



AN ASSESSMENT OF BREEDING SUCCESS IN THE DARK-BELLIED BRENT GOOSE IN 1990

by J .S. Kirby

The Wildfowl & Wetlands Trust, Slimbridge, Gloucester, GL2 7BT

SUMMARY

Some 82,122 Dark-bellied Brent Geese were counted at 12 estuarine sites in Britain between 11 September and 2 December 1990, and the proportions of juveniles present and brood sizes were recorded for many of the flocks. Most of the recorded flocks in east and south-east England were observed within intertidal areas, whilst many of those in southern England were on grass. Of 44,574 geese aged, 21.4% were juveniles, thus revealing a moderate level of breeding success for the population in summer 1990. There was considerable variability amongst the samples taken. Average brood size was 3.0 juveniles per pair overall. Using these data, it is predicted that some 94-141,000 Dark-bellied Brent Geese will resort to British estuaries in midwinter 1990/91.

INTRODUCTION AND METHODS

For the sixth consecutive autumn, breeding performance in Dark-Bellied Brent Geese (*Branta bernicla bernicla*) was assessed by experienced voluntary observers at a number of coastal sites in Britain. Here we report the results of these observations, which were made between 11 September and 2 December 1990. On the basis of these, we predict the likely size of the 1990/91 winter population in Britain. Preliminary results, based on the period up to 30 October, have been reported previously (Kirby & Baines 1990).

Both the proportion of young birds in flocks and family sizes were recorded during observations on 52 dates during autumn and early winter. During this time, visits were made to 12 estuarine sites, and a total of 161 counts were made in 57 different sectors of these estuaries (Table 1). Only seven counts were made in September and most took place over the weekends of 20/21 October, 27/28 October and 17/18 November. Nine of the included estuaries received up to ten visits but the Orwell (11 visits), Leigh (15), Chichester Harbour (31) and Wash (44) were visited more frequently, mostly involving several counters visiting different sectors of the site on the same day (Table 1).

RESULTS AND DISCUSSION

Numbers and distribution

Table 1 shows total numbers of birds counted at each site, maximum flock sizes and the distribution of the birds counted in relation to habitat. This census does not aim to assess total numbers at each site (only breeding performance) and the results cannot be used for this purpose, as the counts of different areas are mostly not synchronous. Thus the grand total of 82,122 birds counted certainly includes many repeat counts of the same flocks. The largest flocks were recorded in Essex, with 4,000 on the Blackwater, 5,000 at Foulness and up to 10,000 at Leigh.

In the same way that caution is necessary when considering the numbers at particular sites, the same is true when considering the distribution of the geese across habitats. This is because not all habitats were visited equally intensively as observers selected where they wished to view the geese. Of all birds counted, the vast majority were in intertidal areas (Table 1), either on the sea or mudflats (_ca. 60%) or on saltmarshes (_ca. 24%). Relatively few geese overall fed in grass or cereal fields. However, the numbers of birds counted in each habitat varied regionally, perhaps reflecting to some degree the preferences of the geese themselves, rather than that of the observers. Intertidal areas supported most birds in the majority of estuaries in east and south-east England, whilst many birds made use of grass along the southern coast of England (Table 1). The only sizeable flocks recorded on cereals involved birds close to the Orwell and Blackwater estuaries.

Table 1. Numbers of Dark-bellied Brent Geese and the proportions (%) on different habitats at a number of British estuaries. For the positions of each estuary, refer to Kirby *et al.* (1990).

SITE	Distribution across habitats							
	No. OF VISITS	No. OF SECTORS	TOTAL COUNT	LARGEST FLOCK	MUD & WATER	SALT-MARSH	GRASS	CEREALS
Humber	10	4	3,937	1,400	0.0	100.0	0.0	0.0
Wash	44	13	18,109	1,800	11.3	79.6	9.1	0.0
N. Norfolk	7	3	1,	600	51.1	6.2	42.7	0.0
Orwell	11	3	2,093	600	43.2	3.0	6.4	47.4
Stour	8	7	2,098	187	92.4	7.6	0.0	0.0
Blackwater	5	3	5,332	4,000	25.0	0.0	0.0	15.0
Foulness,	4	1	8,138	5,000	100.0	0.0	0.0	0.0
Leigh,	15	1	24,818	10,000	-	-	-	-
Chichester	31	14	9,454	800	69.6	4.9	24.2	1.3
Langatone	9	1	2,138	396	45.0	0.0	55.0	0.0
Beaulieu	1	2	1,095	420	61.6	0.0	38.4	0.0
N.W.	8	4	2,213	900	27.7	0.0	72.3	0.0
Poole	2	1	91	36	0.0	100.0	0.0	0.0
TOTALS	161	51	82,122	26, 139	59.6	24.2	10.0	6.2

- full details of distribution across habitats not available.

