12	3	15,482	8.92	2.88	0.16		100			
11 Crouch Estuary	24 Oct	04 Feb	4	2	3,001	11.63	2.00	0.31				52.55	47.45
12 Blackwater Estuary	12 Nov	06 Feb	19	6	8,085	16.61						100	
13 Colne Estuary	31 Oct	20 Dec	6	4	662	6.65	1.25	0.25	9.67	35.35	13.29	41.69	
14 Hamford Water	31 Oct	06 Jan	17	11	1,621	15.92	1.92	0.16	31.83	27.15	16.84		24.18
15 Stour Estuary	29 Oct	24 Dec	40	28	2,855	9.88	2.00	0.21	3.01	60.35	4.38		32.26
16 Orwell Estuary	15 Nov	02 Dec	3	3	376	[20.21]			51.60	48.40			
17 Deben Estuary	23 Dec	23 Dec	1	1	160	[14.38]							100
18 Alde-Ore Estuary	01 Nov	22 Jan	7	5	86	[19.77]			19.77		74.42	1.16	4.65
19 Blyth Estuary (Suffolk)	22 Nov	22 Nov	1	1	2	[0]			100				
20 North Norfolk Coast	22 Oct	25 Apr	43	24	10,793	13.01	2.63	0.11	38.20	1.35	3.93	36.07	20.45
21 The Wash	05 Nov	02 Apr	12	6	7,281	6.72				2.87	32.38	26.84	37.91
22 North Lincolnshire Coast	28 Oct	23 Dec	6	6	1,992	10.19				5.72	15.56		78.72
<b>Totals</b>	<b>04 Oct</b>	<b>25 Apr</b>	<b>341</b>	<b>174</b>	<b>84,361</b>	<b>10.97</b>	<b>2.57</b>	<b>0.04</b>	<b>16.40</b>	<b>30.04</b>	<b>4.32</b>	<b>35.49</b>	<b>13.75</b>

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 increased from a low of 8.68% in October to a peak of 13.59% in November. It then fluctuated throughout the winter, rising to 13.11% in April, though the sample of aged birds was notably lower than in previous months (Table 2, Figure 2). The mean brood size of successful pairs varied very little during this time, peaking at 2.80 ( $\pm$  0.66 s.e.) in March.

Table 2 The proportion of young and mean brood size of Dark-bellied Brent Geese in the UK during winter 2007/08.

Month	Proportion of young (%)		Mean brood size		
	Overall	n	Mean	s.e.	n
Oct	8.68	23,121	2.62	0.09	299
Nov	13.59	19,110	2.76	0.08	383
Dec	11.24	17,124	2.48	0.11	134
Jan	10.53	13,822	2.25	0.09	193
Feb	11.18	8,579	2.20	0.18	46
Mar	10.92	1,575	2.80	0.66	5
Apr	13.11	1,030	2.67	0.67	3
Total	<b>10.97</b>	<b>84,361</b>	<b>2.57</b>	<b>0.04</b>	<b>1,063</b>

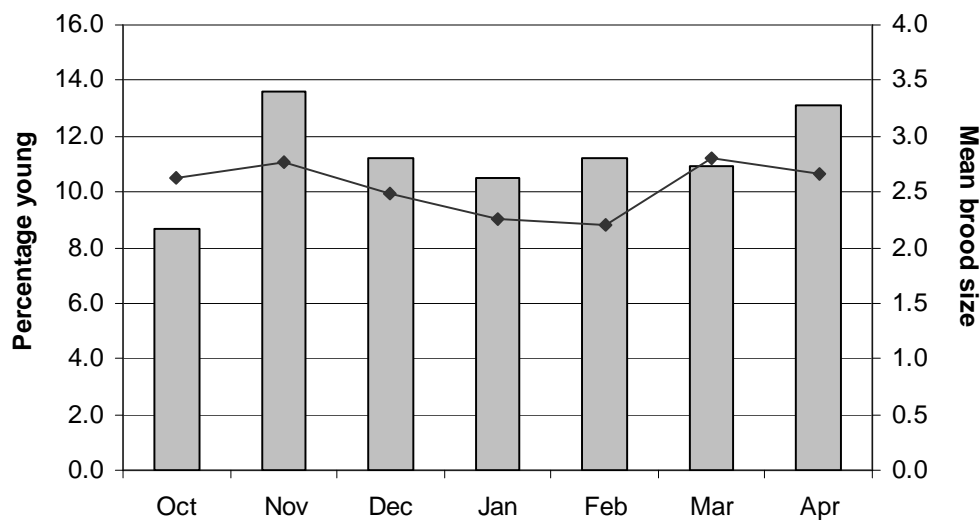


Figure 2 The percentage of young (columns) and mean brood size (diamonds) of Dark-bellied Brent Geese in the UK during winter 2007/08.



The proportion of young within individual flocks varied from 0% to 80% (not including two reported 'flocks' of one juvenile) (Figure 3). The majority of flocks (39.59%,  $n = 135$ ) contained between 5-15% young, while 29.33% of flocks contained less than 5% young ( $n = 100$ , of which 44 contained no young at all). As the proportion of young increased above 15%, the number of flocks within each class decreased; 56 flocks (16.42%) held 15-30% young, and 38 (11.14%) and 12 (3.52%) contained 30-50% and greater than 50% young, respectively.

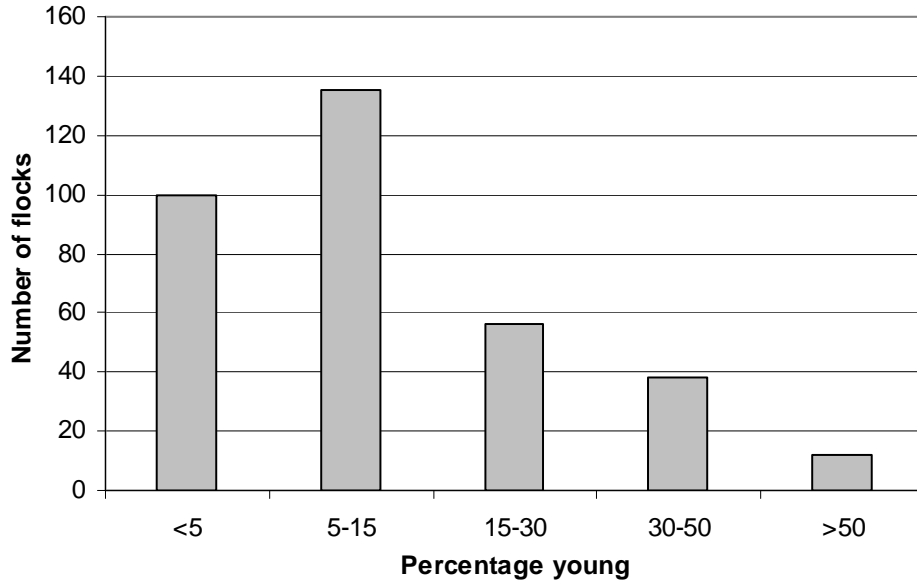


Figure 3 Frequency distribution of the percentage of young individual flocks ( $n = 341$ ) of Dark-bellied Brent Geese in the UK during winter 2007/08.

The proportion of young varied across flock size (Figure 4), ranging from 14.90% young, observed in flocks of fewer than 100 geese, to 4.80% young recorded in two flocks of 2,000-5,000 birds. Mean brood size varied between 2.04 and 3.04 young per successful pair, the largest recorded in two flock size categories, 500-999 birds and those of more than 5,000 ( $\pm 0.12$  s.e.) and those of more than 5,000 ( $\pm 0.19$  s.e.).