Productivity

Of all geese aged (44,574), 21.4% were juveniles (Table 2), indicating that the birds had bred moderately successfully in 1990. This compares with 34.4% young in 1988 and less than 1% young in 1989. As in previous years, the proportions of young recorded varied considerably both within and between sites. An indication of the magnitude of this variation within sites is provided in Table 2, which shows the minimum and maximum percentage young recorded at each location. For example, some of the many flocks observed on the Wash held no young at all, whilst others held up to 54.1% young. This is in accordance with recently published results from the Dutch Wadden Sea (Lambeck 1990a,b) where substantial variation between the age ratios of sub-flocks was reported. Combining data for each site and treating that as one sample reveals that the flocks with the highest proportion of juveniles were those on the Orwell (30.5% young), Langstone Harbour (29.8%) and at Leigh (26.8%) on the Thames estuary.

The causes of such a high degree of variability in percentage young are likely to be numerous and inter-related. Presumably, the abilities of different observers to make the observations in the first place would be an important factor, as would be the sizes of the flocks recorded, assessments of breeding performance based on small flocks frequently give spurious results, as can be seen for Poole Harbour in Table 2. The timing of visits through the season is also presumably important as one might expect the more successful breeders to arrive later than those that have failed. Three localities were visited on more than twelve occasions during the observation period. The proportions of young recorded on each visit to each of these sites is shown in Figure 1. Again, there is considerable variability, especially in Langstone Harbour. The data from Leigh (from C.D. Jolly) were perhaps collected most consistently as precisely the same intertidal area was visited, in the same way, on each occasion. The observations from Leigh suggest a considerable upsurge in the proportion of young birds in the flocks took place in the last week of October, followed by a decline thereafter, and perhaps a second increase in juveniles in late November (fewer observations were made in November than in October). This could be explained by movement through the Leigh of successful breeders to other areas of the country, or on to other habitats. In the Wadden Sea, the proportion of juveniles decreased from 50% in the autumn to 25% in midwinter, and increased to 40% in spring (Lambeck 1990a). This was attributed to movement through the area of families heading for the more southerly wintering areas.

As reported in previous studies of Brent Geese, Lambeck (1990a,b) noted that age-ratios were lower in flocks dependent on intertidal habitats than in those feeding inland. This can be seen from the data collected here (Table 3), with saltmarshes, grasslands and cereals generally supporting more young birds than the mudflats. Again there may well be several reasons for this, but the most likely explanation might be that pairs with large broods are dominant over those with few or none, as has been widely documented in the literature, and families may thus successfully **occupy** the most preferred habitats. It is perhaps also true that it is easier to make accurate assessments of percentage young on the more inland areas, rather than for birds on distant mudflats, since you can generally get closer to the flocks. The relative importance of each of these factors in determining the results you obtain when collating data on breeding success would seem to be worthy of more sophisticated analyses in the near future.

Table 2. Numbers of Dark-bellied Brent Geese aged and proportions of juveniles recorded.

SITE	TOTAL COUNT	No. AGED	No. OF YOUNG	PERCENTAGE YOUNG PER SITE			% ALL YOUNG
				MIN.	MAX.	TOTAL	
Humber	3,937	3,116	485	11.6	25.3	15.6	5.1
Wash	18,109	13,103	2,544	0.0	54.1	19.4	26.7
N. Norfolk	1,406	1,215	209	8.4	25.5	17.2	2.2-
Orwell	2,093	1,284	391	21.0	47.3	30.5	4.1'
Stour	2,098	700	113	8.5	18.2	'16.1	1..
Blackwater	5,332	2,332	478	4.5	31.2	20.5	5.0
Foulness,	8,738	2,748	397	13.6	20.1	14.4	4..
Leigh, Thames	24,818	7,936	2 ,	8.0	67.2	26.8	22.4
Chichester.Hbr.	9,454	6,739	1,303	1.8	66.3	19.3	13.7
Langstone Hbr.	2,738	2,738	816	0.0	58.3	29.8	8.6
Beaulieu	1,095	858	147	2.1	29.5	17.1	1.5
N.W. Solent	2,213	1,714	469	22.9	36.1	27.4	4.9
Poole Harbour	91	91	39			(42.9)	0.4
TOTALS	82,1	44,57	9,521	0.0	67.2	21.4	100.0

N.B. The bracketed figure is based on relatively few birds.

Table 3. The distribution of juvenile Dark-bellied Brent Geese across habitats. Note that only those sites where geese were found on more than one habitat are included. For each habitat, the number of geese aged is followed by percentage young.