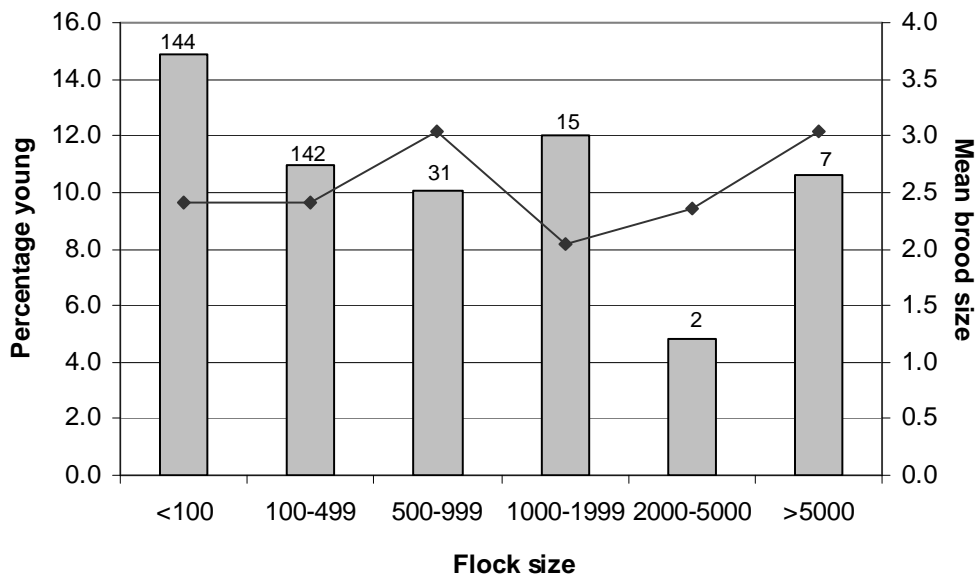


Figure 4 The percentage of young (columns) and mean brood size (diamonds) of Dark-bellied Brent Geese in the UK in flocks of different size during winter 2007/08 (sample sizes are given above columns).

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 (35.5%) were aged in grass fields, while 30.0% were aged on intertidal habitats, and 16.4% and 13.8% on water and in cereal fields, respectively. Only 4.3% of the total geese aged were observed on saltmarsh.

Grass fields supported the highest proportion of young (14.33%), followed by cereal fields (11.30%), while other habitats saw a similar percentage of young amongst flocks; 9.04% on water; 8.33% on intertidal habitats; and 7.91% on saltmarsh. Mean brood size was also greatest in flocks found on grass fields ( $2.79, \pm 0.07$  s.e.), although it did not vary greatly across these habitats.