SITE	Water & Mud		Saltmarsh		Grassland		Cereals	
	Count	%	Count	%	Count	%	Count	%
Wash	1,368	1.9	10,082	21.3	1,653	22.3	0	-
N. Norfolk	719	15.2	87	31.0	409	17.8	0	-
Orwell	683	18.8	62	35.4	134	26.9	405	27.7
Stour	623	16.7	77	11.7	0	-	0	-
Blackwater	1,332	18.7	0	-	0	-	1,000	20.8
Chichester	4,443	15.5	474	32.9	1,699	24.3	123	38.2
Langstone	1,233	24.3	0	-	1,505	34.3	0	-
Beaulieu	438	5.3	0	-	420	29.5	0	-
N.W. Solent	601	24.5	0	-	1,113	28.9	0	-
Mean values		15.7		26.5		26.2		28.9

Most of the pairs recorded with juveniles had either two (24.9%), four (23.2%) or three (19.6%) young with them (Table 4) and the average brood size was 3.0. This compares with an average 3.2 young per pair in 1988, the most productive season of recent years.

Table 4. Brood sizes of Dark-bellied Brent Geese. Only those sites where more than 20 brood sizes were recorded are included.

SITE	BROOD SIZE						TOTALS
	6	5	4	3	2	1	
Wash	0	0	19	14	25	4	62
N. Norfolk;	0	4	8	5	8	6	31
Blackwater	0	4	6	9	10	19	48
Foulness, Thames	0	2	6	8	13	17	46
Leigh, Thames	1	89	95	54	55	18	312
Chichester Harbour	6	16	31	35	49	36	173
Langstone Harbour	0	8	12	24	30	16	90
TOTALS	7	123	177	149	190	116	762
FREQUENCY (\)	0.9	16.1	23.2	19.6	24.9	15.3	

The world population of the Dark-bellied Brent Goose was estimated at approximately 218,000 in January 1990 (A. St Joseph, pers. comm.) and approximately 90,000 were present in Britain in midwinter (Kirby & Salmon 1990). Assuming an average annual mortality of 15\ (Summers & Underhill, In press.) and 21.4\ productivity in 1990, the world population should reach ca. 235,750 birds in winter 1990/91. Of these, 40-60\ will resort to British estuaries (Salmon & Fox, In press.) and thus the midwinter 1990/91 population size in Britain may well be in the region of 94-141,450 birds.

ACKNOWLEDGEMENTS

These observations were organized as part of the National Wildfowl Counts programme which is financially supported by the Nature Conservancy Council and the Department of the Environment for Northern Ireland. Their support is much appreciated.

Myrfyn Owen kindly improved an earlier draft of this report with his comments and we made use of observations supplied by the following ornithologists, to whom we are grateful:

D.F. Billett, K. Burn, C. Campbell, C.R. Casey, p. Catlett, C.B. Collin, I. Dennis, A. de Potier, R.D. Edgar, D. George, R. Heath, R. Holman, M. Holmes, C.D. Jolly, R. King, R. Leavitt, H.J. Lee, R. Lord, E. Mackrill, J. Maskey, A. McKeeman, I.W. Paterson, M.E. Rooney, B. Savage, C. Smith, S.F. Smitl), J. Thorogood, p. Todd, C.R. Tubbs, J.M. Tubbs, J. Turner, E. Urquhart, J. Walker, R. Watson, P.N. Watts, R. Williamson, E.J. Wiseman and M. Wright.

Clive Jolly deserves a special mention for supplying his most interesting and detailed records of Brents at Leigh-on-Sea.

REFERENCES

Kirby, J.S. & Haines, W.G. 1990 . A preliminary assessment of breeding success in the Dark-bellied Brent Goose, 1990. Report to NCC, The Wildfowl & Wetlands Trust, Slimbridge, 4pp.

Kirby, J.S. & Salmon, D.G. 1990. Numbers. of Dark-Bellied Brent Geese in Britain, midwinter 1989/1990. Report to NCC, The wildfowl & Wetlands Trust, Slimbridge, 7pp.

Kirby, J.S., Waters, R.J. & Prys-Jones, R.P. 1990. Wildfowl and Wader Counts 1989-90. The Wildfowl & Wetlands Trust, Slimbridge.

Lambeck, R.H.D. 1990a. The applicability of age ratio and brood size counts in population dynamic studies of the Brent Goose Branta b. bernicla. Ardea 78: 414-425.

Lambeck, R.H.D. 1990b. Differences in migratory pattern and habitat choice between social classes of the Brent Goose Branta b. bernicla. Ardea 78: 426-440.

Salmon, D.G. & Fox, A.D. In press. Dark-bellied Brent Geese Branta b. bernicla in Britain, 1976-1987. Ardea.

Summers, R.W. & Underhill, L.G. In press. The growth of the population of Dark-Bellied Brent Geese Branta b. bernicla between 1955 and 1988. J. Appl. Ecol.