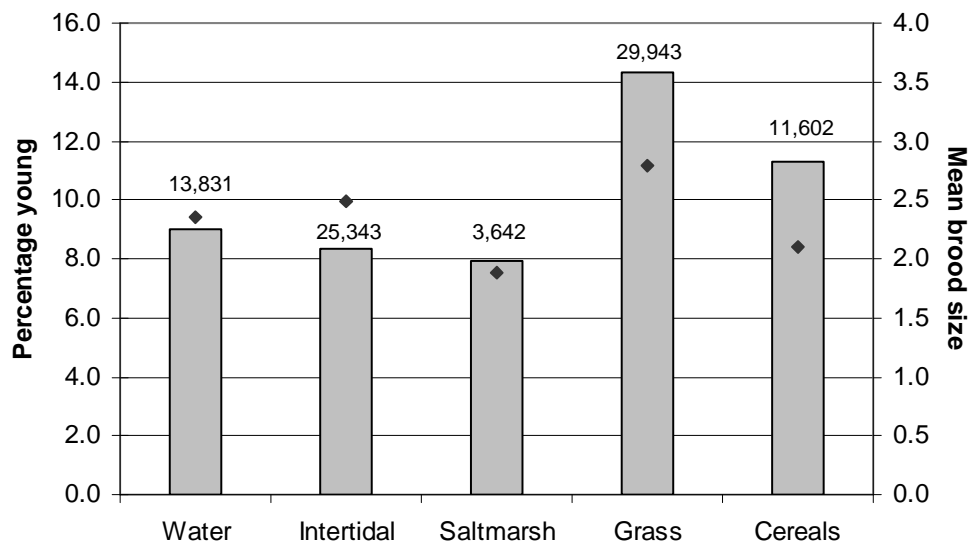


Figure 5 The percentage of young (columns) and mean brood size (diamonds) of Dark-bellied Brent Geese in the UK recorded in different habitat groups during winter 2007/08 (sample sizes are given above columns).

## 4 DISCUSSION

Results from age assessments made at wintering sites in the UK indicate that breeding success of Dark-bellied Brent Geese in 2007 was higher than in the previous year, and above the most recent ten-year mean ( $9.94\% \pm 2.96$  s.e.). There was a marked increase in the number of broods observed compared with 2006 and the mean brood size was also higher, reflecting the improved breeding success.

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 2007, though only a few reports are available, monitoring stations along the Taimyr and Yamal Peninsulas in Russia indicated that lemmings were present in variable numbers (low numbers at the Yamal; common to abundant at the Taimyr), and Arctic Foxes were rare or absent (Soloviev & Tomkovich 2008). Between the mid 1990s and 2005, whilst there was still considerable annual variation in Brent breeding success, the pattern shifted away from a predictable three-yearly cycle, and there were fewer than expected good breeding seasons (Figure 6). 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. Over the most recent three years, however, breeding success has been good, 28.4% young in 2005, poor, 2.03% young in 2006 (the percentage of young for 2006 was recalculated following the inclusion of late data, previously reported as 2.07%; Hall 2007) and, if compared with other years, variable in 2007. This also follows a similar pattern to that of lemming abundance at the breeding grounds, which saw exceptionally high numbers in 2005, a crash in 2006 and a variable year in 2007. These results suggest productivity may be returning to the more predictable three-yearly cycle; it will, however, take a few years of further monitoring to establish whether this is the case.

Reductions in the number of good breeding seasons in recent years led to a decline in the population of approximately 30% both nationally and internationally (Musgrove *et al.* 2007; Wetlands International 2006) leading to the species being listed as 'Vulnerable' according to the European Red List criteria (BirdLife International 2004). 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 there to be any significant improvement in population status. Encouragingly, results from the Wetland Bird Survey (Musgrove *et al.* 2007) suggest wintering numbers have started increasing again in Britain, particularly in 2005/06 following the excellent breeding season in that year.