20 January 1991

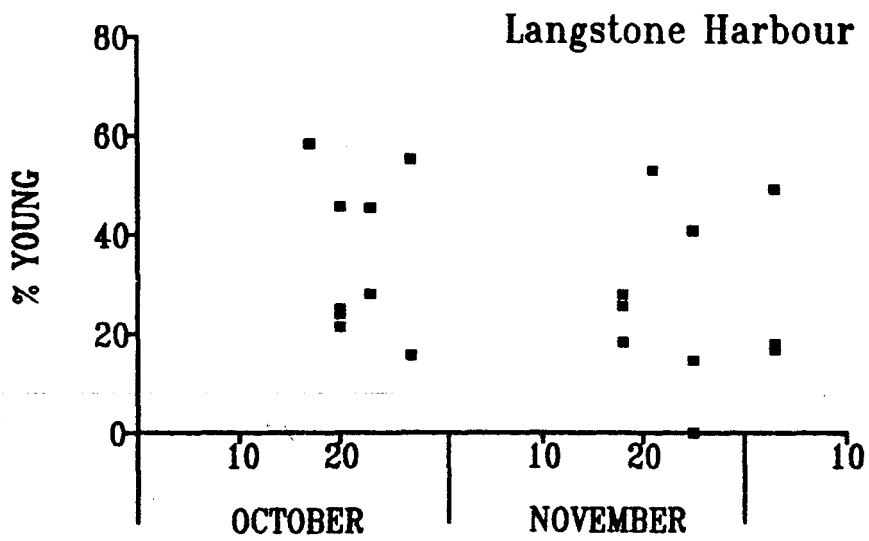
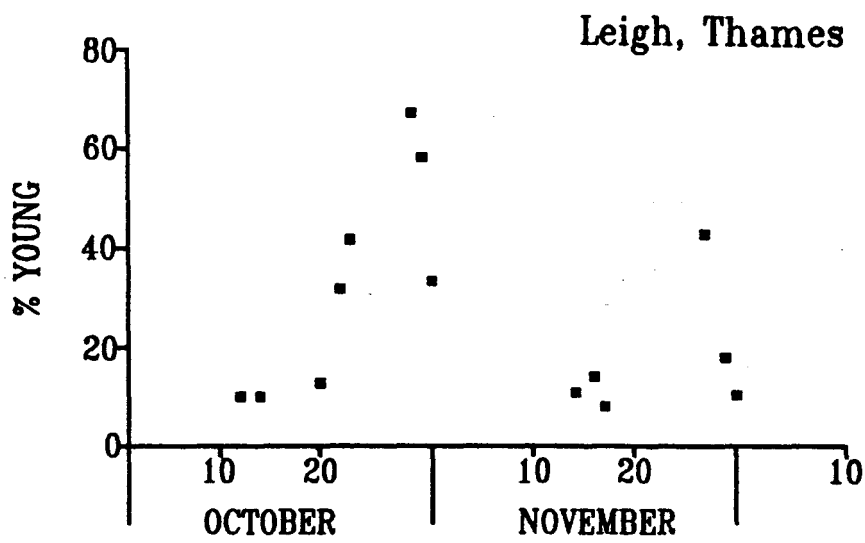
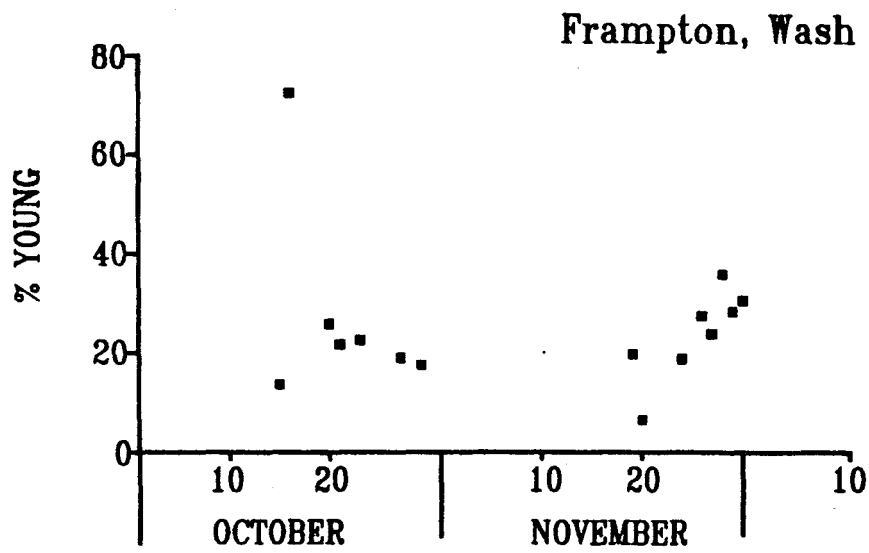


Figure 1.