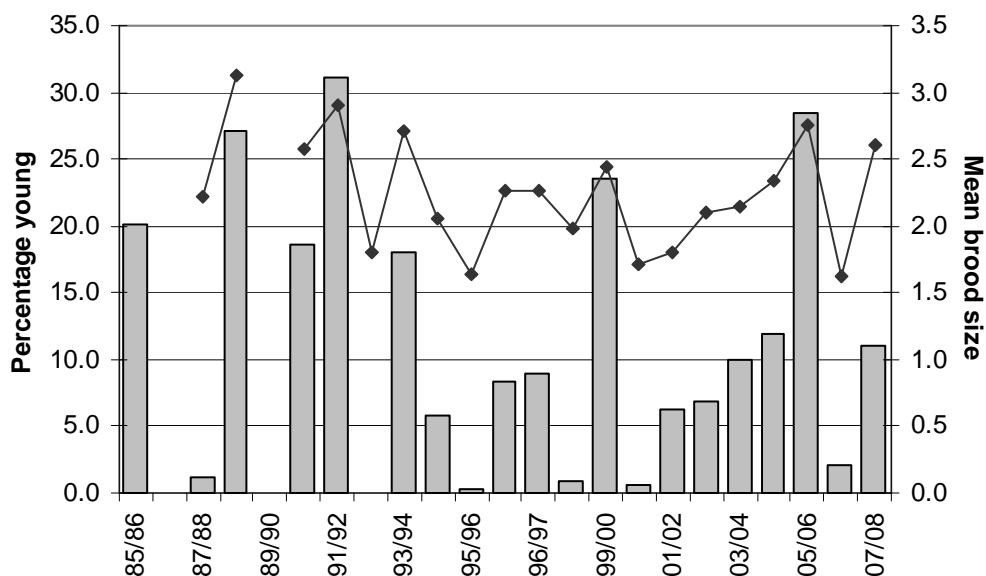


Figure 6 The percentage of young (columns) and mean brood size (diamonds) of Dark-bellied Brent Geese recorded in the UK, 1985/86-2007/08.

## ACKNOWLEDGMENTS

The biggest thank you goes to the volunteer counters who undertook the fieldwork upon which this report is based. Without their hard work and continued interest in this monitoring programme, there would be no report and we would have a poorer understanding of the dynamics of this population. With sincere apologies for any omissions or misspellings, they are:

Paul Charlton, Jeremy Clarke, Chris Cockburn, Barry Collins, Jane Crapnell, Jason Crook, Anne de Potier, Beryl Edmunds, Brian Fellows, Richard Heath, Russell Leavett, David Low, Ed Mackrill, Tim Nicholson, Julian Novorol, Mark Nowers, Geoff Orton, Martin Overly, Rod Plowman, David Price, Dave Smallshire, Tony Smith, Graham Smith, Liz Smith, Jenni Tubbs, Ewan Urquhart, Rick Vonk, John Waldon, John Walker, David & Pat Wileman, Ed Wiseman and Derek & Glenys Wood.

Thanks also to Richard Hearn and Helen Baker for comments on an earlier version of this report.

This report was produced under the Goose & Swan Monitoring Programme (GSMP). This programme of surveys monitors the abundance and breeding success of geese and swans in the UK during the non-breeding season. GSMP is organised by the Wildfowl & Wetlands Trust (WWT) on behalf of WWT and the Joint Nature Conservation Committee (JNCC, on behalf of Natural England, Scottish Natural Heritage, Countryside Council for Wales and the Environment and Heritage Service in Northern Ireland). The support of JNCC is gratefully acknowledged.

## 5 REFERENCES

- BirdLife International. 2004. *Birds in Europe: population estimates, trends and conservation status*. Cambridge, UK: BirdLife International. BirdLife Conservation Series No. 12.
- Dhondt, AA. 1987. Cycles of lemmings and Brent Geese *Branta b. bernicla*: a comment on the hypothesis of Roselaar and Summers. *Bird Study* 34: 151-154.
- Hall, C. 2007. *The breeding success of Dark-bellied Brent Geese Branta bernicla bernicla, as assessed in the UK*. Wildfowl & Wetlands Trust Report. Slimbridge.
- Musgrove A, MP Collier, AN Banks, NA Calbrade, RD Hearn & GE Austin. 2007. *Waterbirds in the UK 2005/06: The Wetland Bird Survey*. BTO/WWT/RSPB/JNCC, Thetford.
- Soloviev, M & P Tomkovich. (Eds.) 2008. *ARCTIC BIRDS: an international breeding conditions survey*. Online database: <http://www.soil.msu.ru/~soloviev/arctic/index.html>. Accessed 28 May 2008.
- Stroud, DA, GP Mudge & MW Pienkowski. 1990. *Protecting internationally important birds sites: a review of the EEC Special Protection Area network in Great Britain*. NCC, Peterborough.
- Summers, RW & LG Underhill. 1991. The growth of the population of Dark-bellied Brent Geese *Branta b. bernicla* between 1995 and 1988. *Journal of Applied Ecology* 28: 574-585.
- Wetlands International. 2006. *Waterbird Population Estimates – Fourth Edition*. Wetlands International, Wageningen, The Netherlands.